



APPLICATION FORM FOR PERMIT/PERMIT MODIFICATIONS TO OPERATE A SOLID WASTE MANAGEMENT FACILITY

For SNHD Use Only

CONTROL/PERMIT NUMBER: _____

- New Permit
 Waiver/Variance

- Revision - Major Modification
 Revision - Minor Modification

1. Type of Solid Waste Management Facility

- | | | |
|--|--|--|
| <input type="checkbox"/> Class I Disposal Site | <input type="checkbox"/> Class II Disposal Site | <input type="checkbox"/> Class III Disposal Site |
| <input type="checkbox"/> Compost Plant | <input type="checkbox"/> Materials Recovery Facility | <input type="checkbox"/> Medical Waste Management Facility |
| <input type="checkbox"/> Recycling Center | <input checked="" type="checkbox"/> Solid Waste Storage Bin Facility | <input type="checkbox"/> Transfer Station |
| <input type="checkbox"/> Waste Grease Facility | <input type="checkbox"/> Waste Tire Management Facility | <input type="checkbox"/> Waste to Energy/Fuel Facility |

2. Name of Facility Nevada Department of Transportation, Las Vegas Maintenance Yard

Fictitious Firm Name (dba) _____

Facility Address	<i>Street Address</i> 123 East Washington Avenue	<i>City, State, Zip</i> Las Vegas, NV 89101
	<i>Telephone Number</i> (702) 385-6500	<i>Emergency Telephone Number</i>
	<i>Jurisdiction</i> City of Las Vegas	<i>Zoning Classification (e.g. M-1, M-2, etc)</i> C-V
	<i>Parcel Number (s)</i> 139-27-603-005 and 139-27-603-019	

Mailing Address	<i>Street Address/PO Box</i> 1263 South Stewart Street	<i>City, State, Zip</i> Carson City, NV 89712
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Contact Information	<i>Name</i> Martin Strganac, PE	
	<i>Phone Number</i> (702) 385-6502	<i>Email Address</i> MStrganac@dot.nv.gov

3. Name of Facility/ Business Owner (Legal) *ie Corporation, Sole Proprietorship, or Last Name, First Name & Middle Initial*
Nevada Department of Transportation

Mailing Address	<i>Street Address</i> 1263 South Stewart Street	<i>City, State, Zip</i> Carson City, NV 89712
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Telephone Number(s)	<i>Telephone Number</i> (775) 888-7000	<i>Fax Number</i> (775) 888-7115
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4. Name of Facility/ Business Operator *ie Corporation, Sole Proprietorship, or Last Name, First Name & Middle Initial*
Nevada Department of Transportation

Address	<i>Street Address</i> 123 East Washington Avenue	<i>City, State, Zip</i> Las Vegas, NV 89101
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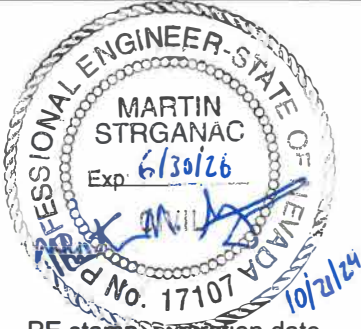
Telephone Number(s)	<i>Telephone Number</i> (702) 385-6500	<i>Emergency Telephone Number</i> (702) 279-8555
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5. Facility Design Parameters	<i>Inside Area (Sq. Ft):</i> 704,800 sq. ft	<i>Storage Capacity (cubic yards)</i> 342 cubic yards	<i>Processing Capacity (i.e. cubic yds/day; tons/day)</i> 50 cubic yards / day
	<i>Total Area (Sq. Ft):</i> 704,800 sq. ft		

REASON FOR APPLICATION SUBMITTAL: New Application

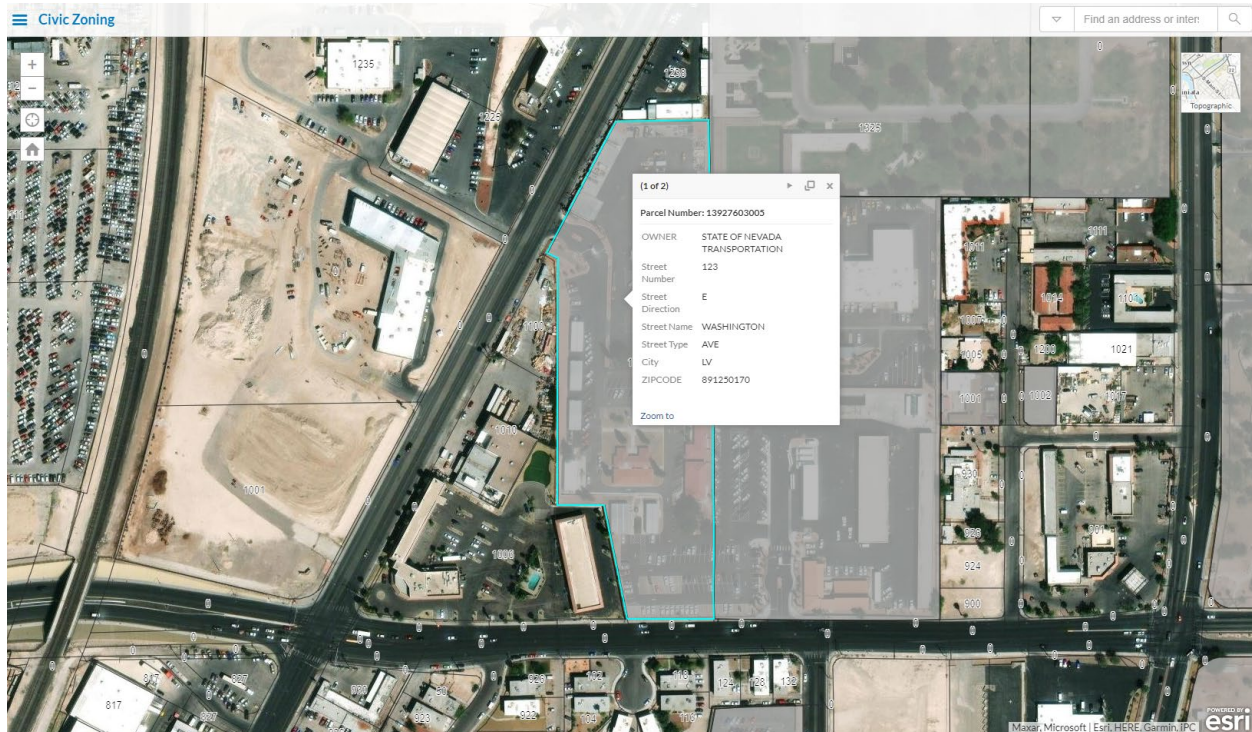
6. Solid Waste Types Proposed for Acceptance Complete and attach the SOLID WASTE TYPES PROPOSED FOR ACCEPTANCE form			
7. Facility Operations	<i>Hours of Operations</i> 24 hours per day		<i>Days of Operation</i> 365 days per year
Open to the Public <i>(If no, type N/A)</i>	<i>Hours of Operations</i> N/A		<i>Days of Operation</i> N/A
8. Name of Property Owner	<i>ie Corporation, Sole Proprietorship, or Last Name, First Name & Middle Initial</i> Nevada Department of Transportation		
Telephone Number(s)	(775) 888-7000		
Address	<i>Street Address</i> 1263 South Stewart Street		<i>City, State, Zip</i> Carson City, NV 89712
9. Professional Engineer or Consultant	<i>Last Name</i> Winfree	<i>First Name</i> Steven	<i>Middle Initial</i>
License Number/Engineer Discipline (if applicable)	NV: 024157 / Civil Engineer		
Firm Name	Stantec Consulting Services, Inc.		
Telephone Number(s)	(702) 821-4330	<i>Cell Phone Number</i>	
Address	<i>Street Address</i> 6111 South Buffalo Drive, Suite 200		<i>City, State, Zip</i> Las Vegas, NV 89113
Email Address	steven.winfree@stantec.com		

This application form and supporting documents, as required by the current version of the Application Guide for this facility type, are hereby submitted to SNHD to apply for a permit to operate or modify a solid waste management facility. We understand that receipt of this application does not constitute an approval to operate or modify the facility. We understand that this application must be approved by SNHD and a permit issued before the operation or modification of the facility. We certify that the Report of Design supports the Report of Operating Plan. We certify that, to the best of our knowledge, the information provided on this application and submitted with this application in the supporting documents is complete and accurate and complies with the requirements specified in the current version of the Application Guide for this facility type and the Solid Waste Management Authority Regulations for this type of Solid Waste Management Facility.

10. Certifications		
 <p>PE stamp, expiration date, signature and signature date</p>	Signature of Applicant Agent (facility owner or operator)	<i>Mart Strganac</i>
	Printed name of Applicant Agent (facility owner or operator)	Martin Strganac
	Title of Applicant Agent (facility owner or operator)	District Engineer
	Telephone Number	702-683-0282
	Date of Signing	10/14/24

Land Use Approval

Approval Type	Comment
<p>Land use approval and supporting documents, or land use exemption from the local jurisdiction for the waste management activities conducted on the parcel(s) on which the facility will be located (Clark County Planning, City of Henderson, City of Las Vegas, City of North Las Vegas, City of Boulder City, and Mesquite). SNHD cannot review the application without either land use approval or exemption documentation.</p>	<p>According to the City of Las Vegas Unified Developmental Code, the parcel is zoned C-V Civic District.</p> <p>Per Section 19.10.020 of the Code, "The following uses are permitted in the C-V District: 1) Except for uses indicated in Subsection (D) of this Section that require a Special Use Permit, any use operated or controlled by the City, Clark County, the State of Nevada or the Federal Government."</p> <p>Subsection (D) does not include waste management activities; a Special Use Permit is not indicated.</p>



SOLID WASTE TYPES PROPOSED FOR ACCEPTANCE

Solid Waste Categories and Types

(Check all that apply)

Paper (All Types)

Cardboard

Plastic (All Types)

Glass (All Types)

Textiles

Metals

Ferrous Scrap Metals

Non-Ferrous Scrap Metals

Other (Specify) Mixed metals

Organic Material

Green Waste

Food Waste

BioSolids

Restaurant Grease

Rendered Animal Matter

Manure

Other (Specify) _____

Construction & Demolition Debris (C&D)

Asphalt

Concrete

Carpet

Carpet Padding

Drywall

Wood

Other (Specify) _____

Special Waste

Waste Tires

Paint

Fluorescent Lamps

Household Hazardous Waste

Other (Specify) _____

Universal Wastes

Lead-Acid Batteries (automotive)

Mercury Devices & Waste

Lithium Batteries

Fluorescent Lamps/Bulbs

Other (Specify) _____

E-Wastes

Batteries (alkaline & rechargeable)

Computers

Cell Phones

CRTs

Televisions (Plasma, LED, LCD)

Other (Specify) _____

Other (Specify)

2.0 EQUIPMENT

2.1 EQUIPMENT LIST

The facility may use the equipment included in **Table 2**.

Table 2 Equipment List

Class	Unit No.	Using	Year	Make	Model	Description
5	457	C102	2002	GMC	TC15903	½ Ton Pickup
5	462	C157	2002	GMC	TC15903	½ Ton Pickup
5	54	C159	2001	GMC	TC15903	½ Ton Pickup
5	2971	C141	2000	GMC	TC15903	½ Ton Pickup
35	1983	C150	2005	John Deer	624J	Loader Front End
11E	1143	C150	1999	GMC	TC31403	Compactor Truck
11E	652	C720	2008	Ford	F-450	1 Ton Dump Truck Bio-Diesel
11E	640	C150	2008	Ford	F-450	1 Ton Dump Truck Bio-Diesel
11E	1312	C157	2005	Ford	F-450	Dump Truck w/ Swaploader Bio-Diesel
11E	3123	C159	2002	Ford	F-450	Dump Truck
11E	560	C142	2002	Ford	F-450	Dump Truck w/ Swaploader
11E	568	C152	2002	Ford	F-450	Dump Truck w/ Swaploader
11E	567	C150	2002	Ford	F-450	Dump Truck w/ Swaploader
11E	2996	C150	2000	Ford	F-450	Dump Truck
11E	3001	C152	2000	Ford	F-450	Dump Truck
11F	936	C102	2003	Ford	F-450	Truck w/ Utility Body
35	1983	C150	2005	John Deer	624J	Loader Front End

2.2 EQUIPMENT MAINTENANCE

All equipment used in the facility will be inspected daily to ensure they are in good condition. Preventive maintenance of equipment will be performed as appropriate for each type of equipment. In the event of



CLOSURE PLAN
Nevada Department of Transportation,
Las Vegas Maintenance Yard

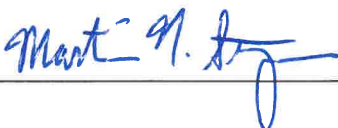
The owner of the facility will notify the Southern Nevada Health District (SNHD) in writing at least 90 days before beginning closure of the facility. The Nevada Department of Transportation, Las Vegas Maintenance Yard facility is located at 123 East Washington Avenue, Las Vegas, NV 89101. The owner will also notify all generators and haulers of wastes managed by the facility both by phone where possible, and in writing that the facility will not accept any solid waste after the designated closing date.

The Owner or designated Operator shall, within 30 days after receiving the final shipment of solid waste, remove all remaining solid waste, litter, and inoperable equipment, in accordance with the plan for closure of the facility. All putrescible waste (if any) will be removed within 24 hours of receipt of the notice of closure.

The Owner/Operator will remove up to the *Permitted Storage Capacity* of solid waste and transport said waste to an approved Class I, II, or III receiving facility. The Closure cost document is based solely on the estimate to load, transport, and dispose of the solid waste in question. The estimate does not consider the resale value of the equipment or material onsite at the facility.

Following disposal of the solid waste onsite, the Owner/Operator will clean the site to in accordance with normal standards required by the SNHD.

Following the completion of closure activities, the operator will notify SNHD to arrange for a final inspection of the facility in order to permit SNHD to verify successful completion of closure.

Martin Strganac 

Print and Sign

10/14/24

Date

Cost of Closure Estimate

As part of the application for a permit to operate a permitted solid waste management facility, a cost of closure estimate is required to be included, as outlined in the Solid Waste Management Authority Regulations (SWMAR) 2-6.01. This cost estimate will be used to establish financial assurance (SWMAR 2-7) for the facility. Submittal of this form meets the cost of closure estimate requirement for the application for a permit.

Facility Information

Facility Name:	Nevada Department of Transportation, Las Vegas Maintenance Yard		
Facility Address:	123 East Washington Avenue, Las Vegas, NV 89101		
Type of Facility being applied for:	Solid Waste Storage Bin Facility		
Contact:	Martin Strganac, PE		
Email:	MStrganac@dot.nv.gov	Phone:	702-385-6502

The cost of closure estimate must be sufficient to cover the cost of closing the facility including the removal, hauling, and proper disposal at a permitted landfill¹, of the maximum permitted solid waste storage capacity. **The cost of closure estimate may not consider the resale value of equipment or other materials at the facility.**

Cost of Closure Estimate

Permitted Storage Capacity:	342 yd ³
Labor & Equipment Cost:	██████████
Transportation Cost:	████████████████████
Disposal Cost at permitted Landfill:	██████████
Other (Specify): Misc. Refuge	████████████████████
Other (Specify):	
Other (Specify):	
Total:	████████████████████

¹ Proper disposal for material(s) not accepted at a Class I, II or III landfill must be included as *Other (Specify)*:

Certification

I hereby certify that the costs represented in this estimate are an accurate reflection of the current market to the best of my knowledge.

Martin Strganac


10/14/24
 Print/Sign Date



**Nevada Department of
Transportation, Las Vegas
Maintenance Yard Design Report**

Report of Design for a Solid Waste
Management Facility at
123 East Washington Avenue
Las Vegas, NV 89101
APNs: 139-27-603-005 and
139-27-603-019

October 2024

Prepared for:

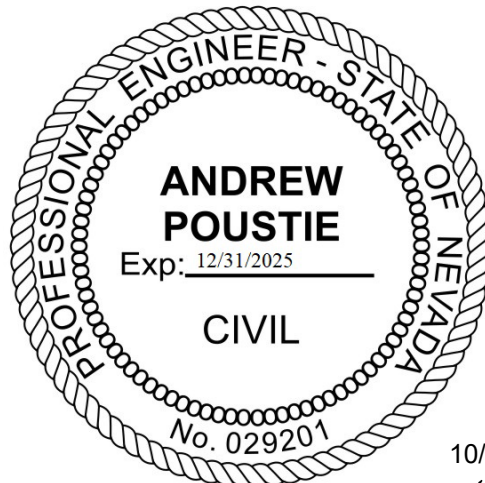
Southern Nevada Health District

Prepared by:

Stantec Consulting Services, Inc.

Prepared on Behalf of:

Nevada Department of Transportation



10/29/2024

Andrew Poustie

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1.0 FACILITY INFORMATION

The Nevada Department of Transportation (NDOT), Las Vegas Maintenance Yard is located at 123 East Washington Avenue in Las Vegas, NV, approximately one-mile northeast of the I-15 / I-515 interchange. The property spans two parcels (APNs: 139-27-603-005 and 139-27-603-019), which are both zoned as a Civic District (C-V) as shown in **Figure 1**. Much of the neighboring area is also zoned C-V; however, within one mile of the facility, there are pockets of other land use types including: Commercial / Industrial (C-M), Limited Commercial (C-1), General Commercial (C-2), Single Family Residential (R-1), Industrial (M), Residential Mobile / Manufactured Home Park (R-MHP), Medium Density Residential (R-3), High Density Residential (R-4), and Apartments (R-5).

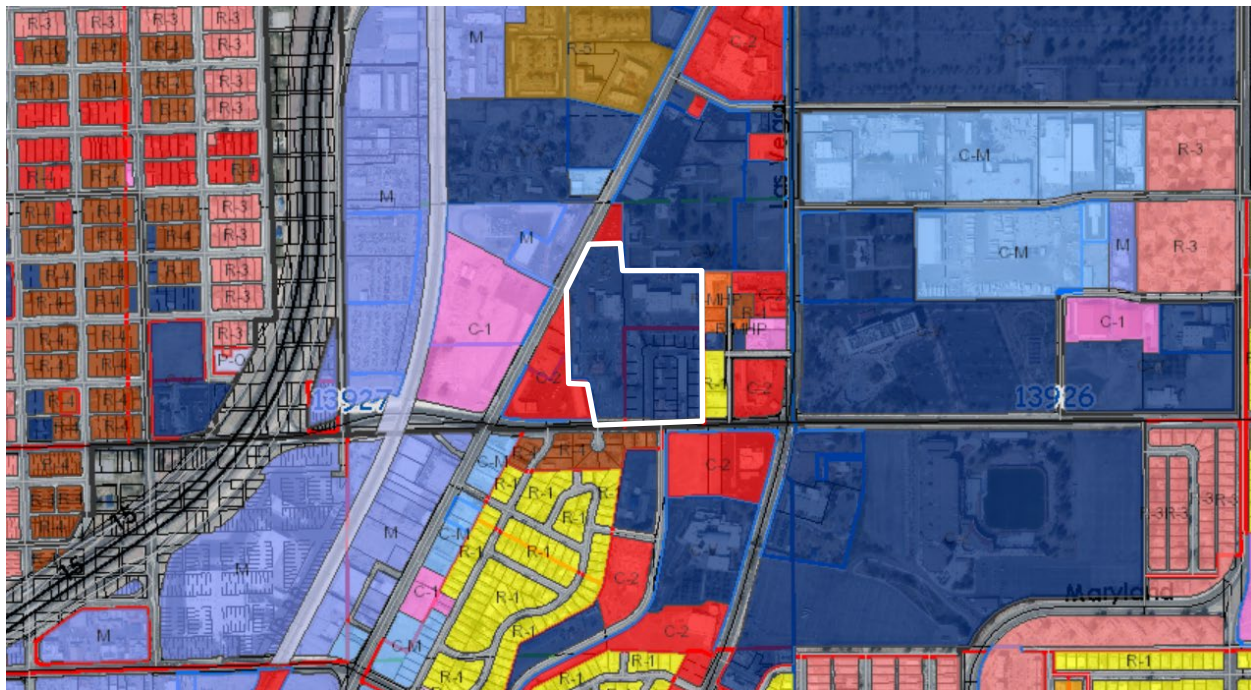


Figure 1 Facility Location

The Las Vegas Maintenance Yard is both owned and operated by NDOT.

- Owner Address: 1263 South Stewart Street, Carson City, NV 89712
- Operator Address: 123 East Washington Avenue, Las Vegas, NV 89101

The Responsible Person for the Las Vegas Maintenance Yard is:

- Mario Gomez, PE, District Engineer, 702-630-4091



The facility is open 24 hours per day / seven days per week and may receive roadway waste retrieved throughout Clark County, NV typically consisting of paper, cardboard, plastic, glass, textiles, metals, organic material, roadway grit, tire debris, construction and demolition debris, and domestic waste generated onsite. The facility is not open to the public.

2.0 FACILITY CONTROL

There are two new guard shacks with automatic entrance and exit gates with automated access card readers that control access to the facility. One entrance can be accessed via E. Washington Avenue and the other entrance can be accessed off N. Main Street. Traffic signs direct on-site access.

3.0 MANAGEMENT AREAS

3.1 AREAS OF ACTIVITIES

The areas of activities are shown in Exhibit A.

3.2 ANTICIPATED WASTE TYPES, QUANTITIES, AND SOURCES

3.2.1 Accepted Wastes

Street sweepers collect debris from the roadway in NDOT Rights-of-Way and bring the waste to the facility. Debris is washed out inside a decant basin where liquids can separate from the solids. Once dry, the solids are collected and placed in the storage bins. Liquids pass through a sand-oil separator before discharging to the City of Las Vegas sewer collection system.

Waste collected from roadways is anticipated to include the following general types of waste: paper, textiles, plastic, construction and demolition debris, glass, tires / waste tires, and organic material (e.g., yard debris, pallets / wood), and roadway grit. It is estimated that the facility may receive up to 50 yd³ of debris daily. All waste is then transported off-site via truck to the landfill for final disposal or to an appropriate recycling facility based on waste type. The maximum time that unprocessed solid waste will be stored at the facility is one week. The maximum time that tires and recyclables will be stored at the facility is one month.

3.2.2 Prohibited Wastes

Employees will receive training upon initial assignment to the facility, and annually thereafter, on the procedures for detecting and not moving any prohibited wastes and for handling any prohibited waste that was inadvertently collected on State routes.

If it is discovered that any prohibited waste has been inadvertently accepted, the facility will use best management practices for handling the waste and will arrange for the appropriate transportation and



NEVADA DEPARTMENT OF TRANSPORTATION, LAS VEGAS MAINTENANCE YARD DESIGN REPORT

disposal of the waste. An accurate record of any rejection or inadvertent receipt of prohibited wastes will be maintained at the facility. SNHD shall be notified by the next working day, in writing and in a format specified by SNHD, of all rejected loads.

3.2.3 Waste Characterization

All waste collected on NDOT routes will be inspected at the facility during receipt and prior to acceptance by NDOT personnel. The facility will not recover or store the prohibited wastes identified above nor any hazardous waste, such as that from Conditionally Exempt Small Quantity Generators (CESQG), Small Quantity Generators (SQG) and Large Quantity Generators (LQG). If any prohibited or hazardous waste is discovered, the waste will be rejected and the NDOT employee will be directed to call H2O Environmental for disposal. As mentioned above, SNHD shall be notified by the next working day, in writing and in a format specified by SNHD, of all rejected loads.

3.2.4 Waste Transportation

Acceptable waste is stored in collecting bins until it can be properly transported to an appropriate landfill or a recycling center. The facility will not receive putrescible waste. Unprocessed solid waste will be transported to the land fill within one week of acceptance.

Tires and recyclables will be stored separately and will be transported from the facility within one month of acceptance. The facility will document the transport of waste tires from the facility using manifests for waste tires transported by registered waste tire haulers and receipts. The facility will notify SNHD if a registered waste tire hauler does not return to the facility, within 30 days, a copy of the manifest signed by the destination. The manifests and receipts will be kept for at least three years and will include the following information:

- The quantity in Passenger Tire Equivalents (PTEs) or tons of waste tires transported to or from the facility.
- The name and registration number or address of the waste tire hauler.
- The destination of the waste tires.

4.0 ENVIRONMENTAL CONTROLS

4.1 AIR POLLUTION CONTROL

The facility is permitted by the Clark County Division of Air Quality and will have the following provisions for controlling air pollutants, including fugitive dust, to prevent a public nuisance:

- Paved access roads and parking areas.
- Paved outdoor waste storage areas.



- Speed limit signs.
- Vehicle wash station onsite to prevent dust track-out.

4.2 FIRE CONTROL

The facility will have the following provisions for preventing and controlling fires:

- Las Vegas Fire and Rescue Fire Station 1 is approximately one mile south of the facility at 500 North Casino Center Boulevard.
- Fire hydrants at the locations shown on design plans.
- Fire extinguishers are located inside occupied buildings.
- Facility conforms to the Nevada State Fire Marshall non-structural fire and life safety requirements.

4.3 POLLUTION CONTROL

Potential stormwater pollutants at the site will be managed using the best management practices (BMPs) identified in NDOT's Stormwater Management Program Plan, which includes an Illicit Discharge Program (<https://www.nevadadot.com/home/showdocument?id=17626>).

The waste bins will be placed on paved surfaces that drain to the sanitary sewer system. Drainage is treated by a sand/oil separate prior to discharge to the sanitary sewer. The sand/oil separator will be maintained in accordance with the City of Las Vegas sanitary sewer discharge permit requirements. Potentially hazardous materials will not be placed in the waste storage bins.

4.4 STORM WATER CONTROL

As part of its Stormwater Management Program, NDOT has an Illicit Discharge Detection and Elimination Program that was developed to identify and prevent the discharge of potential pollutants to stormwater run-off at NDOT facilities. Stormwater run-on and run-off at the site will be controlled using the best management practices (BMPs) identified in NDOT's Stormwater Management Program Plan (<https://www.nevadadot.com/home/showdocument?id=17626>). Site grading and civil utility improvements, as shown on the design plans, will direct stormwater flows to storm drain inlets.

4.5 LITTER CONTROL

The provisions for preventing and controlling litter (i.e., collecting scattered lightweight debris and cleaning the facility) include:

- Containment walls and fencing around the facility.
- Waste storage containers constructed of durable materials.



- The facility is swept regularly, and litter is policed and properly disposed.

4.6 ODOR CONTROL

Wastes managed by the facility will not include any putrescible waste and therefore should not result in odors capable of causing a public nuisance.

4.7 VECTOR CONTROL

The type of waste stored at the facility is not anticipated to attract rodents or birds or create other insect vector control issues. However, the facility will follow best management practices to control potential vector sources. This procedure includes:

- Eliminating any nesting materials.
- Preventing rodents and birds from entering storage rooms and employee facilities by sealing all openings greater than a quarter of an inch.
- Using wet cleaning methods involving a 10% bleach solution (1 and a half cups of household bleach per gallon of water or 1-part bleach to nine parts water) or equivalent solution to remove rodent droppings and urine.

The best management practices that will be utilized for preventing and controlling insect vectors (i.e., mosquitos) are those in place for preventing and controlling standing water, including:

- Effective site grading.
- The facility will include a dewatering area, designed to prevent long-term standing water.
- Tires will be disposed regularly to prevent long-term standing water.

Standing water is not allowed to be present for greater than 72 hours during the mosquito breeding season (March to October).

5.0 FACILITY SPECIFIC DESIGN REQUIREMENTS

5.1 SOLID WASTE STORAGE BIN FACILITIES

Solid Waste Storage Bin Facilities have additional standards for design specified in Solid Waste Management Authority (SWMA) Regulations Chapter 3-8.01(B). This facility complies in that:

- No processing of solid waste occurs at the facility.
- Solid waste is not transferred from container to container; however, transfer from the draining pad to the container is practiced, so a waiver has been requested.



NEVADA DEPARTMENT OF TRANSPORTATION, LAS VEGAS MAINTENANCE YARD DESIGN REPORT

- The public does not have access and, therefore, deposits no waste at the facility.
- Solid waste is stored inside waste storage bins.
- No special wastes or household hazardous wastes are deposited at this facility.

6.0 ENGINEERED PLANS AND SPECIFICATIONS

Engineered plans and technical specifications for the facility are included with the application materials.





**Nevada Department of
Transportation, Las Vegas
Maintenance Yard Operation
Plan**

Proposed operating procedures for a
Solid Waste Management Facility

October 2024

Prepared for:

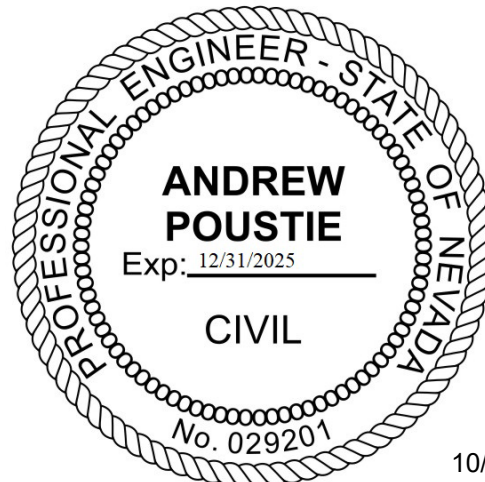
Southern Nevada Health District

Prepared by:

Stantec Consulting Services, Inc.

Prepared on Behalf of:

Nevada Department of Transportation



10/29/2024

Andrew Poustie

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1.0 FACILITY

1.1 FACILITY INFORMATION

General facility information is shown in **Table 1**.

Table 1 Facility Information

Name	Nevada Department of Transportation, Las Vegas Maintenance Yard
Physical Address	123 East Washington Avenue Las Vegas, NV 89101
Parcel Numbers	139-27-603-005 and 139-27-603-019
Primary Phone Number	(702) 385-6000
Emergency Phone Number	(702) 279-8555
Hours of Operation	<p><i>Operation:</i> 24 hours per day, 7 days per week, 365 days per year</p> <p><i>Receiving / Shipping / Cleaning / Maintenance:</i> 6:00 a.m. to 6:00 p.m. Monday through Friday</p> <p><i>Processing:</i> 24 hours per day, 7 days per week, 365 days per year</p>

Provisions to control access to the facility are as follows:

- The facility is not open to the public.
- The facility is surrounded by fencing to prevent access.
- Authorized vehicles enter the facility through one of two guarded access gates.



NEVADA DEPARTMENT OF TRANSPORTATION, LAS VEGAS MAINTENANCE YARD OPERATION PLAN

The following figures depict aerial and street views of the facility before construction.

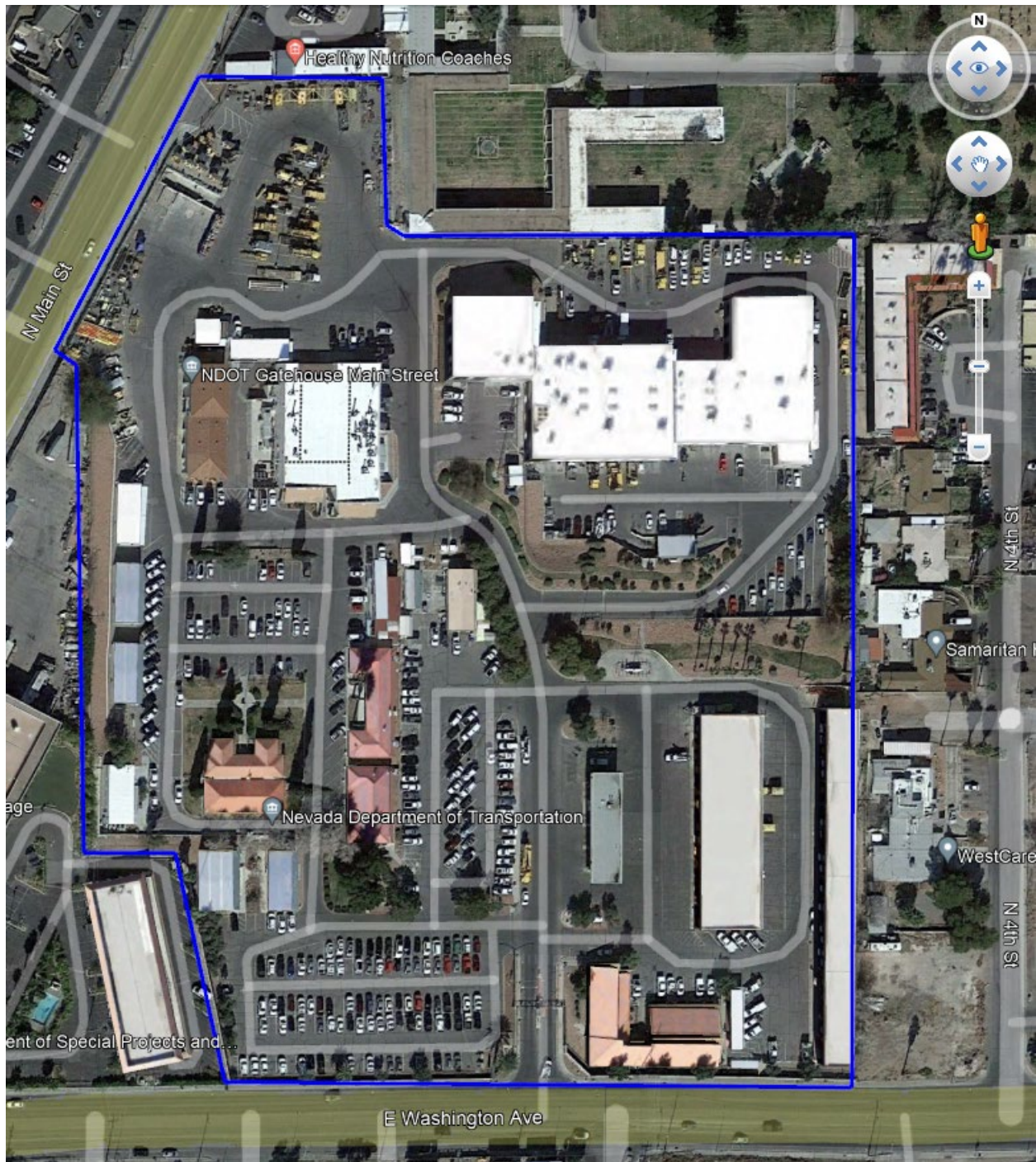


Figure 1 Aerial View



NEVADA DEPARTMENT OF TRANSPORTATION, LAS VEGAS MAINTENANCE YARD OPERATION PLAN



Figure 2 Street View – From Washington Avenue

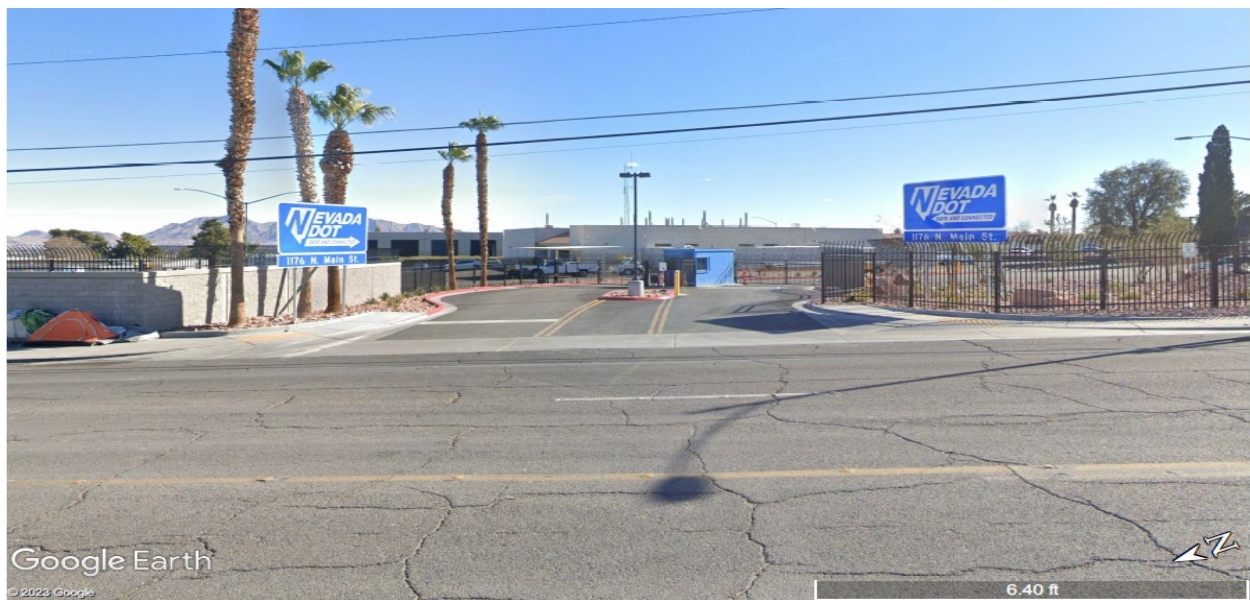


Figure 3 Street View – From Main Street

This Washington Avenue and Main Street entrances, shown in **Figures 2** and **3** include new guard shacks. The guard shacks are equipped with automatic entrance and exit gates controlled by card readers for NDOT staff. Public access is controlled by guards during normal business hours.



2.0 EQUIPMENT

2.1 EQUIPMENT LIST

The facility may use the equipment included in **Table 2**.

Table 2 Equipment List

Class	Unit No.	Using	Year	Make	Model	Description
5	457	C102	2002	GMC	TC15903	½ Ton Pickup
5	462	C157	2002	GMC	TC15903	½ Ton Pickup
5	54	C159	2001	GMC	TC15903	½ Ton Pickup
5	2971	C141	2000	GMC	TC15903	½ Ton Pickup
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11E	1143	C150	1999	GMC	TC31403	Compactor Truck
11E	652	C720	2008	Ford	F-450	1 Ton Dump Truck Bio-Diesel
11E	640	C150	2008	Ford	F-450	1 Ton Dump Truck Bio-Diesel
11E	1312	C157	2005	Ford	F-450	Dump Truck w/ Swaploader Bio-Diesel
11E	3123	C159	2002	Ford	F-450	Dump Truck
11E	560	C142	2002	Ford	F-450	Dump Truck w/ Swaploader
11E	568	C152	2002	Ford	F-450	Dump Truck w/ Swaploader
11E	567	C150	2002	Ford	F-450	Dump Truck w/ Swaploader
11E	2996	C150	2000	Ford	F-450	Dump Truck
11E	3001	C152	2000	Ford	F-450	Dump Truck
11F	936	C102	2003	Ford	F-450	Truck w/ Utility Body
35	1983	C150	2005	John Deer	624J	Loader Front End
				Elgin	Eagle	Street Sweeper
				Elgin	Crosswind	Street Sweeper
				Tymco	600	Street Sweeper



2.2 EQUIPMENT MAINTENANCE

All equipment used in the facility will be inspected daily to ensure they are in good condition. Preventive maintenance of equipment will be performed as appropriate for each type of equipment. In the event of equipment break down, the equipment will be repaired promptly, and substitute equipment will be obtained as needed. Onsite maintenance of equipment will comply with Southern Nevada Health District (SNHD) Solid Waste Management Authority (SWMA) Regulations Chapter 4-3, as appropriate.

The equipment maintenance area can be seen on the design plans.

3.0 TYPES OF WASTE

3.1 ACCEPTED WASTES

Street sweepers collect debris from the roadway in NDOT Rights-of-Way and bring the waste to the facility. Debris is washed out inside a decant basin where liquids can separate from the solids. Once dry the solids are collected and placed in the storage bins. Liquids pass through a sand-oil separator before discharging to the City of Las Vegas sewer collection system.

Waste collected from roadways is anticipated to include the following general types of waste: paper, textiles, plastic, construction and demolition debris, glass, tires / waste tires, and organic material (e.g., yard debris, pallets / wood), and roadway grit. It is estimated that the facility may receive up to 50 yd³ of debris daily. All waste is then transported off-site via truck to the landfill for final disposal or to an appropriate recycling facility based on waste type. The maximum time that unprocessed solid waste will be stored at the facility is one week. The maximum time that tires and recyclables will be stored at the facility is one month.

3.2 PROHIBITED WASTES

Employees will receive training upon initial assignment to the facility, and annually thereafter, on the procedures for detecting and not moving any prohibited wastes and for handling any prohibited waste that was inadvertently collected on State routes.

If it is discovered that any prohibited waste has been inadvertently accepted, the facility will use best management practices for handling the waste and will arrange for the appropriate transportation and disposal of the waste. An accurate record of any rejection or inadvertent receipt of prohibited wastes will be maintained at the facility. SNHD shall be notified by the next working day, in writing and in a format specified by SNHD, of all rejected loads.

Table 3 includes an alphabetical list of prohibited wastes, facilities where prohibited wastes will be directed, and the companies that will be relied upon for prohibited wastes transport off-site.



NEVADA DEPARTMENT OF TRANSPORTATION, LAS VEGAS MAINTENANCE YARD OPERATION PLAN

Table 3 Prohibited Wastes

Prohibited Wastes	Directed to:	Transported by:
Asbestos waste	Clean Harbors 4500 North Walnut Road, Suite B Las Vegas, NV 89081	Clean Harbors
Hazardous waste	Clean Harbors 4500 North Walnut Road, Suite B Las Vegas, NV 89081	Clean Harbors
Heavy equipment tires	Lunas Inc. 4830 E. Cartier Avenue Las Vegas, NV 89115	Lunas Inc.
Off-the-Road (OTR) tires	Lunas Inc. 4830 E. Cartier Avenue Las Vegas, NV 89115	Lunas Inc.
PCB waste	Clean Harbors 4500 North Walnut Road, Suite B Las Vegas, NV 89081	Clean Harbors
Radioactive waste	US Ecology Washington, Inc. 1777 Terminal Drive, Ste A Richland, WA 99354	Republic Services of Southern Nevada
Tires larger than 11R24.5 inches	Lunas Inc. 4830 E. Cartier Avenue Las Vegas, NV 89115	Lunas Inc.
Waste tires (not free of rims or other contaminants such as rocks, dirt, metal, and trash)	Lunas Inc. 4830 E. Cartier Avenue Las Vegas, NV 89115	Lunas Inc.

3.3 WASTE CHARACTERIZATION

All waste collected on NDOT routes will be inspected at the facility during receipt and prior to acceptance by NDOT personnel. The facility will not recover or store the prohibited wastes identified above nor any hazardous waste, such as that from Conditionally Exempt Small Quantity Generators (CESQG), Small Quantity Generators (SQG) and Large Quantity Generators (LQG). If any prohibited or hazardous waste is discovered, the waste will be rejected and the NDOT employee will be directed to call Clean Harbors for disposal. As mentioned above, SNHD shall be notified by the next working day, in writing and in a format specified by SNHD, of all rejected loads.

3.4 WASTE TRANSPORTATION

Acceptable waste is stored in collection bins until it can be properly transported to an appropriate landfill or a recycling center. The facility will not receive putrescible waste. Solid waste will be transported to the landfill within one week of acceptance.



NEVADA DEPARTMENT OF TRANSPORTATION, LAS VEGAS MAINTENANCE YARD OPERATION PLAN

Tires and recyclables will be stored separately and will be transported from the facility within one month of acceptance. The facility will document the transport of waste tires from the facility using manifests for waste tires transported by registered waste tire haulers and receipts. The facility will notify SNHD if a registered waste tire hauler does not return to the facility, within 30 days, a copy of the manifest signed by the destination. The manifests and receipts will be kept for at least three years and will include the following information:

- The quantity in Passenger Tire Equivalents (PTEs) or tons of waste tires transported to or from the facility.
- The name and registration number or address, if registration is not required, of the waste tire hauler.
- The destination of the waste tires.

This information will be available for inspection by SNHD during regular business hours and will be summarized in an annual report submitted to SNHD.

4.0 CONTINGENCY PLANS

4.1 EMERGENCY PROCEDURES

The facility's Maintenance Manager will serve as the Emergency Response Coordinator. If, for any reason, the Maintenance Manager is unable to perform the duties of Emergency Response Coordinator, the Maintenance Supervisor II shall be the secondary Emergency Response Coordinator. Both the Maintenance Manager and the Maintenance Supervisor II shall be required to carry cellular phones.

The Emergency Response Coordinator will be responsible for ensuring compliance by all employees with the contingency plan for preventing and controlling emergencies at the facility (e.g., fire). Please note as the facility is not located within a 100-year flood zone, a flooding emergency is not included in the contingency plan.

The Emergency Response Coordinator is also responsible for ensuring training of all employees in the facility's emergency response plan, as well as recording of all information required in the event of an emergency. Facility employees will receive training upon initial assignment to the facility and annually thereafter on the procedures for preventing and controlling emergencies. An accurate record of employee training and any emergencies or unusual events will be maintained at the facility for at least three years.

According to the contingency plan, in the event of an emergency:

1. The Emergency Response Coordinator shall instruct the Maintenance Supervisor II to immediately stop any maintenance activities.



NEVADA DEPARTMENT OF TRANSPORTATION, LAS VEGAS MAINTENANCE YARD OPERATION PLAN

2. All employees will evacuate the facility via the nearest available exit. Employees will re-group at the designated gathering area or at an alternative gathering area, if the first one is inaccessible. The Emergency Response Coordinator will confirm that everyone was safely evacuated.
3. The Emergency Response Coordinator will call 911.
4. Where practical, traffic will be immediately directed to vacate the property to provide maximum space for emergency response vehicles.
5. The Emergency Response Coordinator shall contact the District 1 Engineer. The District 1 Engineer shall be responsible for providing required notification and reports to SNHD and other authorities as soon as possible.
6. The Emergency Response Coordinator shall document the event including the nature of the event, the adequacy of employee responses, the response of emergency response authorities, and any witness statements.
7. If, after the emergency, the facility cannot be used as planned, NDOT Employees will be directed to transport all waste to the nearest waste management facility.

4.2 FIRE CONTROL

The facility will have the following provisions for preventing and controlling fires:

- Las Vegas Fire and Rescue Fire Station 1 is approximately one mile south of the facility at 500 North Casino Center Boulevard.
- Fire hydrants at the locations shown on design plans.
- Fire extinguishers are located inside occupied buildings.
- Facility conforms to the Nevada State Fire Marshall non-structural fire and life safety requirements.

It is important to note that facility personnel are not expected to fight a fire. However, in the event of an incipient stage fire at the facility, employees may use one of the provided fire extinguishers to extinguish the fire. If a fire at the facility grows beyond incipient stage, 911 will be called for assistance.

The fire lanes around the perimeter of each outdoor waste container will be kept clear and free of flammable or combustible material or vegetation.

5.0 OPERATING RECORDS

The facility operator will maintain an accurate record of the previous calendar quarter's reportable quantities at the facility for at least three years. This information will be available for inspection by SNHD



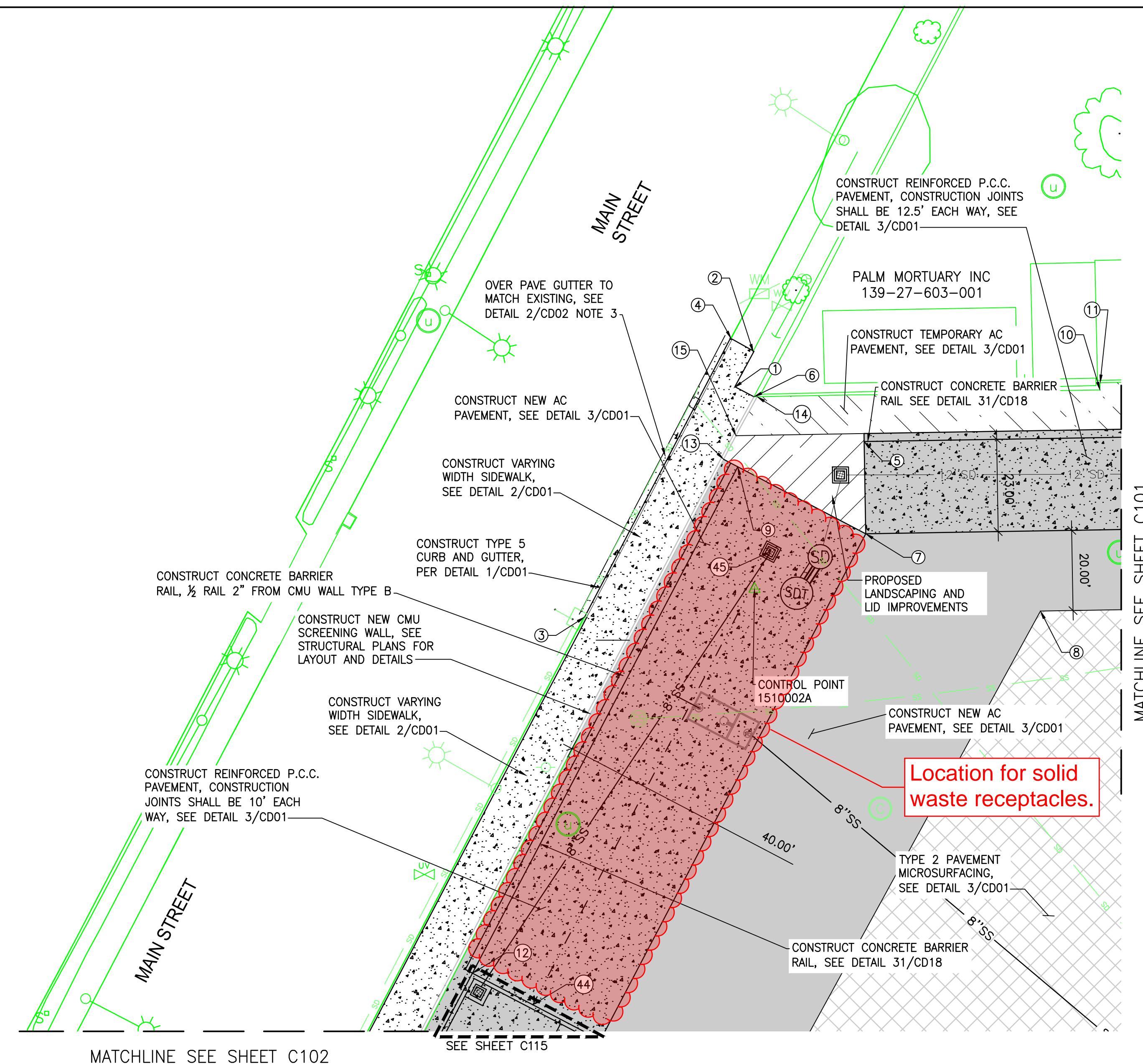
NEVADA DEPARTMENT OF TRANSPORTATION, LAS VEGAS MAINTENANCE YARD OPERATION PLAN

during regular business hours and will be summarized in an annual report submitted to SNHD by February 15th of each year.



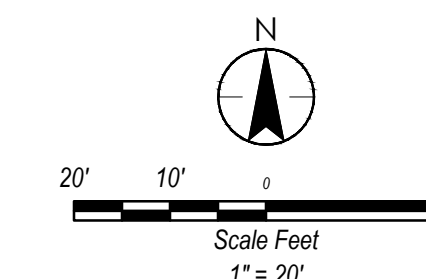
Exhibit A
Areas of Activities

POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
1	26,773,667.54	787,688.29	SIDEWALK
2	26,773,676.37	787,693.05	SIDEWALK
3	26,773,610.32	787,650.98	TOP OF CURB
4	26,773,679.76	787,687.52	TOP OF CURB
5	26,773,654.09	787,720.65	BARRIER RAIL
6	26,773,665.25	787,693.23	SIDEWALK
7	26,773,631.09	787,721.07	CONCRETE
8	26,773,611.82	787,764.65	PAVEMENT
9	26,773,647.80	787,689.18	BARRIR RAIL
10	26,773,666.97	787,779.48	PAVEMENT
11	26,773,668.74	787,779.54	PAVEMENT
12	26,773,521.54	787,623.02	BARRIER RAIL
13	26,773,649.66	787,685.64	CONCRETE
14	26,773,665.26	787,694.00	PAVEMENT
15	26,773,655.55	787,688.73	PAVEMENT
44	26,773,513.65	787,638.08	PCC FLOWLINE
45	26,773,626.62	787,697.28	PCC FLOWLINE



LEGEND

- LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
- LIMITS OF PAVEMENT MICROSURFACING
- LIMITS OF P.C.C. CONSTRUCTION
- LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS
- EXISTING BUILDINGS
- LIMITS OF REINFORCED P.C.C.
- LIMITS OF TEMPORARY ASPHALT CONCRETE
- SEE SHEET C115 FOR DETAILED DESIGN AND LAYOUT



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Key Map	
0	1
2	3
4	5
6	7

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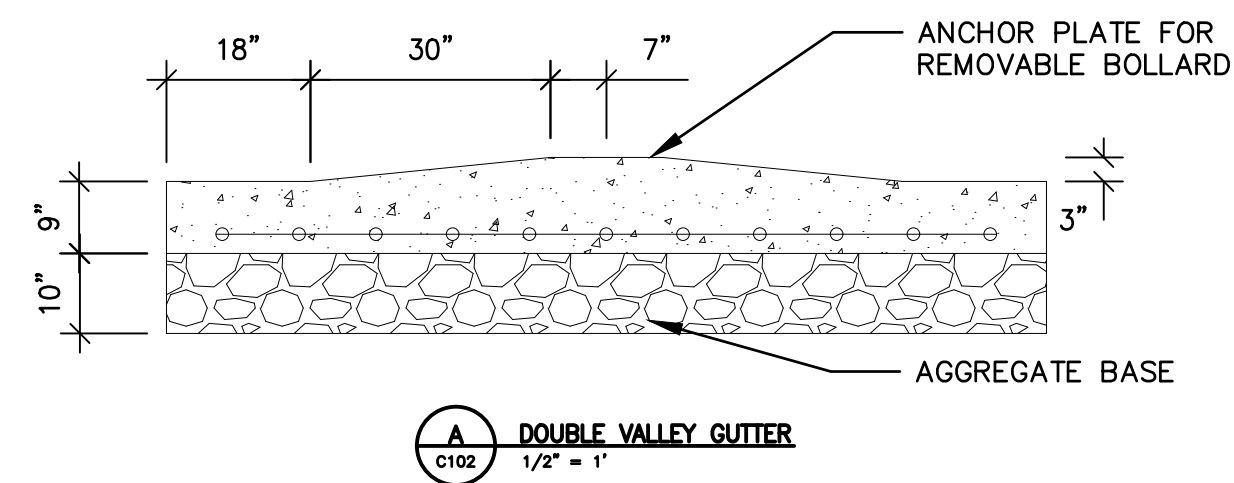
File Name:

Dwn. Chkd. Dsgn. YY.MM.DD

Title	
CIVIL SITE PLAN	
Project No. 181300599	Scale SEE SHEET
Drawing No. C100	Sheet 19 of 177
	Revision 0

POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
27	26,773,442.81	787,672.02	TOP OF CURB/CONCRETE
28	26,773,273.00	787,681.84	TOP OF CURB
29	26,773,252.23	787,689.45	PAVEMENT
30	26,773,452.46	787,649.29	CONCRETE
31	26,773,479.99	787,596.74	CONCRETE
32	26,773,272.84	787,688.05	TOP OF CURB
33	26,773,259.41	787,604.15	PAVEMENT
34	26,773,258.04	787,655.92	PAVEMENT
35	26,773,251.44	787,716.91	PAVEMENT
36	26,773,425.04	787,716.31	PAVEMENT
37	26,773,425.00	787,679.88	PAVEMENT
38	26,773,451.87	787,648.98	TOP OF CURB
39	26,773,484.74	787,598.46	SIDEWALK
40	26,773,296.87	787,603.87	PAVEMENT
41	26,773,377.63	787,717.12	PAVEMENT
42	26,773,454.17	787,650.42	TOP OF CURB
43	26,773,406.65	787,687.98	TOP OF CURB
63	26,773,452.10	787,649.34	FENCE
64	26,773,441.12	787,670.30	FENCE
65	26,773,389.47	787,548.56	FENCE

POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
66	26,773,375.58	787,571.50	FENCE
67	26,773,328.50	787,574.82	FENCE
68	26,773,418.89	787,563.48	FENCE
69	26,773,226.82	787,576.34	FENCE
156	26,773,338.08	787,590.70	TOP OF CURB
157	26,773,439.10	787,711.43	PAVEMENT
158	26,773,433.00	787,711.42	PAVEMENT
159	26,773,433.75	787,691.24	PAVEMENT
160	26,773,439.77	787,691.38	PAVEMENT
161	26,773,216.85	787,680.32	TOP OF CURB
162	26,773,216.70	787,686.54	TOP OF CURB



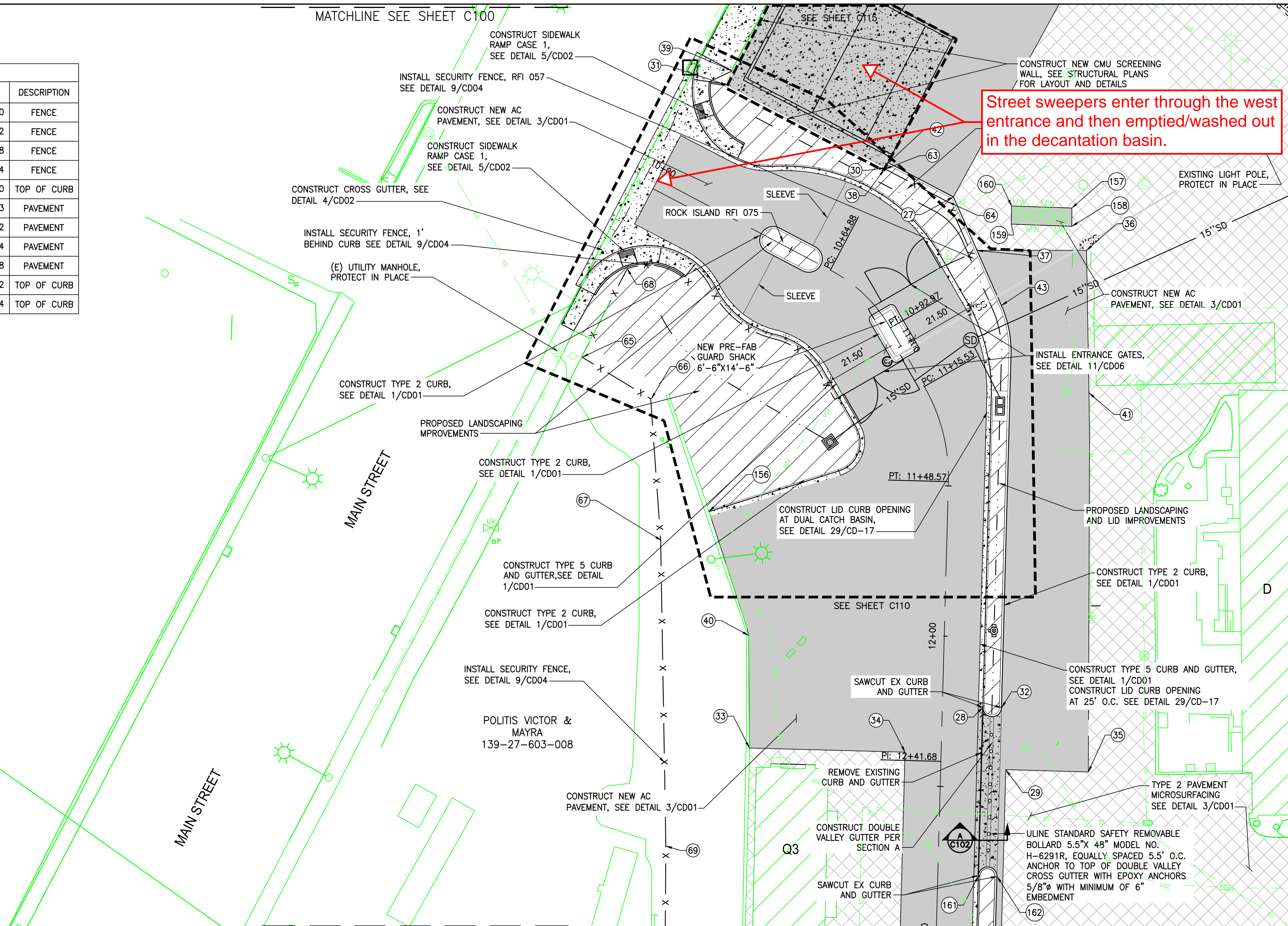
LEGEND

- LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
- LIMITS OF PAVEMENT MICROSURFACING
- LIMITS OF P.C.C. CONSTRUCTION
- LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS
- EXISTING BUILDINGS
- LIMITS OF REINFORCED P.C.C.
- SEE SHEET C110 & C115 FOR DETAILED DESIGN AND LAYOUT

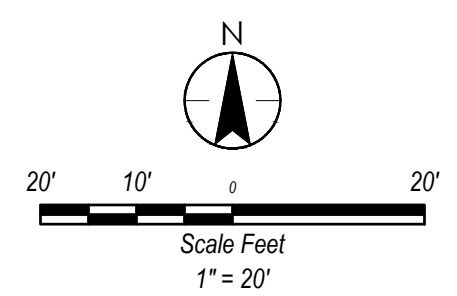
MATCHLINE SEE SHEET C100

MATCHLINE SEE SHEET C104

MATCHLINE SEE SHEET C103



Street sweepers enter through the west entrance and then emptied/washed out in the decantation basin.



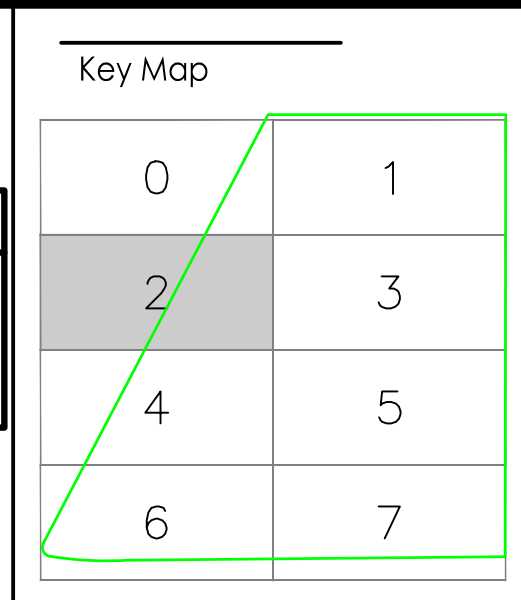
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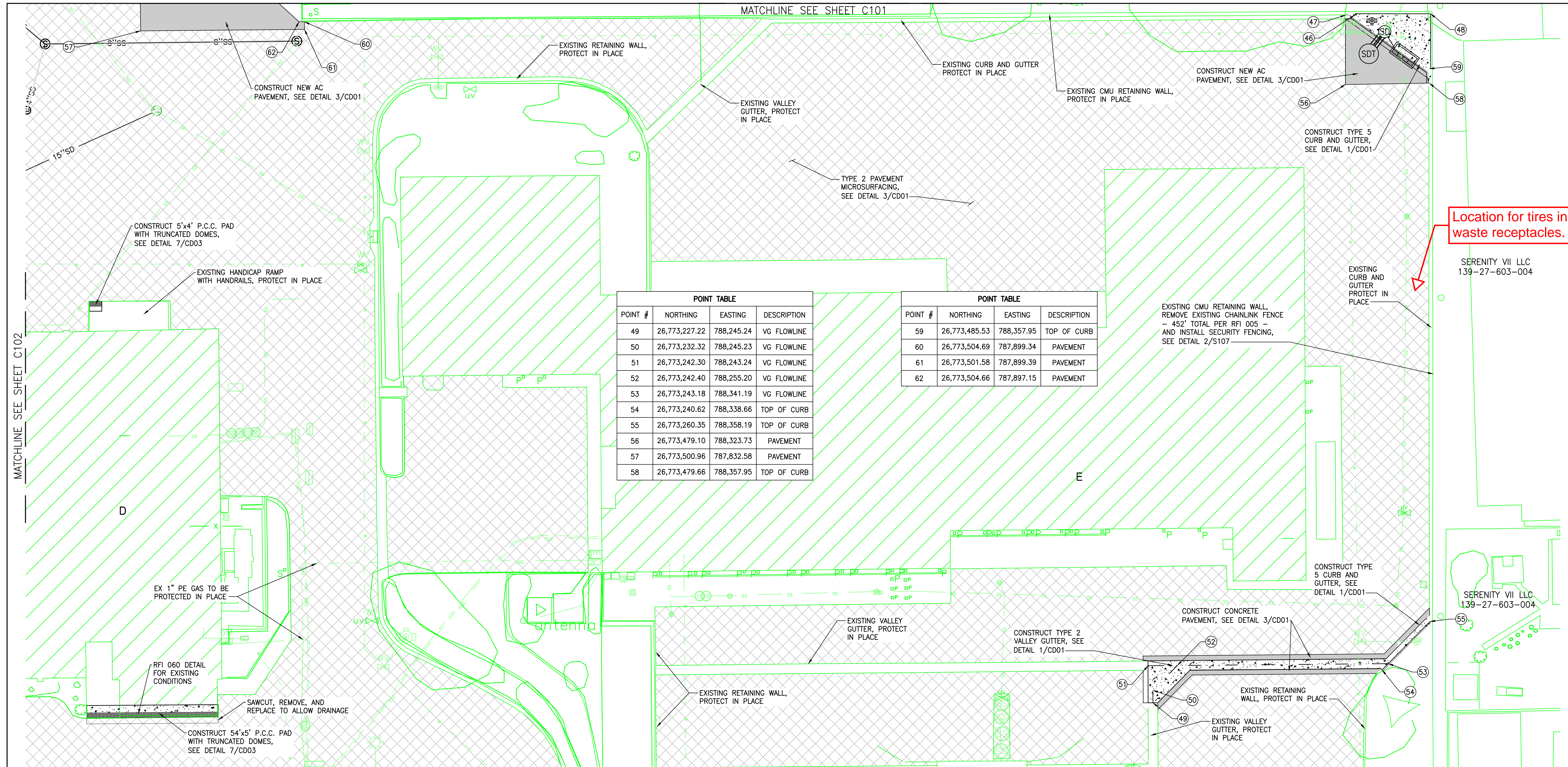
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DEPARTMENT OF TRANSPORTATION
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Title
CIVIL SITE PLAN

Project No. 181300599 Scale SEE SHEET

Drawing No. C102 Sheet 21 of 177 Revision 0



MATCHLINE SEE SHEET C102

MATCHLINE SEE SHEET C101

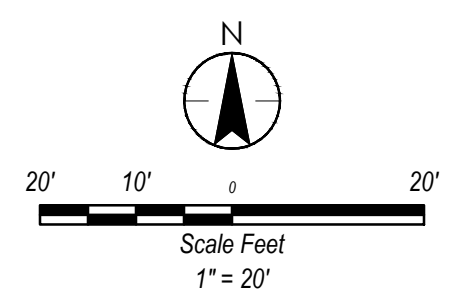
MATCHLINE SEE SHEET C105

POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
49	26,773,227.22	788,245.24	VG FLOWLINE
50	26,773,232.32	788,245.23	VG FLOWLINE
51	26,773,242.30	788,243.24	VG FLOWLINE
52	26,773,242.40	788,255.20	VG FLOWLINE
53	26,773,243.18	788,341.19	VG FLOWLINE
54	26,773,240.62	788,338.66	TOP OF CURB
55	26,773,260.35	788,358.19	TOP OF CURB
56	26,773,479.10	788,323.73	PAVEMENT
57	26,773,500.96	787,832.58	PAVEMENT
58	26,773,479.66	788,357.95	TOP OF CURB

POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
59	26,773,485.53	788,357.95	TOP OF CURB
60	26,773,504.69	787,899.34	PAVEMENT
61	26,773,501.58	787,899.39	PAVEMENT
62	26,773,504.66	787,897.15	PAVEMENT

LEGEND

	LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT		EXISTING BUILDINGS
	LIMITS OF PAVEMENT MICROSURFACING		LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS
	LIMITS OF P.C.C. CONSTRUCTION		

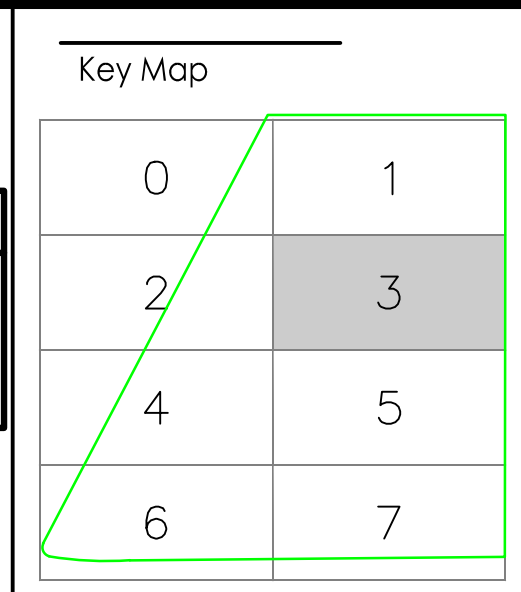


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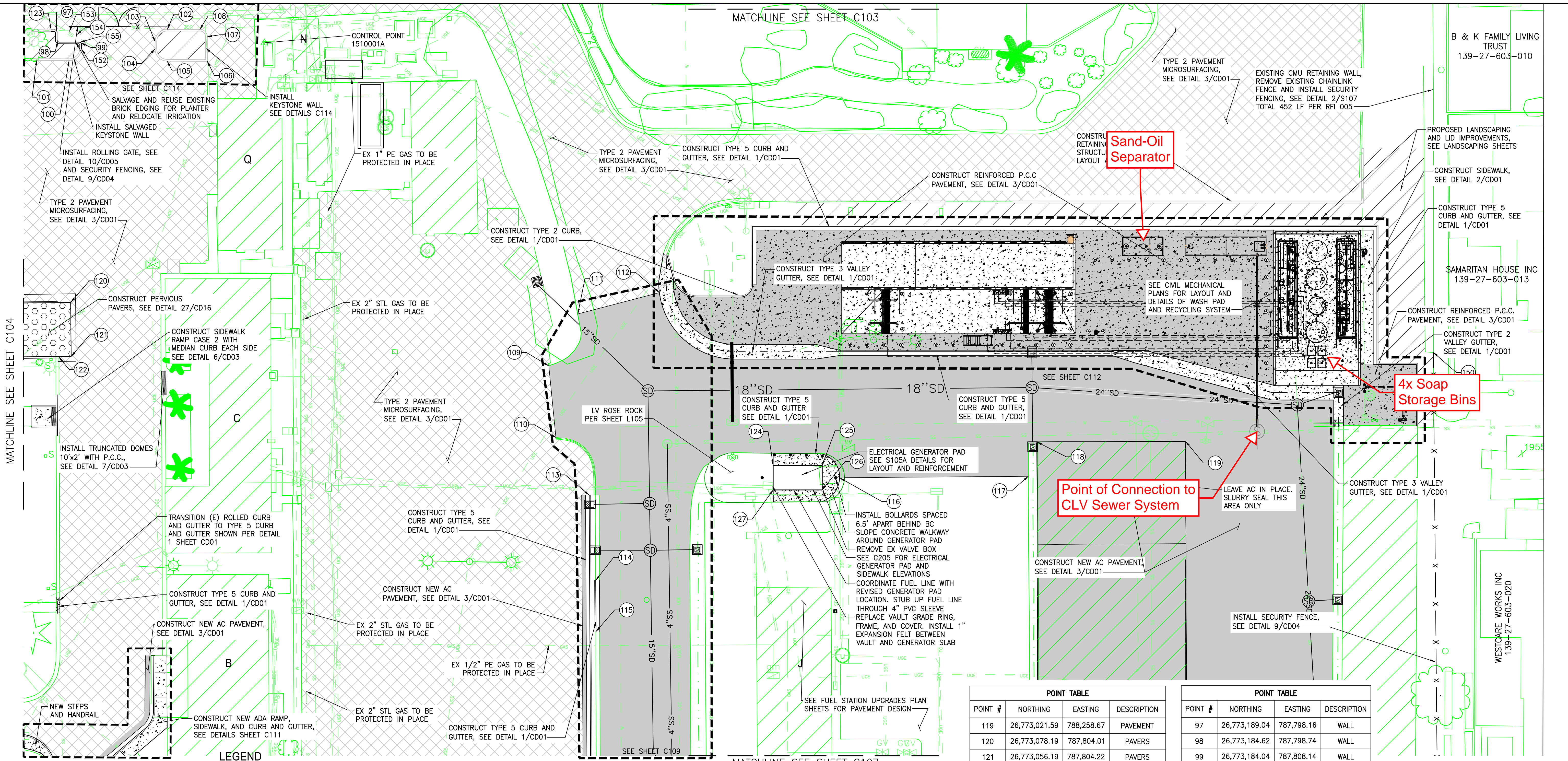
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Title CIVIL SITE PLAN	
Project No. 181300599	Scale SEE SHEET
Drawing No. C103	Sheet 22 of 177
	Revision 0



MATCHLINE SEE SHEET C104

MATCHLINE SEE SHEET C103

MATCHLINE SEE SHEET C107

LEGEND

- LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
- LIMITS OF PAVEMENT MICROSURFACING
- LIMITS OF P.C.C. CONSTRUCTION
- LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS
- EXISTING BUILDINGS
- LIMITS OF REINFORCED P.C.C.
- LIMITS OF TEMPORARY ASPHALT CONCRETE

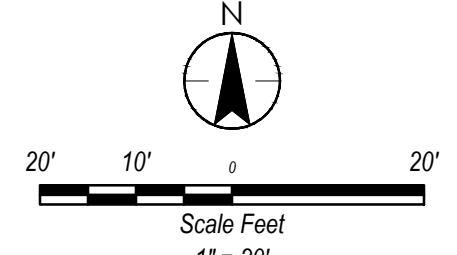
SEE SHEETS C109, C111, C112, AND C114 FOR DETAILED DESIGN AND LAYOUT

NOTES

1. SEE SHEET C104 FOR POINT TABLES.

POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
119	26,773,021.59	788,258.67	PAVEMENT
120	26,773,078.19	787,804.01	PAVERS
121	26,773,056.19	787,804.22	PAVERS
122	26,773,055.96	787,799.22	TOP OF CURB
123	26,773,189.33	787,796.08	WALL
124	26,773,011.77	788,090.49	ELEC PAD
125	26,773,011.77	788,110.49	ELEC PAD
126	26,773,001.77	788,110.49	ELEC PAD
127	26,773,001.77	788,090.49	ELEC PAD

POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
97	26,773,189.04	787,798.16	WALL
98	26,773,184.62	787,798.74	WALL
99	26,773,184.04	787,808.14	WALL
123	26,773,189.33	787,796.08	WALL
152	26,773,181.65	787,808.41	WALL
153	26,773,188.63	787,803.44	SIDEWALK
154	26,773,187.35	787,806.50	SIDEWALK
155	26,773,184.29	787,807.75	SIDEWALK

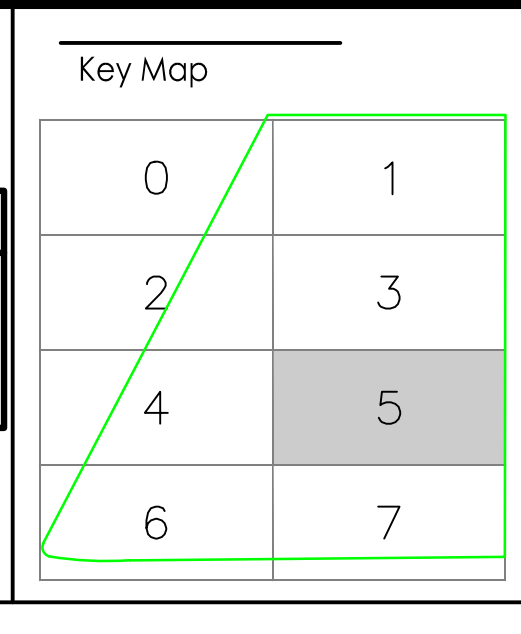


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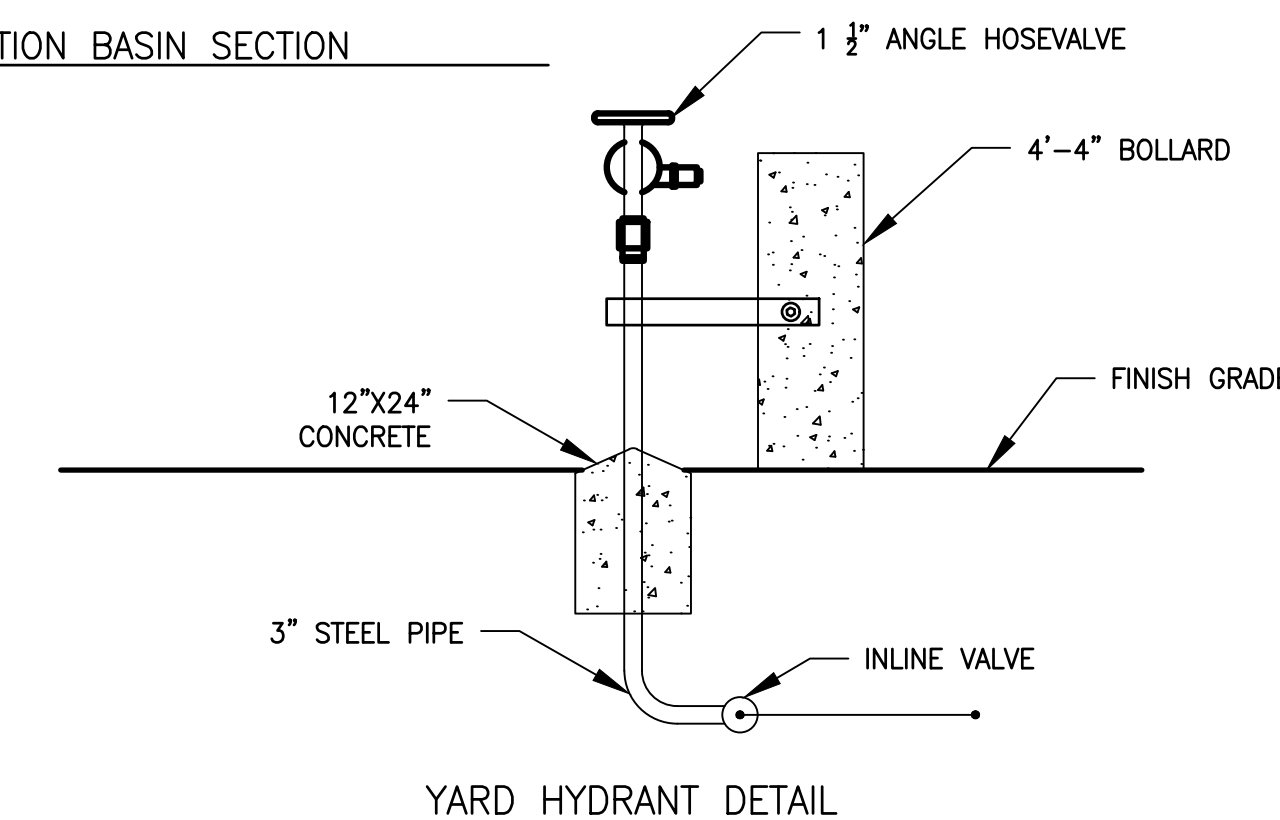
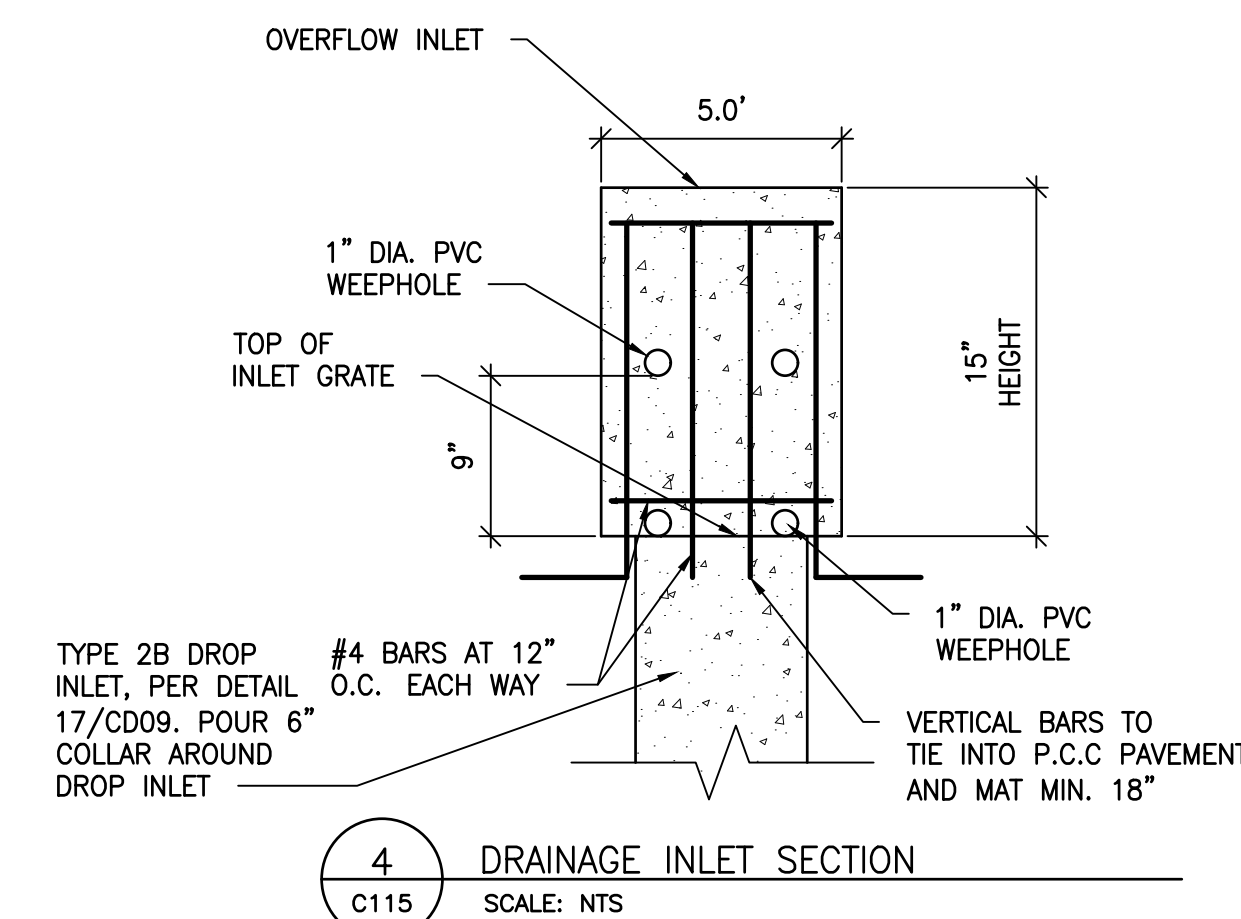
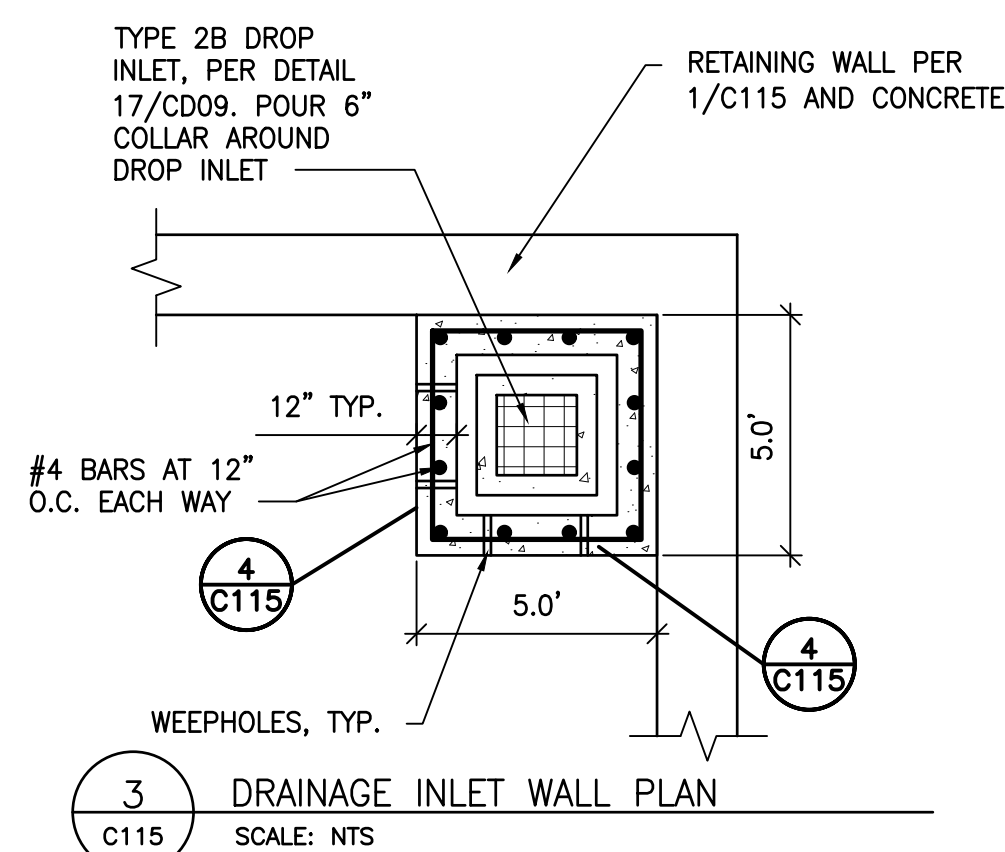
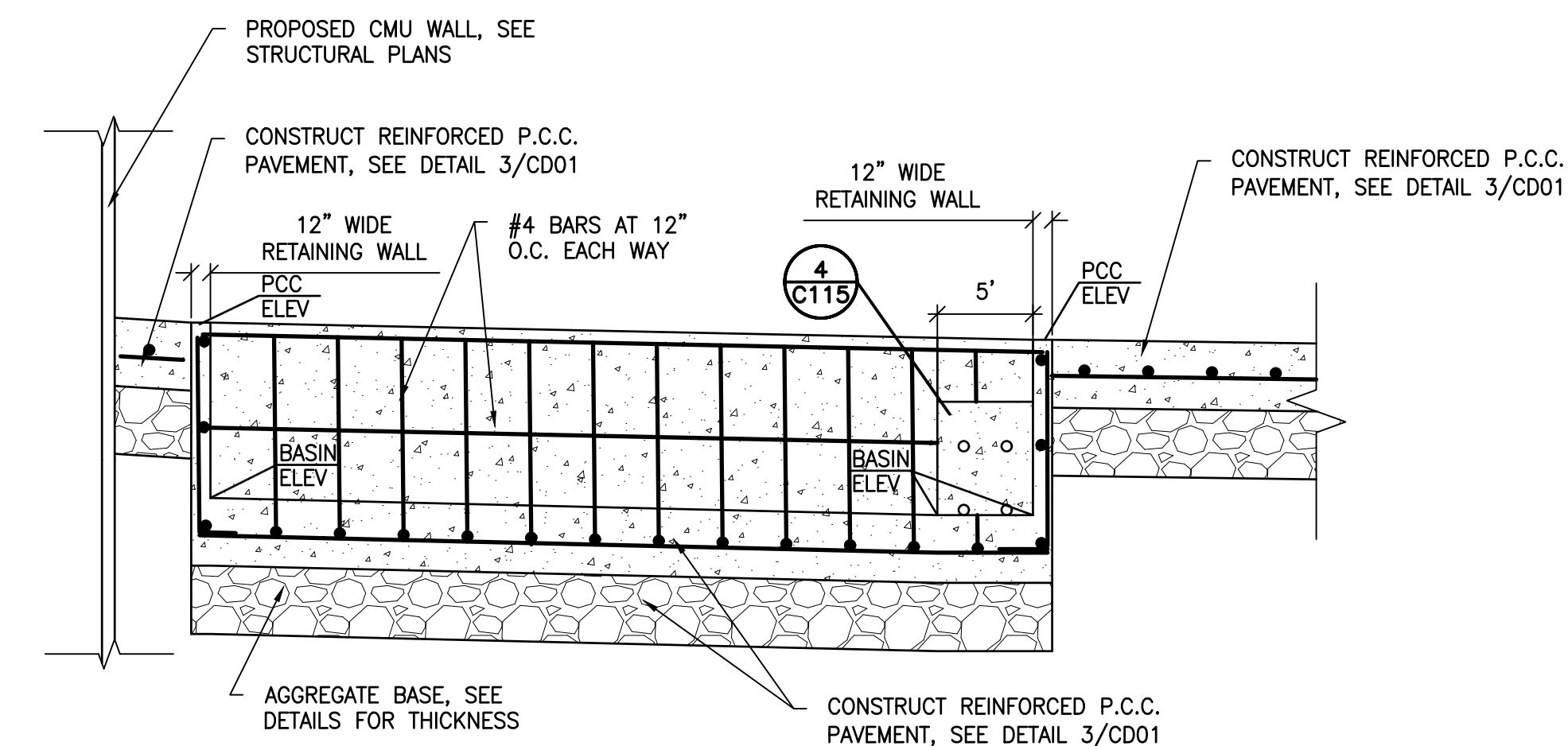
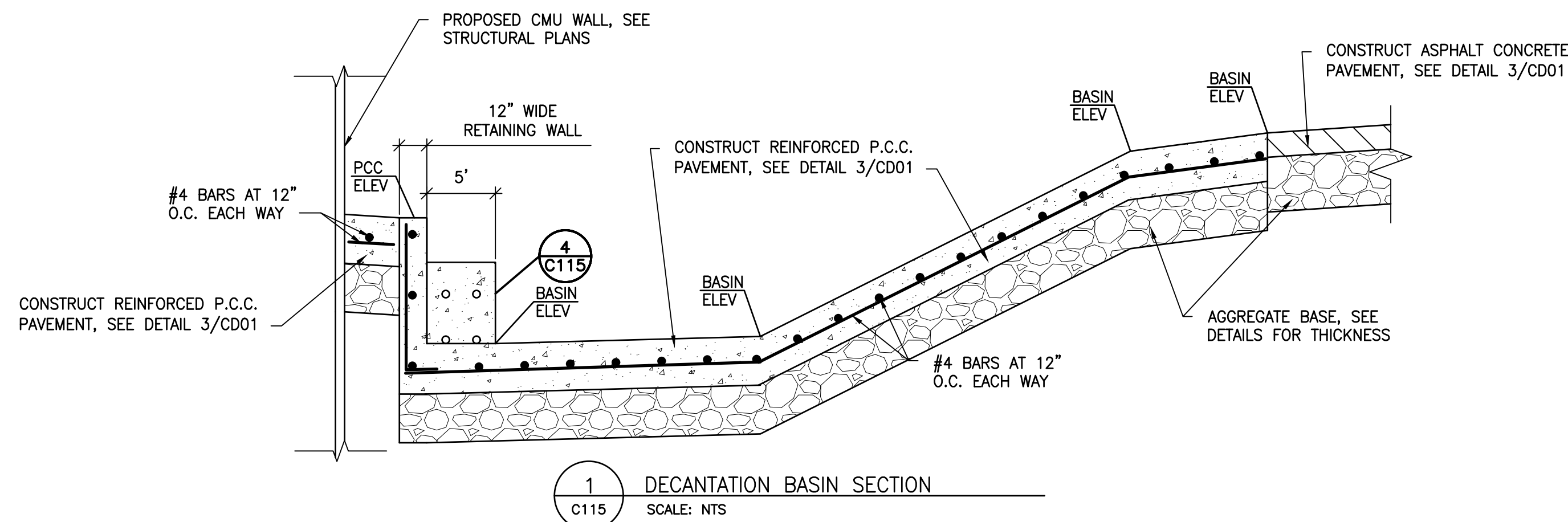
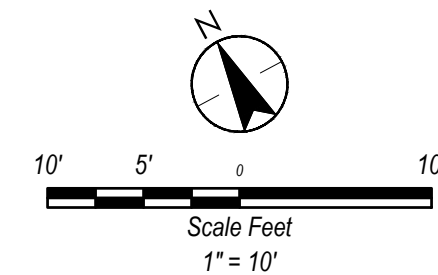
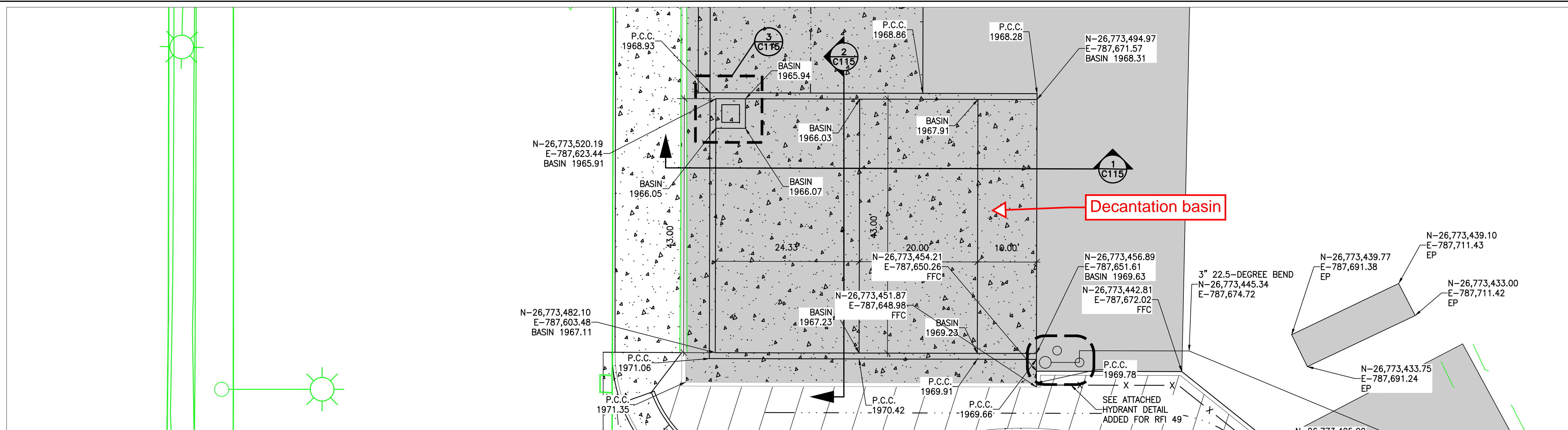
Client/Project
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title
CIVIL SITE PLAN

Project No. 181300599 Scale SEE SHEET

Drawing No. C105 Sheet 24 of 177 Revision 0



V:\03\Drawings\181300599\Drawings\Record Drawings\Record Drawings\USP9_CIV_31E_Plan\CD112.dwg
 2/2/2022 10:58 AM By: JBB

0	RECORD DRAWINGS	AC	JBB	22.10.01
Revision		By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD
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RECORD DRAWING

This record drawing has been prepared, entirely or in part on the basis of unverified information compiled and furnished by others to the preparer who is not responsible for any inaccuracies, errors or omissions which may have been incorporated into the document as a result.

Key Map

	1
2	3
4	5
6	7



6995 Sierra Center Parkway
Reno, NV 89511
www.stantec.com

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STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title
DECANTATION BASIN DETAILS

Project No. 181300599	Scale SEE SHEET
Drawing No. C115	Sheet 34 of 177
Revision 0	

Steve Sisolak
Governor



Nevada Department of
Public Safety
DEDICATION PRIDE SERVICE

George Togliatti
Director

Sheri Brueggemann
Deputy Director

Mike Dzyak
State Fire Marshal

Nevada State Fire Marshal Division

Stewart Facility
107 Jacobsen Way
Carson City, Nevada 89711
Telephone (775) 684-7501 - Fax (775) 684-7518

October 8, 2020

Nevada Department of Transportation
Attn.: Lacey Tisler
1301 Old Hot Springs Road, Room 106
Carson City, NV 89706

Tel.: (775) 888-7953
Fax:

Project: **NDOT Las Vegas Maintenance Yard**

SFM Project No: **20CL272R1**
Project Address: **123 E. Washington Ave., Las Vegas NV**
Occupancy Type: **?**
Construction Type: **? w/ AFES**
Occupant Load: **TBD**
Project Area: **687,632-ft² (Area affected by scope of plan review)**

The Nevada Department of Public Safety State Fire Marshal Division has reviewed your application for the above referenced project.

Scope of Project Review: **Yard improvements including new entrances, fuel station, wash rack, and paving .**

This review is to verify conformance with the non-structural fire and life safety requirements adopted by the State of Nevada.

This application is approved for construction:

The issuance of this approval constitutes a permit through the Nevada State Fire Marshal Division. All work shall be in compliance with those codes and standards adopted through NAC 477.281, as amended by NAC 477.283.

The applicant is required to comply with all requirements of federal, state or local authorities having jurisdiction. **A copy of plans and construction documents stamped "Approved" by the Nevada State Fire Marshal Division is required to be available on-site for use by the Field Inspector.** The State Fire Marshal Division may revoke any project approvals if subsequent inspection finds a violation of adopted codes or standards, inaccurate representation or construction that varies from the approved application.


A Certificate of Compliance covering non-structural fire and life safety to allow occupancy will only be granted by the State Fire Marshal Division following inspection by the Division. Please go to the Nevada State Fire Marshal Division Website to electronically request an inspection. Please provide the Division at least three (3) business days notice for all inspection requests. In addition, the Nevada State Fire Marshal Division approved plan set must be onsite at time of inspection.

Furthermore, please be aware that the fee collected as a part of the plan review process covers the initial inspection costs, while any subsequent inspections may be charged a "re-inspection fee", as allowed for under NAC 477.325(4)(d).

Approval for construction is issued under the conditions of the International Fire Code (IFC) Section 105.3 and becomes automatically invalid unless work as authorized is commenced within 180 days after its issuance, or approval for construction has been extended per IFC Section 105.3.2.

if you have any questions or concerns, please feel free to contact me directly at albert.ruiz@dps.state.nv.us or (775) 684-7532

Sincerely,
NEVADA STATE FIRE MARSHAL DIVISION



Bureau Chief Albert Ruiz
Fire Protection Engineering
Nevada Department of Public Safety
State Fire Marshal Division

Copy: City of Las Vegas Fire and Rescue lvfireengineering@lasvegasnevada.gov
Matt Ogan SPWD matt.ogan@admin.nv.gov

FINAL ACTION REPORT

for

Air Quality Permit Subject to Public Participation

**Nevada Department of Transportation
Source Number 15964**

Application Date: July 14, 2022

Type of Action: New

Public Notice: August 18, 2022

Public Comment: August 19, 2022 through September 17, 2022

Issuance date: September 19, 2022

Expiration date: September 18, 2027

No comments were received from the general public during the public comment period. As a result, a public hearing is not required and this final action report is complete.



4701 W. Russell Rd Suite 200
Las Vegas, NV 89118-2231
Phone (702) 455-5942
Fax (702) 383-9994

MINOR SOURCE PERMIT

SOURCE ID: 15964

Nevada Department of Transportation
123 East Washington Avenue
Las Vegas, Nevada 89101

ISSUED ON: September 19, 2022

EXPIRES ON: September 18, 2027

Current action: New

Issued to:

Nevada Department of Transportation
123 East Washington Avenue
Las Vegas, Nevada 89101

Responsible Official:

Mario Gomez
District Engineer
PHONE: (702) 385-6501
EMAIL: mgomez@dot.nv.gov

Issued by the Clark County Department of Environment and Sustainability, Division of Air Quality, in accordance with Section 12.1 of the Clark County Air Quality Regulations.

A handwritten signature in blue ink that reads "Theodore A. Lendis".

Theodore A. Lendis, Permitting Manager

EXECUTIVE SUMMARY

The source is a fully operational maintenance yard (supporting the Nevada Department of Transportation), located in the Hydrographic Area of 212 – Las Vegas Valley. As a fully operational maintenance yard (supporting the Nevada Department of Transportation), the source is classified under SIC 4789, “Transportation Services Not Elsewhere Classified,” and NAICS 488490, “Other Support Activities for Road Transportation.”

The source consists of emergency generators, boilers, a cooling tower, and fuel dispensing operations. Combined, these emission units establish the Nevada Department of Transportation as a minor source of all regulated air pollutants, enforced by the Clark County Division of Air Quality.

In addition, the gasoline dispensing operation at the source is subject to the federal requirements of 40 CFR Part 63 Subpart CCCCC. The emergency generators are subject to the federal requirements of 40 CFR Part 60 Subpart IIII, 40 CFR Part 60 Subpart JJJJ, and some of the federal requirements of 40 CFR Part 63 Subpart ZZZZ.

SOURCE-WIDE PTE SUMMARY

The facility is a minor source of PM₁₀, PM_{2.5}, NO_x, CO, SO₂, and VOC.

Table 1. Potential to Emit (tons per year)

Pollutant	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	H ₂ S	Pb
Total	0.14	0.14	5.22	7.16	0.05	0.18	0	0

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COMMON ACRONYMS AND ABBREVIATIONS

(These terms may be seen in the permit)

AQR	Clark County Air Quality Regulation
CFR	Code of Federal Regulations
CO	carbon monoxide
DAQ	Division of Air Quality
DOM	date of manufacture
EF	emission factor
EPA	U.S. Environmental Protection Agency
EU	emission unit
GDO	gasoline dispensing operation
HP	horsepower
H ₂ S	hydrogen sulfide
kW	kilowatt
MMBtu	British thermal units (in millions)
NAICS	North American Industry Classification System
NG	natural gas
NO _x	nitrogen oxide
Pb	lead
PM _{2.5}	particulate matter less than 2.5 microns in aerodynamic diameter
PM ₁₀	particulate matter less than 10 microns in aerodynamic diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTE	potential to emit
RACT	reasonably available control technology
RICE	reciprocating internal combustion engine
SCC	Source Classification Codes
SIC	Standard Industrial Classification
SO ₂	sulfur dioxide
TSD	Technical Support Document
VOC	volatile organic compound

1.0 EQUIPMENT

1.1 EMISSION UNITS

The stationary source consists of the emission units (EUs) listed in Table 1-1. [AQR 12.1.4.1(b)]

Table 1-1. Summary of Emission Units

EU	Rating	Type	Make	MN	SN
Power Generation					
A01	750 kW	Emergency Generator	Caterpillar	C18	LTH00564
	1,112 hp	Diesel Engine DOM 2021			
A02	25 kW	Emergency Generator	Cummins	GGMB4706158	D100116836
	39.5 hp	NG Engine DOM 2010			
A03	45 kW	Emergency Generator	Cummins	C45N6	E190574334
	73 hp	NG Engine DOM 2019			
A04	60 kW	Emergency Generator	Cummins	GGHE4702142	E100124271
	97.7 hp	Propane Engine DOM 2010			
Boilers					
B01	2.10 MMBtu/hr	NG Boiler	National Brand	H22100ACEBRCAA	9307108962
Gasoline Dispensing Operation					
C01	10,000 gallon	Aboveground Storage Tank – Gasoline			
C02	5,000 gallon	Aboveground Storage Tank – E85			

1.2 INSIGNIFICANT ACTIVITIES

The following units/activities are insignificant emission sources under AQR 12.1.2(c). When added to the source PTE, emissions from these units will not subject the source to major-source requirements for any pollutant. Pursuant to AQR 12.1.2(a), all exempt and insignificant units and activities shall remain subject to any other applicable requirements.

Table 1-2. List of Insignificant Activities

Rating	Description
0.0751 MMBtu/hr	NG Boiler
0.0751 MMBtu/hr	NG Boiler
0.5070 MMBtu/hr	Propane Boiler
480 gpm	Cooling Tower
600 gallon	Aboveground Storage Tank – Diesel
10,000 gallon	Aboveground Storage Tank – Diesel
2,000 gallon	Aboveground Storage Tank – Urea
3,000 gallon	Aboveground Storage Tank – Biodiesel

1.3 NONROAD ENGINES

Pursuant to Title 40, Part 1068.30 of the Code of Federal Regulations (40 CFR Part 1068.30), nonroad engines shall not remain at a location for more than 12 consecutive months; otherwise, the engine(s) will constitute a stationary reciprocating internal combustion engine (RICE) and be subject to the applicable requirements of 40 CFR Part 63, Subpart ZZZZ; 40 CFR Part 60, Subpart IIII; and/or 40 CFR Part 60, Subpart JJJJ. Stationary RICE shall be permitted as emission units upon commencing operation at this stationary source.

Records of location changes for portable or transportable nonroad engines shall be maintained, and shall be made available to the Control Officer upon request. These records are not required for engines owned and operated by a contractor for maintenance and construction activities as long as records are maintained demonstrating that such work took place at the stationary source for periods of less than 12 consecutive months.

Nonroad engines used on self-propelled equipment do not have this 12-month limitation or the associated recordkeeping requirements.

2.0 CONTROLS

2.1 CONTROL DEVICES

No add-on control devices have been identified.

2.2 CONTROL REQUIREMENTS

Boilers / Water Heaters / Fuel Burning Equipment [AQR 12.1.4.1(c)&(f)]

1. The permittee shall combust only natural gas in the boiler (EU: B01).
2. The permittee shall operate and maintain the boiler (EU: B01) in accordance with the manufacturer's operations and maintenance (O&M) manual for emissions-related components and good combustion practices.

Generators / Engines [AQR 12.1.4.1(c)&(f)]

3. The permittee shall only combust diesel fuel with a maximum sulfur content of 15 ppm and either a minimum cetane index of 40 or a maximum aromatic content of 35% by volume in the emergency generator (EU: A01). [40 CFR 60.4207(b), 40 CFR 63.6590(c)]
4. The permittee shall operate the emergency generator (EU: A01) with a turbocharger and an aftercooler.
5. The permittee shall operate and maintain each emergency generator (EUs: A01-A04) in accordance with the manufacturer's O&M manual for emissions-related components.

Gasoline Dispensing Operation [AQR 12.1.4.1(c)&(f)]

6. The permittee shall implement all applicable requirements on gasoline dispensing equipment. [40 CFR Part 63, Subpart CCCCCC & AQR 12.1.4.1(f)]
7. From October 1 to March 31 every year in the Las Vegas Valley, the Eldorado Valley, the Ivanpah Valley, the Boulder City limits, and any area within three miles of these areas, no gasoline intended as a final product for fueling motor vehicles shall be supplied or sold by any person; sold at retail; sold to a private or a municipal fleet for consumption; or introduced into any motor vehicle by any person unless the gasoline has at least 3.5 percent oxygen content by weight. [AQR 53.1.1 & 53.2.1]
8. If a gasoline storage tank in the Las Vegas Valley, the Eldorado Valley, the Ivanpah Valley, the Boulder City limits, and any area within three miles of these areas, receives its last gasoline delivery with less than 3.5 percent oxygen content by weight before September 15, gasoline dispensed from that tank will be exempt from enforcement of Section 53.2.1 until the first delivery date after October 1. [AQR 53.5.1.1]

9. The permittee shall not allow gasoline to be handled in a manner that would result in vapor releases to the atmosphere for extended periods of time. Preventative measures to be taken include, but are not limited to, the following: *[40 CFR 63.11116 and 63.11117]*
 - a. Minimize gasoline spills;
 - b. Clean up spills as expeditiously as practicable;
 - c. Cover all open gasoline containers and all gasoline storage tank fill pipes with a gasketed seal when not in use;
 - d. Only load gasoline into storage tanks using a submerged fill tube where the greatest distance from the bottom of the storage tank to the point of the fill tube opening is no more than six inches.

Other [AQR 12.1.4.1(c)&(f)]

10. The permittee shall not cause, suffer, or allow any source to discharge air contaminants (or other materials) in quantities that will cause a nuisance, including excessive odors. *[AQR 40 & AQR 43]*

3.0 *LIMITATIONS*

3.1 OPERATIONAL LIMITS

Emergency Engines

1. The permittee shall limit the operation of the emergency generators (EUs: A01-A04) for testing and maintenance purposes to 100 hours per year. The permittee may operate the emergency generators up to 50 hours per year for nonemergency situations, but those hours count towards the 100 hours provided for testing and maintenance. Except as provided below (a-e, inclusive) the emergency generators cannot be used for peak shavings or nonemergency demand response, or to generate income for a facility by supplying power to an electric grid or to otherwise supply power as part of a financial arrangement with another entity: *[40 CFR Part 60.4211 and/or 40 CFR Part 63.6640]*
 - a. The engine is dispatched by the local balancing authority and/or local transmission and distribution operator.
 - b. The dispatch is intended to mitigate local transmission and/or distribution limitations so as to avert potential voltage collapse or line overloads that could lead to interruption of power supply in a local area or region.
 - c. The dispatch follows reliability, emergency operation or similar protocols the follow specific NERC, regional, state, public utility commission or local standards or guidelines.
 - d. The power is provided only to the facility itself or to support the local transmission and distribution system.
 - e. The owner or operator identifies and records the entity that dispatches the engine and the specific NERC, regional, state, public utility commission or local standards or guidelines that are being followed for the dispatching engine. The local balancing authority or local transmission and distribution system operator may keep these records on behalf of the engine owner or operator.

Gasoline Dispensing Operation

2. The permittee shall limit the throughput (aggregate of all gasoline products) to 310,000 gallons per year (EUs: C01-C02). *[AQR 12.1.4.1(c)&(f)]*

3.2 EMISSION LIMITS

- The permittee shall not allow the actual emissions from the stationary source to exceed the PTE listed per year in Table 3-1, except for emission units intended only for use in emergencies and as provided in AQR 12.1.6(b). [AQR 12.1.4.1(c)]

Table 3-1. Potential to Emit (tons per year)

Pollutant	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	H ₂ S	Pb
Total	0.14	0.14	5.22	7.16	0.05	0.18	0	0

- The permittee shall not allow the actual emissions from the following individual emission units to exceed the PTE listed per year in Table 3-2, except for emission units intended only for use in emergencies and as provided in AQR 12.1.6(b). [AQR 12.1.4.1(c)]

Table 3-2. Source-Wide Emission Unit PTE Summary (tons per year)

EU	Conditions	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	HAP
A01	500 hours	0.04	0.04	3.59	0.25	0.01	0.07	0.01
A02	500 hours	0.01	0.01	0.18	0.45	0.01	0.03	0.01
A03	500 hours	0.01	0.01	0.19	2.66	0.01	0.01	0.01
A04	500 hours	0.01	0.01	0.36	3.04	0.01	0.02	0.01
B01	8,760 hours	0.07	0.07	0.90	0.76	0.01	0.05	0.02
C01	210,000 gallons	0	0	0	0	0	2.02	0.10
C02	100,000 gallons							

- The permittee shall not discharge into the atmosphere, from any emission unit, any air contaminant in excess of an average of 20 percent opacity for more than six consecutive minutes. [AQR 26.1]

4.0 COMPLIANCE DEMONSTRATION REQUIREMENTS

4.1 MONITORING

Visible Emissions [AQR 12.1.4.1(d)]

1. The responsible official shall sign and adhere to the *Visible Emissions Check Guidebook* and keep a copy of the signed guide on-site at all times.
2. The permittee shall conduct a visual emissions check at least quarterly on the emergency diesel generator (EU: A01), while the emission unit is in operation.
3. If no plume appears to exceed the opacity standard during the visible emissions check, the date, location, and results shall be recorded, along with the viewer's name.
4. If a plume appears to exceed the opacity standard, the permittee shall do one of the following:
 - a. Immediately correct the perceived exceedance, then record the first and last name of the person who performed the emissions check, the date the check was performed, the unit(s) observed, and the results of the observation; or
 - b. Call a certified Visible Emissions Evaluation (VEE) reader to perform a U.S. Environmental Protection Agency (EPA) Method 9 evaluation.
 - i. For sources required to have a certified reader on-site, the reader shall start Method 9 observations within 15 minutes of the initial observation. For all other sources, the reader shall start Method 9 observations within 30 minutes of the initial observation.
 - ii. If no opacity exceedance is observed, the certified VEE reader shall record the first and last name of the person who performed the VEE, the date the VEE was performed, the unit(s) evaluated, and the results. A Method 9 VEE form shall be completed for each emission unit that was initially perceived to have exceeded the opacity limit, and the record shall also indicate:
 - (1) The cause of the perceived exceedance;
 - (2) The color of the emissions; and
 - (3) Whether the emissions were light or heavy.
 - iii. If an opacity exceedance is observed, the source shall take immediate action to correct the exceedance. The source shall then record the first and last name of the person performing the VEE, the date the VEE was performed, the unit(s) evaluated, and the results. A Method 9 VEE form shall be completed for each reading identified, and the record shall also indicate:
 - (1) The cause of the exceedance;

- (2) The color of the emissions;
 - (3) Whether the emissions were light or heavy;
 - (4) The duration of the emissions; and
 - (5) The corrective actions taken to resolve the exceedance.
5. Any scenario of visible emissions noncompliance can and may lead to enforcement action.

Generators / Engines [AQR 12.1.4.1(d)]

6. The permittee shall monitor the sulfur content and cetane index or aromatic content of the fuel burned in the emergency generator (EU: A01) by retaining a copy of vendor fuel specifications. [40 CFR 60.4207(b), 40 CFR 63.6604(b)]
7. The permittee shall operate each emergency generator (EUs: A01-A04) with a nonresettable hour meter and monitor each one during testing, maintenance, and nonemergency operation. If the engine is used for an emergency, the permittee shall monitor its operation and document the nature of the emergency.

Gasoline Dispensing Operation [AQR 12.1.4.1(d)]

8. The permittee shall monitor and record as necessary the throughput of gasoline (EUs: C01–C02) in gallons so as to determine monthly combined throughput, and each month shall calculate the total of the last 365 days of gasoline throughput and divide by 12.
9. The permittee shall monitor the fuel storage and dispensing system to determine if its components are in compliance with the control requirements of this permit. Monitoring inspections shall be recorded and consist of:
 - a. Inspecting daily for gasoline spills, and recording the times and dates the source became aware of a spill and cleaned it up; and
 - b. Inspecting covers on gasoline containers and fill pipes after each respective delivery, and recording the dates of fuel deliveries and corresponding inspections.

4.2 TESTING

No performance testing requirements have been identified.

4.3 RECORDKEEPING REQUIREMENTS

1. The permittee is required to comply with the recordkeeping requirements of 40 CFR Part 63 Subpart CCCCC. [40 CFR Part 63.11125]
2. The permittee shall create and maintain the following records, all of which must be producible on-site to the Control Officer's authorized representative upon request and

without prior notice during the permittee's hours of operation: [AQR 12.1.4.1(d)(2) & AQR 12.1.4.1(s)]

Opacity

- a. Dates and times when visible emissions checks and observations are made, and the corrective steps taken to bring opacity into compliance.

Inspections/Maintenance/General

- b. Manufacturer's O&M manual for emission units, if obtainable;
- c. Records of inspections and maintenance as required by this permit;

Emergency Generators

- d. Sulfur content and cetane index or aromatic content of diesel fuel used to power the emergency generator (EU: A01), as certified by the supplier;
- e. Date and duration of operation of each emergency generator (EUs: A01-A04) for testing, maintenance, and nonemergency use;
- f. Date and duration of operation of each emergency generator (EUs: A01-A04) for emergency use, including documentation justifying use during the emergency;

Nonroad Engines

- g. Records of location changes for nonroad engines, if applicable;

Gasoline Dispensing Operation

- h. Required equipment inspections and maintenance;
- i. Maintenance on storage and distribution equipment, including a general description of location and parts;
- j. Date and time that storage and distribution equipment was taken out of service;
- k. Date of repair or replacement of storage and distribution equipment/parts;
- l. Date and time of gasoline delivered;
- m. Monthly total combined throughput of gasoline;
- n. Monthly 12-month average combined throughput of gasoline;
- o. Calendar year combined annual gasoline product throughput (reported annually);

Emissions

- p. Deviations from permit requirements that result in excess emissions (reported as required in Section 4.4 of this permit);
 - q. Deviations from permit requirements that do not result in excess emissions (reported annually); and
 - r. Calculation of annual emissions for each emission unit and for the entire source (reported annually).
3. The permittee shall include in each record above, where applicable, the date and time the monitoring or measurement was taken, the person performing the monitoring or measurement, and the emission unit or location where the monitoring or measurement was performed. Each record must also contain the action taken to correct any deficiencies, when applicable. *[AQR 12.1.4.1(d)(2)(A)]*
 4. The permittee shall maintain all records for a period of at least five years from their creation. *[AQR 12.1.4.1(d)(2)(B)]*

4.4 REPORTING AND NOTIFICATION

1. The permittee is responsible for all applicable notification and reporting requirements contained in 40 CFR Parts 60 and 63.
2. If the construction or modification of a source differs from what was authorized in a new permit or significant permit revision, the source shall provide a written notice to the Control Officer that includes a list of the differences, and complete descriptions of each one, at least 30 days before commencing operations. *[AQR 12.1.4.1(n)]*
3. The permittee shall submit an annual report to the Control Officer in accordance with the following requirements. *[AQR 12.1.4.1(d)(3)]*
 - a. Each annual report shall be: *[AQR 12.9]*
 - i. Based on the preceding calendar year;
 - ii. Submitted on or before March 31 of each year, even if there was no activity (if March 31 falls on a Saturday or Sunday, or on a state or federal holiday, the submittal shall be due on the next regularly scheduled business day); and
 - iii. Addressed to the attention of the Control Officer.
 - b. Each annual report shall contain, at a minimum:
 - i. As the first page of text, a signed certification containing the sentence: "I certify that, based on information and belief formed after reasonable inquiry, the statements contained in this document are true, accurate, and complete." This statement shall be signed and dated by a responsible official of the company (a sample form is available from DAQ); *[AQR 12.9(g)]*

- ii. The calculated actual annual emissions from each emission unit, even if there was no activity, and the total calculated actual annual emissions for the source based on the emissions calculation methodology used to establish the PTE in the permit or an equivalent method approved by the Control Officer prior to submittal. *[AQR 12.9(c)(2)]*
 - iii. Include each recorded item listed in Section 4.3 of this permit that is noted for annual reporting purposes.
4. The permittee shall report to the Control Officer any upset, breakdown, malfunction, emergency, or deviation that causes emissions of regulated air pollutants in excess of any limits set by regulation or by this permit. The report shall be in two parts, as specified below: *[AQR 25.6.1 & AQR 12.1.4.1(d)(3)(B)]*
 - a. Within 24 hours of the time the permittee learns of the excess emissions, the permittee shall notify DAQ by phone at (702) 455-5942, by fax at (702) 383-9994, or by email at AQCompliance@ClarkCountyNV.gov.
 - b. Within 72 hours of the notification required by Section 4.4.6.a above, the permittee shall submit a detailed written report to DAQ containing the information required by AQR 25.6.3.
5. The permittee shall report deviations from permit requirements that do not result in excess emissions, including those attributable to upset conditions as defined in the permit, with the annual report. Such reports shall include the probable cause of such deviations, as well as any corrective actions or preventive measures taken. *[AQR 12.1.4.1(d)(3)(B)]*
6. Any report and/or compliance certification submitted pursuant to this section or the AQR shall contain certification by a responsible official of truth, accuracy, and completeness. This certification, and any other certification required under this section, shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. *[AQR 12.1.4.1(d)(3)(C)]*

5.0 ADMINISTRATIVE REQUIREMENTS

5.1 GENERAL

1. The permittee must comply with all permit conditions. Noncompliance with any condition is a violation of the AQRs and grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a renewal application. *[AQR 12.1.4.1(r)]*
2. If any term or condition of this permit becomes invalid as a result of a challenge to a portion of this permit, the other terms and conditions of this permit shall be unaffected and remain valid. *[AQR 12.1.4.1(i)]*
3. The terms and conditions of this permit apply to any part or activity of the stationary source that emits, or has the potential to emit, any regulated air pollutant for which operating authority has been granted, and includes all third parties (such as lessees or contractors) conducting such activities. *[AQR 12.1.4.1(c) & AQR 12.1.4.1(aa)]*
4. Any application, report, or compliance certification submitted to the Control Officer pursuant to this permit or the AQRs shall contain a certification of truth, accuracy, and completeness with a responsible official's original signature. *[AQR 12.1.3.6(a), AQR 12.1.4.1(d)(3), & 40 CFR Part 3]*
5. As a condition of the issuance of the permit, the owner or operator agrees to allow inspection of the premises to which the permit relates, including the location where records must be kept under the conditions of the permit, by any authorized representative of the Control Officer at any time during the permittee's hours of operation without prior notice to perform the following: *[AQR 12.1.4.1(s)]*
 - a. Access and copy any records that must be kept under the conditions of the permit;
 - b. Inspect any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit;
 - c. Sample or monitor substances or parameters for the purpose of assuring compliance with the permit or applicable requirements; and
 - d. Document alleged violations using such devices as cameras or video equipment.
6. The permittee shall pay fees to the Control Officer consistent with the approved fee schedule in AQR 18. *[AQR 12.1.4.1(k)]*
7. This permit does not convey property rights of any sort, or any exclusive privilege. *[AQR 12.1.4.1(t)]*
8. Anyone issued a permit under AQR 12 shall post the permit in compliance with AQR 12.13. *[AQR 12.1.4.1(v)]*

9. This permit shall not waive, or make less stringent, any limitations or requirements contained in or issued under the Nevada State Implementation Plan, or that are otherwise federally enforceable. *[AQR 12.1.4.1(w)]*
10. Except as provided in AQR 12.1.6, no person shall commence construction of, operate, or make a modification to a minor source except in compliance with a minor source permit that authorizes such construction, operation, or modification. *[AQR 12.1.3.1(a)]*
11. The permittee's commencement of operations constitutes an acknowledgment that the permittee assumes the responsibility of ensuring the source's emission units and emission control equipment have been constructed and will be operated in compliance with all applicable requirements. *[AQR 12.1.4.2]*
12. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of the permit. *[AQR 12.1.4.1(o)]*

5.2 RENEWALS AND REVISIONS

1. This permit may be modified, revoked, reopened and reissued, or terminated for cause by the Control Officer. The filing of a request by the permittee for a permit modification, for termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. *[AQR 12.1.4.1(p)]*
2. The permittee shall furnish to the Control Officer, in writing and within a reasonable time, any information that the Control Officer may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit, or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Control Officer copies of records that the permit requires keeping. The permittee may furnish records deemed confidential to the Control Officer with a claim of confidentiality, pursuant to AQR 12.6. *[AQR 12.1.4.1(u)]*
3. Any revision of an emission limitation, monitoring, testing, reporting, or recordkeeping requirement shall be made consistent with the permit revision requirements in AQR 12.1.6. *[AQR 12.1.4.1(e)]*
4. A permit may be reopened and revised under any of the following circumstances: *[AQR 12.1.4.1(q)]*
 - a. Additional requirements (including excess emissions requirements) become applicable to an affected source under the acid rain program. Upon approval by the Control Officer, excess emissions offset plans shall be deemed to be incorporated into the permit.
 - b. The Control Officer determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit.
 - c. The Control Officer determines that the permit must be revised or revoked to assure compliance with applicable requirements.

- d. Proceedings to reopen and issue a permit shall follow the same procedures that apply to initial permit issuance, and shall affect only those parts of the permit for which cause to reopen exists. Such reopening shall be made as expeditiously as practicable.
5. For the renewal of an existing minor source permit, a timely application shall be submitted to the Control Officer. An application for renewal shall be deemed to be timely if it is submitted at least 120 days, but no more than 270 days, before the date of permit expiration. *[AQR 12.1.3.1(b)]*
6. To be deemed complete, an application must contain all information required under AQR 12.1.3.6, and must be accompanied by payment of the applicable fee(s) established in AQR 18. If, while processing an application deemed complete, the Control Officer determines that additional information is needed to evaluate or take final action on the application, he or she may request such information in writing and set a reasonable deadline for its submission. Failure to provide the additional information required by the Control Officer by the deadline could result in denial of the application. *[AQR 12.1.3.3]*
7. If an existing minor source submits a timely and complete application for renewal of a minor source permit, the source's continued operation after permit expiration and before issuance of the renewed permit is not a violation of the AQRs. This application shield shall cease to apply if, after a completeness determination, the applicant fails to submit any additional information identified as necessary to process the application by a deadline the Control Officer has specified in writing, or if the renewed permit is denied for any other reason. *[AQR 12.1.3.4]*
8. If the submittal of an application for renewal of an existing minor source permit is not timely, there is no permit application shield as provided in AQR 12.1.3.4, and the source loses its authority to operate upon permit expiration until the renewal permit is issued. *[AQR 12.1.3.1(c)]*
9. If an application for renewal of an existing minor source permit is submitted within six months after permit expiration, the source loses its authority to operate upon permit expiration until the renewal permit is issued. *[AQR 12.1.3.1(d)]*
10. If an application for the renewal of an existing minor source permit is submitted six months or more after permit expiration, the source loses its authority to operate upon permit expiration; the source will be treated as a new minor source, and the application will be subject to all the requirements of AQR 12.1.3.6. *[AQR 12.1.3.1(e)]*



DES
**DEPARTMENT OF ENVIRONMENT
AND SUSTAINABILITY**



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Phone (702) 455-5942
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MINOR SOURCE TECHNICAL SUPPORT DOCUMENT

SOURCE NAME:

Nevada Department of Transportation

SOURCE ID:

15964

SOURCE LOCATION:

123 East Washington Avenue
Las Vegas, Nevada 89101

COMPANY NAME:

Nevada Department of Transportation

APPLICATION SUBMITTED BY:

Stantec Consulting Services Incorporated

CURRENT ACTION:

New

APPLICATION RECEIVED:

July 14, 2022

TSD Date: August 18, 2022

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ACRONYMS AND ABBREVIATIONS

(These terms may be seen in the technical support document)

AQR	Clark County Air Quality Regulation
CARB	California Air Resources Board
CFR	Code of Federal Regulations
CO	carbon monoxide
DAQ	Division of Air Quality
DOM	date of manufacture
EF	emission factor
EPA	U.S. Environmental Protection Agency
EU	emission unit
GDO	gasoline dispensing operation
HP	horsepower
H ₂ S	hydrogen sulfide
kW	kilowatt
MMBtu	British thermal units (in millions)
NAICS	North American Industry Classification System
NG	natural gas
NO _x	nitrogen oxide
O ₂	oxygen
Pb	lead
PM _{2.5}	particulate matter less than 2.5 microns in aerodynamic diameter
PM ₁₀	particulate matter less than 10 microns in aerodynamic diameter
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTE	potential to emit
RACT	reasonably available control technology
RICE	reciprocating internal combustion engine
SCC	Source Classification Codes
SIC	Standard Industrial Classification
SO ₂	sulfur dioxide
TDS	total dissolved solids
TSD	Technical Support Document
VOC	volatile organic compound

Technical Support Document

This TSD establishes the methodology related to the terms and conditions of its Minor Source Permit, issued pursuant to Clark County Department of Air Quality Regulations (AQR) Section 12.1. The TSD shall not serve as the operating authority.

Source Description

The source is a fully operational maintenance yard (supporting the Nevada Department of Transportation), located in the Hydrographic Area of 212 – Las Vegas Valley. As a fully operational maintenance yard (supporting the Nevada Department of Transportation), the source is classified under SIC 4789, “Transportation Services Not Elsewhere Classified,” and NAICS 488490, “Other Support Activities for Road Transportation.”

The source consists of emergency generators, boilers, a cooling tower, and fuel dispensing operations. Combined, these emission units establish the Nevada Department of Transportation as a minor source of all regulated air pollutants, enforced by the Clark County Division of Air Quality.

In addition, the gasoline dispensing operation at the source is subject to the federal requirements of 40 CFR Part 63 Subpart CCCCC. The emergency generators are subject to the federal requirements of 40 CFR Part 60 Subpart IIII, 40 CFR Part 60 Subpart JJJJ, and some of the federal requirements of 40 CFR Part 63 Subpart ZZZZ.

Permitting Action

The permitting action for this source is a new AQR 12.1 minor source permit.

Emission Units

Table 1 lists the emission units at this stationary source.

Table 1. List of Emission Units

EU	Rating	Type	Make	MN	SN	SCC
Power Generation						
A01	750 kW	Emergency Generator	Caterpillar	C18	LTH00564	20300101
	1,112 hp	Diesel Engine DOM 2021				
A02	25 kW	Emergency Generator	Cummins	GGMB4706158	D100116836	20300201

	39.5 hp	NG Engine DOM 2010				
Boilers						
A03	45 kW	Emergency Generator	Cummins	C45N6	E190574334	20300201
	73 hp	NG Engine DOM 2019				
Boilers						
A04	60 kW	Emergency Generator	Cummins	GGHE4702142	E100124271	20301001
	97.7 hp	Propane Engine DOM 2010				
Gasoline Dispensing Operation						
B01	2.10 MMBtu/hr	NG Boiler	National Brand	H22100ACEBRCAA	9307108962	10300603
Gasoline Dispensing Operation						
C01	10,000 gallon	Aboveground Storage Tank – Gasoline				40600306
C02	5,000 gallon	Aboveground Storage Tank – E85				40600306

Table 1a denotes equipment or activities that are present at this source, but are insignificant activities pursuant to AQR 12.1.2. The emissions from these units or activities, when added to the PTE of the source, will not make the source major for any pollutant.

Table 1a. Insignificant Emission Units or Activities

Rating	Description
0.0751 MMBtu/hr	NG Boiler
0.0751 MMBtu/hr	NG Boiler
0.5070 MMBtu/hr	Propane Boiler
480 gpm	Cooling Tower
600 gallon	Aboveground Storage Tank – Diesel
10,000 gallon	Aboveground Storage Tank – Diesel
2,000 gallon	Aboveground Storage Tank – Urea
3,000 gallon	Aboveground Storage Tank – Biodiesel

Calculation of Emissions

Applicability

AQR 12.1.0 permitting applicability is determined by calculating the emissions for all proposed emission units using 8,760 hours of operation (except for emergency generators or fire pumps, which use 500 hours), any inherent controls, any inherent throughput limitations, and the emission factors provided by the manufacturer, by source test results, by EPA AP-42, or by other approved methods.

Applicability emissions include emissions from insignificant emission units and activities, but do not include fugitive emissions (except for categorical sources listed in AQR 12.2.2(j) or any other stationary source category that, as of August 7, 1980, is being regulated under Sections 111 or 112 of the Act). The permittee has asked to use emission factors from the manufacturer as well as AP-42, to calculate emissions for criteria pollutants.

Table 2 shows the thresholds for AQR 12.1.1(d) applicability.

Table 2. AQR 12.1.1(d) Applicability Emissions Evaluation (tons per year)

Pollutant	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	H ₂ S	Pb	HAP ¹
Applicability Thresholds	5	5	5	25	25	5	1	0.3	n/a
Major Source Thresholds	100	100	100	100	100	100	n/a	100	10/25
Nonattainment NSR Thresholds	100	100	100	100	100	100	n/a	100	n/a
PSD Thresholds	250	250	250	250	250	250	n/a	250	n/a
Applicability Emissions Total	0.86	0.59	5.60	7.36	0.11	2.24	0	0	0.19

¹10 tons for any single HAP, or 25 tons for any combination of HAP pollutants.

AQR 12.1 is applicable to any stationary source located in Clark County that has the potential to emit (PTE) a regulated air pollutant equal to or greater than the thresholds listed in AQR 12.1.1(d), as shown in Table 2, but less than the major source thresholds listed in AQRs 12.2.2(ff) or 12.3.2(r).

AQR 12.1 is also applicable to any Part 70 source that is exempt from the requirement to obtain a Part 70 operating permit and has a PTE that equals or exceeds the thresholds listed in AQR 12.1.1(d), or to any source that takes a voluntarily accepted emission limit or standard pursuant to AQR 12.1.7 to avoid obtaining a Part 70 operating permit. See the attachment for calculations.

This source exceeds the applicability limit for NO_x, so it is required to obtain an air quality permit, as shown in Table 2.

As Table 2 shows, Applicability Emissions are below major source thresholds for all pollutants, which qualifies this source as a true minor. (A synthetic minor source is one that has taken a limit to avoid becoming a major source; an SM80 source is a synthetic minor source that has a PTE for one or more pollutants at or above 80% of the major source threshold. The calculations are included as an attachment.)

HAP emissions are also evaluated during the calculation of source status emissions because it is considered a regulated air pollutant. However, the Division of Air Quality (DAQ) has determined that the calculated and/or estimated HAP emissions from this source fall below the AQR 12.1 permitting threshold. Therefore, a specific PTE will not be included in the permit, but any applicable NESHAP and/or MACT requirements will be included in the air quality permit.

PTE

PTE is calculated to include any controls or limits, whether voluntarily proposed by the source or required. PTE does not include insignificant emission units and activities, but does include fugitive emissions.

Table 3 shows the PTE associated with this source; PTE calculations are included in the attachments.

Table 3. PTE (tons per year)

Pollutant	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	H ₂ S	Pb
PTE	0.14	0.14	5.22	7.16	0.05	0.18	0	0

Emission Increase

Every criteria pollutant has an emission increase that is below each respective threshold for significance (see Table 4). As a result, the source is not required to submit a RACT analysis for this permitting action.

Table 4. Emissions Increase Calculation and Significance Evaluation (tons per year)

Affected EU	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	H ₂ S	Pb
Proposed PTE	0.14	0.14	5.22	7.16	0.05	0.18	0	0
Permitted PTE	0	0	0	0	0	0	0	0
Δ Emissions	0.14	0.14	5.22	7.16	0.05	0.18	0	0
Significance Threshold	7.5	7.5	20	35	40	20	5	0.6
RACT Analysis Required	No	No	No	No	No	No	NA	NA

Control Technology

The emergency generator (EU: A01) is equipped with a turbocharger and an aftercooler.

The aboveground storage tanks (EUs: C01-C02) are each equipped with a spill containment box.

Operational Limits

Emergency engines shall be limited to operating 100 hours per year for testing and maintenance purposes, including nonemergency limitations. On May 1, 2015, the United States Court of Appeals for the District of Columbia Circuit issued a decision to vacate provisions in 40 CFR Part 60 Subpart IIII, 40 CFR Part 60 Subpart JJJJ, and 40 CFR Part 63 Subpart ZZZZ that allowed emergency engines to operate for demand response and when there is a deviation of voltage or frequency. DAQ prohibited sources from operating emergency generators for those activities, consistent with the court decision and EPA's April 15, 2016, implementation memo. On August 10, 2022 EPA posted in the Federal Register that the changes had been formally promulgated into the above-mentioned CFRs. By definition, an emergency generator may not be operated for peak shavings, emergency demand response, or to generate income for a facility by supplying power to an electric grid or to otherwise supply power as part of a financial arrangement with another entity. Except as provided in 40 CFR Part 60.4211(f)(3)(i) and/or 40 CFR Part 60.4243(d)(3)(i) and/or 40 CFR Part 63.6640(f)(4)(i) and (ii), emergency generators cannot be used for peak shavings or nonemergency demand response, or to generate income for a facility by supplying power to an electric grid or to otherwise supply power as part of a financial arrangement with another entity. Except as provided above, to operate a generator for peak shavings, emergency demand response, or to generate income for a facility by supplying power to an electric grid or to otherwise supply power as part of a financial arrangement with another entity, the permittee must request the engine be treated as a nonemergency engine (EUs: A01-A04).

The gasoline dispensing operation (EUs: C01-C02) will be limited to 310,000 gallons per year.

Review of Applicable Regulations

Emergency Generators – 40 CFR Part 63 Subpart ZZZZ and 40 CFR Part 60 Subpart JJJJ

The emergency generators (EUs: A02-A04) were each manufactured after the date of applicability – January 1, 2009. As a result, these emission units are subject to the federal requirements of 40 CFR Part 60 Subpart JJJJ and 40 CFR Part 63 Subpart ZZZZ.

However, the source will meet all the federal requirements of 40 CFR Part 63 Subpart ZZZZ, by adhering to the federal requirements of 40 CFR Part 60 Subpart JJJJ.

In addition, the permittee shall comply with the emissions standards listed in Table 5 for the applicable spark ignition engines (EUs: A02-A04).

Table 5. Emissions Standards for Emergency Natural Gas and/or Propane Generator

EU	Rating	NO _x + HC	CO
A02	25 < hp ≤ 100	10.0 g/hp-hr	387 g/hp-hr
A03	25 < hp ≤ 100	10.0 g/hp-hr	387 g/hp-hr
A04	25 < hp ≤ 130	13.4 g/kW-hr	519 g/kW-hr

Emergency Generators – 40 CFR Part 60 Subpart IIII

The emergency diesel generator (EU: A01) was manufactured after the date of applicability – July 1, 2006. As a result, this emission unit is subject to the federal requirements of 40 CFR Part 60 Subpart IIII and 40 CFR Part 63 Subpart ZZZZ. However, the source will meet all the federal requirements of 40 CFR Part 63 Subpart ZZZZ, by adhering to the federal requirements of 40 CFR Part 60 Subpart IIII.

In addition, the permittee shall comply with the emissions standards in 40 CFR 1039 Appendix I for the applicable compression ignition engine (EU: A01) for the same model year and maximum engine power, provided in Table 6.

Table 6. Emissions Standards for Emergency Diesel Generator

EU	Power (kW)	NMHC + NO _x	CO	PM
A01	> 560 kW	6.4 g/kw-hr	3.5 g/kW-hr	0.20 g/kW-hr

Gasoline Dispensing Operation

The gasoline dispensing operation is subject to the federal requirements of 40 CFR Part 63 Subpart CCCCCC.

Monitoring

Standard monitoring requirements for opacity, boilers, engines, and a gasoline dispensing operation will be included in the air quality permit.

Performance Testing

The gasoline dispensing operation (EUs: C01-C02) is not equipped with a vapor recovery system and as a result, the gasoline dispensing operation will not be subject to performance testing either.

Increment Analysis

Facility Location: 667510, 4005800 (Universal Transverse Mercator (UTM) NAD83)

Nevada Department of Transportation is a minor source in Hydrographic Area 212 (the Las Vegas Valley). Permitted emission units include four generators, one boiler and gasoline dispensing. Since minor source baseline dates for NO_x (October 21, 1988) and SO₂ (June 29, 1979) have been triggered, Prevention of Significant Deterioration (PSD) increment analysis is required.

DAQ modeled the source using AERMOD to track the increment consumption. Stack data submitted by the applicant were supplemented with information available for similar emission units. Five years (2011 to 2015) of meteorological data from the McCarran Station were used in the model. U.S. Geological Survey National Elevation Dataset terrain data were used to calculate elevations. Table 7 shows the location of the maximum impact and the potential PSD increment consumed by the source at that location. The impacts are below the PSD increment limits.

Table 7. PSD Increment Consumption

Pollutant	Averaging Period	Source's PSD Increment Consumption (µg/m ³)	Location of Maximum Impact	
			UTM X (m)	UTM Y (m)
SO ₂	3-hour	2.13 ¹	667389	4005732
SO ₂	24-hour	1.21 ¹	667420	4005732
SO ₂	Annual	0.25	667487	4005926
NO _x	Annual	3.90	667487	4005926

¹ Highest Second High Concentration.

Public Participation

This permitting action will be posted on the department's website for the general public to view and comment, pursuant to AQR 12.1.5.3 – a new minor source that will be located within 1,000 feet of the outer boundary of a residential area.

Attachments

See calculation sheets on next page as attachments.

Attachment 1. Emissions for Permit Applicability (tons per year)

EU	Conditions	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	HAP
A01	500 hours	0.04	0.04	3.59	0.25	0.01	0.07	0.01
A02	500 hours	0.01	0.01	0.18	0.45	0.01	0.03	0.01
A03	500 hours	0.01	0.01	0.19	2.66	0.01	0.01	0.01
A04	500 hours	0.01	0.01	0.36	3.04	0.01	0.02	0.01
B01	8,760 hours	0.07	0.07	0.90	0.76	0.01	0.05	0.02
C01	210,000 gallons	0	0	0	0	0	2.02	0.10
C02	100,000 gallons							
Insig	8,760 hours	0.01	0.01	0.03	0.01	0.01	0.01	0.01
Insig	8,760 hours	0.01	0.01	0.03	0.01	0.01	0.01	0.01
Insig	8,760 hours	0.02	0.02	0.32	0.18	0.04	0.02	0.01
Insig	8,760 hours	0.68	0.41	0	0	0	0	0
Total Emissions		0.86	0.59	5.60	7.36	0.11	2.24	0.19

PTE of cooling tower (insignificant activity) is based on values in application and proposed by the source

Attachment 2. Source Potential to Emit (tons per year)

EU	Conditions	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	HAP
A01	500 hours	0.04	0.04	3.59	0.25	0.01	0.07	0.01
A02	500 hours	0.01	0.01	0.18	0.45	0.01	0.03	0.01
A03	500 hours	0.01	0.01	0.19	2.66	0.01	0.01	0.01
A04	500 hours	0.01	0.01	0.36	3.04	0.01	0.02	0.01
B01	8,760 hours	0.07	0.07	0.90	0.76	0.01	0.05	0.02
C01	210,000 gallons	0	0	0	0	0	2.02	0.10
C02	100,000 gallons							
Total Emissions		0.14	0.14	5.22	7.16	0.05	0.18	0.06

VISIBLE EMISSIONS CHECK GUIDE **(Non-Certified Observer)**

The Clark County Air Quality Regulations (AQRs) require that a facility’s visible emissions be monitored while it is operating to make sure it meets local and federal pollution standards.

This guide tells you how to observe visible emissions and when to bring in a certified Method 9 observer to determine whether facility emissions exceed the standards in the regulations.

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Useful Acronyms

AQR	Clark County Air Quality Regulation	PM	particulate matter
DAQ	Division of Air Quality	PTE	potential to emit
EPA	Environmental Protection Agency	VEC	visible emissions check

Definitions

- *Ambient air* is the part of the atmosphere outside of buildings that the general public has access to.
- *Emissions* are releases of a regulated air pollutant (in particle or gas form) into ambient air.
- *Fugitive dust* is particulate matter that is not collected by a capture system, is “entrained” (suspended) in ambient air, and is caused by human and natural activities—for example, the movement of soils, vehicles, equipment, and wind. Only emissions from sources covered by Section 41 of the AQRs qualify as “fugitive.”
- *Fugitive emissions* are emissions that cannot reasonably be expected to pass through a stack, chimney, vent, or other opening.
- The *line of sight* is the imaginary line between the observer’s position and the source’s emission point.

- The *observation period* is the total time during which observations are made. This is usually six minutes.
- The *opacity* of an emission plume refers to how much light passes through it. A plume with a higher opacity is harder to see through.
- *Regulated pollutants* are airborne substances that the Clean Air Act identifies as being harmful to public health.
- A *stationary source* is any building, structure, facility, or installation that emits (or may emit) any regulated pollutant.
- *Test (or Reference) Method 9* is an approved way to visibly measure pollution in the air. Conducting a Method 9 test requires a certification from the Environmental Protection Agency.

Requirements

DAQ issues permits to all stationary sources in Clark County that have the potential to release regulated pollutants at levels that are at or above regulatory thresholds. Every permit DAQ issues contains the following requirement:

The permittee must be able to produce observation records on-site to the Control Officer's authorized representative, upon request and without prior notice, during the permittee's hours of operation. [AQR 12.1.4.1(d)(2) & AQR 12.1.4.1(s)]

This means that all stationary sources must have someone at the site who regularly observes visible emissions and records those observations. DAQ representatives may inspect a site and ask for those records at any time. If a source repeatedly has issues complying with emissions standards, the Control Officer may require a certified Visible Emissions Evaluation reader to be present whenever the plant is operating.

AQR Section 25.6.1 requires sources with a permit to report each exceedance of visible emissions standards to DAQ. If a compliance inspector documents visible emissions that are above the standards, DAQ may issue a Notice of Violation with civil penalties.

This guide explains how to check for visible emissions if you are not a Method 9-certified observer.

A. Visible Emissions Check

This guide is adapted from the Code of Federal Regulations, Title 40, Part 60, Appendix A, and the California Air Resources Board's *Fundamentals of Enforcement: Visible Emissions Evaluation* handbook. It describes how to perform a visible emissions check in Clark County, Nevada.

A.1 Observation Materials

- Pen or pencil
- Clipboard
- Emissions check form (see sample at end of guide)

A.2 Observation Process

The most important things for establishing a good **line of sight** between the observer and the emission point are:

- (1) the angle of the sun [140°],
- (2) the distance from the observer to the stack (or other emission unit), and
- (3) the observation background.

To determine your position based on the line of sight, you'll need to note:

- Sun position
- Background contrast
- Plume direction
- Plume distance

Observe from a place where the line of sight is at or near a right angle to the wind's direction. This will ensure the most accurate view of the plume's **opacity**.

Answering the following questions will help ensure you're in the best position relative to the sun.

1. Can you see the shadow of either the plume or the emission point on the ground between you and the plume?
 - If yes, the plume is between you and the sun. Change your location.
 - If no, proceed.
2. Is your shadow visible on the ground in front of you?
 - If no, the sun may be in front of you. Change your location.
 - If yes, proceed.

Sun position. Stand so the sun is behind you within a 140° horizontal arc. One way to think about this is to imagine you're standing on the center of a clock face. If you place yourself so that the emission point is at 12:00 and the sun is behind you, between approximately 4:00 and 8:00, you'll be in a good position to do your check. Illustrations at the end of this guide will show you the best places to stand.

Background. It's easiest to see visible emissions against a contrasting background. Try to observe light plumes against a dark background (a tree or dark-colored object), and dark plumes against a light background (a clear sky or light-colored object). Take into account the whole background, not just the areas directly behind, above, and below the emission point.

A.3 Observation Results

Normal. If no emissions are visible, or if visible emissions fall within the opacity standards, use the VEC form to record the observer's name, the facility's location, the date, and the start and stop time of the check. Note on the form the emission unit(s) being observed. Use the unit numbers and descriptions in the DAQ-issued permit.

- Write down a general description of background conditions during the observation (e.g., clear sky, high clouds, mountains, trees, buildings).
- Describe wind conditions (light, moderate, high) and direction.
- Unaltered digital photos and video may be used to record sky conditions, the observer's location relative to the source and the sun, the unit being observed, and the emission points. At least one photo should show the observer's point of view. Pictures meant to show the general environment, including sky conditions and sun position, must be taken within about 15–20 minutes of the observation.

Abnormal. If visible emissions appear to exceed an opacity standard, you have two options.

- **Option 1:** Immediately correct the perceived exceedance, then record the first and last name of the person who performed the emissions check, the date the check was performed, the unit(s) observed, and the results of the observation.
- **Option 2:** Call a certified Visible Emissions Evaluation (VEE) reader to perform an EPA Method 9 evaluation. For sources required to have a certified reader on site, the reader shall start Method 9 observations within 15 minutes of the initial observation. For all other sources, the reader shall start Method 9 observations within 30 minutes of the initial observation.

If no opacity exceedance is observed, the certified VEE reader shall record the first and last name of the person who performed the VEE, the date the VEE was performed, the unit(s) evaluated, and the results. A Method 9 VEE form shall be completed for each emission unit that was initially perceived to have exceeded the opacity limit, and the record shall also indicate:

- The cause of the perceived exceedance;
- The color of the emissions; and
- Whether the emissions were light or heavy.

If an opacity exceedance is observed, the certified VEE reader shall take immediate action to correct the exceedance. The reader shall then record the first and last name of the person performing the VEE, the date the VEE was performed, the unit(s) evaluated, and the results. A Method 9 VEE form shall be completed for each reading identified, and the record shall also indicate:

- The cause of the exceedance;
- The color of the emissions;
- Whether the emissions were light or heavy;
- The duration of the emissions; and
- The corrective actions taken to resolve the exceedance.

Any scenario of visible emissions noncompliance can and may lead to enforcement action.

B. Acknowledgement

I hereby certify that all employees performing opacity checks to demonstrate compliance with the standards of air quality permit have been trained in accordance with this opacity guide. I understand that a signed copy of this opacity guide must be kept on-site and made available to our employees and the Control Officer (or delegated officials) upon request.

Signature

Date

Printed Name: _____

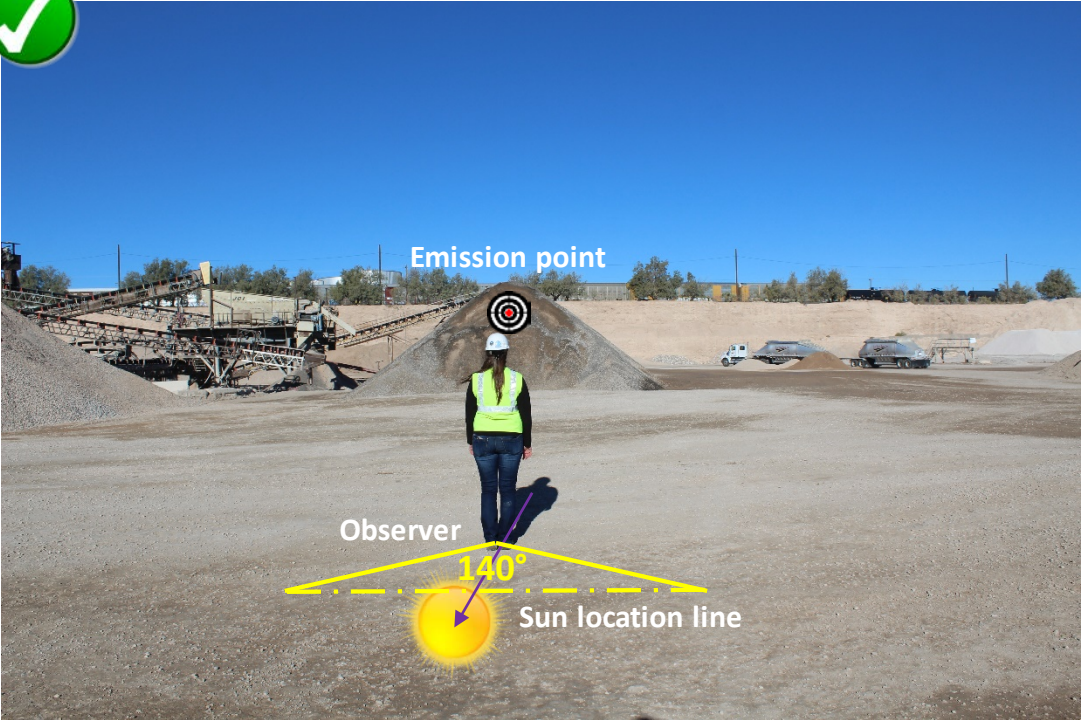
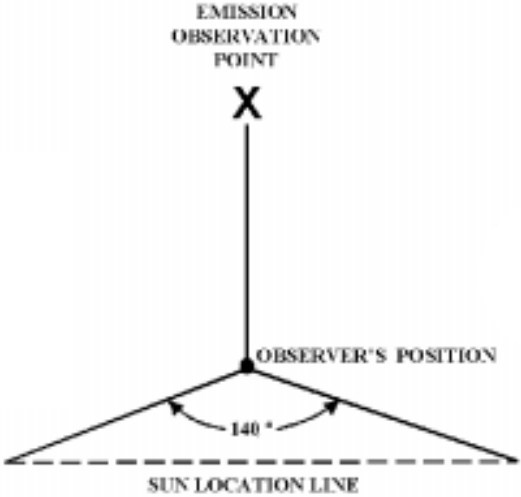
Source ID#: _____

C. Sample Form

VISIBLE EMISSIONS CHECK FORM	
Company:	
Facility/source address:	
Name of observer:	
Date/time of observation:	
Unit observed:	
Sky conditions:	
Wind speed/direction:	
OBSERVATIONS	

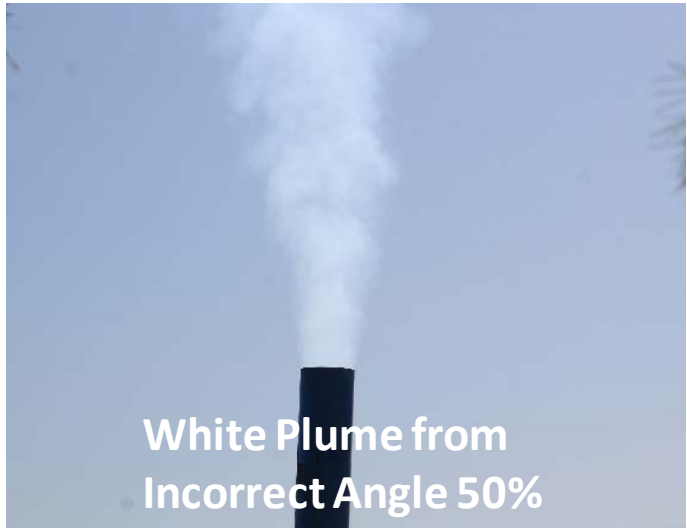
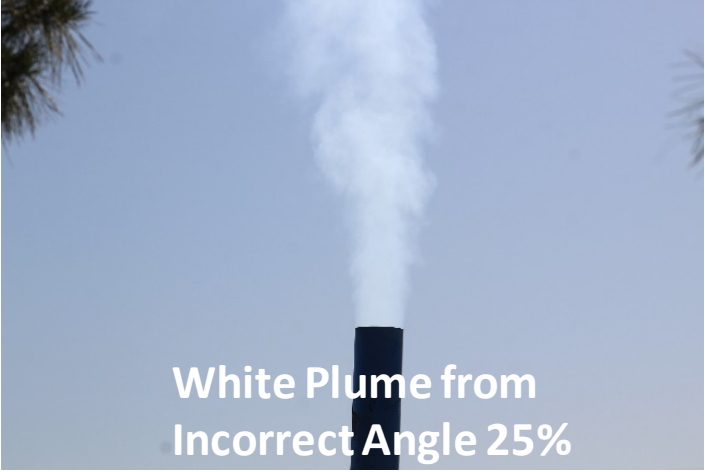
Line of Sight

SOURCE LAYOUT SKETCH



Plume Opacity

The pictures below show emission plumes from a smokestack used to train compliance inspectors. Inspectors are trained to observe plumes of different colors—mostly white and black—and different opacities, from 0 to 100%.



INDEX OF SHEETS - STANTEC

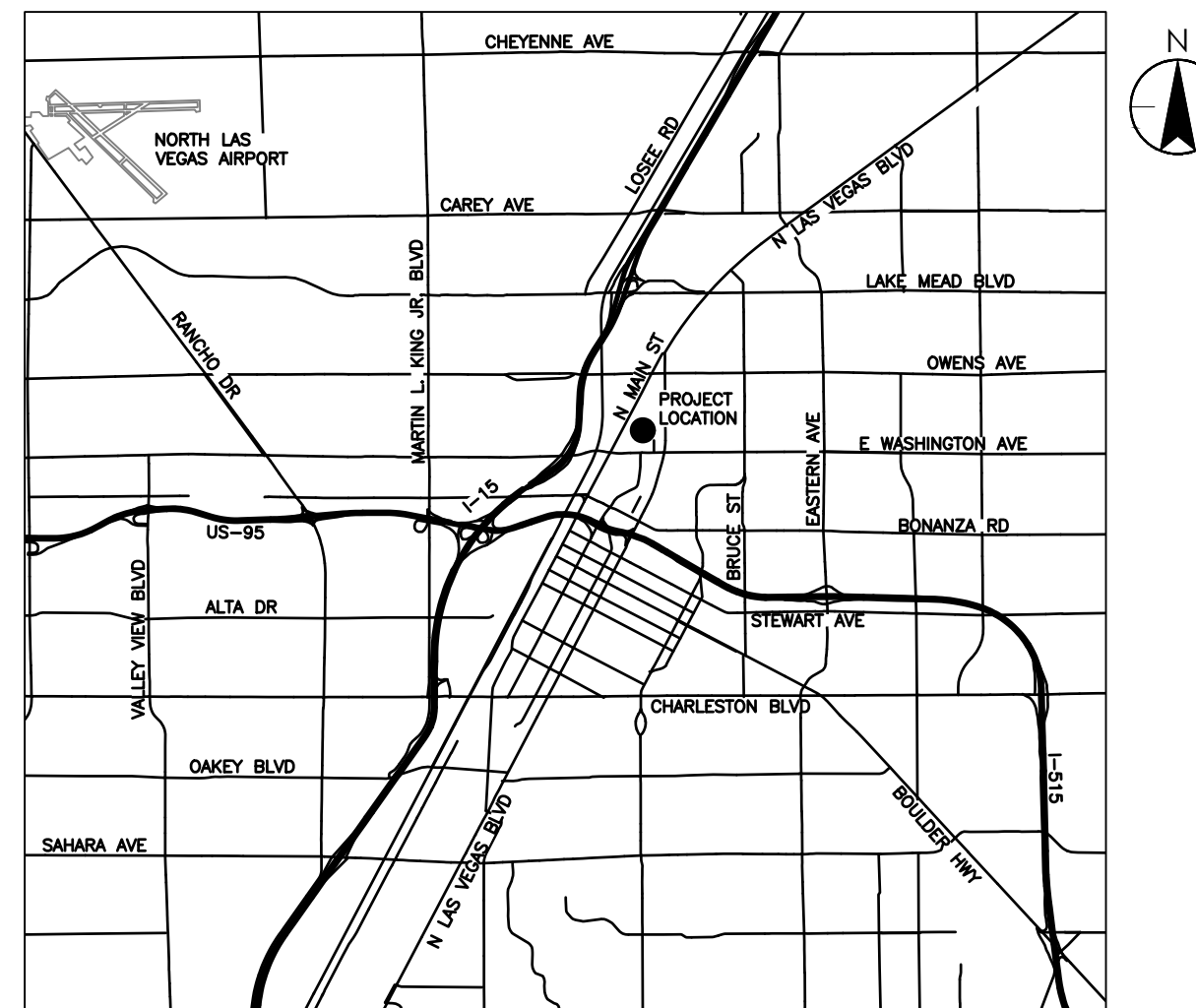
G001	COVER
G002	NOTES
G003	LEGEND AND ABBREVIATIONS
G004	KEY SHEET
G005	SURVEY CONTROL
G006-G007	RECORD OF SURVEY
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D108-D115	DEMOLITION DETAILS
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C108-C115B	CIVIL SITE PLAN SPECIFIC DETAILS
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C208-C215	CIVIL SITE GRADING PLAN SPECIFIC DETAILS
C300-C307	CIVIL UTILITY PLANS
C308-C311	CIVIL STORM DRAIN PROFILES
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E500	ELECTRICAL CANOPY LIGHTING PLAN
S1-S13	CANOPY STRUCTURAL DESIGN

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B4-2	BEATY EQUIPMENT LIST
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S0-1-S1-4	FUEL TANK FOUNDATION SYSTEMS
E0-0	SYMBOL LIST AND DRAWING INDEX
E0-1	ELECTRICAL SPECIFICATIONS
E0-2	SINGLE-LINE DIAGRAM AND PANEL SCHEDULES
E1-0	ELECTRICAL PLAN

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLANS
CLARK COUNTY

123 E. WASHINGTON AVENUE
NDOT LAS VEGAS MAINTENANCE YARD (MY921)
IMPROVEMENTS

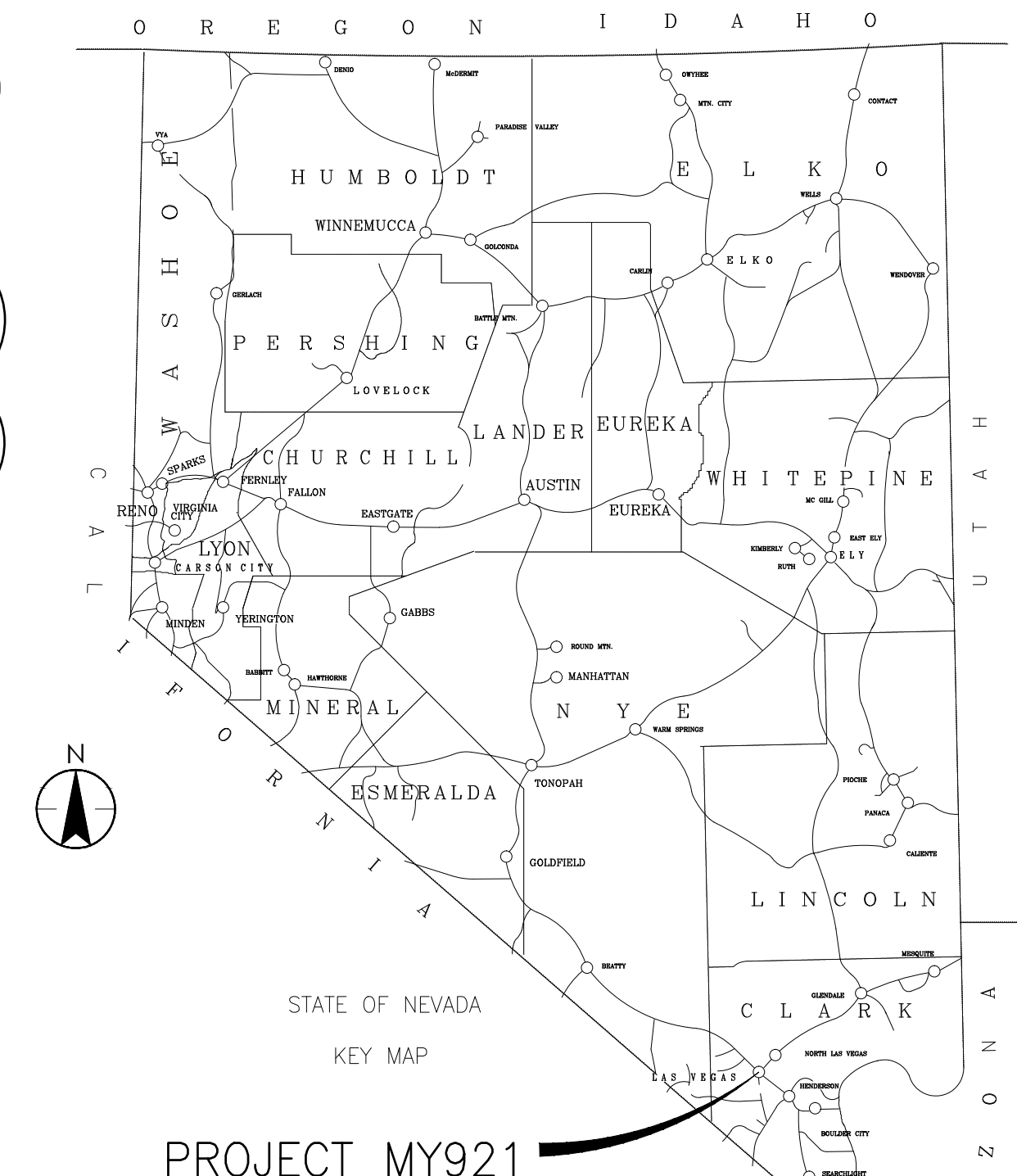


VICINITY MAP
NOT TO SCALE

APPROVALS

City of Las Vegas Engineering

REVIEWED BY
LAS VEGAS FIRE & RESCUE
RELEASE FOR INSTALLATION AS SUBMITTED
This review does not constitute permission to violate any City, State, or Federal Laws or Ordinances. Ultimate responsibility for compliance rests with the Owner.
Final acceptance of installation is based upon field inspection and acceptance testing.
REVIEWED BY
bhalvorson 06/24/2021



PROJECT MY921

BASIS OF DESIGN

- INTERNATIONAL BUILDING CODE (IBC), 2018 EDITION
- INTERNATIONAL EXISTING BUILDING CODE (IEBC), 2018 EDITION
- UNIFORM MECHANICAL CODE (UMC), 2018 EDITION
- UNIFORM PLUMBING CODE (UPC), 2018 EDITION
- NATIONAL ELECTRICAL CODE (NEC), 2017 EDITION
- INTERNATIONAL ENERGY CONSERVATION CODE (IECC), 2018 EDITION
- INTERNATIONAL FIRE CODE (IFC), 2018 EDITION
- 2010 ADA STANDARDS/ADAAG, IC/ANSI, FEDERAL ACCESSIBILITY REQUIREMENTS
- AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 7TH EDITION
- UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY, LATEST EDITION
- UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY, LATEST EDITION
- DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS, CLARK COUNTY WATER RECLAMATION DISTRICT, LATEST EDITION, SANITARY SEWER DESIGN ONLY
- NEVADA ADMINISTRATIVE CODE (NAC) 477 NEVADA STATE FIRE MARSHAL DIVISION REQUIREMENTS TO THE DESIGN CODES (IFC-2012 SECTION 105.4.2)

GENERAL REQUIREMENTS

- ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY, LATEST ADDITION UNLESS SPECIFICALLY IDENTIFIED ON THE PLANS OR TECHNICAL SPECIFICATIONS. SEWER CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS, CLARK COUNTY WATER RECLAMATION DISTRICT, LATEST EDITION UNLESS NOTED OTHERWISE ON THESE PLANS OR THE TECHNICAL SPECIFICATIONS
- ALL BASE SHALL BE TYPE II
- ALL CEMENT SHALL BE CLASS V
- ALL CURB, CURB AND GUTTER, VALLEY GUTTER, CONCRETE PAVEMENT, AND CONCRETE COLLARS SHALL BE MODIFIED CLASS A CONCRETE, 4,500 PSI
- CATCH BASINS, AND DROP INLETS SHALL BE MODIFIED CLASS DA, 4,000 PSI
- MANHOLES SHALL BE MODIFIED CLASS DA, 4,500 PSI
- FOOTINGS AND MAT FOUNDATIONS SHALL BE MODIFIED CLASS A, 4,500 PSI.
- ASPHALT PAVEMENT INCLUDING PATCHING SHALL BE TYPE II COARSE 75 BLOW PG76-22CC
- MICROSURFACING SHALL BE TYPE 2
- ALL PAVEMENT MARKINGS EXCEPT THERMOPLASTIC PAVEMENT MARKINGS SHALL BE TYPE 1 FAST DRY TRAFFIC PAINT
- THERMOPLASTIC PAVEMENT MARKINGS SHALL CONFORM TO TYPE 2 PAVEMENT MARKINGS
- REINFORCING STEEL FOR PAVEMENT AND DECONTAMINATION BASIN SHALL CONFORM TO SPECIFICATIONS SET FORTH IN THE STRUCTURAL PLANS

CONTRACTOR DEFERRED SUBMITTALS

- WASH STATION RECYCLING SYSTEM AND EQUIPMENT AS DEPICTED ON THE M SHEETS AND WASH STATION RECYCLING SYSTEM AND EQUIPMENT AS DESCRIBED IN THE SPECIFICATIONS.
- STRUCTURAL COMPONENTS AS SHOWN ON SHEETS S108 TO S114
- MODULAR HANDICAP RAMP AS SHOWN ON SHEET C111

BASIS OF BEARING AND ELEVATIONS

THE BASIS OF BEARING IS NAD 83/94 NEVADA STATE PLANE EAST ZONE, US SURVEY FEET. GRID TO GROUND FACTOR=1.0001770

THE BASIS OF ELEVATION IS NAVD '88, BASED UPON MONUMENT 710001M WITH AN ELEVATION OF 2081.428 FEET

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 07/24/21 12:52 PM by: J. Buzzone

Permit Seal	Key Map	Client/Project	Title
		STATE OF NEVADA DEPARTMENT OF TRANSPORTATION 123 E. WASHINGTON AVE, NDOT LAS VEGAS MAINTENANCE YARD (MY921) IMPROVEMENTS Las Vegas, Clark County, Nevada	COVER PAGE
6/17/2021		6995 Sierra Center Parkway Reno, NV 89511 www.stantec.com	Project No. 181300599
		The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay. The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.	Scale SEE SHEET
			Drawing No. G001
			Sheet 1 of 177
			Revision 1

CLV DWG & APP #:
107V9042, L21-01092

WATER NOTES

1. WATER MAIN SHUTDOWNS/INTERRUPTION OF WATER/FIRE SERVICE; OBTAIN TENTATIVE APPROVAL FROM NDOT PRIOR TO PLANNING A SHUTDOWN. APPROVAL IS REQUIRED FIVE WORKING DAYS PRIOR TO NOTIFICATION. SPECIAL ARRANGEMENTS INCLUDING NIGHT TIME SHUTDOWNS MAY BE REQUIRED OF THE CONTRACTOR TO ACCOMMODATE NDOT OPERATIONS. THE TOTAL TIME OF ANY WATER SERVICE INTERRUPTION IS LIMITED TO 4 HOURS MAXIMUM. THE CONTRACTOR SHALL NOT OPERATE ANY EXISTING WATER VALVES.
2. MAINTAIN 18 INCHES VERTICAL AND 5 FEET HORIZONTAL SEPARATION BETWEEN ALL UNDERGROUND UTILITY LINES AND WATER LINES. IF WATER LINE IS BELOW POWER LINE OR IS WITHIN 18 INCH VERTICAL SEPARATION OF POWER LINE, POWER/TELEPHONE LINE SHALL BE ENCASED WITH 4 INCHES MINIMUM OF CONCRETE EXTENDING 5 FEET EACH SIDE OF CROSSING. CONCRETE ENCASEMENT OF WATER LINES IS NOT ALLOWED. SEE NV ENERGY SPECIFICATIONS SECTION RC-3 FOR CONDUIT ENCASEMENT.
3. ALL HOT TAPS TO BE PERFORMED BY THE CONTRACTOR, EXCLUDING CONNECTIONS TO EXISTING STEEL CYLINDER PIPE. THE CONTRACTOR SHALL CONTACT LAS VEGAS VALLEY WATER DISTRICT AT LEAST 2 WORKING DAYS PRIOR TO SCHEDULING HOT TAP DATE AND TIME. PRIOR TO HOT TAPPING, THE SADDLE SHALL BE HYDROSTATICALLY PRESSURE TESTED TO 150 PSI MINIMUM OR THE DESIGN OF PIPE SYSTEM FOR A MINIMUM OF 5 MINUTES. THE TEST SHALL BE PERFORMED IN THE PRESENCE OF THE WATER UTILITY PERSONNEL PRIOR TO PERFORMING THE TAP. ALL TAPPING EQUIPMENT SHALL BE DISINFECTED AND INSPECTED BY CITY FORCES PRIOR TO TAPPING A CITY MAIN. EXISTING STEEL CYLINDER PIPE SHALL BE PERFORMED BY AN APPROVED COMPANY LISTED IN THE AGENCY ADDENDA SECTION OF THE LVVWD SPECIFICATIONS
4. REDUCED PRESSURE PRINCIPLE AND DOUBLE CHECK VALVE BACKFLOW ASSEMBLIES SHALL COMPLY WITH UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS AND BE APPROVED BY LAS VEGAS VALLEY WATER DISTRICT PRIOR TO INSTALLATION, AND TESTED BY A CERTIFIED BACKFLOW ASSEMBLY TESTER, AND TEST RESULTS SHALL BE APPROVED BY LAS VEGAS VALLEY WATER DISTRICT. ALL NEW WATER METER SETS SHALL COMPLY WITH UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS.
5. ALL WATER MAIN, WATER/FIRE SERVICE, AND BACKFLOW PREVENTION INSPECTIONS AND TESTING MUST BE APPROVED PRIOR TO APPROVAL OF ANY CERTIFICATE OF OCCUPANCY.
6. DISINFECTION AND TESTING OF WATER LINES SHALL COMPLY WITH SPECIFICATION REQUIREMENTS PRIOR TO BEING PLACED IN SERVICE.

ASBESTOS PIPE NOTES

1. CONTRACTOR MAY BE REQUIRED TO HANDLE, DISTURB OR REMOVE CERTAIN WATER PIPES CONSTRUCTED OF TRANSITE AND ASBESTOS CONTAINING MATERIALS REGULATED AS A POTENTIALLY HAZARDOUS MATERIAL AS PART OF THE WORK ASBESTOS OR TRANSITE PIPE WHICH HAS NOT BEEN CUT OR DAMAGED OR WHICH IS NOT TAPPED, CUT, DAMAGED OR REMOVED DURING PERFORMANCE OF THE WORK, SHALL NOT BE DEEMED "HAZARDOUS MATERIALS" FOR PURPOSES OF THESE GENERAL CONDITIONS. NDOT MUST BE PROVIDED WITH CHAIN OF CUSTODY FORMS FOR ALL TRANSITE OR ASBESTOS PIPE DISPOSED OF BY CONTRACTOR OR ITS SUBCONTRACTORS. ANY DISTURBANCE, REMOVAL, DISPOSAL, HANDLING OR WORK ACTIVITY ON TRANSITE PIPE MUST BE DONE IN STRICT COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS GOVERNING THE SAFE HANDLING PRACTICES FOR DISTURBANCE, REMOVAL, HANDLING AND DISPOSAL OF ASBESTOS-CONTAINING MATERIAL, AND CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL COSTS AND ACTIONS NECESSARY TO COMPLY WITH SUCH LAWS AND REGULATIONS. CONTRACTOR SHALL PROVIDE THE DISPOSAL MANIFEST TO THE NDOT INSPECTOR SHOWING ALL TRANSITE PIPE MATERIAL HAS BEEN DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. CONTRACTOR SHALL INDEMNIFY AND HOLD NDOT HARMLESS FROM ANY CLAIMS, INJURIES, DEMANDS OR LIABILITIES ARISING FROM CONTRACTOR'S HANDLING, REMOVAL, DISPOSAL OR WORK ON OR ABOUT TRANSITE PIPE.
2. CONTRACTOR'S PERSONNEL PERFORMING WORK ON ASBESTOS OR TRANSITE PIPE, INCLUDING WITHOUT LIMITATION CUTTING, TAPPING, REPAIRING, OR REMOVING, MUST HAVE SUCCESSFULLY COMPLETED SPECIALIZED OSHA TRAINING IN THE HANDLING AND DISPOSAL OF ASBESTOS PRIOR TO THE PERFORMANCE OF ANY SUCH WORK, OR CONTRACTOR SHALL HIRE A SUBCONTRACTOR THAT HAS SUCCESSFULLY COMPLETED SPECIALIZED OSHA TRAINING IN THE HANDLING AND DISPOSAL OF ASBESTOS TO PERFORM SUCH WORK.

GENERAL NOTES

1. LOCATIONS OF UNDERGROUND FACILITIES SHOWN ON THE PLANS HAVE BEEN DETERMINED BY GROUND PENETRATING RADAR (GPR), CONVENTIONAL FIELD SURVEY, AVAILABLE RECORD DRAWING AND POTSOLE INFORMATION. ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITY STRUCTURES, WHETHER SHOWN OR NOT, AND TO NOTIFY ALL UTILITY COMPANIES TO VERIFY IN THE FIELD THE LOCATION OF THEIR INSTALLATIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL PROTECT ALL UTILITY STRUCTURES FROM DAMAGE. THE EXPENSE OF REPAIR OR REPLACEMENT SHALL BE BORNE SOLELY BY THE CONTRACTOR. THE CONTRACTOR SHALL REQUEST FIELD MARKING OF EXISTING UTILITIES AT LEAST 48 HOURS IN ADVANCE OF BEGINNING CONSTRUCTION BY CALLING UNDERGROUND SERVICE ALERT AT 811. IT WILL BE THE CONTRACTORS RESPONSIBILITY TO MAINTAIN AND PROTECT ALL UTILITIES DURING CONSTRUCTION.
2. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXECUTED TO COMPLETION WITHOUT DELAY SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC. THE CONSTRUCTION OF THE STREET IMPROVEMENTS SHALL ALLOW FOR THE PERPETUATION OF ALL EXISTING LEGAL ACCESSSES AND EXISTING DRIVEWAYS, UNLESS OTHERWISE NOTED.
3. THE CONTRACTOR SHALL COOPERATE WITH OTHER CONTRACTORS OR UTILITY COMPANY FORCES WORKING ON THE SITE, AND WITH BUSINESS OWNERS ACTIVE OPERATIONS.
4. UNLESS OTHERWISE INDICATED IN THE DRAWINGS, ALL SURFACES SHALL BE RESTORED TO THEIR ORIGINAL OR BETTER CONDITION AT THE COMPLETION OF CONSTRUCTION. EXISTING CONCRETE SUCH AS SIDEWALK, CURB, AND GUTTER SHALL BE REMOVED TO LIMITS MARKED IN FIELD BY THE CONTRACTORS SURVEYOR. ALL REMOVAL MATERIALS SHALL BE DISPOSED OF OFF SITE AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL EXERCISE CAUTION WHEN WORKING ON PRIVATE PROPERTY.
5. AT LOCATIONS WHERE NEW UNDERGROUND FACILITIES CROSS EXISTING FACILITIES THE CONTRACTOR SHALL EXPOSE THE EXISTING FACILITY AND VERIFY THAT SUFFICIENT HORIZONTAL AND VERTICAL CLEARANCE EXISTS FOR THE NEW FACILITY TO BE CONSTRUCTED IN COMPLIANCE WITH THE PLANS. AT LOCATIONS WHERE NEW UNDERGROUND FACILITIES ARE TO BE CONNECTED TO EXISTING FACILITIES THE CONTRACTOR SHALL EXPOSE THE EXISTING FACILITY AND VERIFY THAT THE CONNECTION CAN BE MADE AS SHOWN ON THE PLANS. THIS VERIFICATION SHALL BE PERFORMED PRIOR TO ANY CONSTRUCTION. ANY CONFLICTS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION AS SOON AS THEY ARE DISCOVERED.
6. ALL DIMENSIONS TO CURBS OR CURB AND GUTTERS ARE TO THE FRONT FACE OF CURB UNLESS NOTED OTHERWISE ON THE DRAWINGS.
7. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF DISCREPANCIES BETWEEN THE INFORMATION SHOWN ON THESE DRAWINGS AND THE CONDITIONS EXISTING IN THE FIELD. THE CONTRACTOR SHALL COMPARE ALL DRAWINGS AND VERIFY THE FIGURES BEFORE STARTING THE WORK AND WILL BE RESPONSIBLE FOR ANY ERRORS WHICH MIGHT HAVE BEEN AVOIDED THEREBY. IF THE CONTRACTOR FAILS TO NOTIFY THE OWNER OR THEIR REPRESENTATIVE IN A TIMELY MANNER OF ANY APPARENT ERROR OR OMISSION ON THE PLANS OR SPECIFICATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTING WORK INCORRECTLY DONE AT THE CONTRACTOR'S EXPENSE.
8. THE USE OF POTABLE WATER FROM THE PUBLIC WATER SYSTEM FOR CONSTRUCTION PURPOSES IS PROHIBITED. CONSTRUCTION WATER USED FOR COMPACTION AND DUST CONTROL SHALL BE OBTAINED FROM AN APPROVED SOURCE.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL MANHOLE RIMS AND ANY EXISTING UTILITY COVERS WITHIN THE CONSTRUCTION LIMITS ARE SET FLUSH WITH THE NEW FINISHED GRADE IN PAVEMENT.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING STAGING AREA LOCATIONS. CONTRACTOR SHALL OBTAIN WRITTEN APPROVAL PRIOR TO USING A STAGING AREA. THE CONTRACTOR SHALL OBTAIN ANY PERMITS FROM THE CITY OF LAS VEGAS, AND NEVADA DEPARTMENT OF TRANSPORTATION (NDOT) THAT ARE REQUIRED FOR STOCKPILING/PROCESSING MATERIALS.
11. PAYMENT FOR WORK SHOWN ON THESE PLANS EITHER SPECIFIED OR INFERRED, BUT NOT INCLUDED IN THE BID PROPOSAL, SHALL BE CONSIDERED AS INCLUDED IN THE PRICE PAID FOR OTHER ITEMS OF WORK.
12. DURING THE ENTIRE DURATION OF THIS CONSTRUCTION CONTRACT, THE CONTRACTOR SHALL IMPLEMENT STRINGENT DUST CONTROL MEASURES IN ACCORDANCE WITH THE TERMS OF THE APPROVED DUST CONTROL PERMIT AND SOUTHERN NEVADA HEALTH DEPARTMENT RULES AND REGULATIONS. THE CONTRACTOR IS REQUIRED TO SUPPRESS DUST AT ALL TIMES, 24 HOURS A DAY, SEVEN (7) DAYS A WEEK, REGARDLESS OF WHEN CONSTRUCTION ACTIVITIES ARE OCCURRING.
13. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRS TO EXISTING LANDSCAPING DAMAGED BY OR THROUGH CONSTRUCTION ACTIVITIES. REPAIRS SHALL BE MADE TO THE SATISFACTION OF THE ENGINEER AND OWNER. THERE WILL BE NO DIRECT PAYMENT FOR THIS WORK.
14. BEFORE ANY WORK IS STARTED IN THE STREET RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ADVANCED WARNING SIGNS FOR THE CONSTRUCTION ZONE. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE NEVADA DEPARTMENT OF TRANSPORTATION STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" - CURRENT EDITION AND TO THE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES" - CURRENT EDITION AND BE APPROVED BY NDOT AND THE CITY OF LAS VEGAS.
15. PROTECTION AND REPLACEMENT OF ALL SURVEY MONUMENTS OR PROPERTY STAKES NOT DELINEATED ON THE CONTRACT DRAWINGS SHALL BE THE CONTRACTOR'S RESPONSIBILITY. DAMAGED OR REMOVED MONUMENTS AND/OR PROPERTY STAKES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE BY A LICENSED SURVEYOR PER NEVADA REVISED STATUTES 625.380.
16. THE APPROVED PLAN, PERMITS AND INSPECTION RECORD MUST BE ON THE JOB SITE AT ALL TIMES.
17. PLAN APPROVAL FOR SEWER AND WATER CONSTRUCTION SHALL EXPIRE AS STATED IN THE PERMIT CONDITIONS.
18. PROFILES MAY NOT REFLECT ALL UTILITY CROSSING.
19. CONTRACTOR SHALL COORDINATE WITH NDOT FOR RELOCATION OF NON-PROJECT RELATED EQUIPMENT.
20. SHORING MAY BE REQUIRED FOR INSTALLATION OF UNDERGROUND IMPROVEMENTS.

DEMOLITION NOTES

1. CONTRACTOR SHALL DEMO ALL STRUCTURE FOUNDATIONS AND FOOTINGS AND SHALL BACKFILL ALL EXCAVATIONS TO THE GRADES SHOWN ON THE GRADING PLAN. BACKFILL COMPACTION SHALL CONFORM TO THE UNIFORM STANDARD SPECIFICATIONS.
2. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH ALL UTILITIES INVOLVED IN THE DEMOLITION AND SHALL ABANDON OR REMOVE PER EACH UTILITY'S STANDARDS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITS AND FEES ASSOCIATED WITH THE DEMOLITION. NDOT SHALL PROVIDE THE BUILDING AND FIRE-LIFE-SAFETY PERMITS.
4. CONTRACTOR SHALL INVESTIGATE THE SITE PRIOR TO BID AND SHALL BE RESPONSIBLE FOR REMOVING ALL TRASH, DEBRIS, AND ABANDONED EQUIPMENT ON SITE. (TRASH, DEBRIS, AND ABANDONED EQUIPMENT NOT SHOWN ON DRAWINGS)
5. CONTRACTOR SHALL GIVE THE OWNER (NDOT) THE FIRST RIGHT OF REFUSAL FOR ALL DEMO ITEMS. CONTRACTOR SHALL TAKE OWNERSHIP OF ALL ITEMS THE OWNER DOES NOT WANT.
6. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL APPLICABLE ITEMS ON THE DEMOLITION REVIEW CHECKLIST BELOW HAVE BEEN ADDRESSED. THE INSPECTOR WILL VERIFY THAT ALL SAFETY REQUIREMENTS HAVE BEEN IMPLEMENTED. WHEN THE DEMOLITION HAS BEEN COMPLETED, A FINAL DEMOLITION INSPECTION IS REQUIRED.
7. DEMOLITION QUANTITIES NOTED ON SHEET D100 TO D107 ARE NOT LIMITED TO A PER SHEET BASIS. ITEMS CAN BE QUANTIFIED ACROSS MULTIPLE SHEETS.
8. ITEMS DESIGNATED AS SALVAGED SHALL BE DELIVERED TO DISTRICT 1 FOR FUTURE USE.

DEMOLITION CHECKLIST

1. NV ENERGY, LAS VEGAS VALLEY WATER DISTRICT, SOUTHWEST GAS, PHONE, CABLE AND ANY OTHER UTILITY OR AGENCY AFFECTED BY THE DEMOLITION SHALL BE CONSULTED. OVERHEAD WIRING SHALL BE PROPERLY PROTECTED PER AGENCY REQUIREMENTS.
2. WHEN REQUIRED BY THE BUILDING OFFICIAL, A COMPLETE INSPECTION OF THE BUILDING BY A STRUCTURAL ENGINEER TO DETERMINE STRUCTURAL SYSTEMS AND ANY SPECIAL CONDITIONS AFFECTING DEMOLITIONS SHALL BE CONDUCTED PRIOR TO DEMOLITION AND SUBMITTED TO THE DEPARTMENT FOR REVIEW.
3. DURING THE DEMOLITION, CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLANS OR CONSTRUCTION PHASING PLAN TO DIRECT VEHICLE AND PEDESTRIAN TRAFFIC AROUND OR THROUGH DEMOLITION AREAS DURING OPERATIONS.
4. ANY CLOSURE OF CITY RIGHTS-OF-WAY (SIDEWALKS, STREETS, ALLEYS, ETC.) SHALL REQUIRE ISSUANCE OF AN ENCROACHMENT PERMIT FROM THE CITY OF LAS VEGAS FORTY-EIGHT (48) HOURS PRIOR TO THE CLOSURE.
5. THE WORK OF DEMOLISHING ANY BUILDING SHALL NOT BE COMMENCED UNTIL THE REQUIRED PEDESTRIAN PROTECTION STRUCTURES ARE IN PLACE (PER THE INTERNATIONAL BUILDING CODE, CURRENT VERSION).
6. PEDESTRIAN PROTECTION SHALL CONFORM TO THE REQUIREMENT OF THE INTERNATIONAL BUILDING CODE, CURRENT VERSION.
7. NO FREE-STANDING WALLS WILL BE ALLOWED.
8. NON-BEARING EXTERIOR WALLS SHALL BE CUT DOWN TO A SAFE LEVEL BEFORE BEARING WALLS ARE REMOVED.
9. ROOF AND FLOOR DIAPHRAGMS SHALL BE REMOVED ONLY TO THE EXTENT NEEDED TO FREE THE WALLS BELOW FOR IMMEDIATE DEMOLITION.
10. WALLS SHALL BE FEATHERED BACK AT A 45 DEGREE ANGLE BEFORE WORK IS HALTED.
11. DUST CONTROL SHALL BE MAINTAINED AT ALL TIMES TO THE SATISFACTION OF THE CLARK COUNTY HEALTH DISTRICT. CONTRACTOR SHALL OBTAIN A DUST CONTROL PERMIT.
12. ALL ADJACENT STRUCTURES MUST BE ADEQUATELY PROTECTED.
13. THE HIGHEST STANDARDS OF WORKMANSHIP AND SAFETY SHALL BE MAINTAINED THROUGHOUT THE JOB.
14. WHEN ANY UNSAFE CONDITIONS ARE ENCOUNTERED, WORK SHALL BE HALTED, THE STRUCTURE SECURED, AND THE STATE PUBLIC WORKS DIVISION NOTIFIED IMMEDIATELY.
15. SANITARY SEWER SERVICE LATERALS SHALL BE CAPPED AND LABELED. INSPECTOR MUST SEE CAPS BEFORE COVERING.
16. ALL IMPROVEMENTS WITHIN CITY OF LAS VEGAS PUBLIC RIGHT OF WAY SHALL BE REPAIRED AS PER THE CITY OF LAS VEGAS, MAINTENANCE & ENGINEERING DEPARTMENT REQUIREMENTS.
17. AFTER DEMOLITION IS COMPLETED, THE SITE SHALL BE LEFT IN A SAFE, CLEAN, AND SANITARY CONDITION, ENSURING THAT ALL FOUNDATIONS, DEBRIS, CONSTRUCTION MATERIALS, FURNISHINGS, TRASH, GARBAGE, ETC. ARE COMPLETELY REMOVED. IF IT BECOMES NECESSARY TO FILL IN ANY OF THE EXCAVATIONS, IT SHALL BE DONE WITH FILL MEETING THE STANDARDS AS SET FORTH IN THE PROJECT SPECIFICATIONS.
18. ALL SIGNS TO CONTROL TRAFFIC IN THE PUBLIC STREETS AND RIGHTS-OF-WAY SHALL CONFORM TO THE REQUIREMENTS AS SHOWN IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES WITH INFORMATION AVAILABLE IN THE TRAFFIC DIVISION OF THE CITY OF LAS VEGAS ENGINEERING DEPARTMENT. ALL OTHER SIGNS REQUIRED AT THE SITE SHALL HAVE BLACK OR RED LETTERING ON A WHITE BACKGROUND OF EQUAL SIZE AND QUALITY TO THE ABOVE STATED MANUAL.
19. AN ASBESTOS ASSESSMENT REPORT APPROVED AND SIGNED BY THE CLARK COUNTY HEALTH DISTRICT, AIR QUALITY DIVISION, IS REQUIRED PRIOR TO ISSUING OF A DEMOLITION PERMIT. REPORT IS PROVIDED IN SPECS FOR COUNTY APPROVAL. CONTRACTOR SHALL IMPLEMENT THE REQUIREMENTS OF THIS REPORT.

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Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

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Key Map

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Client/Project

STATE OF NEVADA
 DEPARTMENT OF TRANSPORTATION

123 E. WASHINGTON AVE, NDOT LAS VEGAS
 MAINTENANCE YARD (MY921) IMPROVEMENTS

Las Vegas, Clark County, Nevada

File Name:

Dwn. Chkd. Dsgn. YY.MM.DD

Title

PROJECT NOTES

Project No. 181300599 Scale SEE SHEET

Drawing No. G002 Sheet 2 of 177 Revision 0

CLV DWG & APP #:
 107V9042, L21-01092

ABBREVIATIONS

AB	AGGREGATE BASE AWWA
AC	ASPHALTIC CEMENT
A.D.	ALGEBRAIC DIFFERENCE
AP	ANGLE POINT
APP	ASPHALT PAVEMENT PATH
ARV	AIR RELEASE VALVE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWWA	AMERICAN WATER WORKS ASSOCIATION
B/E	BASE PLATE
BC	BEGINNING OF CURVE
BF	BOTTOM OF FOOTING
BFC	BACK FACE OF CURB
BFV	BUTTERFLY VALVE
BVCS	BEGINNING OF VERTICAL CURVE STATION
BW	BACK OF SIDEWALK
CB	CATCH BASIN
C of CL	CENTERLINE
COWRD	CLARK COUNTY WATER RECLAMATION DISTRICT
CHKD	CHECKED
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CONST.	CONSTRUCT
CV	CHECK VALVE
DI	DROP INLET
DIA	DIAMETER
D.I.P.	DUCTILE IRON PIPE
DR	DRAWN
DW	DRIVEWAY
DWN	DRAWN
E	EASTING
EFC	END OF CURVE
EG	ELEVATION
ELB	ELBOW
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
EVC	END OF VERTICAL CURVE ELEVATION
EVCES	END OF VERTICAL CURVE STATION
EW	EACH WAY
EX	EXISTING
(E)	EXISTING
FC	FLEXIBLE COUPLING
FCA	FLANGED COUPLING APAPTER
FCS	FIELD CONTROL STATION
FEL&C	FUSION EPOXY LINED & COATED
FF	FINISH FLOOR
FFC	FRONT FACE OF CURB
FG	FINISH GRADE
FH	FIRE HYDRANT
FIN	FINISHED
FL	FLOWLINE
FLG	FLANGED
FPT	FEMALE PIPE TAPER
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FEET
FV	FLUSH VALVE
FW	FRESH WATER
G	GAS
GALV	GALVANIZED
GB	GRADE BREAK
GE	GROOVED END
GPM	GALLONS PER MINUTE
GSP	GALVANIZED STEEP PIPE
GV	GATE VALVE
HDPE	HIGH DENSITY POLYETHYLENE
HORZ	HORIZONTAL
HP	HIGH POINT
HW	HEAD WALL
IE	INVERT ELEVATION
INSUL	INSULATED
K	RATE OF VERTICAL CURVATURE
L	LENGTH
L	LEFT
LAT.	LATERAL
LF	LINEAL FEET
LP	LOW POINT
LT.	LEFT
LWWD	LAS VEGAS VALLEY WATER DISTRICT
MAX	MAXIMUM
M.D.D.	MAXIMUM DRY DENSITY
MFG	MANUFACTURER
MIN.	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MPOC	MID POINT OF CURVE

N	NORTHING
NC	NORMALLY CLOSED
NDP	NO DIRECT PAYMENT
NFPA	NATIONAL FIRE PREVENTION ASSOCIATION
NG	NATURAL GAS
NO	NORMALLY OPEN
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OHP	OVERHEAD POWER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PC	POINT OF CURVATURE
PCC	PORTLAND CEMENT CONCRETE
PCC	POINT OF COMPOUND CURVATURE
PE	PLAIN END PROFESSIONAL ENGINEER
PI	POINT OF INTERSECTION
PLATE	PLATE
POC	POINT ON CURVE
POT	POINT ON TANGENT
PPB	PEDESTRIAN PUSH BUTTON
PRC	POINT OF REVERSE CURVATURE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PVI	POINT OF VERTICAL INTERSECTION
PVC	POLYVINYL CHLORIDE
R	RADIUS
R	RIGHT
RCP	REINFORCED CONCRETE PIPE
RED	REDUCER
REF	REFERENCE
REINIF	REINFORCED
REQD	REQUIRED
RET.	RETURN
RMJ	RESTRAINED MECHANICAL JOINT
RJ	RESTRAINED JOINT
RP	RADIUS POINT
RT.	RIGHT
R/W	RIGHT OF WAY
RW	RECYCLED WATER
R&W	REMOVE WASTE
S	SLOPE
SCH	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SDT	STORM DRAIN TREATMENT MANHOLE
SF	SQUARE FEET
SHT	SHEET
SP	SOAP
SPD	SUMP PUMP DISCHARGE
SQ	SQUARE
SS	SANITARY SEWER
SSCO	SANITARY SEWER CLEANOUT
SSMH	SANITARY SEWER MANHOLE
SST	STAINLESS STEEL
SSWR	SANITARY SEWER
STA	STATION
STD	STANDARD
STL	STEEL
STM	STEAM
SUP	SHARED USE PATH
SW	SIDEWALK
TC	TOP OF CURB
TDC	TOP OF DEPRESSED CURB
TEL	TELEPHONE
TP	TOP OF PAVEMENT
TW	TOP OF WALL
TYP.	TYPICAL
UNLESS	UNLESS NOTED OTHERWISE
USPWC	UNIFORM SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
VERT.	VERTICAL
V.C.	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VG	VALLEY GUTTER
V.P.I.	VERTICAL POINT OF INTERSECTION
W	WATER
W	WALK
WLD	WELD

--- x --- x ---	EXISTING FENCE
-----	EXISTING FACILITIES
-----	EXISTING PROPERTY LINES
-----	EXISTING EDGE OF PAVEMENT/ROAD
-----	EXISTING DIRT ROAD
-----	EXISTING UTILITY EASEMENT
-----	EXISTING GRADE
----- E	EXISTING ELECTRICAL
----- FO	EXISTING FIBER OPTIC
----- OHP	EXISTING OVERHEAD POWER
----- OHT	EXISTING OVERHEAD TELEPHONE
----- SD	EXISTING STORM DRAIN
----- SS	EXISTING SANITARY SEWER
----- T	EXISTING TELEPHONE
----- W	EXISTING WATER
----- UGT	EXISTING UNDERGROUND TELEPHONE
----- E	EXISTING ELECTRICAL
--- 4354 ---	EXISTING CONTOUR

EXISTING LEGEND

	EXISTING PIPE OR STRUCTURE TO BE ABANDONED OR REMOVED
	EXISTING SPOT ELEVATION
	EXISTING POWER POLE AND GUY WIRE
	EXISTING WATER VALVE
	EXISTING SANITARY SEWER MANHOLE
	EXISTING STORM DRAIN MANHOLE
	EXISTING LIGHT POLE
	EXISTING WATER VALVE/WATER METER
	EXISTING FIRE HYDRANT
	EXISTING UTILITY MANHOLE
	EXISTING GAS VALVE/GAS METER
	EXISTING MONITORING WELL
	EXISTING BOLLARD/POST

PROPOSED LEGEND

	SECTION IDENTIFICATION CALLOUT
	DETAIL IDENTIFICATION CALLOUT
	NEW FACILITIES
	LIMITS OF CONSTRUCTION
	FENCE
	CENTERLINE
	UNDERGROUND PIPE
	SECTION LINES
	SILT FENCE
	FILL SLOPE
	CUT SLOPE
	SLOPE OF NEW PIPE (PROFILE)
	VERTICAL POINT OF INTERSECTION
	FLOW ARROWS
	DESIGN ELEVATION INDICATORS
	SANITARY SEWER CLEANOUT
	SANITARY SEWER MANHOLE
	STORM DRAIN MANHOLE
	STORM DRAIN TREATMENT VAULT
	FLOWLINES
	4"SS SANITARY SEWER PIPE (DIAMETER)
	15"SD STORM DRAIN PIPE (DIAMETER)
	CATCH LIMITS
	AIR RELEASE VALVE
	AIR & VACUUM VALVE
	COMBINATION AIR VALVE
	GATE VALVE
	CHECK VALVE
	YARD HYDRANT
	FLOW ARROW
	UTILITY VAULT
	TEST STATION
	NEW SSMH
	PUSH ON JOINT FITTING
	FLANGED FITTING
	MECHANICAL JOINT FITTING
	FLANGED COUPLING ADAPTER
	FLEXIBLE COUPLING
	WELDED FITTING
	GROOVED END FITTING

NOTE: ALL SYMBOLS OR ABBREVIATIONS MAY NOT BE USED ON PLANS

1	CLV REVIEW PERMITTING COMMENTS	AP	JBB	21.06.16
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Key Map



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STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title
LEGENDS AND ABBREVIATIONS

Project No. 181300599 Scale SEE SHEET

Drawing No. G003 Sheet 3 of 177 Revision 0

CLV DWG & APP #: 107V9042, L21-01092

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VERTICAL DATUM: ELEVATIONS ARE BASED UPON NAVD83/94. BASIS IS MONUMENT 710001M(2081.428).

BEARING SOURCE: ELEVATIONS OF THIS MAP ARE BASED UPON GPS SPIRIT LEVEL. COORDINATES REFLECT A SINGLE COMBINATION GRID TO GROUND FACTOR OF 1.0001770 AND HAVE BEEN CONVERTED TO FEET. MONUMENTS ARE STAMPED WITH "NDOT" AND MONUMENT NAME UNLESS NOTED IN DESCRIPTION.

SPECIAL NOTE: PLSS MONUMENTS LISTED IN THIS CONTRACT ARE REQUIRED TO BE PERPETUATED UNDER THE DIRECT SUPERVISION OF A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF NEVADA TO ASSURE COMPLIANCE WITH NEVADA REVISED STATUTES, CHAPTERS 329 & 625. ANY MONUMENTS FOUND DURING SURVEY, MAPPING, CONSTRUCTION OR MAINTENANCE PHASES OF NEVADA DEPARTMENT OF TRANSPORTATION PROJECTS NOT LISTED FOR PERPETUATION IN THE CONTRACT PLANS SHALL BE PERPETUATED IN ACCORDANCE WITH THE STATE OF NEVADA DEPARTMENT OF TRANSPORTATION, TRANSPORTATION POLICY (TP)3-1-3, TITLED PERPETUATION OF SURVEY MONUMENTS.


CONSTRUCTION CONTROL					
NAME	NORTHING	EASTING	ELEVATION	OLD STATION	NOTE
710001M	26769233.06	782002.54	2081.428		LPN1030 SPIRIT LEVEL
NCL010X	26773183.11	787736.99	1976.039		LPN1045 GPS
NVBMZ	26695631.81	782307.65	2432.15		LPN1085 GPS
NVCAZ	26786619.25	777618.89	2211.74		LPN1045 GPS
NVFWZ	26747529.62	822489.92	1769.62		LVVWD CORS
1510001A	26773184.05	787882.98	1972.47		ADJ FAST STATIC GPS
1510002A	26773617.28	787693.36	1962.13		ADJ FAST STATIC GPS

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Client/Project
 STATE OF NEVADA
 DEPARTMENT OF TRANSPORTATION

123 E. WASHINGTON AVE, NDOT LAS VEGAS
 MAINTENANCE YARD (MY921) IMPROVEMENTS
 Las Vegas, Clark County, Nevada

File Name:

 Dwn. Chkd. Dsgn. YY.MM.DD

Title
 CONTROL SHEET

Project No. 181300599
 Drawing No. G005

Scale
 SEE SHEET

Sheet
 5 of 177

Revision
 0

CLV DWG & APP #:
 107V9042, L21-01092

MATCHLINE SEE SHEET D100

(E) PCC SIDEWALK, TO BE REMOVED, 1,450 SF

(E) CMU WALL WITH FENCING TO BE REMOVED, 240 LF

(E) AC PAVEMENT TO BE REMOVED TO LIMITS OF NEW CONSTRUCTION, 49,940 SF

(E) EXISTING BIN STORAGE PAD, TRASH COMPACTOR PAD, TRASH COMPACTOR, RETAINING WALLS, HANDRAIL, ELECTRICAL CONDUIT/CABLE, LIGHTING, AND APPURTENANCES TO BE REMOVED FOR IMPROVEMENTS

(E) LIGHTPOLE, PROTECT IN PLACE

(E) MONITORING WELL, TO BE ABANDONED, 4 EA SEE NOTE 2

(E) PCC FLATWORK TO BE REMOVED

(E) BOLLARDS TO BE REMOVED, 4 EA

(E) SHED TO BE REMOVED SEE DETAIL 2/D108

(E) PCC FLATWORK TO BE REMOVED

(E) LIGHTPOLE, PROTECT IN PLACE

(E) TEMPORARY BARRIER TO BE REMOVED AND SALVAGED, COORDINATE WITH DISTRICT 1 MAINTENANCE

(E) CARPORT TO BE PROTECTED IN PLACE

(E) BUILDING TO BE REMOVED SEE DETAILS C-F ON SHEET D108 FOR INTERNAL DEMOLITION AND REMEDIATION

(E) TEMPORARY BARRIER TO BE REMOVED AND SALVAGED COORDINATE WITH DISTRICT 1 MAINTENANCE

(E) BOLLARDS TO BE REMOVED, 8 EA

(E) PCC FLATWORK TO BE REMOVED

(E) TREE DEMO

(E) LIGHTPOLE, PROTECT IN PLACE

(E) FIRE HYDRANT AND BOLLARDS (2 EA) TO BE REMOVED AND RELOCATED, SEE SHEET C302 FOR RELOCATED FIRE HYDRANT LOCATION

(E) TEMPORARY BARRIER TO BE REMOVED AND SALVAGED

POLITIS VICTOR & MAYRA
139-27-603-008

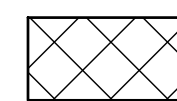

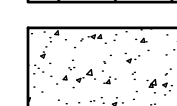

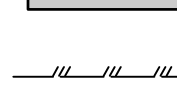
(E) CHAIN LINK FENCE TO BE REMOVED, 625 LF

(E) CMU WALL TO REMAIN

(E) LANDSCAPING AND MEDIAN CURB TO BE REMOVED, SALVAGE EXISTING BOULDERS FOR NEW LANDSCAPING SEE DETAIL G/D108

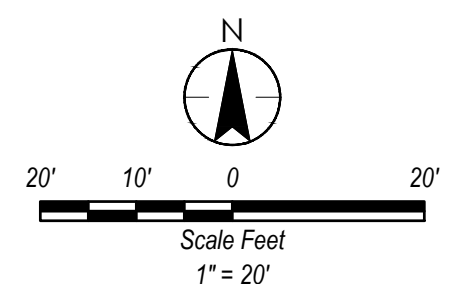
MATCHLINE SEE SHEET D104

LEGEND

-  LIMITS OF ASPHALT CONCRETE PAVEMENT DEMOLITION
-  LIMITS OF LANDSCAPING DEMOLITION
-  LIMITS OF PCC DEMOLITION
-  LIMITS OF BUILDING DEMOLITION
-  SAWCUT LIMITS

NOTES

1. SEE SHEETS C100 TO C107 FOR HORIZONTAL CONTROL LIMITS OF DEMOLITION AND C300 TO C307 FOR ADJUSTMENT OF UTILITIES
2. WELL LOG NUMBERS FOR MONITORING WELLS TO BE ABANDONED ARE: 48681, 48682, 48683, 48684
CONTRACTOR SHALL CONTACT NEVADA DIVISION OF WATER RESOURCES FOR MONITORING WELL ABANDONMENT PERMITS AND REQUIREMENTS.

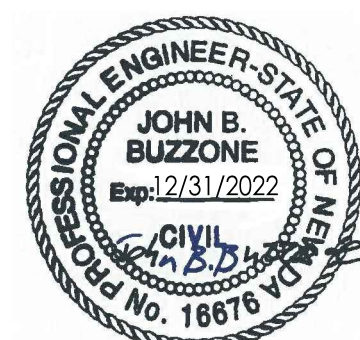


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1	CLV REVIEW PERMITTING COMMENTS	AP	JBB	21.06.16
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0	1
2	3
4	5
6	7



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Las Vegas, Clark County, Nevada

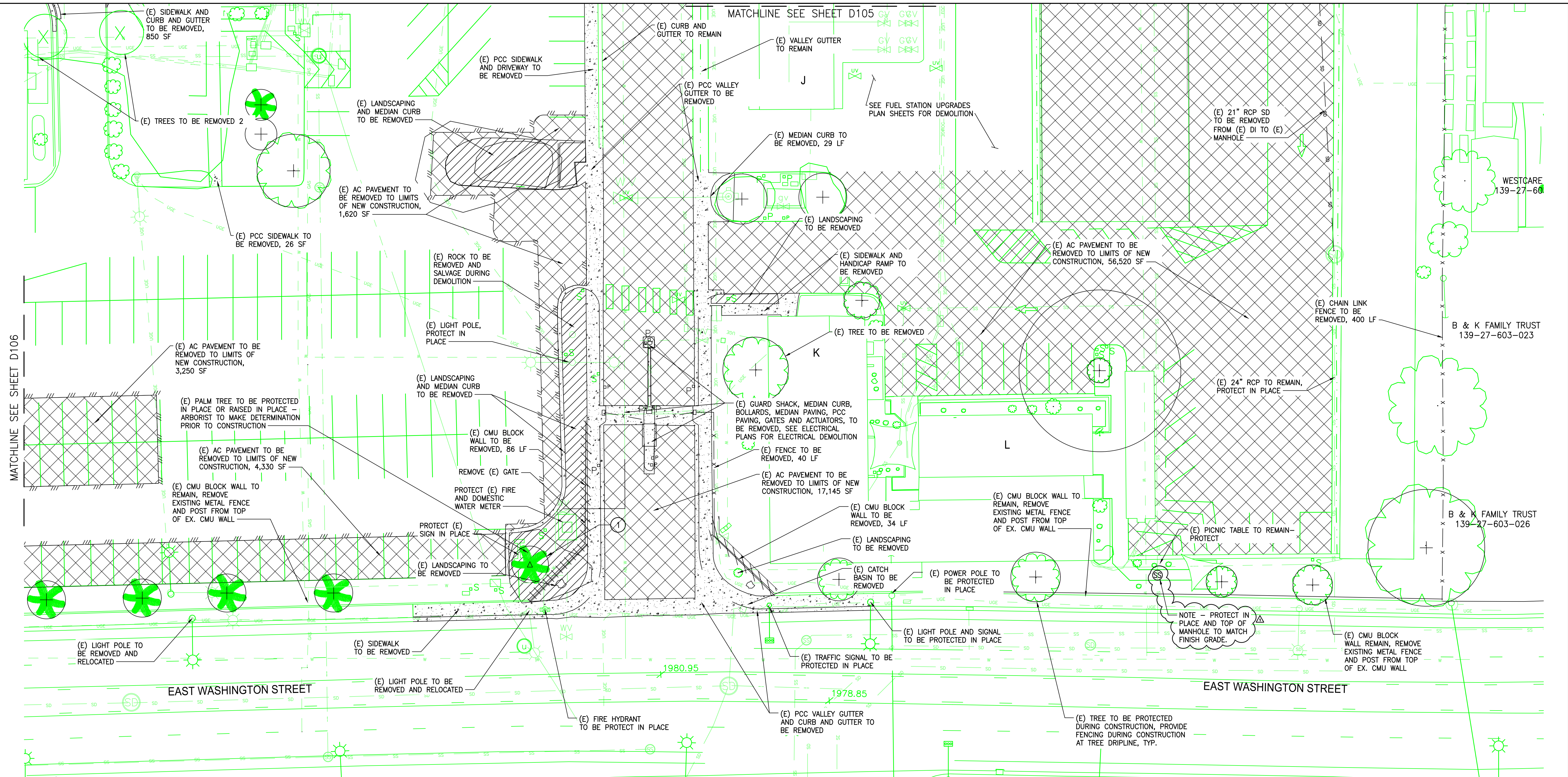
File Name:
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Title
DEMOLITION PLAN 3

Project No. 181300599 Scale SEE SHEET

Drawing No. D102 Sheet 10 of 177 Revision 1

CLV DWG & APP #: 107V9042, L21-01092



LEGEND

	LIMITS OF ASPHALT CONCRETE PAVEMENT DEMOLITION		LIMITS OF BUILDING DEMOLITION
	LIMITS OF LANDSCAPING DEMOLITION		SAWCUT LIMITS
	LIMITS OF PCC DEMOLITION		

NOTES

- SEE SHEETS C100 TO C107 FOR HORIZONTAL CONTROL LIMITS OF DEMOLITION AND C300 TO C307 FOR ADJUSTMENT OF UTILITIES.
- NUMBER TREES SHOWN (5) ARE TO BE SALVAGED AND REPLANTED. SEE LANDSCAPING SHEETS FOR NEW LOCATIONS.

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Key Map

0	1
2	3
4	5
6	7

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Las Vegas, Clark County, Nevada

File Name:
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Title
DEMOLITION PLAN 8

Project No. 181300599 Scale SEE SHEET

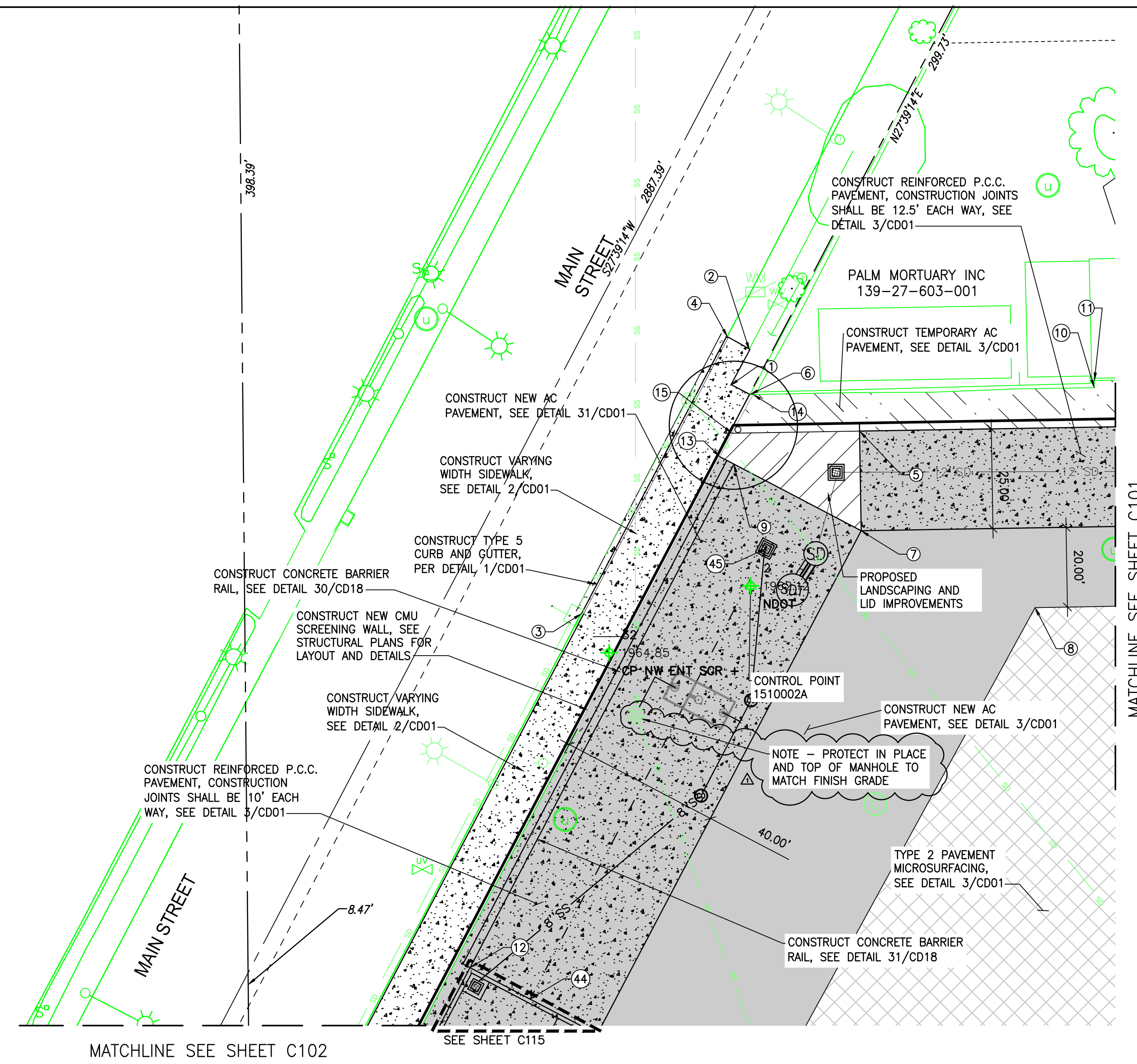
Drawing No. D107 Sheet 15 of 177 Revision 2

CLV DWG & APP #:
107V9042, L21-01092

<p>1 CLV REVIEW PERMITTING COMMENTS</p> <p>Revision By Appd. YY.MM.DD</p>	<p>AP JBB 21.06.16</p> <p>By Appd. YY.MM.DD</p> <p>Issued</p>	<p>6/17/2021</p>	<p>6995 Sierra Center Parkway Reno, NV 89511 www.stantec.com</p>	<p>Client/Project STATE OF NEVADA DEPARTMENT OF TRANSPORTATION 123 E. WASHINGTON AVE, NDOT LAS VEGAS MAINTENANCE YARD (MY921) IMPROVEMENTS Las Vegas, Clark County, Nevada</p>	<p>Title DEMOLITION PLAN 8</p> <p>Project No. 181300599 Scale SEE SHEET</p> <p>Drawing No. D107 Sheet 15 of 177 Revision 2</p>
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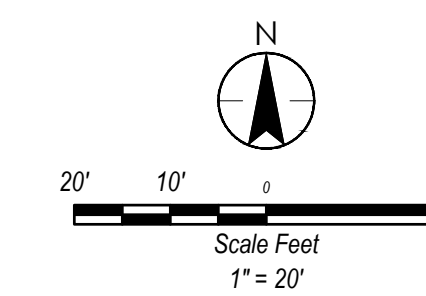
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POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
1	26,773,667.54	787,688.29	SIDEWALK
2	26,773,676.37	787,693.05	SIDEWALK
3	26,773,610.32	787,650.98	TOP OF CURB
4	26,773,679.76	787,687.52	TOP OF CURB
5	26,773,656.09	787,720.65	BARRIER RAIL
6	26,773,665.25	787,693.23	SIDEWALK
7	26,773,631.09	787,721.07	CONCRETE
8	26,773,611.82	787,764.65	PAVEMENT
9	26,773,647.80	787,689.18	BARRIR RAIL
10	26,773,666.97	787,779.48	PAVEMENT
11	26,773,668.74	787,779.54	PAVEMENT
12	26,773,521.54	787,623.02	BARRIER RAIL
13	26,773,649.66	787,685.64	CONCRETE
14	26,773,665.26	787,694.00	PAVEMENT
15	26,773,655.55	787,688.73	PAVEMENT
44	26,773,513.65	787,638.08	PCC FLOWLINE
45	26,773,626.62	787,697.28	PCC FLOWLINE



LEGEND

- LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
- LIMITS OF PAVEMENT MICROSURFACING
- LIMITS OF P.C.C. CONSTRUCTION
- LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS
- EXISTING BUILDINGS
- LIMITS OF REINFORCED P.C.C.
- LIMITS OF TEMPORARY ASPHALT CONCRETE
- SEE SHEET C115 FOR DETAILED DESIGN AND LAYOUT



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1	CLV	JBB	21.06.16

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6/17/2021

Key Map

0	1
2	3
4	5
6	7

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DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title
CIVIL SITE PLAN

Project No. 181300599
Scale SEE SHEET

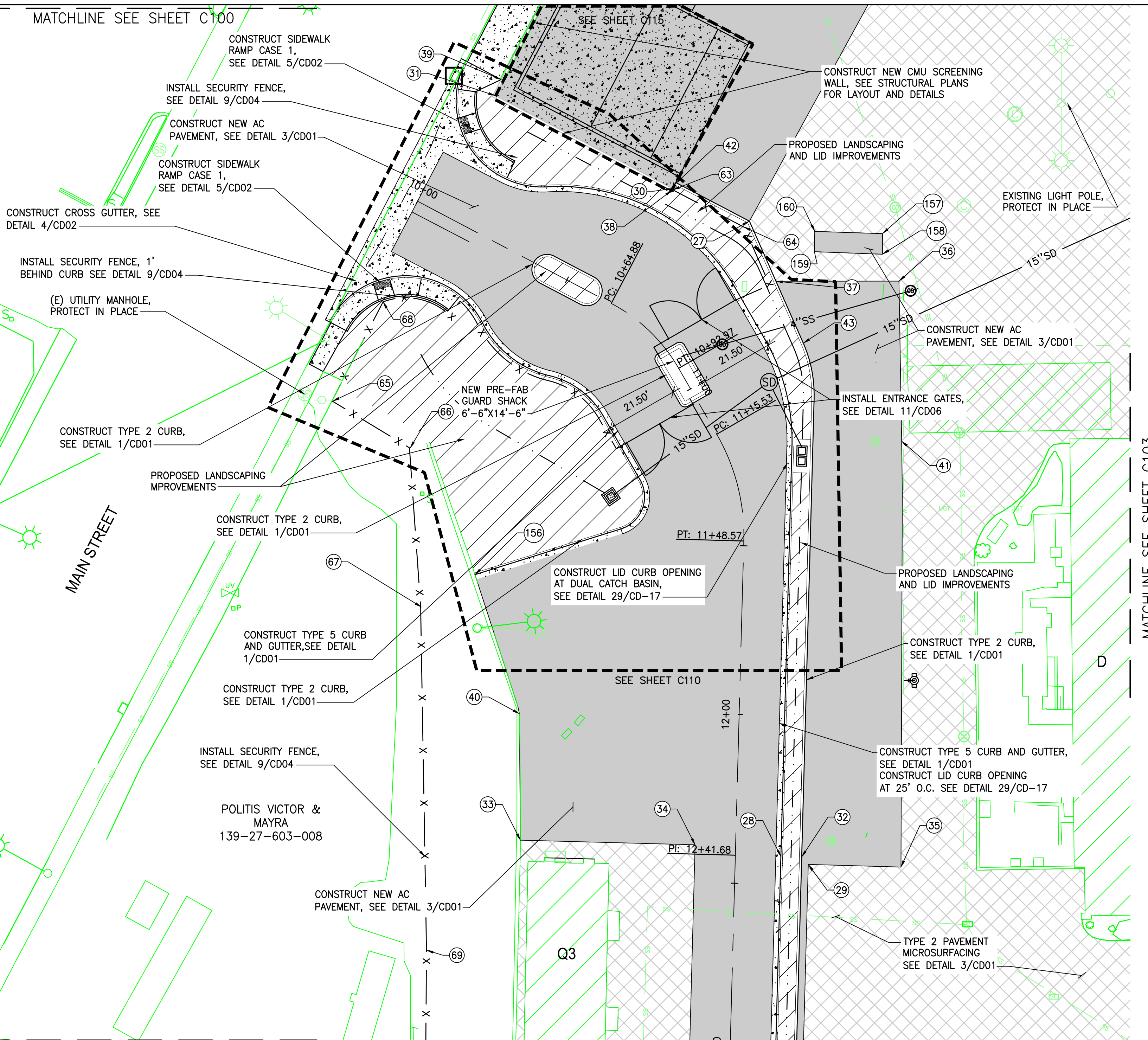
Drawing No. C100
Sheet 19 of 177
Revision 0

CLV DWG & APP #:
107V9042, L21-01092

POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
27	26,773,442.81	787,672.02	TOP OF CURB/CONCRETE
28	26,773,254.60	787,681.34	TOP OF CURB
29	26,773,252.23	787,689.45	PAVEMENT
30	26,773,452.46	787,649.29	CONCRETE
31	26,773,479.99	787,596.74	CONCRETE
32	26,773,254.43	787,687.51	TOP OF CURB
33	26,773,259.41	787,604.15	PAVEMENT
34	26,773,258.04	787,655.92	PAVEMENT
35	26,773,251.44	787,716.91	PAVEMENT
36	26,773,425.04	787,716.31	PAVEMENT
37	26,773,425.00	787,679.88	PAVEMENT
38	26,773,451.87	787,648.98	TOP OF CURB
39	26,773,484.74	787,598.46	SIDEWALK
40	26,773,296.87	787,603.87	PAVEMENT
41	26,773,377.63	787,717.12	PAVEMENT
42	26,773,454.17	787,650.42	TOP OF CURB
43	26,773,406.65	787,687.98	TOP OF CURB
63	26,773,452.10	787,649.34	FENCE
64	26,773,441.12	787,670.30	FENCE
65	26,773,389.47	787,548.56	FENCE

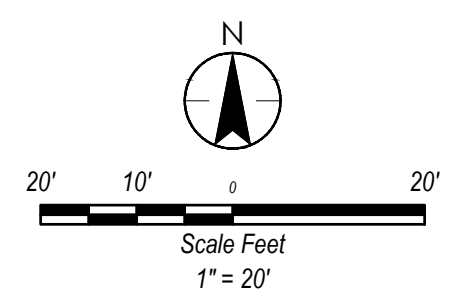
POINT TABLE			
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66	26,773,375.58	787,571.50	FENCE
67	26,773,328.50	787,574.82	FENCE
68	26,773,418.89	787,563.48	FENCE
69	26,773,226.82	787,576.34	FENCE
156	26,773,338.08	787,590.70	TOP OF CURB
157	26,773,439.10	787,711.43	PAVEMENT
158	26,773,433.00	787,711.42	PAVEMENT
159	26,773,433.75	787,691.24	PAVEMENT
160	26,773,439.77	787,691.38	PAVEMENT

USA
139-27-602-003



LEGEND

- LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
- LIMITS OF PAVEMENT MICROSURFACING
- LIMITS OF P.C.C. CONSTRUCTION
- LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS
- EXISTING BUILDINGS
- LIMITS OF REINFORCED P.C.C.
- SEE SHEET C110 & C115 FOR DETAILED DESIGN AND LAYOUT



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Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

Issued	By	Appd.	YY.MM.DD

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Key Map

0	1
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4	5
6	7

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DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

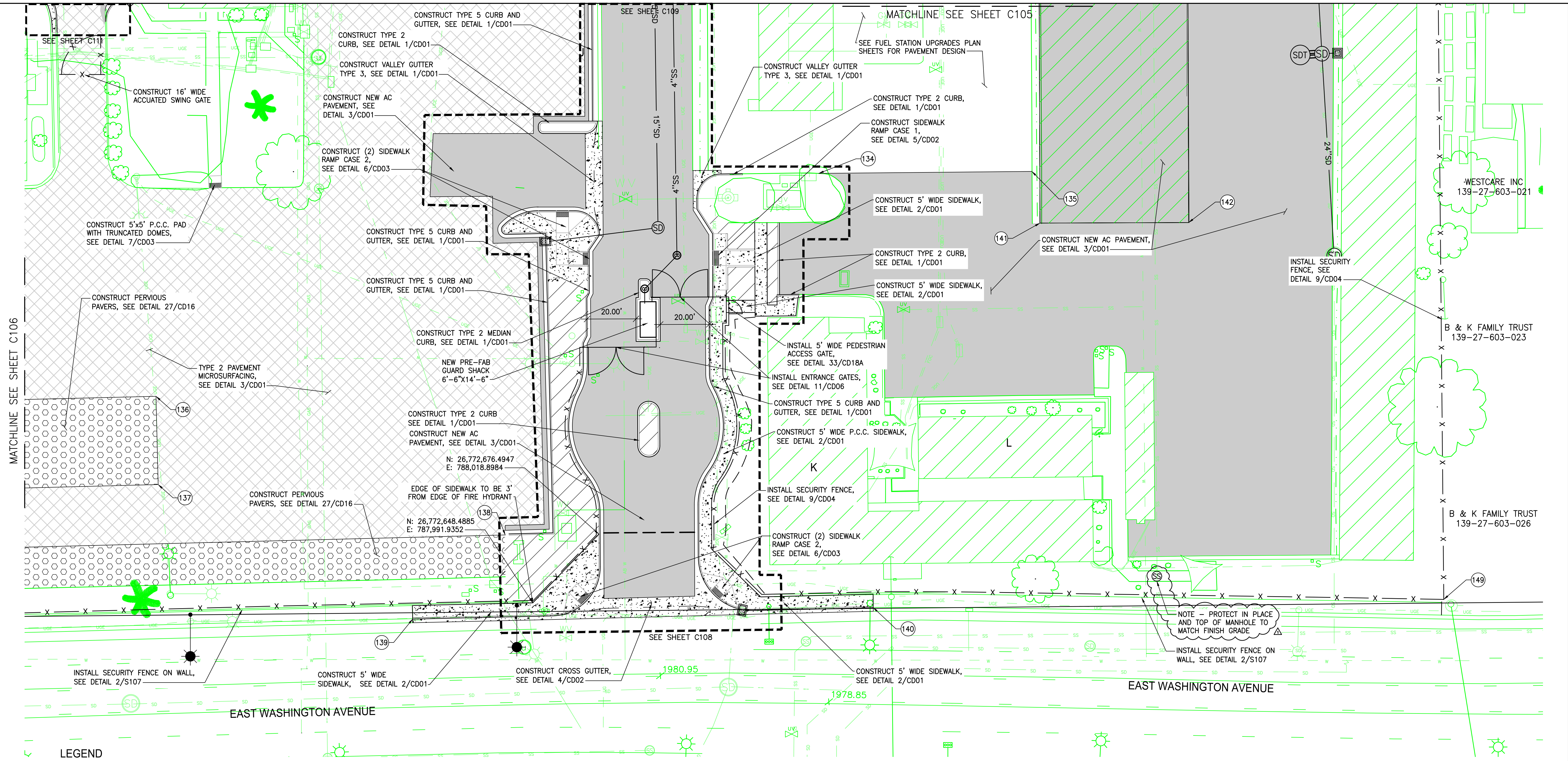
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Title
CIVIL SITE PLAN

Project No. 181300599 Scale SEE SHEET

Drawing No. C102 Sheet 21 of 177 Revision 1

CLV DWG & APP #:
107V9042, L21-01092



MATCHLINE SEE SHEET C106

MATCHLINE SEE SHEET C105

SEE SHEET C109

15' SS 4"

15' SS 4"

15' SS 4"

15' SS 4"

15' SS 4"

15' SS 4"

15' SS 4"

15' SS 4"

15' SS 4"

15' SS 4"

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15' SS 4"

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15' SS 4"

15' SS 4"

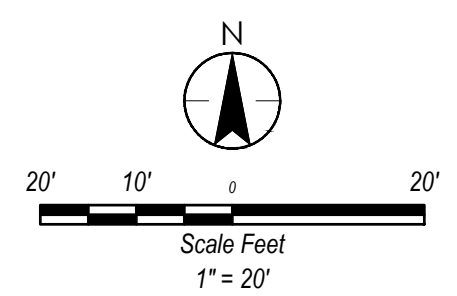
15' SS 4"

LEGEND

- LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
- LIMITS OF PAVEMENT MICROSURFACING
- LIMITS OF P.C.C. CONSTRUCTION
- LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS
- LIMITS OF PERVIOUS PAVERS
- EXISTING BUILDINGS
- SEE SHEETS C108 AND C109 FOR DETAILED DESIGN AND LAYOUT

NOTES

1. SEE SHEET C104 FOR POINT TABLES.



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Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

Issued	By	Appd.	YY.MM.DD

Permit-Seal

6/17/2021

Key Map

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2	3
4	5
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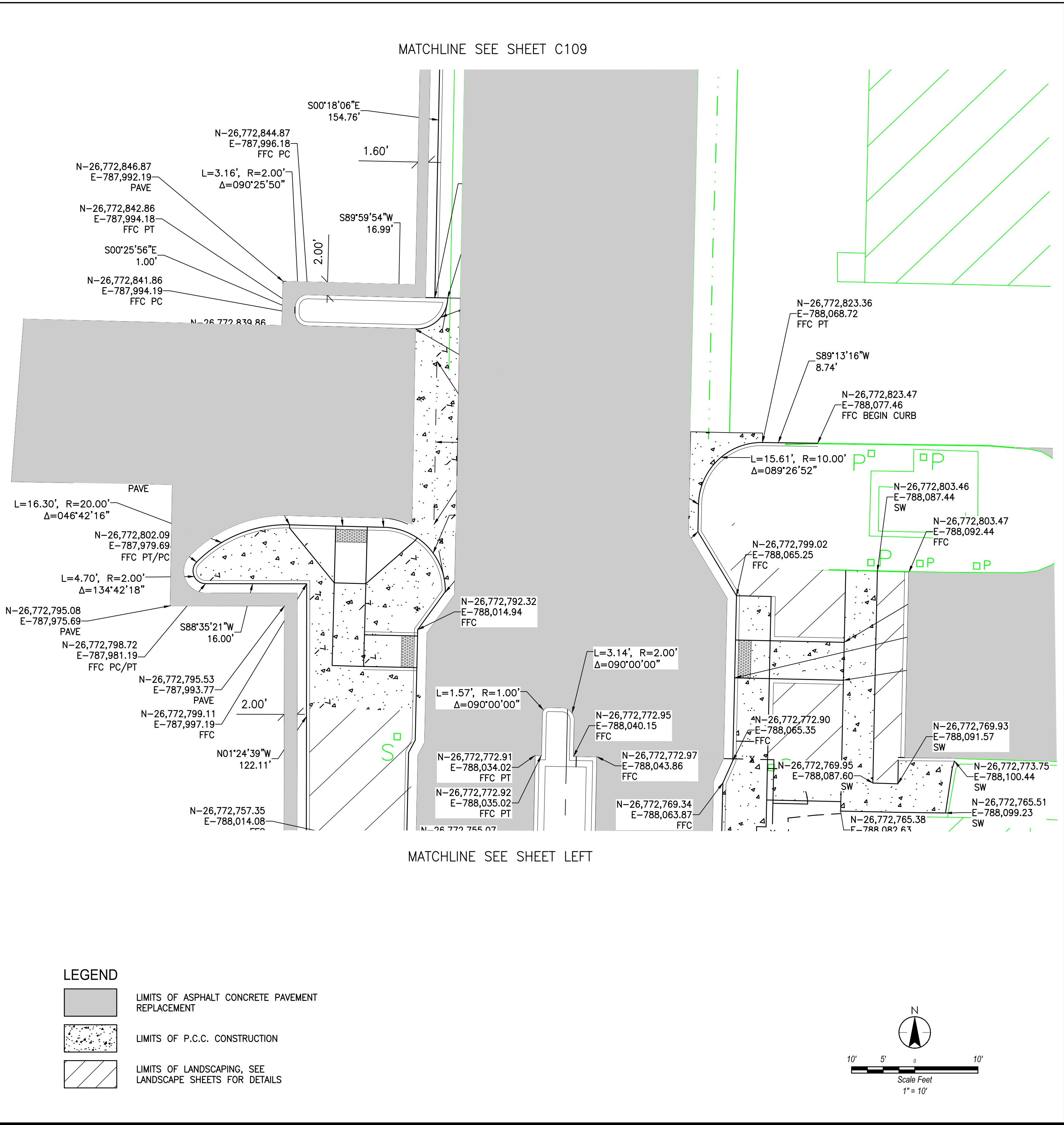
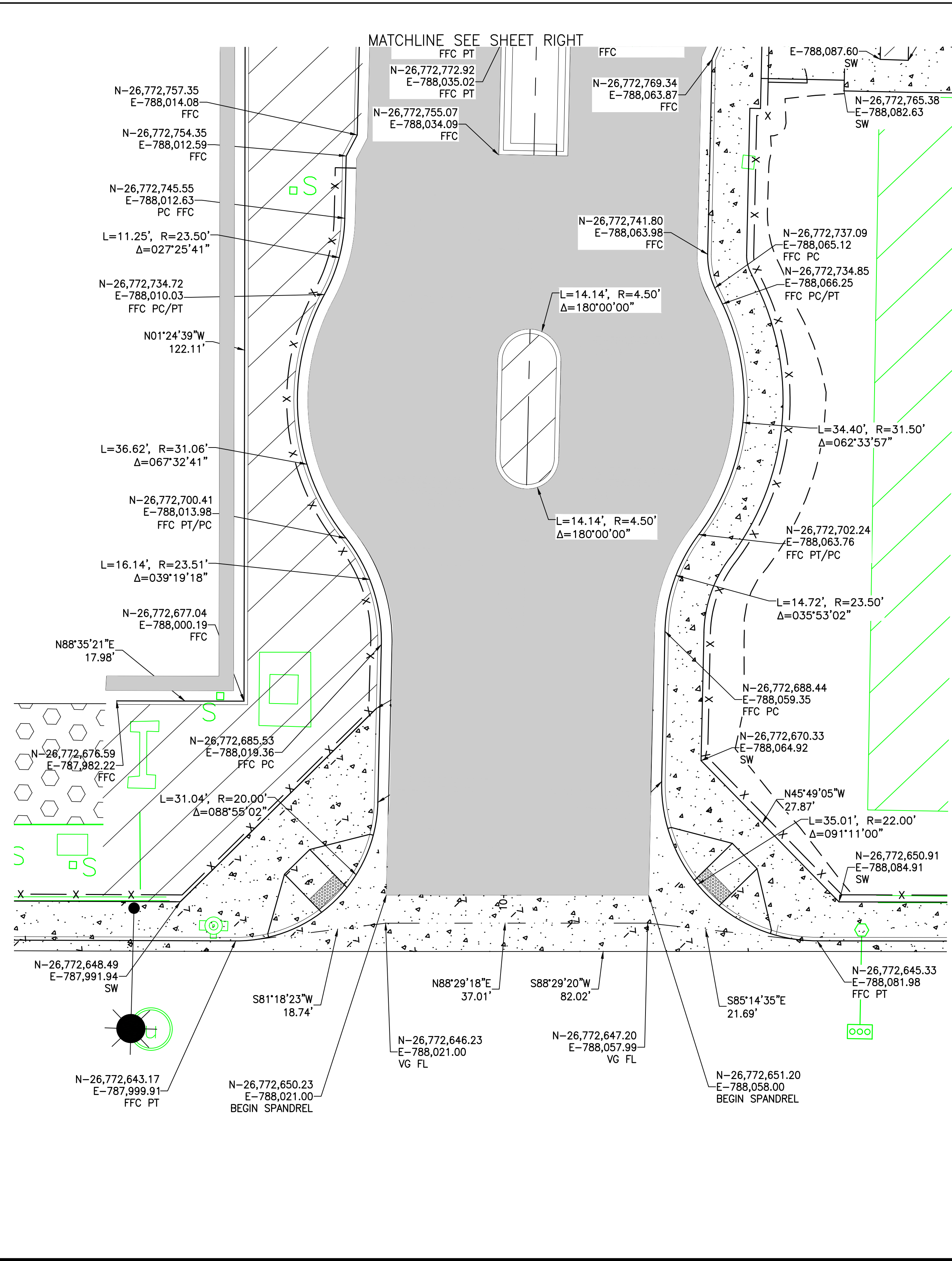
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 123 E. WASHINGTON AVE, NDOT LAS VEGAS
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 Las Vegas, Clark County, Nevada

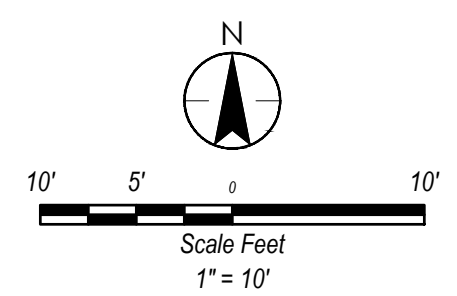
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 Dwn. Chkd. Dsgn. YY.MM.DD

Title		
CIVIL SITE PLAN		
Project No. 181300599	Scale SEE SHEET	CLV DWG & APP #: 107V9042, L21-01092
Drawing No. C107	Sheet 26 of 177	Revision 4



LEGEND

- LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
- LIMITS OF P.C.C. CONSTRUCTION
- LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS

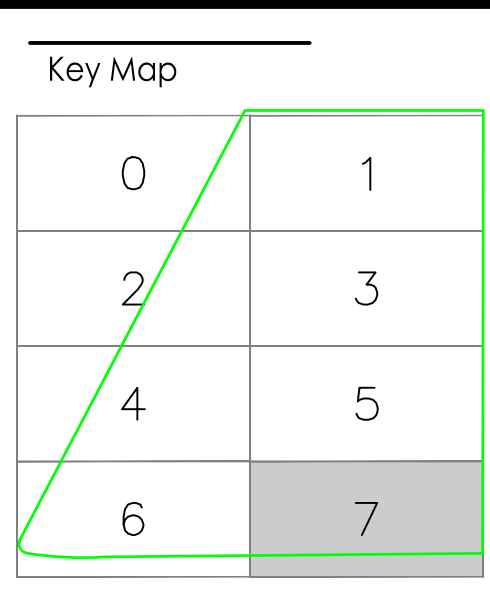


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1	CLV	JBB	21.06.16

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Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title
SOUTH ENTRANCE GATE DETAILS

Project No. 181300599
Drawing No. C108

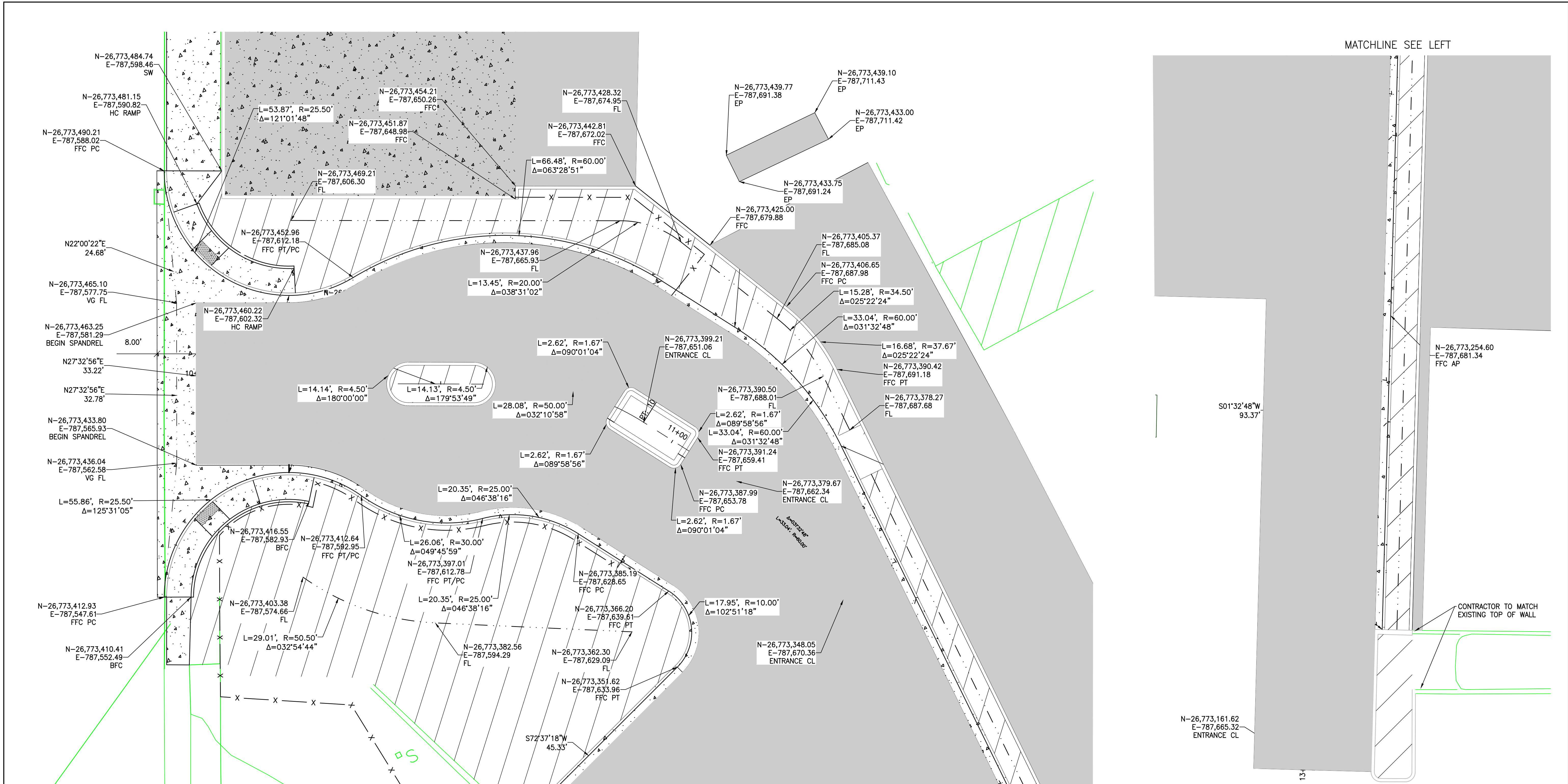
Scale
SEE SHEET

Sheet 27 of 177




Revision
3

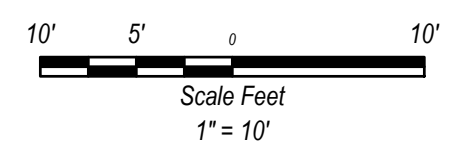
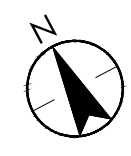
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107V9042, L21-01092

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 ORIGINAL SHEET - ANS1 D



LEGEND

-  LIMITS OF ASPHALT CONCRETE PAVEMENT
-  LIMITS OF LANDSCAPING, SEE LANDSCAPE SHEETS FOR DETAILS
-  LIMITS OF P.C.C. CONSTRUCTION




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Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

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6/17/2021

Key Map

0	1
2	3
4	5
6	7



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 Las Vegas, Clark County, Nevada

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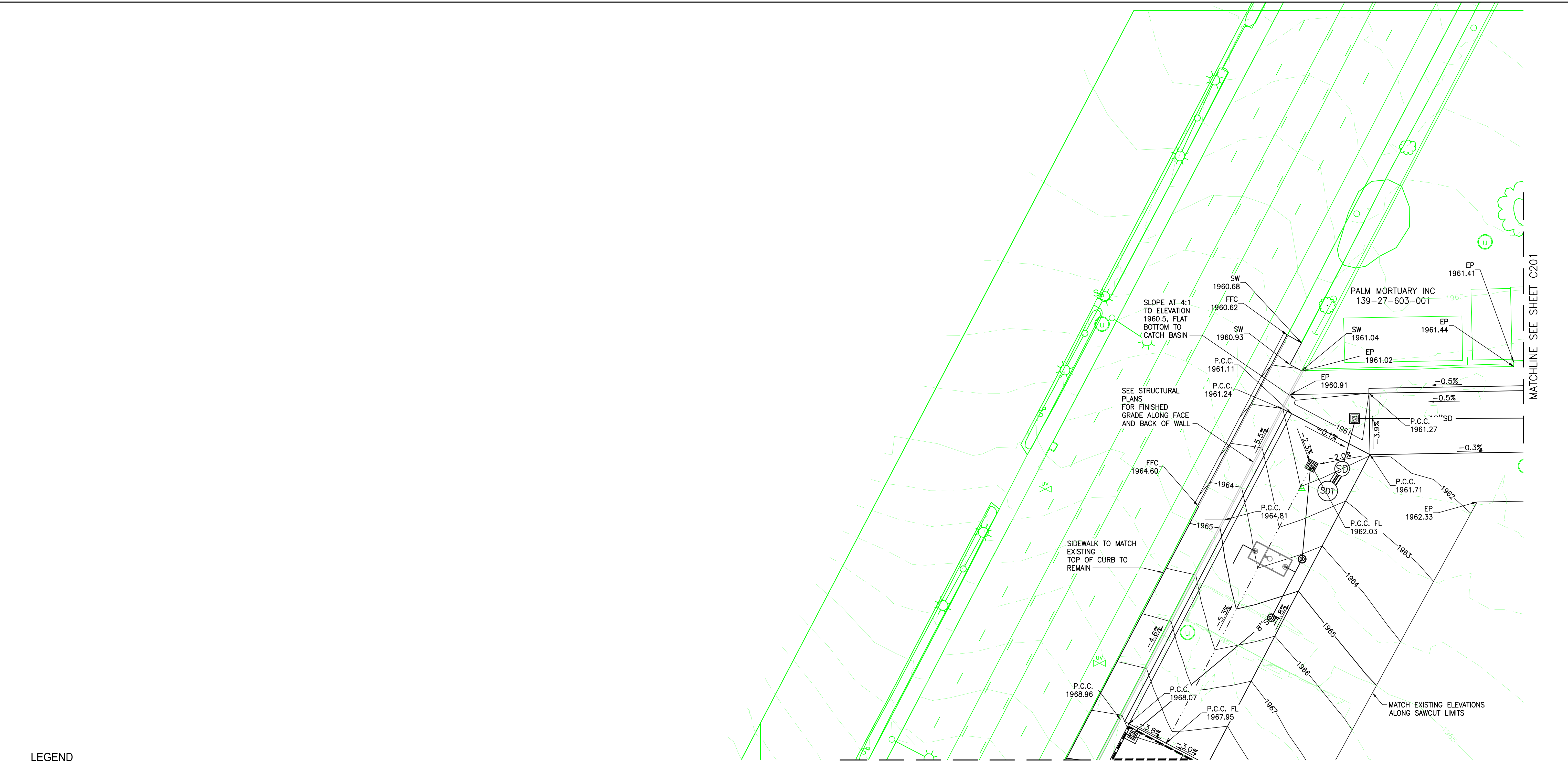
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Title
 NORTHWEST ENTRANCE GATE DETAILS

Project No. 181300599
 Scale SEE SHEET

Drawing No. C110
 Sheet 29 of 177
 Revision 1

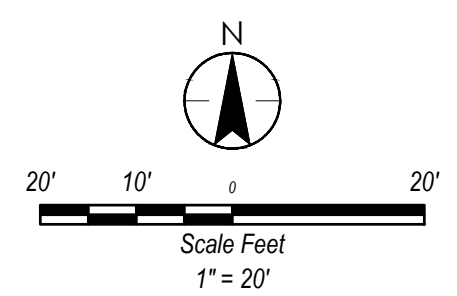
CLV DWG & APP #:
 107V9042, L21-01092



LEGEND

	1965	EXISTING CONTOUR - MAJOR
		EXISTING CONTOUR - MINOR
	1965	PROPOSED CONTOUR - MAJOR
	1963	PROPOSED CONTOUR - MINOR
		SEE SHEET C115 FOR DETAILED DESIGN AND LAYOUT

- NOTES**
- SEE SHEETS C300 TO C307 FOR CATCH BASIN, MANHOLES, AND PIPING LOCATION AND ELEVATIONS
 - EXISTING GROUND CONTOUR LINES ARE BASED UPON AERIAL TOPOGRAPHY. SUPPLEMENTAL SURVEY WAS CONDUCTED ON SITE IN RECONSTRUCTION AREAS AND PROPOSED CONTOURS TIE INTO CONVENTIONAL SURVEY ELEVATIONS.



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1	CLV	JBB	21.06.16

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Key Map

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2	3
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6	7

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MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title		
SITE GRADING PLAN		
Project No. 181300599	Scale SEE SHEET	
Drawing No. C200	Sheet 35 of 177	Revision 0

CLV DWG & APP #:
107V9042, L21-01092

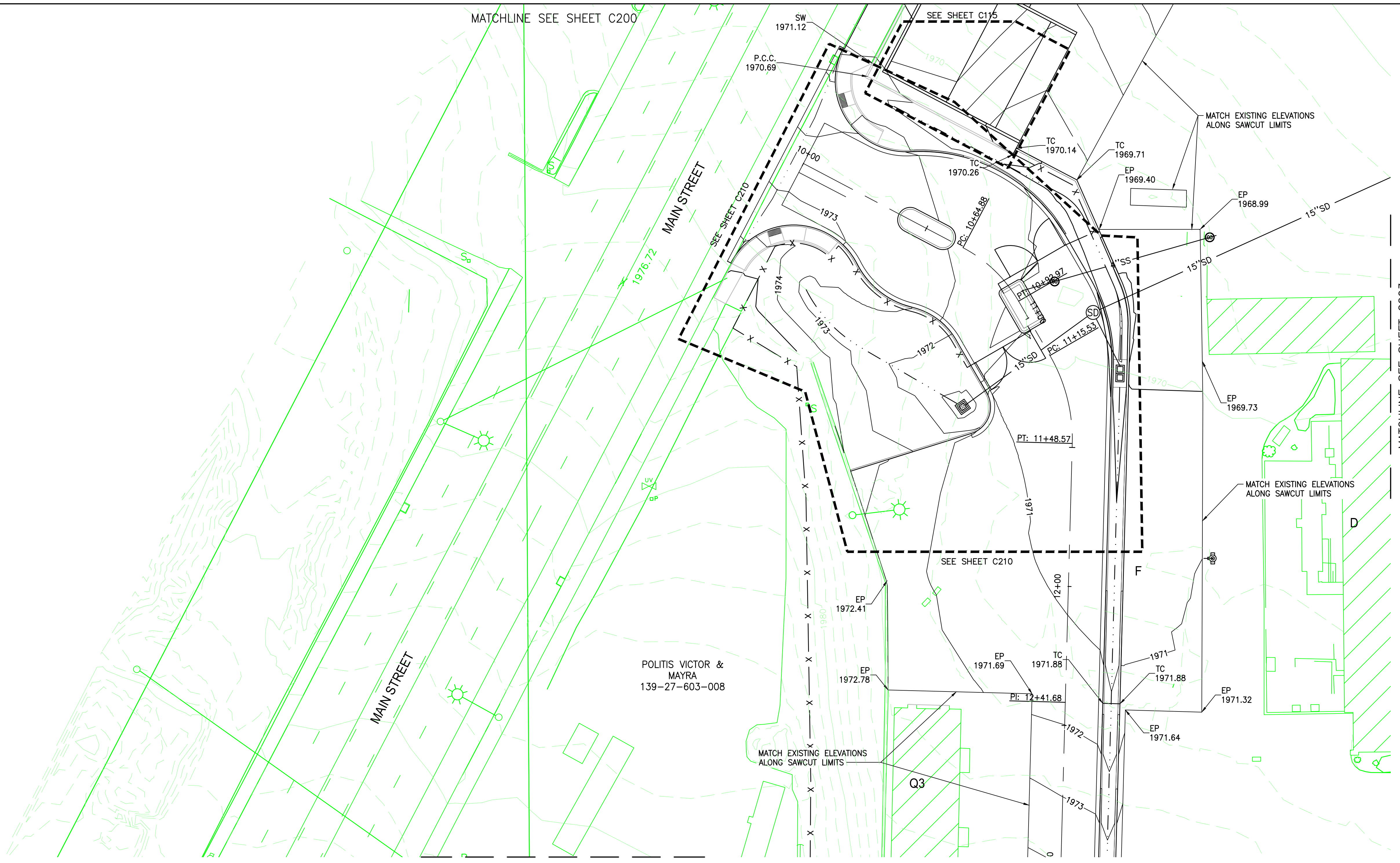
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MATCHLINE SEE SHEET C200

SEE SHEET C115

MATCH EXISTING ELEVATIONS ALONG SAWCUT LIMITS

MATCHLINE SEE SHEET C203



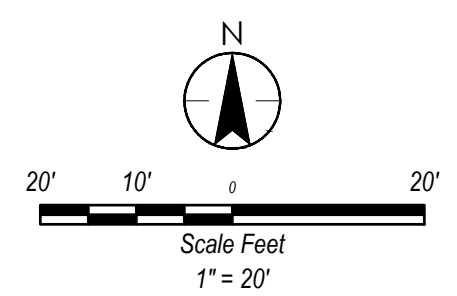
MATCHLINE SEE SHEET C204

LEGEND

- 1965 EXISTING CONTOUR - MAJOR
- - - EXISTING CONTOUR - MINOR
- 1965 PROPOSED CONTOUR - MAJOR
- - - 1963 PROPOSED CONTOUR - MINOR
- SEE SHEET C115 & C210 FOR DETAILED DESIGN AND LAYOUT

NOTES

1. SEE SHEETS C300 TO C307 FOR CATCH BASIN, MANHOLES, AND PIPING LOCATION AND ELEVATIONS
2. EXISTING GROUND CONTOUR LINES ARE BASED UPON AERIAL TOPOGRAPHY. SUPPLEMENTAL SURVEY WAS CONDUCTED ON SITE IN RECONSTRUCTION AREAS AND PROPOSED CONTOURS TIE INTO CONVENTIONAL SURVEY ELEVATIONS.



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1	CLV	JRB	21.06.16

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Key Map

0	1
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4	5
6	7

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 Las Vegas, Clark County, Nevada

File Name:

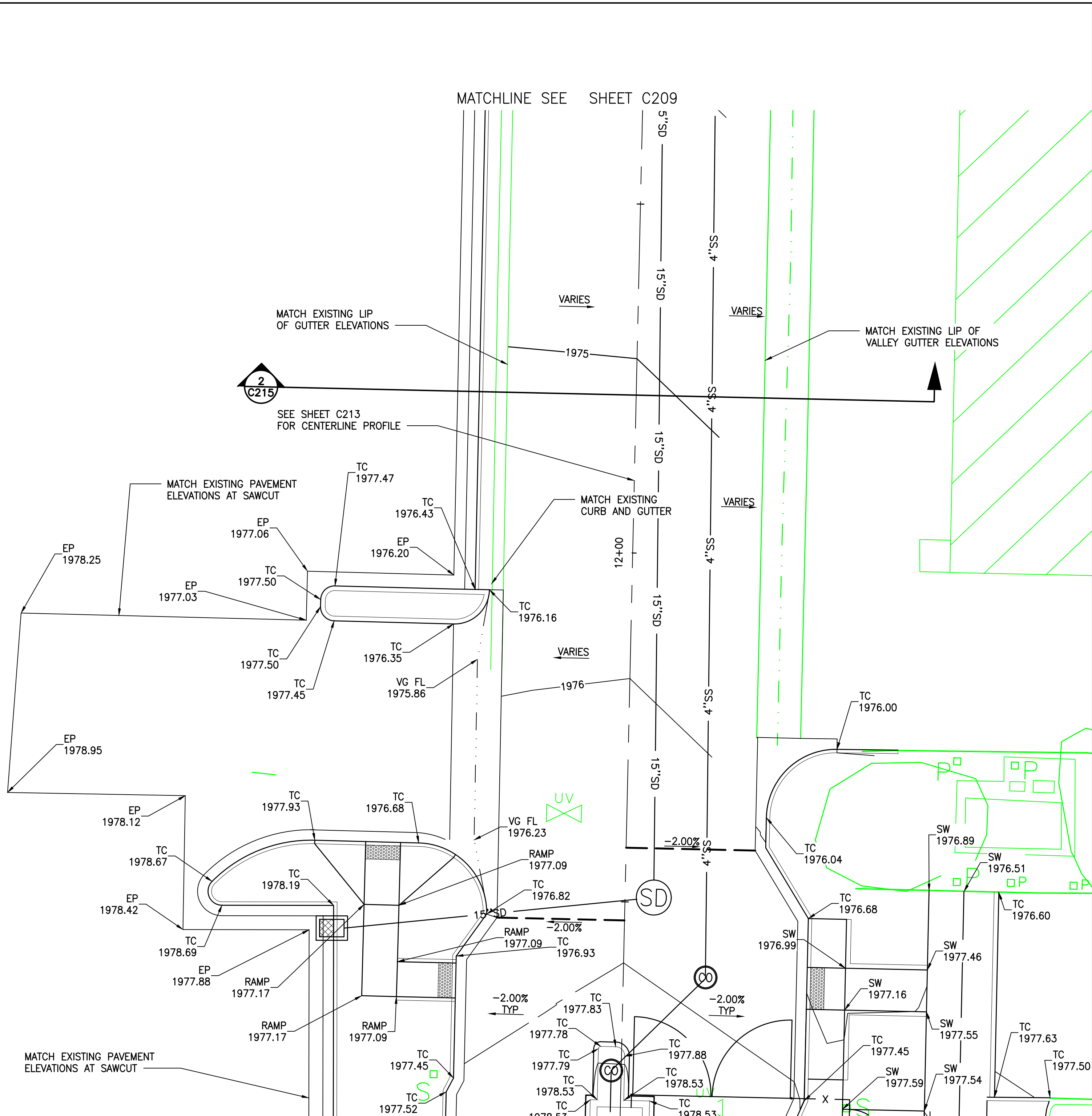
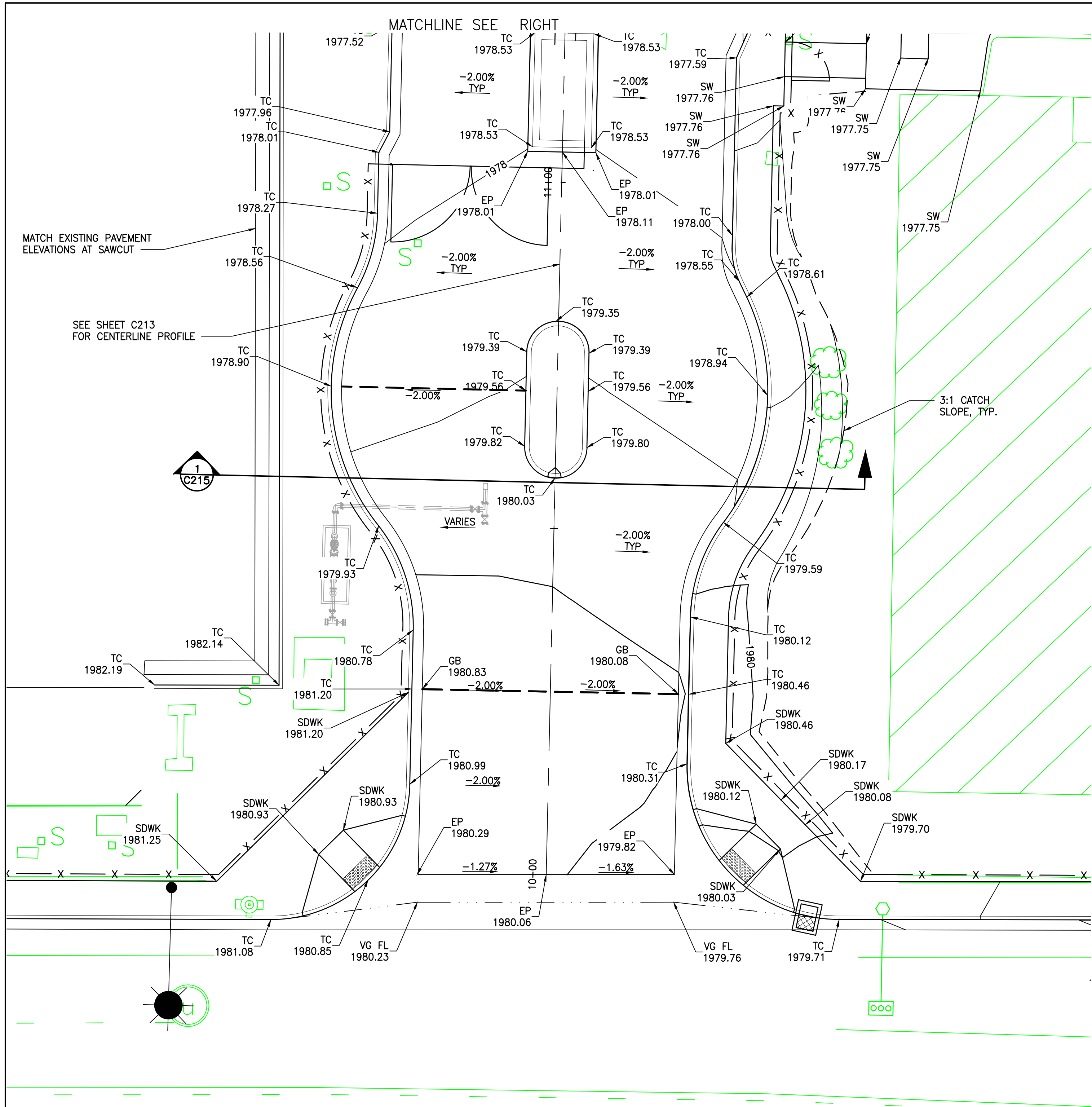
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Title
 SITE GRADING PLAN

Project No. 181300599 Scale SEE SHEET

Drawing No. C202 Sheet 37 of 177 Revision 1

CLV DWG & APP #:
107V9042, L21-01092



LEGEND

— 1965 —	EXISTING CONTOUR - MAJOR
— 1965 —	EXISTING CONTOUR - MINOR
— 1965 —	PROPOSED CONTOUR - MAJOR
— 1963 —	PROPOSED CONTOUR - MINOR

NOTES

1. SEE SHEETS C300 TO C307 FOR CATCH BASIN, MANHOLES, AND PIPING LOCATION AND ELEVATIONS

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1	CLV	JBB	21.06.16

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Key Map

0	1
2	3
4	5
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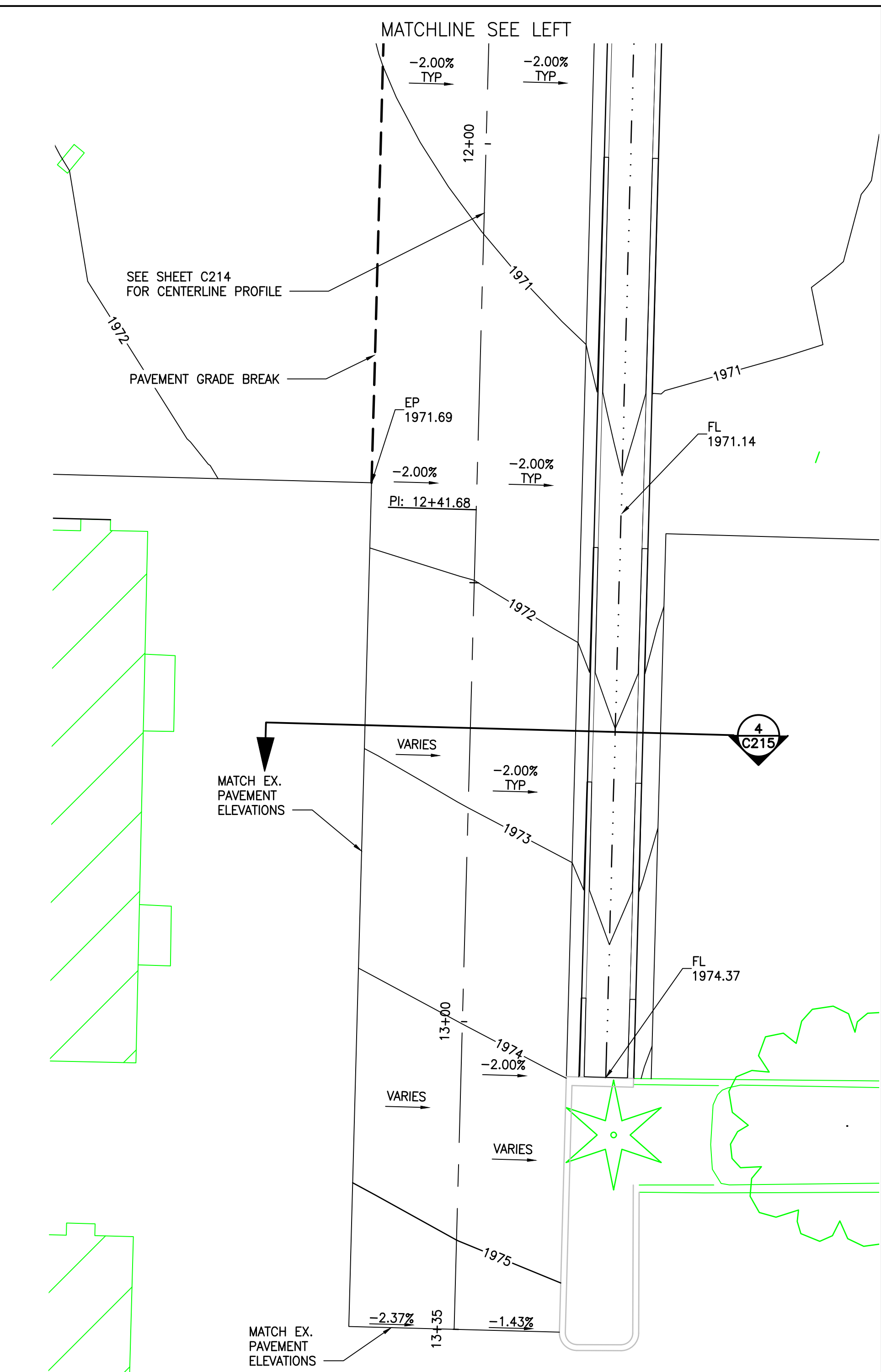
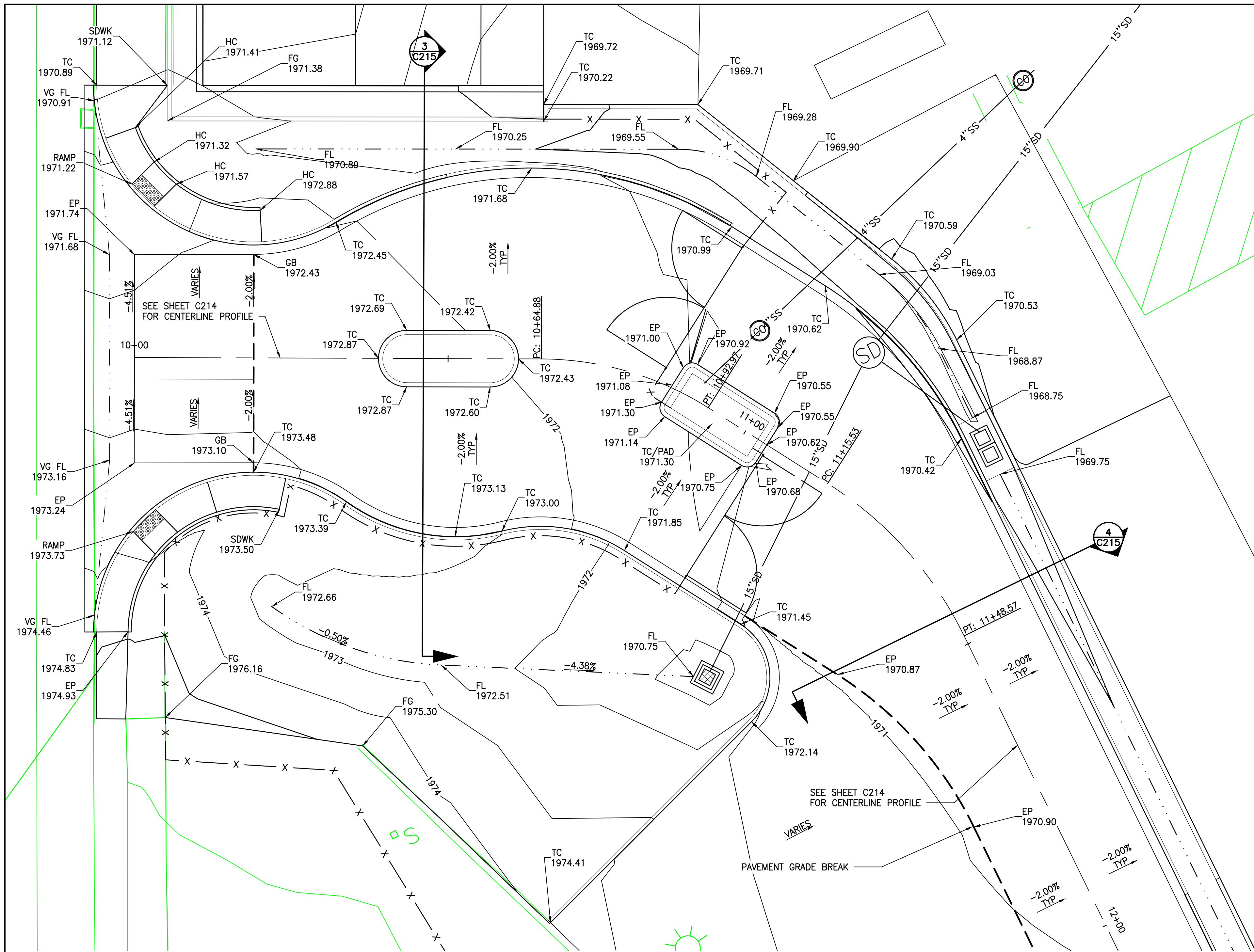
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File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title SOUTH ENTRANCE GATE GRADING DETAILS		
Project No. 181300599	Scale SEE SHEET	CLV DWG & APP #: 107V9042, L21-01092
Drawing No. C208	Sheet 43 of 177	Revision 3

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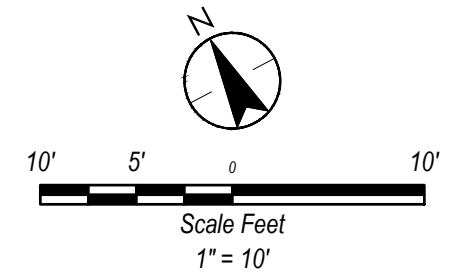


LEGEND

	1965	EXISTING CONTOUR - MAJOR
	1965	EXISTING CONTOUR - MINOR
	1965	PROPOSED CONTOUR - MAJOR
	1963	PROPOSED CONTOUR - MINOR

NOTES

1. SEE SHEETS C300 TO C307 FOR CATCH BASIN, MANHOLES, AND PIPING LOCATION AND ELEVATIONS



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1	CLV	JBB	21.06.16

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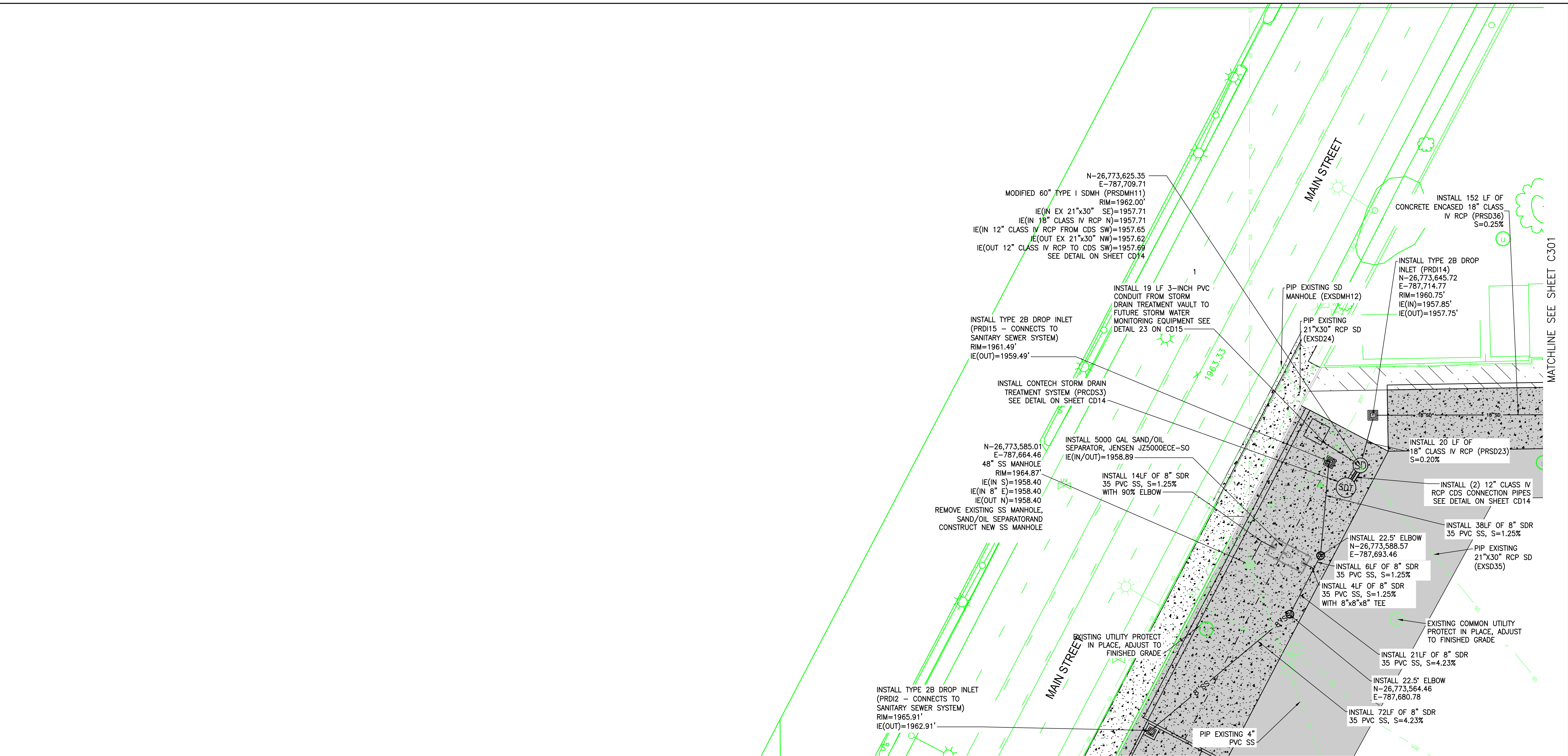
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Client/Project
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 Las Vegas, Clark County, Nevada

File Name:

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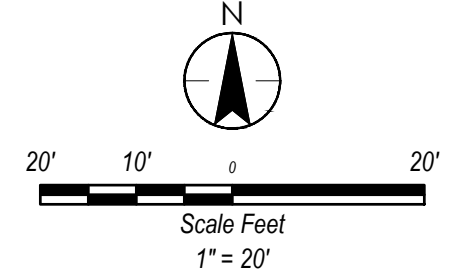
Title NORTHWEST ENTRANCE GATE GRADING DETAILS		
Project No. 181300599	Scale SEE SHEET	CLV DWG & APP #: 107V9042, L21-01092
Drawing No. C210	Sheet 45 of 177	Revision 1



MATCHLINE SEE SHEET C302

STORM DRAIN NOTES:

CONTRACTOR SHALL POTHOLE ALL STORM DRAIN CROSSINGS PRIOR TO INSTALLATION TO VERIFY DEPTH OF EXISTING UTILITIES. IF CONFLICT EXISTS, CONTRACTOR TO NOTIFY ENGINEER AND OWNER OF SUCH CONFLICTS TO DETERMINE IF VERTICAL ADJUSTMENT OF PROPOSED STORM DRAIN IS NECESSARY.



LEGEND

- [Hatched Area] LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
- [Dotted Area] LIMITS OF P.C.C. CONSTRUCTION

NOTES:

- HATCH SHOWN FOR UTILITIES TO BE ADJUSTED WITHIN NEW PAVEMENT LIMITS.
- SEE SHEET CD09 FOR TYPE 2B DROP INLET DETAILS.
- SEE SHEET CD07 FOR TYPE 1 MANHOLE DETAILS.
- SEE SHEETS C308-C311 FOR STORM DRAIN PROFILES.
- REFERENCE CCWRD SPECIFICATIONS FOR ENCASEMENT REQUIREMENTS.

Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

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Client/Project
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title
UTILITY PLAN

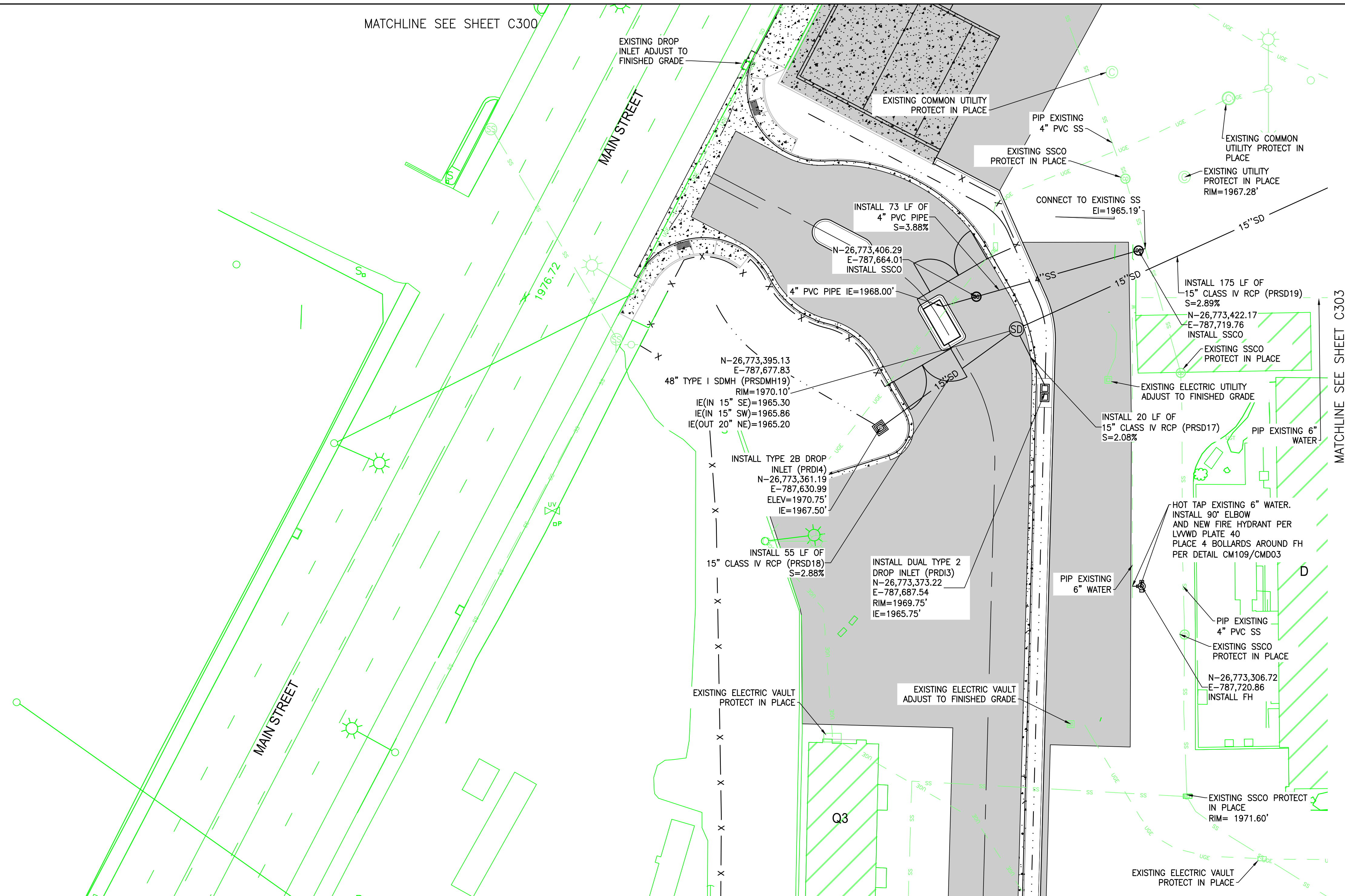
Project No. 181300599 Scale SEE SHEET

Drawing No. C300 Sheet 51 of 177 Revision 1

CLV DWG & APP #:
107V9042, L21-01092


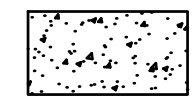
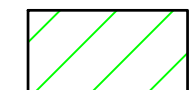
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MATCHLINE SEE SHEET C300



MATCHLINE SEE SHEET C304

LEGEND

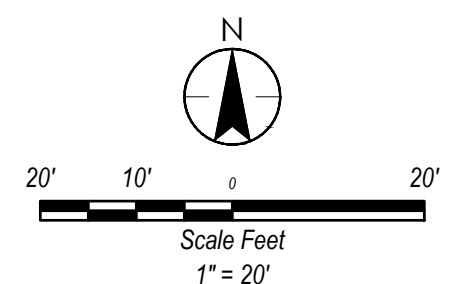
-  LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
-  LIMITS OF P.C.C. CONSTRUCTION
-  EXISTING BUILDINGS

NOTES:

1. HATCH SHOWN FOR UTILITIES TO BE ADJUSTED WITHIN NEW PAVEMENT LIMITS.
2. SEE SHEET CD07 FOR TYPE 1 MANHOLE DETAILS.
3. SEE SHEET CD08 FOR SANITARY SEWER CLEAN OUT DETAILS.
4. SEE SHEET CD09 FOR TYPE 2B DROP INLET DETAILS.
5. SEE SHEETS C308-C311 FOR STORM DRAIN PROFILES.

STORM DRAIN NOTES:

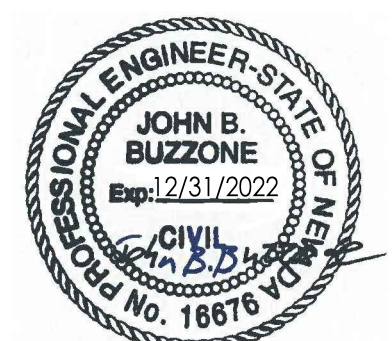
CONTRACTOR SHALL POTHOLE ALL STORM DRAIN CROSSINGS PRIOR TO INSTALLATION TO VERIFY DEPTH OF EXISTING UTILITIES. IF CONFLICT EXISTS, CONTRACTOR TO NOTIFY ENGINEER AND OWNER OF SUCH CONFLICTS TO DETERMINE IF VERTICAL ADJUSTMENT OF PROPOSED STORM DRAIN IS NECESSARY.



Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

Issued	By	Appd.	YY.MM.DD


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6/17/2021

Key Map

0	1
2	3
4	5
6	7



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STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title
UTILITY PLAN

Project No. 181300599
Drawing No. C302

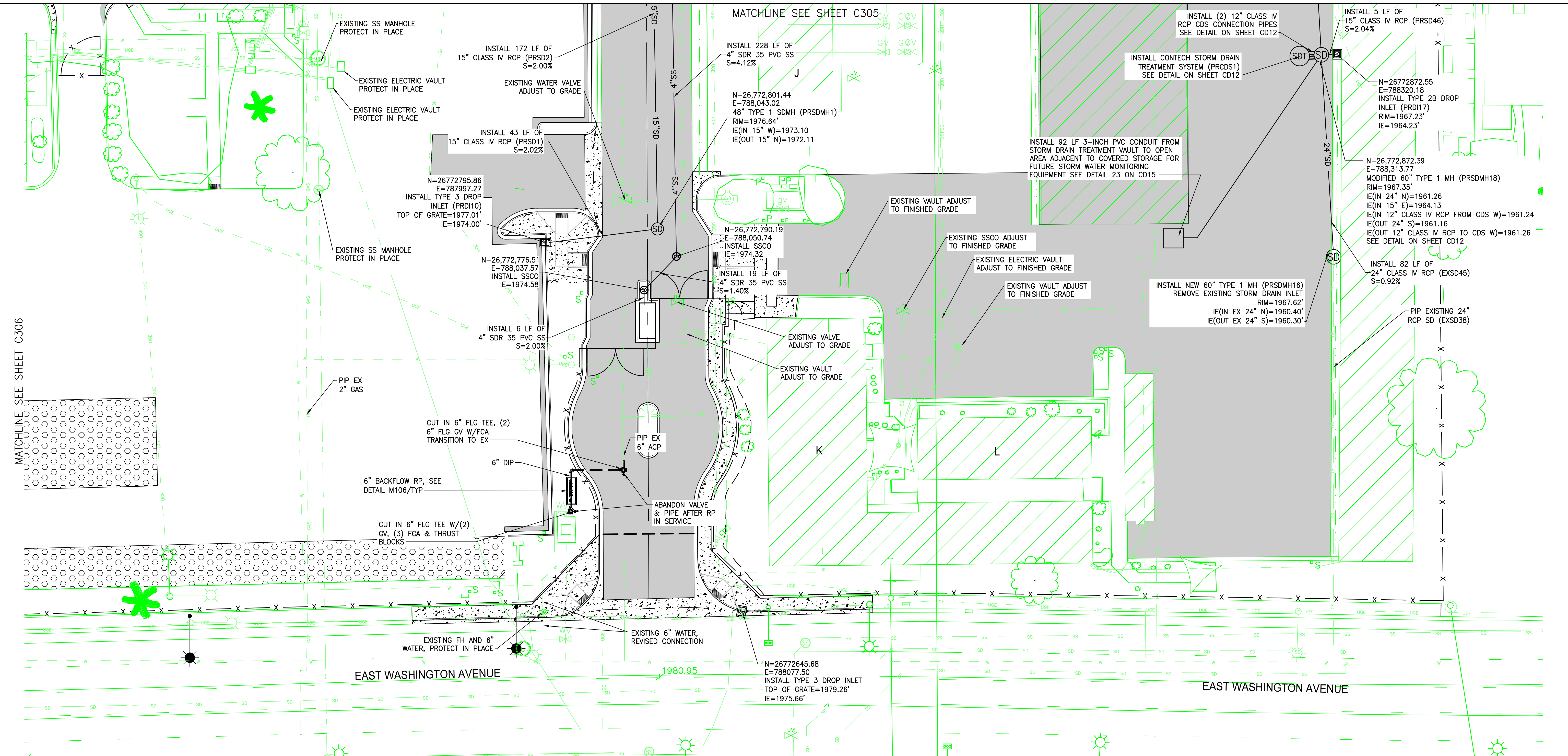
Scale
SEE SHEET

Sheet 53 of 177

Revision
1

CLV DWG & APP #:
107V9042, L21-01092

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 07/2021 11:17 AM By: jclavin, jclavin



MATCHLINE SEE SHEET C306

MATCHLINE SEE SHEET C305

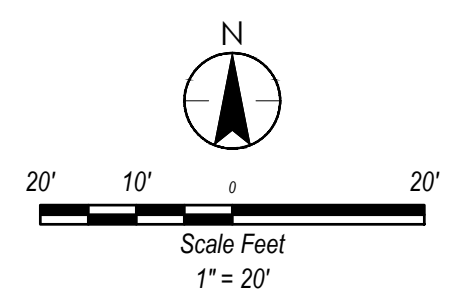
LEGEND

	LIMITS OF ASPHALT CONCRETE PAVEMENT REPLACEMENT
	LIMITS OF P.C.C. CONSTRUCTION
	EXISTING BUILDINGS

- NOTES:**
- HATCH SHOWN FOR UTILITIES TO BE ADJUSTED WITHIN NEW PAVEMENT LIMITS.
 - SEE SHEET CD07 FOR TYPE 1 MANHOLE DETAILS.
 - SEE SHEET CD08 FOR SANITARY SEWER CLEAN OUT DETAILS.
 - SEE SHEET CD10 AND SHEET CD11 FOR TYPE 3 DROP INLET DETAILS.
 - SEE SHEET C213 FOR SOUTH ENTRANCE PROFILE AND SHEETS C308-C311 FOR STORM DRAIN PROFILES.

STORM DRAIN NOTES:

CONTRACTOR SHALL POTHOLE ALL STORM DRAIN CROSSINGS PRIOR TO INSTALLATION TO VERIFY DEPTH OF EXISTING UTILITIES. IF CONFLICT EXISTS, CONTRACTOR TO NOTIFY ENGINEER AND OWNER OF SUCH CONFLICTS TO DETERMINE IF VERTICAL ADJUSTMENT OF PROPOSED STORM DRAIN IS NECESSARY.



1	CLV REVIEW PERMITTING COMMENTS	AP	JBB	21.06.16
Revision		By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD
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0	1
2	3
4	5
6	7

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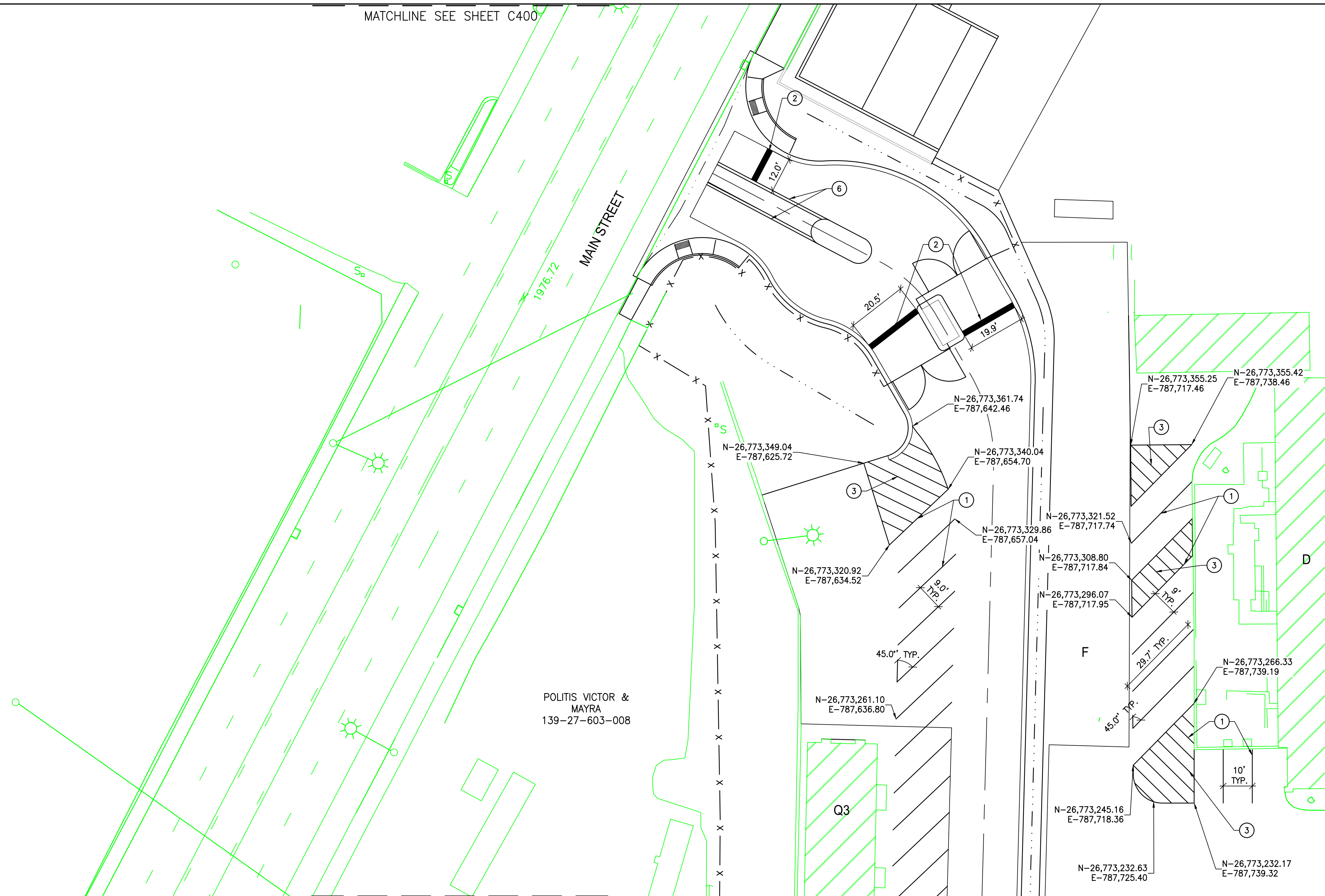
Client/Project
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title UTILITY PLAN		
Project No. 181300599	Scale SEE SHEET	
Drawing No. C307	Sheet 58 of 177	Revision 4

CLV DWG & APP #:
107V9042, L21-01092

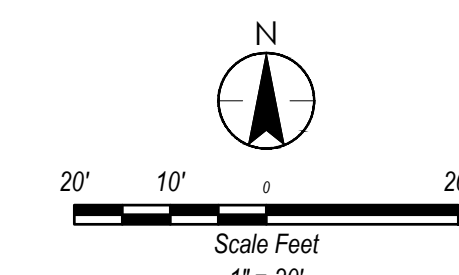
MATCHLINE SEE SHEET C400



MATCHLINE SEE SHEET C404

STRIPING NOTES

- ① 4" WIDE SOLID WHITE STRIPING, TRAFFIC PAINT
- ② 24" WIDE SOLID WHITE STRIPING, THERMOPLASTIC
- ③ NO PARKING AREA. SOLID WHITE STRIPING LINES SPACED EVERY 4'.
- ④ HANDICAP PARKING SYMBOL, THERMOPLASTIC, SEE DETAIL 30/CD17
- ⑤ WHITE STRAIGHT ARROW MARKING, THERMOPLASTIC
- ⑥ 4' WIDE SOLID DOUBLE YELLOW STRIPING, TRAFFIC PAINT



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1	CLV	JBB	21.06.16

Issued	By	Appd.	YY.MM.DD

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Key Map

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2	3
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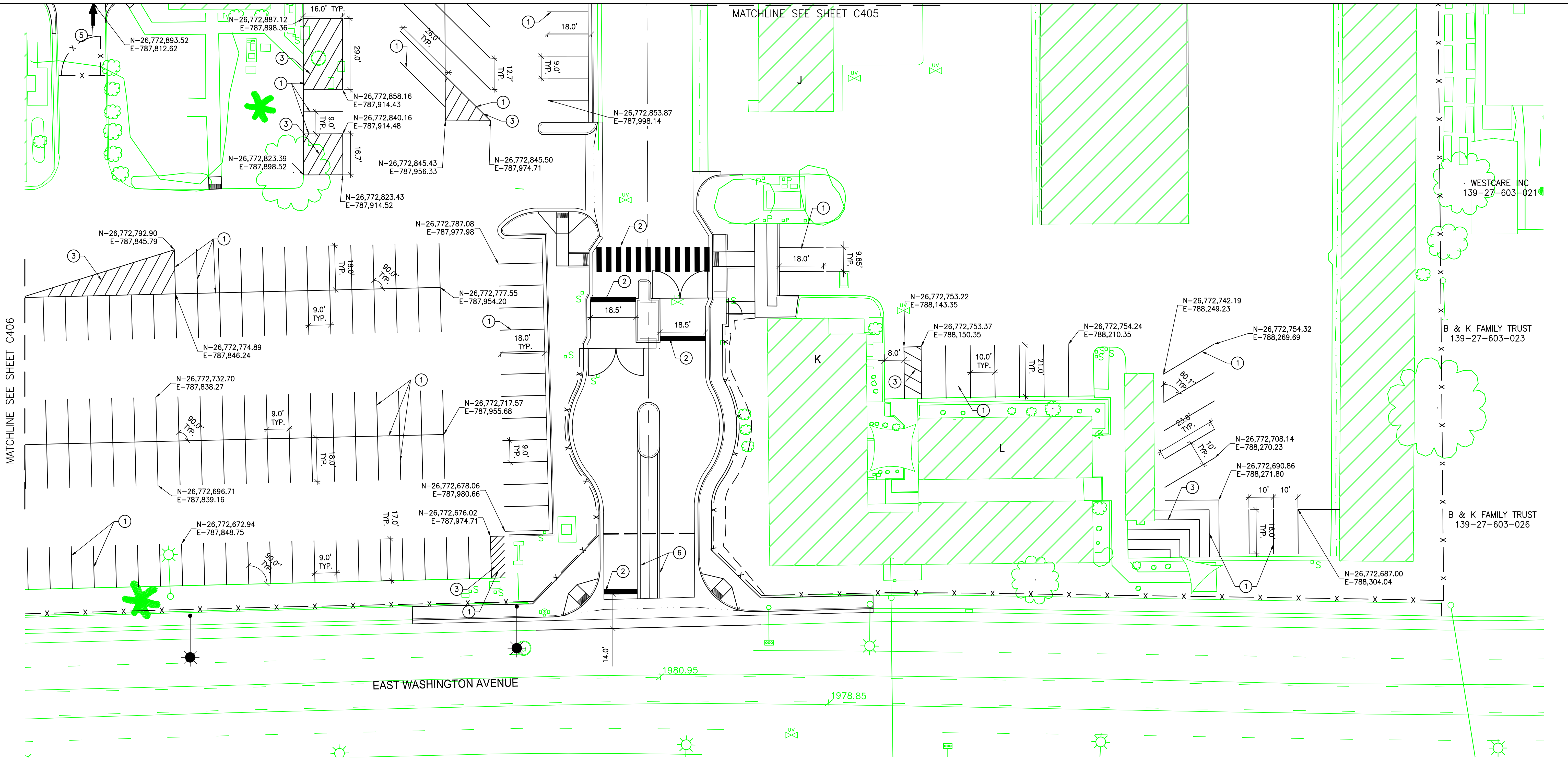
The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay. The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

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File Name:
Dwn. Chkd. Dsgn. YY.MM.DD

Title		
STRIPING PLAN		
Project No. 181300599	Scale SEE SHEET	
Drawing No. C402	Sheet 65 of 177	Revision 1

CLV DWG & APP #:
107V9042, L21-01092

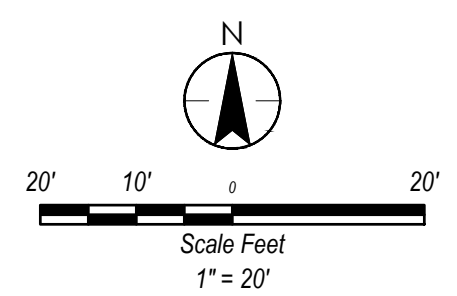


MATCHLINE SEE SHEET C406

MATCHLINE SEE SHEET C405

STRIPING NOTES

- ① 4" WIDE SOLID WHITE STRIPING, TRAFFIC PAINT
- ② 24" WIDE SOLID WHITE STRIPING, THERMOPLASTIC
- ③ NO PARKING AREA. SOLID WHITE STRIPING LINES SPACED EVERY 4'.
- ④ HANDICAP PARKING SYMBOL, THERMOPLASTIC, SEE DETAIL 30/CD17
- ⑤ WHITE STRAIGHT ARROW MARKING, THERMOPLASTIC
- ⑥ 4' WIDE SOLID DOUBLE YELLOW STRIPING, TRAFFIC PAINT



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Issued	By	Appd.	YY.MM.DD

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Key Map

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6	7

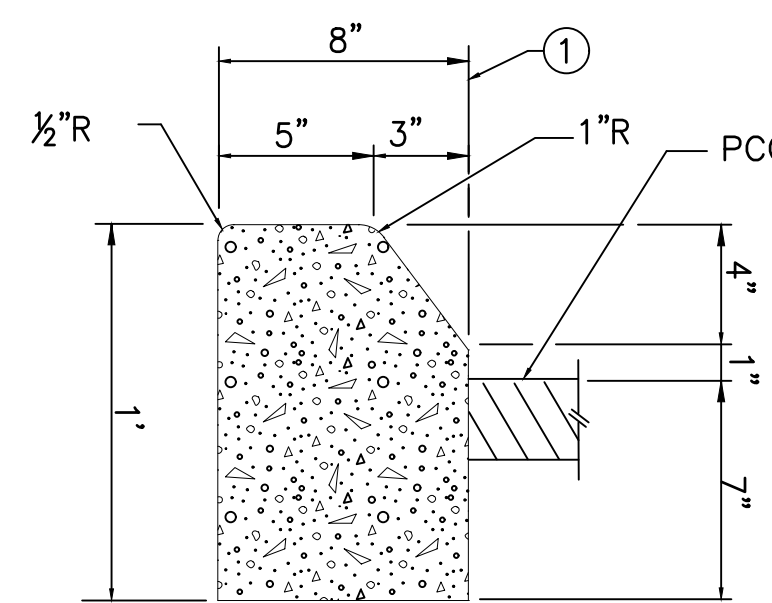
6995 Sierra Center Parkway
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 Las Vegas, Clark County, Nevada

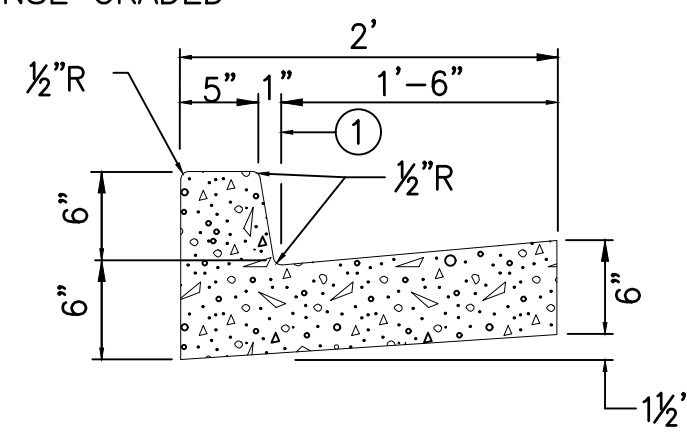
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 Dwn. Chkd. Dsgn. YY.MM.DD

Title		CLV DWG & APP #: 107V9042, L21-01092	
STRIPING PLAN			
Project No. 181300599	Scale SEE SHEET		
Drawing No. C407	Sheet 70 of 177	Revision 4	



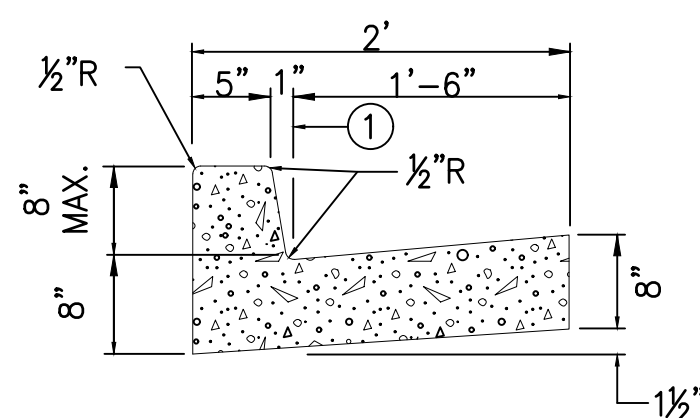
(0.02315 cu. yd. per ft.)

SECTION TYPE 2 CURB



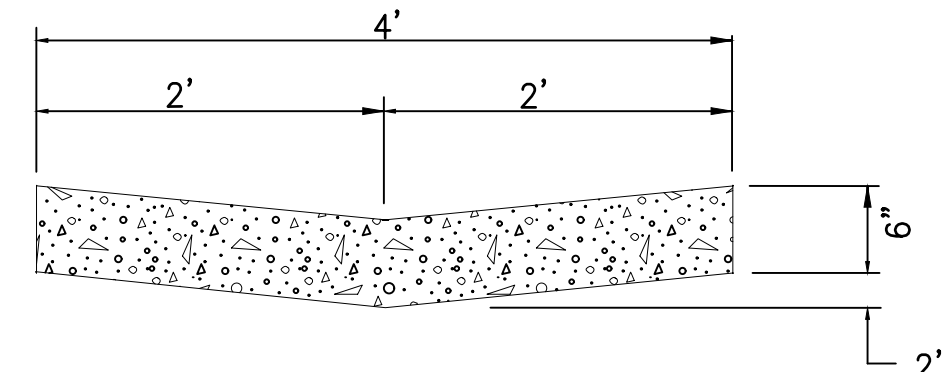
(0.04552 cu. yd. per ft.)

SECTION TYPE 5



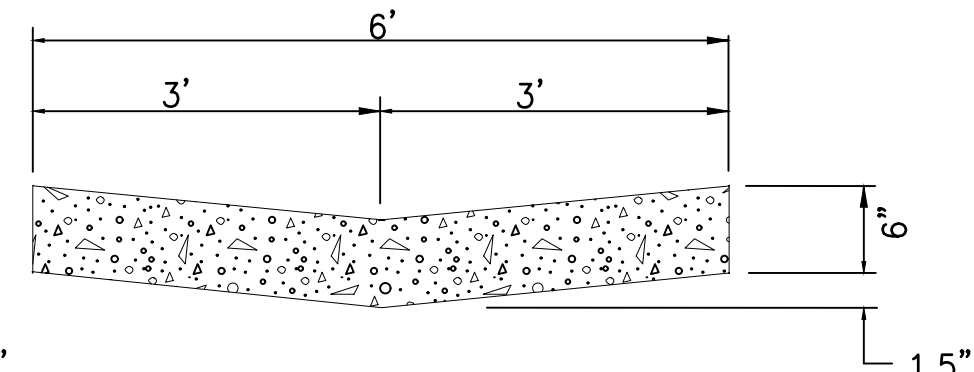
MODIFIED TYPE 5 CURB AND GUTTER

CURB AND GUTTER



(0.07407 cu. yd. per ft.)

SECTION TYPE 2 VALLEY GUTTER



(0.07407 cu. yd. per ft.)

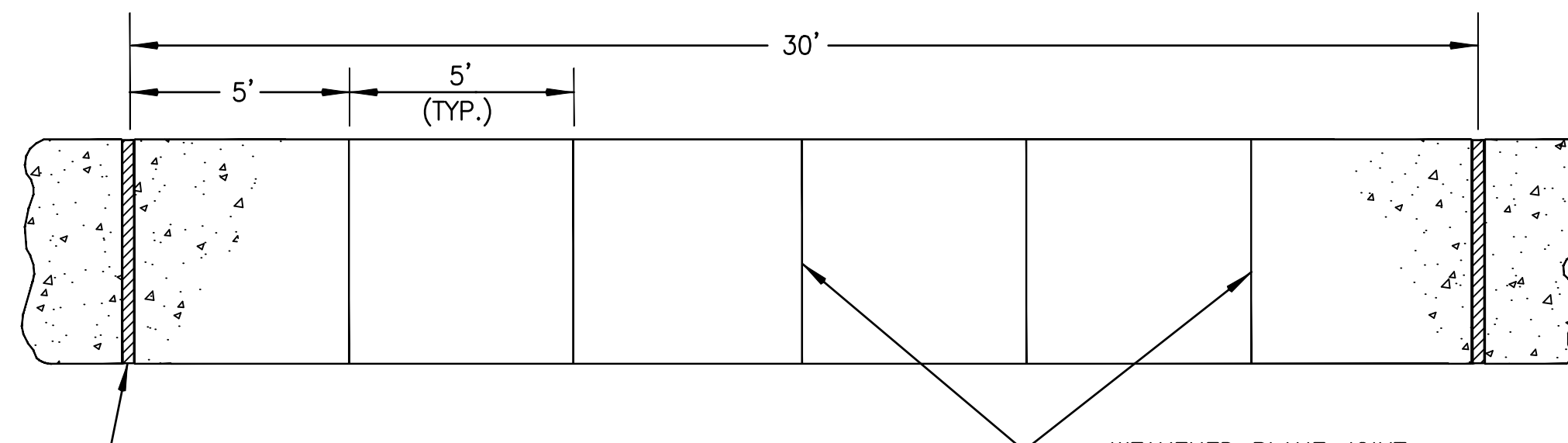
SECTION TYPE 3 VALLEY GUTTER

NOTES:

- ALL CURB, CURB AND GUTTER AND VALLEY GUTTER SHALL HAVE 6" TYPE II AGGREGATE BASE.

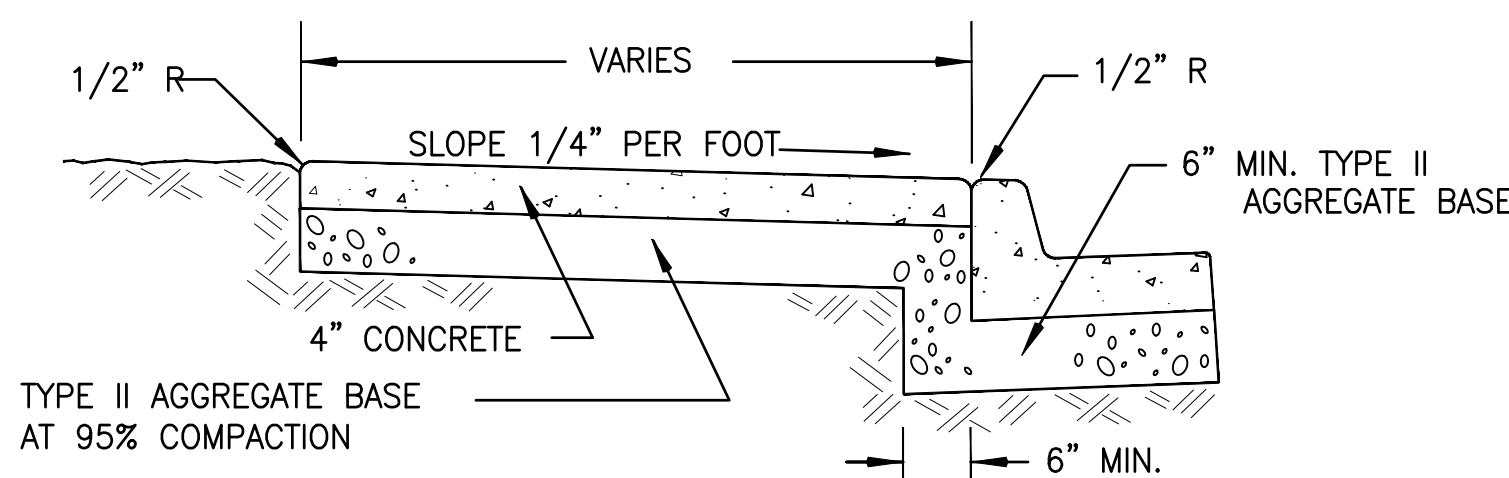
- ① LOCATION OF STATION/OFFSET OR NORTHING AND EASTING

1 CURB, CURB AND GUTTER, AND VALLEY GUTTER
SCALE: NTS

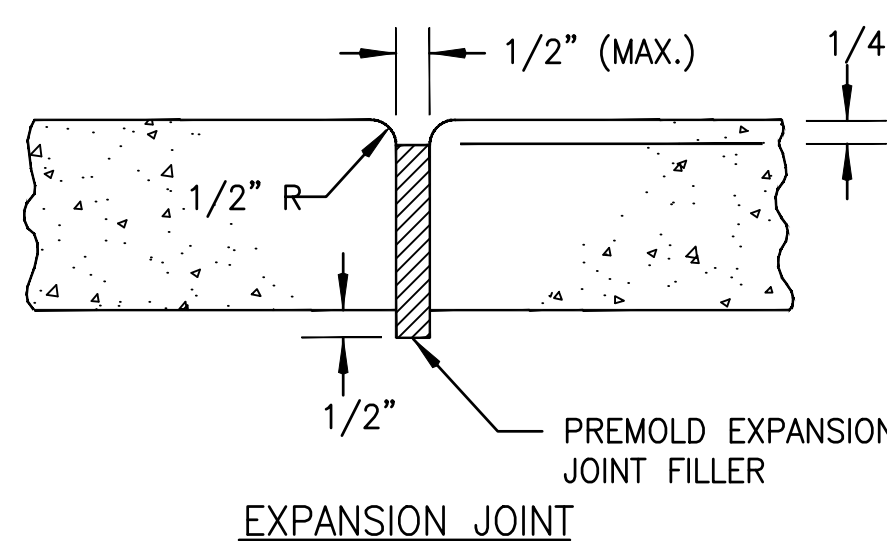


1/2" EXPANSION JOINT AT 30' INTERVALS, AT COLD JOINTS AND AT BEGINNING AND END OF RETURN. EXPANSION JOINTS TO MATCH LOCATION MATCH LOCATION OF CURB AND GUTTER EXPANSION JOINT.

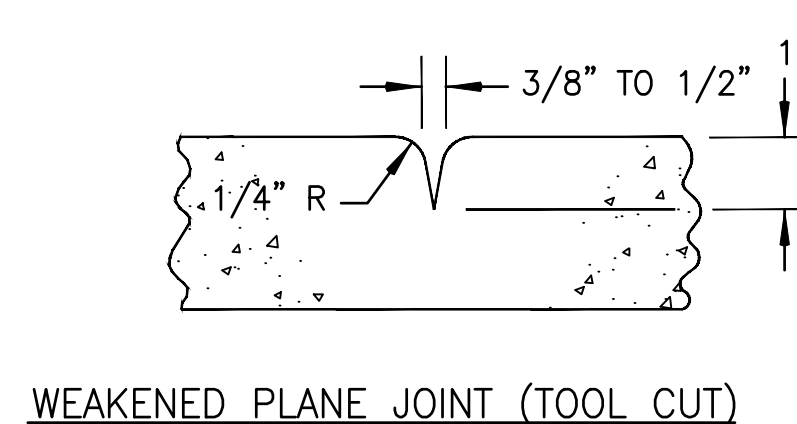
PLAN



TYPICAL SECTION



EXPANSION JOINT



WEAKENED PLANE JOINT (TOOL CUT)

NOTES:

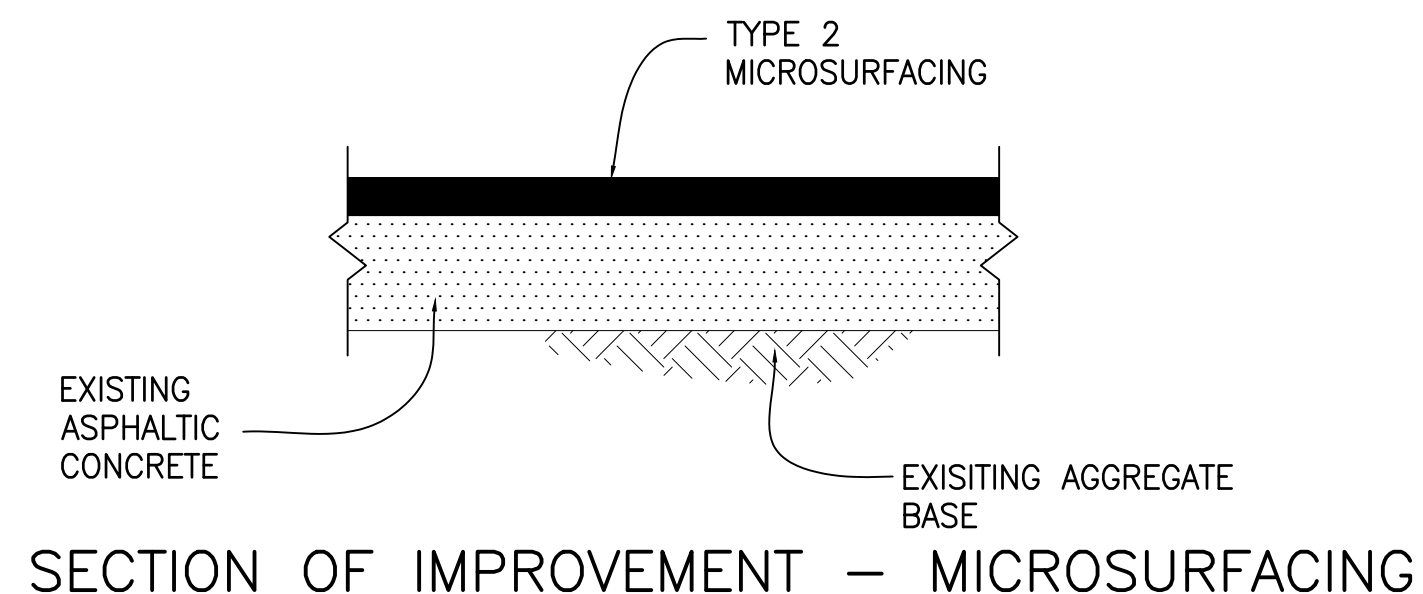
- ON ALL CURB RETURNS A 1/2" EXPANSION JOINT SHALL BE CONSTRUCTED BETWEEN THE BACK OF CURB AND THE SIDEWALK FOR THE ENTIRE LENGTH OF THE RETURN.
- LONGITUDINAL WEAKENED PLANE JOINT REQUIRED AT MIDPOINT OF SIDEWALK 10' OR WIDER.

2 SIDEWALK
SCALE: NTS

NOTES:

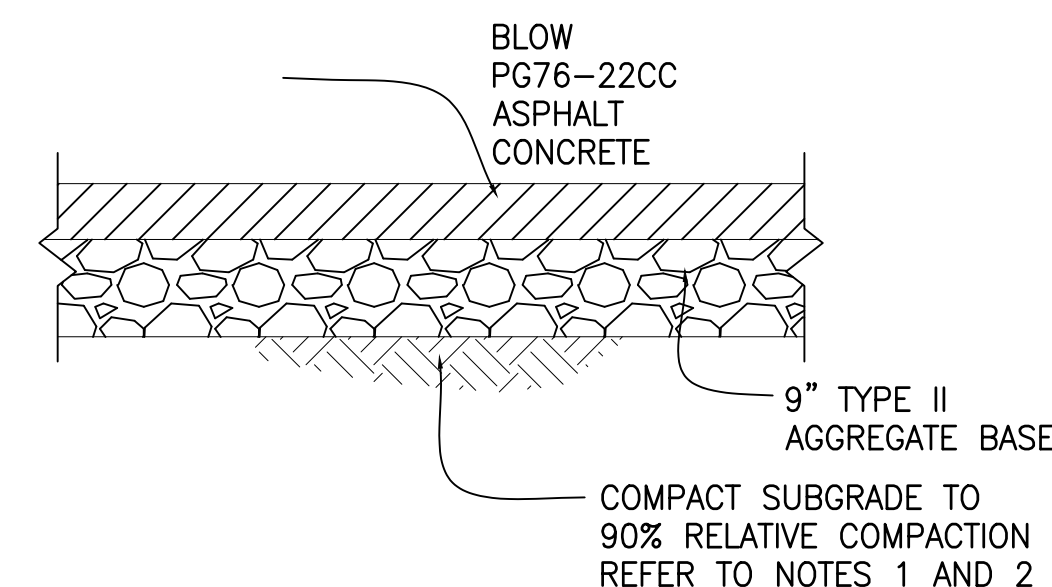
- IN PAVED AREAS (INCLUDING ADJOINING SIDEWALKS, PATIOS AND OTHER CONCRETE SLABS) AND AT LEAST 2 FEET BEYOND IN PLAN VIEW, IT WILL BE NECESSARY TO OVEREXCAVATE AND RECOMPACT 3 FEET OF NATURAL SOILS BELOW EXISTING GRADE OR FINAL SUBGRADE, WHICHEVER IS LOWER WHEN SOILS ENCOUNTERED ARE CLASSIFIED AS FIRM OR SOFT. OVEREXCAVATION MAY BE TERMINATED IF CALICHE IS ENCOUNTERED PRIOR TO THE REQUIRED DEPTH OF OVEREXCAVATION AND IT IS BELOW SUBGRADE IN PAVEMENT AREAS.
- PRIOR TO BACKFILLING OVEREXCAVATED AREAS, THE BOTTOM 6" OF THE EXPOSED SUBGRADE SHALL BE SCARIFIED AND RECOMPACTED TO 90%.
- THE LOWER PORTION (1 FOOT IN PAVED AREAS) OF THE FILL MATERIAL PLACED IN THE OVEREXCAVATED AREA SHALL CONSIST OF THE ON-SITE FINE-GRAINED SOILS THAT ARE EXCAVATED TO ACT AS A RELATIVELY IMPERMEABLE BLANKET. NATIVE MATERIAL MAY EXTEND TO THE BASE OF THE AGGREGATE BASE.
- CONTRACTOR SHALL NOTIFY OWNER IMMEDIATELY UPON COMPLETING THE EXCAVATION TO THE GRADE SHOWN FOR INSPECTION BY THE OWNER'S REPRESENTATIVE. THE OWNER'S REPRESENTATIVE WILL IDENTIFY ANY SOILS CLASSIFIED AS FIRM OR SOFT AND REQUIRING OVEREXCAVATION.

3 SECTIONS OF IMPROVEMENTS
SCALE: NTS



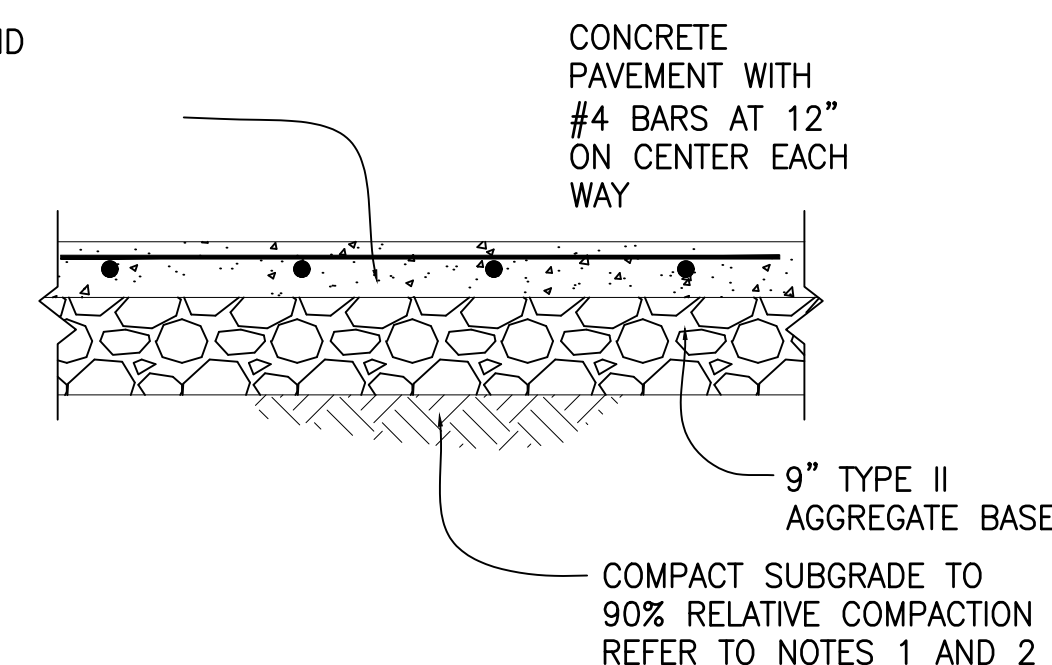
SECTION OF IMPROVEMENT - MICROSURFACING

4" TYPE II COARSE 75



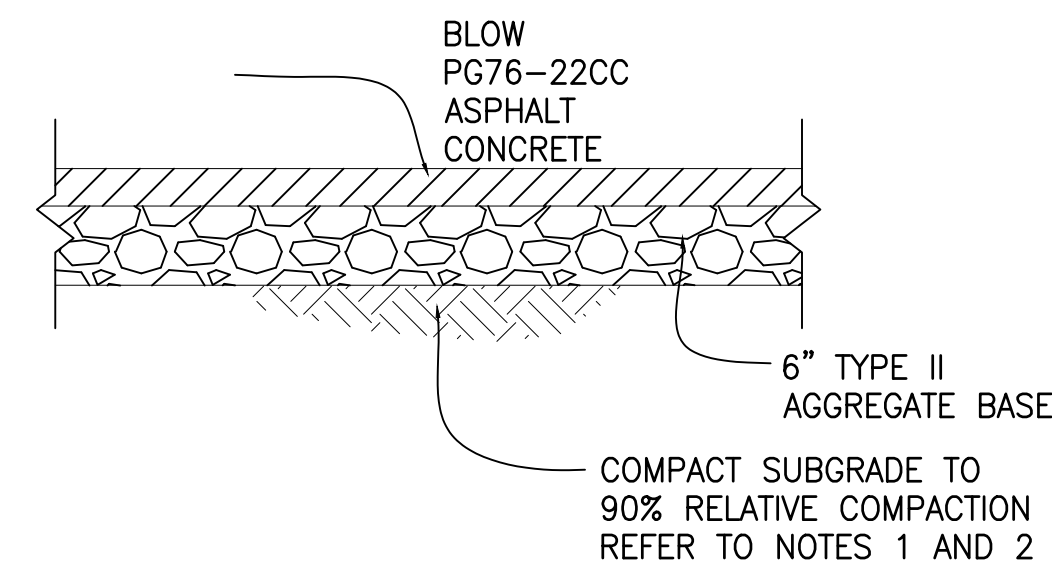
SECTION OF IMPROVEMENT - AC PAVEMENT

8" PORTLAND CEMENT



SECTION OF IMPROVEMENT - REINFORCED PCC PAVEMENT

2" TYPE II COARSE 75



SECTION OF IMPROVEMENT - TEMPORARY AC PAVEMENT

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Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

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Key Map



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Client/Project

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DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

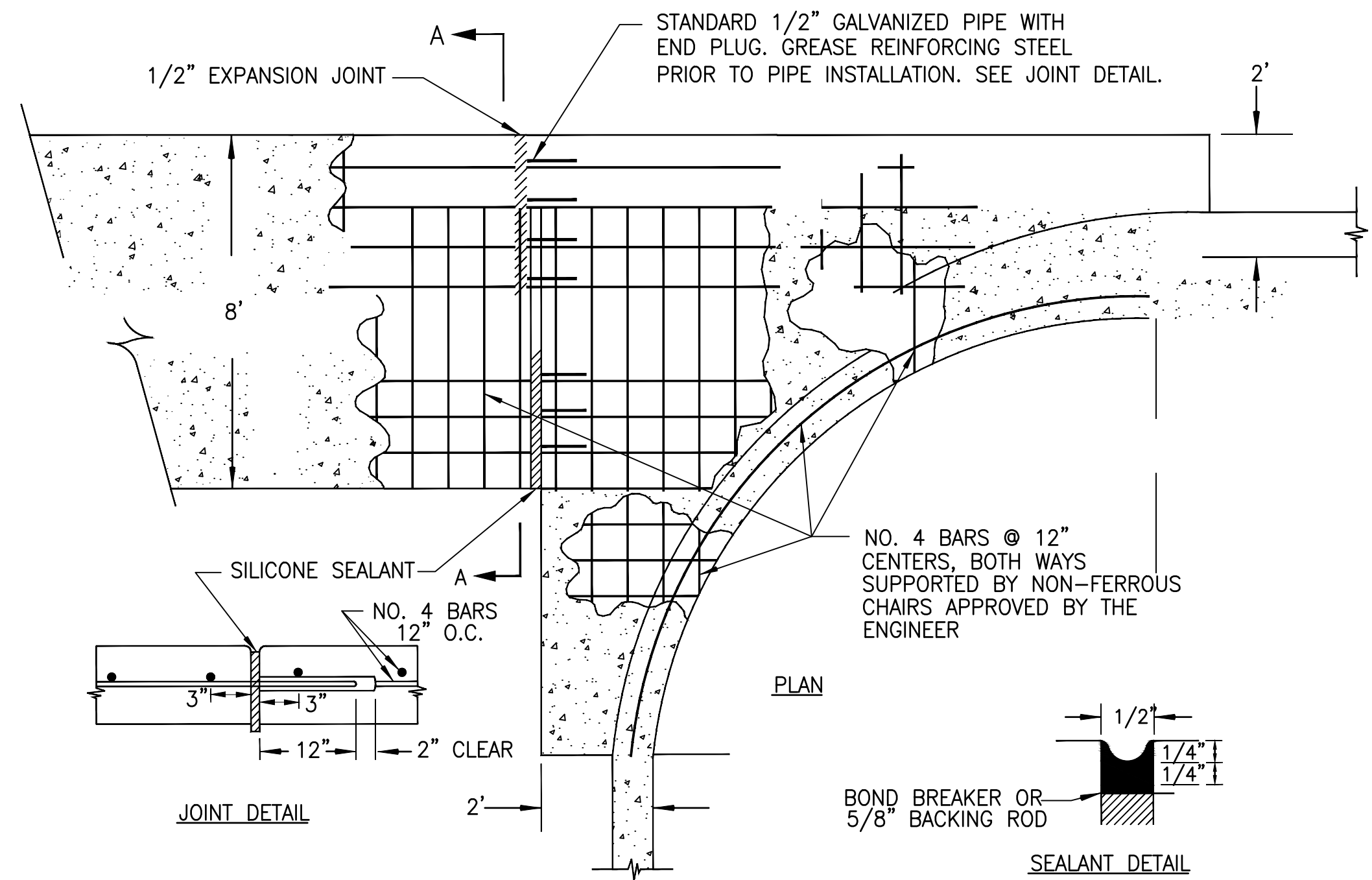
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Dwn. Chkd. Dsgn. YY.MM.DD

Title

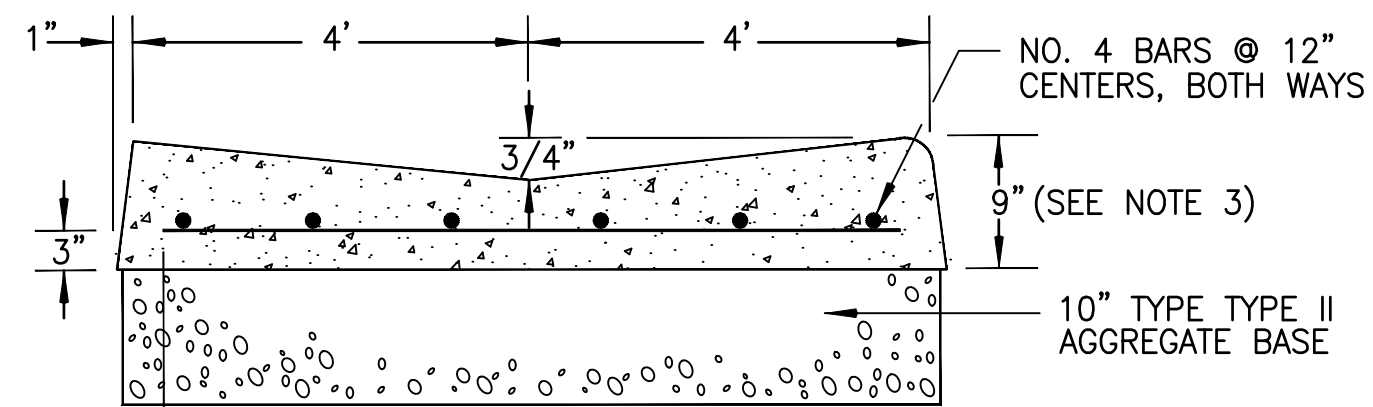
CIVIL DETAILS

Project No. 181300599	Scale SEE SHEET
Drawing No. CD01	Sheet 72 of 177
Revision 0	

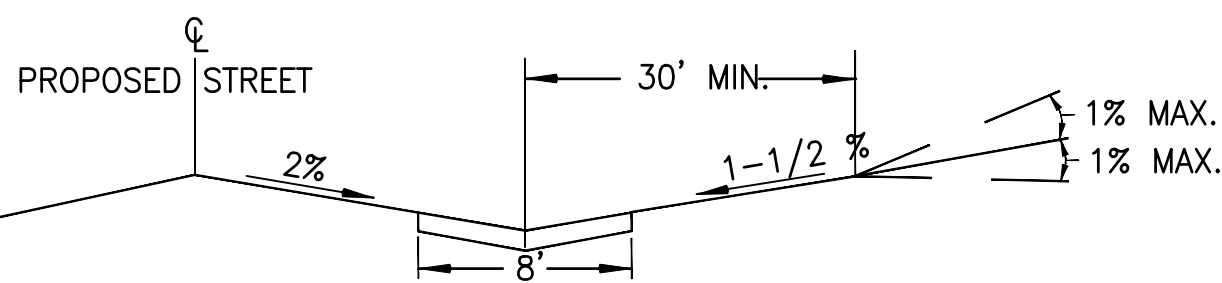
CLV DWG & APP #:
107V9042, L21-01092



JOINT DETAIL



SECTION A-A

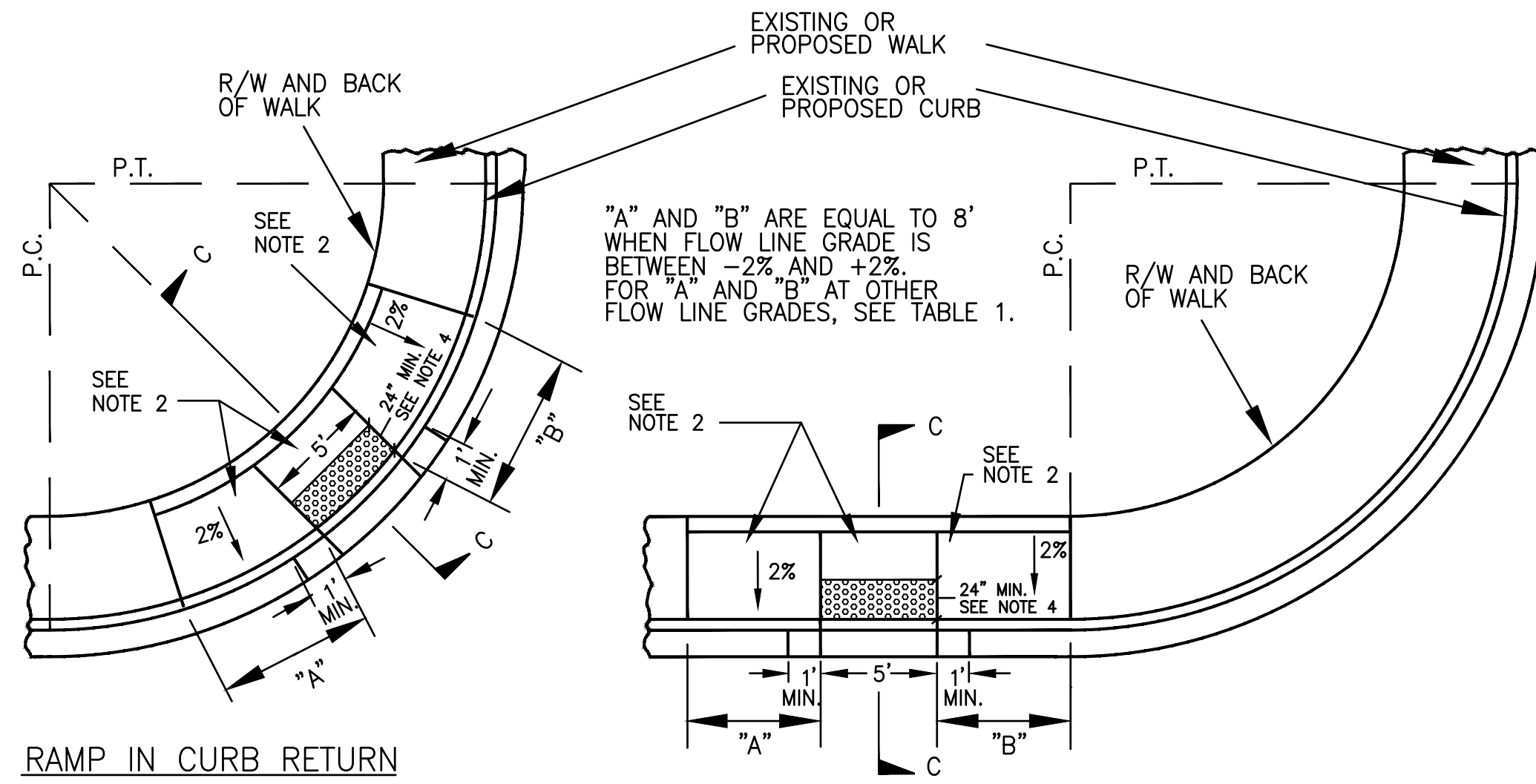


TYPICAL PROFILE AT INTERSECTION

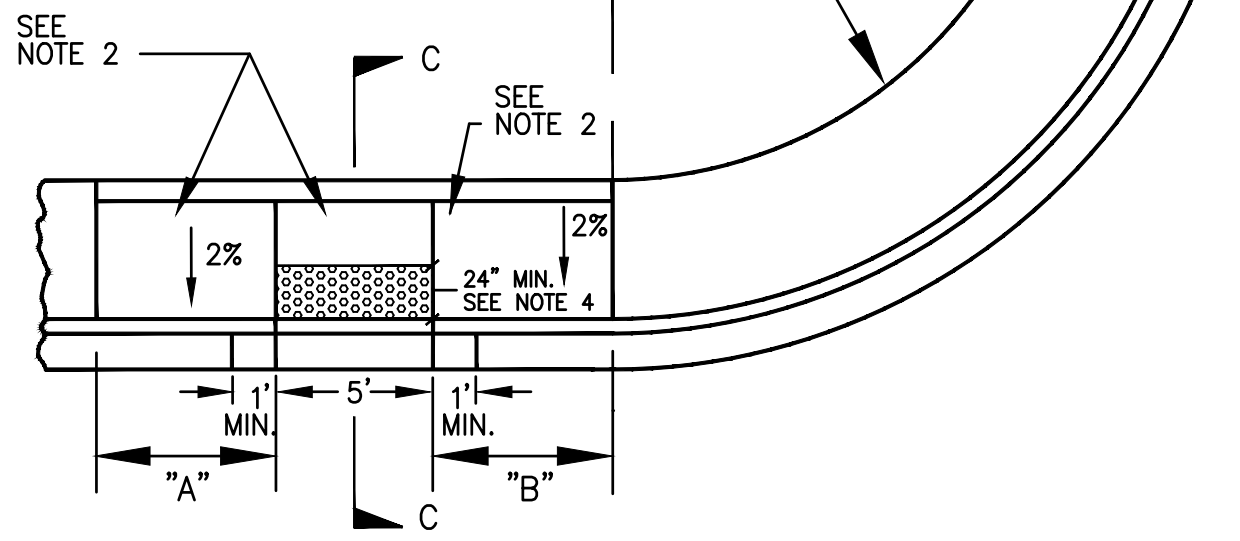
NOTES:

1. FINISHED ASPHALT CONCRETE SURFACE TO BE FLUSH WITH CROSS GUTTER LIP.
2. CONSTRUCTION OF CROSS GUTTER IS NOT ALLOWED ACROSS MAJOR COLLECTOR OR ARTERIAL STREETS.
3. ADJACENT SPANDREL SHALL BE 9" THICK P.C.C.

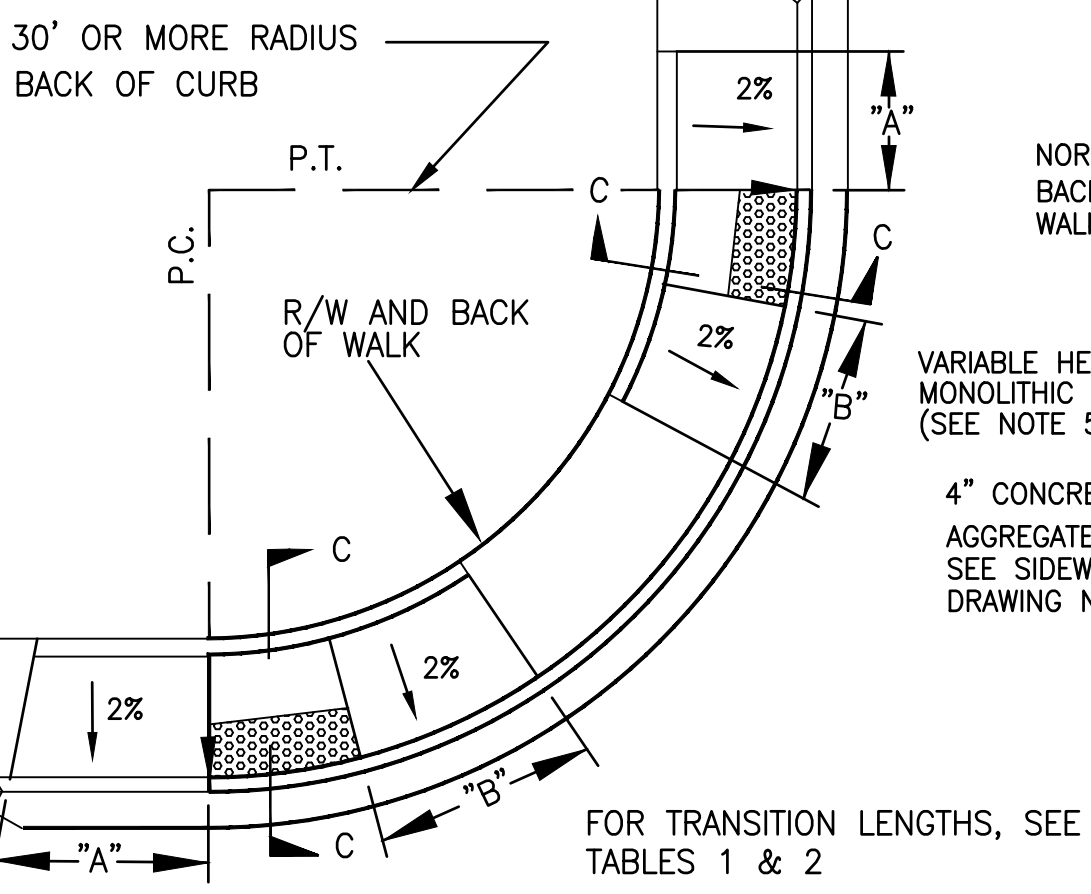
4 CROSS GUTTER
CD02 SCALE: NTS



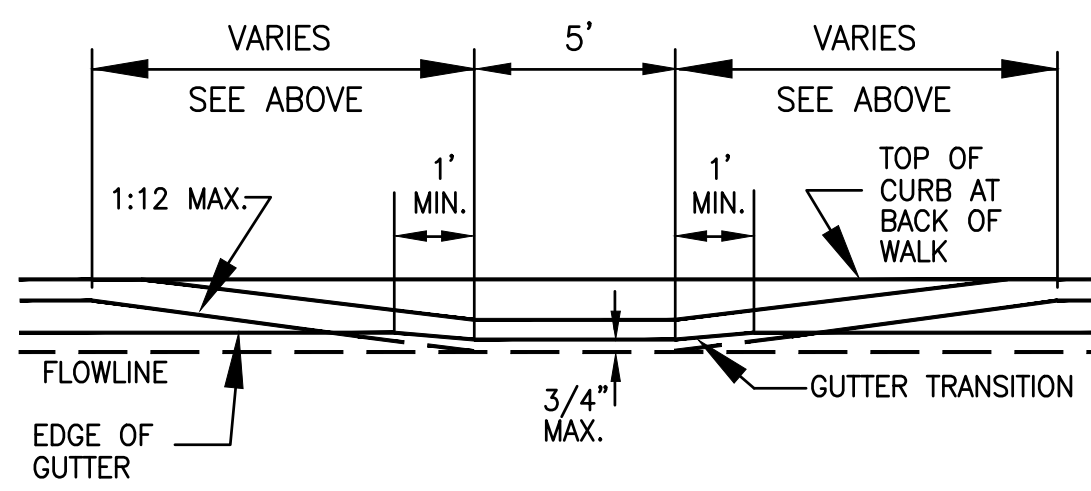
RAMP IN CURB RETURN



RAMP OUTSIDE CURB RETURN



PAIRED RAMP IN CURB RETURN



PROFILE

GRADE (%) "B" TO "A"	"A" (FT) MIN.	"B" (FT) MIN.
-6 TO -5.01	4.5	21.5
-5 TO -4.01	4.5	15.0
-4 TO -3.01	4.5	12.0
-3 TO -2.01	4.5	9.5
-2 TO 2	8.0	8.0
2.01 TO 3	9.5	4.5
3.01 TO 4	12.0	4.5
4.01 TO 5	15.0	4.5
5.01 TO 6	21.5	4.5

TABLE 1. TRANSITION LENGTHS FOR 1:12 SIDE SLOPES

GRADE (%) "B" TO "A"	"A" (FT) MIN.	"B" (FT) MIN.
-6 TO -5.01	4.0	12.5
-5 TO -4.01	4.0	10.0
-4 TO -3.01	4.0	8.5
-3 TO -2.01	4.0	7.5
-2 TO 2	6.5	6.5
2.01 TO 3	7.5	4.0
3.01 TO 4	8.5	4.0
4.01 TO 5	10.0	4.0
5.01 TO 6	12.5	4.0

TABLE 2. TRANSITION LENGTHS FOR 1:10 SIDE SLOPES

NOTES:

1. SIDEWALK RAMPS OUTSIDE OF THE CURB RETURN SHALL BE LOCATED ADJACENT TO THE RETURN UNLESS OTHERWISE APPROVED.
2. RAMPS SHALL BE CONSTRUCTED WITH A ROUGH BROOM FINISH TRANSVERSE TO THE SLOPE OF THE RAMP.
3. WHEN CONSTRUCTING RAMP WHERE CURB & GUTTER EXISTS, COMPLETELY REMOVE INTERFERING PORTIONS OF EXISTING CURB & GUTTER.
4. DETECTABLE WARNING CONSISTING OF RAISED TRUNCATED DOMES WHICH COMPLY WITH DETAIL 7/CD03 AND CONTRASTING VISUALLY WITH ADJOINING SURFACES SHALL BE PLACED ON BOTTOM PORTION OF RAMP EXTENDING THE FULL WIDTH OF THE RAMP AND TO A MINIMUM DEPTH OF 24 INCHES. PAVER BLOCKS PERMITTED ONLY IN THE CITY OF BOULDER CITY FOR DETECTABLE WARNING AREAS.
5. CURB MAY BE PLACED AND IS PREFERRED BEHIND BACK OF WALK IF SUFFICIENT RIGHT-OF-WAY OR EASEMENTS EXIST AND IS APPROVED BY THE ENGINEER.
6. TABLE 1 AND 2 APPLY TO CURB WITH 6" CURB FACE. IF CURB FACE IS GREATER THAN 6", A SPECIAL DESIGN IS REQUIRED.

Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

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Key Map



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MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

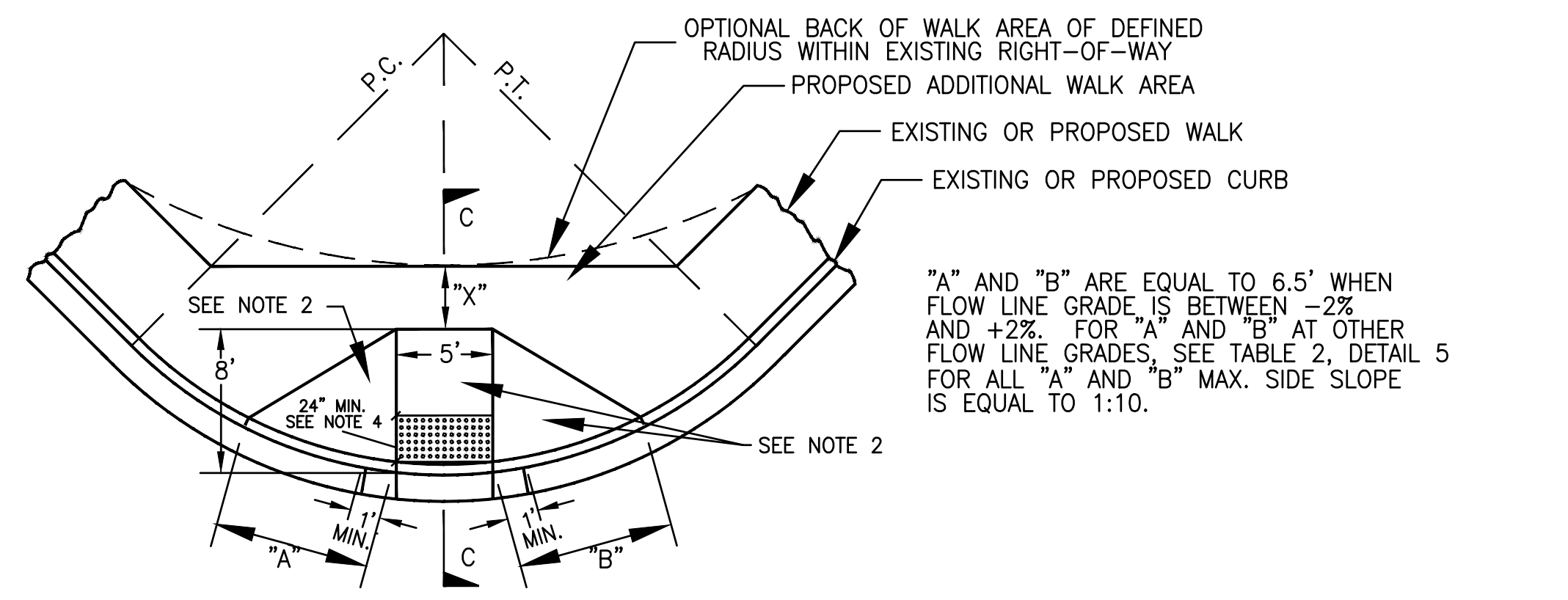
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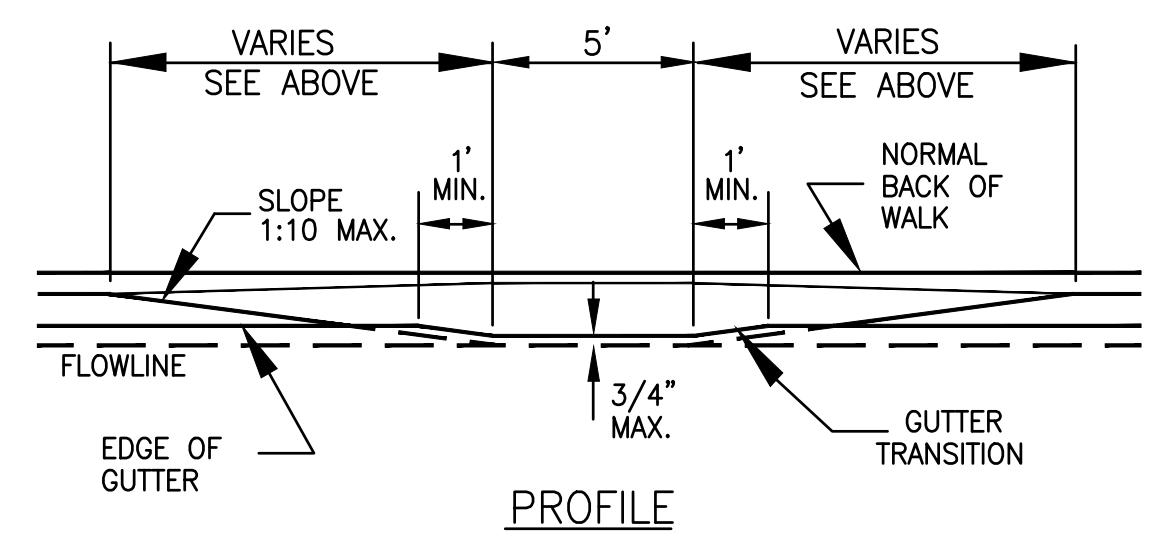
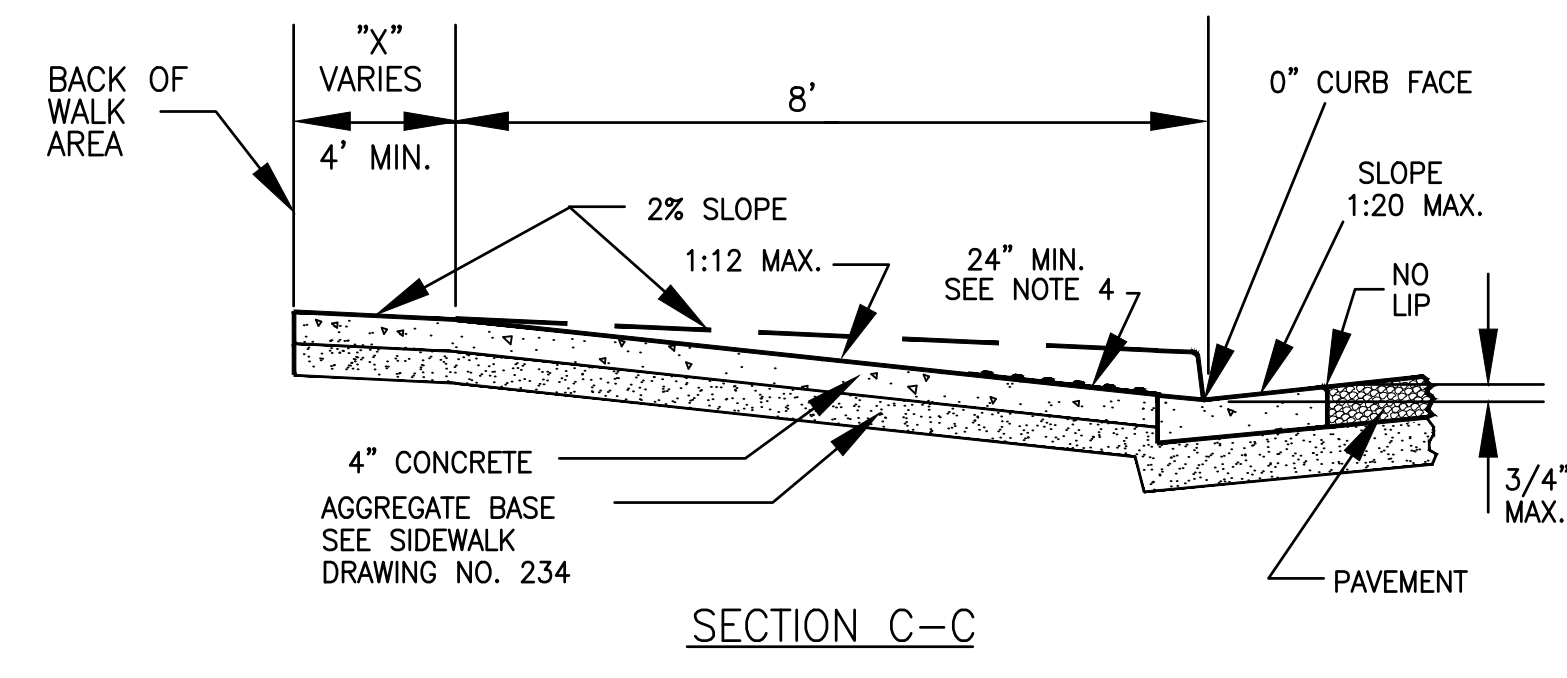
CIVIL DETAILS

Project No.	Scale	
181300599	SEE SHEET	
Drawing No.	Sheet	Revision
CD02	73 of 177	0

CLV DWG & APP #:
107V9042, L21-01092



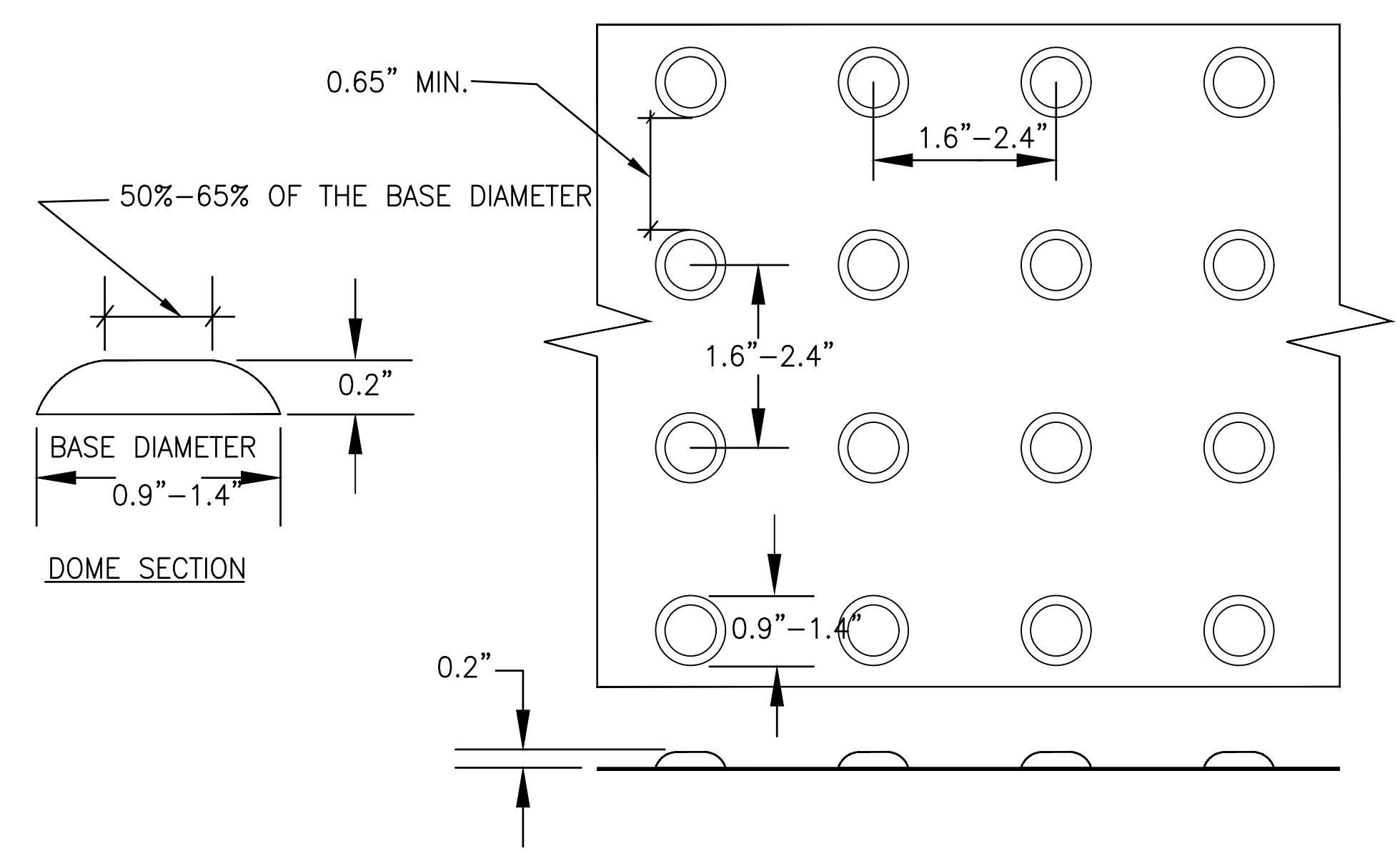
RAMP IN CURB RETURN
(NO BACK OF WALK DEPRESSION)



- NOTES:
1. SIDEWALK RAMP WITHIN CURB RETURN SHALL BE LOCATED AT THE MIDPOINT OF CURB RETURN UNLESS OTHERWISE APPROVED.
 2. RAMPS SHALL BE CONSTRUCTED WITH A ROUGH BROOM FINISH TRANSVERSE TO THE SLOPE OF THE RAMP.
 3. WHEN CONSTRUCTING RAMP WHERE CURB & GUTTER EXISTS, COMPLETELY REMOVE INTERFERING PORTIONS OF EXISTING CURB & GUTTER.
 4. DETECTABLE WARNING CONSISTING OF RAISED TRUNCATED DOMES WHICH COMPLY WITH DETAIL 7/CD03 AND CONTRASTING VISUALLY WITH ADJOINING SURFACES SHALL BE PLACED ON BOTTOM PORTION OF RAMP EXTENDING THE FULL WIDTH OF THE RAMP AND TO A MINIMUM DEPTH OF 24 INCHES. PAVER BLOCKS PERMITTED ONLY IN THE CITY OF BOULDER CITY FOR DETECTABLE WARNING AREAS.

CASE II SHALL BE USED WHERE R/W AND FIELD CONDITIONS PERMIT.

6 SIDEWALK RAMP CASE 2
SCALE: NTS



7 DETECTABLE WARNING DETAILS (TRUNCATED DOMES)
SCALE: NTS

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 ORIGINAL SHEET - ANS1 D

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DEPARTMENT OF TRANSPORTATION

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MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:
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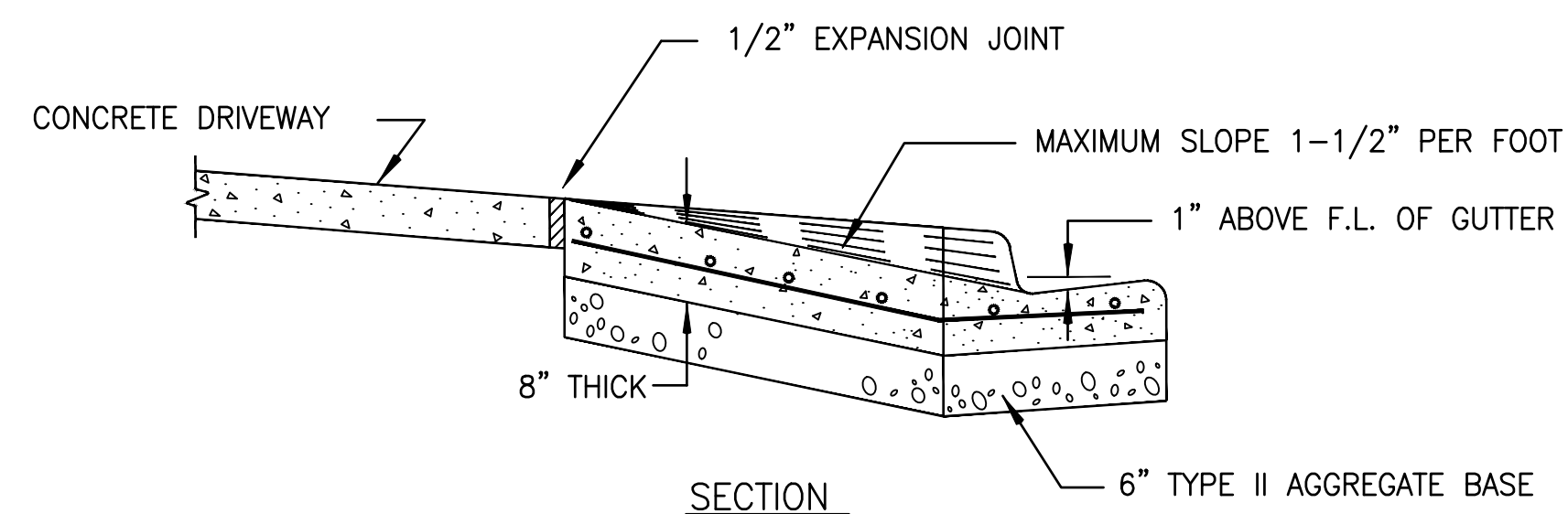
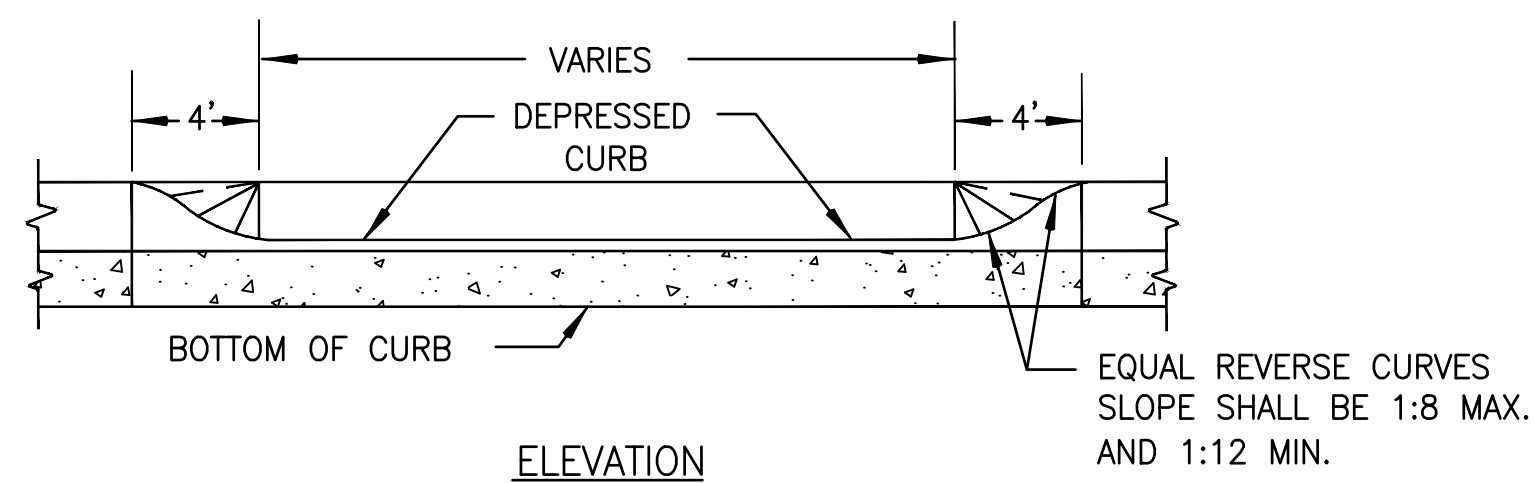
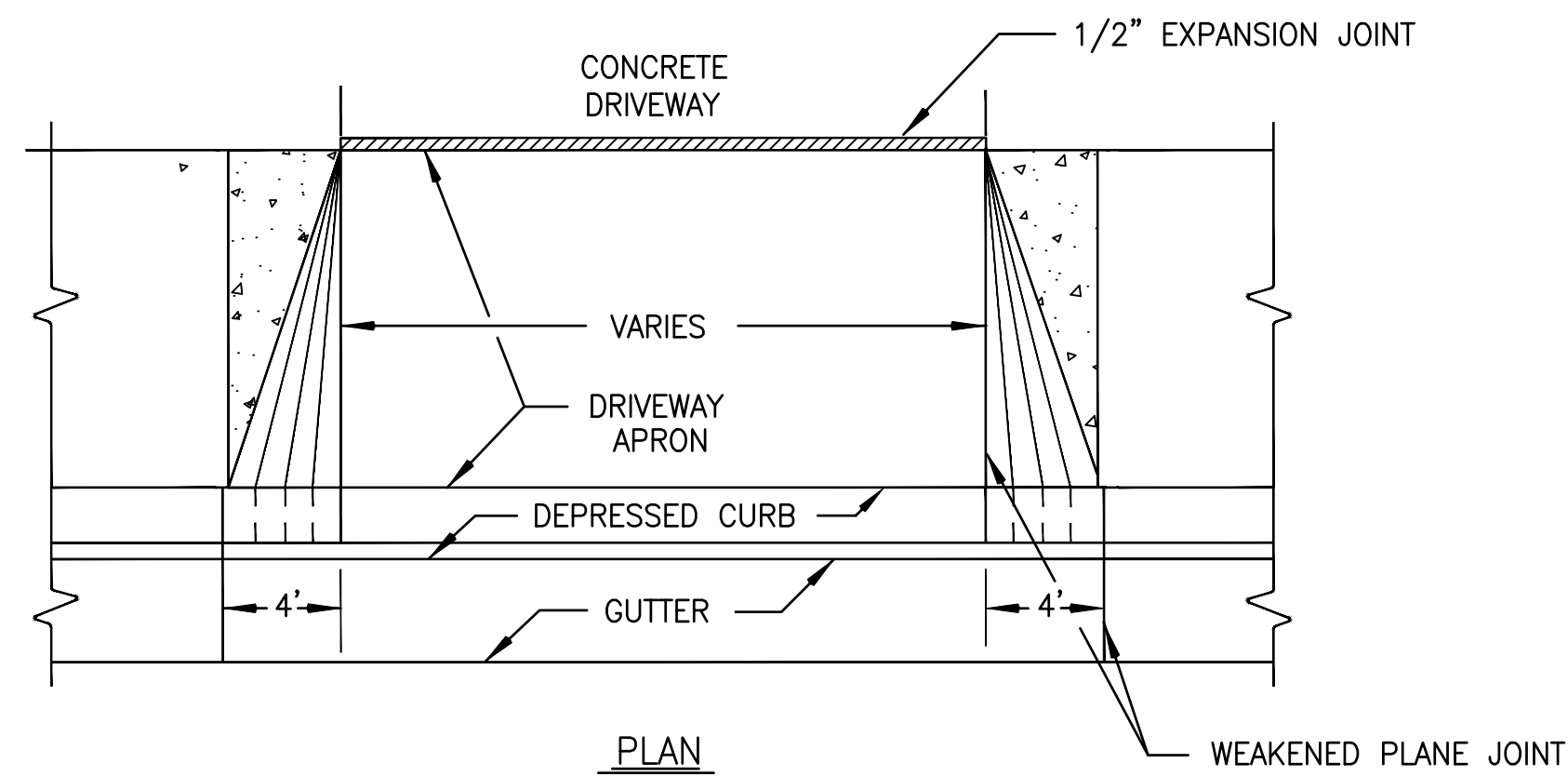
Title
CIVIL DETAILS

Project No. 181300599
Drawing No. CD03

Scale SEE SHEET
Sheet 74 of 177

Revision 0

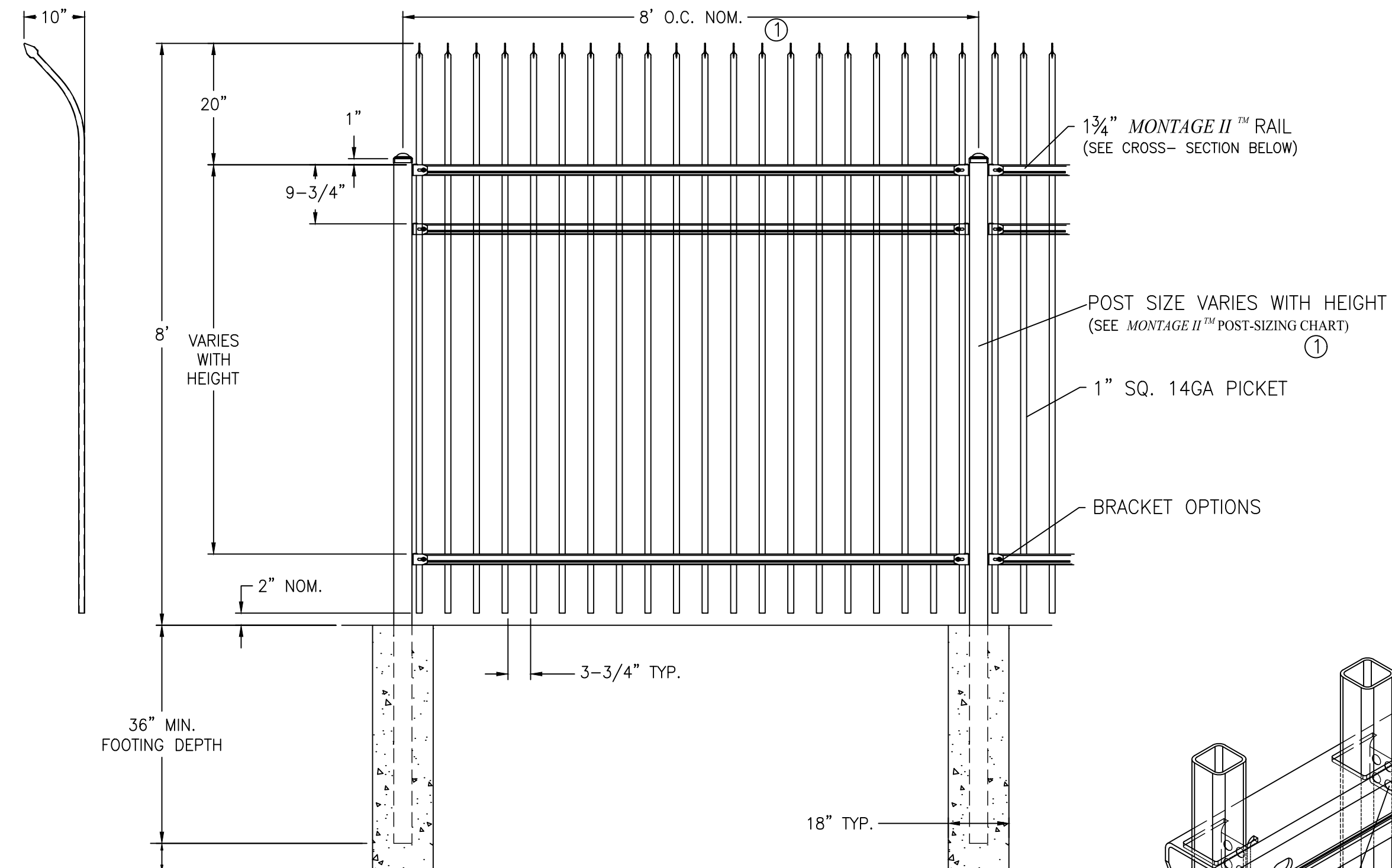
CLV DWG & APP #:
107V9042, L21-01092



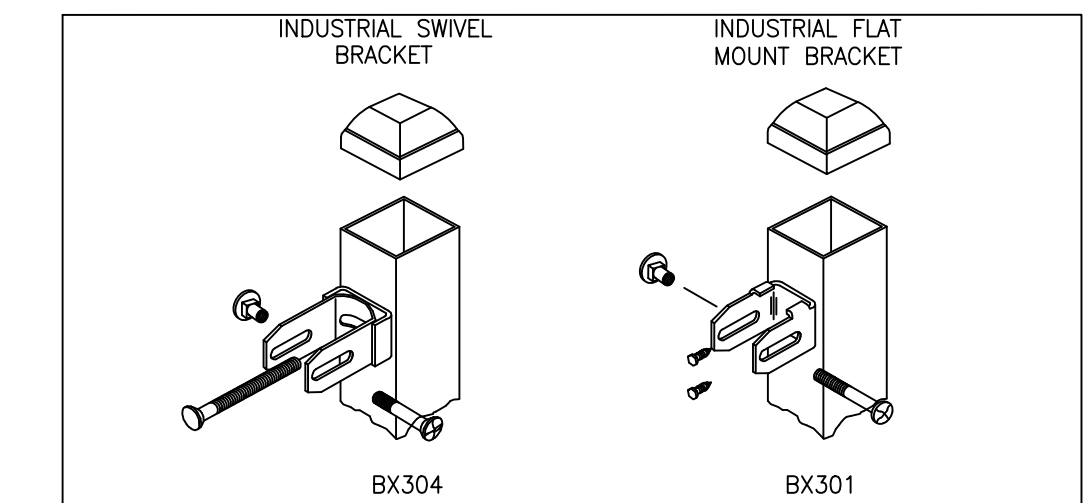
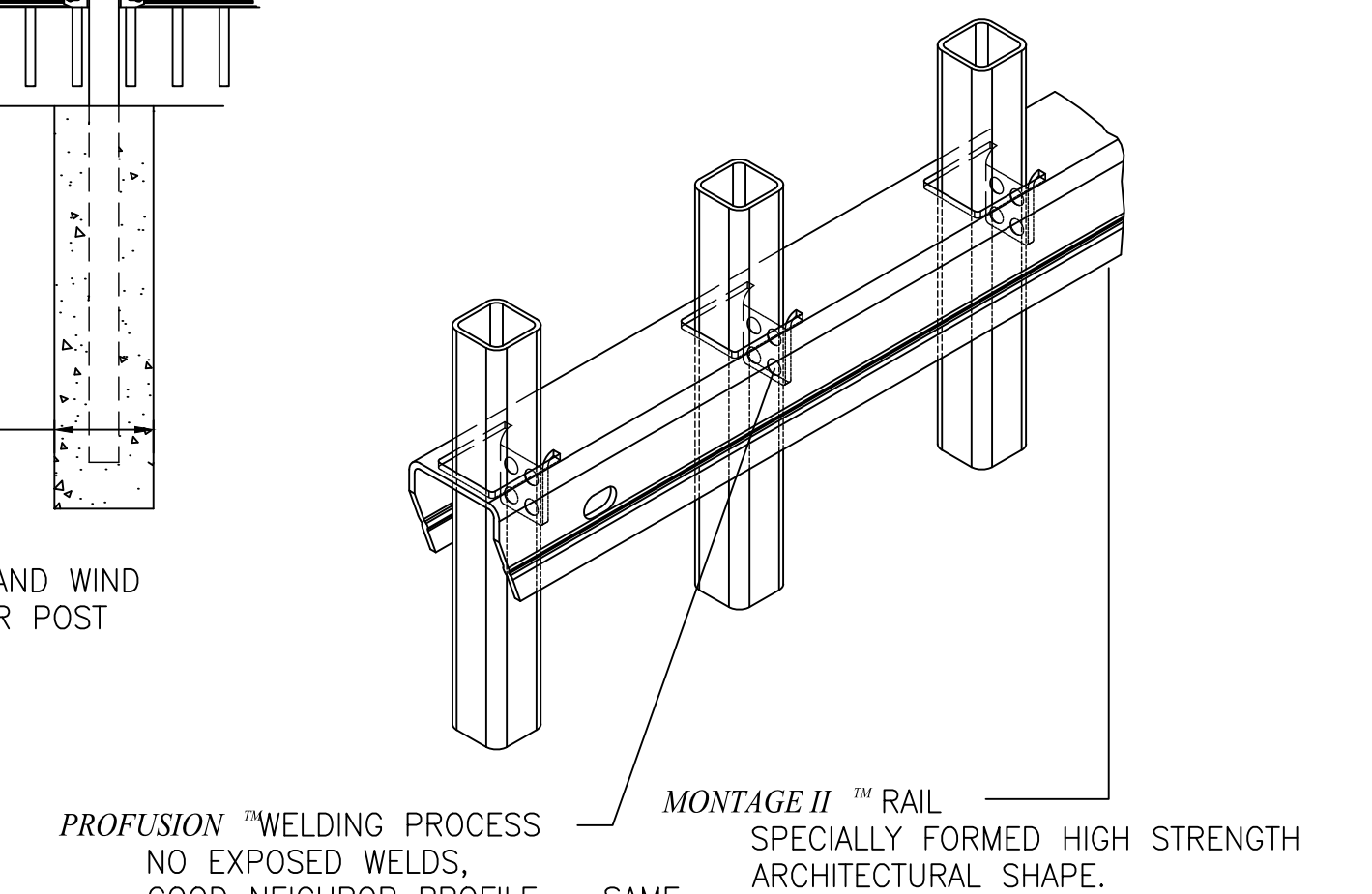
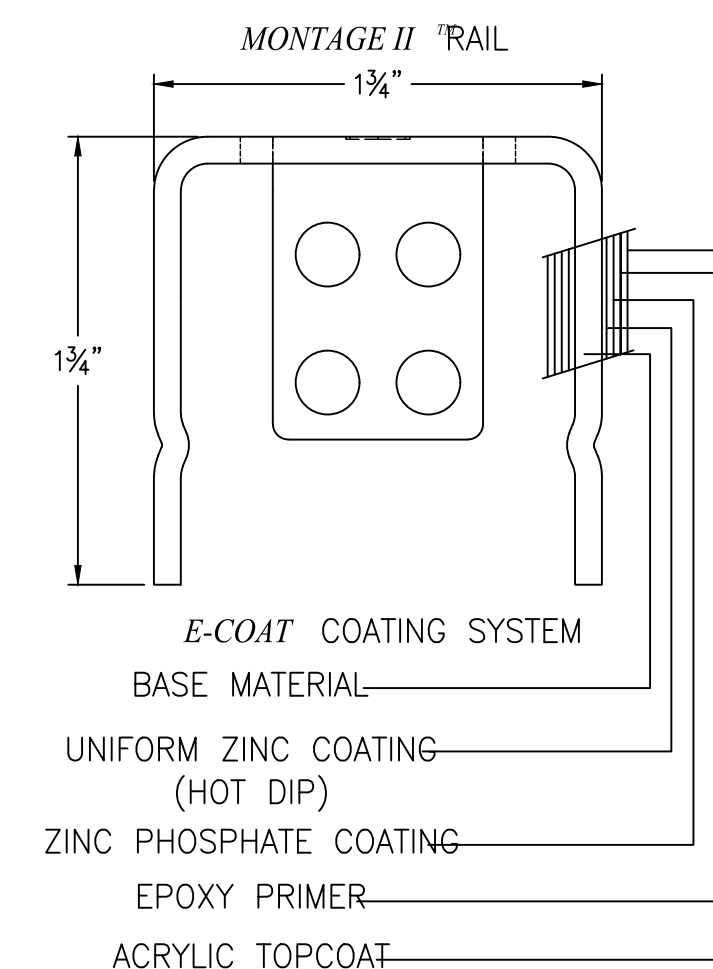
NOTES:

1. NO. 4 BARS AT 16" O.C. BOTH WAYS EXTENDING INTO GUTTER. NO. 4 BARS SHALL BE PLACED 3" ABOVE BOTTOM OF CONCRETE SUPPORTED BY NON-FERROUS CHAIRS APPROVED BY THE ENGINEER.
2. WHEN CONSTRUCTING DRIVEWAY WHERE CURB AND GUTTER EXISTS, COMPLETELY REMOVE INTERFERING PORTIONS OF EXISTING CURB AND GUTTER. DRIVEWAY SHALL BE MONOLITHIC TO A.C. LINE.
3. DRIVEWAY THICKNESS FOR INDUSTRIAL USE SHALL BE 8" MIN.
4. WEAKENED PLANE JOINTS SHALL BE EQUALLY SPACED AT 15' MAX. INTERVALS, SEE DETAIL 2/CD01
5. NO UTILITY BOXES AND COVERS ADJACENT TO R-TYPE CURB SHALL BE ALLOWED AT DRIVEWAY LOCATIONS.
6. THE "DUSTPAN" DRIVEWAY CANNOT BE A PART OF THE PEDESTRIAN ACCESS ROUTE SINCE THE DEPRESSED AREA IS NOT COMPLIANT WITH ADAAG.

8 COMMERCIAL DRIVEWAY
NON ADA
CD04 SCALE: NTS



NOTES:
1.) POST SIZE DEPENDS ON FENCE HEIGHT AND WIND LOADS. SEE MONTAGE II SPECIFICATIONS FOR POST SIZING CHART AND SETTING DIMENSIONS.



VALUES SHOWN ARE NOMINAL AND NOT TO BE USED FOR INSTALLATION PURPOSES. SEE PRODUCT SPECIFICATION FOR INSTALLATION REQUIREMENTS.

9 SECURITY FENCE
CD04 SCALE: NTS

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1	CLV	JBB	21.06.16

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Key Map



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Las Vegas, Clark County, Nevada

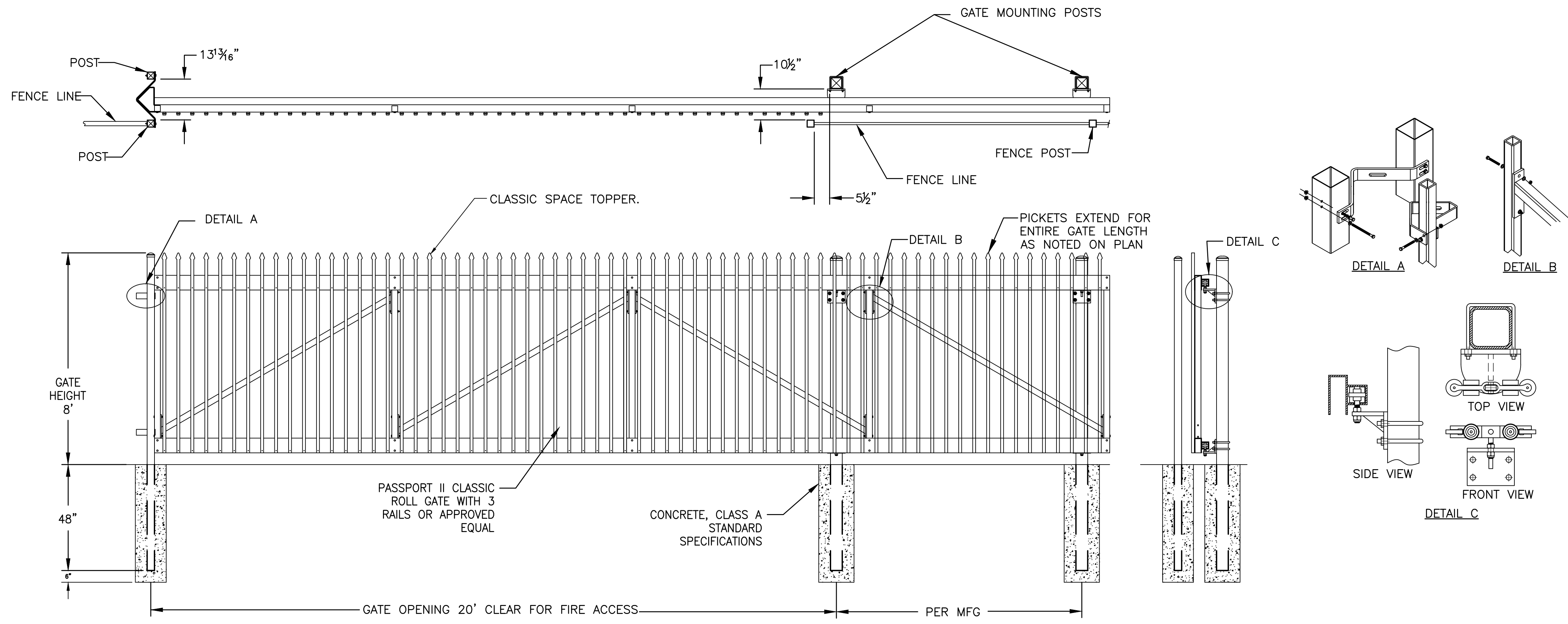
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Title

CIVIL DETAILS

Project No. 181300599 Scale SEE SHEET
Drawing No. CD04 Sheet 75 of 177 Revision 0

CLV DWG & APP #:
107V9042, L21-01092



NOTES:
 1. ROLL GATE SHALL BE MECHANICALLY OPERATED. SEE SPECIFICATIONS FOR OPERATOR REQUIREMENTS.

10 ELECTRICALLY OPERATED ROLLING SLIDE GATE
 CD05 SCALE: NTS

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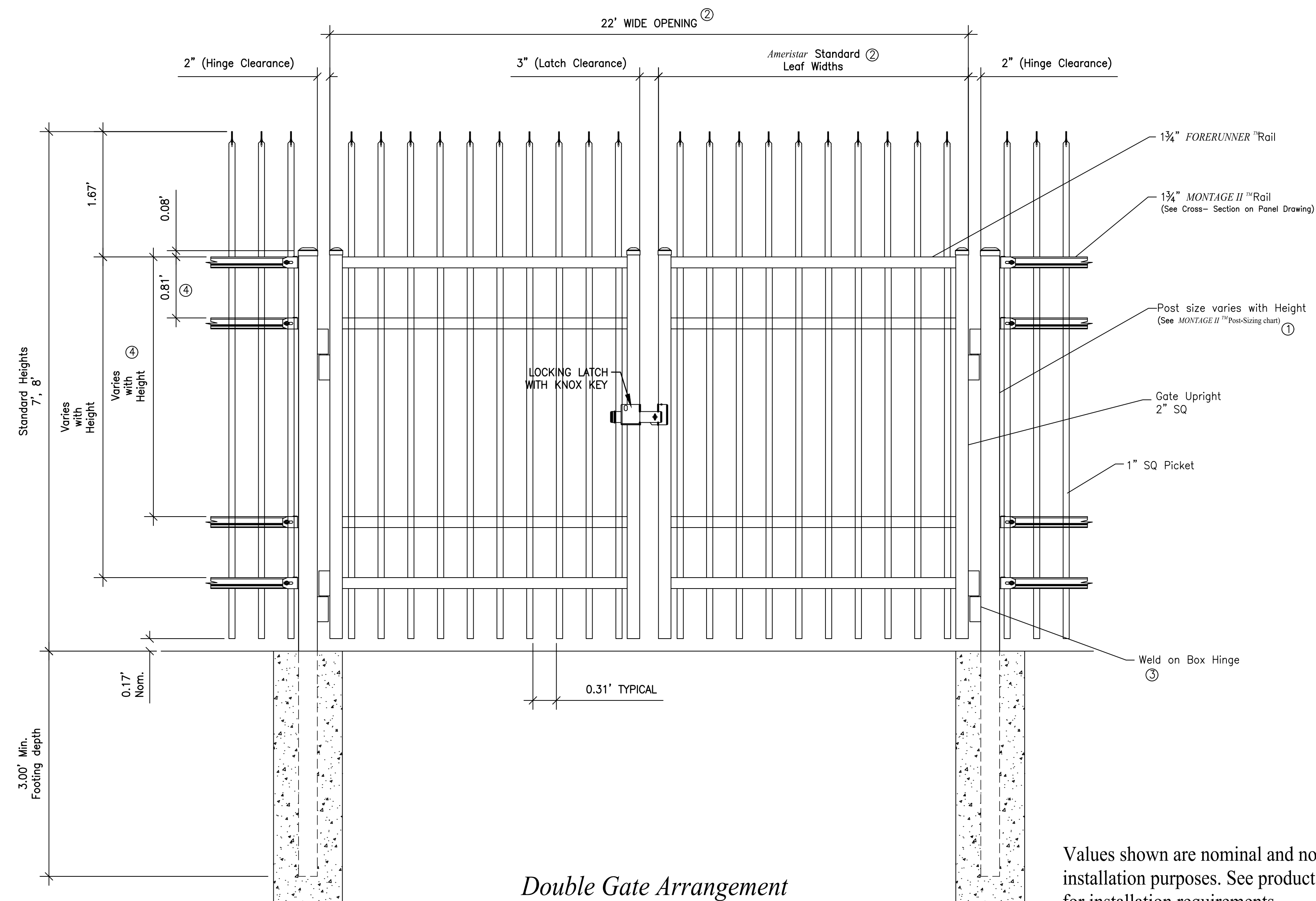
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 Las Vegas, Clark County, Nevada

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Title		Project No.		Scale	
CIVIL DETAILS		181300599		SEE SHEET	
Drawing No.	Sheet	Revision			
CD05	76 of 177	1			

CLV DWG & APP #:
 107V9042, L21-01092

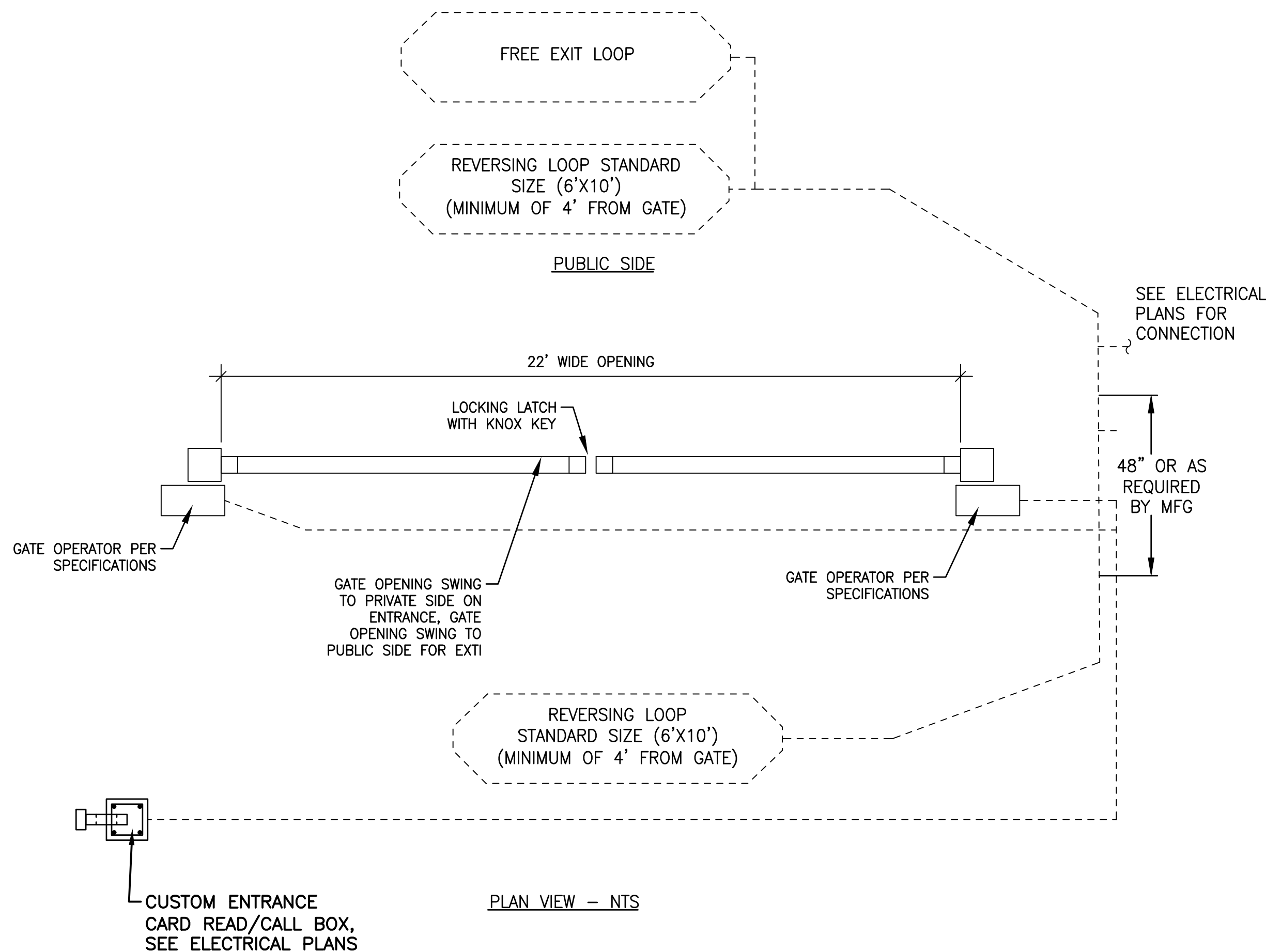


Double Gate Arrangement

- NOTES:
1. POST SIZE DEPENDS ON FENCE HEIGHT, WEIGHT AND WIND LOADS. SEE MONTAGE II SPECIFICATIONS FOR POST SIZING CHART.
 2. SEE AMERISTAR GATE TABLE FOR STANDARD OUT TO OUTS. CUSTOM GATE OPENINGS AVAILABLE FOR SPECIAL OUT TO OUT/LEAF WIDTHS.
 3. ADDITIONAL STYLES OF GATE HARDWARE ARE AVAILABLE ON REQUEST THIS COULD CHANGE THE LATCH & HINGE CLEARANCE.
 4. THIRD & FORTH RAIL OPTIONAL.

Values shown are nominal and not to be used for installation purposes. See product specification for installation requirements.

11 DOUBLE SWING ENTRANCE/EXIT GATE
CD06 SCALE: NTS



PLAN VIEW - NTS

NOTES:

1. SEE SPECIFICATIONS SECTION 32 31 19.2 .
2. LOOPS LOCATIONS SHOWN ARE FOR THE EXITING MOVEMENTS ON WASHINGTON AVENUE AND MAIN STREET.
3. LOOP LOCATIONS FOR ENTERING MOVEMENTS WILL MIRROR EXITING MOVEMENTS.
4. CARD/CALL BOX SHALL BE PLACED ON PUBLIC SIDE ON ENTERING MOVEMENTS, SEE ELECTRICAL PLANS.
5. OPERATOR SHALL BE MAINTAINED ON THE PRIVATE SIDE.
6. KNOX KEY SWITCH REQUIRED ON AUTOMATIC GATES. 1

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1	CLV	JBB	21.06.16

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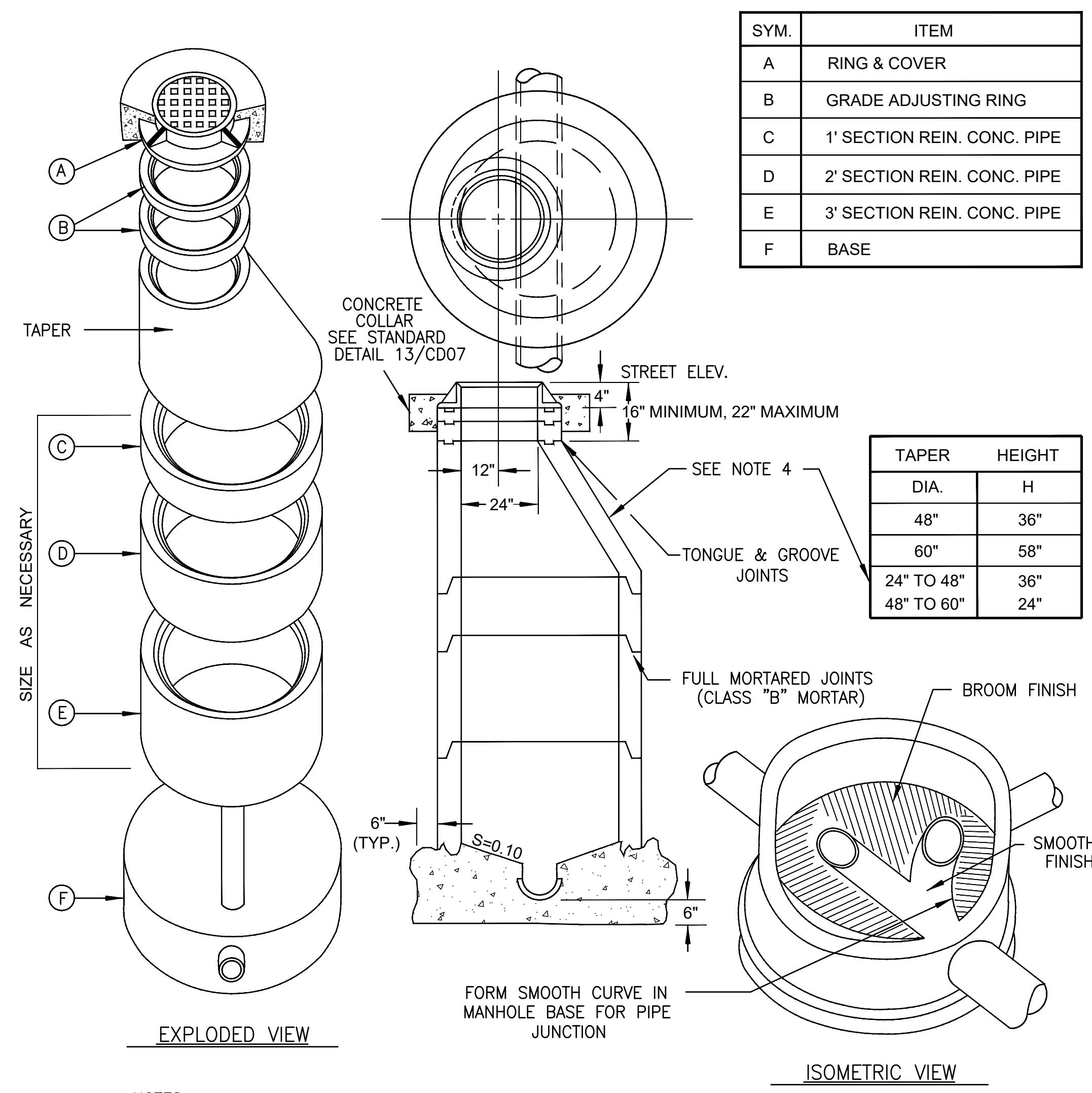
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Project No.	Scale	
181300599	SEE SHEET	
Drawing No.	Sheet	Revision
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MANHOLE NOTES:

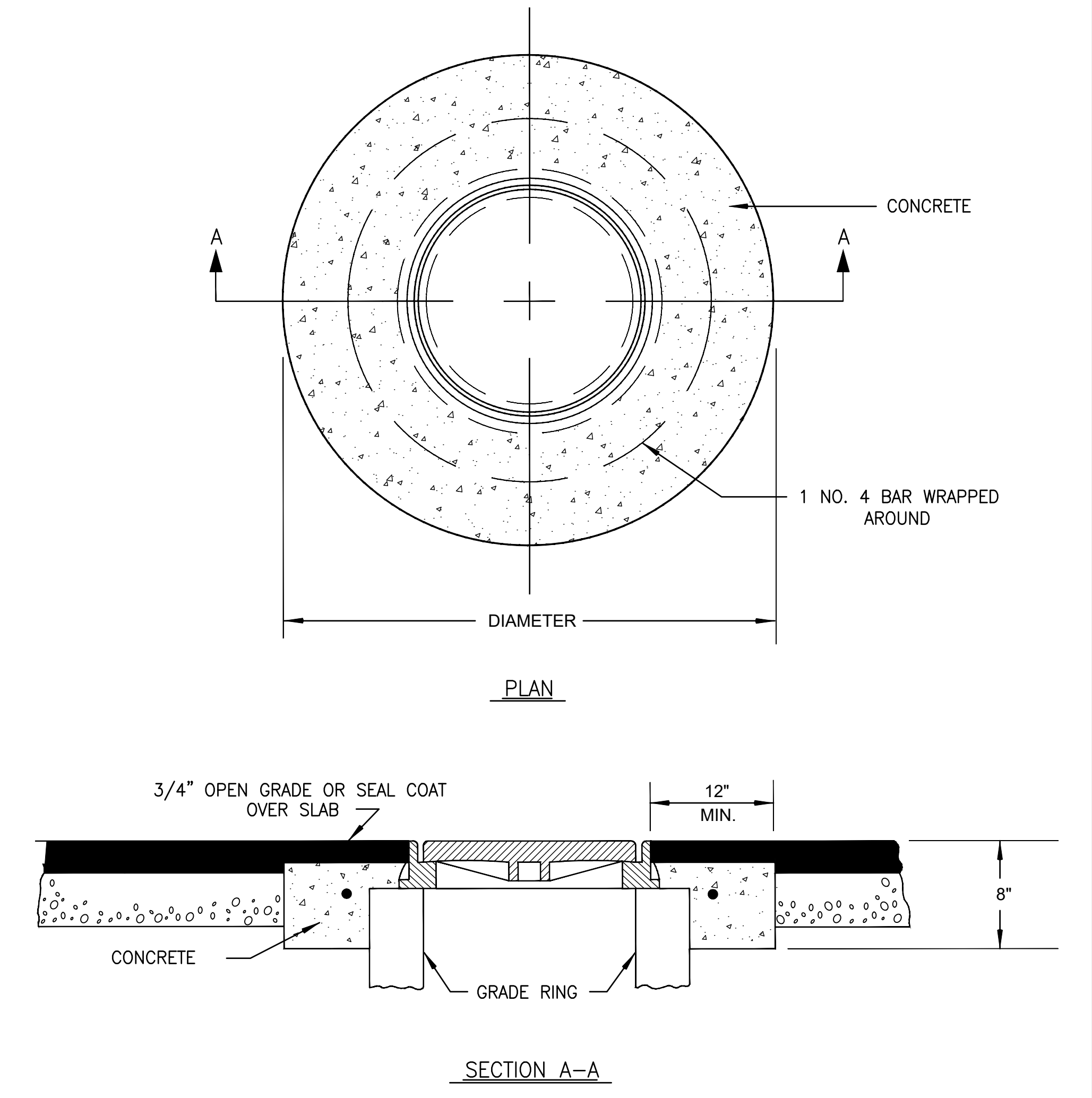
- MANHOLE MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF SECTION 609, "CATCH BASINS, MANHOLES AND INLETS" OF THE UNIFORM STANDARD SPECIFICATIONS FROM THE REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA.
- REINFORCING STEEL SHALL BE AS SHOWN, WIRED TIGHTLY AT ALL INTERSECTIONS AND EMBEDDED AT LEAST ONE (1) INCH CLEAR UNLESS OTHERWISE NOTED.
- EXCAVATION SHALL BE AS NEARLY VERTICAL AS POSSIBLE (SHEET AND SHORE, IF SOIL CONDITIONS REQUIRE), IN EXISTING STREET SECTIONS, ALLEY SECTIONS AND CONFINED AREAS SUCH AS LIMITED EASEMENT OR ADJACENT TO STRUCTURES. NATURAL ANGLE OF REPOSE WILL ALLOW IN ALL OTHER AREAS.
- MANHOLE DESIGN FOR PIPE LARGER THAN SIXTY (60) INCHES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
- MANHOLE DESIGN FOR DEPTHS EXCEEDING EIGHTEEN (18) FEET SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
- TYPE AND SIZE OF MANHOLE TO BE CONSTRUCTED IN A PARTICULAR LOCATION SHALL BE DETERMINED BY THE PIPE SIZE, ALIGNMENT AND GRADE AS FOLLOWS:
 TYPE I
 FORTY-EIGHT (48) INCH SIZE
 A. ALL CASES FOR PIPE EIGHTEEN (18) INCHES AND SMALLER.
 B. TWENTY-FOUR (24) INCHES AND SMALLER PIPE ON TANGENT LINE AND GRADE.
 SIXTY (60) INCH SIZE
 A. TWENTY-SEVEN (27) INCH THROUGH THIRTY-SIX (36) INCH PIPE ON TANGENT LINE AND GRADE.
 B. TWENTY-ONE (21) INCH THROUGH TWENTY-SEVEN (27) INCH PIPE AT ANGLE POINTS AND CHANGES IN GRADE OR PIPE SIZE.
 TYPE 1-A
 USED IN PLACE OF TYPE 1 WHEN COVER ABOVE CONDUIT IS LIMITED, AND WHEN APPROVED BY THE ENGINEER.
 TYPE II
 FORTY-EIGHT (48) INCH SIZE
 A. THIRTY (30) INCH THROUGH SIXTY (60) INCH PIPE ON TANGENT LINE WITH A CHANGE IN GRADE OR PIPE SIZE.
 TYPE III
 TANGENT
 SIXTY (60) INCH SIZE
 A. THIRTY-NINE (39) INCH THROUGH SIXTY (60) INCH PIPE ON TANGENT LINE AND GRADE WITH NO CHANGE IN PIPE SIZE.
 ANGLE POINT
 SIXTY (60) INCH SIZE
 A. THIRTY (30) INCH THROUGH SIXTY (60) INCH PIPE AT THE ANGLE POINT IN LINE.
 7. PRECAST MANHOLE COMPONENTS SHALL CONFORM TO ASTM C-478.
 8. DISTANCE BETWEEN THE TOP OF MANHOLE AND FIRST STEP SHALL BE A MAXIMUM OF SIXTEEN (16) INCHES. MANHOLE STEPS SHALL BE GROUTED IN PLACE.
 9. (CLARK COUNTY ONLY) DISTANCE BETWEEN MANHOLES SHALL BE A MAXIMUM OF FOUR HUNDRED (400) FEET.
 10. MANHOLE SPACING SHALL BE REFERRED TO THE WASTE WATER COLLECTION STANDARDS.

12 STORM DRAIN MANHOLE NOTES
SCALE: NTS



- NOTES:**
- IN UNIMPROVED NON-TRAFFIC AREAS, TOP OF MANHOLE SHALL BE 6" TO 9" ABOVE GRADE.
 - PIPES SHALL NOT PROTRUDE MORE THAN 3" INSIDE OF MANHOLE SECTION. CONSTRUCT WATER TIGHT CONNECTION TO MANHOLE.
 - PIPE SECTION LENGTHS ARRANGED TO FIT DEPTH.
 - AN OPTIONAL TWO PIECE 24" TO 48" AND 48" TO 60" CONE MAY BE USED.

13 STORM DRAIN TYPE 1 MANHOLE
SCALE: NTS



- NOTES:**
- CONCRETE COLLAR TO BE CONSTRUCTED 1/8" BELOW SURFACE OF DENSE GRADE WHERE OPEN GRADE IS NOT USED.
 - CONCRETE COLLAR NOT REQUIRED IN UNINCORPORATED CLARK COUNTY RESIDENTIAL STREETS LESS THAN 80' R/W WIDTH.

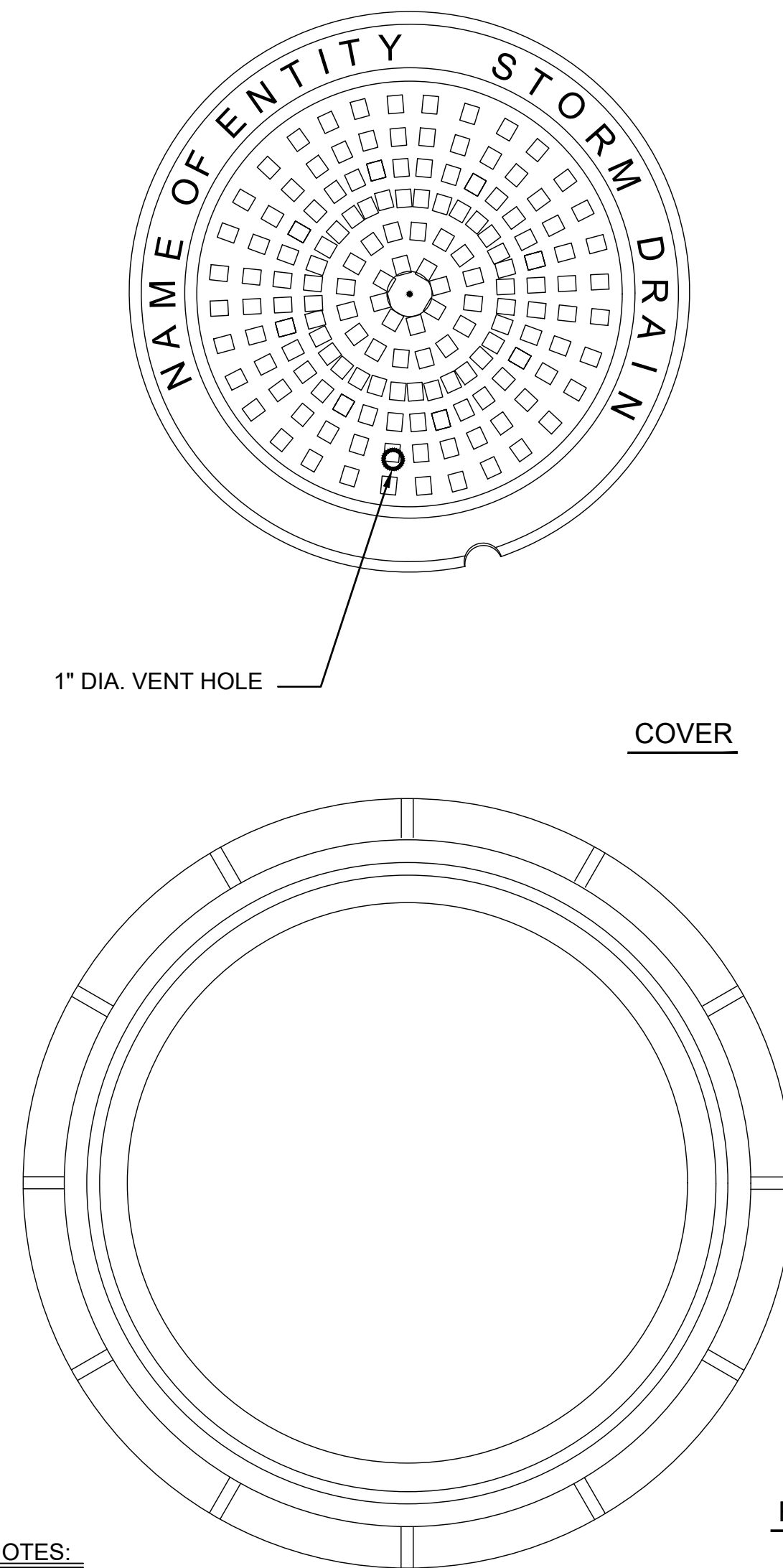
14 CONCRETE COLLAR AROUND MANHOLES
SCALE: NTS

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<p>Permit-Seal</p> <p>6/17/2021</p>	<p>Key Map</p>	<p>6995 Sierra Center Parkway Reno, NV 89511 www.stantec.com</p> <p>The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay. The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.</p>	<p>Client/Project</p> <p>STATE OF NEVADA DEPARTMENT OF TRANSPORTATION</p> <p>123 E. WASHINGTON AVE, NDOT LAS VEGAS MAINTENANCE YARD (MY921) IMPROVEMENTS Las Vegas, Clark County, Nevada</p> <p>File Name: Dwn. Chkd. Dsgn. YY.MM.DD</p>	<p>Title</p> <p>CIVIL DETAILS</p> <p>Project No. 181300599 Scale SEE SHEET</p> <p>Drawing No. CD07 Sheet 78 of 177 Revision 0</p>
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1	CLV	JBB	21.06.16

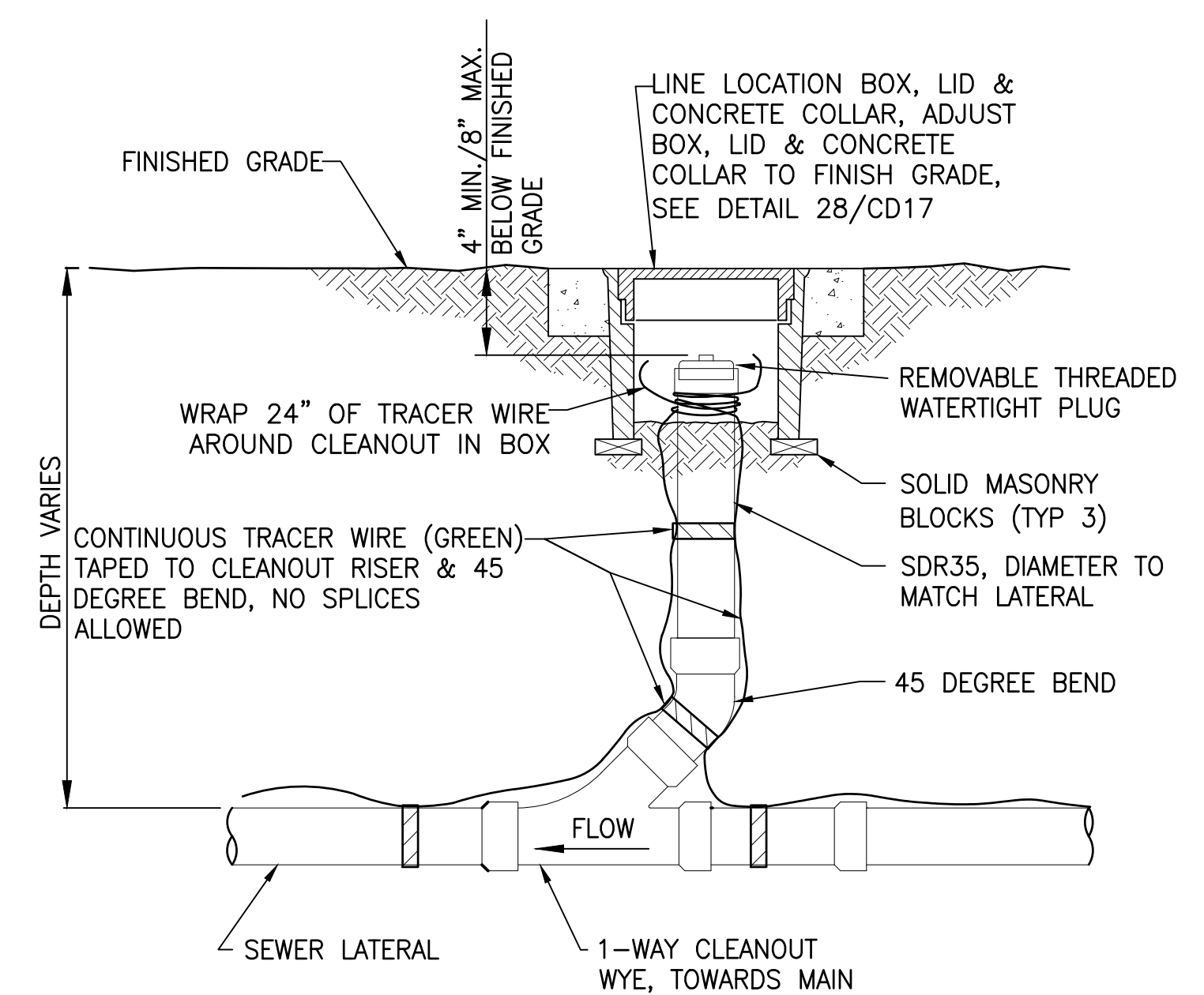
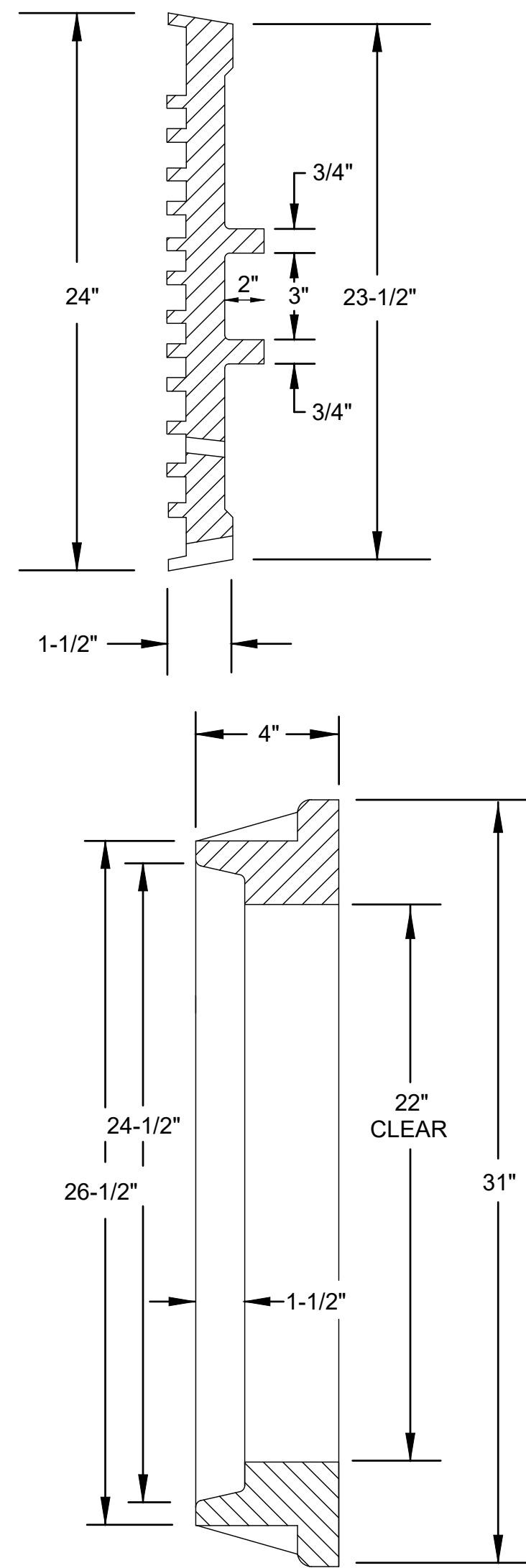
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NOTES:

1. FRAME AND COVER TO BE ALHAMBRA FOUNDRY COMPANY TYPE A1310 IN ACCORDANCE WITH ASTM A-48, CLASS 30, OR APPROVED EQUAL.
2. CAST IRON SHALL HAVE MINIMUM TENSILE STRENGTH OF 30,000 P.S.I.
3. FRAME AND COVER MACHINED TO FIT.
4. WEIGHT OF FRAME AND COVER 330 LBS. MINIMUM.

15 MANHOLE COVER AND RING
CD08 SCALE: NTS



16 SANITARY SEWER CLEAN OUT
CD08 SCALE: NTS

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DEPARTMENT OF TRANSPORTATION
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Las Vegas, Clark County, Nevada

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Title

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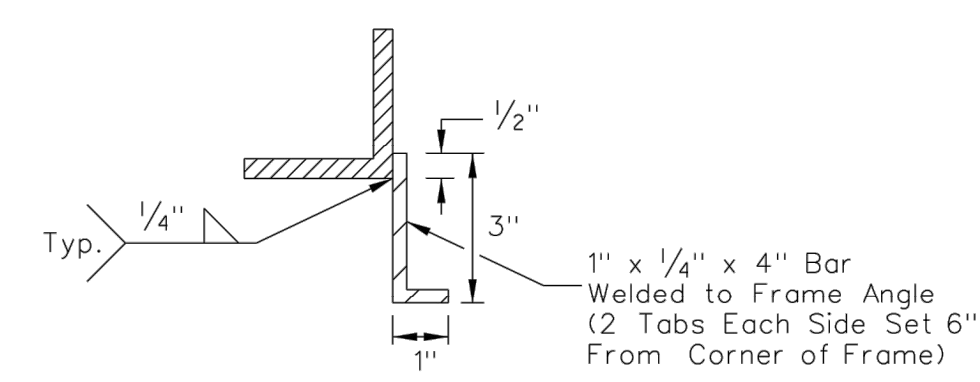
Project No.	Scale	
181300599	SEE SHEET	
Drawing No.	Sheet	Revision
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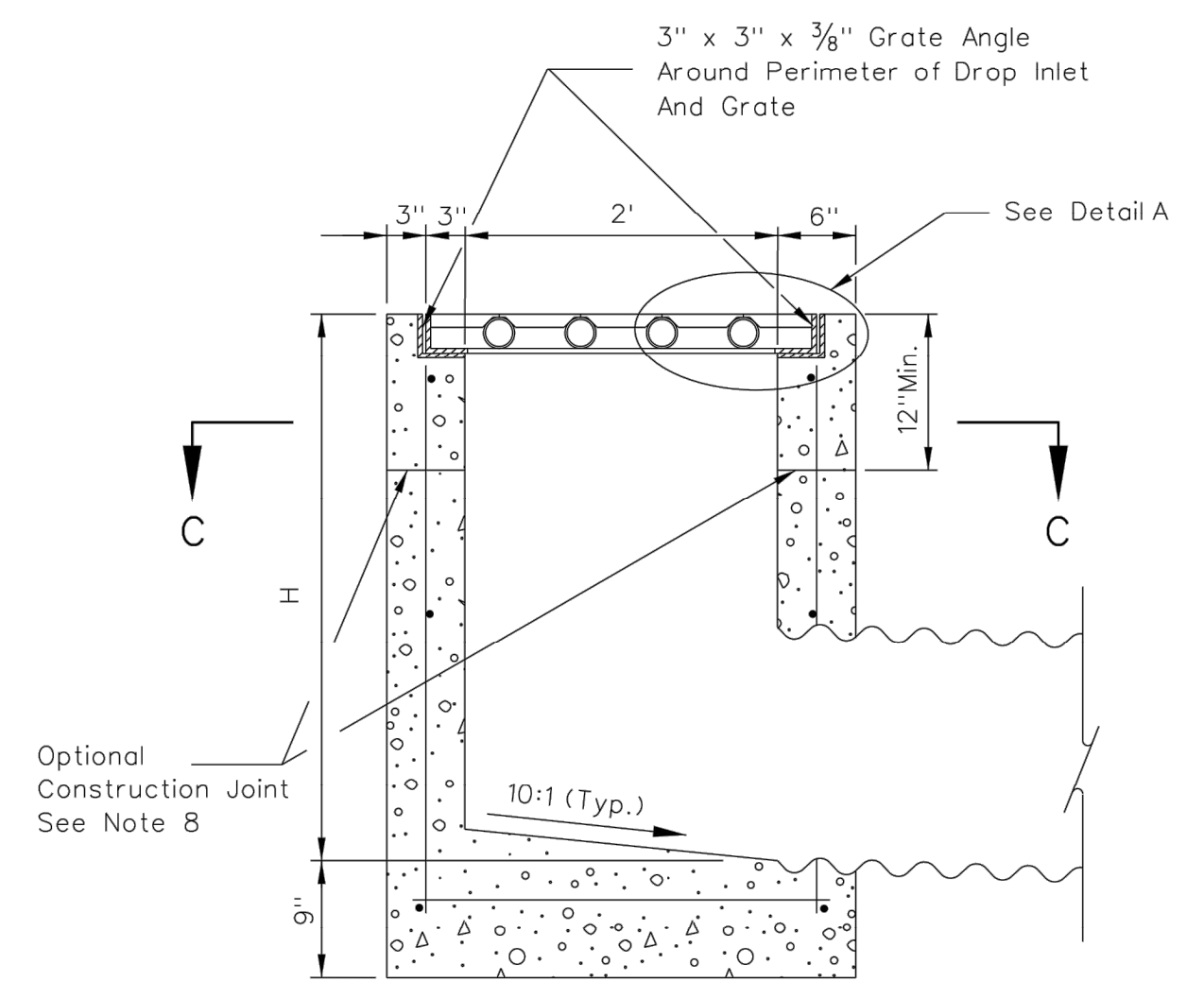
R C P	PIPE SIZE (INCH)	A	H Min. (FT)	CONCRETE (CU. YD.)		REINFORCING (LB)		STRUCTURAL STEEL (LB)
				BASE QUAN. (H Min.)	ADD RATE (CU. YD./FT)	BASE QUAN. (H Min.)	ADD RATE (LB/FT)	
H	15"	2'	2.50	0.71	0.19	36	10	229
D	18"	2' 6"	3.00	0.89	0.20	40	10	254
P	24"	3'	3.50	1.08	0.22	58	12	278
E	30"	3' 6"	4.00	1.28	0.24	63	12	304
C	36"	4'	4.50	1.50	0.26	67	13	328
M	42"	4' 6"	5.00	1.71	0.28	90	15	353
P	48"	5'	5.50	1.94	0.30	95	15	378

The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

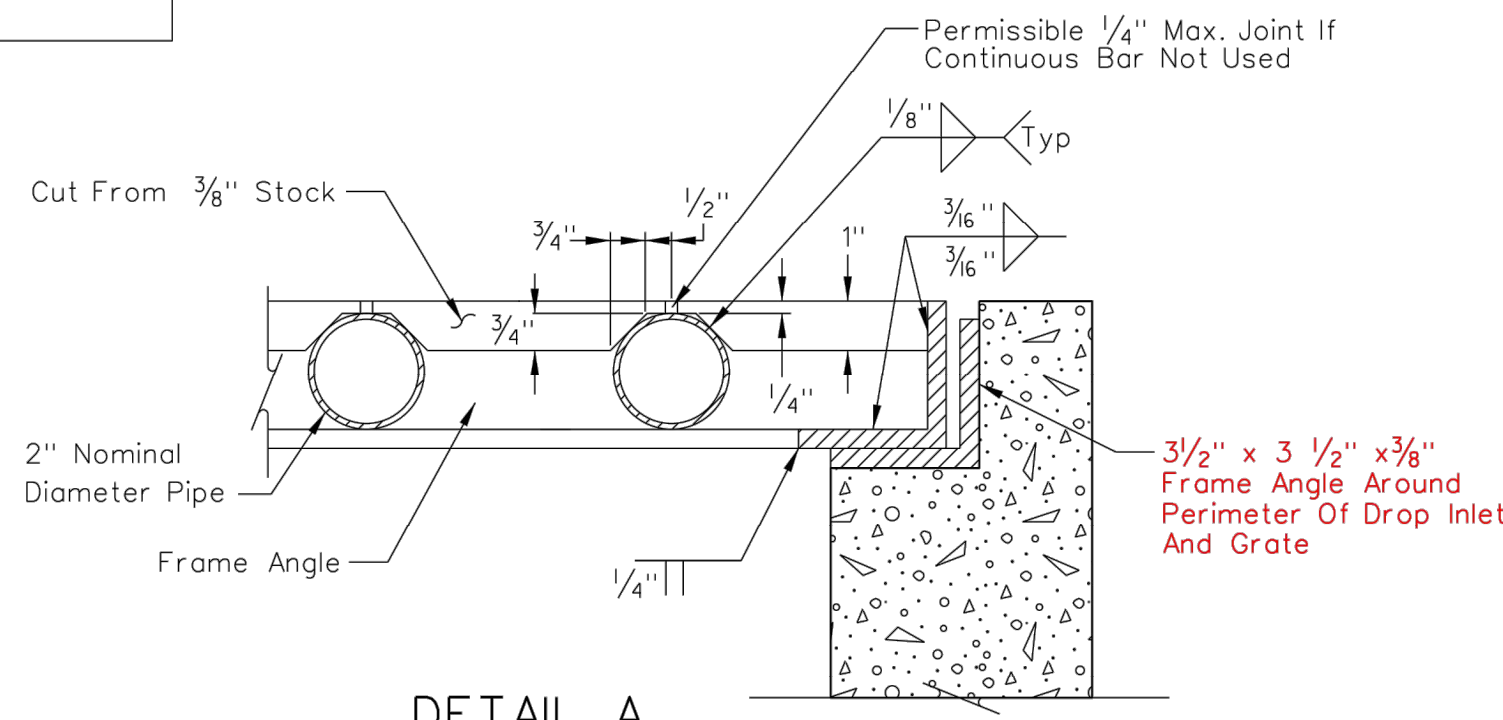


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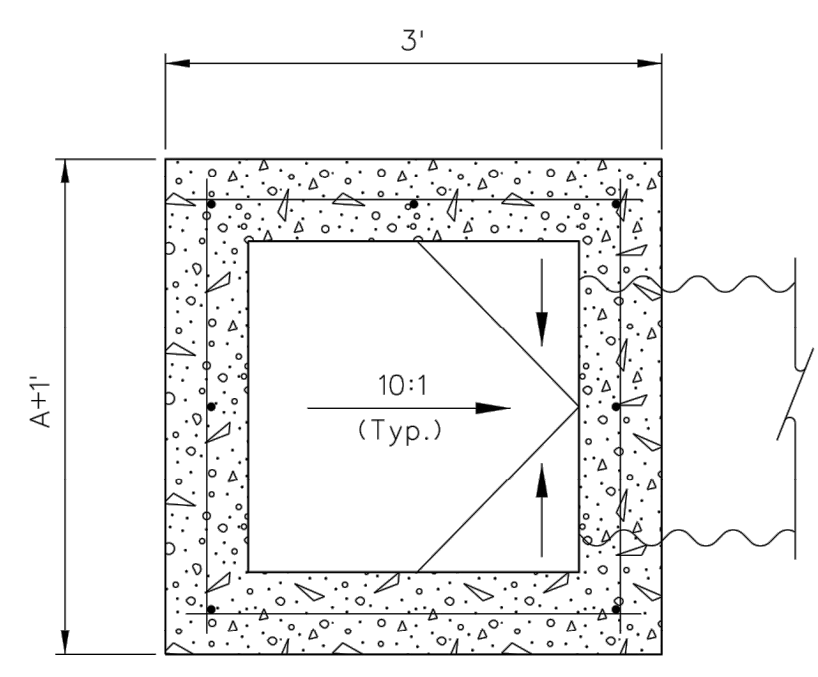
- NOTES:**
- All concrete shall be class A or AA.
 - Reinforcing steel shall be No. 4 bars with maximum spacing at 18 inch centers, wired tightly at all intersections and embedded 2 inches clear of all concrete surfaces.
 - Exposed edges of concrete shall be chamfered 1 inch.
 - Structural steel weight includes the 2 inch normal diameter pipe standard weight and frame angles (3'x 3'x 3/8") and (3 1/2'x 3 1/2'x 3/8").
 - For 2 inch nominal diameter pipe see ASTM A53.
 - See sheet R-2.9.1 for details if connecting HDPE pipe.
 - Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow line(s) to outlet pipe and provide a 10:1 slope to flow line(s).
 - Run rebar continuous thru construction joint. Joint must be a minimum 3 inches from horizontal bars.
 - Additional pipe penetrations may be placed in any wall.



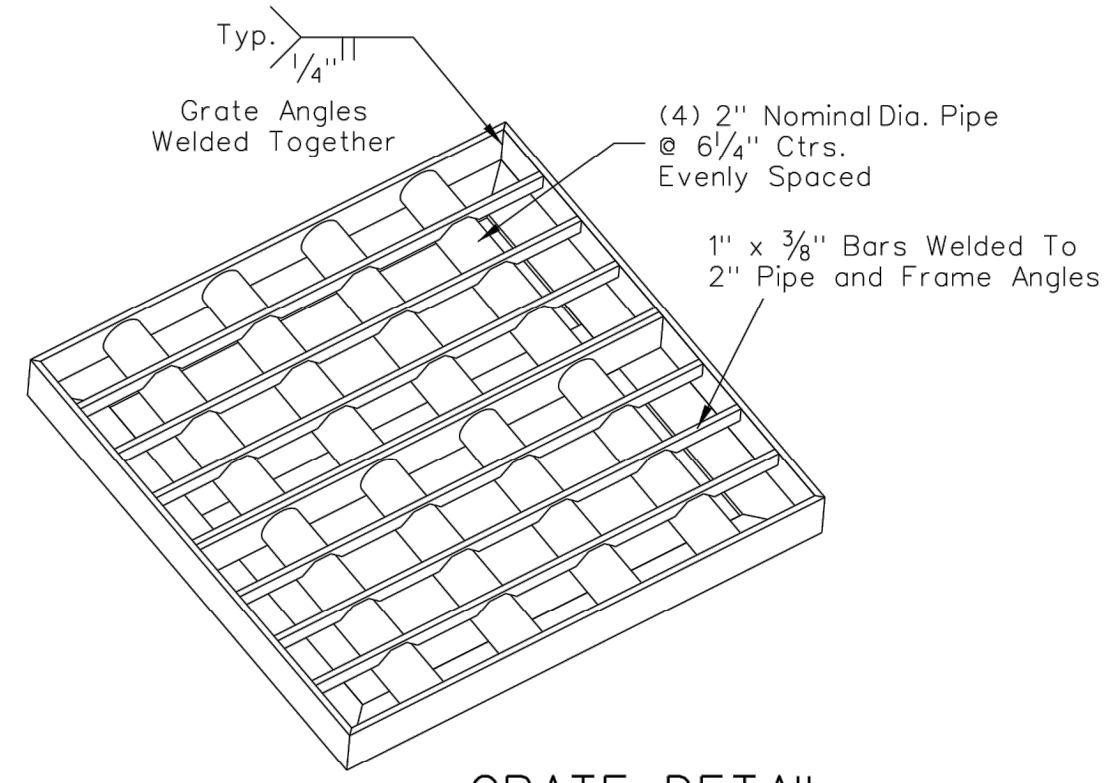
SECTION A-A



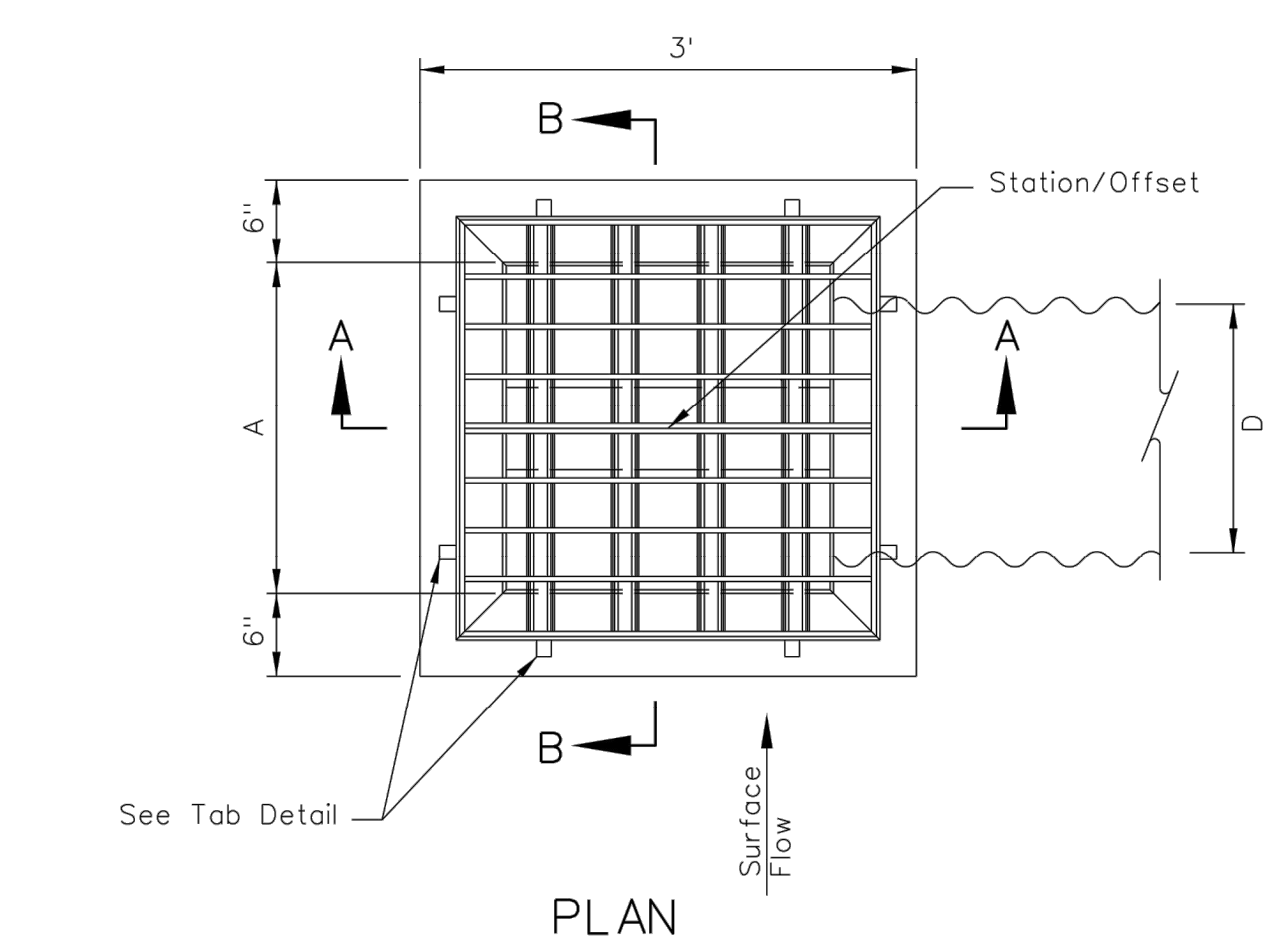
DETAIL A



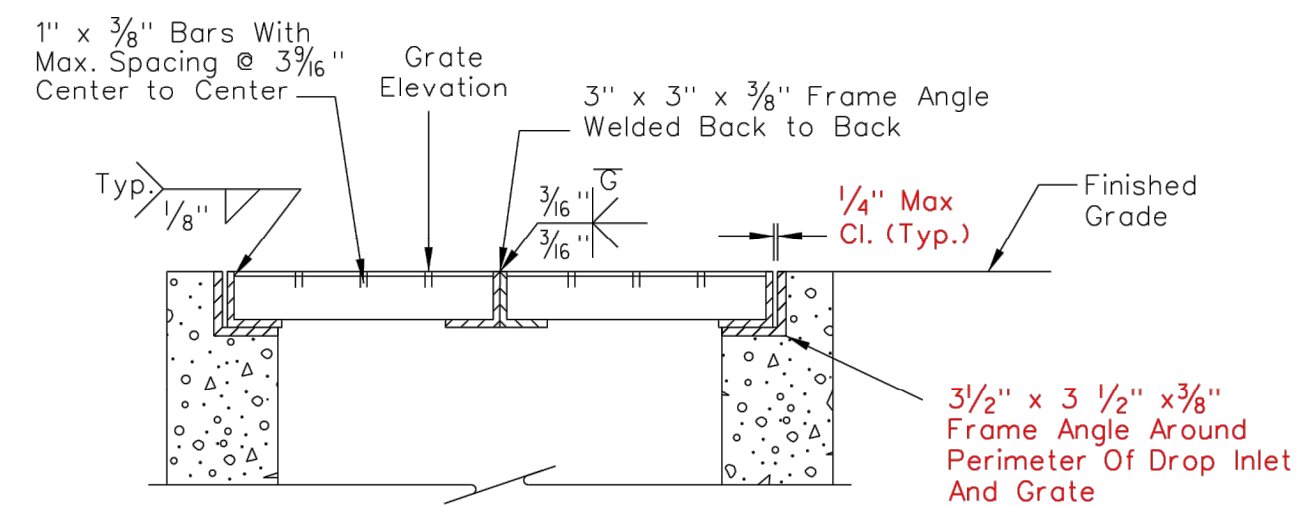
SECTION C-C



GRATE DETAIL



PLAN



SECTION B-B

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**DROP INLET
TYPE 2B**

R-4.2.2	(609)	Signed Original On File
ADOPTED 11/06	REVISED 10/15	CHIEF HYDRAULICS ENGR.

17 TYPE 2B DROP INLET
CD09 SCALE: NTS

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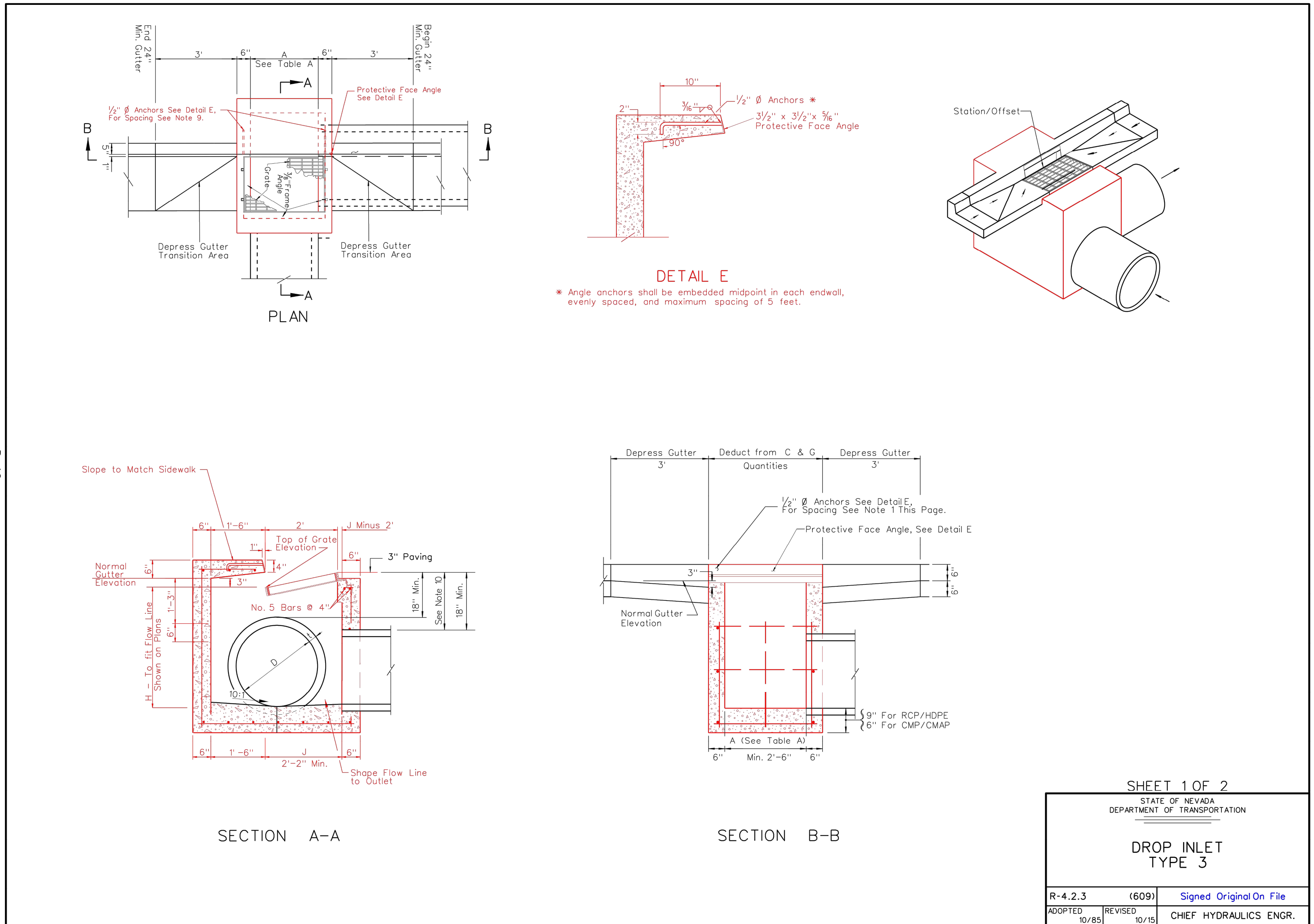
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Las Vegas, Clark County, Nevada

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Title
CIVIL DETAILS

Project No. 181300599 Scale SEE SHEET
Drawing No. CD09 Sheet 80 of 177 Revision 0

CLV DWG & APP #:
107V9042, L21-01092



SHEET 1 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**DROP INLET
TYPE 3**

R-4.2.3	(609)	Signed Original On File
ADOPTED 10/85	REVISED 10/15	CHIEF HYDRAULICS ENGR.

18 TYPE 3 DROP INLET
CD10 SCALE: NTS

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Las Vegas, Clark County, Nevada

File Name:
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CLV DWG & APP #:
107V9042, L21-01092

CIVIL DETAILS

Project No. 181300599	Scale SEE SHEET
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	Revision 0

R-47

TABLE A

PIPE SIZE				STRUCTURAL STEEL *							
CMP Round	HDPE Round	RCP Round	A & J Value	Max H	MAIN BARS	FRAME ANGLES	FRAME BAR	GRATE LBS.	FRAME LBS.	CHANNEL & PLATES, LBS.	TOTAL LBS.
12" to 18"		2'-6"	21'	4 1/2" X 3/8"	5" X 3" X 3/8"	5" X 3/8"	229	88	93	409	
24"		3'-	21'	4 1/2" X 3/8"	5" X 3" X 3/8"	5" X 3/8"	265	96	107	468	
30"		3'-6"	16'	4 1/2" X 3/8"	5" X 3" X 3/8"	5" X 3/8"	300	104	126	530	
36"		4'-	9'	5 1/2" X 3/8"	6" X 3 1/2" X 3/8"	6" X 3/8"	409	134	143	685	
42"		4'-	7'	5 1/2" X 3/8"	6" X 3 1/2" X 3/8"	6" X 3/8"	451	144	160	755	
48"		5'-	7'	5 1/2" X 3/8"	6" X 3 1/2" X 3/8"	6" X 3/8"	550	160	176	886	

The "A" and "J" values represent the minimum side dimension of the drop inlet (see sheet R-4.2.3) when a pipe penetrates the "A" or "J" side of that drop inlet. If no pipe penetrates the "A" side, use A=2'6". If no pipe penetrates the "J" side, use J=2'2". If pipes penetrate both of the sides, use the values above for each side of the drop inlet, depending on the size of the penetrating pipe.

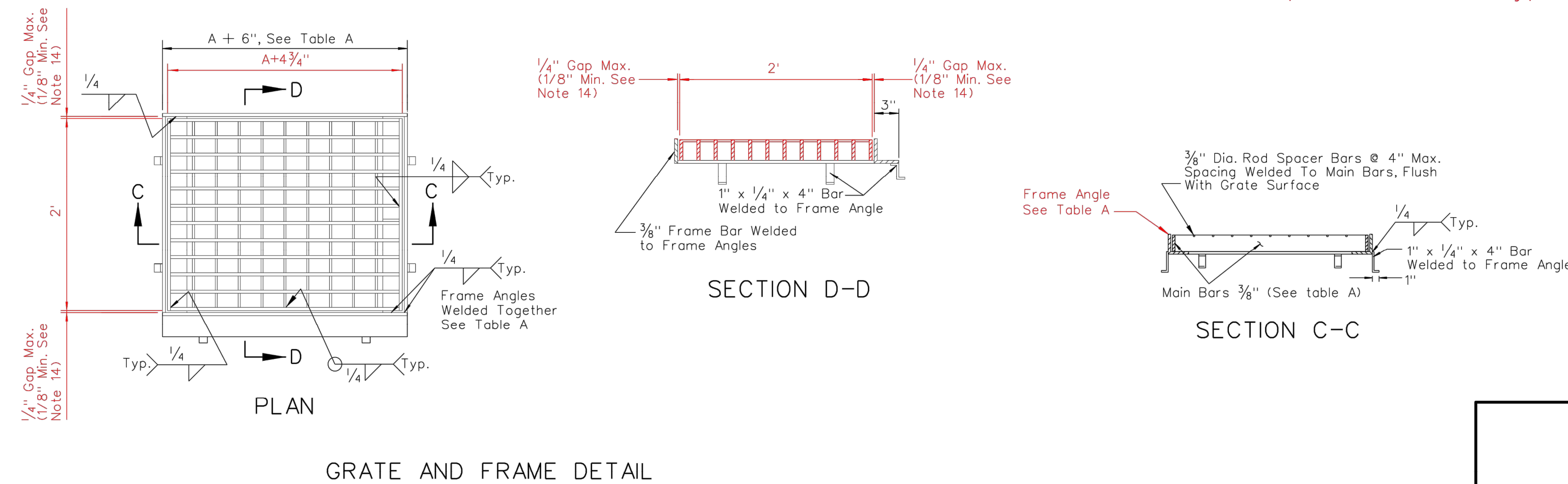
When installing an arch or elliptical pipe, using the horizontal dimension (span), choose the equivalent or next larger round diameter dimension as described in the table above.

Maximum H is based upon the drop inlet having #4 bars at 12" on center.

* Varies with "A" dimension only.

NOTES:

- All concrete shall be class A or AA.
- All reinforcing steel shall be tightly wired and embedded 1 1/2 inches clear of concrete surface. Except as noted, all reinforcing shall be No. 4 bars with maximum spacing of 12 inch centers, for all values of "H" to the maximum as shown in Table A. If H exceeds these maximums, drop inlet will require special design.
- Exposed edges of concrete shall be chamfered 1 inch.
- Where pipe intersects drop inlet on a 12° or larger skew increase J to $\frac{J}{\cos \text{skew } Z}$, redesign for skews at A.
- Where pipe intersects drop inlet on a 12° or larger skew increase span to $\frac{\text{span}}{\cos \text{skew } Z}$, redesign for skews at A.
- For values of "H" see the plans.
- "H" is the difference in elevation between the out flow pipe and the normal gutter grade line at the curb face minus 3 inches.
- Pipe(s) can be placed in any wall.
- For drop inlet, configurations with 2 pipes-inflow pipe invert elevation shall be ≥ 0.1 feet above outflow pipe invert elevation.
- Extreme low cover situations to be reviewed by the hydraulics engineer.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow line(s) to outlet pipe, and provide a 10:1 slope to flow line(s).
- Station/offset distance listed in plans is measured to the face of curb at the gutter flow line.
- See sheet R-2.9.1 for details if connecting to HDPE pipe.
- Grate is to fit in the frame and be easily removed. If the gap between the grate and frame is greater than 1/4" on each side of the grate, the grate and frame shall be removed and reconstructed to the tolerances specified or, with approval of the Engineer, a filler strip up to 1/4" in thickness may be welded flush to the top of the frame to reduce the gap to a maximum of 1/4"



SHEET 2 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

DROP INLET
TYPE 3

R-4.2.3.1	(609)	Signed Original On File
ADOPTED 10/85	REVISED 10/15	CHIEF HYDRAULICS ENGR.

19 TYPE 3 DROP INLET
CD11 SCALE: NTS

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Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

Issued	By	Appd.	YY.MM.DD

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Key Map

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STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS

Las Vegas, Clark County, Nevada

File Name:

Dwn. Chkd. Dsgn. YY.MM.DD

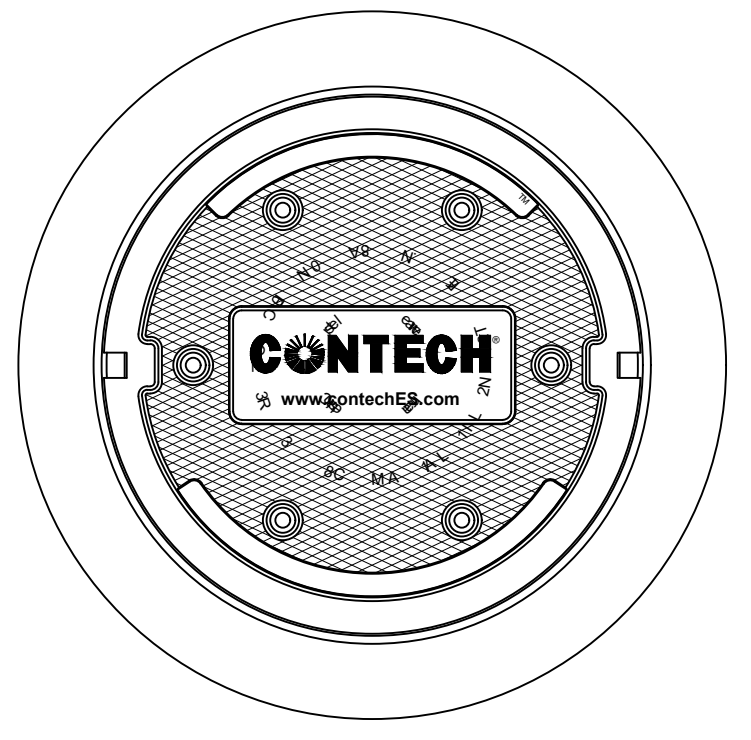
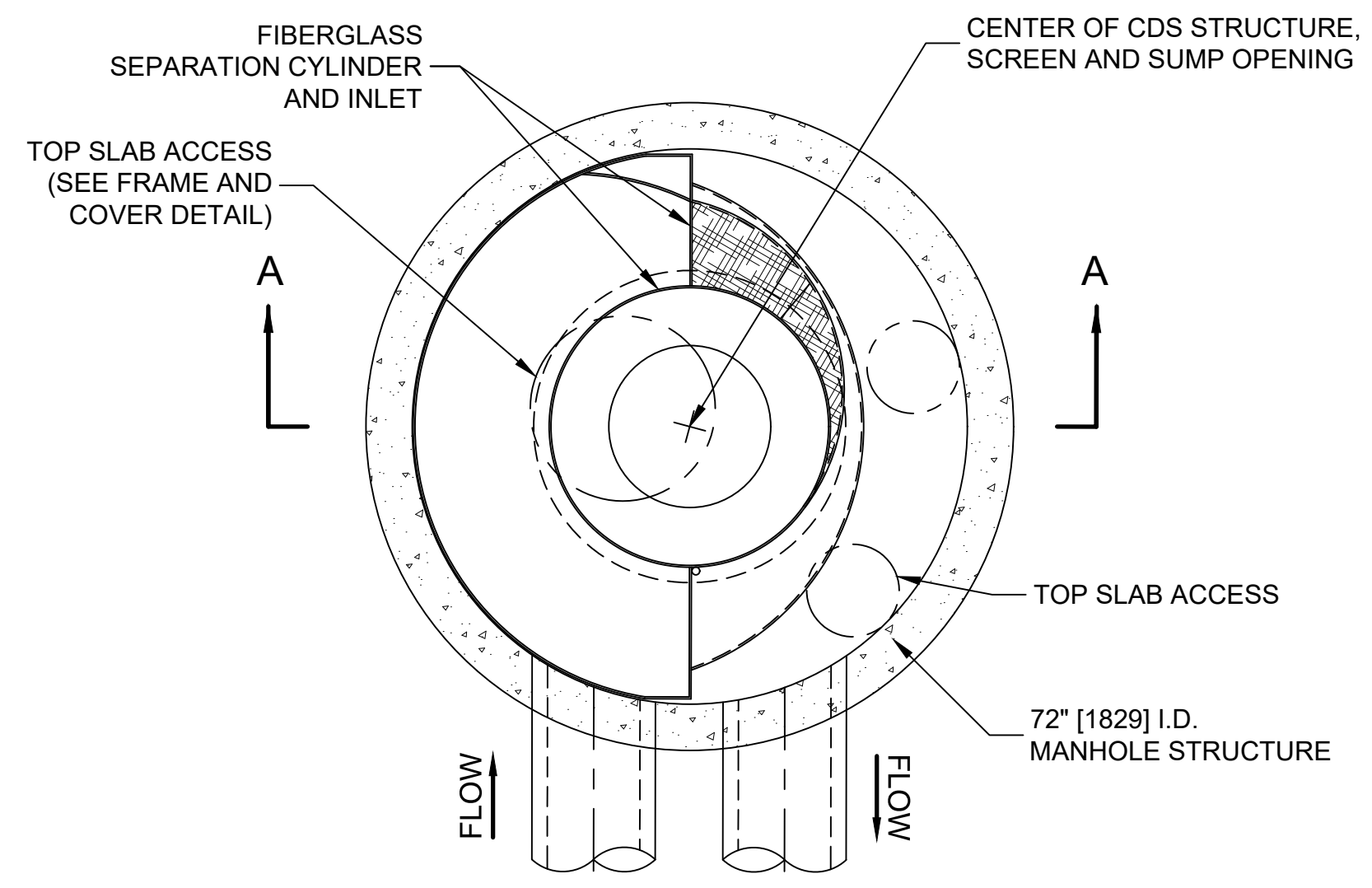
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CIVIL DETAILS

Project No. 181300599 Scale SEE SHEET

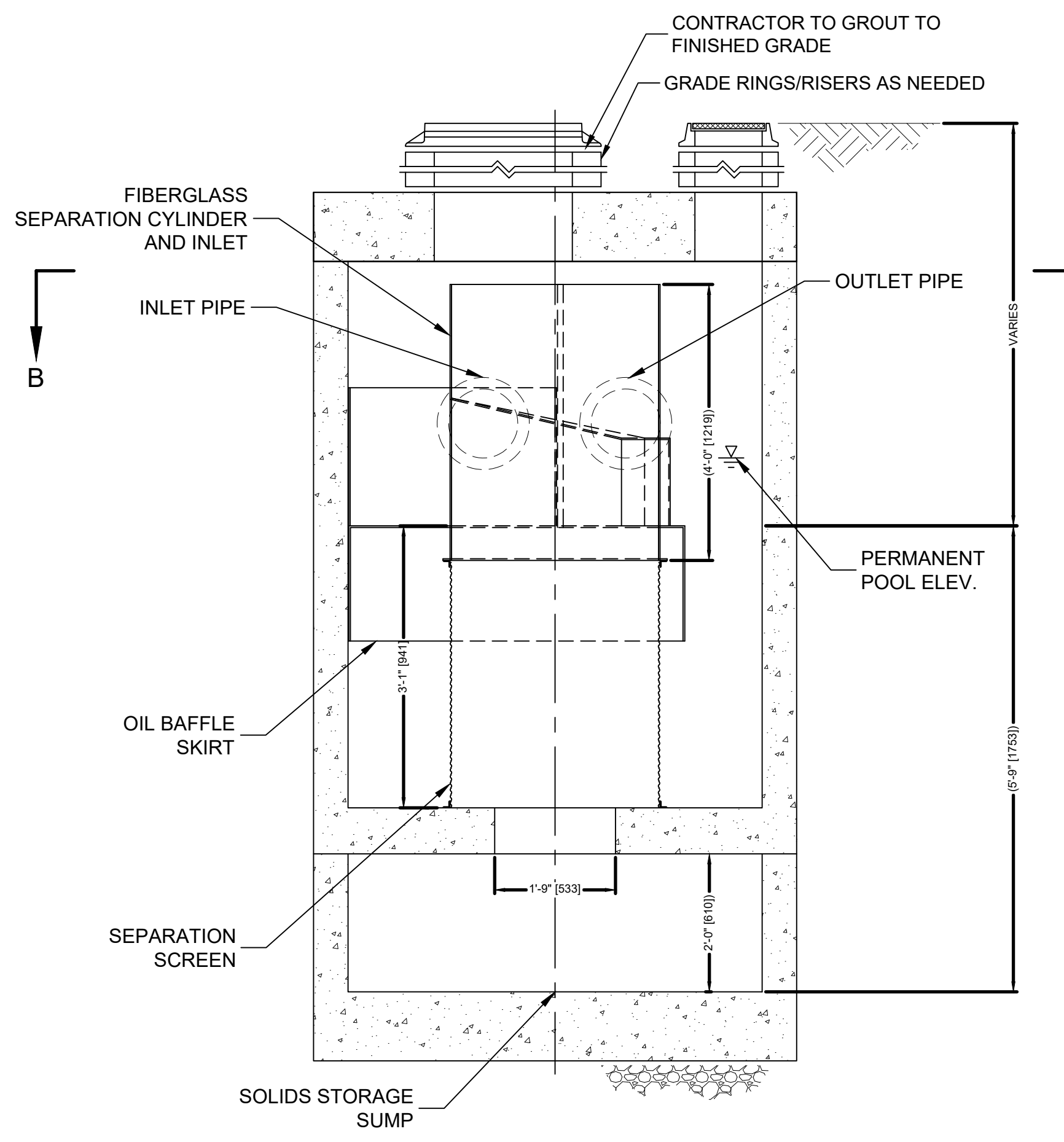
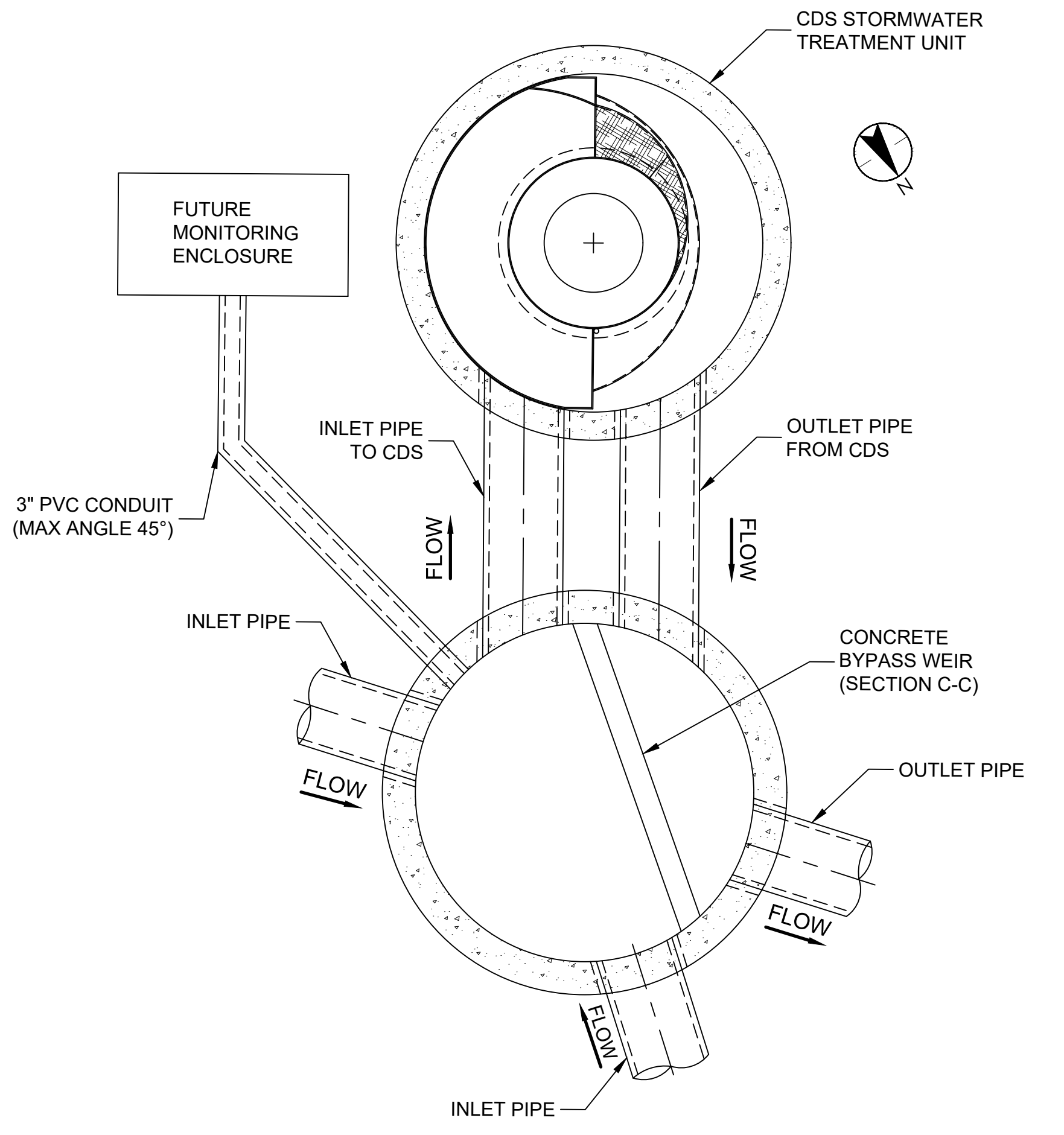
Drawing No. CD11 Sheet 82 of 177 Revision 0

CLV DWG & APP #:
107V9042, L21-01092

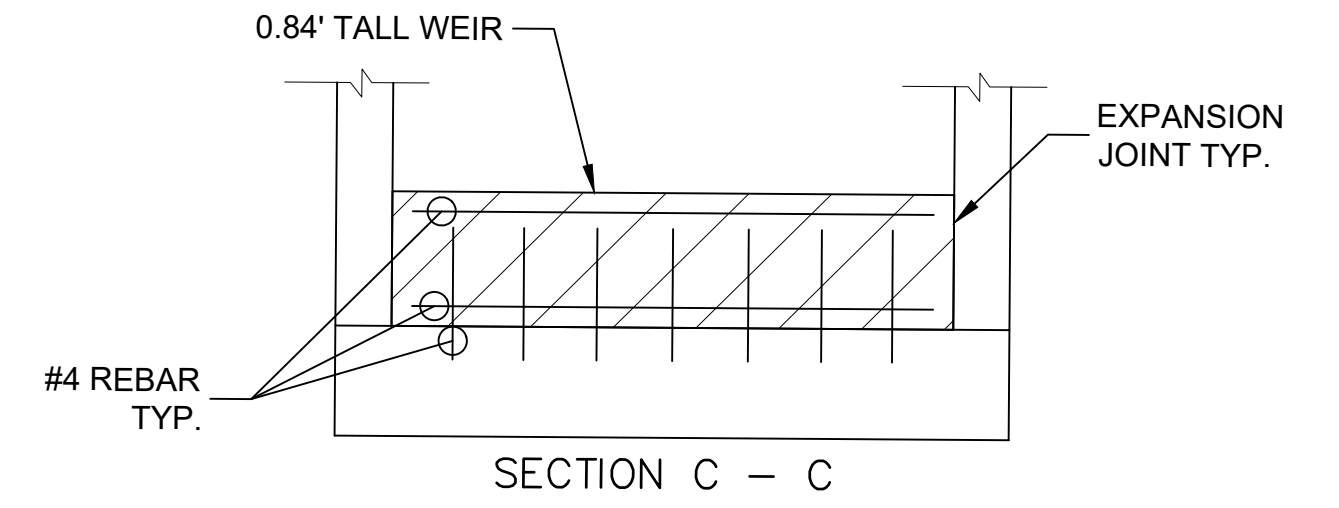


CDS3025-6-C DESIGN NOTES
 CDS3025-6-C RATED TREATMENT CAPACITY IS 2.5 CFS, OR PER LOCAL REGULATIONS. MAXIMUM HYDRAULIC INTERNAL BYPASS CAPACITY IS 20.0 CFS. IF THE SITE CONDITIONS EXCEED 20.0 CFS, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

SITE SPECIFIC DATA REQUIREMENTS				
STRUCTURE ID	PRCDS3			
WATER QUALITY FLOW RATE (CFS)	2.31			
PEAK FLOW RATE (CFS)**	33.4			
RETURN PERIOD OF PEAK FLOW (YRS)	100			
SCREEN APERTURE (2400 OR 4700)	*			
PIPE DATA:	I.E.	MATERIAL	DIAMETER	LENGTH
INLET PIPE 1	1957.67	RCP	12"	+/-5.0'
OUTLET PIPE	1957.67	RCP	12"	+/-5.0'
RIM ELEVATION	1962.46			
ANTI-FLOTATION BALLAST	PER CONTECH			
NOTES/SPECIAL REQUIREMENTS:				
* PER CONTECH				
** FLOWS IN EXCESS OF WATER QUALITY RATE WILL BE BYPASSED VIA BYPASS MANHOLE				



- GENERAL NOTES**
- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
 - DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY PER PLAN.
 - FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
 - CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
 - STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
 - PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
- INSTALLATION NOTES**
- ANY SUB-BASE OR BACKFILL DEPTH SHALL BE CONFORMANCE WITH AGENCY STANDARDS. ANY ANTI-FLOTATION PROVISIONS SHALL BE SPECIFIED BY CONTECH.
 - CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
 - CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
 - CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
 - CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.



- NOTES:**
- REFER TO UTILITY LAYOUT SHEETS FOR BYPASS CONFIGURATION.
 - CONCRETE BYPASS WEIR SHALL BE 8 INCHES THICK BY 0.84 FEET TALL.

CONTECH
 ENGINEERED SOLUTIONS LLC
 www.contechES.com
 9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
 800-338-1122 513-645-7000 513-645-7993 FAX

CDS3025-6-C
 INLINE CDS
 STANDARD DETAIL



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 9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
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CDS STORMWATER TREATMENT SYSTEM
 TYPICAL OFFLINE LAYOUT
 WITH BYPASS MANHOLE STRUCTURE

22 CD14 STORMWATER TREATMENT DEVICE 3 (PRCDS3)
 CONTECH CDS3025-6-C AND BYPASS
 SCALE: NTS

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1	CLV	JBB	21.06.16

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 Las Vegas, Clark County, Nevada

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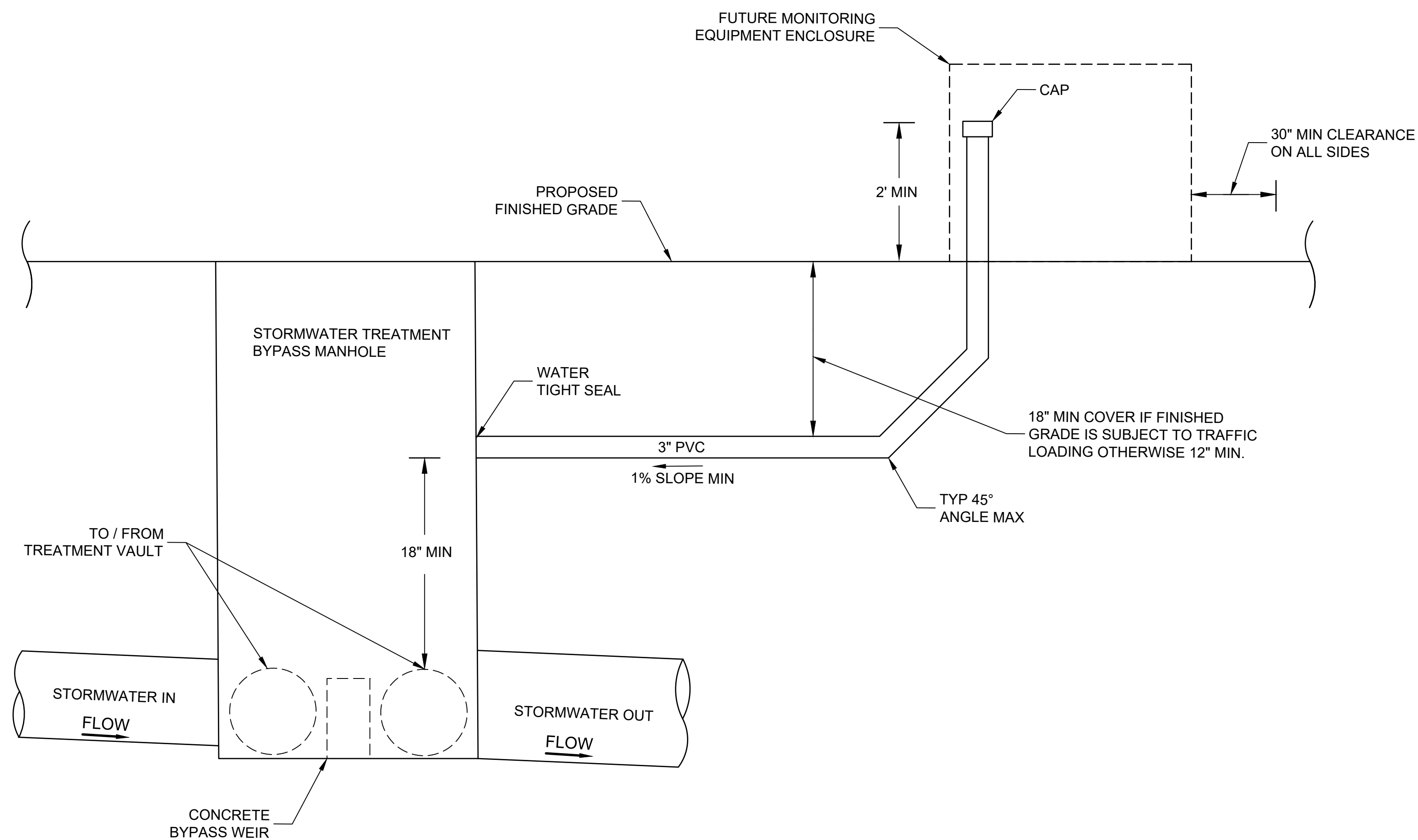
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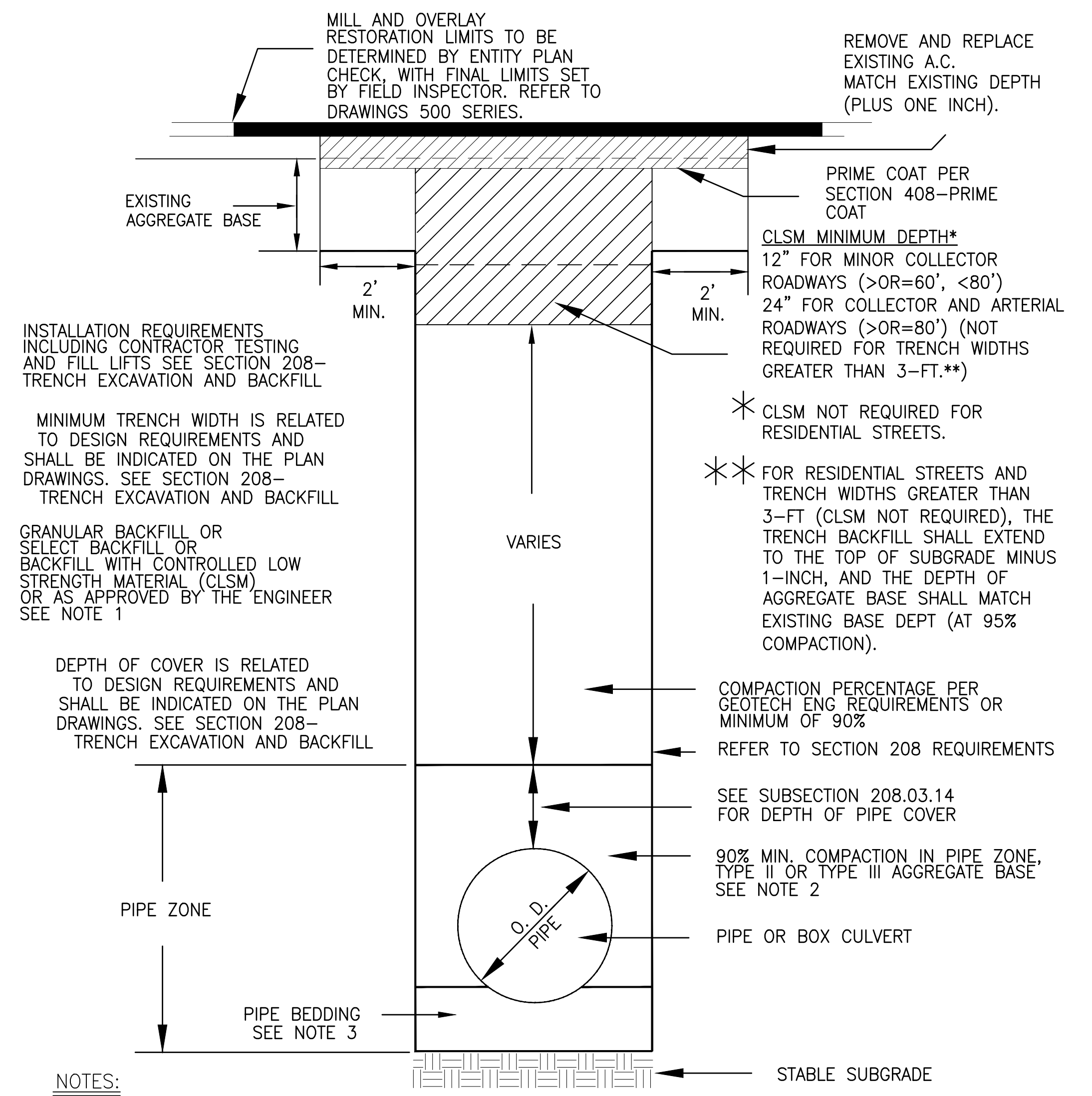
Project No. 181300599 Scale SEE SHEET

Drawing No. CD14 Sheet 85 of 177 Revision 0

CLV DWG & APP #:
 107V9042, L21-01092



23 PVC MONITORING CONDUIT
CD15 SCALE: NTS



- NOTES:**
1. NO STONES OR LUMPS GREATER THAN 3" PERMITTED IN TRENCH 2' OR LESS IN WIDTH.
 2. TRENCH WIDTH, BEDDING, SUBGRADE AND PIPE ZONE REQUIREMENTS FOR UTILITY INSTALLATIONS SHALL CONFORM TO THE RESPECTIVE ENTITY REQUIREMENTS.
 3. CRUSHED ROCK MAY BE USED FOR PIPE BEDDING ONLY IF MATERIAL USE HAS BEEN SPECIFICALLY APPROVED BY THE GOVERNING AGENCY. SEE STANDARD DRAWING NO. 505 FOR PIPE BEDDING METHODS.
 4. LAS VEGAS VALLEY WATER DISTRICT REQUIRES PIPE BEDDING AND BACKFILL WITHIN THE PIPE ZONE TO BE OF THE SAME MATERIAL.

24 TYPICAL PIPE TRENCHING
CD15 SCALE: NTS

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1	CLV REVIEW PERMITTING COMMENTS	AP	JBB 21.06.16

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Title CIVIL DETAILS		
Project No. 181300599	Scale SEE SHEET	
Drawing No. CD15	Sheet 86 of 177	Revision 1

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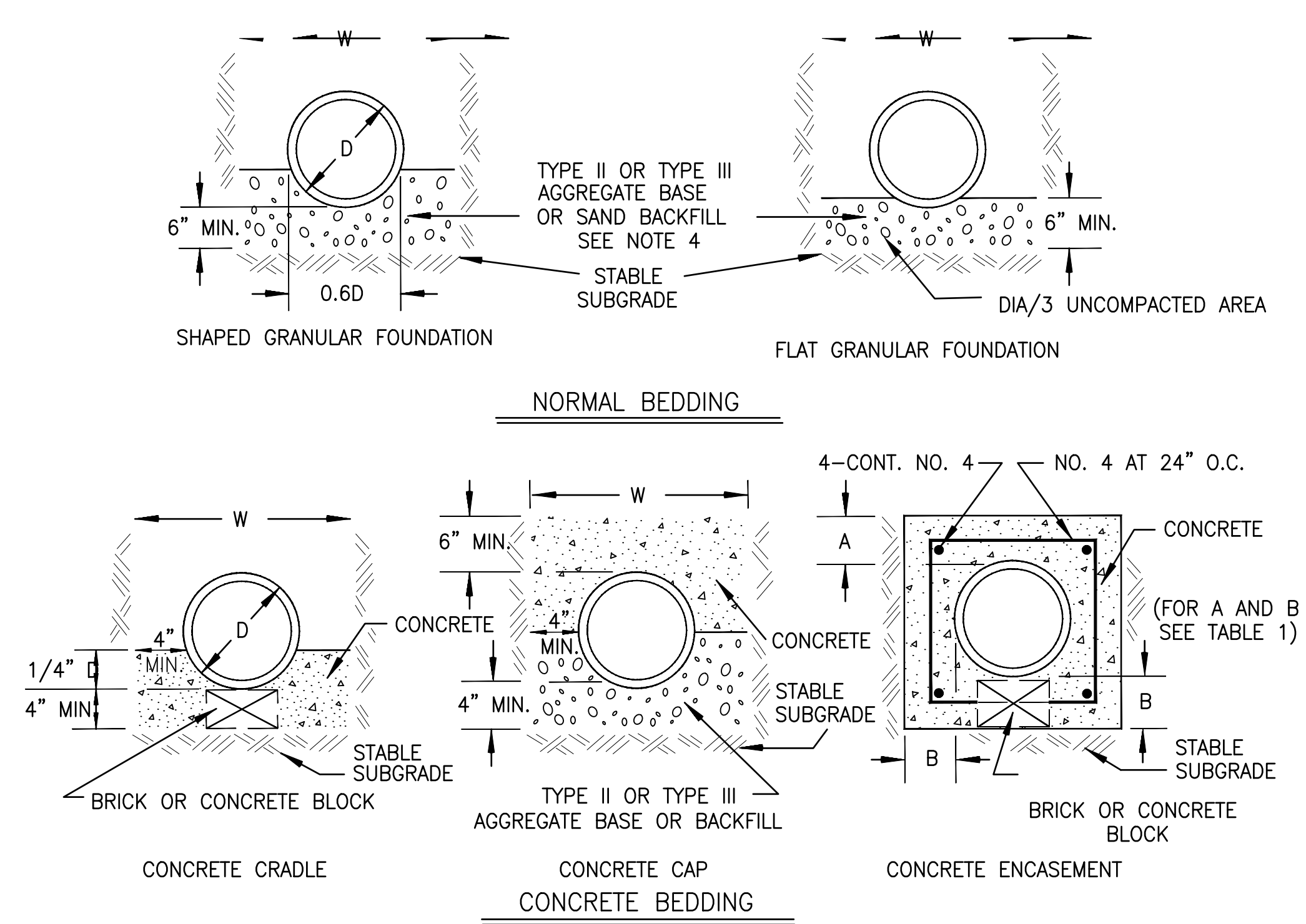


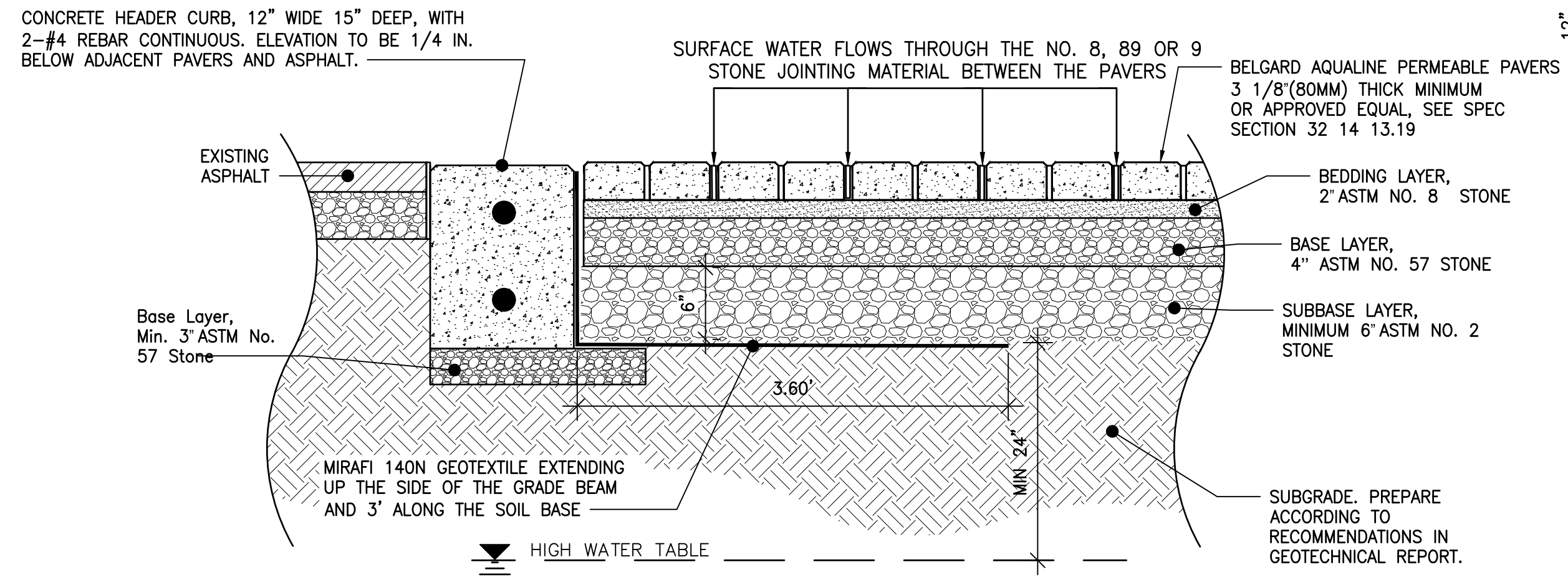
TABLE 1

PIPE SIZE	B	A	PIPE SIZE	B	A
6"	4"	4"	24"	6"	6"
8"	4"	4"	27"	7"	6"
10"	4"	4"	30"	8"	6"
12"	4"	4"	33"	8"	6"
15"	4"	4"	36"	9"	6"
18"	5"	5"	39"	9"	6"
21"	5"	5"	42"	10"	6"

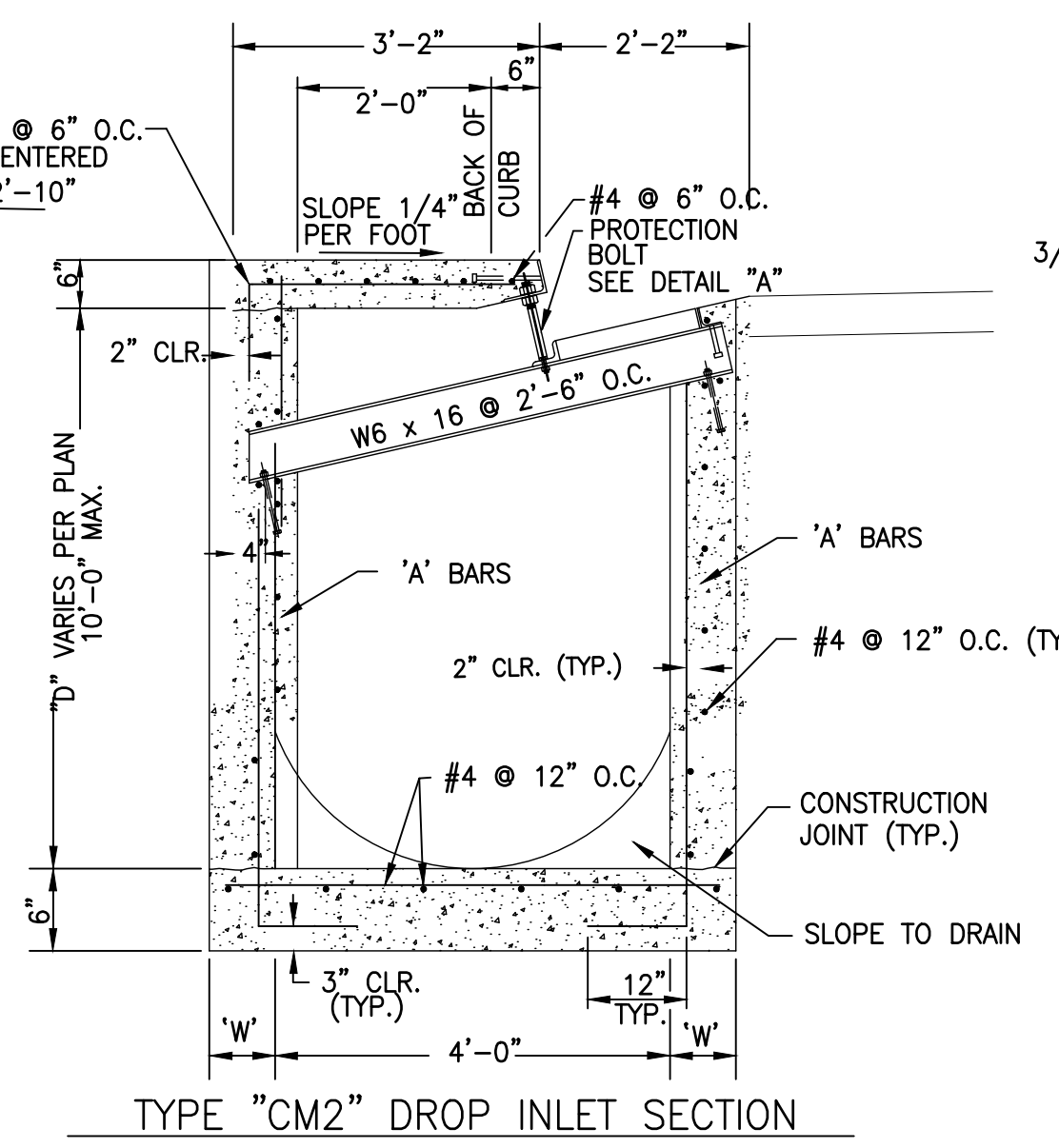
- NOTES:**
- PIPE BEDDING TO BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY. SUBGRADE SHALL CONFORM TO RESPECTIVE ENTITY REQUIREMENTS.
 - INDICATED THICKNESS OF BEDDING MATERIAL TO BE CONSTRUCTED UNDER THE BARREL. SUBGRADE TO BE EXCAVATED TO PROVIDE 2" CLEARANCE UNDER THE BELL.
 - OTHER BEDDING METHODS MAY BE SPECIFIED OR APPROVED.
 - CRUSHED ROCK MAY BE USED FOR PIPE BEDDING ONLY IF MATERIAL USE HAS BEEN SPECIFICALLY APPROVED BY THE GOVERNING AGENCY.

D = OUTSIDE DIAMETER OF PIPE
 W = OUTSIDE DIAMETER OF PIPE + 24" MAXIMUM

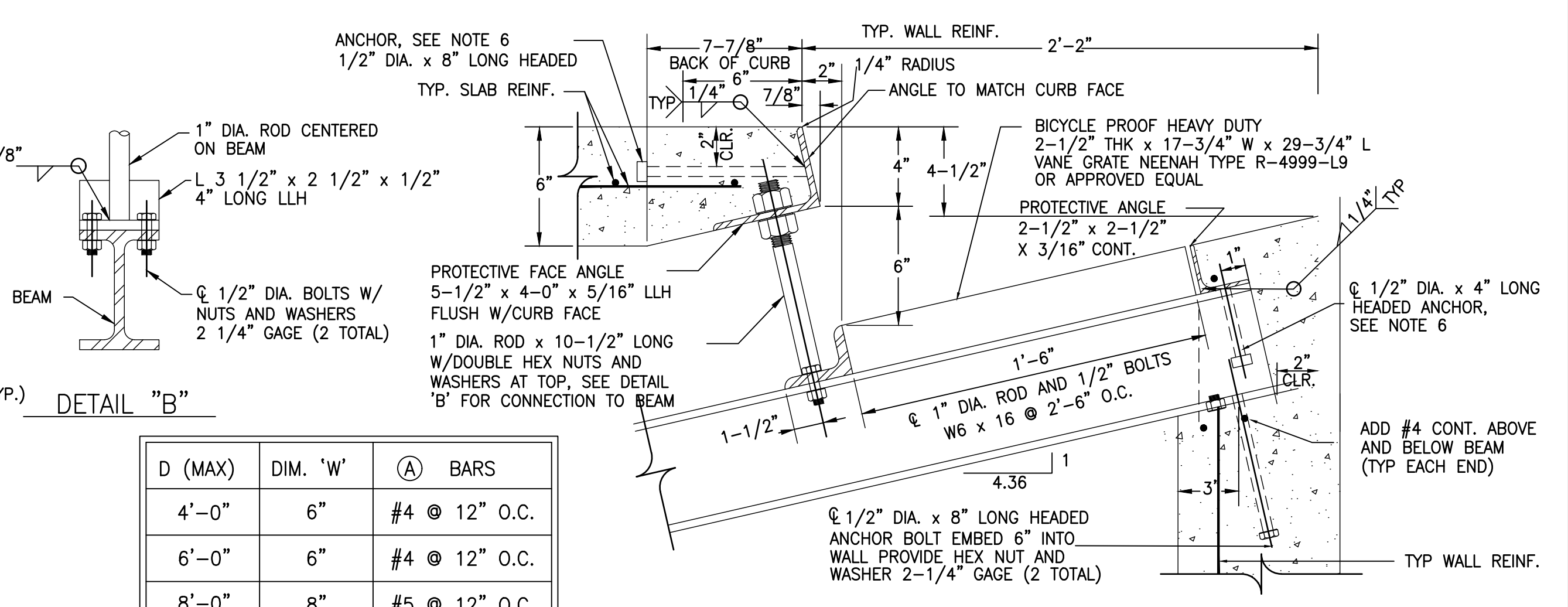
25 TYPICAL PIPE BEDDING
 CD16 SCALE: NTS



27 PERMEABLE PAVING DETAIL
 CD16 SCALE: NTS

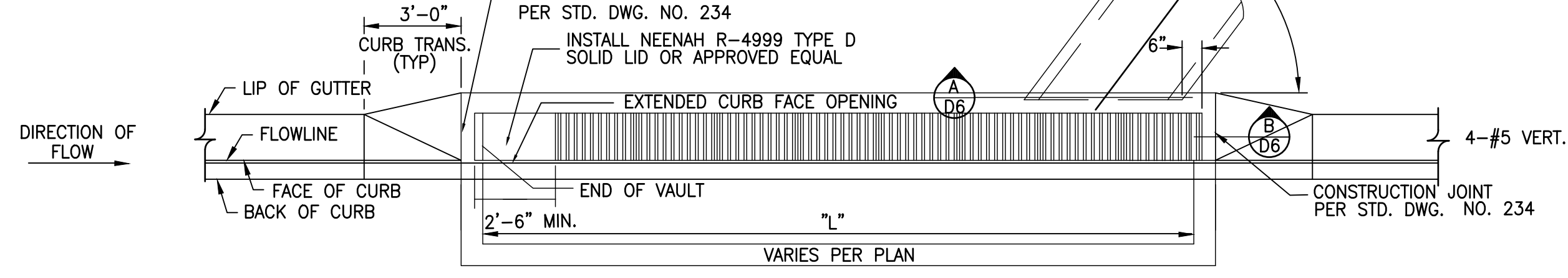


TYPE "CM2" DROP INLET SECTION

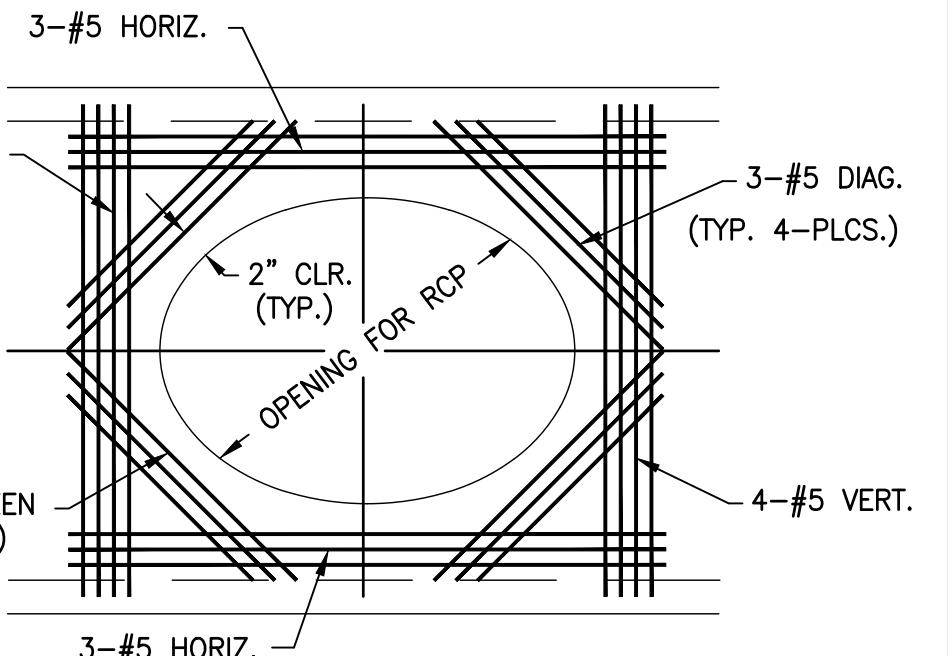


PROTECTIVE FACE & ROD - DETAIL "A"

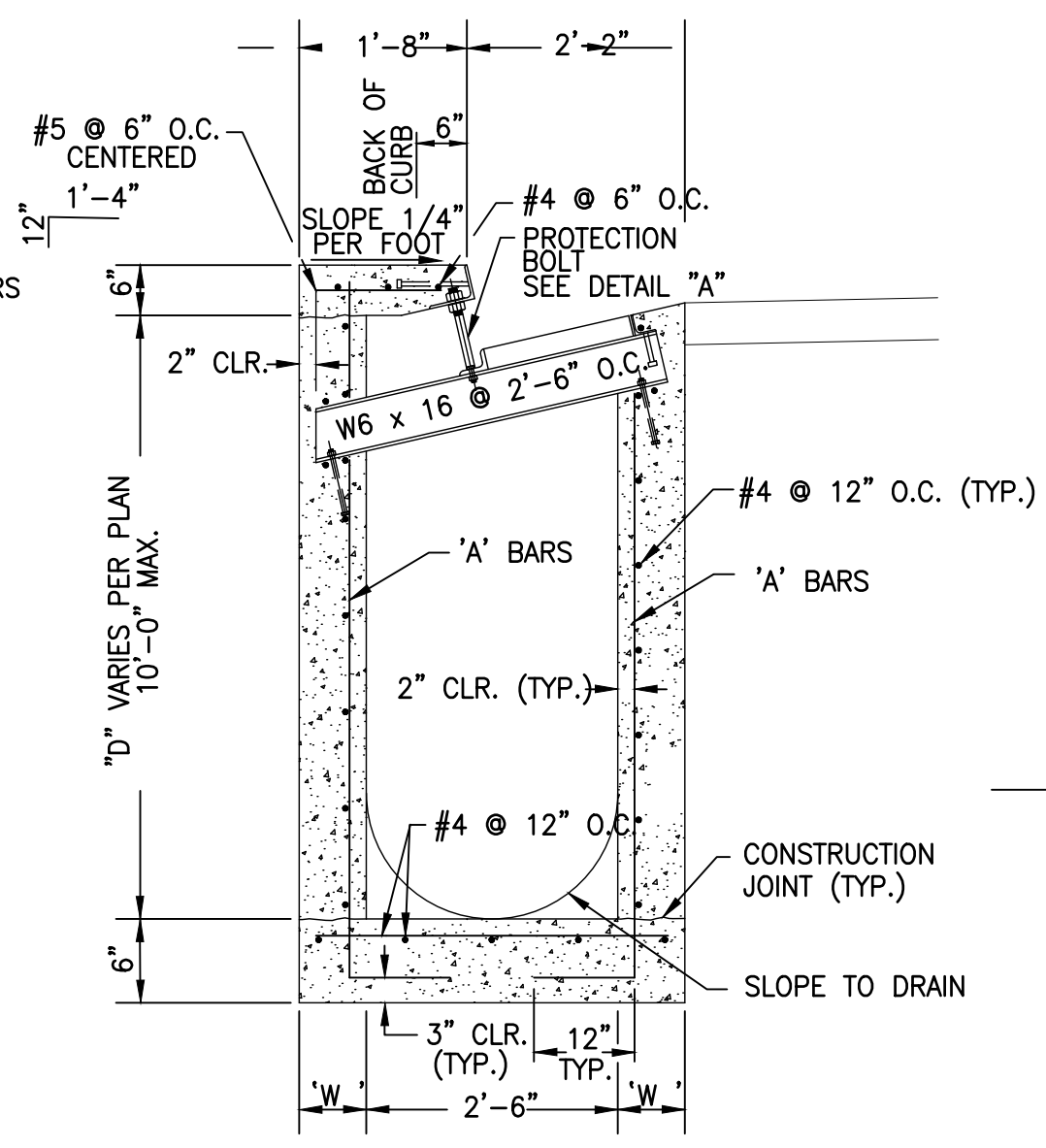
D (MAX)	DIM. 'W'	(A) BARS
4'-0"	6"	#4 @ 12" O.C.
6'-0"	6"	#4 @ 12" O.C.
8'-0"	8"	#5 @ 12" O.C.
10'-0"	8"	#5 @ 6" O.C.



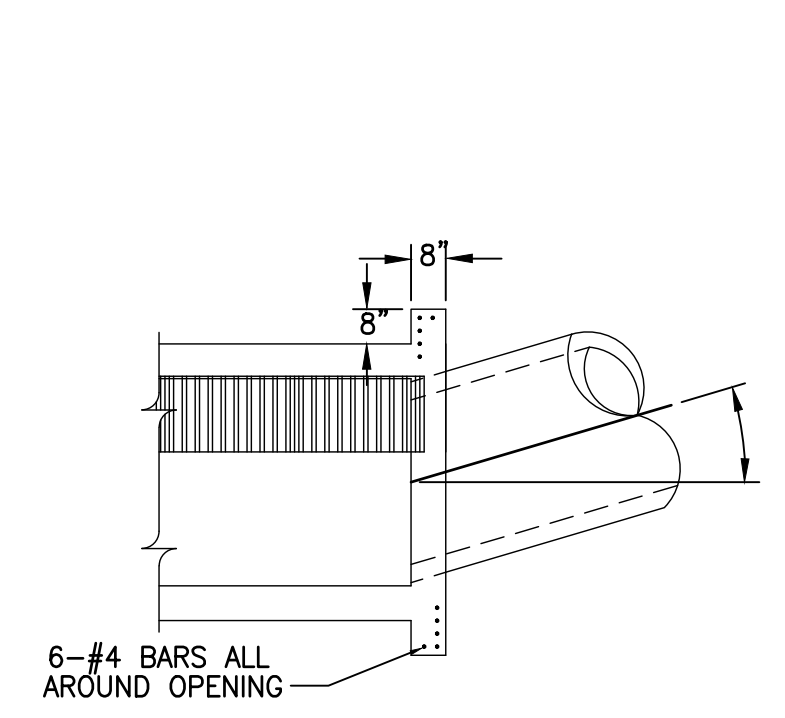
DROP INLET LAYOUT PLAN



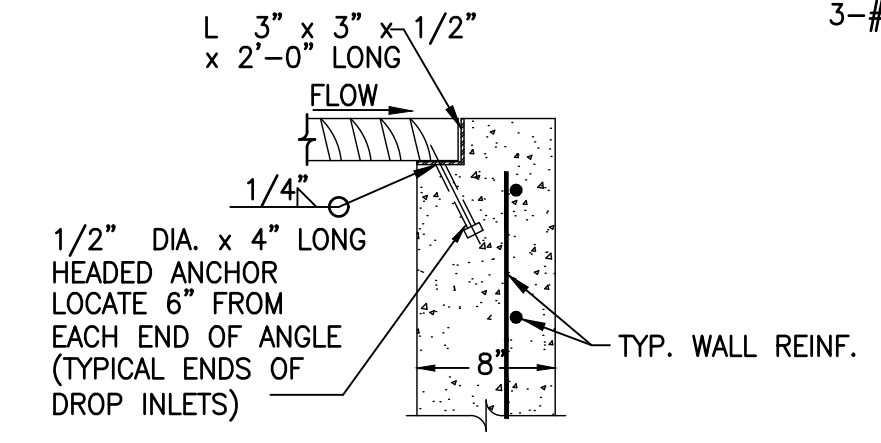
SECTION "A"



TYPE "DM2" DROP INLET SECTION



ALTERNATE CONNECTION DETAIL



SECTION "B"

- NOTES:**
- ALL EXPOSED METALS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION. ASTM A123
 - PROVIDE 1/2" (MIN.) CLEARANCE ALL AROUND THE STEEL BEAM, DRY PACK AFTER INSTALLATION.
 - WHEN REQUIRED BY LENGTH OF OPENING, PLATE ANGLE MAY BE DELIVERED IN SECTIONS AND BUTT WELDED IN PLACE.
 - ALL GALVANIZED DAMAGED BY WELDING SHALL RECEIVE TWO COATS OF GALVALLOY OR EQUAL.
 - CONCRETE SHALL BE MODIFIED CLASS DA 4000 PSI, SEE SPECIAL PROVISIONS SECTION 501.
 - ANGLE ANCHORS SHALL BE EMBEDDED MIDPOINT IN EACH ENDWALL AND EVENLY SPACED, (MAXIMUM SPACING OF 2').

26 TYPE "C-D" MODIFIED DROP INLET
 CD16 SCALE: NTS

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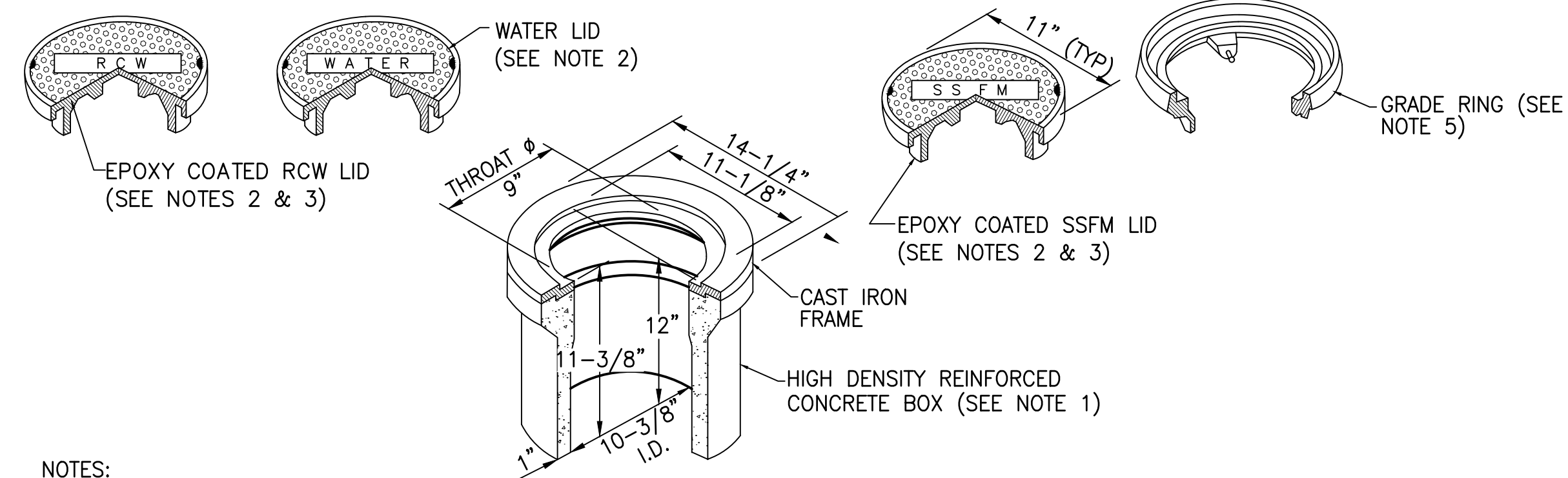
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Title
 CIVIL DETAILS

Project No. 181300599
 Scale SEE SHEET

Drawing No. CD16
 Sheet 87 of 177
 Revision 0

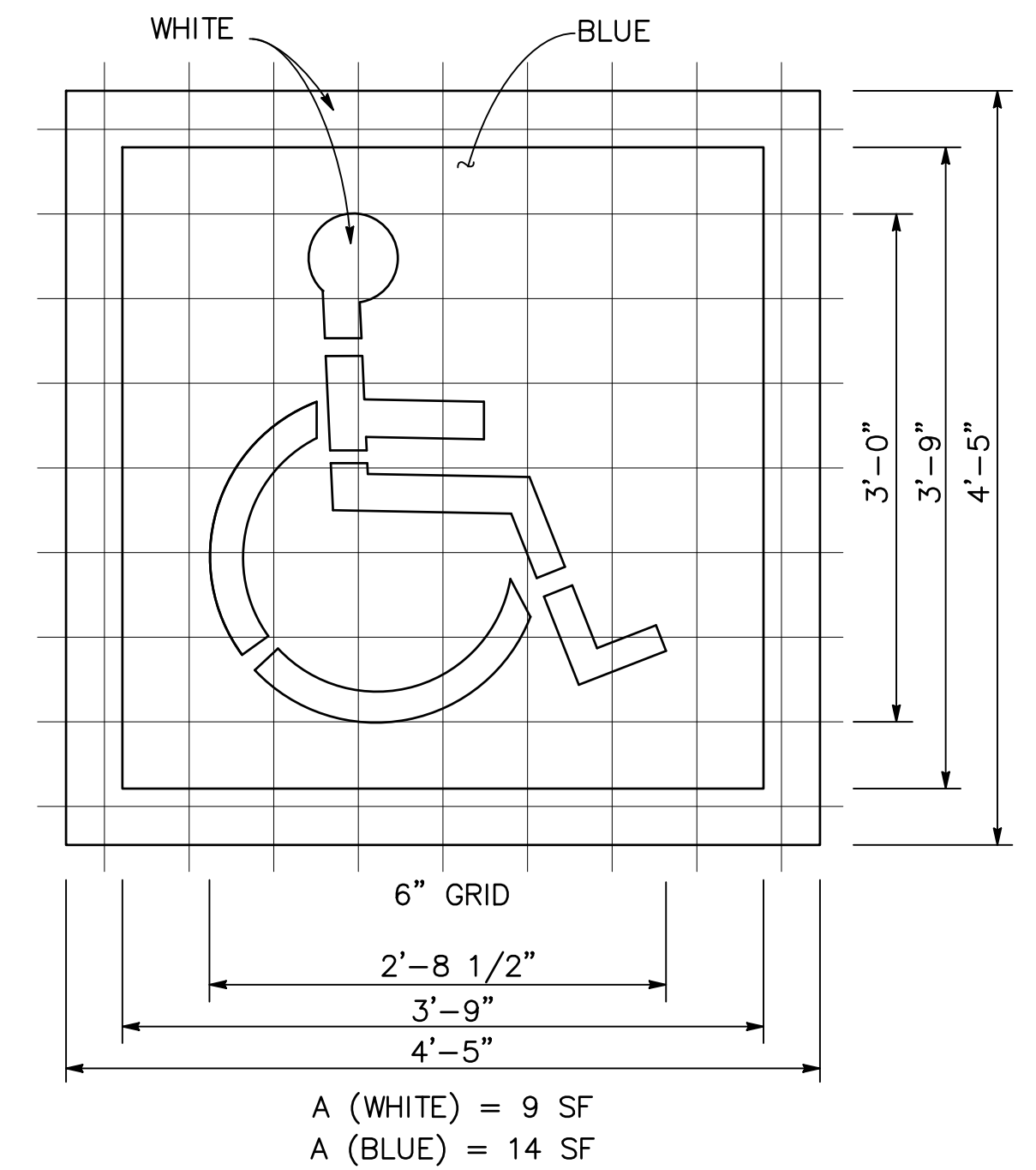
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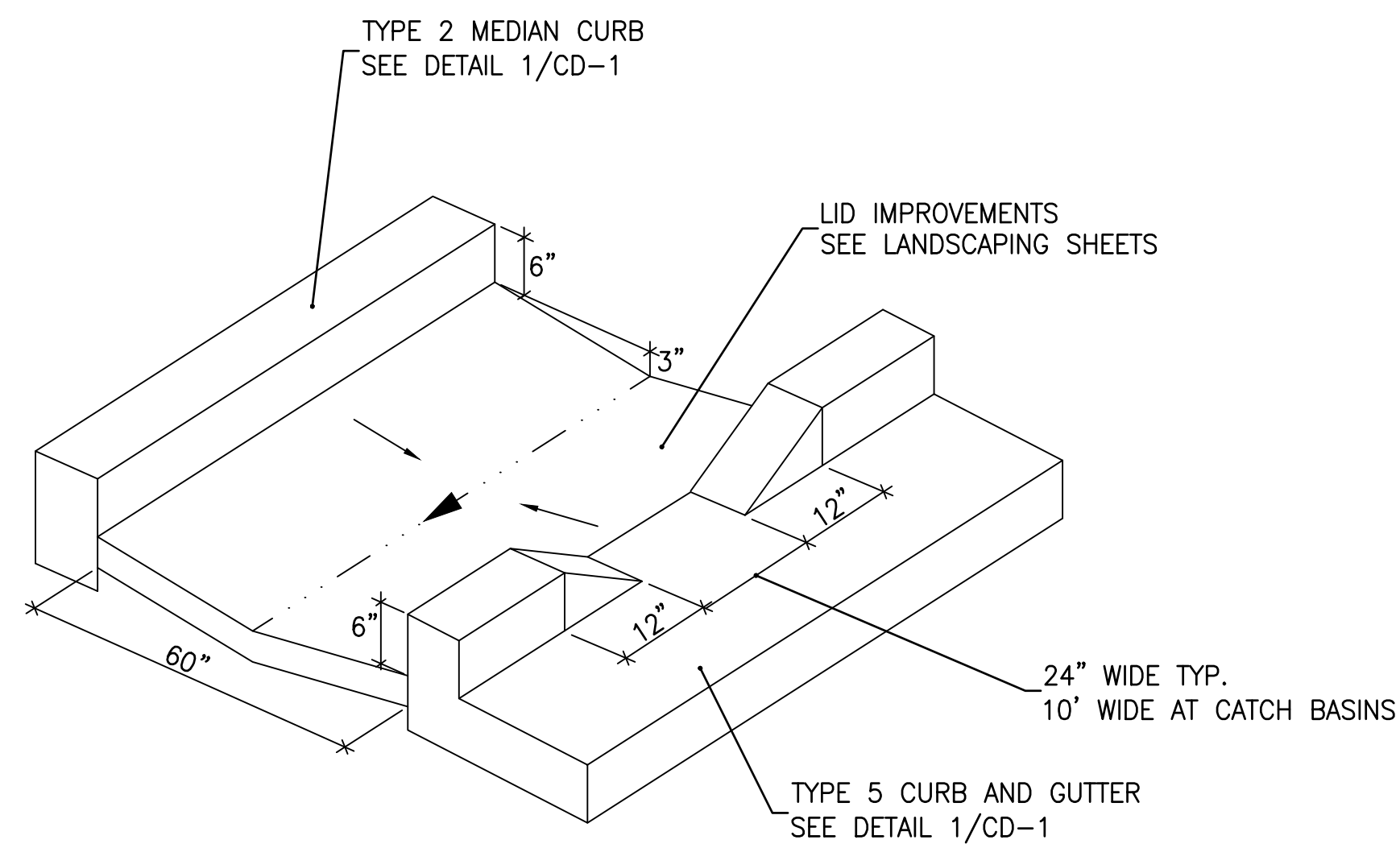
NOTES:

1. VALVE BOX AND LID SHALL BE H20 TRAFFIC RATED WITH A MINIMUM INSIDE DIAMETER OF 10 INCHES (CHRISTY G5 TRAFFIC VALVE BOX & LID).
2. CAST IRON LID SHALL BE MARKED AT THE FACTORY "WATER" FOR WATER APPLICATIONS, "RECLAIMED WATER" OR "RCW" FOR RECLAIMED WATER APPLICATIONS, AND "SS FORCE MAIN" OR "SSFM" FOR SANITARY SEWER APPLICATIONS.
3. FOR RECLAIMED WATER AND SANITARY SEWER APPLICATIONS, CAST IRON LID SHALL BE EPOXY COATED AT THE FACTORY, OR POWDER COATED, COLOR SHALL BE PURPLE FOR RECLAIMED WATER APPLICATIONS AND GREEN FOR SANITARY SEWER APPLICATIONS.
4. VALVE BOX SHALL BE SET OR ADJUSTED TO GRADE WITH RISER PER DETAIL M105/TYP. FOR OVERLAY ADJUSTMENTS, RISER WILL NOT REQUIRE REPLACEMENT OR EXTENSION IF IT EXTENDS A MINIMUM OF 2 INCHES INTO ADJUSTED VALVE BOX.
5. GRADE RING IS NOT ALLOWED FOR NEW VALVE BOX INSTALLATIONS. CAST IRON GRADE RING (CHRISTY G5 GRADE RING) MAY BE USED FOR OVERLAY ADJUSTMENTS WHEN OVERLAY DEPTH EQUALS THE GRADE RING DEPTH. NO MORE THAN ONE GRADE RING ALLOWED PER BOX.

28 VALVE BOX AND LID
CD17 SCALE: NTS



30 HANDICAP PARKING SYMBOL
CD17 SCALE: NTS



29 LID CURB OPENING
CD17 SCALE: NTS

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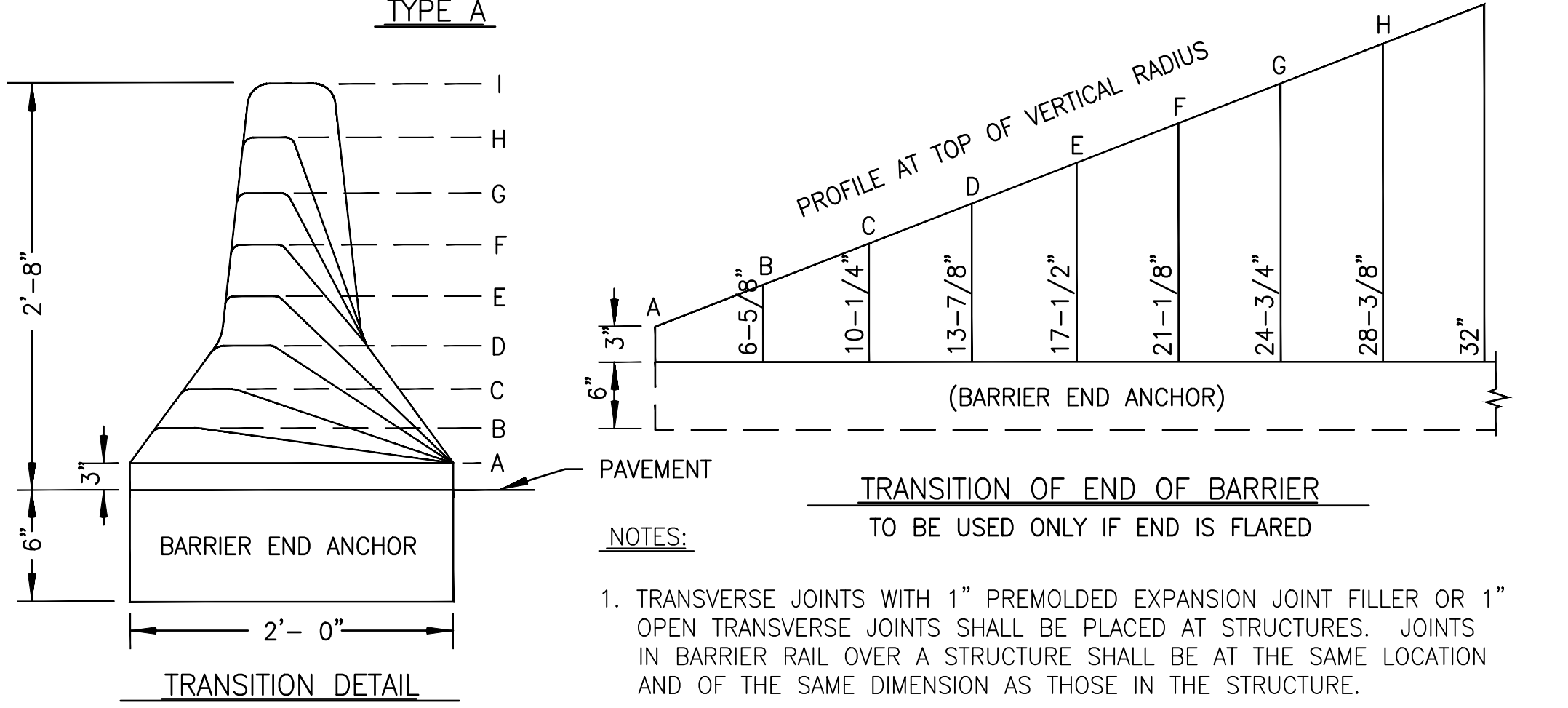
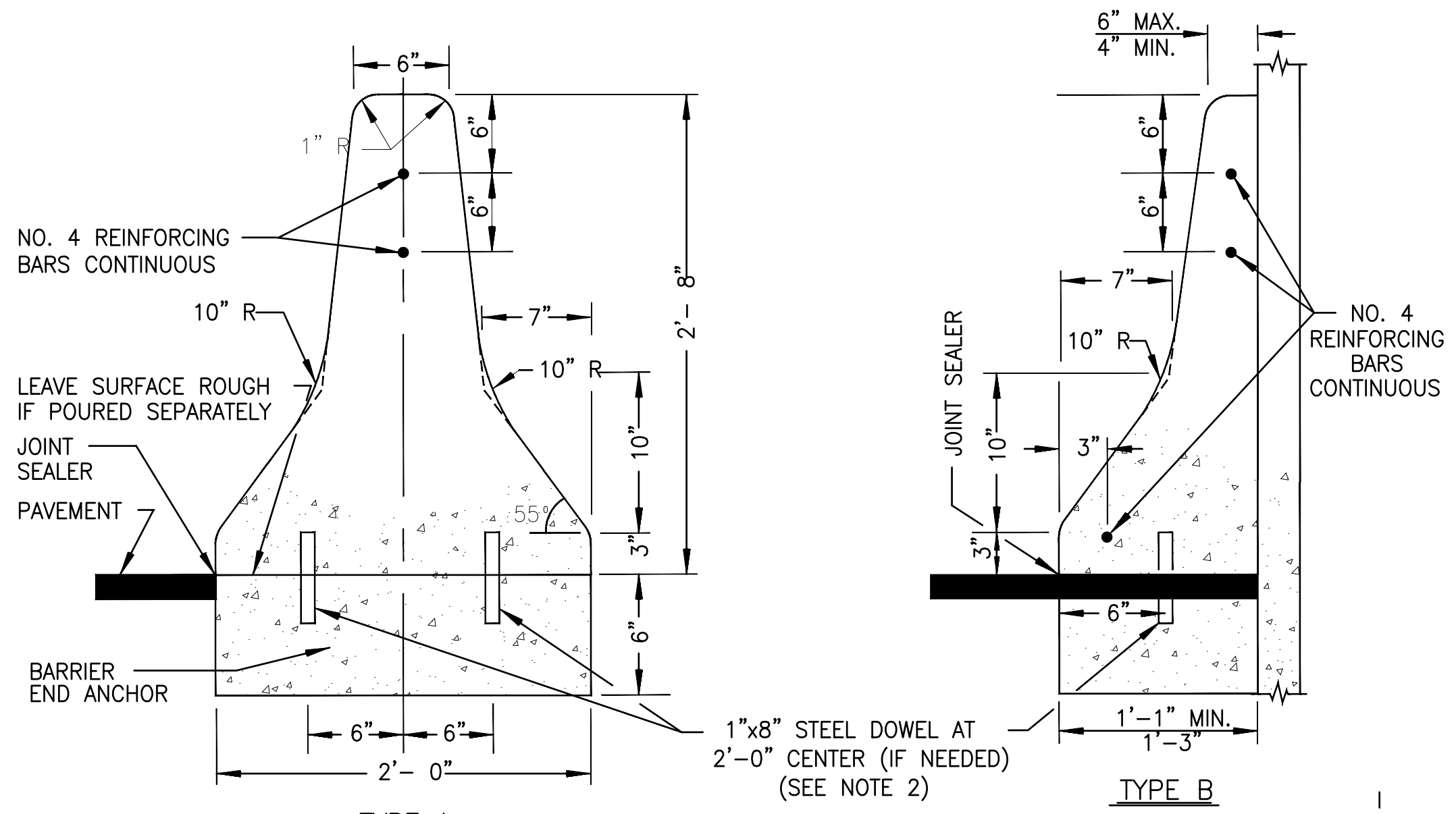
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Project No. 181300599	Scale SEE SHEET	CLV DWG & APP #: 107V9042, L21-01092
Drawing No. CD17	Sheet 88 of 177	Revision 0



CONCRETE BARRIER RAIL FLARE RATES

OPERATING SPEED	FLARE RATE
60	17:1 MAX
50	14:1
40	11:1

- NOTES:**
- TRANSVERSE JOINTS WITH 1" PREMOLDED EXPANSION JOINT FILLER OR 1" OPEN TRANSVERSE JOINTS SHALL BE PLACED AT STRUCTURES. JOINTS IN BARRIER RAIL OVER A STRUCTURE SHALL BE AT THE SAME LOCATION AND OF THE SAME DIMENSION AS THOSE IN THE STRUCTURE.
 - BITUMINOUS PAVING REQUIRED: PAVING SHALL BUTT AGAINST THE BARRIER RAIL END ANCHOR SECTION AND SHALL EXTEND FULL WIDTH UNDER THE NORMAL BARRIER RAIL SECTION PLUS 6" MINIMUM 6-INCH DEEP BARRIER. END ANCHORS SHALL BE CONSTRUCTED IN THE FIRST AND LAST 10 LINEAR FEET OF THE FULL HEIGHT BARRIER RAIL RUN. IF TRANSITIONS ARE USED, THE ANCHOR SHALL BE EXTENDED UNDER THE TRANSITION.

31 CONCRETE BARRIER RAIL
SCALE: NTS

BILL OF MATERIALS (RCP HDPE CMP)

PIPE SIZE (INCH)	SINGLE (ONE GRATE)					DOUBLE (TWO GRATES)					TRIPLE (THREE GRATES)				
	* CONCRETE (CY)	* REINF. (LB.)	* CONCRETE (CY)	* REINF. (LB.)	STR STEEL (LB)	* CONCRETE (CY)	* REINF. (LB.)	* CONCRETE (CY)	* REINF. (LB.)	STR STEEL (LB)	* CONCRETE (CY)	* REINF. (LB.)	* CONCRETE (CY)	* REINF. (LB.)	STR STEEL (LB)
15	0.71	0.19	36	10	211	1.06	0.26	50	13	397	1.41	0.33	70	17	583
18	0.89	0.20	40	10	306	1.31	0.28	56	13	574	1.72	0.35	77	18	842
24	1.08	0.22	58	12	349	1.56	0.30	80	15	652	2.04	0.37	105	20	956
30	1.28	0.24	63	12	390	1.83	0.31	86	16	729	2.38	0.39	113	20	1068
36	1.50	0.26	67	13	524	2.11	0.33	92	16	980	2.72	0.41	120	21	1435
42	1.71	0.28	90	15	575	2.39	0.35	120	18	1073	3.07	0.43	154	22	1571
48	1.94	0.30	95	15	707	2.68	0.37	127	18	1329	3.42	0.44	163	23	1951

*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

TABLE OF DIMENSIONS (RCP HDPE CMP)

PIPE SIZE (INCH)	A	H Min. (FT)	MAIN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	L (FT)		
						SINGLE GRATE	DOUBLE GRATE	TRIPLE GRATE
15	2'	2.50	3/2 X 3/8	4 X 3 X 3/8	4 X 3/8	2'	4'	6'
18	2' 6"	3.00	4/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2'	4'	6'
24	3'	3.50	4/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2'	4'	6'
30	3' 6"	4.00	4/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2'	4'	6'
36	4'	4.50	5/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2'	4'	6'
42	4' 6"	5.00	5/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2'	4'	6'
48	5'	5.50	5/2 X 7/8	6 X 3 1/2 X 3/8	6 X 3/8	2'	4'	6'

NOTES:

- All concrete shall be class A or AA.
- Reinforcing steel shall be No.4 bars with maximum spacing at 18 inch centers, wired tightly at all intersections and embedded 2 inches clear of all concrete surfaces.
- Exposed edges of concrete shall be chamfered 1 inch.
- Dimensions may be varied to fit local conditions if ordered by the engineer.
- Commercial prefabricated gratings approved by the bridge division may be used in lieu of the field-welded grating shown.
- Extreme low cover situations to be reviewed by hydraulics engineer.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, slope flow line(s) to outlet pipe and provide a 10:1 slope to flow line(s).
- See sheet R-2.9.1 for details if connecting HDPE pipe.
- A single Type 2 drop inlet shall be constructed unless a double or triple is specified.
- Single grate configuration shown for clarity. Outside dimensions of each grate shall measure 2 feet by $A+4\frac{3}{4}$ ".
- Run rebar continuous thru construction joint. Joint must be a minimum of 3 inches from horizontal bars.
- Weld one tab on ϕ of grate and remaining two tabs 6 inches from edge of frame. Six tabs per inlet, three tabs on each side.
- Weld tabs 6 inches from edge of frame. Four tabs per grate, two on each side.
- For multiple grate installations, the station/offset is to the center of the concrete drop inlet structure.
- Grate is to fit in the frame and be easily removed. If the gap between the grate and frame is greater than 1/4" on each side of the grate, the grate and frame shall be removed and reconstructed to the tolerances specified or, with approval of the engineer, a filler strip up to 1/4" in thickness may be welded flush to the top of the frame to reduce the gap to a maximum of 1/4".
- Additional pipe penetrations may be placed in any wall. Pipe penetrations are to be to the center of the structure wall unless specified otherwise.

32 DROP INLET TYPE 2
SCALE: NTS

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

DROP INLET TYPE 2

R-4.2.1	(609)	Signed Original On File
ADOPTED 11/70	REVISED 10/15	CHIEF HYDRAULICS ENGR.

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Revision	By	Appd.	YY.MM.DD
1	CLV	JBB	21.06.16

Permit-Seal

6/17/2021

Key Map

Stantec

6995 Sierra Center Parkway
Reno, NV 89511
www.stantec.com

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Client/Project
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

File Name:

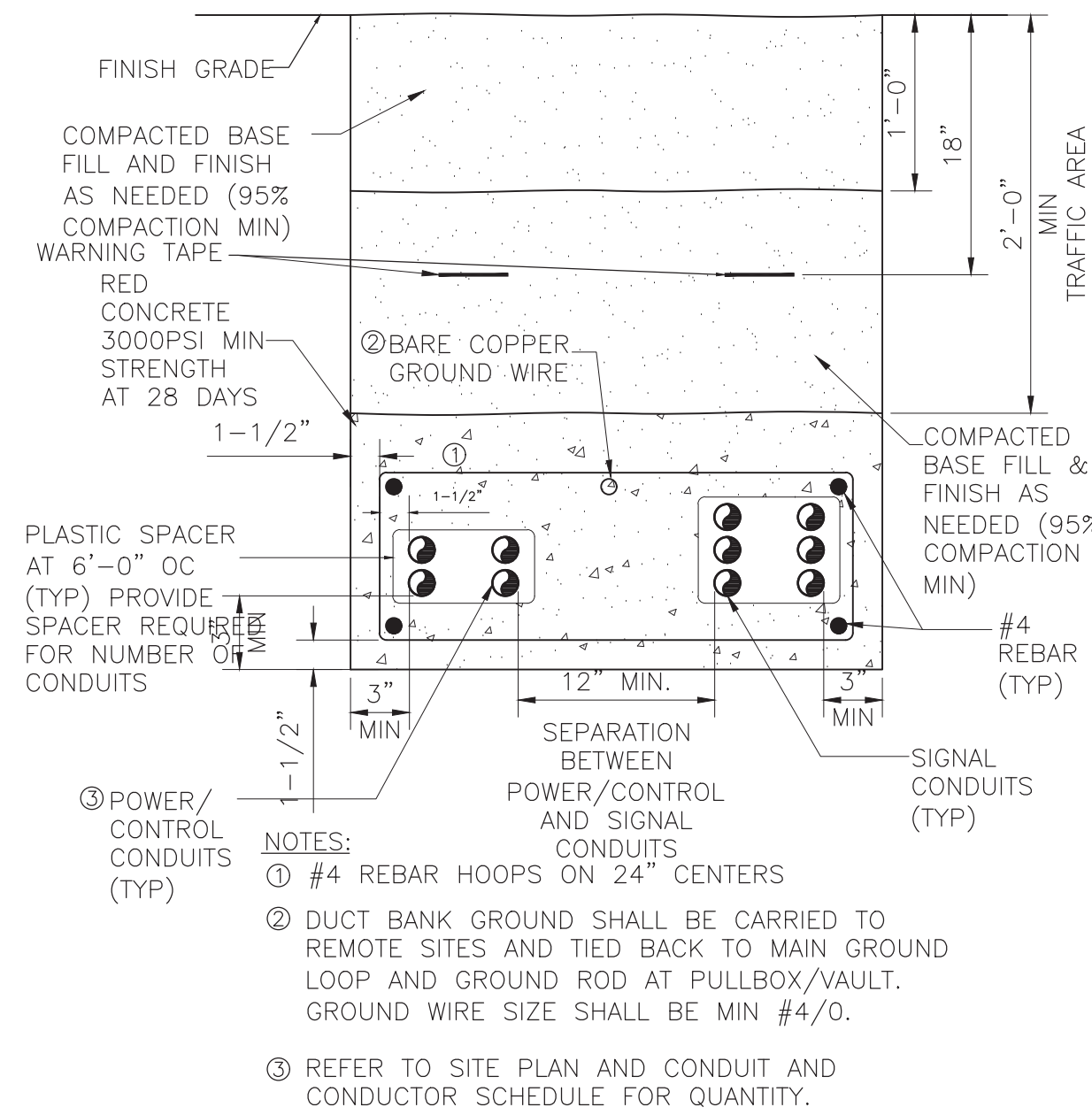
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Title
CIVIL DETAILS

Project No. 181300599 Scale SEE SHEET

Drawing No. CD18 Sheet 89 of 177 Revision 0

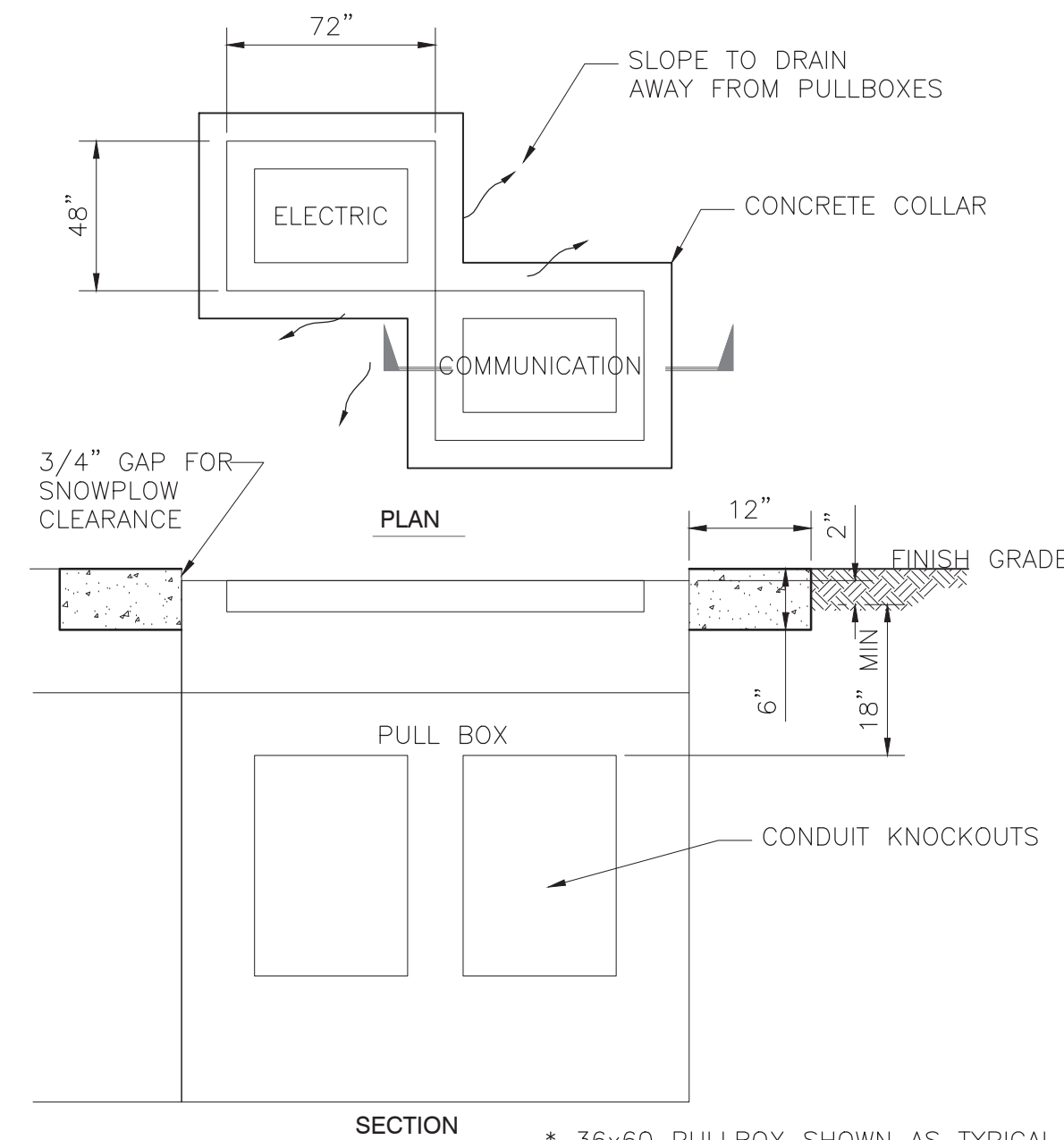
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DUCT BANK DETAIL

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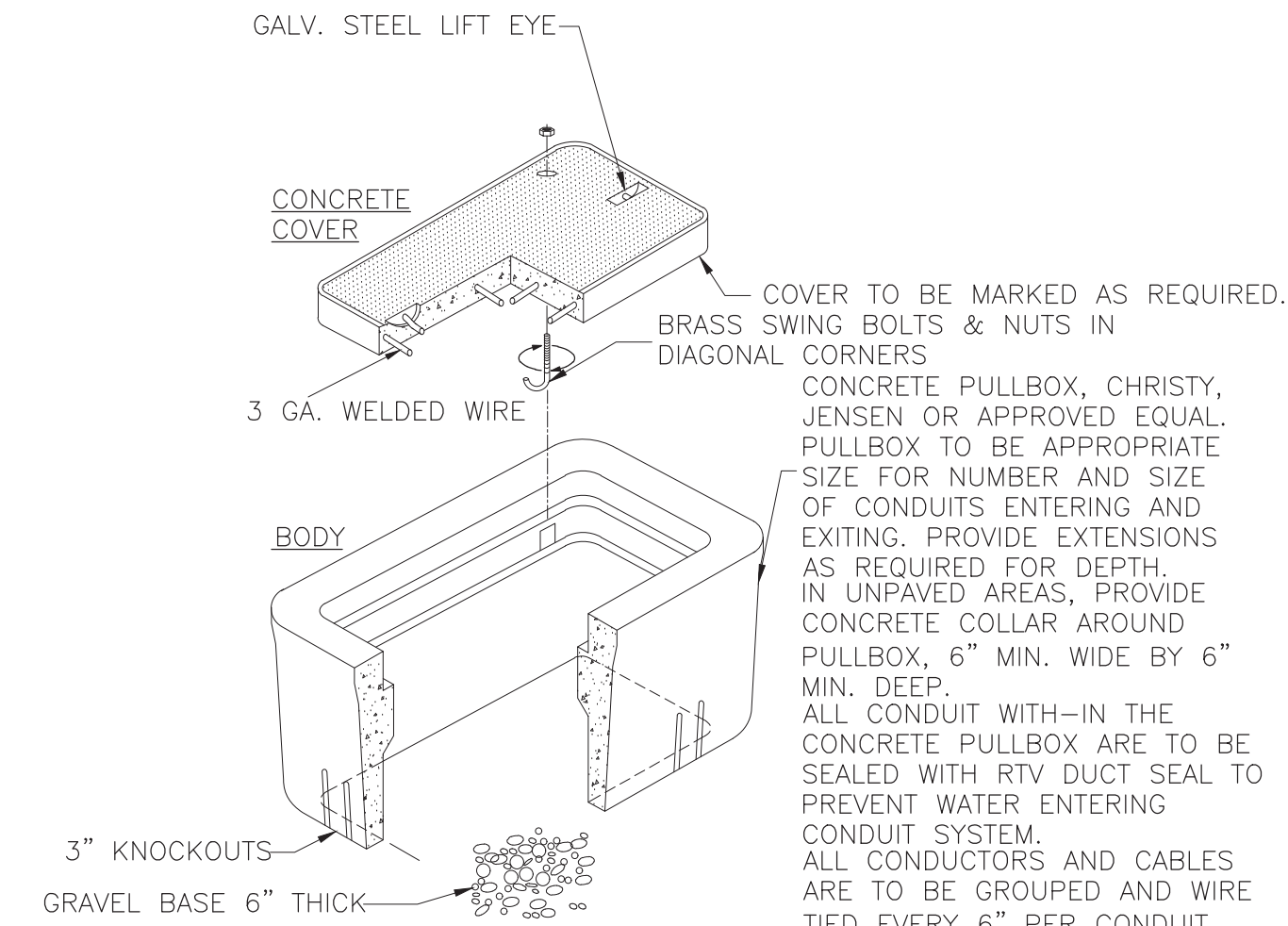
A
E030



CONCRETE PULLBOX/VAULT, PLAN AND SECTION DETAIL

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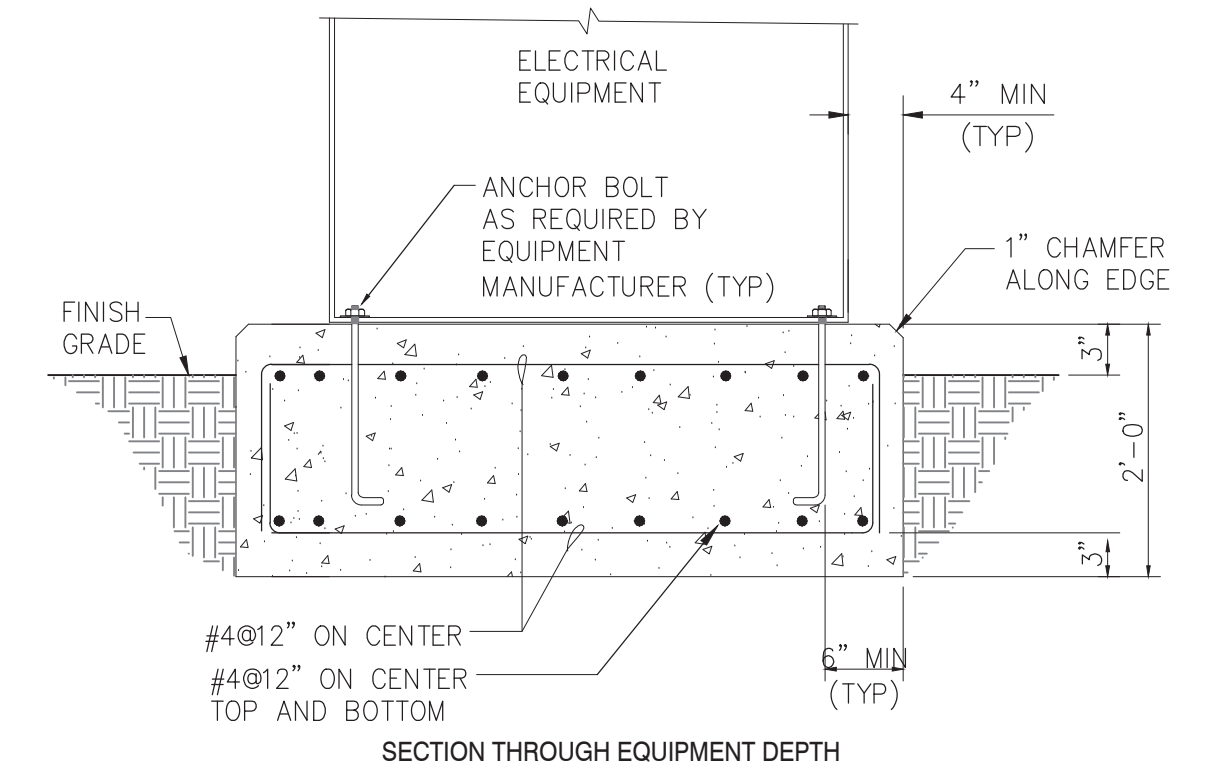
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SMALL CONCRETE PULLBOX DETAIL

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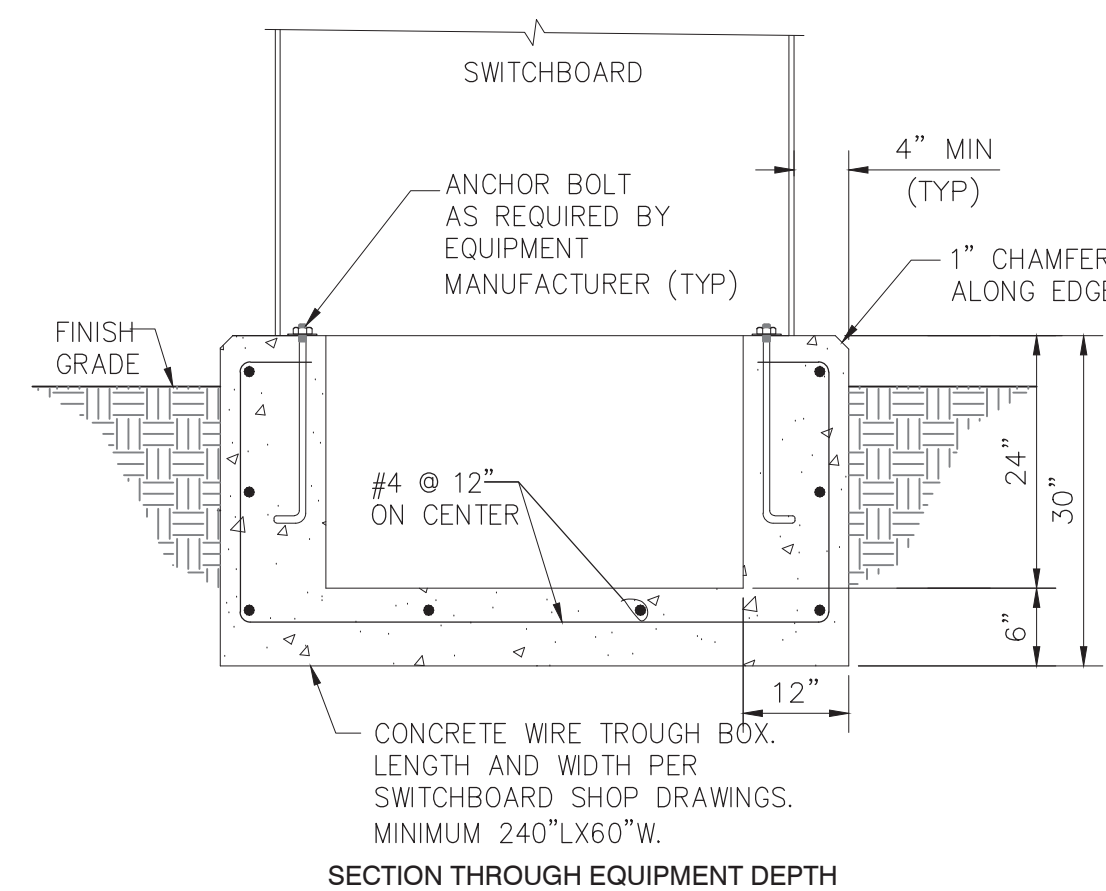
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E030



ELECTRICAL EQUIPMENT FOUNDATION

SCALE: NONE

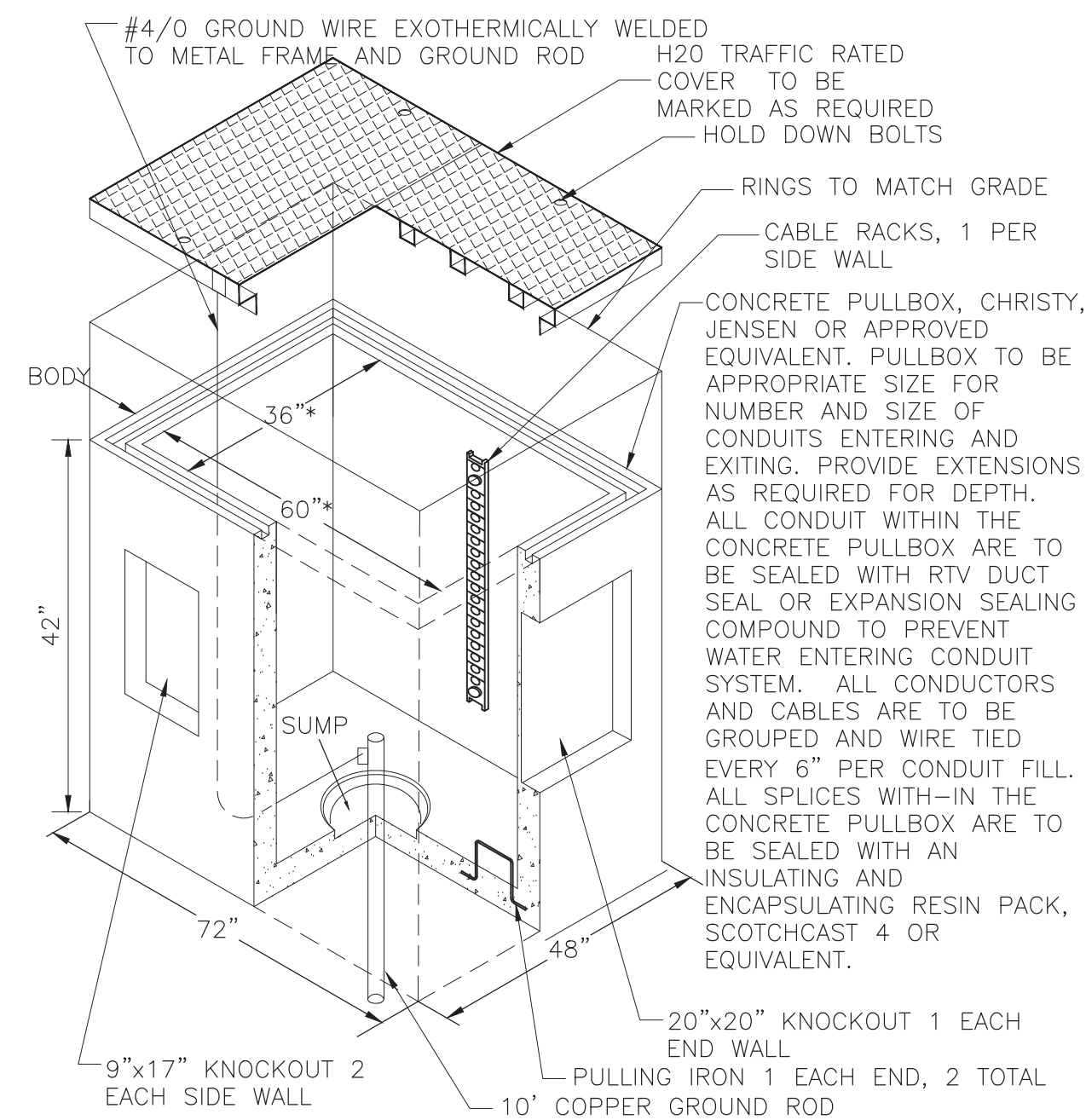
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E030



SWITCHBOARD FOUNDATION DETAIL

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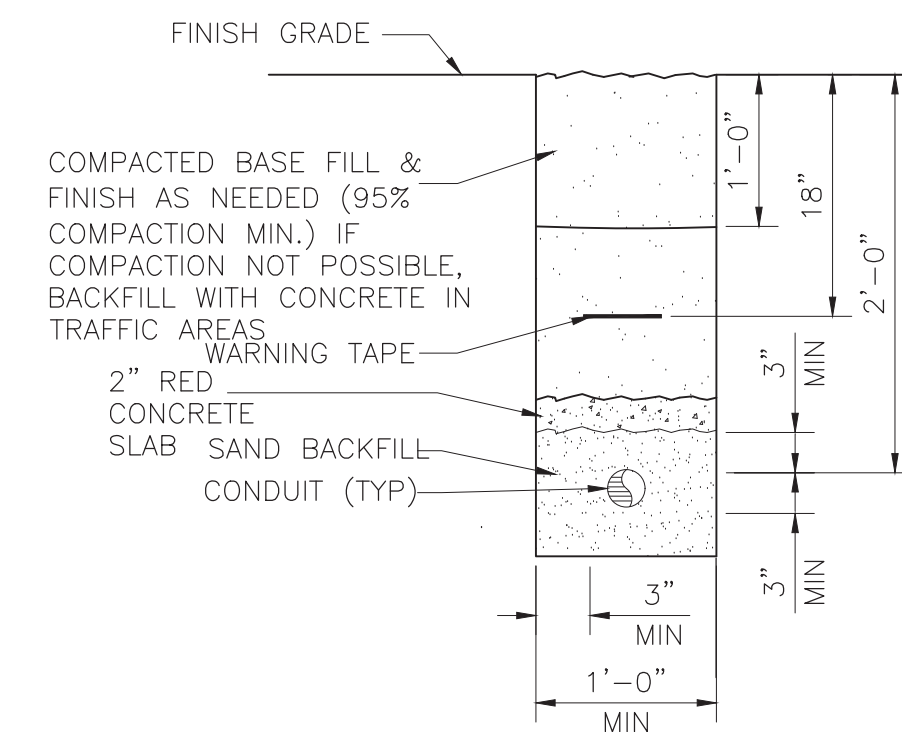
E
E030



CONCRETE PULLBOX/VAULT DETAIL

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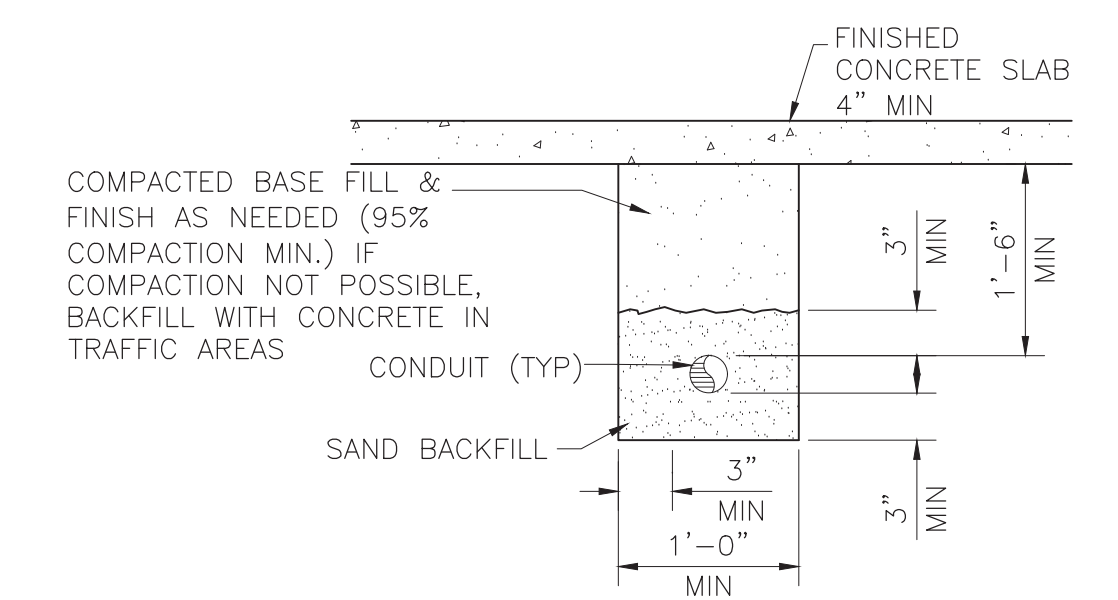
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E030



TRENCH DETAIL

SCALE: NONE

G
E030



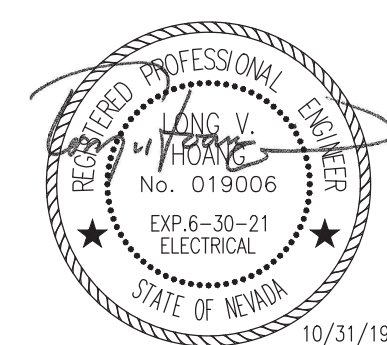
UNDER SLAB TRENCH DETAIL

SCALE: NONE

H
E030

SPWD REVIEW

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6/17/2021

Key Map

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STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

Title

ELECTRICAL DETAILS 1

Project No.
181300599

Scale
SEE SHEET

Drawing No.

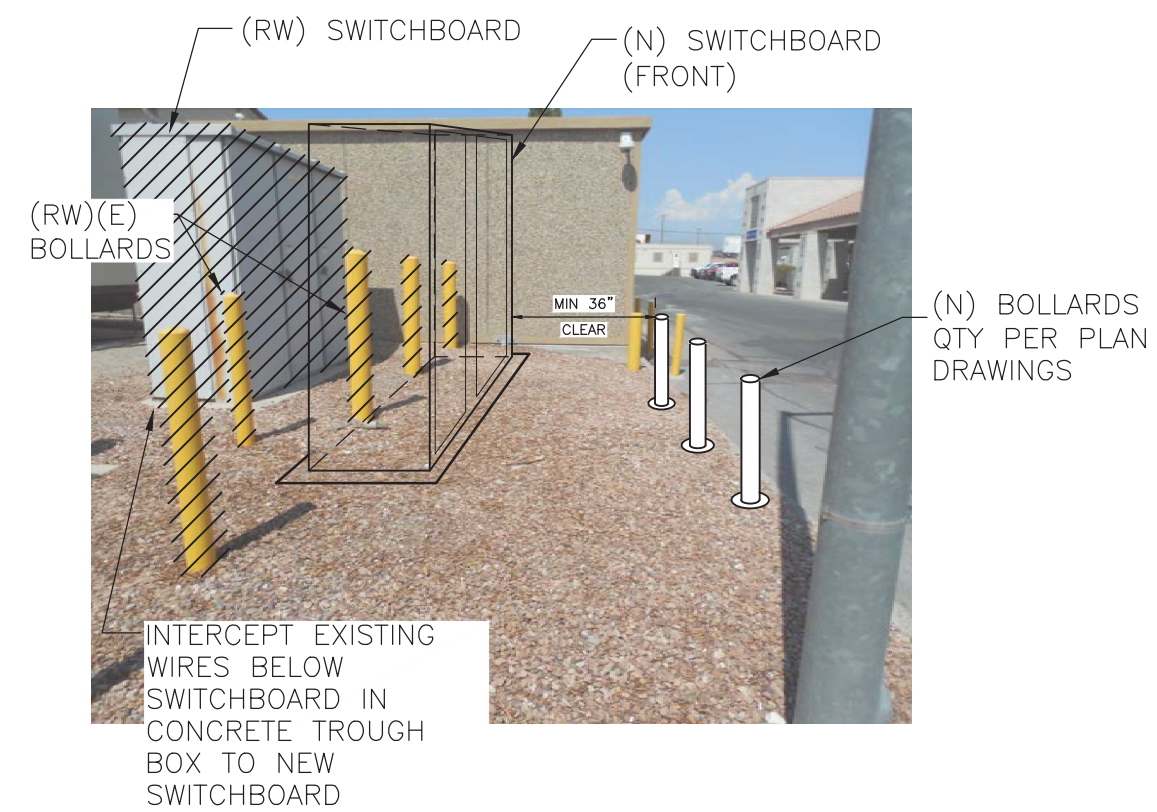
E030

Sheet

149 of 177

Revision

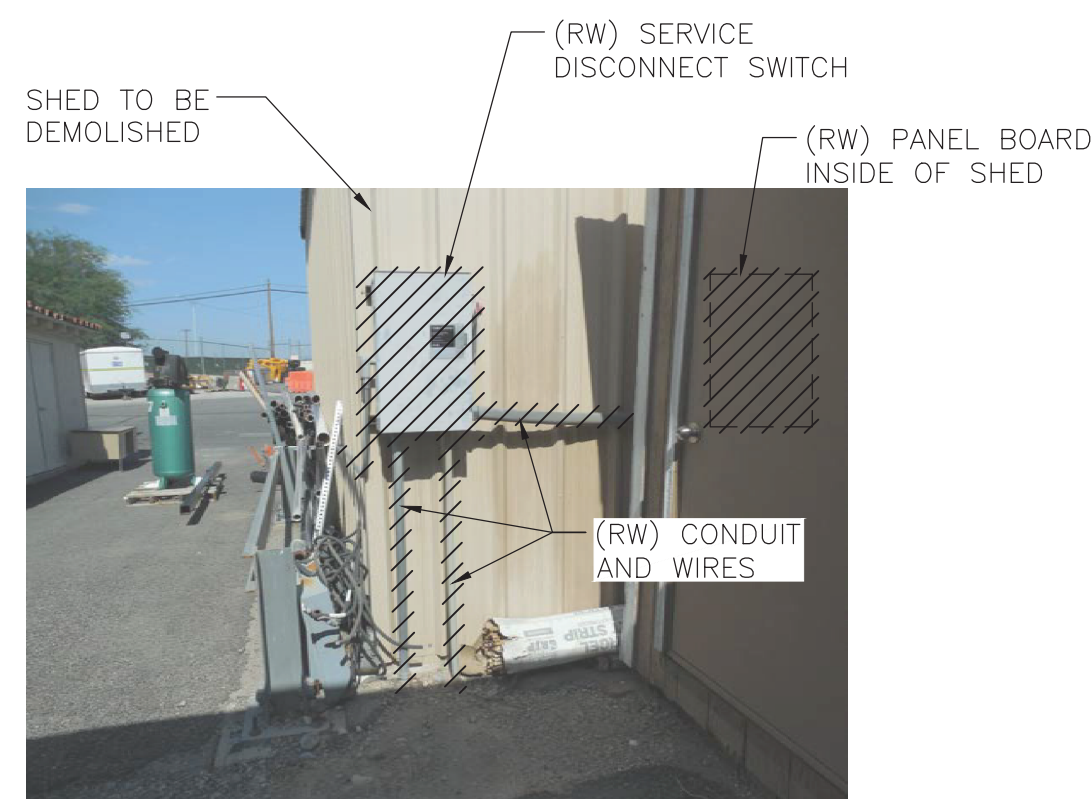
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SWITCHBOARD DETAIL

SCALE: NONE

A
E032



BUILDING F SHED DEMOLITION DETAIL

SCALE: NONE

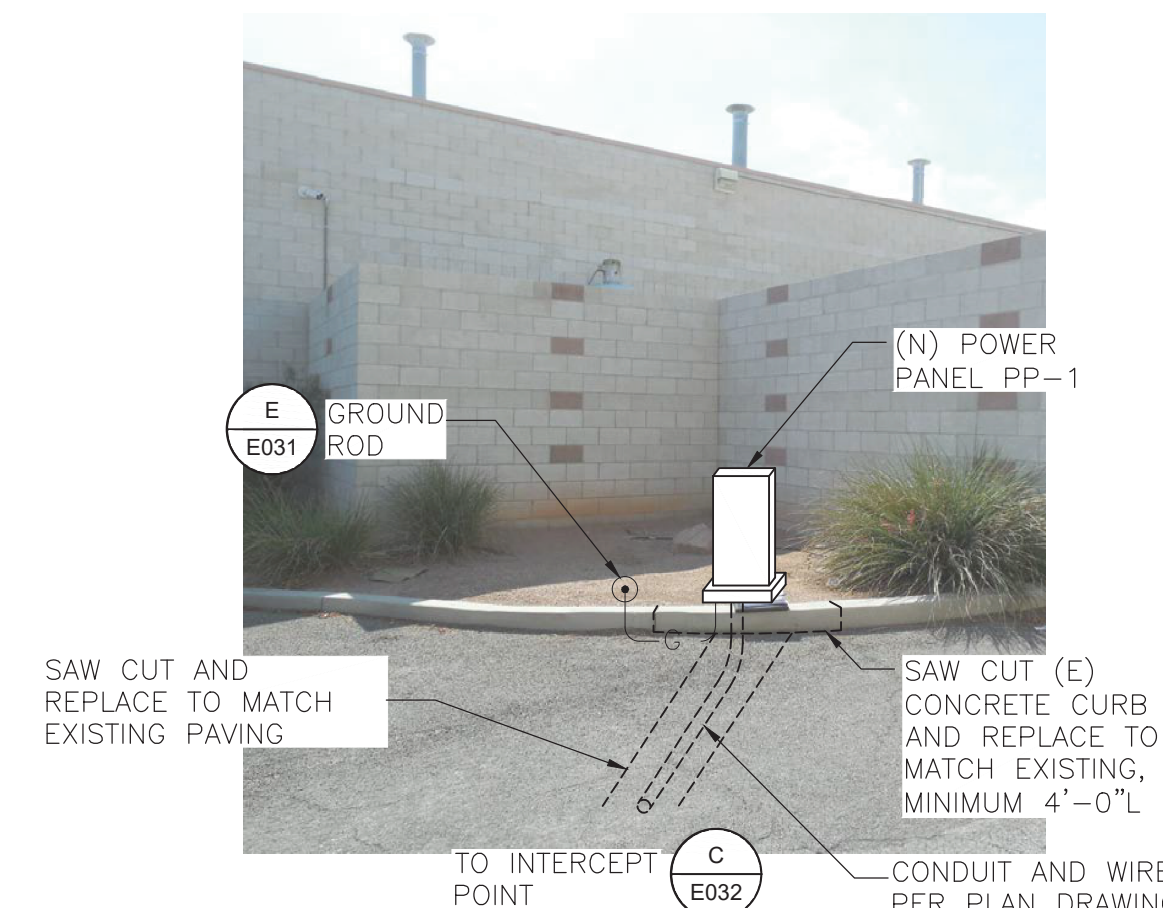
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E032



BUILDING F SERVICE INTERCEPT DETAIL

SCALE: NONE

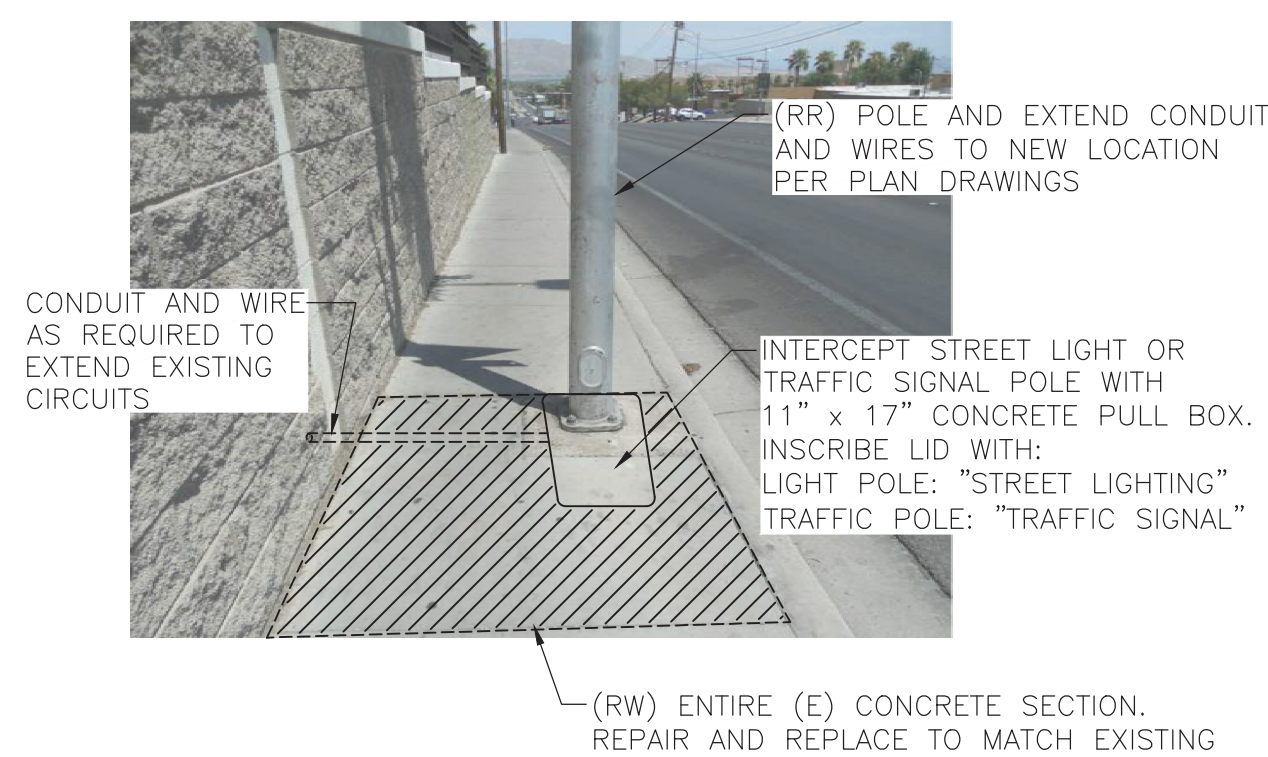
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E032



NEW POWER PANEL DETAIL

SCALE: NONE

D
E032



LIGHT/TRAFFIC POLE RELOCATION DETAIL

SCALE: NONE

E
E032

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E032

G
E032

H
E032

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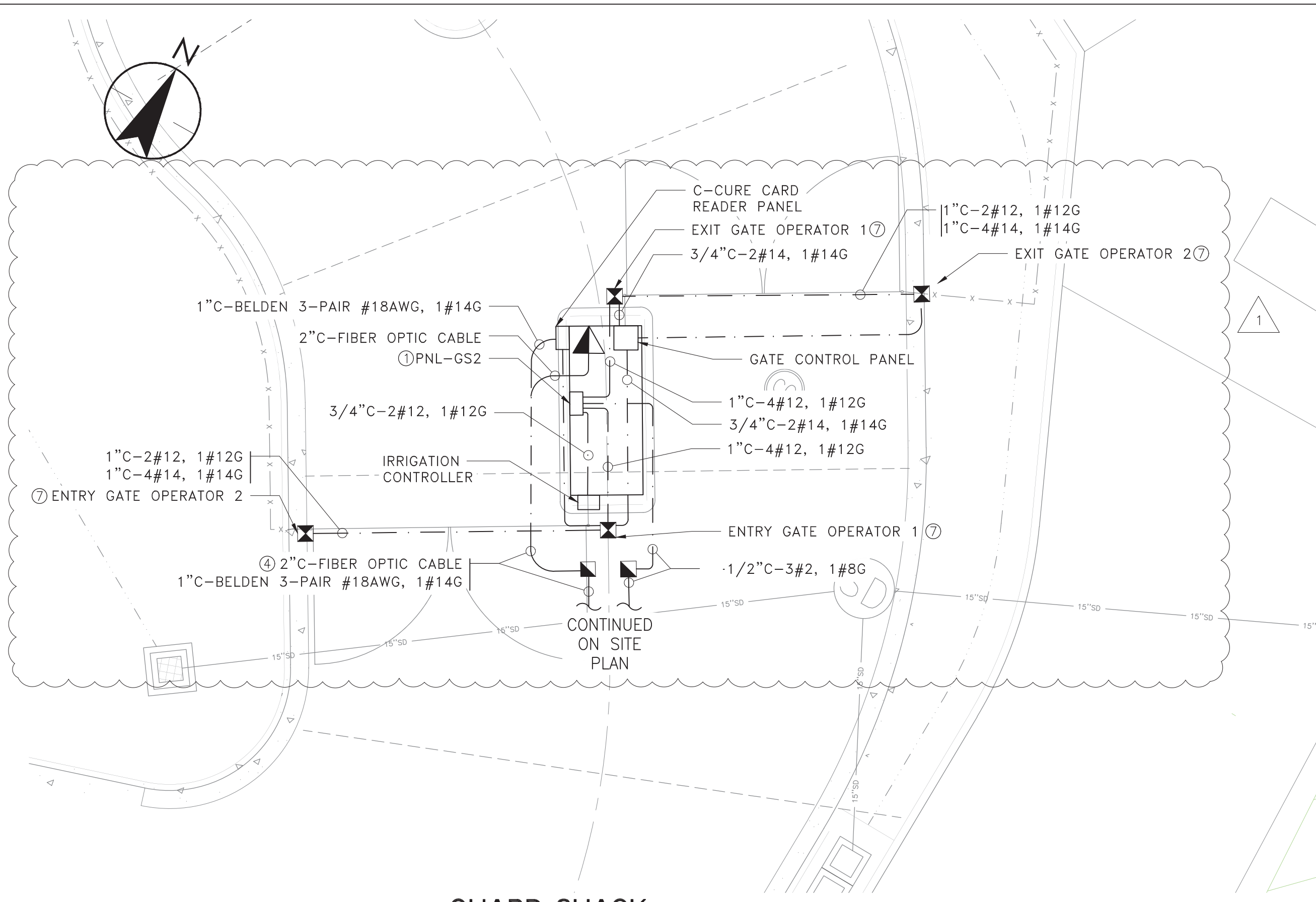
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DEPARTMENT OF TRANSPORTATION

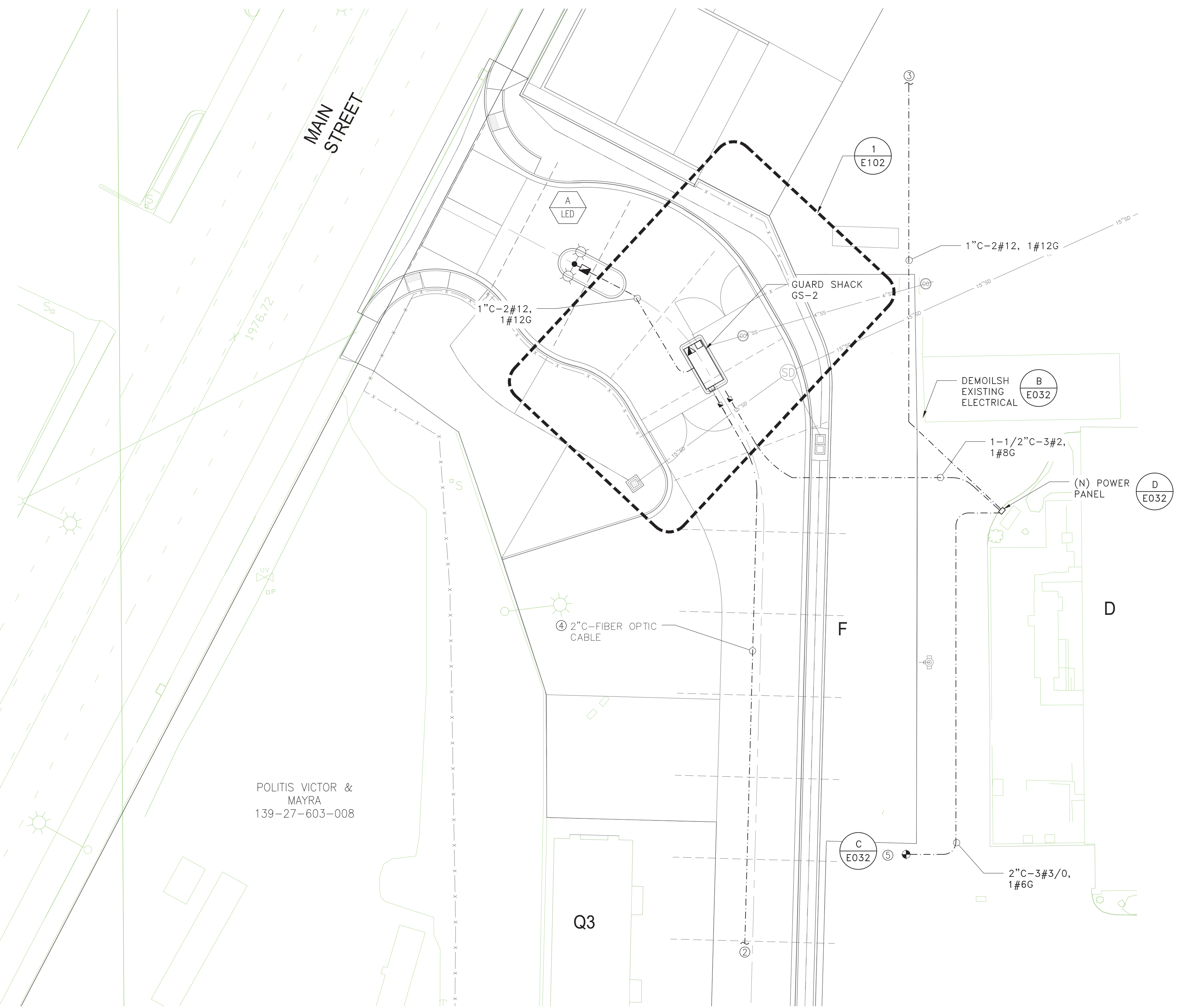
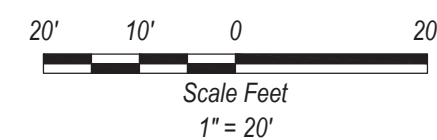
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MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

Title ELECTRICAL DETAILS 3		
Project No. 181300599	Scale SEE SHEET	
Drawing No. E032	Sheet 151 of 177	Revision 0



GUARD SHACK GS-2 PLAN ⑥
SCALE: NONE

- SHEET NOTES:**
- ① LIGHTING PANEL PROVIDED BY GUARD SHACK MANUFACTURER.
 - ② CONTINUED ON E104.
 - ③ CONTINUED ON E100.
 - ④ PULL FIBER OPTIC AND CABLE BELOW WITHOUT SPLICES BACK TO BUILDING N ON E105.
 - ⑤ INTERCEPT AND EXTEND EXISTING SERVICE FEED FROM MAIN SWITCHBOARD TO DEMOLISHED BUILDING F WITH NEW PULL BOX TO NEW POWER PANEL.
 - ⑥ COORDINATE ELECTRICAL CONDUIT STUB-UPS WITH FINAL LOCATION OF EQUIPMENT AND DEVICES PER BUILDING SUBMITTAL.
 - ⑦ CONNECT LOOP DETECTORS TO GATE OPERATOR PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.



POLITIS VICTOR & MAYRA
139-27-603-008

SPWD REVIEW

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Revision	By	Appd.	YY.MM.DD
1	SFM	ENTRANCE MODIFICATIONS	20.05.18

Issued	By	Appd.	YY.MM.DD

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6/17/2021

Key Map

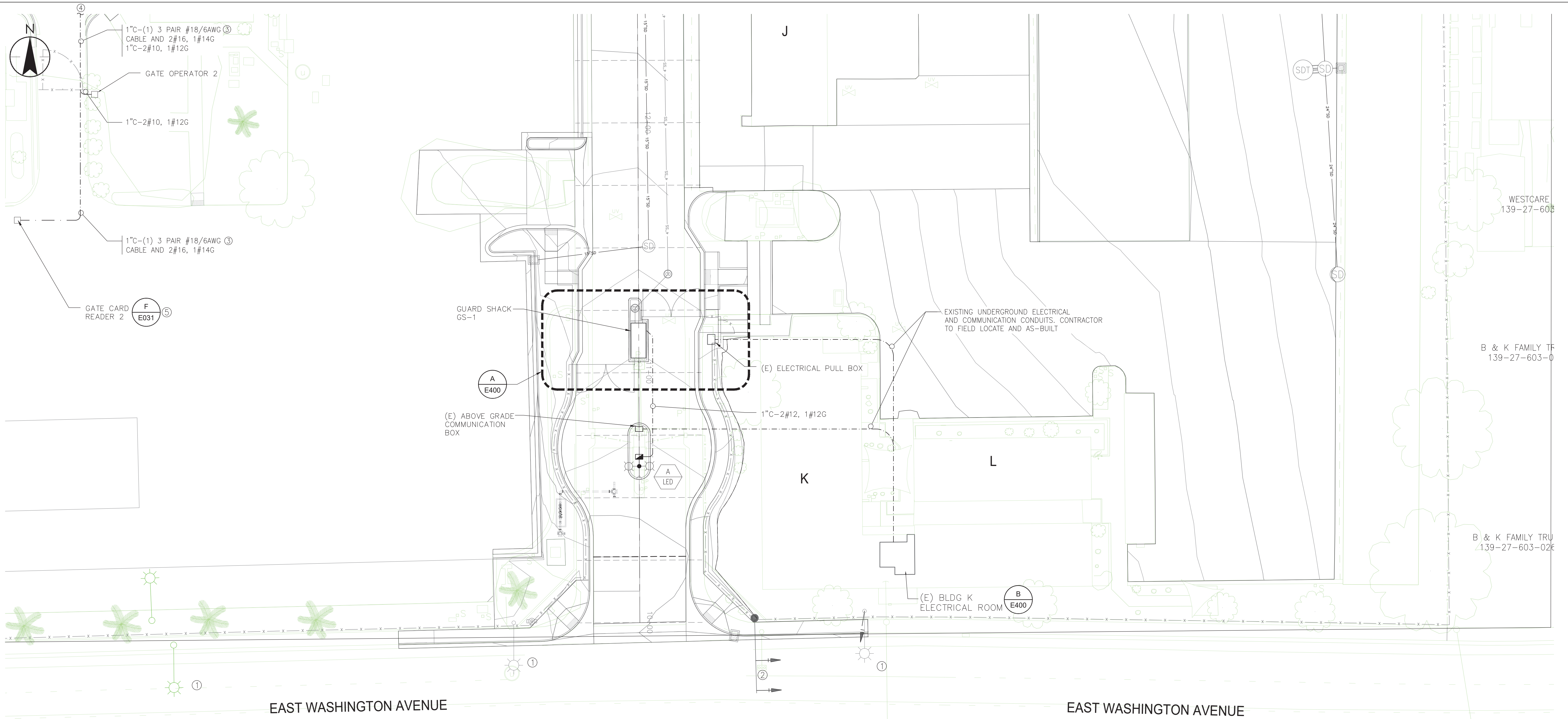
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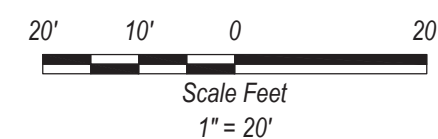
Client/Project
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
123 E. WASHINGTON AVE, NDOT LAS VEGAS
MAINTENANCE YARD (MY921) IMPROVEMENTS
Las Vegas, Clark County, Nevada

Title	
ELECTRICAL SITE PLAN	
Project No. 181300599	Scale SEE SHEET
Drawing No. E102	Sheet 155 of 177
Revision 1	



SHEET NOTES:

- ① EXISTING LIGHT POLE. RELOCATE TO BACK OF WALK. SEE DETAIL E/E032.
- ② EXISTING TRAFFIC SIGNAL. RELOCATE TO BACK OF WALK. PROVIDE TEMPORARY TRAFFIC SIGNALING UNTIL WORK IS COMPLETE. SEE DETAIL E/E032.
- ③ PROVIDE BELDEN CABLE PER C-CURE REQUIREMENT.
- ④ CONTINUE ON E105.
- ⑤ CARD READER SHALL BE SOFTWARE HOUSE/TYCO HID PROXIMITY CARD READER COMPATIBLE WITH EXISTING SITE'S C-CURE SYSTEM.



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6/17/2021

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Client/Project
 STATE OF NEVADA
 DEPARTMENT OF TRANSPORTATION
 123 E. WASHINGTON AVE, NDOT LAS VEGAS
 MAINTENANCE YARD (MY921) IMPROVEMENTS
 Las Vegas, Clark County, Nevada

Title		
ELECTRICAL SITE PLAN		
Project No. 181300599	Scale SEE SHEET	
Drawing No. E107	Sheet 160 of 177	Revision 0



**LAS VEGAS
CITY COUNCIL**

CAROLYN G. GOODMAN
Mayor

BRIAN KNUDSEN

Mayor Pro Tem

CEDRIC CREAR

VICTORIA SEAMAN

OLIVIA DIAZ

FRANCIS ALLEN-PALENSKE

NANCY E. BRUNE

JORGE CERVANTES

City Manager

PUBLIC WORKS

MIKE JANSSEN, P.E., PTOE

EXECUTIVE DIRECTOR OF
INFRASTRUCTURE

COOPERTOP BUILDING

416 N 7TH STREET
LAS VEGAS, NV 89101
702.229.6594 | VOICE
711 | TTY



cityoflasvegas | lasvegasnevada.gov

Emailed

March 23, 2023

Mario Gomez, District Engineer
State of Nevada Department of Transportation (NDOT)
123 E Washington Avenue
Las Vegas, Nevada 89101

Subject: ISSUANCE OF CLASS II ENVIRONMENTAL CONTROL PERMIT ISSUED TO STATE OF NEVADA (NDOT) BY THE CITY OF LAS VEGAS PERMIT # CSF-0020

Dear Mr. Gomez,

Your application for a Class II Environmental Control Permit has been reviewed and processed in accordance with Section 14.17.190 of the Las Vegas Municipal Code.

The enclosed City of Las Vegas Permit # CSF-0020 covers all the industrial wastewater discharged from the facility located at 123 E Washington Avenue into the City of Las Vegas sanitary sewer system.

All industrial wastewater discharges from this facility and actions and reports relating thereto shall be in accordance with the terms and conditions of this permit.

The City of Las Vegas City Council has adopted a Rates and Fees Resolution (Appendix A). This resolution establishes fees permit compliance penalties and issuance.

In addition, the current domestic sewer-use fee shall be assessed based upon the total volume of industrial wastewater that is discharged, as provided for in LVMC 14.17.190(D). Please note that sewer fees are adjusted annually.

Questions pertaining to this permit modification may be referred to Environmental Compliance Inspector Barry Hicks (702) 229-2160 or myself at (702) 229-2338 and via our group email ece@lasvegasnevada.gov.

Sincerely,

Sherri McMahan, REM, QCISA
Environmental Officer

CLASS II

ENVIRONMENTAL CONTROL PERMIT # CSF-0020

In accordance with the provisions of Chapter 14.17 of the Las Vegas Municipal Code

State of Nevada Department of Transportation (NDOT)
Herein referred to as the "Permittee", located at
123 E Washington Avenue
Las Vegas, Nevada 89101

is hereby authorized to discharge industrial wastewater from the above identified facility into the City of Las Vegas (City) sanitary sewer system in accordance with the conditions set forth in this permit. Compliance with this permit does not relieve the permittee of its obligation to comply with any or all applicable pretreatment regulations, or laws that may become effective during the term of this permit.

Noncompliance with any term or condition of this permit shall constitute a violation of Las Vegas Municipal Code (LVMC) Chapter 14.17 and or 14.18 (Appendices B and C)

This permit shall become effective on March 23, 2023 and shall expire at midnight on March 31, 2028.

If the permittee wishes to continue to discharge after the expiration date of this permit, an application must be filed for a renewal permit in accordance with the requirements of LVMC 14.17.165 as noted, a minimum of 60 days prior to the expiration date.

By: 

Sherri McMahon, REM, QCISA
Environmental Officer

Issued this 23rd day of March, 2023

PART I – DISCHARGE REQUIREMENTS

- A. During the effective dates of the permit, the permittee is authorized to discharge industrial wastewater to the City of Las Vegas sanitary sewer system from the discharge locations listed below:
1. Vactor truck and street sweeper settling basin area which includes the dumpster and equipment storage pad
 2. Equipment/vehicle wash area
 3. Fleet maintenance shop
- B. During the effective dates of the permit, the discharge from the discharge locations in Part I(A) shall be pretreated by passing through a sand/oil interceptor. The sand/oil interceptor shall be operated and maintained in a manner that prevents a violation of Part I(C) or I(E)(3) of this permit.
- C. During the effective dates of the permit, the industrial wastewater discharge from the activities listed in Part I(A) shall not contain total suspended solids in concentrations that inhibit the normal flow of the sewer. The permittee shall pay surcharge fees for total suspended solids concentrations that exceed 750 mg/L.
- D. During the effective dates of the permit, the discharge flow rate from the discharge locations listed in Part I(A) shall not surcharge the sewer line at any time, cause any upstream private lateral to backup, or exceed an average daily flow of 5 gallons per minute or a 3-minute peak flow of 50 gallons per minute.
1. Discharge point location(s) - Changes to the approved discharge point(s) identified in Part 1 (A) of this permit must be approved by the City prior to the changes being made. Any changes made without the required approval will be considered a violation of this permit and may be subject to enforcement actions.
- E. During the effective dates of the permit, the permittee is prohibited from discharging or causing to be discharged into the system any of the following materials:
1. Pollutants that create a fire or explosion hazard in any part of the system, including, but not limited to, wastestreams with a closed cup flashpoint of less than one hundred forty degrees Fahrenheit (sixty degrees Celsius) using the test methods specified in 40 CFR 261.21;
 2. Pollutants that will cause corrosive structural damage to any part of the system, but in no case any discharge with a pH lower than 5.0 unless the works is specifically designed to accommodate such discharges;
 3. Solid or viscous pollutants in amounts that will cause an obstruction to the flow in any part of the system, resulting in interference;

4. Any pollutant, including oxygen demanding pollutants (BOD, etc.), that are released in a discharge at a flow rate or in a pollutant concentration, or both, that will cause interference with the system;
 5. Heat in amounts that will inhibit biological activity in any wastewater treatment plant operated by the City and therefore result in interference, but in no case heat in such amounts that the temperature at any wastewater treatment plant operated by the City exceeds one hundred four degrees Fahrenheit (forty degrees Celsius), or such higher temperature limits as may be approved by the EPA upon request of the Director;
 6. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
 7. Pollutants that result in the presence of toxic gases, vapors, or fumes within the system in a quantity that may cause acute worker health and safety problems;
 8. Any trucked or hauled pollutants, except at discharge points designated by the Director;
 9. Any material which, by reason of its nature or quantity, is dangerously flammable, reactive, explosive or corrosive, or which by interaction with other materials results in a fire, explosion, damage to the system, injury, unreasonable safety hazard or nuisance;
 10. Any material that causes a sewer atmosphere to exceed ten percent of the lower explosive limit at the point of discharge into the system, or exceed five percent at any other point in the system;
 11. Floatable material from an industrial user that is readily removable;
 12. Any wastewater that causes interference or pass through;
 13. Any material that adversely affects the result of any whole effluent toxicity test at any wastewater treatment plant; or
 14. Any material the discharge of which violates an applicable regulation promulgated in accordance with Parts (b), (c) or (d) of Part 307 of the Clean Water Act.
- F. During the effective dates of the permit, the permittee is prohibited from discharging or causing to be discharged into the system any of the following materials in concentrations significantly greater than those found in ordinary domestic wastewater:
1. Gasoline, jet fuel, diesel, kerosene, naphtha, benzene, toluene, ethylbenzene, xylene, ethers, alcohols, ketones, aldehydes, chlorinated hydrocarbons, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, solvents or pesticides;
 2. Acids, caustics, sulfides, fluorides or substances that will react with water to form acidic products;

3. Particles that are greater than one-half of an inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshing, entrails, feathers, ashes, cinders, sand, silt, gravel, spent lime, stone marble dust, concrete, metallic objects, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas tar, asphalt residues, residues from the refining or processing of fuel, lubricating oil, mud, glass grinding or polishing wastes;
 4. Toxic priority pollutants, organophosphorus pesticides, or carbamate pesticides; or
 5. Wastewater that contains pigment or color that can be identified in the discharge from any wastewater treatment plant.
- G. During the effective dates of the permit, the permittee shall not increase the use of process water or in any other way attempt to dilute a discharge as a partial or complete substitute for adequate treatment in order to achieve compliance with any requirement set forth in this permit.
- H. During the effective dates of the permit, the discharge from the activities listed in Part I(A) shall be subject to sewer-use fees. The permittee shall pay quarterly sewer-use fees based on the total discharge volume using the current domestic strength charge rate provided for in Las Vegas Municipal Code 14.04.
- I. During the effective dates of the permit, the permittee shall provide sufficient odor control measures and restore any pavement or manhole damage impacted by the piping or discharge. Approval from the City's Sanitary Sewer Planning Section of Public Works shall be obtained prior to restoring any manhole damage, and shall be performed in accordance with the Sanitary Sewer Planning Section requirements.
- J. During the effective dates of the permit, the permittee shall visually monitor the discharge location (during times of discharge) a minimum of daily to ensure that the sewer flow does not surcharge above the top of the sewer pipe. Should surcharging occur, the permittee shall immediately cease the discharge and notify the City at 702-229-6600 and email ece@lasvegasnevada.gov.
- K. All discharges shall comply with all other applicable laws, regulations, standards, and requirements contained in Las Vegas Municipal Codes 14.17 and 14.18 and any applicable state and federal pretreatment laws, regulations, standards, and requirements, including any such laws, regulations, standards, or requirements that may become effective during the term of this permit.

PART II - MONITORING REQUIREMENTS

A. Flow Monitoring

1. Upon commencement of discharge and every month thereafter, the permittee shall summarize the total monthly flow that is discharged to the sanitary sewer from the vector truck and street sweeper settling basin area listed in Part I(A).
2. The flow shall be monitored using an inline flow measuring device (flow meter). The permittee shall assure that the access and the sampling and measuring equipment are maintained in a safe and proper operating condition at all times at no expense to the City.
3. The permittee at a minimum shall inspect and document the flow meter for proper operation on a weekly basis.
4. The flow meter shall be calibrated and maintained in accordance with the manufacturer's recommendations but no less than once annually.

Part III - REPORTING and NOTIFICATION REQUIREMENTS

A. Quarterly Flow Monitoring Report

1. The permittee shall summarize the monthly flow monitoring results and submit a report at the end of each calendar quarter. The quarterly reports shall be submitted to ECE within 15 days following the end of each quarter.

The flow monitoring reports shall summarized and include the following information:

- a. Start date, starting flow of each month
- b. Ending date, ending flow of each month
- c. Monthly total flow volume in gallons
- d. Documentation of weekly inspections
- e. Documentation of any required calibration
- f. Documentation of any malfunctions and repairs

The quarterly report due dates are listed in the table below:

Reporting Period	Report Due Date
January - March	April 15 th
April - June	July 15 th
July - September	October 15 th
October - December	January 15 th

All reports required by this permit shall be electronically submitted to the City of Las Vegas at ece@lasvegasnevada.gov.

B. Notification Requirements

1. In the event of any flow monitoring equipment failure and or malfunction, the following information must be provided to the City in writing within 48 hours of discovery:
 - a. Date and time flow meter or associated equipment was discovered not to be functioning
 - b. Cause of the equipment failure or malfunction
 - c. Start and end dates and flow meter reading of replaced flow meter, if applicable
 - d. Flow meter reading of new flow meter, if applicable
 - e. Estimate of daily flow average of old flow meter prior to malfunction or failure
 - f. Time line for repair or replacement of flow meter and associated equipment if will exceed 48 hours after discovery of failure or malfunction

C. Accidental Spill/Discharge Response

The permittee shall be responsible for any sanitary sewer overflows (SSO) that are caused by their discharge into the City of Las Vegas' sanitary sewer system. The permittee shall immediately notify the City of any unauthorized spill or discharge at 702-229-6600 and ece@lasvegasnevada.gov.

D. Permit Modification

- a. The permittee shall be informed by the City of any change in its Environmental Control Permit at least thirty days prior to the effective date of change. Any change or new condition in such permit shall include a reasonable time schedule for compliance therewith.
- b. The permittee must file all modifications, revocations and reissuance, or termination of a permit, or of a notification of planned changes or anticipated noncompliance in writing to the City at ece@lasvegasnevada.gov a minimum of thirty days prior.

Part IV – OTHER REQUIREMENTS

A. Interceptors

1. Any interceptor that is required by this Section shall be readily accessible for inspection and shall be properly maintained to ensure that accumulations of floatable and settleable material do not impair the efficiency of the interceptor and are not discharged into the system. An interceptor shall not be considered properly maintained if accumulations of floatable and settleable material in any chamber total more than twenty-five percent of the chamber's operative fluid capacity. Each interceptor shall be routinely pumped at an appropriate frequency, but no less than once per calendar year. The Director may impose additional pumping and cleaning requirements consistent with this Chapter. Every fitting, standpipe, plumbing appurtenance, baffle and chamber that is required for correct operation of an interceptor shall be properly installed and in proper working condition at all times.
2. Each interceptor shall be routinely pumped at an appropriate frequency, but no less than once per calendar year. The City may impose additional pumping and cleaning requirements.
3. The permittee shall keep a record of every time the interceptor is pumped or cleaned. This record shall include the date, the name of the company that pumped or cleaned the interceptor, and the amount of waste that was removed. These records shall be made available to the City upon request. The removal of waste shall be done by a company licensed to haul such waste and the waste shall be disposed of in accordance with Federal, State and local regulations.

B. Inspections

The facility shall be inspected at least once annually and/or sampled if deemed necessary by the City.

- a. Whenever it is necessary to make an inspection to monitor or enforce any of the provisions of, or to perform any duty imposed by, this LVMC 14.17 or other applicable law, or whenever the City has reasonable cause to believe that there exists upon any premises any violation of the provisions of this Chapter or other applicable law or any condition which makes such premises hazardous, unsafe or dangerous, the City is authorized to enter such premises at all reasonable times and inspect the same and perform any duty that is imposed upon the City by this LVMC 14.17 or other applicable law.

C. Standard Conditions

The permittee must comply with all conditions of this permit and Las Vegas Municipal Code (LVMC) 14.17 and all applicable regulations or laws that may become effective during the duration of this permit

D. Special Conditions

This permit may be revoked or modified if the permittee's discharge cause or threaten pass through, interference, or any other problem in the collection system or at the wastewater treatment plant. This permit may also be revoked if the flow rate or volume creates capacity issues in the collection system.

E. Fees

- a. Users who are issued permits shall pay all fees established by the City Council pursuant to LVMC 14.17.345, including without limitation application and annual renewal fees. Failure to pay any fee within the applicable time period is sufficient grounds to withhold an environmental control permit or revoke an environmental control permit that was previously issued.
- b. The current domestic sewer-use fee shall be assessed based upon the total volume of industrial wastewater that is discharged, as provided for in LVMC 14.17.190(D). Please note that sewer fees are adjusted annually.

ATTACHMENTS:

Standard Conditions

Appendix A – Rates and Fees Resolution

Appendix B – Las Vegas Municipal Code Chapter 14.17

Appendix C – Las Vegas Municipal Code Chapter 14.18

Appendix D – Photos of Discharge Locations

Standard Conditions



STANDARD CONDITIONS

Amended 2/22/2023-MJ

SECTION A. GENERAL CONDITIONS AND DEFINITIONS

1. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

2. Duty to Comply

The permittee must comply with all conditions of this permit and Las Vegas Municipal Code (LVMC) 14.17 and all applicable regulations or laws that may become effective during the duration of this permit. Failure to comply with the requirements of these documents may be grounds for administrative action, or enforcement proceedings including civil or criminal penalties, injunctive relief, and summary abatements.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or correct any adverse impact to the Water Pollution Control Facility (WPCF) or the environment resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Permit Modification

This permit may be modified for good causes including, but not limited to, the following:

- a. To incorporate any new or revised Federal, State, or local pretreatment standards or requirements
- b. Material or substantial alterations or additions to the discharger's operation processes, or discharge volume or character which were not considered in drafting the effective permit
- c. A change in any condition in either the industrial user or the WPCF that requires either a temporary or permanent reduction or elimination of the authorized discharge
- d. Information indicating that the permitted discharge poses a threat to the City of Las Vegas' collection or treatment systems, WPCF personnel or the receiving waters

- e. Violation of any terms or conditions of the permit
- f. Misrepresentation or failure to disclose fully all relevant facts in the permit application or in any required reporting
- g. Revision of or a grant of variance from such categorical standards pursuant to 40 CFR 403.13
- h. To correct typographical or other errors in the permit
- i. Upon request of the permittee, provided such request does not create a violation of any applicable requirements, standards, laws, or rules and regulations.

The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

5. Permit Termination

This permit may be terminated for the following reasons:

- a. Falsifying self-monitoring reports
- b. Tampering with monitoring equipment
- c. Refusing to allow timely access to the facility premises and records
- d. Failure to meet effluent limitations
- e. Failure to pay fines
- f. Failure to pay sewer charges
- g. Failure to meet compliance schedules

6. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any violation of Federal, State, or local laws or regulations.

7. Limitation on Permit Transfer

Permits may not be reassigned or transferred to a new owner.

8. Permit Expiration

Each wastewater contribution permit shall be issued for a specified period, not to exceed five years and each user shall apply for renewal of its permit not later than sixty days prior to the expiration of its existing permit.

9. Dilution

The permittee shall not increase the use of potable or process water or, in any way, attempt to dilute an effluent as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this permit.

10. Definitions

- a. Best management practice or "BMP"- means a practice or combination of practices determined to be an effective means of implementing the prohibitions listed in LVMC 14.17.015. BMP's may include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices, such as treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage. BMP's shall be considered local limits and pretreatment standards for the purposes of LVMC 14.17 and Section 307(d) of the Act as specified at 40 CFR Section 403.5(c)(4).
- b. Daily Maximum - The maximum allowable discharge of pollutant during a calendar day. Where daily maximum limitations are expressed in units of mass, the daily discharge is the total mass discharged over the course of the day. Where daily maximum limitations are expressed in terms of a concentration, the daily discharge is the arithmetic average measurement of the pollutant concentration derived from all measurements taken that day.
- c. Composite Sample - A sample that is collected over time, formed either by continuous sampling or by mixing discrete samples. The sample may be composited either as a time composite sample: composed of discrete sample aliquots collected at least once per hour in one container at constant time intervals providing representative samples irrespective of stream flow; or as a flow proportional composite sample: collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increases while maintaining a constant time interval, at least once per hour, between the aliquots.
- d. Grab Sample - An individual sample collected in less than 15 minutes, without regard for flow or time.
- e. Instantaneous Maximum Concentration - The maximum concentration allowed in any single grab sample.

- f. Cooling Water -
- i. Uncontaminated: Water used for cooling purposes only which has no direct contact with any raw material, intermediate, or final product and which does not contain a level of contaminants detectably higher than that of the intake water.
 - ii. Contaminated: Water used for cooling purposes only which may become contaminated either through the use of water treatment chemicals used for corrosion inhibitors or biocides, or by direct contact with process materials and/or wastewater.
- g. Monthly Average - The arithmetic mean of the values for effluent samples collected during a calendar month or specified 30-day period (as opposed to a rolling 30-day window).
- h. Weekly Average - The arithmetic mean of the values for effluent samples collected over a period of seven consecutive days.
- i. Bi-Weekly - Once every other week.
- j. Bi-Monthly - Once every other month.
- k. Upset - Means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee, excluding such factors as operational error, improperly designed or inadequate treatment facilities, or improper operation and maintenance or lack thereof.
- l. Bypass - Means the intentional diversion of wastes from any portion of a treatment facility.
- m. Significant Noncompliance - Means any violation that meets one or more of the following criteria:
- i. Chronic violations of wastewater discharge limits, defined here as those in which 66 percent or more of all of the measurements taken for the same pollutant parameter during a 6-month period exceed (by any magnitude) a numeric Pretreatment Standard or Requirement, including instantaneous limits, as defined by 40 CFR 403.3(l);
 - ii. Technical Review Criteria (TRC) violations, defined here as those in which 33 percent or more of all of the measurements taken for the same pollutant parameter during a 6-month period equal or exceed the product of the numeric Pretreatment Standard or Requirement including instantaneous limits, as

defined by 40 CFR 403.3(l) multiplied by the applicable TRC (TRC = 1.4 for BOD, TSS, fats, oil, and grease, and 1.2 for all other pollutants except pH);

- iii. Any other violation of a Pretreatment Standard or Requirement as defined by 40 CFR 403.3(l) (daily maximum, long-term average, instantaneous limit, or narrative Standard) that the City determines has caused, alone or in combination with other Discharges, Interference or Pass Through (including endangering the health of City personnel or the general public);
 - iv. Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the City's exercise of its emergency authority under 40 CFR 403.8(f)(1)(vi)(B) to halt or prevent such a discharge;
 - v. Failure to meet, within 90 days after the schedule date, a compliance schedule milestone contained in a local control mechanism or enforcement order for starting construction, completing construction, or attaining final compliance;
 - vi. Failure to provide, within 45 days after the due date, required reports such as baseline monitoring reports, 90-day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules;
 - vii. Failure to accurately report noncompliance;
 - viii. Any other violation or group of violations, which may include a violation of Best Management Practices, which the City determines will adversely affect the operation or implementation of the local Pretreatment program.
- n. WPCF (Water Pollution Control Facility) - Means the City-owned assemblage of devices, structures and equipment for treatment of wastewater. This shall also include the City regulatory agency responsible for wastewater discharges.

11. General Prohibitive Standards

- a. It is unlawful for any user to discharge or cause to be discharged into the system any of the following materials:
 - i. Pollutants that create a fire or explosion hazard in any part of the system, including, but not limited to, wastestreams with a closed cup flashpoint of less than one hundred forty degrees Fahrenheit (sixty degrees Celsius) using the test methods specified in 40 CFR 261.21;
 - ii. Pollutants that will cause corrosive structural damage to any part of the system, but in no case any discharge with a pH lower than 5.0 unless the works is specifically designed to accommodate such discharges;

- iii. Solid or viscous pollutants in amounts that will cause an obstruction to the flow in any part of the system, resulting in interference;
- iv. Any pollutant, including oxygen demanding pollutants (BOD, etc.), that are released in a discharge at a flow rate or in a pollutant concentration, or both, that will cause interference with the system;
- v. Heat in amounts that will inhibit biological activity in any wastewater treatment plant operated by the City and therefore result in interference, but in no case heat in such amounts that the temperature at any wastewater treatment plant operated by the City exceeds one hundred four degrees Fahrenheit (forty degrees Celsius), or such higher temperature limits as may be approved by the EPA upon request of the City;
- vi. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
- vii. Pollutants that result in the presence of toxic gases, vapors, or fumes within the system in a quantity that may cause acute worker health and safety problems;
- viii. Any trucked or hauled pollutants, except at discharge points designated by the City;
- ix. Any material which, by reason of its nature or quantity, is dangerously flammable, reactive, explosive or corrosive, or which by interaction with other materials results in a fire, explosion, damage to the system, injury, unreasonable safety hazard or nuisance;
- x. Any material that causes a sewer atmosphere to exceed ten percent of the lower explosive limit at the point of discharge into the system, or exceed five percent at any other point in the system;
- xi. Floatable material from an industrial user that is readily removable;
- xii. Any wastewater that causes interference or pass through;
- xiii. Any material that adversely affects the result of any whole effluent toxicity test at any wastewater treatment plant; or
- xiv. Any material the discharge of which violates an applicable regulation promulgated in accordance with Subsections (b), (c) or (d) of Section 307 of the Act.

- b. Except as allowed in an environmental control permit, it is unlawful for any user to discharge or cause to be discharged into the system any of the following materials in concentrations significantly greater than those found in ordinary domestic wastewater:
- i. Gasoline, jet fuel, diesel, kerosene, naphtha, benzene, toluene, ethylbenzene, xylene, ethers, alcohols, ketones, aldehydes, chlorinated hydrocarbons, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, solvents or pesticides;
 - ii. Acids, caustics, sulfides, fluorides or substances that will react with water to form acidic products;
 - iii. Particles that are greater than one-half of an inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshing, entrails, feathers, ashes, cinders, sand, silt, gravel, spent lime, stone marble dust, concrete, metallic objects, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas tar, asphalt residues, residues from the refining or processing of fuel, lubricating oil, mud, glass grinding or polishing wastes;
 - iv. Toxic priority pollutants, organophosphorus pesticides, or carbamate pesticides; or
 - v. Wastewater that contains pigment or color that can be identified in the discharge from any wastewater treatment plant.
- c. Except where expressly authorized to do so by an applicable national pretreatment standard, it is unlawful for the permittee to increase the use of process water or in any other way attempt to dilute a discharge as a partial or complete substitute for adequate treatment in order to achieve compliance with a national pretreatment standard or any requirement set forth in LVMC 14.17. The City may impose mass limitations on any permittee who uses dilution to meet applicable national pretreatment standards or other applicable requirements set forth in LVMC 14.17, or in any other case where the City deems the imposition of mass limitations to be appropriate.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes but is not limited to: effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

Upon reduction of efficiency of operation, or loss or failure of all or part of the WPCF, the permittee shall, to the extent necessary to maintain compliance with its permit, control its production or discharges (or both) until operation of the WPCF is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass of Treatment Facilities

- a. Bypass is prohibited unless it is unavoidable to prevent loss of life, personal injury, or severe property damage or no feasible alternatives exist.
- b. The permittee may allow bypass to occur which does not cause effluent limitations to be exceeded, but only if it is also for essential maintenance to assure efficient operation.
- c. Notification of bypass:
 - i. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, at least ten days before the date of the bypass, to the City of Las Vegas.
 - ii. Unanticipated bypass. The permittee shall immediately notify the City of Las Vegas and submit a written notice to the WPCF within 5 days. This report shall specify:
 - A) A description of the bypass, and its cause, including its duration;
 - B) Whether the bypass has been corrected; and

- C) The steps being taken or to be taken to reduce, eliminate and prevent a recurrence of the bypass.

4. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in accordance with Section 405 of the Clean Water Act and Subtitles C and D of the Resource Conservation and Recovery Act.

5. Containment of Certain Discharges

- a. Upon written notification from the City, or as required by an environmental control permit, an industrial user shall provide secondary containment for prohibited material or other substances that are regulated by LVMC 14.17, as determined by the City. Secondary containment for such material shall be provided and maintained at the user's sole cost and expense.
- b. Upon written notification from the City, or as required by an environmental control permit, an industrial user shall submit to the City and implement a spill prevention and control plan, including, without limitation, plans for the secondary containment system and operating procedures. This spill prevention and control plan shall contain, but is not limited to, the following elements:
 - i. Description of discharge, including nonroutine batch discharges;
 - ii. Description of stored chemicals;
 - iii. Procedures for promptly notifying the City of any spill or any discharge that would violate any provision of LVMC 14.17;
 - iv. Procedures to prevent spills, including as necessary, inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents);
 - v. Procedures and practices for responding to spills, including as necessary measures and equipment for emergency response and follow-up practices to minimize any damage.
- c. If at any time the City determines that a spill prevention and control plan is inadequate, such plan shall be modified and implemented as specified by the City.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water or substance. All equipment used for sampling and analysis must be routinely calibrated, inspected and maintained to ensure their accuracy. Monitoring points shall not be changed without notification to and the approval of the City of Las Vegas.

2. Flow Measurements

If flow measurement is required by this permit, the appropriate flow measurement devices and methods consistent with approved scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than 10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Analytical Methods to Demonstrate Continued Compliance

All sampling and analysis required by this permit shall be performed in accordance with the techniques prescribed in 40 CFR Part 136 and amendments thereto, otherwise approved by EPA, or as specified in this permit.

4. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures identified in Section C.3, the results of this monitoring shall be included in the permittee's self-monitoring reports.

5. Inspection and Entry

The permittee shall allow the City of Las Vegas, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

- a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit;
- d. Sample or monitor, for the purposes of assuring permit compliance, any substances or parameters at any location; and
- e. Inspect any production, manufacturing, fabricating, or storage area where pollutants, regulated under the permit, could originate, be stored, or be discharged to the sewer system.

6. Retention of Records

- a. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the City of Las Vegas at any time.
- b. All records that pertain to matters that are the subject of special orders or any other enforcement or litigation activities brought by the City of Las Vegas shall be retained and preserved by the permittee until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired.

7. Record Contents

Records of sampling and analyses shall include:

- a. The date, exact place, method, and time of sampling and the names of the person or persons taking the samples;
- b. The dates analyses were performed;
- c. Who performed the analyses;
- d. The analytical techniques/methods use;
- e. The results of such analyses;
- f. Chain-of-custody form(s);
- g. Laboratory analyses data; and
- h. Supporting documentation as warranted with any required "Best Management Practices"

8. Falsifying Information

Knowingly making any false statement of any report or other document required by this permit or knowingly rendering any monitoring device or method inaccurate, is a crime and may result in the imposition of criminal sanctions and/or civil penalties.

SECTION D. ADDITIONAL REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall give notice to the City of Las Vegas 90 days prior to any facility expansion, production increase, or process modifications which results in new or substantially increased discharges or a change in the nature of the discharge.

2. Anticipated Noncompliance

The permittee shall give advance notice to the City of Las Vegas any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. Duty to Provide Information

The permittee shall furnish to the City of Las Vegas within 5 days any information which the City of Las Vegas may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also, upon request, furnish to the City of Las Vegas within 5 days copies of any records required to be kept by this permit.

4. Signatory Requirements

All applications, reports, or information submitted to the City of Las Vegas must contain the following certification statement and be signed as required in Sections (a), (b), (c) or (d) below:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

- a) By a responsible corporate officer, if the Industrial User submitting the reports is a corporation. For the purpose of this paragraph, a responsible corporate officer means:

- i. a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or;
 - ii. the manager of one or more manufacturing, production, or operation facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- b) By a general partner or proprietor if the Industrial User submitting the reports is a partnership or sole proprietorship respectively.
- c) By the principal executive officer or director having responsibility for the overall operation of the discharging facility if the Industrial User submitting the reports is a Federal, State, or local governmental entity, or their agents.
- d) By a duly authorized representative of the individual designated in paragraph (a), (b), or (c) of this section if:
 - i. the authorization is made in writing by the individual described in paragraph (a), (b), or (c);
 - ii. the authorization specifies either an individual or a position having responsibility for the overall operation of the facility from which the Industrial Discharge originates, such as the position of plant manager, operator of a well, or a well field superintendent, or a position of equivalent responsibility, or having overall responsibility for environmental matters for the company; and
 - iii. the written authorization is submitted to the City.
- e) If an authorization under paragraph (d) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, or overall responsibility for the environmental matters for the company, a new authorization satisfying the requirements of paragraph (d) of this section must be submitted by the City prior to or together with any reports to be signed by an authorized representative.

5. Operating Upsets

Any permittee that experiences an upset in operations that places the permittee in a temporary state of noncompliance with the provisions of either this permit or with LVMC 14.17 shall inform the City of Las Vegas within 24 hours of becoming aware of the upset at (702) 229-6200.

A written follow-up report of the upset shall be filed by the permittee with the City of Las Vegas within five days. The report shall specify:

- a. Description of the upset, the cause(s) thereof and the upset's impact on the permittee's compliance status;
- b. Duration of noncompliance, including exact dates and times of noncompliance, and if not corrected, the anticipated time the noncompliance is expected to continue; and
- c. All steps taken or to be taken to reduce, eliminate and prevent recurrence of such an upset.

The report must also demonstrate that the treatment facility was being operated in a prudent and workmanlike manner.

A documented and verified operating upset shall be an affirmative defense to any enforcement action brought against the permittee for violations attributable to the upset event.

6. Annual Publication

At the end of each quarter, the sampling analyses results from each Significant Industrial User shall be evaluated for the previous six months to determine if they meet the criteria for Significant Noncompliance. The City will publish, at least annually, in the largest daily newspaper published within the City, a list of the names of Class I industrial users who, at any time during the previous twelve months, were in significant noncompliance with applicable national pretreatment standards or other applicable requirements set forth in LVMC 14.17. Accordingly, the permittee is apprised that noncompliance with this permit may lead to an enforcement action and may result in publication of its name in an appropriate newspaper in accordance with this section.

7. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil and/or criminal penalties for noncompliance under LVMC 14.17 or State or Federal laws or regulations.

8. Penalties for Violations of Permit Conditions

LVMC 14.17 provides that any person who violates a permit condition is subject to civil penalties. Any person who willfully or negligently violates permit conditions is subject to criminal penalties of a fine of up to \$1,000 per day of violation, or by imprisonment for not more than six months, or both. The permittee may also be subject to sanctions under State and/or Federal law. The City of Las Vegas may also impose administrative penalties which have been adopted in a separate resolution.

9. Recovery of Costs Incurred

In addition to civil and criminal liability, the permittee violating any of the provisions of this permit or LVMC 14.17 or causing damage to or otherwise inhibiting the City of Las Vegas wastewater disposal system shall be liable to the City of Las Vegas for any expense, loss, or damage caused by such violation or discharge. The City of Las Vegas shall bill the permittee for the costs incurred by the City of Las Vegas for any cleaning, repair, or replacement work caused by the violation or discharge. Refusal to pay the assessed costs shall constitute a separate violation of LVMC 14.17.

SECTION E. STORMWATER REQUIREMENTS

1. It is unlawful for any person to discharge or cause to be discharged into the Municipal Separate Sewer System (MS4) any non-stormwater, unless the discharge has been authorized by NDEP and approved by the Director, or is one of the following:
 - a. Water line flushing; discharges from other potable water sources; landscape irrigation or lawn watering; diverted stream flows; rising groundwater; uncontaminated groundwater infiltration; discharges from foundation and footing drains (not including active groundwater dewatering systems for which a separate State permit is required); water from crawl space pumps; air conditioning and swamp cooler condensation; non-commercial washing of vehicles; springs; flows from natural riparian habitats or wetlands; discharges or flows from firefighting activities; runoff from the washing of streets, if no detergents or chemicals are used; or any other water source not containing pollutants, provided that NDEP has not determined the source to be a substantial contributors of pollutants.
 - b. Dechlorinated swimming pool water (less than 0.1 mg/L chlorine), provided that a suitable connection to the sanitary sewer is not available, as determined by the Director, and permission to discharge swimming pool water into the MS4 has first been obtained from the Director.
 - c. Discharges specified by NDEP as being necessary to protect public health and safety.
 - d. Dye testing, provided that notification, either verbal or written, is given to the Director prior to the time of the testing.
2. It is unlawful for any person to discharge or cause to be discharged into any surface waters within the City any pollutant, without first obtaining from NDEP an NPDES permit authorizing the discharge, when such a permit is required by the Act.
3. It is unlawful for any person to discharge or cause to be discharged into the MS4 any non-stormwater that would cause a violation of the City's NPDES stormwater permit.

Appendix A

Rates & Fees Resoultion



R-121-94
RESOLUTION ESTABLISHING RATES AND FEES

RELATED TO THE DISCHARGE OF INDUSTRIAL WASTEWATER

WHEREAS, Chapter 17 of Title 14 of the Municipal Code of the City of Las Vegas, Nevada sets forth regulations concerning the discharge of industrial wastes into the wastewater collection and treatment of said city; and

WHEREAS, Chapter 17 of Title 14 of the Municipal Code of the City of Las Vegas, Nevada calls for the City Council to adopt a resolution to establish fees related to permitting, compliance monitoring, surcharging, administration penalties, requests for appeal, disposal of special waste;

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Las Vegas, at a regular meeting thereof held on the 2nd day of NOVEMBER, 1994, that the following fee schedules were adopted:

A. In addition to the basic yearly sewer use charge, each industrial user shall pay yearly the following permit fee:

Class I	\$ 500
Class II	\$ 150
Temporary	\$ 150

B. In addition to the basic yearly sewer use charge and permit fee, each industrial user shall pay for compliance monitoring fees. These fees will be assessed on a time and material basis for the work involved for the pretreatment staff to inspect, sample, and analyze the wastewater from each industrial user.

C. Applicable surcharge rates for wastewater which exceeds the thresholds established in Chapter 17 of Title 14 of the Municipal Code of the City of Las Vegas are as follows:

<u>Parameter</u>	<u>Dollars Per Pound</u>
Biochemical Oxygen Demand	\$.15
Suspended Solids	\$.09
Phosphorus	\$1.64

D. At its discretion the City of Las Vegas may impose the following administrative penalties:

	<u>Fee</u>
(1) Late semi-annual self-monitoring report, baseline monitoring report, or 90-day monitoring report	\$ 100/Day
(2) Failure to properly meet signatory requirements (i.e. unsigned report, no certification statement or unauthorized signature)	\$ 50/Event
(3) Failure to report additional monitoring	\$ 50/Sampling Event
(4) Failure to attend Compliance Meeting	\$ 100/Meeting
(5) Failure to meet compliance milestone date	\$ 100/Day
(6) Failure to post Notices required by the Municipal Code	\$ 100/Event
(7) Submission of invalid sampling results	\$ 100/Sampling Event
(8) Failure to properly document "Chain of Custody" for sampling	\$ 100/Event
(9) Failure to submit Industrial Waste Permit Application/Survey within 30 days from date of request	\$ 100/Event
(10) Failure to report a change in business operation which may affect the wastewater constituents and characteristics of the discharge	\$ 100/Event
(11) Unauthorized Discharge	\$ 500/Day
(12) Failure to maintain proper records required by the Municipal Code	\$ 200/Event

- (13) Found to be in Significant Noncompliance \$ 500/Event
- (14) Failure to meet 30-day resampling and reporting requirement for noncompliance \$ 50/Day
- (15) Failure to report slug loading, upset or bypass of pretreatment unit \$ 100/Event
- (16) Failure to notify the City within 24 hours of a discharge violation \$ 25/Event

This schedule of administrative penalties does not preclude the City from enforcing the requirements of Section 14.17.370 of the Las Vegas Municipal Code which allows the City to fine violators up to \$1000 per day for violating the Municipal Code.

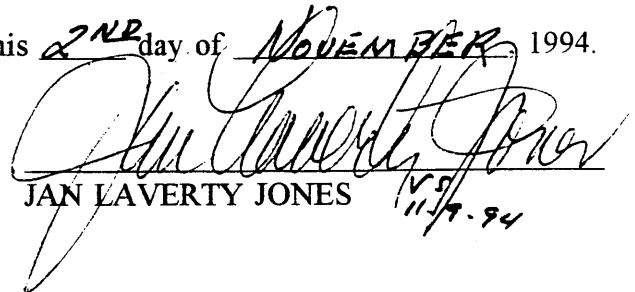
E. The following is the schedule of appeal fees:

<u>LEVEL</u>	<u>FEE</u>
Department of Public Works	\$ 300
City Council	\$ 1,000

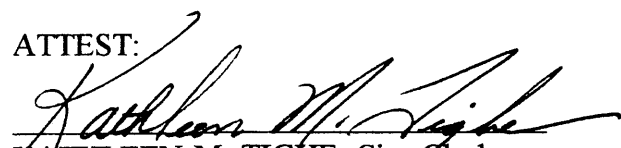
F. Fees for the disposal of special wastes will be developed on a case-by-case basis, by the Director of the Department of Public Works.

BE IT FURTHER RESOLVED that the Mayor and City Clerk of said City be, and they hereby are, authorized, empowered and directed to execute any and all documents which may be necessary to carry this Resolution into effect.

PASSED, ADOPTED and APPROVED this 2ND day of NOVEMBER, 1994.


 JAN LAVERTY JONES
 11-2-94

ATTEST:


 KATHLEEN M. TIGHE, City Clerk

Appendix B

Las Vegas Municipal Code 14.17



**Las Vegas Municipal Code
Chapter 14.17**

**Wastewater Collection and Treatment
(September 2013)**



Las Vegas Municipal Code Chapter 14.17 Wastewater Collection and Treatment

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14.17.005 – Purpose.

The purpose of this Chapter is to set forth uniform requirements for the direct and indirect use of the wastewater collection and treatment system of the City and to comply with all applicable State and Federal standards that are established in accordance with Federal clean water legislation, the General Pretreatment Regulations (40 CFR Part 403) and all related and applicable Federal regulations and grant conditions, as they are now constituted or as they may hereafter be amended or recodified.

(Ord. No. 6105, § 1, 8-4-10; Ord. 3447 § 2, 1989)

14.17.010 – Objectives.

The objectives of this Chapter are to:

- (A) Provide for the beneficial public use of the wastewater collection and treatment system through the regulation of the construction and use of the system;
- (B) Prevent the introduction of pollutants into the system which will interfere with the operation of the system or contaminate the resulting wastewater or sludge, or both;
- (C) Prevent the introduction of pollutants into the system which will pass through the system inadequately treated or will be incompatible with the system;
- (D) Improve the opportunity to recycle and reclaim wastewater and sludge from the system;
- (E) Provide for the equitable distribution of the total cost of the system and all of the related programs through the establishment of fair and equitable fees, charges, assessments and penalties;
- (F) Regulate, through the issuance of permits to certain users and through the enforcement of general requirements for all users, users whose wastewaters are discharged into the system;
- (G) Provide for monitoring and enforcement activities;
- (H) Establish civil, administrative and criminal penalties for violations of the provisions of this Chapter;
- (I) Provide procedures for complying with the requirements that are placed upon the City by other governmental agencies; and
- (J) Conform with the policies of the agencies of the State and Federal governments concerning the requirements that:
 - (1) Relate to the proper design and construction of all wastewater collection and treatment facilities, including without limitation connections to the system;

- (2) Prohibit the introduction of toxic, hazardous and incompatible pollutants into the system; and
- (3) Prohibit any new connection that would introduce into the system water or material that should be discharged into a storm drain.

(Ord. No. 6105, § 2, 8-4-10; Ord. 3713 § 1, 1993; Ord. 3447 § 81, 1989)

14.17.015 – Reserved.

Editor's note— Ord. No. 6105, § 3, adopted August 4, 2010, repealed § 14.17.015, which pertained to the scope of the chapter and derived from Ord. No. 3447, 1989.

14.17.020 – Applicability.

(A) This Chapter applies to:

- (1) Persons within the City; and
- (2) Persons outside the City who are, by permit, contract or agreement with the City, users of the system.

(B) Except as may be otherwise provided in this Chapter, the Director shall administer, implement and enforce the provisions of this Chapter.

(Ord. No. 6105, § 4, 8-4-10; Ord. 3447 § 84, 1989)

14.17.025 – Definitions.

Except where the context otherwise requires, the following definitions shall govern the construction of this Chapter:

"Act" means the provisions of the Clean Water Act, as amended and as set forth in 33 U.S.C. §§ 1251 et seq., together with all guidelines, limitations and standards that are promulgated by the EPA pursuant to the Act.

"Aliquot" means a portion of a sample.

"Authorized representative," with respect to a user or industrial user, means:

- (A) A responsible corporate officer, if the user submitting the information required by this Chapter is a corporation. For the purpose of this definition, a responsible corporate officer means:

- (1) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation; or
 - (2) The manager of one or more manufacturing, production, or operation facilities employing more than two hundred fifty persons or having gross annual sales or expenditures exceeding twenty-five million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- (B) A general partner or proprietor, if the user submitting the information required by this Chapter is a partnership or sole proprietorship, respectively.
- (C) A duly authorized representative of an individual designated in Subsection (A) or Subsection (B) of this definition if:
- (1) The authorization is made in writing by the individual described in Subsection (A) or Subsection (B) of this definition;
 - (2) The authorization specifies either an individual or a position having responsibility for the overall operation of the facility from which the discharge originates, such as the position of plant manager or a position of equivalent responsibility, or having overall responsibility for environmental matters for the company; and
 - (3) The authorization is submitted to the Director.

If an authorization under this Subsection (C) is no longer accurate, a new authorization satisfying the requirements of this Subsection (C) must be submitted to the Director prior to or together with the submission of any reports to be signed by an authorized representative.

"Best management practice" or "BMP" means a structural device, facility, measure, source control practice, or any activity, along with any required documentation thereof, that helps to achieve compliance with any discharge requirement set forth in this Chapter.

"Biochemical oxygen demand" or "BOD" means the quantity of oxygen, expressed in milligrams per liter, utilized in the biochemical oxidation of organic matter, as determined in accordance with the procedures that are set forth in 40 CFR Part 136 or procedures that have been approved by NDEP.

"Bypass" means the intentional diversion of wastestreams from any portion of an industrial user's pretreatment facility.

"CFR" means the Code of Federal Regulations, a codification of regulations issued by the executive departments and agencies of the Federal Government.

"Chain of custody" means a record of each person involved in the possession and handling of a sample, from the collection of the sample to the final analysis of the sample.

"Collection system" or "sanitary sewer" means the part of the system that is used to convey wastewater to wastewater treatment plants.

"Compliance schedule" means the period that is allowed by the Director for an industrial user to comply with its permit conditions or discharge requirements, which may include specific milestone dates for completion of any increment of the compliance schedule.

"Composite sample" means a collection of a minimum of four aliquots obtained at intervals over a twenty-four hour time span. A composite sample may be either an equal-time composite, in which an aliquot proportional to the flow is collected during a regular interval (e.g., once per hour), or an equal-volume interval, in which aliquots of equal volume are collected after a specified flow passes the sampling point (e.g., one hundred ml of sample per one thousand gallons of flow).

"Cooling water" means the water that is discharged from any use, such as air-conditioning, cooling or refrigeration or to which the only pollutant that is added is heat.

"Determine compliance" refers to the sampling and analysis conducted on specific industrial wastes to ascertain compliance with LVMC 14.17.080 to 14.17.135, inclusive, or with any more stringent applicable national pretreatment standards.

"Director" means the Director of Public Works of the City, or an authorized agent or representative of the Director.

"Discharge" means the introduction of wastewater into the system.

"Discharger" means any person who discharges wastewater into the system or otherwise allows wastewater to enter the system.

"Domestic wastewater" means wastewater discharged by residences, commercial establishments, industries, and other dischargers that is similar to wastewater ordinarily discharged by residences. The term includes wastewater containing human excretions, household cleaning wastes, household food wastes, and household drain-cleaning products used in domestic quantities. The term excludes process wastewater from any business or industrial process, ground garbage and food wastes from restaurants and other commercial food vendors, and hazardous materials from residences and other users except as otherwise provided in this definition.

"Effluent" means the liquid outflow from any treatment plant or facility that is designated to treat, convey or store wastewater, liquid waste or industrial waste.

"Environmental control permit" means the permit that is described in LVMC 14.17.140, 14.17.145 and 14.17.150.

"EPA" means the United States Environmental Protection Agency, and, when it is appropriate, the Administrator thereof or any other duly authorized official of that agency.

"Fee" means any charge to a person that is made under this Chapter and shall include without limitation all fees specified in this Chapter.

"Garbage" means the putrescible animal and vegetable wastes that result from the handling, preparation and dispensing of food.

"Grab sample" means a sample collected at a particular time and place which represents the composition of the wastewater only at that time and place.

"Holding tank waste" means any liquid, solid material or waste from a holding tank, such as those associated with vessels, chemical toilets, campers, trailers, septic tanks, vacuum pump tank trucks or other tanker trucks.

"Industrial user" means:

- (A) Any user who discharges or has the potential to discharge industrial wastewater into the system; or
- (B) Any user who is subject to regulations promulgated in accordance with Section 307(b), (c), or (d) of the Act.

"Industrial wastewater" means any wastewater that is not domestic wastewater or stormwater.

"Interceptor" means any grease interceptor, sand/oil interceptor or any other device that is designed, constructed and operated for the purpose of removing and retaining floatable or settleable material from wastewater by differential gravity separation before its discharge into the system.

"Interference" means a discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- (A) Inhibits or disrupts the system, its treatment processes or operations, or its sludge processes, use or disposal; and
- (B) As a result:
 - (1) Causes a violation of any requirement of the City's NPDES permit (including an increase in the magnitude or duration of a violation); or
 - (2) Prevents the use or disposal of sewage sludge in compliance with all applicable State and Federal requirements.

"Lower explosive limit" means the minimum concentration of a combustible gas or vapor in air (usually expressed in percent by volume at sea level) which will ignite if an ignition source (sufficient ignition energy) is present.

"Mass emission rate" means the weight of the material that is discharged into the system during any given period.

"Micrograms per liter (ug/L)" means a unit of the concentration of a water or wastewater parameter. One ug/L is one microgram of the parameter in one liter of water. It approximates parts per billion (ppb) when reporting the results of water and wastewater analysis.

"Milligrams per liter (mg/L)" means a unit of the concentration of a water or wastewater parameter. One mg/L is one milligram of the parameter in one liter of water. It approximates parts per million (ppm) when reporting the results of water and wastewater analysis.

"Monitoring facility" means an approved location in a building sewer to allow for sampling, monitoring and flow measurement of the contents of the sewer.

"National pretreatment standard" means any regulation that contains pollutant discharge limits promulgated by the EPA in accordance with Section 307(b) and (c) of the Act, and that applies to industrial users. The term includes prohibitive discharge limits established pursuant to 40 CFR 403.5.

"NDEP" means the Division of Environmental Protection of the Nevada Department of Conservation and Natural Resources.

"NPDES permit" means a National Pollutant Discharge Elimination System permit that is issued by NDEP pursuant to Section 402 of the Act, authorizing a person to discharge pollutants into the waters of the United States.

"Nuisance" means anything that is hazardous, indecent or offensive to the senses or is an obstruction to the free use of property in such a manner as to interfere with the comfortable and safe enjoyment of life and property.

"Parameter" means any chemical element, substance, compound or wastewater characteristic.

"Pass through" means a discharge that exits the system into the waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the City's NPDES permit (including an increase in the magnitude or duration of a violation).

"Person" means any natural or artificial person, male, female or neuter, singular or plural, including without limitation any individual, firm, company, municipal or private corporation, association, society, institution, enterprise or governmental agency or entity.

"pH" means the logarithm (base ten) of the reciprocal of the hydrogen ion concentration, expressed in moles per liter, as determined in accordance with the procedures that are set forth in 40 CFR Part 136 or procedures that have been approved by NDEP.

"Pretreatment" means the treatment of wastewater before discharge into the system, or the use of process changes or best management practices to improve the amount or quality of wastewater discharged into the system.

"Pretreatment facility" means any works or device for the treatment or flow limitation of wastewater prior to its discharge into the system.

"Radioactive material" means material containing chemical elements that spontaneously change their atomic structure by emitting particles, rays or energy forms in excess of normal background radiation.

"Septic tank" means a receptacle which receives the discharge from a building, sanitary drainage system, or any part thereof, and is designed and constructed in such a manner as to separate the solids from the liquid, digest the organic matter through a period of detention and allow the liquid to be discharged into the soil outside the tank through a system of open joint or perforated piping or a seepage pit.

"Severe property damage" means substantial physical damage to property, damage to the pretreatment facilities which causes them to become inoperable or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass but does not include the economic loss that is caused by delays in production.

"Sharps" means hypodermic needles, hypodermic syringes, blades and broken glass and, without limitation, includes any device, instrument or other object which has acute rigid corners, edges or protuberances.

"Significant industrial user" means any industrial user which meets the Class I criteria defined in Section 14.17.150.

"Significant noncompliance" means any violation of this Chapter or other applicable law by a significant industrial user if the violation meets one or more of the following criteria:

- (A) Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent or more of all of the measurements taken during a six-month period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter;
- (B) Technical Review Criteria (TRC) violations, defined here as those in which thirty-three percent or more of all of the measurements for each pollutant parameter taken during a six-month period equal or exceed the product of the daily maximum limit or the average limit multiplied by the applicable TRC (TRC = 1.4 for BOD, TSS, fats, oil and grease, and 1.2 for all other pollutants except pH);

- (C) Any other violation of a pretreatment effluent limit (daily maximum or longer-term average) that, as determined by the Director, has endangered the health of City personnel or the general public, either alone or in combination with other discharges, interference or pass through;
- (D) Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the City's exercise of the emergency authority that is granted to it by this Chapter to halt or prevent such a discharge;
- (E) Failure to meet, within ninety days after the schedule date, a compliance schedule milestone contained in a permit or enforcement order for starting construction, completing construction, or attaining final compliance;
- (F) Failure to provide, within thirty days after the due date, required reports such as baseline monitoring reports, ninety-day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules;
- (G) Failure to accurately report noncompliance; or
- (H) Any other violation or group of violations which the Director determines will adversely affect the operation or implementation of the local pretreatment program.

"Sludge" means any semisolid material that is settled or skimmed by wastewater treatment.

"Source control" means any practice that reduces the amount of any hazardous substance, pollutant, or contaminant entering the wastewater prior to recycling, treatment, or disposal. The term:

- (A) Includes equipment or technology modifications, process or procedure modifications, the reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.
- (B) Does not include any treatment that alters the physical, chemical, or biological characteristics or the volume of a hazardous substance, pollutant, or contaminant through a process or activity which itself is not integral to and necessary for the production of a product or the providing of a service.

"Spill" means any significant spill, leak, or release of any hazardous material, hazardous waste or any industrial chemical or product, whether intentional or unintentional, other than that which is part of a user's or other person's normal operation or as allowed by an environmental control permit or NPDES permit.

"Standard Industrial Classification" or "SIC" means a system of classifying industries, as identified in the Standard Industrial Classification Manual, 1987, prepared by the Office of Management and Budget.

"Storm drain" means a street, gutter, wash or conveyance structure for carrying stormwater.

"Stormwater" means runoff resulting from precipitation, irrigation, or normal residential activity.

"Surface waters" means "navigable waters" as that term is defined in the Act.

"System" means the wastewater collection and treatment system of the City, which includes, without limitation, any device or system used in the transportation (such as sewers, pipes and other conveyances that convey wastewater to the City's wastewater treatment plants), storage, treatment, recycling and reclamation of municipal wastewater or industrial wastes.

"Total dissolved solids" means the solid matter in solution, as determined in accordance with the procedures that are set forth in 40 CFR Part 136 or procedures that have been approved by NDEP.

"Total oil and grease" means relatively non-volatile hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases, and related materials that are extracted and determined as hexane extractable material by EPA Method 1664 and amendments thereto.

"Total petroleum hydrocarbons" means petroleum compounds with a carbon number range of C5 to at least C34, as determined in accordance with procedures that are acceptable to the Director.

"Total suspended solids" or "TSS" means the solid matter that is suspended in a liquid, as determined in accordance with the procedures that are set forth in 40 CFR Part 136 or procedures that have been approved by NDEP.

"Trade secret" means any formula, plan, pattern, process, tool, mechanism, compound, procedure, production data or compilation of information which is not patented but which is known only to certain individuals within a commercial concern who are using it to fabricate, produce or compound an article of trade, or a service that has a commercial value and which affords the person who possesses the same the opportunity to obtain a business advantage over competitors who do not know of it or use it.

"Upset" means an exceptional incident in which there is an unintentional and temporary noncompliance with the discharge limitations that are specified in an industrial user's environmental control permit or this Chapter as the result of factors that are beyond the reasonable control of such industrial user.

"User" means any person who contributes, or causes or permits the contribution of, wastewater into the system.

"Wastewater" means any liquid, solid, gaseous, or radioactive substance that enters the system.

"Wastewater treatment plant" means an assemblage of devices, structures and equipment for treatment of wastewater.

(Ord. No. 6105, § 6, 8-4-10) Editor's note— Ord. No. 6105, § 5, adopted August 4, 2010, repealed the former § 14.17.025, and § 6 of Ord. No. 6105 enacted a new § 14.17.025 as set out herein. The former § 14.17.025 pertained to similar subject matter and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.030 – Declaration of policy.

It is declared to be the policy of the City to protect the health, welfare and safety of the residents thereof by constructing, operating and maintaining a system of sewers and liquid waste treatment and disposal facilities that service the homes and commercial and industrial establishments within the City and its environs, as required by State and Federal law. The following basic principles apply to wastewater that is discharged into the system:

- (A) The highest and best use of the system is the collection, treatment and reclamation or disposal of domestic wastewater. The use of the system for industrial waste discharges is subject to regulation by the City;
- (B) Industry is urged to seek procedures for the recovery and reuse of industrial waste discharges which will satisfy the limitations that are prescribed for industrial discharges, rather than the procedures that are designed solely to meet discharge limitations;
- (C) The City is committed to a policy of wastewater renovation and reuse in order to provide an alternate source of water supply and to reduce the overall costs of wastewater treatment and disposal. The renovation of wastewater through wastewater treatment processes may necessitate more stringent quality requirements with respect to industrial waste discharges as the demand for reclaimed water increases. The optimum use of the City's facilities may require the discharge of wastewaters during periods of low flow into the system in accordance with guidelines that are established by the City;
- (D) Provisions are made in this Chapter to regulate industrial discharges, to comply with the State and Federal requirements and policies, and to satisfy increasingly higher standards of treatment plant effluent quality and environmental considerations. This Chapter establishes quantity and quality limitations on wastewater discharges in situations in which such discharges may adversely affect the system or the quality of the effluent therefrom, or both. These limitations are intended to improve the quality of wastewater being received for treatment and to encourage water conservation by all of the users who are connected to the system. The intent of the City's policy is to discourage an increase in the quantity (mass emission rate) of waste parameters that are discharged; and
- (E) Methods of cost recovery are established for situations in which industrial discharges impose upon the City the costs of collection, treatment or disposal, or any combination of such costs, and recovery of those costs is necessary in order to be fair and equitable to all users of the system.

(Ord. No. 6105, § 7, 8-4-10; Ord. 3713 § 3, 1993; Ord. 3447 § 82, 1989)

14.17.035 – Director—Powers and duties.

- (A) The Director is authorized, empowered and directed to adopt rules and regulations that the Director may deem reasonably necessary in order to protect the system and to control and regulate the proper use thereof; provided, however, that the terms and provisions of such rules and regulations shall be promulgated in a manner that is reasonably calculated to result in the uniform control of the system.
- (B) The Director may classify dischargers by industrial categories and impose an industrial wastewater treatment surcharge that is based upon flow quality and the flow quantity, as provided for by this Chapter.
- (C) Any time limit that is provided in any written notice from the Director or in any provision of this Chapter may be extended only by a written directive of the Director.
- (D) The Director may perform work of an educational nature and may, for this purpose, cooperate with civic organizations, industries, water agencies, wastewater collection and treatment agencies and other public corporations.
- (E) The Director shall have the responsibility of administering, implementing and enforcing all of the provisions of this Chapter. However, the Director may delegate any power that is granted to, or duty that is imposed upon, the Director by this Chapter to any other person who is in the employ of the City's Department of Public Works.

(Ord. No. 6105, § 8, 8-4-10; Ord. 3713 § 4, 1993; Ord. 3447 §§ 89, 132, 1989)

14.17.040 – City may restrict discharge.

If wastewater collection and treatment capacity is not available, the Director may restrict discharge into the system until sufficient capacity can be made available. When requested to do so by a potential discharger who desires to locate new facilities within the service area of the system, the Director may advise such discharger concerning the areas in which wastewater of the quantity and quality that it is expected to generate can be received by the system. The Director may refuse immediate service to any new source that is located in an area in which the expected quantity or quality of wastewater is unacceptable in the system.

(Ord. No. 6105, § 9, 8-4-10; Ord. 3713 § 5, 1993; Ord. 3447 § 85, 1989)

14.17.045 – Users required to retain records.

Each user of the system who is subject to this Chapter shall retain records of waste manifests, monitoring results and related wastewater generation and pretreatment activities, whether or not the same are required by this Chapter, for a minimum period of three years. Such records shall be made available for inspection and copying by the Director at any time. The period of retention shall be extended during the course of any unresolved litigation that involves the user or the City, or both, or upon the order of the Director.

14.17.050 – Notifying Director of spill.

- (A) In the event that a spill enters the system, a public street or a storm drain, the user from whose facilities the spill emanates shall immediately notify the Director of the incident by telephone. The notification shall include the location or locations of the spill, the type or types of material that was spilled, the concentration and volume thereof and the corrective actions, if any, that have been taken.
- (B) Within five days following the spill, the user shall submit to the Director a detailed written report that describes the cause of the spill, the corrective action that was taken and the measures that the discharger will take to prevent future occurrences. Such notification shall not relieve the discharger of the liability for fines that may result from the spill.

14.17.055 – Availability of information to user's employees.

- (A) In order for the employees of industrial users to be informed of the requirements of the City, each industrial user shall make available to its employees copies of the user's environmental control permits, and copies of this Chapter, together with such other wastewater information and notices as may from time to time be furnished by the Director that address more effective pollution control.
- (B) A legible, understandable and conspicuously placed notice shall be permanently posted on each industrial user's bulletin board or other prominent place advising the industrial user's employees to contact the Director in the event of a spill that enters the system, a public street or a storm drain. In the event that a substantial number of an industrial user's employees use a language other than English as a primary language, the notice shall be worded in English and in the other languages so used. The notice shall include the phone number that has been specified by the Director.

14.17.060 – Availability of information to the public.

- (A) Information and data with respect to any user that is obtained from reports, surveys, environmental control permit applications, environmental control permits, monitoring programs, and inspection and sampling activities shall be made available to the public without restriction unless the user specifically otherwise requests, and is able to demonstrate to the satisfaction of the Director that the release of such information would divulge information, processes or methods of production that are entitled to protection as trade secrets under applicable State law. Any such request must be asserted at the time the information is submitted to the City. When a request not to disclose information within a

document has been timely made and the Director is satisfied that the release of information would divulge information, processes or methods of production that are entitled to protection as trade secrets under applicable State law, the portions of a document containing that information shall not be made available to the public. However, such information shall be made available upon request to governmental agencies for uses related to the NPDES program or the pretreatment program, and in enforcement proceedings that involve the person who furnished the information. Wastewater parameters and characteristics, as well as other effluent data as defined by 40 CFR 2.302, will not be recognized as confidential information and will be made available to the public without restriction.

- (B) The City may charge a reasonable fee in accordance with State law for providing copies of records requested under this Section.

(Ord. No. 6105, § 14, 8-4-10) Editor's note— Ord. No. 6105, § 13, adopted August 4, 2010, repealed the former § 14.17.060, and § 14 of Ord. No. 6105 enacted a new § 14.17.060 as set out herein. The former § 14.17.060 pertained to similar subject matter and derived from Ord. No. 3447, 1989 and Ord. 3713, 1993.

14.17.065 – City publication of certain information.

The Director will publish, at least annually, in the largest daily newspaper published within the City, a list of the names of Class I industrial users who, at any time during the previous twelve months, were in significant noncompliance with applicable national pretreatment standards or other applicable requirements set forth in this Chapter.

(Ord. No. 6105, § 15, 8-4-10; Ord. 3713 § 7, 1993; Ord. 3447 § 91, 1989)

14.17.070 – Liability for harmful discharge of wastes.

Any user who discharges or causes to be discharged any wastewater into the system, where such discharge causes damage to, or detrimental effects on, the system, or any part thereof, shall be liable to the City for all damages, cleanup costs, and other associated costs that result therefrom. The City may assess the associated costs against the property owner and bill the owner for such costs, which may be processed as in the case of sewer charges in accordance with Sections 14.04.090, 14.04.100 and 14.04.105.

(Ord. No. 6271, § 1, 9-18-13; Ord. No. 6105, § 16, 8-4-10; Ord. 3713 § 8, 1993; Ord. 3447 § 92, 1989)

14.17.075 – Unauthorized tampering of system unlawful.

It is unlawful for any unauthorized person to enter, break, damage, destroy, uncover, deface or tamper with any structure, equipment or appurtenance which is a part of the system.

(Ord. 3447 § 93, 1989)

14.17.080 – Discharges which cause system stoppage unlawful.

It is unlawful for any user to discharge or cause to be discharged into the system any waste that creates a stoppage, plugging, breakage, significant reduction in sewer capacity or any other damage to the system, or any part thereof. In addition to any other penalty that may be provided by law, any excessive maintenance expense or any other expense that is attributable to the unlawful discharge may be charged to and collected from the offending user by the City.

(Ord. 3713 § 9, 1993; Ord. 3447 § 94, 1989)

14.17.085 – Certain drainage discharges prohibited—Exceptions.

- (A) Except as provided for in Subsection (B) of this Section, it is unlawful for any user to discharge or cause to be discharged into the system any rainwater, stormwater, groundwater, street drainage, subsurface drainage, roof drainage, yard drainage, water from ponds or lawn spray runoff, or any other water (except air conditioning condensate) that is suitable for discharge into the City's storm drain system. Every private or public washrack or floor or slab drain that is used for cleaning machinery or machine parts shall be adequately protected against storm or surface inflow.
- (B) If no alternate method of disposal is reasonably available, the Director may issue a temporary environmental control permit for the discharge of water described in Subsection (A) on a temporary basis pursuant to LVMC 14.17.190. A temporary environmental control permit may also be given in order to mitigate an environmental or health hazard with the installation of appropriate rainwater diversion devices or facilities. The Director may also allow a user to discharge such wastewater for extended periods under a Class I or Class II environmental control permit.

(Ord. No. 6105, § 17, 8-4-10; Ord. 3713 § 10, 1993; Ord. 3447 § 95, 1989)

14.17.090 – Discharge of radioactive waste prohibited—Exceptions.

It is unlawful for any user to discharge or cause to be discharged into the system any radioactive waste except when:

- (A) The user is authorized to use radioactive materials by an applicable Federal and State agency or other governmental agency that is empowered to regulate the use of radioactive materials;
- (B) The waste is discharged in strict conformity with current Federal and State regulations for safe disposal;
- (C) The user is in compliance with all of the rules and regulations of all other applicable regulatory agencies; and

- (D) A Class I permit has been obtained from the Director pursuant to LVMC 14.17.140, 14.17.145 and 14.17.150

(Ord. No. 6105, § 18, 8-4-10; Ord. 347 § 96, 1989)

14.17.095 – Discharge of infectious waste prohibited—Exceptions.

It is unlawful for any user to discharge or cause to be discharged into the system any infectious waste, other than that which may be contained in domestic wastewater. Recognizable portions of the human or animal anatomy shall not be discharged into the system.

(Ord. No. 6105, § 19, 8-4-10; Ord. 3447 § 97, 1989)

14.17.100 – Discharge of ground food waste prohibited.

It is unlawful for any industrial user to discharge or cause to be discharged into the system any ground food waste.

(Ord. No. 6105, § 20, 8-4-10; Ord. 3713 § 11, 1993; Ord. 3447 § 98, 1989)

14.17.105 – Discharge of sharps prohibited.

It is unlawful for any user to discharge or cause to be discharged into the system any ground or unground sharps.

(Ord. No. 6105, § 21, 8-4-10; Ord. 3447 § 99, 1989)

14.17.110 – Discharge of certain wastes prohibited—Exceptions.

- (A) Except as otherwise provided by Subsection (B), it is unlawful for any user to discharge or cause to be discharged into the system:

- (1) Any holding tank waste;
- (2) The contents of any interceptor after such contents have been removed; or
- (3) Any trucked or hauled wastewater.

- (B) The Director may conditionally allow a user to discharge, through an approved connection, wastes that are otherwise prohibited by Subsection (A) of this Section upon:

- (1) Submission by the user of a written application and approval by the Director; or
- (2) Approval by the Director under emergency conditions.

- (C) Discharges approved pursuant to this Section shall be subject to applicable fees and charges established by the City Council pursuant to LVMC 14.17.345

(Ord. No. 6105, § 22, 8-4-10; Ord. 3713 § 12, 1993; Ord. 3447 § 100, 1989)

14.17.115 – Wastewater discharge—Approved connection sewer required—Exceptions.

It is unlawful for any user to remove any manhole cover, or to discharge or cause to be discharged any wastewater directly into a manhole or other opening in the system that has not been authorized for wastewater discharge, unless such discharge is approved by the Director. The Director may require a written application by the user and the payment of the applicable fees and charges that have been established by the City Council pursuant to LVMC 14.17.345.

(Ord. No. 6105, § 23, 8-4-10; Ord. 3713 § 13, 1993; Ord. 3447 § 101, 1989)

14.17.120 – Discharge of certain materials expressly prohibited—Exceptions.

- (A) It is unlawful for any user to discharge or cause to be discharged into the system any of the following materials:
- (1) Pollutants that create a fire or explosion hazard in any part of the system, including, but not limited to, wastestreams with a closed cup flashpoint of less than one hundred forty degrees Fahrenheit (sixty degrees Celsius) using the test methods specified in 40 CFR 261.21;
 - (2) Pollutants that will cause corrosive structural damage to any part of the system, but in no case any discharge with a pH lower than 5.0 unless the works is specifically designed to accommodate such discharges;
 - (3) Solid or viscous pollutants in amounts that will cause an obstruction to the flow in any part of the system, resulting in interference;
 - (4) Any pollutant, including oxygen demanding pollutants (BOD, etc.), that are released in a discharge at a flow rate or in a pollutant concentration, or both, that will cause interference with the system;
 - (5) Heat in amounts that will inhibit biological activity in any wastewater treatment plant operated by the City and therefore result in interference, but in no case heat in such amounts that the temperature at any wastewater treatment plant operated by the City exceeds one hundred four degrees Fahrenheit (forty degrees Celsius), or such higher temperature limits as may be approved by the EPA upon request of the Director;
 - (6) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

- (7) Pollutants that result in the presence of toxic gases, vapors, or fumes within the system in a quantity that may cause acute worker health and safety problems;
 - (8) Any trucked or hauled pollutants, except at discharge points designated by the Director;
 - (9) Any material which, by reason of its nature or quantity, is dangerously flammable, reactive, explosive or corrosive, or which by interaction with other materials results in a fire, explosion, damage to the system, injury, unreasonable safety hazard or nuisance;
 - (10) Any material that causes a sewer atmosphere to exceed ten percent of the lower explosive limit at the point of discharge into the system, or exceed five percent at any other point in the system;
 - (11) Floatable material from an industrial user that is readily removable;
 - (12) Any wastewater that causes interference or pass through;
 - (13) Any material that adversely affects the result of any whole effluent toxicity test at any wastewater treatment plant; or
 - (14) Any material the discharge of which violates an applicable regulation promulgated in accordance with Subsections (b), (c) or (d) of Section 307 of the Act.
- (B) Except as allowed in an environmental control permit, it is unlawful for any user to discharge or cause to be discharged into the system any of the following materials in concentrations significantly greater than those found in ordinary domestic wastewater:
- (1) Gasoline, jet fuel, diesel, kerosene, naphtha, benzene, toluene, ethylbenzene, xylene, ethers, alcohols, ketones, aldehydes, chlorinated hydrocarbons, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, solvents or pesticides;
 - (2) Acids, caustics, sulfides, fluorides or substances that will react with water to form acidic products;
 - (3) Particles that are greater than one-half of an inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshing, entrails, feathers, ashes, cinders, sand, silt, gravel, spent lime, stone marble dust, concrete, metallic objects, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas tar, asphalt residues, residues from the refining or processing of fuel, lubricating oil, mud, glass grinding or polishing wastes;
 - (4) Toxic priority pollutants, organophosphorus pesticides, or carbamate pesticides; or

- (5) Wastewater that contains pigment or color that can be identified in the discharge from any wastewater treatment plant.
- (C) Except where expressly authorized to do so by an applicable national pretreatment standard, it is unlawful for an industrial user to increase the use of process water or in any other way attempt to dilute a discharge as a partial or complete substitute for adequate treatment in order to achieve compliance with a national pretreatment standard or any requirement set forth in this Chapter. The Director may impose mass limitations on any industrial user who uses dilution to meet applicable national pretreatment standards or other applicable requirements set forth in this Chapter, or in any other case where the Director deems the imposition of mass limitations to be appropriate.

(Ord. No. 6105, § 25, 8-4-10) Editor's note— Ord. No. 6105, § 24, adopted August 4, 2010, repealed the former § 14.17.120, and § 25 of Ord. No. 6105 enacted a new § 14.17.120 as set out herein. The former § 14.17.120 pertained to similar subject matter and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.125 – Director may prohibit certain discharges deemed harmful to system personnel.

It is unlawful for any user to discharge or cause to be discharged into the system any wastewater if the Director has determined that such discharge may have an adverse or harmful effect upon any part of the system, any person who operates or maintains any part of the system, treatment plant effluent quality or any public or private property, or may otherwise endanger the public or local ecological systems or tend to create a nuisance. The Director, in determining the acceptability of specific wastewaters, shall consider the nature of the wastewater and the adequacy and nature of the system to accept the wastewater. A user who is affected by any such determination shall have the right to appeal that determination in the manner that is set forth in LVMC 14.17.320 and to have the appeal finally decided before any criminal proceeding may be instituted against the user.

(Ord. No. 6105, § 26, 8-4-10; Ord. 3713 § 15, 1993; Ord. 3447 § 103, 1989)

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14.17.130 – Maximum concentration limitations designated.

- (A) It is unlawful for any industrial user to introduce wastewater into the system that, at any time, exceeds the following concentrations:

Parameter	Maximum Concentration Limitation (mg/L unless noted otherwise)
Arsenic	2.3
Barium	13.1
Beryllium	0.02
Cadmium	0.15
Chromium (Hexavalent)	0.1
Chromium (Total)	5.6
Copper	0.6
Cyanide (Total)	19.9
Lead	0.20
Mercury	0.001
Nickel	1.1
pH	5.0—11.0 Standard Units
Phenols	33.6
Selenium	0.5
Silver	2.7
Total Petroleum Hydrocarbons	100
Zinc	8.2

- (B) Notwithstanding the concentration limitations that are set forth in Subsection (A) of this Section, if the Director, in order to implement any provision of this Chapter or any national pretreatment standard, imposes more additional or more restrictive limitations upon a user's environmental control permit and includes them in the permit, it is unlawful for the user to introduce wastewater into the system that exceeds the permit limitations.
- (C) Except as otherwise allowed by the Director pursuant to Subsection (D), it is unlawful for any industrial user to introduce wastewater into the system that exceeds the surcharge thresholds set forth in the table below:

Parameter	Surcharge Threshold (mg/L)
Ammonia (as N)	61.0
Biochemical Oxygen Demand	600
Phosphorus	14.0
Total Suspended Solids	750

- (D) The Director may allow a particular industrial user to discharge in excess of any surcharge threshold set forth in Subsection (C). In such a case, the Director may impose reasonable conditions on the discharge. The user shall pay surcharge fees in amounts that have been established by the City Council pursuant to LVMC 14.17.345, which shall be in addition to sewer service charges established under LVMC Chapter 14.04
- (E) The Director shall determine the method to be used to calculate the total amount of any parameter described in Subsection (C) that is discharged into the system and the amount to be subject to surcharge fees. The method shall be subject to other applicable provisions of this Chapter. The user shall pay the costs of laboratory analyses and staff coordination time used to determine the amount of surcharge fees.
- (F) The Director may deny a request to exceed any surcharge threshold set forth in Subsection (C) upon a determination that the discharge has a reasonable potential, either alone or in combination with discharges from other contributing industrial users, to adversely affect the system.
- (G) Concentrations of parameters identified in this Section shall be determined using sampling procedures specified in LVMC 14.17.240

(Ord. No. 6271, § 2, 9-18-13; Ord. No. 6105, § 28, 8-4-10)

Editor's note—Ord. No. 6105, § 27, adopted August 4, 2010, repealed the former § 14.17.130, and § 28 of Ord. No. 6105 enacted a new § 14.17.130 as set out herein. The former § 14.17.130 pertained to similar subject matter and derived from Ord. No. 3447, 1989; Ord. No. 3713, 1993 and Ord. No. 3876, 1995.

14.17.133 – Exceeding dissolved solids limitations—Conditions—Prohibited.

- (A) The Director may require any industrial user who introduces wastewater into the system with a total dissolved solids concentration in excess of one thousand two hundred mg/L to submit a salinity control plan. Such a plan must be submitted to the City within ninety days after notification from the Director to do so. The plan shall contain a description of chemicals and materials that contribute to the total dissolved solids concentration in the wastewater discharged by the industrial user, as well as source control practices that will be incorporated by the industrial user to reduce the total dissolved solids concentration to less than one thousand two hundred mg/L, or the lowest concentration that the Director deems to be reasonably practicable.

- (B) The Director may require any industrial user who exceeds the total dissolved solids threshold to resample for this parameter on an ongoing basis and submit the results to the Director to demonstrate compliance with the user's salinity control plan. The user shall pay the costs of laboratory analyses and staff coordination time used to determine concentrations of total dissolved solids. If any subsequent sampling indicates significant deviation from the user's salinity control plan, the Director may require the user to perform corrective action.
- (C) The Director may require an industrial user to submit an updated salinity control plan when the Director deems necessary. The plan shall contain additional or revised source control practices that will be incorporated by the industrial user to reduce the total dissolved solids concentration to less than one thousand two hundred mg/L, or the lowest concentration that the Director deems to be reasonably practicable. Updated salinity control plans must be submitted to the Director within ninety days after notification from the Director to do so.
- (D) The Director may prohibit the introduction into the system of any wastewater that contains excessive amounts of total dissolved solids, as determined by the Director.

(Ord. No. 6105, § 29, 8-4-10)

14.17.135 – Bypasses prohibited—Exceptions.

- (A) Bypasses are prohibited, and the Director may take enforcement action against an industrial user for a bypass unless:
 - (1) The bypass was unavoidable to prevent loss of life, personal injury or severe property damage;
 - (2) There was no feasible alternative to the bypass, including without limitation the use of auxiliary treatment facilities, the retention of untreated wastes, or proper maintenance during normal periods of equipment downtime; provided, however, that this exception shall not apply if the Director determines that, in the exercise of reasonable engineering judgment, adequate backup equipment should have been installed to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
 - (3) The industrial user submitted the notices that are required by Subsection (B) of this Section, and the Director, after considering the potential adverse effects of the anticipated bypass, has determined that the bypass will satisfy the three conditions that are set forth in paragraph (1) of this Subsection (A) of this Section and has approved the bypass.
- (B) (1) If an industrial user knows in advance of the need for a bypass, it shall submit a prior notice to the Director, if possible, at least ten days before the date of the bypass.

- (2) An industrial user shall submit an oral notice to the Director of an unanticipated bypass that exceeds the limits that are imposed in its environmental control permit or the applicable national pretreatment standards within twenty-four hours after the time that the industrial user becomes aware of the bypass. The industrial user shall also provide a written report to the Director within five days after the time the industrial user becomes aware of the bypass, which report shall contain a description of the bypass, its cause, the duration of the bypass, including the exact dates and times, the steps that have been taken or are planned to prevent the recurrence of such a bypass and, if the bypass has not been corrected, the anticipated time that it is expected to continue and the steps that have been taken or are planned to reduce or eliminate the bypass. The Director may waive such written report on a case-by-case basis if the oral report has been received within the twenty-four-hour period and it contains all of the required information.
- (C) Bypasses that provide essential maintenance to assure efficient operation of an industrial user's facilities are not subject to the provisions of Subsections (A) and (B) of this Section as long as they do not cause a violation of the industrial user's environmental control permit or the applicable national pretreatment standards.

(Ord. No. 6105, § 30, 8-4-10; Ord. 3447 § 105, 1989)

14.17.140 – User classifications designated.

- (A) No statement that is contained in LVMC 14.17.080 to 14.17.135, inclusive, shall be construed as preventing the Director from issuing an environmental control permit that allows an industrial waste of unusual strength or character if the discharge does not violate the applicable national pretreatment standards. The discharger shall pay all of the extra costs that are incurred by the City in connection with treating such discharge.
- (B) For the purposes of this Chapter, the following user classifications are established in order to assign appropriate user charges and fees and permit requirements:
 - (1) Class I;
 - (2) Class II;
 - (3) Temporary.
- (C) Users who are issued permits shall pay all fees established by the City Council pursuant to LVMC 14.17.345, including without limitation application and annual renewal fees. Failure to pay any fee within the applicable time period is sufficient grounds to withhold an environmental control permit or revoke an environmental control permit that was previously issued.

(Ord. No. 6105, § 31, 8-4-10; Ord. 3713 § 17, 1993; Ord. 3447 § 106 (A), (B), 1989)

14.17.145 – Environmental control permit—Generally.

- (A) Permits for the use of the system are required as provided in this Chapter. Permit applications, in the form that is prescribed by the Director and accompanied by all applicable fees, shall be filed with the Director. Environmental control permits shall be subject to such annual fees as have been established by the City Council pursuant to LVMC 14.17.345. The cost of the laboratory analyses and staff coordination time used in establishing an industrial user's compliance with its discharge limits shall be paid by the industrial user whose facility is sampled, in accordance with fees that have been established by the City Council pursuant to LVMC 14.17.345
- (B) Each industrial user who proposes to discharge to any part of the system, unless exempted by the Director, shall apply for and, if required by the Director, obtain an environmental control permit. Also, any industrial user who does not currently have an existing environmental control permit, but proposes to contribute new pollutants, significantly increase the existing pollutants or significantly change the characteristics of existing pollutants shall, before doing so, comply with LVMC 14.17.185. All industrial users who are connected to, or are discharging into, any part of the system on the date that the 2010 ordinance amending this Chapter becomes effective shall obtain an environmental control permit, if required by the Director, within one hundred twenty days from and after the effective date of the 2010 ordinance amending this Chapter.
- (C) Each industrial user who submits an application for an environmental control permit shall pay an application fee as established by the City Council pursuant to LVMC 14.17.345. The failure to pay a fee within the time period specified in a permit application, permit or invoice from the City is sufficient grounds to withhold a permit or revoke a permit that was previously issued.
- (D) In response to an application for an environmental control permit, the Director may:
 - (1) Deny a permit;
 - (2) Determine that no permit is required;
 - (3) Issue a permit in accordance with the requirements of this Chapter;
 - (4) Issue a permit subject to conditions that are consistent with this Chapter; or
 - (5) Issue a permit that imposes additional or more stringent conditions than what this Chapter would otherwise require in order to prevent future violations, if the Director has reason to believe that:
 - (a) The user may violate applicable national pretreatment standards or any provision of this Chapter; or
 - (b) The user's contribution could cause a violation of the City's NPDES permit.

14.17.150 – Environmental control permit—Classifications.

Environmental control permits shall be classified as follows:

(A) Class I:

- (1) Class I includes any industrial user who:
 - (a) Is subject to national pretreatment standards, as defined herein;
 - (b) Discharges an average of twenty-five thousand gallons per day or more of process wastewater to the system (excluding sanitary, noncontact cooling and boiler blowdown wastewater);
 - (c) Contributes a process wastestream which makes up five percent or more of the average dry weather hydraulic or organic capacity of any wastewater treatment plant; or
 - (d) Is designated as such by the Director on the basis that the industrial user has a reasonable potential, either alone or in combination with other contributing industries, to adversely affect the system, cause interference, cause pass through, or violate any national pretreatment standard (in accordance with 40 CFR 403.8(f)(6)).
- (2) The facilities of each Class I industrial user shall be subject annually to a minimum of two inspections and one sampling by the Director.
- (3) Each Class I industrial user shall perform self-monitoring as follows:
 - (a) A minimum of two times per year; and
 - (b) Such additional times per year as the Director may require in order to determine compliance with any national pretreatment standard or any requirement set forth in this Chapter.

(B) Class II:

- (1) Class II includes any industrial user who:
 - (a) Is not required to obtain a Class I permit; and
 - (b) Is designated by the Director as Class II on the basis that the user:

- (i) Discharges into the system a pollutant or pollutants that have a reasonable potential, either alone or in combination with discharges from other contributing industrial users, to adversely affect the system, cause interference, cause pass through, or violate any requirement set forth in this Chapter; or
 - (ii) Has on the premises a pollutant or pollutants that, if discharged or released into the system, have a reasonable potential, either alone or in combination with discharges from other contributing industrial users, to adversely affect the system, cause interference, cause pass through, or violate any requirement set forth in this Chapter.
- (2) The facilities of each Class II industrial user shall be inspected and sampled as deemed necessary by the Director.
 - (3) The Director may require a Class II industrial user to perform periodic self-monitoring as the Director may deem appropriate or necessary in order to determine compliance with any requirement set forth in this Chapter.

(C) Temporary:

- (1) Temporary includes any user who has been authorized by the Director to discharge stormwater, groundwater, or any other wastewater whose discharge is otherwise prohibited by LVMC 14.17.085
- (2) The facilities of each temporary user shall be inspected and sampled as deemed necessary by the Director.
- (3) The Director may require a temporary user to perform periodic self-monitoring as the Director may deem appropriate or necessary in order to determine compliance with any requirement set forth in this Chapter.

(Ord. No. 6105, § 33, 8-4-10; Ord. 3713 § 19, 1993; Ord. 3447 § 106 (E), 1989)

14.17.155 – Environmental control permit—Application.

- (A) Each user who is required to obtain a Class I or Class II environmental control permit, or a renewal thereof, shall complete and file with the Director an application on the form that is prescribed by the Director. The application shall be accompanied by any applicable fees that have been established by the City Council pursuant to LVMC 14.17.345. In support of its application, the applicant shall submit all pertinent information associated with the discharge, including without limitation:
 - (1) The name (including any company name), street address, mailing address, telephone number, names of authorized representatives, and SIC code(s) of the applicant;

- (2) The volume of the wastewater that the applicant anticipates will be discharged;
 - (3) The parameters and characteristics of the wastewater that the applicant anticipates will be discharged, including without limitation those that are set forth in LVMC 14.17.085 to 14.17.110, inclusive, and 14.17.120 to 14.17.130, inclusive, as those parameters and characteristics are determined by an independent laboratory that meets the requirements set forth in LVMC 14.17.225
 - (4) The time and duration of the proposed discharge;
 - (5) The average and peak wastewater flow rates, including without limitation daily, monthly, and seasonal variations, if any;
 - (6) The site plans, floor plans, mechanical and plumbing plans and details of the applicant's facilities that show all of the sewers and appurtenances by size, location and elevation;
 - (7) A description of the applicant's activities, facilities and plant processes on the premises, including without limitation all of the materials and types of materials which are, or could be, discharged;
 - (8) Each product that is produced by the facilities, by type, amount and rate of production;
 - (9) The number and type of employees and their respective hours of work; and
 - (10) Any other information requested by the Director, including without limitation information related to any national pretreatment standard or any requirement set forth in this Chapter.
- (B) The Director will evaluate the data that are furnished by the applicant and may require additional information.
- (C) After the acceptance and evaluation by the Director of the data that are so furnished, the Director may issue an environmental control permit, which shall be subject to the provisions of this Chapter.

(Ord. No. 6105, § 34, 8-4-10; Ord. 3447 § 107, 1989)

14.17.160 – Environmental control permit—Conditions.

Each environmental control permit shall be expressly subject to all of the provisions of this Chapter and all other regulations, user charges and fees that are established by the City. The conditions of all environmental control permits shall be enforced in accordance with this Chapter and applicable Federal and State regulations. The conditions of each environmental control permit may, without limitation, include any or all of the following:

- (A) The unit charge or schedule of user charges, surcharge fees and other fees that must be paid by the permittee in order for the wastewater to be discharged into the system from its facilities;
- (B) Limits on the parameters and characteristics of the wastewater discharges from the permittee's facilities;
- (C) Limits on rate and time of the wastewater discharges from the permittee's facilities or the requirements for flow regulation and equalization with respect thereto;
- (D) Requirements for the installation of inspection and sampling facilities and spill containment facilities with respect to the permittee's facilities;
- (E) Other monitoring and inspection requirements which, without limitation, may include specific sampling locations, frequency of sampling, times of sampling and number and types of test standards and reporting schedules, for the monitoring programs at the permittee's facilities;
- (F) Pretreatment facility requirements with respect to the permittee's facilities;
- (G) Requirements for maintaining and submitting technical reports and plant records that relate to the wastewater discharges from the permittee's facilities;
- (H) Compliance schedules for the permittee's facilities;
- (I) Analyses of the wastewater discharges from the permittee's facilities that are to be performed, as a part of the permittee's compliance effort, by an independent laboratory that meets the requirements set forth in LVMC 14.17.225
- (J) Requirements for maintaining, and for affording the Director access to, the records of the permittee's facilities that relate to its wastewater discharges;
- (K) Requirements for the notification of the Director of any introduction of new parameters or any substantial change in the volume or character of the existing parameters of the wastewater discharges from the permittee's facilities;
- (L) Requirements for the notification of the Director of spill, upset or bypass discharges from the permittee's facilities;
- (M) The requirement that an amended application shall be filed within ten working days after any information, quantity or operation that was reported in the original application is changed;
- (N) Compliance with the stormwater provisions of LVMC Chapter 14.18; and

- (O) Such other conditions as may be appropriate in order to ensure compliance by the permittee with this Chapter.

(Ord. No. 6105, § 35, 8-4-10; Ord. 3713 § 20, 1993; Ord. 3447 § 108, 1989)

14.17.163 – Environmental control permit—Display.

When required by the terms of an environmental control permit, the permittee shall prominently display the permit or any related notice in the facility to which it pertains.

(Ord. No. 6105, § 36, 8-4-10)

14.17.165 – Environmental control permit—Term.

- (A) Each Class I environmental control permit shall be issued for a specified period, not to exceed five years, and each permittee who desires renewal of the permit shall submit an application for renewal not later than sixty days prior to the expiration of its existing permit.
- (B) Each Class II environmental control permit may be issued for a specified period or on an indefinite basis, and may be issued as a "custom permit" or a "general permit." If a permit is issued for a specified period and the permittee desires renewal of the permit, the permittee shall submit an application for renewal not later than sixty days prior to the expiration of its existing permit. If a permit is issued on an indefinite basis, the Director at any time may revise the permit so that it expires at a specified time, and may require the permittee to submit an application for renewal.
- (C) Each temporary environmental control permit shall be issued for a specified period, not to exceed two years. A temporary environmental control permit is not subject to renewal.
- (D) If a Class I or Class II industrial user submits a timely application for renewal and is not notified by the Director of the renewal of its permit at least thirty days prior to the expiration of its existing permit, its existing permit shall automatically be extended until the effective date of the Director's final decision on the application.
- (E) If an industrial user fails to apply for or renew an environmental control permit in a timely fashion, the Director may issue or renew such permit without an application or take other action as provided for in this Chapter.

(Ord. No. 6105, § 37, 8-4-10; Ord. 3713 § 21, 1993; Ord. 3447 § 109, 1989)

14.17.170 – Environmental control permit—Modifications.

- (A) The Director may change the terms and conditions of any environmental control permit during the period for which it was granted for adequate cause, including without limitation:

- (1) To incorporate any new or revised national pretreatment standards or Federal, State or local pretreatment requirements;
 - (2) In response to material or substantial alterations or additions to the permittee's process, discharge volume or discharge character that were not considered in issuing the permit then in effect;
 - (3) In response to any change in circumstance of the permittee or change in condition of the system that supports a temporary or permanent reduction or elimination of the authorized discharge;
 - (4) In response to information indicating that the permitted discharge poses a threat to the system, City personnel, or the receiving waters;
 - (5) Violation by the permittee of any terms or conditions of the permit;
 - (6) A misrepresentation or failure by the permittee to disclose fully all relevant facts in the permit application or in any required reporting;
 - (7) To reflect the terms of any variance from national pretreatment standards that has been granted pursuant to 40 CFR 403.13, or any revision to such a variance;
 - (8) To correct typographical or other errors in the permit; or
 - (9) Upon request of the permittee, provided that the request is approved by the Director and does not create or result in a violation of any national pretreatment standards or any other applicable requirements, laws, rules or regulations.
- (B) The filing by a permittee of a request for the modification, revocation and reissuance, or termination of a permit, or of a notification of planned changes or anticipated noncompliance, shall not stay the enforcement of any permit condition. However, the Director has the discretion to stay the enforcement of any permit condition in connection with a request for permit modification.
- (C) The permittee shall be informed of any change in its environmental control permit at least thirty days prior to the effective date such of change. Any change or new condition in such permit shall include a reasonable time schedule for compliance therewith. The permittee will, however, be required to meet milestone dates established in any applicable national pretreatment standards.

(Ord. No. 6105, § 38, 8-4-10; Ord. 3713 § 22, 1993; Ord. 3447 § 110, 1989)

14.17.175 – Environmental control permit—Restrictions.

- (A) Each environmental control permit will be issued to a specific user at a specific location and shall not be assigned, transferred or sold.

- (B) Properties that are not connected contiguously are not eligible for regulation under the same environmental control permit.
- (C) The discharge characteristics regulated by two or more environmental control permits shall not be averaged or combined for the purpose of reducing any user fee or satisfying any national pretreatment standard or any requirement set forth in this Chapter.

(Ord. No. 6105, § 39, 8-4-10; Ord. 3447 § 111, 1989)

14.17.180 – Reserved.

Editor's note— Ord. No. 6105, § 40, adopted August 4, 2010, repealed § 14.17.180, which pertained to wastewater contribution permit; initiation of discharge and derived from Ord. No. 3447, 1989.

14.17.185 – Increase in discharge—Director's approval required.

No wastewater discharge in which there has been a contribution of new pollutants, a significant increase in the existing pollutants, or a significant change in the characteristics of the existing pollutants shall be commenced without prior written notification to the Director. Upon such notification, the Director may modify a user's existing environmental control permit or, in the case of a user without a permit, require that an application be filed and an environmental control permit be obtained before any waste discharge that involves such change takes place.

(Ord. No. 6105, § 41, 8-4-10; Ord. 3713 § 23, 1993; Ord. 3447 § 113, 1989)

14.17.190 – Temporary environmental control permit.

- (A) Each user who seeks a temporary environmental control permit shall complete and file with the Director an application in the form that is prescribed by the Director. Such application shall be accompanied by any other information that may be requested by the Director for review and approval.
- (B) The Director may specify and make a part of each temporary environmental control permit specific conditions and requirements.
- (C) Upon approval of a permit by the Director, a permit fee for a temporary environmental control permit shall be paid by the applicant in the amount established by the City Council pursuant to LVMC 14.17.345. The fee shall be payable prior to issuance of the permit.
- (D) Prior to the issuance of a permit, the applicant shall also pay hydraulic loading fees and, if applicable, surcharge fees based on the estimated total discharge volume for the duration of the permit; provided, however, that the Director, on a case-by-case basis, may allow the discharger to measure the flow with a flow meter or similar device that is approved by the Director, and to pay hydraulic loading fees and any applicable surcharge fees on an ongoing basis during the duration of the permit. Hydraulic loading fees shall be determined

by dividing by ninety thousand the total number of gallons of water discharged, and multiplying the result by the domestic strength user rate set forth in LVMC 14.04.030. Surcharge fees, if applicable, shall be determined pursuant to LVMC 14.17.245

- (E) The terms and conditions of a temporary environmental control permit are subject to modification and change by the Director during the period for which it was issued. Any change or new condition in such permit shall include a reasonable time schedule for compliance therewith.

(Ord. No. 6105, § 42, 8-4-10; Ord. 3713 § 24, 1993; Ord. 3447 § 114, 1989)

14.17.195 – Regulation of wastewater discharges—Users outside city boundaries.

The City is authorized to regulate wastewater discharges from users who are located outside of the corporate boundaries of the City but are tributary to the system, consistent with any interlocal agreement. The requirements of this Chapter shall apply to each such user. The Director is authorized to inspect and monitor the facilities of each such user in order to determine its compliance with this Chapter.

(Ord. No. 6105, § 43, 8-4-10; Ord. 3447 § 115, 1989)

14.17.200 – Pretreatment facilities.

- (A) The Director may require an industrial user to establish and operate an industrial wastewater pretreatment facility to treat industrial flows prior to their discharge into the system whenever it is necessary to restrict or prevent the discharge to the system of waste parameters regulated by this Chapter, to distribute more equally over a longer period any peak discharge of industrial wastewaters, or to accomplish any pretreatment result that is required by the Director. All such pretreatment facilities or devices must first be approved by the City before their use, but such approval shall not absolve the industrial user that owns or operates the facility of the responsibility of meeting any industrial effluent limitation that is imposed by the Director on such flows. In a special case, the Director may require the construction of sewer lines by the industrial user in order to convey certain industrial wastes to a specific trunk sewer. All pretreatment facilities that are judged by the Director to require engineering design shall have the plans therefor prepared and signed by a registered professional engineer of suitable discipline who is licensed in the State of Nevada. Detailed plans that show the pretreatment facilities and operating procedures, including without limitation accidental discharge procedures, shall be submitted to the Director for review and approval before such plans and procedures are implemented. Such review and approval, however, shall not absolve the industrial user that owns or operates such facilities from the responsibility of modifying such facilities in the future as may be necessary in order to produce an effluent that is acceptable to the Director under the provisions of this Chapter. No industrial user shall ever increase the use of water, or in any other manner attempt to dilute a discharge, as a partial or complete substitute for adequate methods for the reduction of pollutants to achieve compliance with this Chapter and such industrial user's environmental control permit.

- (B) The following shall be required when deemed necessary by the Director:
- (1) An interceptor to remove prohibited settleable and floatable material;
 - (2) An equalizing tank to equalize wastewater streams which vary greatly in quantity or quality;
 - (3) A neutralization chamber to neutralize low or high pH flows; and
 - (4) A monitoring facility to facilitate inspection, flow measurement and sampling.
- (C) All domestic or sanitary wastewaters from restrooms, showers, drinking fountains and similar facilities shall be kept separate from all industrial wastewaters until the industrial wastewaters have passed through any required pretreatment facility or monitoring device if it is reasonably practicable and deemed necessary by the Director.
- (D) If it is deemed necessary by the Director for an industrial user, whether under permit or not, to install a pretreatment facility, the Director shall place a time constraint on the final installation and operational date of the facility. If appropriate, this constraint shall include without limitation a compliance schedule which indicates milestone dates for the design of the facility, final engineering approval, start of construction and start up date, and a compliance deadline. The industrial user shall submit regular progress reports as required by the Director. The compliance schedule may be extended, but only if the industrial user has shown good faith in attempting to comply with the conditions of its permit but requires additional time for the construction or acquisition, or both, of equipment that is related to pretreatment.
- (E) An industrial wastewater pretreatment facility shall be properly operated and maintained at all times. Proper operation and maintenance includes, without limitation, adequate operator staffing and training; adequate laboratory and process controls, including appropriate quality assurance procedures; appropriate observation of equipment performance; appropriate calibration and adjustment to ensure good performance; good housekeeping; appropriate replacement of parts; regular removal of waste materials; and implementation of good management practices. Backup or auxiliary facilities or similar systems may also be required to ensure compliance with this Chapter.
- (F) The Director may require an industrial user to employ pretreatment facility operators who are certified as Industrial Waste Operators by the Nevada Water Environment Association, with the minimum grade of certification required to be determined by the Director.
- (G) If the Director determines that a pretreatment facility has been improperly shut off or bypassed, is not operational, is not properly operated or maintained, or does not provide adequate treatment, the Director may require that another pretreatment facility be installed.

(Ord. No. 6105, § 44, 8-4-10; Ord. 3713 § 25, 1993; Ord. 3447 § 116, 1989)

14.17.205 – Monitoring facilities.

- (A) Any industrial user who discharges wastewater under a City permit shall, as required and approved by the Director and at the user's expense, install and maintain monitoring facilities and equipment in order to allow inspection, sampling or measurement, or any combination thereof, of its building sewer or plumbing systems. Such facilities shall normally be situated on the industrial user's premises, but the Director shall have the discretion to allow or require monitoring facilities to be constructed elsewhere at the industrial user's expense.
- (B) Required monitoring equipment may include a calibrated flume, weir, flow meter, or any similar device that is approved by the Director and that is suitable to measure the industrial wastewater flow rate and total volume. A flow-indicating, recording and totalizing register may also be required by the Director. In lieu of such wastewater flow measurement, the Director may accept records of water consumption and may adjust the flow volumes by suitable factors in order to determine the peak and average flow rates for a specific discharge.
- (C) If two or more industrial users can discharge into a common side sewer, the Director may require the installation of a separate monitoring facility for each such user. Also, if, in the judgment of the Director, there is a significant difference in the parameters and characteristics of the wastewaters produced by the different operations of a single industrial user, the Director may require that separate monitoring facilities be installed for each separate operation.
- (D) Sampling and flow measurement facilities shall be constructed and located in such a manner as will provide safe access to authorized personnel from the City. If a monitoring facility is in a location with restricted access, measures shall be taken in order to afford access to the facility by the personnel of the City, including without limitation such measures as a gate secured with a lock that is furnished by the Director. There shall be ample operating area in or near such monitoring facility in order to allow accurate sampling and compositing of the samples for analysis. The industrial user shall assure that the access and the sampling and measuring equipment are maintained in a safe and proper operating condition at all times at no expense to the City.
- (E) Monitoring facilities, and the sampling and measuring equipment therein, shall be provided in accordance with design requirements provided by the City and all applicable construction standards, safety devices and specifications. Construction shall be completed within ninety days following the industrial user's receipt of written notification from the City to provide the monitoring facilities.
- (F) Monitoring facilities may be required to include a security closure that can be locked during the sampling or monitoring with a lock that will be provided by the Director.
- (G) Unrestricted access to monitoring facilities shall be available to authorized personnel of the City at all times that are deemed necessary by the Director.

- (H) Notwithstanding the provisions of this Section, if an industrial user has more than one outfall, the Director may identify any particular outfall as de minimis and not require monitoring regarding that outfall if the Director determines that neither the discharge volume or the pollutant concentration from that outfall has reasonable potential to cause a violation of the user's permit.

(Ord. No. 6271, § 3, 9-18-13; Ord. No. 6105, § 45, 8-4-10; Ord. 3713 § 26, 1993; Ord. 3447 § 117, 1989)

14.17.210 – Interceptors—Requirements.

Interceptors shall be installed and maintained by the user, and at the user's expense, in accordance with the following requirements:

- (A) Each commercial food preparation or food dispensing facility shall install a grease interceptor, the size and design of which shall be in accordance with current City requirements.
- (B) Each vehicle or equipment maintenance, repair or washing facility shall install a sand/oil interceptor, the size and design of which shall be in accordance with current City requirements.
- (C) Any facility not identified in Subsection (A) or (B) of this Section that is determined by the Director to have the potential to discharge floatable or settleable material into the system shall install a grease interceptor or a sand/oil interceptor, as determined by the Director, of a size and design that are in accordance with current City requirements.
- (D) An interceptor that, at the time of its installation at a user's facility, was legally and properly installed in accordance with then-applicable requirements, but which does not qualify as an interceptor required under Subsection (A), (B) or (C) of this Section, shall be acceptable as an alternative if the interceptor is effective in removing floatable and settleable material, and is designed and installed in such a manner that it can be inspected and properly maintained. If at any time the Director determines that such interceptor is incapable of adequately retaining the floatable and settleable material in the wastewater flow, or that it was installed in such a manner that it can no longer be inspected or properly maintained, the user shall install a new interceptor, of a size and design that are in accordance with current City requirements, within ninety days after being notified of the requirement.
- (E) A user's installation of an interceptor of a design that is specified in Subsection (A), (B) or (C) of this Section shall not relieve the user of the responsibility to keep floatable and settleable material from entering the system contrary to the provisions of this Chapter. If at any time the Director determines that an interceptor is not adequate under the actual conditions of its use, the user shall install a new interceptor or pretreatment facility that is effective in accomplishing the intended purpose. The new interceptor or pretreatment facility shall be of a size and design that are in accordance with current City requirements,

and shall be installed by the user within ninety days after the user is notified of the requirement.

- (F) Any interceptor that is required by this Section shall be readily accessible for inspection and shall be properly maintained to ensure that accumulations of floatable and settleable material do not impair the efficiency of the interceptor and are not discharged into the system. An interceptor shall not be considered properly maintained if accumulations of floatable and settleable material in any chamber total more than twenty-five percent of the chamber's operative fluid capacity. Each interceptor shall be routinely pumped at an appropriate frequency, but no less than once per calendar year. The Director may impose additional pumping and cleaning requirements consistent with this Chapter. Every fitting, standpipe, plumbing appurtenance, baffle and chamber that is required for correct operation of an interceptor shall be properly installed and in proper working condition at all times.
- (G) Each user that is required to use and maintain an interceptor shall keep a record of every time the interceptor is pumped or cleaned. This record shall include the date, the name of the company that pumped or cleaned the interceptor, and the amount of waste that was removed. Such records shall be made available to the Director upon request. The removal of waste shall be done by a company licensed to haul such waste and the waste shall be disposed of in accordance with Federal, State and local regulations.
- (H) Each user that is required to use and maintain an interceptor shall ensure that the interceptor does not release odors that create a public nuisance, as determined by the Director. The Director may require a user to develop and implement best management practices or other measures to mitigate odors relating to an interceptor.
- (I) If a user fails to comply with any requirement of this Section, a notice of violation may be issued to, and a penalty fee levied against, the user. If, on any subsequent inspection, it is found that the failure to comply continues, additional penalty fees may be levied against the user. The Director may also take any other action concerning the user that is provided for in this Chapter.
- (J) It is unlawful for any person to:
 - (1) Discharge into the system wastewater from any mobile catering vehicle, other than through an approved connection that is designed for such purpose and that flows into an approved grease interceptor;
 - (2) Dispose of oil, grease or any other floatable or settleable material into an interceptor, other than material that has been washed off during normal cleaning;
 - (3) Dispose of any material into an interceptor other than through the approved inlet plumbing; or

- (4) Introduce into an interceptor any additive that causes or is designed to cause any floatable or settleable material to be discharged into the system that would otherwise have been retained in the interceptor.
- (K) Compliance with this Section shall not absolve a user from complying with the maximum discharge limitations set forth in LVMC 14.17.130(A).
- (L) Compliance with the maximum discharge limitations set forth in LVMC 14.17.130(A) shall not absolve a user from complying with any requirement of this Section.

(Ord. No. 6271, § 3, 9-18-13; Ord. No. 6105, § 47, 8-4-10)

Editor's note—Ord. No. 6105, § 46, adopted August 4, 2010, repealed the former § 14.17.210, and § 47 of Ord. No. 6105 enacted a new § 14.17.210 as set out herein. The former § 14.17.210 pertained to sand, grease and oil traps and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.215 – Containment of certain discharges.

- (A) Upon written notification from the Director, or as required by an environmental control permit, an industrial user shall provide secondary containment for prohibited material or other substances that are regulated by this Chapter, as determined by the Director. Secondary containment for such material shall be provided and maintained at the user's sole cost and expense.
- (B) Upon written notification from the Director, or as required by an environmental control permit, an industrial user shall submit to the Director and implement a spill prevention and control plan, including, without limitation, plans for the secondary containment system and operating procedures. This spill prevention and control plan shall contain, but is not limited to, the following elements:
 - (1) Description of discharge, including nonroutine batch discharges;
 - (2) Description of stored chemicals;
 - (3) Procedures for promptly notifying the Director of any spill or any discharge that would violate any provision of this Chapter;
 - (4) Procedures to prevent spills, including as necessary, inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents);
 - (5) Procedures and practices for responding to spills, including as necessary measures and equipment for emergency response and follow-up practices to minimize any damage.

- (C) If at any time the Director determines that a spill prevention and control plan is inadequate, such plan shall be modified and implemented as specified by the Director.

(Ord. No. 6105, § 48, 8-4-10; Ord. 3713 § 28, 1993; Ord. 3447 § 119, 1989)

14.17.220 – Flammable substances.

- (A) The Director may require any user who has the potential to discharge flammable substances to install, operate and maintain a combustible gas monitoring device and a mechanism to divert the entire wastewater flow to a holding tank whenever the combustible gas level at its establishment is greater than twenty percent of the lower explosive limit. Such device and mechanism shall be provided and maintained at the user's sole cost and expense.
- (B) Each user who is so notified shall provide, within the time specified by the Director, detailed gas monitoring and wastewater diversion plans, including without limitation plans and specifications for the monitoring device and operating procedures, to the Director for review and approval. At a minimum, the monitoring device and diversion mechanism shall be installed in a field location and have an indicator, automatic continuous recorder, adjustable two-stage alarm system, calibration for methane detection, and a means for diverting the flow to a holding tank; provided, however, that the Director has the discretion to waive any of these installation requirements by way of written notice to the user. Plans required by this Subsection (B) shall include procedures for notification of City personnel in the event of any spill or emergency discharge of flammable substances, a complete description of all such substances stored or used at the facility, and procedures to be implemented in order to prevent an adverse impact to the system if such an event were to occur. The plans shall also contain descriptions of emergency procedures for containment of releases of flammable materials within the facility, including the specific procedures to be taken by facility personnel, emergency telephone numbers and contacts, and procedures to prevent the release from harming the system.
- (C) The installation or construction of the monitoring device and diversion mechanism shall be completed within a period that is designated by the Director. The review and approval of gas monitoring and wastewater diversion plans shall not absolve the user of the responsibility of satisfying any national pretreatment standard or any requirement set forth in this Chapter.

(Ord. No. 6105, § 49, 8-4-10; Ord. 3713 § 29, 1993; Ord. 3447 § 120, 1989)

14.17.225 – Wastewater analyses.

- (A) Periodic measurements of flow rates, flow volumes and wastewater characteristics shall be made at the times and in the manner prescribed by the Director. The Director may impose monitoring requirements on, and include them within, a permit, or may provide written notice to a user requiring the user to perform wastewater analyses. The permit or written notice may specify the times and locations for monitoring, as well as the manner of sampling, manner of analysis, and manner of reporting.

- (B) Each wastewater analysis that is required pursuant to this Chapter or by the Director shall be performed by an independent laboratory that has a current wastewater certification from the State of Nevada to perform the required analysis. If the State of Nevada does not certify laboratories for the required analysis, it shall be performed by a laboratory that is certified by the State of Nevada for at least one other wastewater parameter. Each analysis shall be performed using analytical methods that are set forth in 40 CFR Part 136 or methods that have been approved by NDEP.
- (C) Monitoring data shall be submitted to the City as specified by the Director or as required by this Chapter. Unless exempted by the Director, the submitted data shall include all laboratory analytical reports, chain-of-custody records, any required supporting documentation.
- (D) All documentation with respect to any sample that is collected pursuant to this Chapter shall be maintained by the user for a minimum of three years. The period shall be extended during the course of any unresolved litigation concerning the user or the user's contribution to the system, or upon the request of the Director. The documentation required by this Section shall be made available for inspection and copying by the Director at all reasonable times, and shall include without limitation the following:
 - (1) The date, exact location, method, and time of sampling, and the names of the person or persons who collected the samples;
 - (2) The sample preservatives and the dates on which the analyses were performed;
 - (3) The identity and addresses of the laboratory or laboratories that performed the analyses; and
 - (4) The results of each such analysis, including any laboratory-supplied documentation.
- (E) Each user who submits monitoring data shall certify under penalty of law that the document and all attachments were prepared under the user's direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. The user shall also certify that, based on the user's inquiry to the person or persons who manage the system or those who are directly responsible for gathering the information, the information is, to the best of the user's knowledge and belief, true, accurate and complete.
- (F) All costs associated with sampling, analyses and flow measurements required by the Director or otherwise pursuant to this Chapter shall be paid by the user. If any sampling, analysis or flow measurement is performed by the Director or an employee or agent of the City, the user shall pay the City a charge sufficient to defray the actual expenses for personnel, space, equipment and supplies so incurred.

(Ord. No. 6105, § 51, 8-4-10) Editor's note— Ord. No. 6105, § 50, adopted August 4, 2010, repealed the former § 14.17.225, and § 51 of Ord. No. 6105 enacted a new § 14.17.225 as set out herein. The former § 14.17.225 pertained to similar material and derived from Ord. No. 3447, 1989.

14.17.230 – Reserved.

Editor's note— Ord. No. 6105, § 52, adopted August 4, 2010, repealed § 14.17.230, which pertained to periodic measurement for surcharge determination and derived from Ord. No. 3447, 1989.

14.17.235 – Sampling procedures subject to inspection.

All sampling, analysis and flow measurement procedures, equipment and results pertaining to any user shall be subject at all reasonable times to inspection by the Director. The Director may take measurements at any user's facility to determine wastewater flows and wastewater parameters. The Director may by written notice require any user to split samples, providing part of the sample to the Director and sending the remainder to an independent laboratory for testing.

(Ord. No. 6105, § 53, 8-4-10; Ord. 3713 § 30, 1993; Ord. 3447 § 123, 1989)

14.17.240 – Sampling procedures designated.

- (A) The Director may require any user to collect composite or grab samples, and designate the sampling procedures. Users shall collect grab samples for the determination of pH, volatile organics, hexavalent chromium, total oil and grease, total petroleum hydrocarbons, phenols, cyanide and sulfide, and any other substance for which a composite sample is inappropriate. Users may collect either grab or composite samples for other parameters unless otherwise specified by the Director. A user shall collect samples when normal business operations are generating typical wastewater discharges. An industrial user who has a large fluctuation in quantity or quality of wastewater may be required to install and maintain automated sampling equipment or automated analysis and recording equipment, or both.
- (B) Samples shall be handled and stored in accordance with procedures that are set forth in 40 CFR Part 136 or procedures that have been approved by NDEP. The Director may require sampling, handling and storage of samples to be performed by a qualified independent contractor.
- (C) If a user monitors any parameter more frequently than is required by the user's permit or by written notification from the Director, and uses the procedures that are set forth in 40 CFR Part 136 or procedures that have been approved by NDEP, the results of such monitoring shall be included in any calculations of pollutant discharge (daily maximum or monthly average), and included in any monitoring reports required by this Chapter.
- (D) The Director may require a user to provide a minimum notification of up to fourteen days in advance of any scheduled monitoring or sampling that is to be performed. Such notification shall include the date, time and location of the proposed monitoring or sampling. If such notification is not provided, the Director may decline to accept the data generated and require the user to repeat the procedure after proper notice is given.

(Ord. No. 6105, § 55, 8-4-10) Editor's note— Ord. No. 6105, § 54, adopted August 4, 2010, repealed the former § 14.17.240, and § 55 of Ord. No. 6105 enacted a new § 14.17.240 as set out herein. The former § 14.17.240 pertained to similar material and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.245 – Monitoring by user.

- (A) The Director may require any user to monitor in order to quantify the amount of wastewater or of any parameter that is subject to surcharge fees in accordance with LVMC 14.17.130. Such monitoring shall be subject to all requirements of this Chapter that apply to monitoring.
- (B) The Director may allow surcharges to be determined on the basis of estimates. The Director may require that the estimates be made by a qualified independent consultant who has implemented a study plan approved by the Director.
- (C) If the Director determines that an industrial user has not accurately reported surcharge data, the Director may estimate amounts, both past and current, of wastewater or parameters that pertain to that user for purposes of establishing surcharge fees and penalties.

(Ord. No. 6105, § 55, 8-4-10) Editor's note— Ord. No. 6105, § 54, adopted August 4, 2010, repealed the former § 14.17.245, and § 55 of Ord. No. 6105 enacted a new § 14.17.245 as set out herein. The former § 14.17.245 pertained to methods for determination of wastewater pollutant concentrations and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.250 – Measurement of total flow of waste.

The determination of a user's wastewater flow shall be made by the Director by means of a metering device that is approved by the Director and is purchased, installed and maintained at the expense of the user, using an estimate that is based upon the total amount of water which is used in the area that is occupied, or by other means that is acceptable to the Director.

(Ord. No. 6105, § 56, 8-4-10; Ord. 3713 § 33, 1993; Ord. 3447 § 126, 1989)

14.17.255 – Reporting compliance.

- (A) Any person who is subject to 40 CFR 403.12 shall comply with the requirements set forth therein. When the provisions of that section require a report to be sent to the "control authority" regarding a discharge to a POTW (publicly owned treatment works), the report shall be sent to the Director.
- (B) Each industrial user shall notify in writing the Director, the EPA's Regional Waste Management Division Director, and State hazardous waste authorities of any discharge into the system of a substance which, if otherwise disposed of, would be a hazardous waste under 40 CFR 261.

(Ord. No. 6105, § 58, 8-4-10) Editor's note— Ord. No. 6105, § 57, adopted August 4, 2010, repealed the former § 14.17.255, and § 58 of Ord. No. 6105 enacted a new § 14.17.255 as set out herein. The former § 14.17.255 pertained to determination of peak flow rate and derived from Ord. No. 3447, 1989.

14.17.260 – Notification of unauthorized discharge.

Each industrial user shall notify the Director immediately of any unauthorized discharge unless otherwise provided for in LVMC 14.17.265.

(Ord. No. 6105, § 58, 8-4-10) Editor's note— Ord. No. 6105, § 57, adopted August 4, 2010, repealed the former § 14.17.260, and § 58 of Ord. No. 6105 enacted a new § 14.17.260 as set out herein. The former § 14.17.260 pertained to excess discharge; amendment of permit and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.265 – Sampling and analysis—Violation.

If sampling and analysis performed by a Class I industrial user indicates a violation of this Chapter, the user shall notify the Director within twenty-four hours after the user becomes aware of the violation. This notification may be made by telephone or e-mail. The user shall also repeat the sampling and analysis, and submit the results thereof to the Director within thirty days after the user becomes aware of the violation, except that the user is not required to resample if the Director:

- (A) Performs the required resampling;
- (B) Performs sampling at the industrial user's facilities at a frequency of at least once per month; or
- (C) Has performed sampling at the industrial user's facilities between the time when the user performed its initial sampling and the time when the user receives the results of the first resampling.

(Ord. No. 6105, § 60, 8-4-10) Editor's note— Ord. No. 6105, § 59, adopted August 4, 2010, repealed the former § 14.17.265, and § 60 of Ord. No. 6105 enacted a new § 14.17.265 as set out herein. The former § 14.17.265 pertained to user report required and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.270 – Sampling and analysis—Best management practices alternative.

The Director may allow or require any industrial user to implement best management practices in lieu of requiring sampling and analysis in order to determine partial or complete compliance with any requirement set forth in this Chapter. The use of best management practices shall not absolve any user from complying with any requirement set forth in this Chapter. The use of best management practices shall be subject to the following conditions:

- (A) Any industrial user that is allowed or required to implement best management practices shall not be absolved from any sampling and analysis requirement imposed by any applicable national pretreatment standard.
- (B) If at any time the Director determines that an industrial user's best management practices are insufficient to determine compliance with any requirement set forth in this Chapter, or if an industrial user fails to comply with those practices, the Director may modify the user's best management practices, or rescind their use as a means of determining compliance. The

Director may also require such a user to conduct frequent sampling and analysis in order to determine compliance.

(Ord. No. 6105, § 60, 8-4-10) Editor's note— Ord. No. 6105, § 59, adopted August 4, 2010, repealed the former § 14.17.270, and § 60 of Ord. No. 6105 enacted a new § 14.17.270 as set out herein. The former § 14.17.270 pertained to monitoring records required and derived from Ord. No. 3447.

14.17.275 – Inspection procedures.

- (A) Whenever it is necessary to make an inspection to monitor or enforce any of the provisions of, or to perform any duty imposed by, this Chapter or other applicable law, or whenever the Director has reasonable cause to believe that there exists upon any premises any violation of the provisions of this Chapter or other applicable law or any condition which makes such premises hazardous, unsafe or dangerous, the Director is authorized to enter such premises at all reasonable times and inspect the same and perform any duty that is imposed upon the Director by this Chapter or other applicable law, subject to the following conditions:
- (1) If the premises are occupied, the Director shall first present proper credentials to the occupant and request entry after explaining the reasons therefor and the purpose of the inspection; or
 - (2) If the premises are unoccupied, the Director shall first make a reasonable effort to locate the owner or other person who has the care or control of such premises and request entry after explaining the reasons therefor and the purpose of the inspection. If such entry is refused or cannot be obtained because the owner or other person who has the care or control of such premises cannot be found after due diligence, the Director may have recourse to every remedy that is provided by law to effect lawful entry and to inspect such premises.
- (B) Notwithstanding the provisions of Subsection (A) of this Section, if the Director has reasonable cause to believe that the wastewater discharge conditions on or emanating from the premises are so hazardous, unsafe or dangerous as to require immediate inspection and action in order to safeguard the public health or safety, the Director shall have the right immediately to enter and inspect such premises and may use any reasonable means that may be required in order to effect such entry and make such inspection, whether the premises are occupied or unoccupied and whether or not formal permission to enter and inspect has been obtained.
- (C) It shall be unlawful for any person to fail or refuse, after a proper demand has been made upon that person in accordance with Subsection (B) of this Section, promptly to permit the Director to enter such premises and to make any inspection that is provided for by Subsection (B). In addition to any criminal penalty that may be imposed upon any person who violates this Subsection (C), such person's environmental control permit may be revoked.

- (D) Any user, by accepting any permit that is issued pursuant to this Chapter, is conclusively presumed to have consented and agreed to the entry at all reasonable times by the Director or designated personnel upon the premises that are described in such permit for any of the following purposes:
- (1) To inspect all areas of the user's facilities that have the potential to influence the characteristics of the wastewater that is, or may be, discharged to the system;
 - (2) To inspect, sample and take flow measurements of the discharge from such user's facilities and to examine records in the performance of the Director's authorized duties;
 - (3) To set up on such user's property such devices as may be necessary or appropriate in order to conduct sampling inspections, compliance monitoring, flow measuring or metering operations, or any combination thereof;
 - (4) To inspect and copy any record, report, test result or other information that is required to carry out the provisions of this Chapter; and
 - (5) To photograph or otherwise create a record of any waste, waste container, vehicle, waste treatment process, discharge location or violation that is discovered during any such inspection.
- (E) If a user has instituted security measures that require proper identification and clearance before entry upon its premises, such user shall make all arrangements with its security guards that may be necessary in order that, upon presentation of their credentials, the duly designated personnel of the City shall be permitted to enter upon the premises without delay for the purpose of performing their authorized duties.

(Ord. No. 6105, § 61, 8-4-10; Ord. 3447 § 131, 1989)

14.17.280 – Noncompliance—Determination.

- (A) The Director may rely on any appropriate evidence to determine noncompliance with an environmental control permit or this Chapter. Upon finding noncompliance, the Director may issue a notice of violation.
- (B) An industrial user who is found to be discharging wastewater into the system at rates or in concentrations greater than:
- (1) Any limit imposed by the user's permit;
 - (2) The levels set forth in LVMC 14.17.130(C); or

- (3) The quantities the user reported to the Director for the period in question, may, in the absence of other evidence, be presumed by the Director to have been discharging at those rates or concentrations at all times during the preceding three years.

(Ord. No. 6105, § 63, 8-4-10) Editor's note— Ord. No. 6105, § 62, adopted August 4, 2010, repealed the former § 14.17.280, and § 63 of Ord. No. 6105 enacted a new § 14.17.280 as set out herein. The former § 14.17.280 pertained to similar material and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.285 – Noncompliance—Fees—Penalties.

- (A) If the sampling and evaluation program that is established for the facilities of any industrial user reveals noncompliance by the industrial user with the concentrations, mass emission rates or conditions that are specified in the environmental control permit of the industrial user or in LVMC 14.17.085 to 14.17.110, inclusive, and 14.17.120 to 14.17.130, inclusive, the industrial user shall pay the fees determined by the Director to be appropriate, but not to exceed the fees that have been established by the City Council pursuant to LVMC 14.17.345. The industrial user may be assessed all of the other costs that are incurred by the City during such sampling and evaluation program, including without limitation the costs of labor, equipment, materials and overhead.
- (B) The noncompliance fees shall continue to accumulate for each day until the industrial user has demonstrated to the satisfaction of the Director compliance with the conditions of the industrial user's environmental control permit or any national pretreatment standard or any requirement set forth in this Chapter.
- (C) If flow measurements, sampling, or other investigations demonstrate that an industrial user is discharging wastewater into the system at a flow rate, quantity of flow, or containing parameter concentrations set forth in LVMC 14.17.130(C) that are in excess of any limits imposed by the user's permit or in excess of the quantities the user reported to the Director for the period in question, the user may be assessed the amount of all delinquent surcharge fees, together with any penalties and interest, that are provided for in LVMC 14.17.340, 14.17.345, 14.17.350 and 14.17.360

(Ord. No. 6105, § 64, 8-4-10; Ord. 3713 § 37, 1993; Ord. 3447 § 134 (A), (B), 1989)

14.17.290 – Noncompliance—Enforcement.

- (A) In the case of noncompliance by an industrial user with the concentrations, mass emission rates or conditions that are specified in the user's environmental control permit or noncompliance with other provisions of this Chapter, the Director may proceed with any one or more of the following actions:
 - (1) Amend the existing permit to add a compliance schedule, but only if the user has shown good faith in attempting to comply with the conditions of its permit but requires additional time for the construction or acquisition, or both, of equipment that is related to pretreatment. If the permit is so amended, the period for compliance shall

be as determined by the Director. Any condition of the compliance schedule that is not acceptable to the user is subject to the provisions of this Chapter that relate to requests for reconsideration and appeals.

- (2) If the user is not under permit, issue a permit or a compliance schedule, after consultation with the user, which requires compliance with the City's discharge standards, any national pretreatment standards or any applicable requirements set forth in this Chapter. The period for compliance shall be as determined by the Director. Any condition of the compliance schedule that is not acceptable to the user is subject to the provisions of this Chapter that relate to requests for reconsideration and appeal.
 - (3) Issue a cease and desist order, prohibiting the user from discharging industrial wastewater from its facilities into the system if corrective action is not taken within a specified time.
 - (4) Commence any enforcement action that is authorized by this Chapter.
- (B) The payment of noncompliance fees by the user or any other person shall not preclude the Director from undertaking any other enforcement procedure that is specified in this Chapter.

(Ord. No. 6105, § 65, 8-4-10; Ord. 3713 § 38, 1993; Ord. 3447 § 134 (C), (D), 1989)

14.17.295 – Wastewater control permit—Suspension.

- (A) The Director may suspend an environmental control permit or the privilege of any industrial user to discharge into the system when such suspension is necessary in order to stop a discharge which presents an imminent hazard to the public health and safety or the welfare of the local environment or which, either alone or by interaction with other discharges, presents an imminent hazard to the system or places the City in violation of its NPDES permit.
- (B) Any industrial user who is notified of a suspension pursuant to this Section shall immediately cease and desist the discharge of all industrial wastewater from its facilities into the system.
- (C) If an industrial user fails to comply voluntarily with the suspension order, the Director may take such action as may be reasonably necessary in order to ensure immediate compliance with such order, including without limitation the immediate blockage or the disconnection of the user's connection to the system.
- (D) In addition, the Director, in the event of any violation of this Chapter by any industrial user, may serve such industrial user with a notice of an intended order of suspension which states the reasons therefor, notifies the industrial user of its opportunity for a hearing with respect thereto and establishes the proposed effective date of the intended order.

- (E) Any industrial user who has been notified of a suspension under this Section may file with the Director a request for a hearing with respect thereto; provided, however, that the filing of such a request shall not stay the existing or proposed suspension.
- (F) If a hearing is requested with respect to an existing or proposed suspension, the Director shall hold a hearing with respect to such suspension within fourteen days after receipt of the request. Within two working days following the close of the hearing, the Director shall make a determination concerning whether to affirm, to terminate or conditionally to terminate the suspension, or the Director may order that the permit be revoked in accordance with LVMC 14.17.300. Reasonable notice of the hearing shall be given to such industrial user no less than five working days prior to the date of the hearing.
- (G) The Director may terminate a suspension under this Section upon proof of the compliance by the industrial user with permit conditions or other requirements, which compliance ends the emergency nature of the hazard that had caused the Director to initiate the suspension; provided, however, that the Director must be satisfied that the user will henceforth comply with all of the discharge requirements that are set forth in this Section, the City's rules and regulations that relate to the discharge of wastewater and any lawful order that is issued pursuant to this Chapter.

(Ord. No. 6105, § 66, 8-4-10; Ord. 3447 § 135, 1989)

14.17.300 – Wastewater control permit—Revocation.

- (A) The Director may revoke an environmental control permit or the privilege of any industrial user to discharge into the system upon a finding that the permittee or industrial user has violated any provision of this Chapter or any of the City's rules and regulations that relate to the discharge of wastewater; provided, however, that no such revocation shall be ordered until a notice and the opportunity for a hearing with respect to the proposed revocation before the Director has been provided in the same manner that is set forth in LVMC 14.17.295 (D) and (E) with respect to suspensions.
- (B) Any industrial user who has been notified of a revocation pursuant to Subsection (A) of this Section shall immediately cease and desist the discharge of all industrial wastewater from its facilities into the system. In order to enforce such revocation, the Director may disconnect or permanently block the user's connection to the system, if such action is deemed by the Director to be reasonably necessary in order to ensure the user's compliance with the order of revocation.
- (C) After a revocation pursuant to Subsection (A) of this Section, there shall be no further discharge of industrial wastewater from the user's facilities into the system unless and until an application for a new environmental control permit has been filed; all of the fees and charges that are required in connection with an initial application and all delinquent fees, charges, penalties and other sums that are owed by the user or the applicant for the new permit, or both, have been paid to the City; and a new environmental control permit has been issued. The user or the applicant for the new permit, or both, shall also reimburse the

City for any cost that was incurred by the City, including without limitation administrative costs and investigative fees, in revoking such permit and disconnecting or blocking such industrial user's connection to the system before the issuance of a new environmental control permit.

(Ord. No. 6105, § 67, 8-4-10; Ord. 3447 § 136, 1989)

14.17.305 – Reserved.

Editor's note— Ord. No. 6105, § 68, adopted August 4, 2010, repealed § 14.17.305, which pertained to suspension or revocation hearing and derived from Ord. No. 3447, 1989.

14.17.310 – Director authorized to take precautionary measures.

The Director shall have the full power and authority to immediately and effectively halt or prevent, through whatever means and procedures are deemed reasonably necessary, and after informal notice to the discharger, any discharge of pollutants into the system, or into any storm drain, which appears to present an imminent endangerment to the health or welfare of any person or the environment, or which discharge threatens property or the proper operation of the system, or which places or threatens to place the City in violation of its NPDES permit. In implementing such measure or measures, the personnel of the City, any party with which the City has contracted for such purpose; or a duly authorized representative of any other government agency shall have immediate access to the premises on which such condition exists. The Director may prohibit the approach to the premises on which such condition exists by any person, vehicle, vessel or thing, and all persons who are not actually employed in the abatement of such condition or in the preservation of life or property on, or in the vicinity of, such premises may be excluded from such premises. The affected user or other person shall have the opportunity to respond, after the fact, to any action taken pursuant to this Section by requesting a hearing in the same manner that is set forth in LVMC 14.17.295 (D) and (E) with respect to suspensions.

(Ord. No. 6105, § 69, 8-4-10; Ord. 3713 § 39, 1993; Ord. 3447 § 138, 1989)

14.17.315 – Upset as affirmative defense.

- (A) An industrial user who wishes to assert the affirmative defense that an alleged violation is the result of an upset shall demonstrate, through properly signed contemporaneous operating logs or other relevant evidence, that:
- (1) The upset occurred and that the industrial user can identify the specific cause or causes thereof;
 - (2) The facilities at which the violation is alleged to have occurred were, at the time that the violation allegedly occurred, being properly operated;

- (3) The industrial user submitted notice of the upset to the Director within the time and accompanied by the information that is specified in LVMC 14.17.050; and
 - (4) The industrial user complied with any remedial measure that is required in order to minimize or correct any adverse impact on the environment that could have resulted from the upset.
- (B) In any enforcement proceeding, an industrial user who seeks to establish the occurrence of an upset shall have the burden of proof.

(Ord. No. 6105, § 70, 8-4-10; Ord. 3713 § 40, 1993; Ord. 3447 § 139, 1989)

14.17.320 – Reconsideration and appeal—Fees.

- (A) Any person who is affected by any decision, action or determination made by the Director in the interpretation or the implementation of the provisions of this Chapter or in any permit that is issued hereunder may file with the Director a written request for the reconsideration of such decision, action or determination. The person requesting reconsideration must file the request within thirty days after receipt of notice of the decision, action or determination, and must set forth in detail the facts that support the request for reconsideration. Such facts must include a statement that sets forth any newly discovered relevant fact that was not known or was unavailable to the person requesting reconsideration at the time of the initial decision, action or determination. The Director shall render a written decision with respect to the request within thirty days after receipt thereof.
- (B) Each request for reconsideration shall be accompanied by the fee, if any, that has been established by the City Council pursuant to LVMC 14.17.345 for the filing of such a request. Any such fee may, in the sole discretion of the Director, be refunded if the Director's ruling with respect to such request is in favor of the person who made the request.
- (C) If the ruling of the Director with respect to a request for reconsideration is unacceptable to the person who made such request, the person may, within ten working days after the date of its receipt of the notification of the Director's ruling, file a written appeal to the City Council.
- (D) Each appeal shall be accompanied by the fee, if any, that has been established by the City Council pursuant to LVMC 14.17.345 for the filing of an appeal. Any such fee may, in the sole discretion of the City Council, be refunded if the City Council's ruling with respect to such appeal is in favor of the person who filed the appeal.
- (E) The appeal shall be heard by the City Council within forty-five days after the date on which the appeal was filed, and the City Council shall make a final ruling with respect to the appeal within forty-five days after the hearing is concluded.

14.17.325 – Liability for civil penalties.

- (A) In the event of any violation by a user of its environmental control permit, if any, or a violation by any person of any provision of this Chapter, for which violation the Director is authorized by this Chapter to issue a compliance order pursuant to this Section, the Director is authorized to commence a civil action against such person for appropriate relief, including without limitation civil penalties or a temporary and permanent injunction against the perpetuation of such violation, or both, or to impose administrative penalties upon such person for such violation in accordance with LVMC 14.17.330
- (B) A user or other person shall be liable for civil penalties pursuant to Subsection (A) of this Section under any of the following circumstances:
- (1) The failure of a user to accurately report the wastewater parameters and characteristics of its discharge;
 - (2) The failure of a user to report significant changes in its operations that could affect the wastewater parameters and characteristics of its discharge;
 - (3) The refusal of a user to permit access by the authorized personnel of the City to such user's premises for the purposes of inspection or monitoring, or both;
 - (4) The failure of a user to submit any self-monitoring report on or before the date on which such report was due;
 - (5) The failure of a user to report, in a timely manner, its proposed interim or permanent remedial or corrective action in the event of a violation of the discharge limits for the parameters that are noted in such user's self-monitoring report;
 - (6) The failure of a user to submit, in a timely manner, a report with respect to its proposed interim or permanent remedial or corrective action and a time schedule in the event that a notice of violation is issued by the Director and such report is required by such notice;
 - (7) The failure of a user to maintain all of the required monitoring equipment in good working order at all times;
 - (8) The failure of a user to comply with any of the conditions of its environmental control permit; and
 - (9) The failure of a user or any other person to comply with any of the provisions of this Chapter.

- (C) Before commencing a civil action against a user or other person pursuant to this Section, the Director shall issue an order that requires the user or other person to comply with this Chapter and advises the user or other person that, upon failure to comply with the order, the Director is authorized to bring a civil action in accordance with this Section.
- (D) Any order which the Director issues pursuant to this Section shall be in writing and shall be delivered in person to the user or other person, or served by registered or certified mail that is addressed to the user or other person at the user or other person's last known address, return receipt requested, shall state with reasonable specificity the nature of the violation in respect of which the order is issued and shall specify a period in which compliance therewith is required. The period for compliance shall not exceed thirty days, in the case of a violation of an interim compliance schedule or operation and maintenance requirement, and shall not exceed the period that the Director determines is reasonable, in the case of a violation of a final deadline. In determining the period for compliance, the Director shall consider the seriousness of the violation and any good faith effort on the part of the user or other person to comply with the applicable requirements.
- (E) In any civil action that is brought by the Director for enforcement of the provisions of this Chapter, the Director shall seek the imposition of a civil penalty upon the user or other person against whom the action is brought in an amount that is not less than one thousand dollars nor more than twenty-five thousand dollars for each day that each such violation continues. In determining the amount of a civil penalty that is to be imposed, following a finding by the court of liability, the court shall consider the circumstances, extent and gravity of the violation in respect of which the action is brought, the economic benefit, if any, that has inured to the user or other person as the result of the violation, any history of similar violations, the degree of culpability of the user or other person, any good faith effort on the part of the user or other person to comply with the applicable requirements, the potential economic impact of the penalty upon the user or other person, and such other matters as justice may require.
- (F) The civil and administrative penalties that are provided for in this Section and in LVMC 14.17.330, respectively, and the seeking or imposition thereof, shall be in addition to, and not in substitution for, any criminal penalty that may be imposed for the violation that forms the subject matter of any such civil or administrative relief and in addition to, and not in substitution for the invocation of the provisions of this Chapter that authorize the suspension or revocation of an environmental control permit as the result of the violation.

(Ord. No. 6105, § 72, 8-4-10; Ord. 3447 § 141, 1989)

14.17.330 – Imposition of administrative penalties.

- (A) Whenever, on the basis of the information that is available, the Director finds that any person is in violation of any of the provisions of this Chapter, any condition of a user's environmental control permit, if any, or any limitation that implements any of the conditions of any such permit, the Director may assess an administrative penalty in an amount that is not less than five hundred dollars nor more than ten thousand dollars for

each day that each such violation continues, unless a different administrative penalty for any of such violations is established in the schedule of fees and charges that has been established by the City Council pursuant to LVMC 14.17.345

- (B) Before assessing any administrative penalty pursuant to this Section, the Director shall give the user or other person upon whom such penalty is to be imposed written notice of the proposed assessment and the opportunity to request, within thirty days after the date on which such notice is received by it, a hearing with respect to the proposed order of assessment.
- (C) In determining the amount of any penalty assessed pursuant to this Section, the Director shall consider the nature, circumstances, extent and gravity of the violation in respect of which the penalty is proposed to be assessed; the economic benefit, if any, that has inured to the user or other person as the result of such violation; any good faith effort on the part of the user or other person to comply with the applicable requirements; the potential economic impact of the penalty upon the user or other person; any history of similar violations; the degree of culpability of the user or other person; and such other matters as justice may require.
- (D) An order which imposes an administrative penalty pursuant to this Section shall become final:
 - (1) Thirty days after its issuance; or
 - (2) If a hearing has been requested pursuant to Subsection (B) of this Section, upon the Director's issuance of a decision following the hearing.
- (E) The failure of a user to pay any administrative penalty that is imposed by the Director pursuant to this Section within thirty days after the imposition thereof shall be grounds for the suspension or revocation of the user's environmental control permit, if any, as well as for any other remedy that is available under this Chapter for terminating the user's ability to discharge or cause to be discharged wastewater from its facilities into the system.

(Ord. No. 6105, § 73, 8-4-10; Ord. 3447 § 142, 1989)

14.17.335 – Reserved.

Editor's note— Ord. No. 6105, § 74, adopted August 4, 2010, repealed § 14.17.335, which pertained to publication of list of significant violators and derived from Ord. No. 3447, 1989 and Ord. No. 3713, 1993.

14.17.340 – Unpaid fees constitute lien.

Any fee, assessment or penalty that is imposed pursuant to this Chapter which remains unpaid for a period that exceeds thirty days after the same became due shall, upon the expiration of such thirty-day period, constitute a perpetual lien on and against the premises which are subject to such fee, assessment or penalty as well as constituting a debt that is owing to the City by the user

upon whom such fee, assessment or penalty is imposed and the owner of record of such premises, if such owner is someone other than the user. The City may bring a civil action in any court of competent jurisdiction to recover such fee, assessment or penalty, or any combination thereof, together with interest thereon, and may enforce such lien by recording a notice thereof with the County Recorder upon the expiration of such thirty-day period and foreclosing the same against the premises that are subject to such lien in the same manner as is provided by the laws of the State for the foreclosure of mechanics' liens.

(Ord. 3447 § 145, 1989)

14.17.345 – Schedule of fees and charges—Establishment.

- (A) In order to provide for the recovery by the City of its costs that are related to the discharge of industrial wastewater into the system and for the enforcement of the provisions of this Chapter, or both, the City Council shall establish a schedule of fees and charges. Such schedule, which shall be subject to periodic revision, may establish a specific amount for any fee, charge, assessment, penalty or other cost that is related to the discharge of industrial wastewater to the system or the enforcement of the provisions of this Chapter, or both, including without limitation:
- (1) Permit application fees;
 - (2) Permit issuance fees;
 - (3) Permit renewal fees;
 - (4) Nonroutine inspection fees;
 - (5) Compliance or surcharge monitoring fees;
 - (6) Wastewater surcharge fees that are based upon the quantity of the flow or the surcharge parameters that are specified in LVMC 14.17.130(C), or both;
 - (7) Administrative penalties;
 - (8) Fees for filing requests for reconsideration and appeals; and
 - (9) Fees for the disposal of special wastes.
- (B) Except as may be otherwise provided in this Chapter, whenever any fee, charge, assessment or penalty that is required by this Chapter to be paid is based upon an estimated value or an estimated quantity, the Director shall make such determination in accordance with generally recognized practices.

(Ord. No. 6105, § 75, 8-4-10; Ord. 3713 § 42, 1993; Ord. 3447 §§ 146, 149, 1989)

14.17.350 – Schedule of fees and charges—Due upon delivery.

All fees, charges, assessments and penalties that are imposed pursuant to the provisions of this Chapter or the approved schedule of fees and charges that is established in accordance with LVMC 14.17.345(A) shall be due and payable upon delivery of notice thereof, or upon mailing such notice to the last known mailing address of the person or entity responsible for payment thereof. All such fees, charges, assessments and penalties shall be and become delinquent thirty days after delivery or mailing of the notice described above.

(Ord. No. 6105, § 76, 8-4-10; Ord. 3713 § 43, 1993; Ord. 3447 § 147, 1989)

14.17.355 – City to keep account of fees, charges and penalties received.

The City shall keep a permanent and accurate account of all fees, charges, assessments and penalties that are received by it under this Chapter, which account shall include the name and address of each person who paid any such fee, charge, assessment or penalty or on whose behalf the same was paid, the date of such payment and amount thereof and the purpose for which the same was paid.

(Ord. 3447 § 148, 1989)

14.17.360 – Delinquency charges.

Whenever a delinquency charge has not been specifically provided for in this Chapter, any fee, charge or assessment that becomes delinquent shall have added to it a basic delinquency charge that is equal to ten percent of the fee, charge or assessment that became delinquent, and thereafter an additional delinquency charge shall accrue on the total amount that is due, including the ten percent basic delinquency charge, at the rate of ten percent per month compounding, but the amount of the delinquent fee, charge or assessment, as increased by delinquency charges, shall not exceed twice the amount of the original fee, charge or assessment. In addition to the delinquency charges described in this Section, the City may also assess the collection costs, including, without limitation, attorneys' fees and court costs, that the City may incur in collecting the fee, charge or assessment and the delinquency charges.

(Ord. No. 6105, § 77, 8-4-10; Ord. 3447 § 150, 1989)

14.17.365 – Actions to collect—Prayer for injunction.

Any action that is brought by the City for the purpose of collecting any fee, charge, assessment or penalty that is provided for in this Chapter may include a prayer for an injunction to prevent repeated and recurring violations of this Chapter.

(Ord. No. 6105, § 78, 8-4-10; Ord. 3447 § 151, 1989)

14.17.370 – Violation—Penalty.

- (A) Any person who negligently or wilfully violates any of the provisions of this Chapter is guilty of a misdemeanor, and each day during which such violation continues constitutes a separate offense.
- (B) Any person who negligently or wilfully introduces or causes to be introduced into the system any pollutant or hazardous substance which such person knew, or with the exercise of reasonable diligence would have known, could cause personal injury or property damage or, unless such action is necessary in order for such person to comply with all applicable Federal, State and local requirements or permits, which causes any of the City's wastewater treatment plants to violate any effluent limitation or condition of any permit that has been issued to the City pursuant to the Act is guilty of a misdemeanor, and each day during which such person continues to introduce or cause to be introduced such pollutant or substance into the system shall constitute a separate offense.
- (C) Any person who knowingly makes a false statement, representation or certification of any material fact in any application, record, report, plan or other document that is filed or required to be maintained pursuant to this Chapter or who knowingly falsifies, tampers with or renders inaccurate any monitoring device or method that is required by this Chapter to be maintained is guilty of a misdemeanor.
- (D) Whenever in this Chapter any act is prohibited or is made or declared to be unlawful or an offense or a misdemeanor, or whenever in this Chapter the doing of any act is required or the failure to do any act is made or declared to be unlawful or an offense or a misdemeanor, the doing of any such prohibited act or the failure to do any such required act shall constitute a misdemeanor and upon conviction thereof, shall be punished by a fine of not more than one thousand dollars or by imprisonment for a term of not more than six months, or by any combination of such fine and imprisonment. Any day of any violation of this Chapter shall constitute a separate offense.

(Ord. No. 6105, § 79, 8-4-10; Ord. 3713 § 44, 1993; Ord. 3447 §§ 143, 154, 1989)

Appendix C

Las Vegas Municipal Code 14.18



**Las Vegas Municipal Code
Chapter 14.18**

Stormwater and Stormwater Management



Las Vegas Municipal Code Chapter 14.18 Stormwater and Stormwater Management

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- 14.18.290 – Nonexclusivity.

14.18.010 – Definitions.

“Act” means the provisions of the Clean Water Act, as amended and as set forth in 33 U.S.C. Sections 1251 et seq., together with all guidelines, limitations and standards that are promulgated by the EPA pursuant to the Act.

“BMP” or “best management practices” means a structural or non-structural device, facility, measure, source control practice, or any activity, along with any required documentation thereof, that helps to achieve compliance with any discharge requirement set forth in this Chapter.

“CFR” means the Code of Federal Regulations, a codification of regulations issued by the executive departments and agencies of the Federal Government.

“Construction activity” means activities subject to NPDES construction permits as defined in 40 CFR Section 122.26.

“Director” means the Director of Public Works, or an authorized agent or representative of the Director.

“Discharge” means a point source discharge of pollutants into the storm system.

“Illicit discharge” means a direct or indirect discharge of non-stormwater to the storm system, except as allowed for in this Chapter.

“Illicit connection” means any connection to the storm system from an indoor sink or drain, or any drain or conveyance, whether on the surface or subsurface, which allows entrance to the storm system of a discharge of sewage, industrial process wastewater, or non-stormwater that could interfere with the storm system or present an imminent and substantial endangerment to human health or the environment.

“Industrial activity” means activities subject to NPDES industrial permits as defined in 40 CFR Section 122.26.

“Maximum extent practicable” means the technology-based discharge standard to reduce pollutants in stormwater discharges that was established by Section 402(p) of the Act and is described in 40 CFR Section 122.34(a).

“NDEP” means the Division of Environmental Protection of the Nevada Department of Conservation and Natural Resources.

“Non-stormwater” means any discharge to the storm system that is not composed entirely of stormwater.

“NPDES permit” means a National Pollutant Discharge Elimination System permit that is issued by NDEP pursuant to Section 402 of the Act, authorizing a person to discharge pollutants into the waters of the United States.

“Person” means any individual, association, organization, partnership, firm, corporation or other entity recognized by law and acting as either the owner of premises or of an operation (or as the owner’s agent), but does not include the City or any other state or local governmental entity within the State of Nevada, or any of their employees or agents.

“Point source” means “point source” as that term is defined in Section 502(14) of the Act.

“Pollutant” means “pollutant” as that term is defined in Section 502(6) of the Act.

“Premises” means any building, lot, parcel of land, or portion of land, whether improved or unimproved, and including adjacent sidewalks and parking strips.

“Release” or “spill” means any significant spill, leak, or release of any non-stormwater into the storm system, whether intentional or unintentional, other than that which is allowed for in this Chapter.

“Stormwater” means any discharge resulting from precipitation, irrigation, or normal residential activity.

“Surface waters” means “navigable waters” as that term is defined in Section 502(7) of the Act.

“Storm system” means any publicly-owned facility by which stormwater is collected or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.

(Ord. 6006 § 2, 2008)

14.18.020 – Purpose.

The purpose of this Chapter is to provide for the health, safety, and general welfare of City residents and visitors through the regulation of discharges to the storm system, to the maximum extent practicable. This Chapter establishes methods for controlling the introduction of stormwater and non-stormwater into the storm system in order to comply with requirements of the City’s NPDES stormwater permit. The objectives of this Chapter are to:

- (A) Regulate the discharge of stormwater and non-stormwater to the storm system;
- (B) Prohibit illicit connections and illicit discharges to the storm system;
- (C) Establish legal authority to carry out all inspection, surveillance, monitoring procedures, and enforcement activities necessary to ensure compliance with this Chapter;
- (D) Establish civil, administrative and criminal penalties for violations of the provisions of this Chapter; and

- (E) Provide procedures for City compliance with requirements that are placed upon the City by other governmental agencies.

(Ord. 6006 § 3, 2008)

14.18.030 – Applicability.

This Chapter shall apply to all water entering the storm system that has been generated on any developed and undeveloped lands, unless explicitly exempted by the Director or NDEP.

(Ord. 6006 § 4, 2008)

14.18.040 – Director’s responsibilities.

The Director shall be responsible for administering, implementing, and enforcing the provisions of this Chapter. Any powers granted or duties imposed upon the Director may be delegated in writing by the Director to persons or entities acting in the beneficial interest of, or in the employ of, the City.

(Ord. 6006 § 5, 2008)

14.18.050 – Compliance—Liability.

The standards established by this Chapter are minimum standards that have been adopted by the City for the purposes stated. Nothing in this Chapter:

- (A) Is intended, nor shall be deemed, to imply that compliance with this Chapter by any person will insulate that person from liability under other sources of law or theories of liability relating to the discharge of pollutants into the storm system;
- (B) Shall create liability on the part of the City or its officers, employees or agents for any damages that result from a discharger=s reliance on this Chapter or any administrative decision lawfully made thereunder.

(Ord. 6006 § 6, 2008)

14.18.060 – Regulation of discharges.

The City is authorized to regulate discharges from persons and premises that are located outside of the corporate boundaries of the City but are tributary to the storm system, consistent with any interlocal agreement. The requirements of this Chapter shall apply to each such person. The Director is authorized to inspect and monitor the facilities of each such person in order to determine its compliance with this Chapter.

(Ord. 6006 § 7, 2008)

14.18.070 – Illicit discharges prohibited—Exceptions.

- (A) It is unlawful for any person to discharge or cause to be discharged into the storm system any nonstormwater, unless the discharge has been authorized by NDEP and approved by the Director, or is one of the following:
- (1) Water line flushing; water from other potable water sources; landscape irrigation or lawn watering; diverted stream flows; rising ground water; ground water infiltration to the storm system; foundation or footing drains (not including active groundwater dewatering systems); crawl space pumps; air conditioning and swamp cooler condensation; springs; non-commercial washing of vehicles; natural riparian habitat or wetland flows; firefighting activities; or any other water source not containing pollutants, provided that NDEP has not determined the source to be a substantial contributors of pollutants.
 - (2) Dechlorinated swimming pool water (less than one mg/L chlorine), provided that a suitable connection to the sanitary sewer is not available, as determined by the Director, and permission to discharge swimming pool water into the storm system has first been obtained from the Director.
 - (3) Discharges specified by NDEP as being necessary to protect public health and safety.
 - (4) Dye testing, provided that notification, either verbal or written, is given to the Director prior to the time of the testing.
- (B) It is unlawful for any person to discharge or cause to be discharged into any surface waters within the City any pollutant, without first obtaining from NDEP an NPDES permit authorizing the discharge, when such a permit is required by the Act.
- (C) It is unlawful for any person to discharge or cause to be discharged into the storm system any non-stormwater that would cause a violation of the City's NPDES stormwater permit.

(Ord. 6006 § 8, 2008)

14.18.080 – Storm system—Violations.

- (A) The construction, use, maintenance or continued existence of illicit connections to the storm system is prohibited, which expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.
- (B) A person is considered to be in violation of this Chapter if the person connects a line conveying sewage to the storm system, or allows such a connection to continue.
- (C) It is unlawful for any person to remove any manhole cover, or to discharge or cause to be discharged any stormwater or non-stormwater directly into a manhole or other opening in

the storm system that has not been authorized for stormwater discharge, unless such discharge is approved by the Director. The Director may require a written application by the person and the payment of the applicable fees and charges that have been established by the City Council pursuant to Section 14.18.200 of this Chapter.

(Ord. 6006 § 9, 2008)

14.18.090 – Storm system—Unlawful disposal.

It is unlawful for any person to dispose of trash, construction debris, or industrial waste materials into the storm system, except as allowed by this Chapter or by the Director.

(Ord. 6006 § 10, 2008)

14.18.100 – Director’s authority—Hearings.

- (A) The Director shall have the full power and authority to immediately and effectively halt or prevent, through whatever means and procedures are deemed reasonably necessary, and after informal notice to the discharger, any discharge of non-stormwater into the storm system which appears to present an imminent endangerment to the health or welfare of any person or the environment, or which discharge threatens property or the proper operation of the storm system, or which places or threatens to place the City in violation of its NPDES stormwater permit. In implementing such measure or measures, the personnel of the City, any party with which the City has contracted for such purpose, or a duly authorized representative of any other government agency shall have immediate access to the premises on which such condition exists. The Director may prohibit the approach to such premises by any person, vehicle, vessel or thing, and all persons who are not actually employed in the abatement of such condition or in the preservation of life or property on, or in the vicinity of, such premises may be excluded from such premises. The affected person or persons shall have the opportunity to respond, after the fact, to any action taken pursuant to this Section by requesting a hearing in the manner that is set forth in Subsection (E) of this Section.
- (B) Any person who is notified of action pursuant to Subsection (A) of this Section (a “storm system access suspension”) shall immediately cease and desist the discharge of all non-stormwater from its facilities into the storm system.
- (C) If a person fails to comply voluntarily with a storm system access suspension order, the Director may take such action as may be reasonably necessary in order to ensure immediate compliance with such order, including without limitation the immediate blockage or the disconnection of the person=s connection to the storm system.
- (D) In addition, the Director, in the event of any violation of this Chapter by any person, may serve such person with a notice of an intended order of storm system access suspension, which notice states the reasons therefor, notifies the person of the opportunity for a hearing with respect thereto and establishes the proposed effective date of the intended order.

- (E) Any person who has been notified of a storm system access suspension under this Section may file with the Director a request for a hearing with respect thereto; provided, however, that the filing of such a request shall not stay the existing or proposed storm system access suspension.
- (F) If a hearing is requested with respect to an existing or proposed storm system access suspension, the Director shall hold a hearing with respect to such storm system access suspension within fourteen days after receipt of the request. Within two working days following the close of the hearing, the Director shall make a determination concerning whether to affirm, to terminate or conditionally to terminate the storm system access suspension. Reasonable notice of the hearing shall be given to such person no less than five working days prior to the date of the hearing.
- (G) The Director may terminate a storm system access suspension under this Section upon proof of the compliance by the person with applicable requirements, which compliance ends the emergency nature of the hazard that had caused the Director to initiate the storm system access suspension; provided, however, that the Director must be satisfied that the person will henceforth comply with all of the discharge requirements that are set forth in this Chapter, the City's rules and regulations that relate to the discharge of stormwater, and any lawful order that is issued pursuant to this Chapter.

(Ord. 6006 § 11, 2008)

14.18.110 – NPDES permits—Required.

Any person who is required by the Act to obtain an NPDES permit for stormwater associated with industrial activity or an NPDES permit for stormwater associated with construction activity shall obtain such permit within the time allowed by the Act. Proof of having obtained such permit may be required in a form acceptable to the Director.

(Ord. 6006 § 12, 2008)

14.18.120 – Inspections.

- (A) Whenever it is necessary to make an inspection to monitor or enforce any of the provisions of, or to perform any duty imposed by, this Chapter, or whenever the Director has reasonable cause to believe that there exists upon any premises any violation of the provisions of this Chapter or any condition which makes such premises hazardous, unsafe or dangerous, the Director is authorized to enter such premises at all reasonable times and inspect the same and perform any duty that is imposed upon the Director by this Chapter, subject to the following conditions:
 - (1) If the premises are occupied, the Director shall first present proper credentials to the occupant and request entry after explaining the reasons therefor and the purpose of the inspection; or

- (2) If the premises are unoccupied, the Director shall first make a reasonable effort to locate the owner or other person who has the care or control of such premises and request entry after explaining the reasons therefor and the purpose of the inspection. If such entry is refused or cannot be obtained because the owner or other person who has the care or control of such premises cannot be found after due diligence, the Director may have recourse to every remedy that is provided by law to effect lawful entry and to inspect such premises.
- (B) Notwithstanding the provisions of Subsection (A) of this Section, if the Director has reasonable cause to believe that non-stormwater discharge conditions on or emanating from the premises are so hazardous, unsafe or dangerous as to require immediate inspection and action in order to safeguard the public health or safety, the Director shall have the right immediately to enter and inspect such premises and may use any reasonable means that may be required in order to effect such entry and make such inspection, whether the premises are occupied or unoccupied and whether or not formal permission to enter and inspect has been obtained.
 - (C) It shall be unlawful for any person to fail or refuse, after a proper demand has been made upon that person in accordance with Subsection (B) of this Section, promptly to permit the Director to enter such premises and to make any inspection that is provided for by Subsection (B). In addition to any criminal penalty that may be imposed upon any person who violates this Subsection (C), such person=s storm system access may be suspended as provided for in Section 14.18.100.
 - (D) Any person subject to this Chapter shall consent and agree to the entry at all reasonable times by the Director or designated personnel upon any premises subject to this Chapter for any of the following purposes:
 - (1) To inspect all areas of the person=s facilities that have the potential to influence the characteristics of the non-stormwater that is, or may be, discharged to the storm system;
 - (2) To inspect, sample and take flow measurements of the discharge from such person=s facilities and to examine records in the performance of the Director=s authorized duties;
 - (3) To set up on such person=s property such devices as may be necessary or appropriate in order to conduct sampling, inspections, compliance monitoring, flow measuring or metering operations, or any combination thereof;
 - (4) To inspect and copy any record, report, test result or other information that is required to carry out the provisions of this Chapter; and
 - (5) To photograph or otherwise create a record of any waste, waste container, vehicle, waste treatment process, discharge location or violation that is discovered during any such inspection.

- (E) If a person has instituted security measures that require proper identification and clearance before entry upon its premises, such person shall make all arrangements with its security guards that may be necessary in order that, upon presentation of their credentials, the duly designated personnel of the City shall be permitted to enter upon the premises without delay for the purpose of performing their authorized duties.

(Ord. 6006 § 13, 2008)

14.18.130 – Construction, commercial and industrial sites.

- (A) For any construction, commercial or industrial site, the Director may require BMPs that reduce the discharge of pollutants to the maximum extent practicable. These BMPs shall be consistent with applicable local guidance documents developed to implement this Section. BMPs that are consistent with the applicable local guidance documents shall be deemed in compliance with this Section. These BMPs shall be installed and maintained at the sole expense of the owner or operator.
 - (1) The Director may require the owner or operator of any construction, commercial or industrial site to submit a written plan for BMPs before commencement of construction or operation of the site, or at any time thereafter. The Director may require any person who proposes development or significant redevelopment to submit a written plan for BMPs, and for the operation and maintenance of any BMP. Any such plan is subject to approval by the Director, and shall be maintained at the same site for which it was written and be available for inspection during normal business hours.
 - (2) Compliance with all terms and conditions of a valid NPDES stormwater permit authorizing the discharge of stormwater to the storm system shall be deemed in compliance with the provisions of this Section.
- (B) If the Director determines that existing BMPs do not reduce the discharge of pollutants to the maximum extent practicable, the Director may require additional BMPs to satisfy the provisions of Subsection (A) of this Section.
- (C) The Director may require secondary containment for any hazardous substance when the Director determines that the substance has the potential to enter the storm system illicitly. Such secondary containment shall be provided and maintained at the sole cost and expense of the person responsible for the substance.

(Ord. 6006 § 14, 2008)

14.18.140 – Responsibility.

Notwithstanding any other requirement of law, as soon as any person responsible for a facility or operation, or responsible for emergency response related thereto, has information regarding any known or suspected release of non-stormwater at or from that facility or operation, where such

release is not authorized by this Chapter, the person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of a release that is in excess of a Federally-reportable quantity, the person shall immediately notify the Director and emergency response agencies of the occurrence by calling 911. In the event of any non-hazardous release, the person shall notify the Director no later than the next business day. If the release emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

(Ord. 6006 § 15, 2008)

14.18.150 – Noncompliance.

- (A) The Director may rely on any appropriate evidence to determine noncompliance with this Chapter.
- (B) In the case of noncompliance with this Chapter, the Director may proceed with any one or more of the following actions:
 - (1) Issue a notice of violation;
 - (2) Assess noncompliance fees;
 - (3) Revoke City permits, licenses and agreements pertaining to work on the premises;
 - (4) Issue a cease and desist order requiring any person who caused or is responsible for the release to cease the release within a specified time;
 - (5) Issue a cleanup and abatement order requiring any such person to clean up and abate the release within a specified time;
 - (6) Cause the release to be cleaned up and abated, and thereafter recover the costs thereof from the person or persons who are responsible for the release; or
 - (7) Take any other action as provided for in any provision of the Chapter.
- (C) The payment of noncompliance fees shall not preclude the Director from undertaking any other enforcement procedure that is specified in this Chapter.

(Ord. 6006 § 16, 2008)

14.18.160 – Request for reconsideration.

- (A) Any person who is affected by any decision, action or determination made by the Director in the interpretation or the implementation of the provisions of this Chapter may file with the Director a written request for the reconsideration of such decision, action or

determination. The person requesting reconsideration must file the request within thirty days after receipt of notice of the decision, action or determination, and must set forth in detail the facts that support the request for reconsideration. Such facts must include a statement that sets forth any newly discovered relevant fact that was not known or was unavailable to the person requesting reconsideration at the time of the initial decision, action or determination. The Director shall render a written decision with respect to the request within thirty days after receipt thereof.

- (B) Each request for reconsideration shall be accompanied by the fee, if any, that has been established by the City Council, pursuant to Section 14.18.200, for the filing of such a request. Any such fee may, in the sole discretion of the Director, be refunded if the Director's ruling with respect to such request is in favor of the person who made the request.
- (C) If the ruling of the Director with respect to a request for reconsideration is unacceptable to the person who made such request, the person may, within ten working days after the date of its receipt of the notification of the Director's ruling, file a written appeal to the City Council.
- (D) Each appeal shall be accompanied by the fee, if any, that has been established by the City Council, pursuant to Section 14.18.200, for the filing of an appeal. Any such fee may, in the sole discretion of the City Council, be refunded if the City Council's ruling with respect to such appeal is in favor of the person who filed the appeal.
- (E) The appeal shall be heard by the City Council within forty-five days after the date on which the appeal was filed, and the City Council shall make a final ruling with respect to the appeal within forty-five days after the hearing is concluded.

(Ord. 6006 § 17, 2008)

14.18.170 – Compliance order.

- (A) In the event of any violation of any provision of this Chapter for which the Director is authorized by this Section to issue a compliance order, the Director is authorized to commence a civil action against the person or persons responsible for the violation. The action may seek all appropriate relief, including without limitation civil penalties or a temporary and permanent injunction against the perpetuation of such violation, or both, or to impose administrative penalties for the violation in accordance with Sections 14.18.180 and 14.18.200.
- (B) A person may be held liable for civil penalties pursuant to Subsection (A) of this Section for failure to comply with any provision of this Chapter.
- (C) Before commencing a civil action against a person pursuant to this Section, the Director shall issue an order that requires the person to comply with this Chapter and advises the

person that, upon failure to comply with the order, the Director is authorized to bring a civil action in accordance with this Section.

- (D) Any compliance order which the Director issues pursuant to this Section shall be in writing and shall be served personally or by registered or certified mail that is addressed to the recipient's last known address, return receipt requested. The order shall state with reasonable specificity the nature of the violation in respect of which the order is issued and shall specify a period in which compliance therewith is required. The period for compliance shall not exceed thirty days, in the case of a violation of an interim compliance schedule or operation and maintenance requirement, and shall not exceed the period that the Director determines is reasonable, in the case of a violation of a final deadline. In determining the period for compliance, the Director shall consider the seriousness of the violation and any good faith effort on the part of the user or other person to comply with the applicable requirements.
- (E) In any civil action that is brought by the Director for enforcement of the provisions of this Chapter, the Director shall seek the imposition of a civil penalty upon the person against whom the action is brought, consistent with the provisions of State law, in an amount that is not less than one thousand dollars nor more than twenty-five thousand dollars for each day that each such violation continues. In determining the amount of a civil penalty that is to be imposed, following a finding by the court of liability, the court shall consider the circumstances, extent and gravity of the violation in respect of which the action is brought, the economic benefit, if any, that has inured to the person as the result of the violation, any history of similar violations, the degree of culpability of the person, any good faith effort on the part of the person to comply with the applicable requirements, the potential economic impact of the penalty upon the person, and such other matters as justice may require.
- (F) The civil and administrative penalties that are provided for in this Section and in Sections 14.18.180 and 14.18.200 shall be in addition to, and not in substitution for, any criminal penalty that may be imposed for the violation that forms the subject matter of any such civil or administrative relief and in addition to, and not in substitution for the invocation of any of the provisions of this Chapter as the result of the violation.

(Ord. 6006 § 18, 2008)

14.18.180 – Penalty—Administration.

- (A) Whenever, on the basis of the information that is available, the Director finds that any person is in violation of any of the provisions of this Chapter, the Director may assess an administrative penalty in an amount that is not less than five hundred dollars nor more than ten thousand dollars for each day that each such violation continues, unless a different administrative penalty for any of such violations is established in the schedule of fees and charges that has been established by the City Council pursuant to Section 14.18.200.

- (B) Before assessing any administrative penalty pursuant to this Section, the Director shall give the person upon whom such penalty is to be imposed written notice of the proposed assessment and the opportunity to request, within thirty days after the date on which such notice is received by it, a hearing with respect to the proposed order of assessment.
- (C) In determining the amount of any penalty assessed pursuant to this Section, the Director shall consider the nature, circumstances, extent and gravity of the violation in respect of which the penalty is proposed to be assessed; the economic benefit, if any, that has inured to the person as the result of such violation; any good faith effort on the part of the person to comply with the applicable requirements; the potential economic impact of the penalty upon the user or other person; any history of similar violations; the degree of culpability of the user or other person; and such other matters as justice may require.
- (D) An order which imposes an administrative penalty pursuant to this Section shall become final:
 - (1) Thirty days after its issuance; or
 - (2) If a hearing has been requested pursuant to Subsection (B) of this Section, upon the Director's issuance of a decision following the hearing.
- (E) The failure of a person to pay any administrative penalty that is imposed by the Director pursuant to this Section within thirty days after the imposition thereof shall be grounds for any remedy that is available under this Chapter for terminating the person's ability to discharge or cause to be discharged stormwater or non-stormwater from its facilities into the storm system.

(Ord. 6006 § 19, 2008)

14.18.190 – Delinquency charges—Liens.

Any fee, assessment or penalty that is imposed pursuant to this Chapter and that remains unpaid for a period that exceeds thirty days after the same became due shall, upon the expiration of such thirty-day period, constitute a perpetual lien on and against the premises which are subject to such fee, assessment or penalty as well as constituting a debt that is owing to the City by the person upon whom such fee, assessment or penalty is imposed and the owner of record of such premises, if such owner is someone other than the person. The City may bring a civil action in any court of competent jurisdiction to recover such fee, assessment or penalty, or any combination thereof, together with interest thereon, and may enforce such lien by recording a notice thereof with the County Recorder upon the expiration of such thirty-day period and foreclosing the same against the premises that are subject to such lien in the same manner as is provided by the laws of the State for the foreclosure of mechanics' liens.

(Ord. 6006 § 20, 2008)

14.18.200 – Fees and other charges.

- (A) In order to provide for the recovery by the City of its costs that are related to the discharge of stormwater, non-stormwater or pollutants into the storm system and for the enforcement of the provisions of this Chapter, or both, the City Council shall establish a schedule of fees and charges. Such schedule, which shall be subject to periodic revision, may establish a specific amount for any fee, charge, assessment, penalty or other cost that is related to the discharge of stormwater, non-stormwater or pollutants to the storm system or the enforcement of the provisions of this Chapter, or both, including without limitation:
- (1) Inspection fees;
 - (2) Application fees;
 - (3) Plan review fees;
 - (4) Monitoring fees;
 - (5) Administrative penalties;
 - (6) Fees for filing requests for reconsideration and appeals; and
 - (7) Other fees that the City Council deems appropriate.
- (B) Except as may be otherwise provided in this Chapter, whenever any fee, charge, assessment or penalty that is required by this Chapter to be paid is based upon an estimated value or an estimated quantity, the Director shall make such determination in accordance with generally recognized practices.

(Ord. 6006 § 21, 2008)

14.18.210 – Payment—When.

All fees, charges, assessments and penalties that are imposed pursuant to the provisions of this Chapter, or pursuant to the approved schedule of fees and charges that is established in accordance with Section 14.18.200, shall be due and payable upon delivery of notice thereof, or upon mailing such notice to the last known mailing address of the person or entity responsible for payment thereof. All such fees, charges, assessments and penalties shall be and become delinquent thirty days after delivery or mailing of the notice described above.

(Ord. 6006 § 22, 2008)

14.18.220 – Records of fees and other charges.

The City shall keep a permanent and accurate account of all fees, charges, assessments and penalties that are received by it under this Chapter, which account shall include the name and

address of each person who paid any such fee, charge, assessment or penalty or on whose behalf the same was paid, the date of such payment and amount thereof and the purpose for which the same was paid.

(Ord. 6006 § 23, 2008)

14.18.230 – Delinquency charges—Additional payments.

Whenever a delinquency charge has not been specifically provided for in this Chapter, any fee, charge or assessment that becomes delinquent shall have added to it a basic delinquency charge that is equal to ten percent of the fee, charge or assessment that became delinquent, and thereafter an additional delinquency charge shall accrue on the total amount that is due, including the ten percent basic delinquency charge, at the rate of ten percent per month compounding, but the amount of the delinquent fee, charge or assessment, as increased by delinquency charges, shall not exceed twice the amount of the original fee, charge or assessment. In addition to the delinquency charges described in this Section, the City may also, as permitted by law, assess collection costs, including, without limitation, any attorneys= fees and court costs that the City may incur in collecting the fee, charge or assessment and the delinquency charges.

(Ord. 6006 § 24, 2008)

14.18.240 – Action to collect—Injunction.

Any action that is brought by the City for the purpose of collecting any fee, charge, assessment or penalty that is provided for in this Chapter may include a request for an injunction to prevent repeated and recurring violations of this Chapter.

(Ord. 6006 § 2, 2008)

14.18.250 – Prohibited acts—Misdemeanor.

(A) Any person who does any of the following is guilty of a misdemeanor:

- (1) Negligently or wilfully introduces or causes to be introduced into the storm system any non-stormwater which such person knew, or with the exercise of reasonable diligence would have known, could cause personal injury or property damage;
- (2) Causes any violation of any condition of any permit that has been issued to the City pursuant to the Act, unless such action is necessary in order for the person to comply with all applicable Federal, State and local requirements or permits; or
- (3) Knowingly makes a false statement, representation or certification of any material fact in any application, record, report, plan or other document that is filed or required to be maintained pursuant to this Chapter or who knowingly falsifies, tampers with or renders inaccurate any monitoring device or method that is required by this Chapter.

- (B) Whenever in this Chapter any act is prohibited or is made or declared to be unlawful or an offense or a misdemeanor, or whenever in this Chapter the doing of any act is required or the failure to do any act is made or declared to be unlawful or an offense or a misdemeanor, the doing of any such prohibited act or the failure to do any such required act shall constitute a misdemeanor and upon conviction thereof, shall be punished by a fine of not more than one thousand dollars or by imprisonment for a term of not more than six months, or by any combination of such fine and imprisonment. Any day of any violation of this Chapter shall constitute a separate offense.

(Ord. 6006 § 26, 2008)

14.18.260 – Unlawful discharges—Restitution.

Any person who discharges or causes to be discharged any non-stormwater into the storm system shall be liable to the City for all damages, cleanup costs, monitoring costs and other associated costs that result therefrom.

(Ord. 6006 § 27, 2008)

14.18.270 – Alternative compensatory action.

In lieu of enforcement proceedings, penalties and remedies authorized by this Chapter, the Director may impose upon a violator alternative compensatory actions, as determined by the Director.

(Ord. 6006 § 28, 2008)

14.18.280 – Nuisance.

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this Chapter is a threat to public health, safety, and welfare, and is declared and deemed a nuisance. Such nuisance may be summarily abated or restored at the violator's expense, a civil action filed to abate, enjoin, or otherwise compel the cessation of such nuisance, or any combination thereof.

(Ord. 6006 § 29, 2008)

14.18.290 – Nonexclusivity.

The remedies listed in this Chapter are not exclusive of any other remedies available under any applicable Federal, state or local law, and it is within the discretion of the Director to seek cumulative remedies.

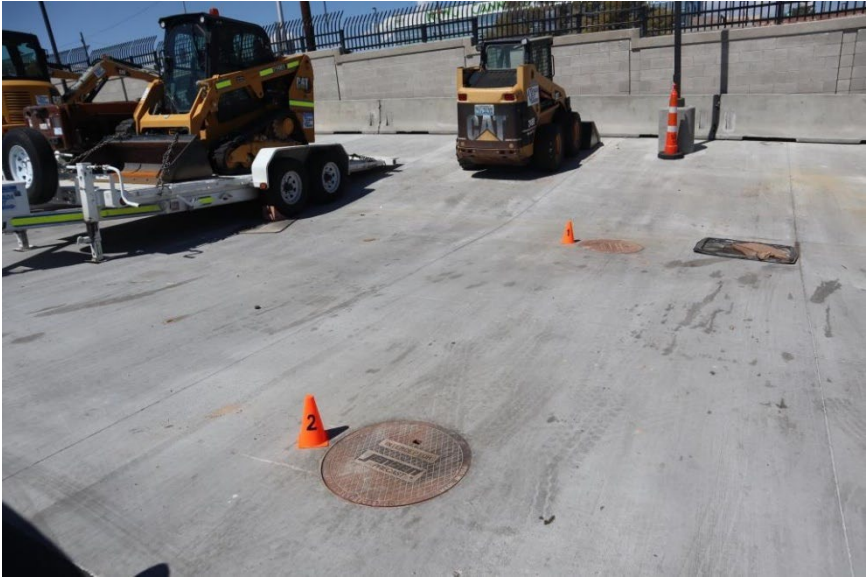
(Ord. 6006 § 30, 2008)

Appendix D

Discharge Locations



Factor and Street Sweep Settling Basin Area



Equipment/Vehicle Wash





Nevada Department of Transportation
Stormwater Management Program
District 1 FPPP

(Facility Pollution Prevention Plan)
Rev. November 2021

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INTRODUCTION

The Nevada Department of Transportation (NDOT) has been issued a Municipal Separate Storm Sewer System (MS4) Permit NV0023329 (Permit) from the Nevada Division of Environmental Protection (NDEP) as authorized by the Environmental Protection Agency (EPA). The Permit authorizes NDOT to discharge municipal stormwater runoff (and specific non-stormwater discharges) to waters of the United States under the National Pollutant Discharge Elimination System (NPDES) stormwater permitting program, and in compliance with the provisions of the Clean Water Act.

The Permit covers state and interstate highways and the Right-of-Ways within the jurisdictional boundary of NDOT, including Maintenance facilities (refer to NDOT's Statewide District Map in Appendix A).

Plan Objectives

The primary objective of the FPPP is to prevent or reduce to the maximum extent practicable (MEP), stormwater pollutant discharges from NDOT Maintenance Facilities. Key elements in meeting this objective are:

- Understanding Maintenance Facility operations and their potential for contributing pollutants to stormwater runoff.
- The development and implementation of best management practices (BMPs) for Maintenance Facility operations.
- Conducting routine facility stormwater inspections to ensure BMPs are appropriate and implemented consistently.
- The identification of stormwater conveyances within the facilities and understanding where they discharge to.
- Employee training and education.

MAINTENANCE FACILITY DESIGNATION

Maintenance facilities fall within one of the following designations, which have been identified and mapped in each associated appendix:

- **Major Facility** (Appendix B): Maintenance stations that accommodate multiple crews and serve as a location for equipment repairs beyond routine maintenance.
- **Minor-A Facility** (Appendix C): Maintenance stations that do not accommodate multiple crews and do not conduct equipment repairs beyond routine maintenance. Maintenance yards, which are typically offsite and serve as ancillary material and/or equipment storage areas for nearby Maintenance stations, are also included in this designation.
- **Minor-B Facility** (Appendix D): Material stockpile areas¹ located offsite of a Maintenance station or yard, e.g., stand-alone sand/salt piles located throughout the State.

¹ Chip pile locations may not be included due to their transitory nature and insignificant potential as a stormwater pollutant of concern.

ADMINISTRATIVE RESPONSIBILITIES

Headquarters (HQ) Environmental Division

The HQ Stormwater Program is responsible for the development and subsequent maintenance of the FPPP document, as well as assisting with the development of internal policies and procedures necessary to ensure FPPP and Permit compliance.

FPPPs are reviewed and maintained (as appropriate) by the Environmental Division' Stormwater Compliance and Enforcement Group. FPPPs may be modified within thirty (30) days of a comprehensive facility stormwater inspection (refer to Section 5.11.4 of the SWMP) in the event additional or modified facility BMPs are deemed necessary.

HQ Stormwater staff will perform and document, at a minimum, semi-annual stormwater inspections at each Major facility, and an annual inspection for all other active facilities. The list of active facilities will be updated annually at the beginning of the fiscal year.

HQ Stormwater staff will on a monthly interval request a list of recordable spills from the FPPP Administrators for their respective facilities; Major A, Minor A or Minor B, and maintain tracking for the fiscal year.

FPPP Administrator

FPPP Administrators are tasked with overseeing the day-to-day implementation of the FPPP and serve as the primary point of contact with the HQ Stormwater Program. Administrators for Major facilities are designated by their respective district management, which is included on the Major facility listings in Appendix B. Administrators for Minor-A and Minor-B facilities are the respective facilities' Maintenance Crew Supervisor I. FPPP Administrators have been provided the Maintenance Facility Best Management Practices (BMPs) Manual as a resource to assist in the management of stormwater pollutants associated with NDOT maintenance facilities.

FPPP Administrator tasks include:

- **Stormwater Self- Inspections:**

Perform facility inspections according to the following frequencies:

- Major Facility: Quarterly (i.e., once every 3 months)
- Minor-A Facility: Semi-annual (i.e., once every 6 months)
- Minor-B Facility: Annual

The stormwater inspection forms for each facility designation can be found in Appendix E and on the [Stormwater SharePoint site](#).

Due to the ongoing adaptation of NDOT's Stormwater program, the inspection forms may be subject to revision at any time. It is therefore recommended that each FPPP Administrator periodically review all stormwater documents to ensure the most recent revisions are being utilized and submitted. Complete each inspection form in its entirety, and document compliance issues and repairs accordingly. Copies of all self-inspection forms shall be housed at the appropriate District Maintenance station.

A FPPP Administrator may designate a qualified person to perform the Self-Inspections, however the FPPP Administrator remains responsible for maintaining stormwater compliance. Informal, i.e., non-documented,

facility “walkthroughs” shall be conducted by FPPP Administrators, or a designated representative, on a routine basis, providing opportunities to assess BMP implementation and address potential stormwater concerns on a more frequent basis. It is recommended that walkthroughs be performed daily at Major Maintenance facilities if possible.

- **Stormwater Self- Inspection Documentation:**

Submit all stormwater self-inspection forms to the HQ Stormwater personnel, located in the respective District, within 7 days for recording and quality assurance review. Include any documentation describing the appropriate corrective action taken for deficiencies and non-compliance findings noted in the facility inspection.

- **HQ Stormwater Oversight Inspections:**

During each fiscal year, the HQ Stormwater Compliance and Enforcement staff will perform Bi-Annual oversight inspections at each Major Maintenance facility and annual oversight inspections at each Minor A and Minor B facilities. During these inspections, the FPPP Administrator, or their assigned representative, shall be available on site for clarification and information as requested by the HQ Stormwater Inspector. The frequency of inspections may change in response to changing regulations and HQ Stormwater Inspectors may conduct additional inspections as necessary to ensure compliance. The appointed HQ Stormwater representative will attempt to contact the FPPP Administrator at least 24 hours in advance of the inspection time, however this is not required.

Following the HQ Stormwater inspection, the inspector will provide a copy of the completed inspection form to the FPPP Administrator within 24 hours following the completion of the inspection. If deficiencies are documented during a field inspection, the FPPP Administrator is required to complete remediation addressing the deficiencies within **7 days** of the completed inspection date **and before the next anticipated storm event**. If implementation before the next storm event is impracticable, the reasons(s) for the delay must be documented and alternative BMPs must be implemented as soon as possible.

The FPPP Administrator shall respond to the inspection report by submitting documentation (narrative and photos) to the appropriate HQ Stormwater staff describing remedial action taken to resolve deficiencies noted in the stormwater inspections conducted by HQ Stormwater personnel.

FPPP Administrators shall submit this documentation to the appropriate HQ Stormwater staff within **7 days** of completion of the remedial activities. HQ Stormwater staff may, on a case-by-case basis, re-inspect the facility to confirm compliance.

The HQ Stormwater staff may provide an inter-Department closing memo to the appropriate FPPP Administrator(s) following completion of the inspection when no deficiencies are identified or following the review of documentation submitted by the FPPP Administrators (as applicable). The inter-Department closing memo is intended to serve as confirmation that all deficiencies noted during the inspection have been addressed.

- **Active Maintenance Facility Inventory**

Upon request, at the beginning of each fiscal year, provide a list of active Facilities: Major, Minor A, and Minor B. The FPPP Administrator should provide updated lists when/if new facilities are added during the fiscal year.

- **Spill Reporting**

Upon request, the FPPP Administrator should provide monthly, a list of recordable spills occurring at any facility; Major, Minor A, and Minor B, to HQ Stormwater staff for tracking.

Recordable spill reporting should include the following information:

- The material released.
- The location and extent of the release.
- The circumstances of the release, and
- The name of parties involved.

Document Access

Copies of the FPPP shall be housed at all Maintenance stations and within the Environmental Division at NDOT's HQ in Carson City. Facility Administrators shall maintain access to this document at their respective facilities.

FACILITY STORMWATER POLLUTANT POTENTIAL RATINGS

The “stormwater pollutant potential rating” is a qualitative evaluation of the potential pollutant contribution to stormwater runoff for a given Maintenance operation/activity. The rating is based upon typical, average conditions observed at the NDOT’s Maintenance facilities over time. Considerations that went into the ranking were pollutant source quantities, area occupied by the pollutant source, location of pollutant source in relation to stormwater conveyances, and the relative frequency of observance.

Table 1 provides a comprehensive rating assessment and relative information pertaining to activities performed throughout various maintenance facilities statewide. Ratings of *N/A*², *low*, *medium*, or *high* were given with respect to a particular operation as it relates to each facility designation.

Table 1: Activity pollutant concerns and subsequent rating by facility type.

Activity	Potential Pollutants	Major	Minor-A	Minor-B
Distributor Truck Cleaning	Solvents, liquid asphalt, asphalt emulsion	Low	Low	N/A
Equipment Downline	Petroleum fluids, antifreeze, anti/de-icing, salt/sand	High	Low	N/A
Equipment Fueling	Diesel, biodiesel, gasoline	High	Med	N/A
Equipment Maintenance	Petroleum fluids, antifreeze	Med	Low	N/A
Equipment Painting	Paint, sand blasting media, waste water	Low	N/A	N/A
Equipment Steam Cleaning	Petroleum fluids, anti-freeze, anti/de-icing, salt/sand	Low	N/A	N/A
Equipment Storage & Parking	Petroleum fluids, anti-freeze, anti/de-icing, salt/sand	High	Med	Low
Equipment Washing	Petroleum fluids, anti-freeze, anti/de-icing, salt/sand	Med	Low	N/A
Field Testing Labs	Sediment, stock solution (e.g. formaldehyde, calcium chloride, USP glycerin, glutaraldehyde, Kathon™ CG/ICP)	Low	Low	N/A
Garbage or Debris Storage	Litter, metals, wood	Med	Med	Low
Liquid Anti/De-icing Storage	Brine (sodium chloride), magnesium chloride	Med	Med	N/A
Litter and Miscellaneous Waste	Paper, plastic bottles, cigarette butts, aluminum cans	Med	Med	Low
Material Stockpiles	Sediment, salt/sand, bulk salt, metals, wood, tires, asphalt grindings, treated aggregates	High	High	High
Paint Truck Cleaning	Paint, waste water	Low	Low	N/A
Pesticide and Fertilizer Storage	Various chemicals, nutrients (nitrogen, phosphorus)	Low	Low	N/A
Spent Light Bulbs	Mercury, metals, glass	Low	Low	N/A
Striping Paint	Water-borne acrylic/latex paint, glass beads	Low	Low	N/A
Used Batteries	Metals, acids	Low	Low	N/A
Vactor Truck and Sweeper Spoils	Sediment, salt/sand, anti/de-icing fluids, organic materials, litter, debris, metals, petroleum fluids	Med	Low	N/A
Water Truck Discharge/Filling	Petroleum fluids	Low	Low	N/A

² Activity is not known to be conducted at any facility under its respective facility designation category.

Maintenance Facility Stormwater Best Management Practices (BMPs) Manual

This guidance document covers acceptable stormwater pollution control practices for a variety of activities that commonly occur at NDOT's Maintenance facilities. The manual is available for downloading from the [Stormwater SharePoint site](#), providing a means for all FPPP Administrators to access. The manual will serve as the basis for implementing BMPs and for conducting facility stormwater inspections.

It can be expected that the manual does not cover BMPs for every specific activity, as Maintenance personnel may perform site specific activities or be tasked to perform new activities pertaining to each site. In these instances, NDOT's Environmental Division will work with the appropriate Maintenance personnel to develop acceptable BMPs for the activities in question, which will then be considered for incorporation into future versions of the manual.

Feedback from Maintenance facility personnel is essential to ensuring that this manual is current, relevant, and continues to be a useful resource for BMPs that are feasible and implementable. Some of the most effective BMPs listed in the manual were developed by maintenance facility staff. The HQ Stormwater Program welcomes any new ideas for possible inclusion in future versions of the manual.

Salt/Sand Stockpile (BMP MS-5)

Measures must be taken to minimize the environmental impact of stormwater runoff originating from the department's salt/sand stockpiles. Facility managers should ensure that the appropriate controls, methods, and procedures are in place to reduce environmental impacts to the maximum extent practicable.

Mechanical Sweeping (BMP GP-5)

Routine mechanical sweeping (including the use of mechanical brooms) of impervious surface areas within Maintenance facilities is considered one of the most effective means for reducing potential stormwater pollutant discharges, and thus will continue to be a BMP performed at all Major and Minor-A facilities with impervious surface areas.

Sweeping activities shall be properly documented in EAMS using the correct activity code, facility designation, and accomplishment. (Please refer to Appendix G for specific guidance on how to properly report sweeping for NDOT Maintenance Facilities.) The guidance document is also available on the [Stormwater SharePoint site](#).

- **Major Facilities:**
Sweeping shall occur at each major facility on a quarterly basis and shall include formal documentation of each event.
- **Minor-A Facilities:**
Minor-A facilities with paved surfaces are required to document at least one sweeping activity on an annual basis. The HQ Stormwater has identified each Minor-A facility that currently meets the annual sweeping requirement and is provided in Table 2. This list shall only be considered as a guide and is subject to change at any time. If a Facility Administrator has any questions regarding sweeping requirements, please contact the HQ Stormwater staff for the District.

Table 2: Minor-A Facilities required to meet documented sweeping frequencies.

District I
Alamo Station
Beatty Station
Big Smokey Station
Blue Jay Station
Flamingo Yard
Glendale Station
Goldfield Station
Mina Station
Montgomery Pass Station
Mountain Springs Station
Mount Charleston Station
Panaca Station
Searchlight Station

- Minor-B Facilities:**
 The majority of Minor-B facilities are unpaved with most residing in remote, un-urbanized areas of the State. Consequently, there are no sweeping requirements for Minor-B facilities. However, should a stormwater inspection indicate a need for sweeping to occur (assuming a paved surface is present), arrangements should be made by the appropriate FPPP Administrator to address the concern.

SITE-SPECIFIC REQUIREMENTS EMPHASIS

Site-specific requirements may be listed here when an emphasis on stormwater control measures is necessary. Each site is periodically reviewed by the HQ Environmental Division for its inclusion in this section.

Major Facilities

Las Vegas North Station

Best Management Practice	Frequency
General Waste Material Disposal	Weekly
Scrap Metal Disposal	Monthly
Used Tire Disposal	Monthly

Las Vegas South Station

Best Management Practice	Frequency
General Waste Material Disposal	Weekly
Scrap Metal Disposal	Monthly
Used Tire Disposal	Monthly

Tonopah Station

Best Management Practice	Frequency
General Waste Material Disposal	Weekly
Scrap Metal Disposal	Weekly
Used Tire Disposal	Weekly

ILLICIT DISCHARGE DETECTION AND ELIMINATION

As defined in 40 CFR§122.26(b)(2) and per NDOT's Illicit Discharge Detection and Elimination (IDDE) Program, an illicit discharge refers to any discharge to a waterway (including municipal storm sewer systems) that is not entirely composed of stormwater. However, the following non-stormwater discharges are considered non-illicit provided NDOT and/or NDEP does not determine them to be substantial contributors of pollutants to NDOT's MS4:

- Potable water line flushing during testing or fire hydrant testing
- Diverted stream flows not requiring a separate permit
- Springs or rising ground waters
- Uncontaminated groundwater infiltration (defined as water other than wastewater that enters an MS4, including sewer service connections and foundation drains, from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow)
- Discharges from potable water sources not requiring a separate permit
- Residential foundation and/or footing drains
- Air conditioning condensate
- Irrigation water from lawns and landscaping
- Water from residential crawl space pumps
- Flow from natural riparian habitats and wetlands not requiring a separate permit
- De-chlorinated swimming pool discharges
- Individual residential car washing
- Water incidental to street sweeping (including associated sidewalks and medians) that is not associated with construction activities
- Discharges or flows from firefighting activities
- Dewatering activities not requiring a separate permit
- Non-stormwater discharges currently covered under a separate NPDES permit

All illicit discharge instances are to be documented and immediately reported HQ Stormwater Staff, for the District, to ensure appropriate response measures, i.e., investigation, cleanup, etc., are taken. All illicit discharges shall be immediately responded to in an effort to eliminate the discharge in question and minimize impacts to receiving waterways. Further IDDE information can be found on [Stormwater SharePoint site](#).

SPILL REPORTING

A release can be described as any pollutant, hazardous waste or contaminant that has been spilled, leaked, pumped, poured, emitted, emptied, discharged, injected, escaped, leached, dumped, or disposed in the environment.

For Recordable Releases:

If a release occurs, the HQ Stormwater staff for your district must be contacted to report the release, unless it meets **ALL** the following criteria:

1. The release is less than a half-gallon; and
2. The release has not and will not reach the waters of the U.S.; and
3. The release is properly cleaned up within 1 hour of discovery.

The Facility Administrator shall provide the following information for all Recordable Releases:

- Material Released.
- Location and extent of the release.
- The circumstances of the release, and
- The name of the parties involved.

For Reportable Releases:

The reportable quantity for petroleum products, e.g., fuel, hydraulic fluid, etc., can be found on the NDEP Spill Reporting website. Currently the reportable quantity is 25 gallons or 3 yd³ of contaminated material (e.g., soil), or the presence of the release on or near groundwater. A spill of any quantity that impacts a waterway or MS4 storm sewer system component (e.g., drop inlet) must be reported to NDEP, regardless of the quantity. Reportable quantities of other than petroleum products are listed in the [40 CFR Part 302.4](#).

Reportable releases shall be cleaned up under the direction of a Certified Environmental Manager and/or NDOT's Environmental Services Division Hazardous Materials Section (775-888-7692) as applicable. Maintenance facility personnel shall immediately respond to any spill in an effort to minimize impacts to the environment and expedite cleanup efforts. The HQ Stormwater Program and Hazardous Materials Section shall be notified of all reportable releases.

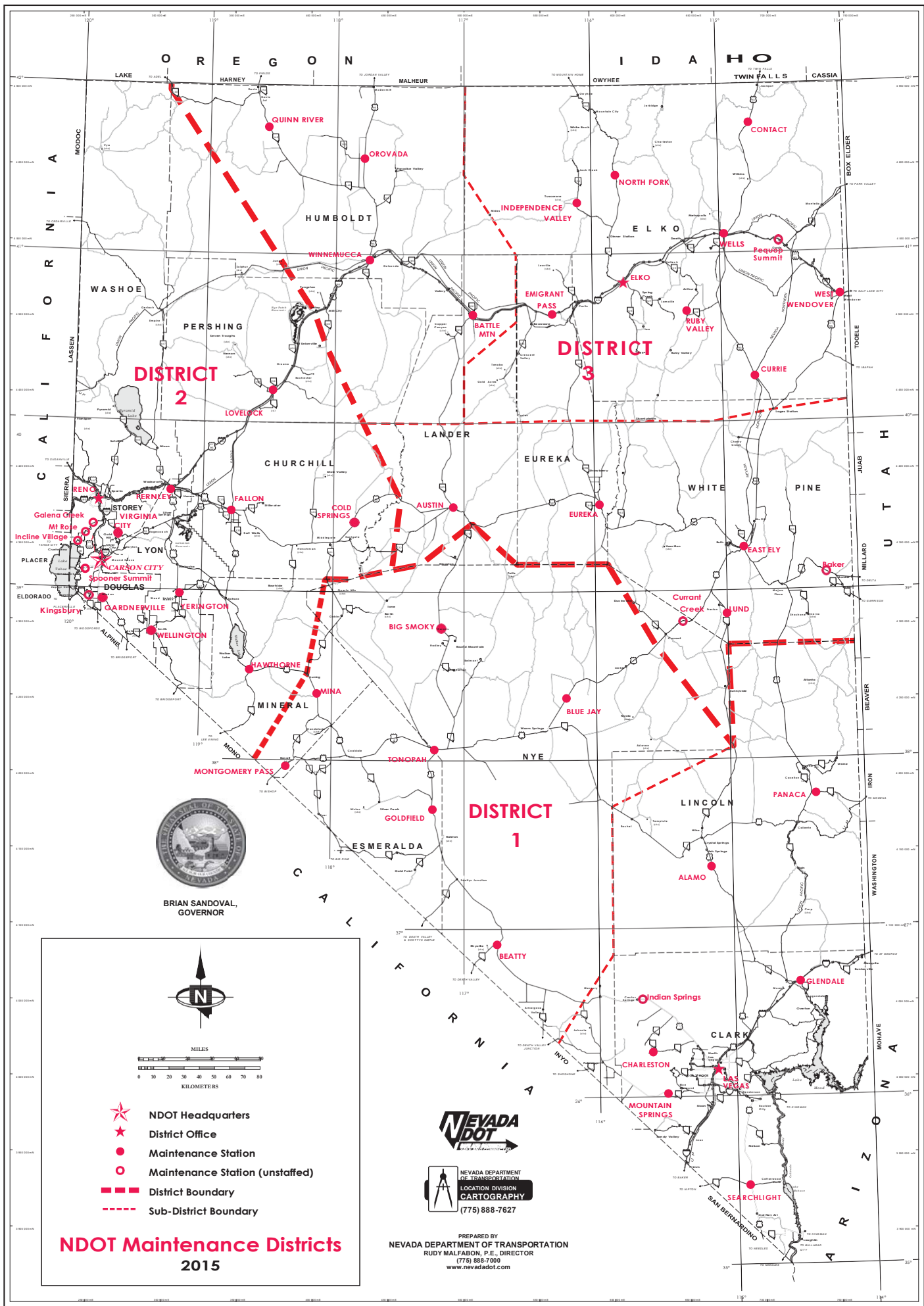
TRAINING

Required stormwater training is offered in each District a minimum of once per year. Additional training will be provided as needed. The development and subsequent updating of stormwater training course curriculum is the responsibility of the HQ Stormwater Program. Training records are housed within the Environmental Division. Questions regarding the Stormwater training program can be directed to James Murphy (NDOT Stormwater Program Manager).

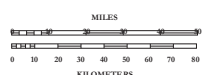
Additionally, examples of common control measures used throughout the NDOT's Maintenance facilities can be found in Appendix E.

APPENDIX A

NDOT Maintenance Districts Map



BRIAN SANDOVAL,
GOVERNOR



- NDOT Headquarters
- District Office
- Maintenance Station
- Maintenance Station (unstaffed)
- District Boundary
- Sub-District Boundary

NDOT Maintenance Districts
2015



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APPENDIX B

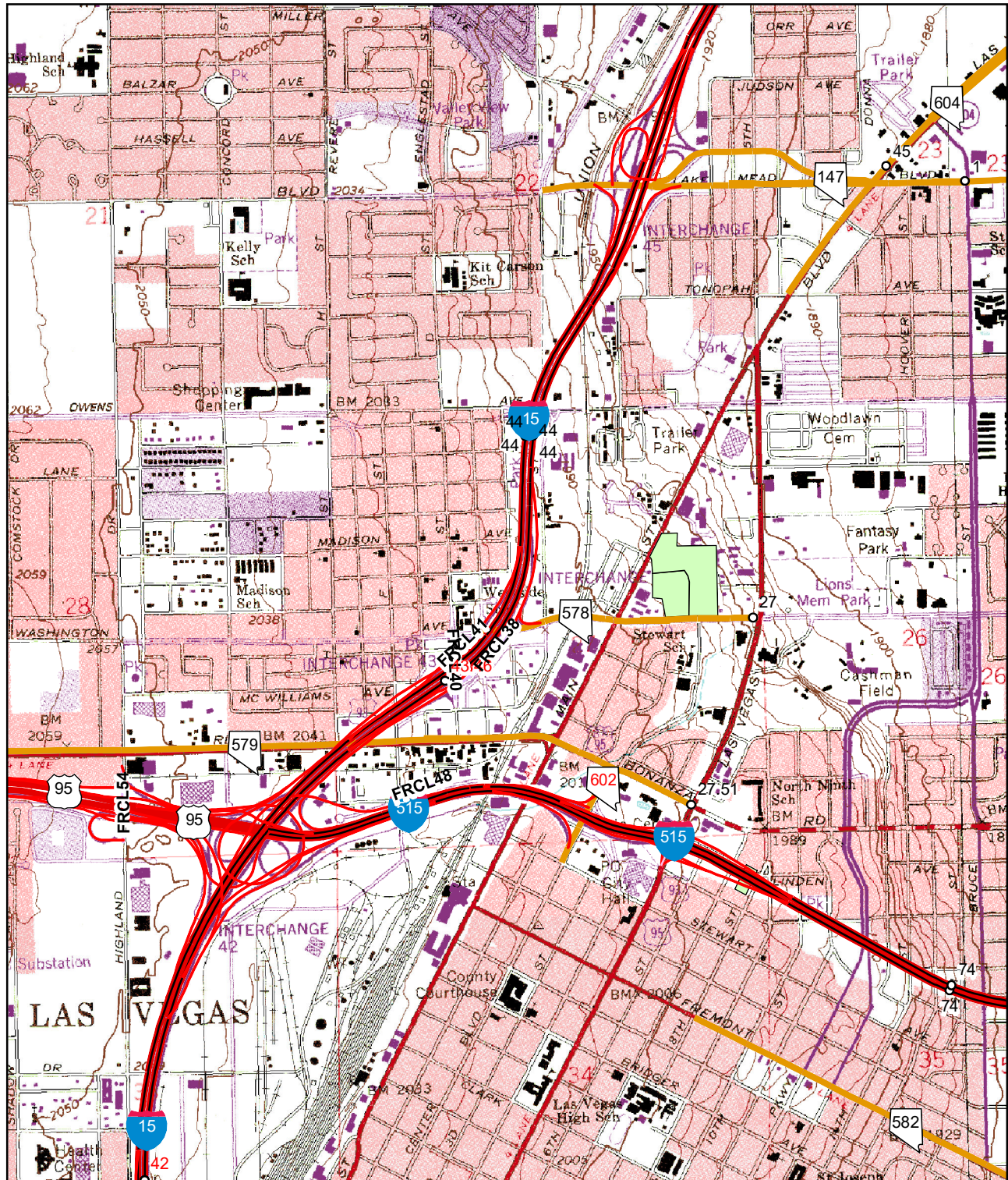
Major Maintenance Facility Listing and Associated Area Maps

District 1 Major

Table A-1. Major Maintenance facility listing and associated FPPP Administrators.

Major Facility	Address/Route	County	Milepost	Latitude	Longitude	Facility Size (Acres)	Drainage Basin	Receiving Waterway	Discharges to Waters of the U.S.	Administrator(s)	Notes
Las Vegas - North Station	123 E. Washington Ave. Las Vegas, NV 89101	CL	-----	36°10' 53.772"	-115°8' 11.602"	11	Colorado River	Las Vegas Valley MS4	Yes	Neil Nelson, Maintenance Supervisor II, C101	Off-System; Surface Water Connection to the Las Vegas Wash
Las Vegas - South Station	6610 Ullom Dr., Las Vegas, NV 89188	CL	-----	36°4' 10.532"	-115°12' 10.924"	11.5	Colorado River	Las Vegas Valley MS4	Yes	Neil Nelson, Maintenance Supervisor II, C101	Off-System; Surface Water Connection to the Las Vegas Wash
Tonopah Station	US-6	NY	1.8	38°3' 44.161"	-117°13' 25.026"	8.5	Central Region	NDOT MS4	No	Glen Jeffrey, Maintenance Supervisor 1, C169	-----

North Las Vegas Maintenance Station General Location Map



The "green" shaded area represents the Maintenance Facility's property layout.

North Las Vegas Maintenance Station Map



Maintenance Facility Site Map Legend

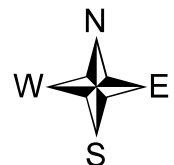
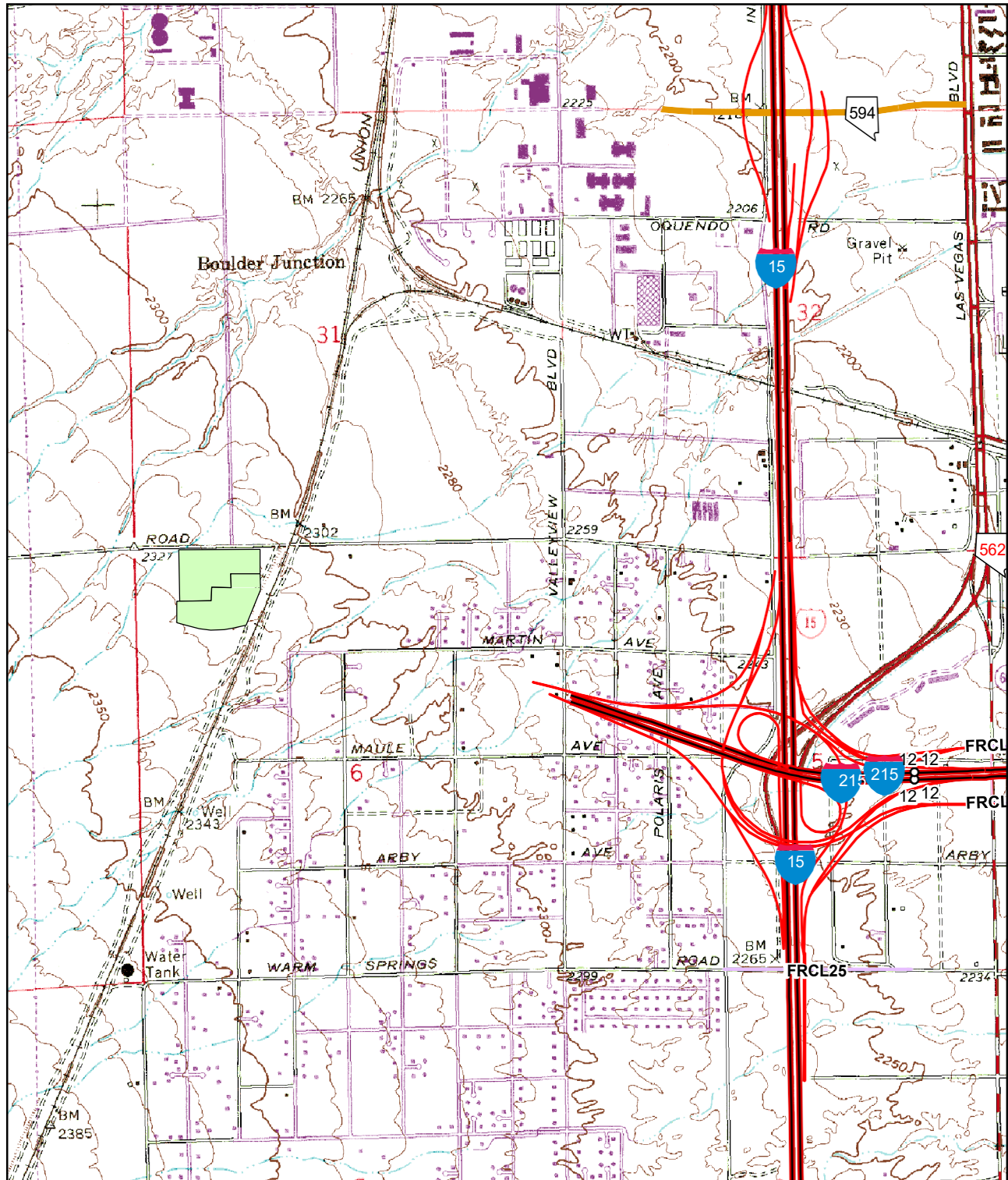
Numerical values represented below identify various operational areas of interest within the facility.

1. Sand/Salt Spreader Racks
2. Scrap Metal Bin
3. Material Storage
4. Trash Compactor
5. Waste Material Storage
6. Flat Bed Trailer Storage
7. Stockpiled Landscape Materials
8. Maintenance Storage
9. Materials Testing Lab
10. Maintenance Storage
11. Maintenance Offices
12. Radio Shop
13. Equipment Repair
14. Equipment "Down Line"
15. Pesticide Storage
16. Tire Shop
17. Storage Pod
18. Stockroom
19. Motor Pool
20. Wash Pad
21. Equipment Storage
22. Paint Shop
23. Lighting Shop
24. Offices
25. Crew Rooms
26. Bio Diesel Tank

- 27. Fueling Area
- 28. Fuel Station Office
- 29. Vehicle Storage
- 30. Wash Pad
- 31. Steam Cleaning Pad
- 32. Progress Lab
- 33. Field Testing Labs
- 34. Public Information
- 35. Right-Of-Way Office
- 36. Training
- 37. Assistant District Engineer
- 38. District Engineer
- 39. Administration
- 40. Computer Services
- 41. Field Crew Offices
- 42. Employee Parking
- 43. Environmental Services Division

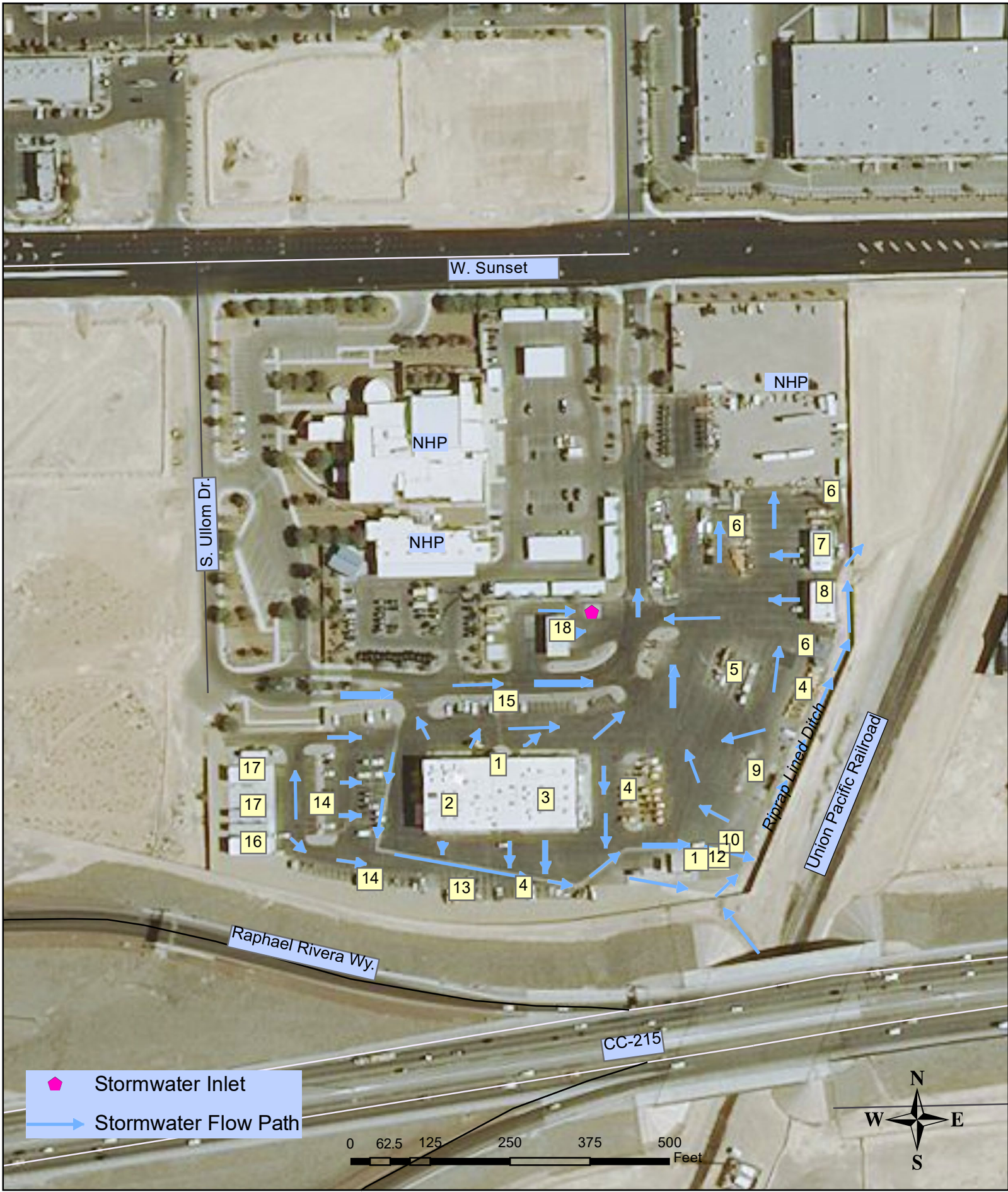
Facility updates are ongoing as reconstruction of the North Las Vegas Maintenance Station progresses. Changes to the facility map will be made after the conclusion of the project.

South Las Vegas Maintenance Station General Location Map



The "green" shaded area represents the Maintenance Facility's property layout.

South Las Vegas Maintenance Station Map



◆ Stormwater Inlet
→ Stormwater Flow Path

0 62.5 125 250 375 500 Feet

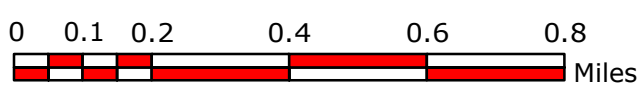
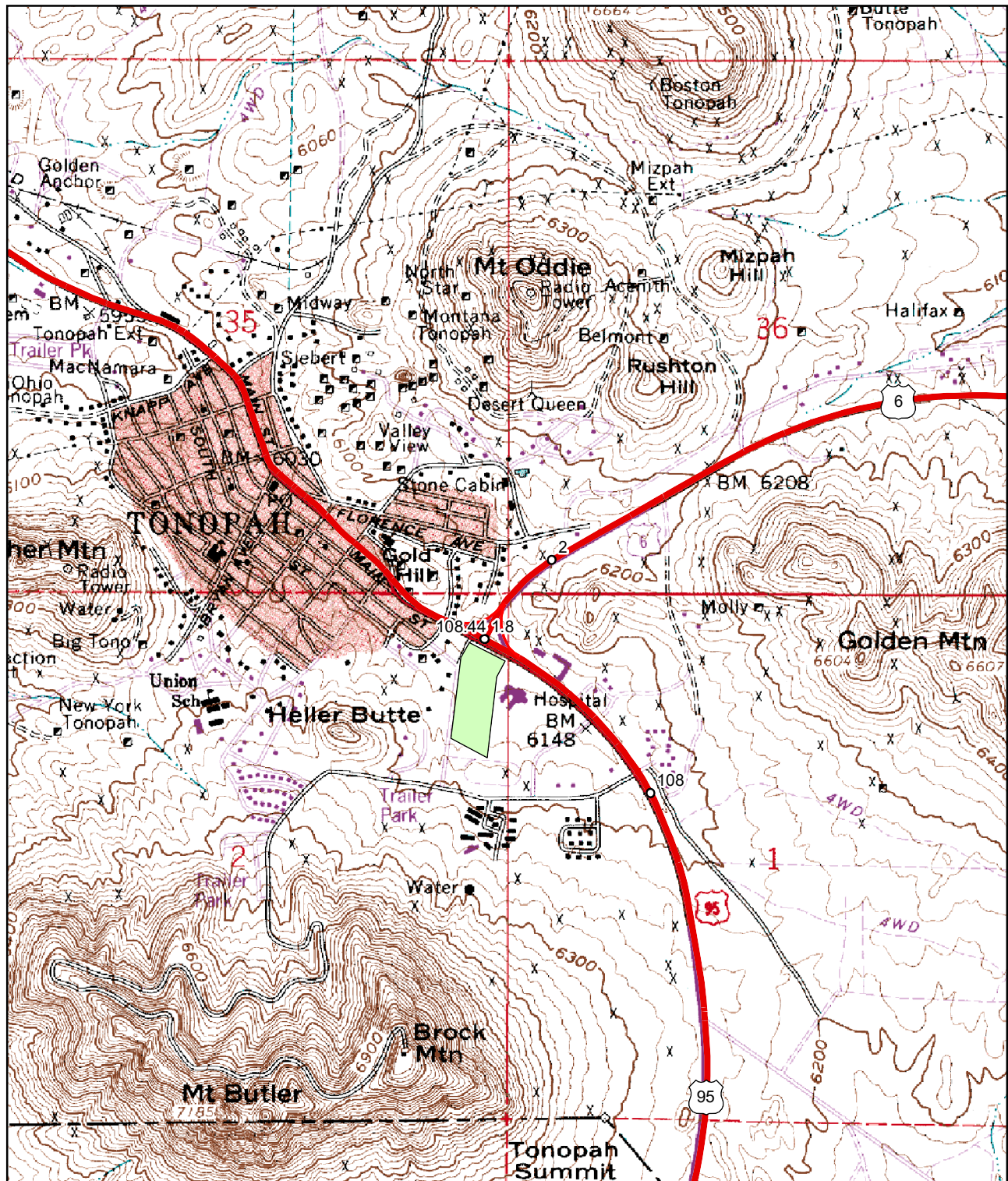


Maintenance Facility Site Map Legend

Numerical values represented below identify various operational areas of interest designated on the facility site map(s).

1. Administrative Offices
2. Equipment Repair Shop
3. Maintenance Storage
4. Maintenance Vehicle Parking
5. Vehicle/Equipment Storage
6. Materials Storage
7. Lighting Materials & Crew Office
8. Paint Storage & Crew Office
9. Wash Pad
10. Scrap Metal Bin
11. Tires Recycling Bin
12. Temporary Sweeping Spoils/Roadside Debris Storage
13. Equipment/Vehicle "Down Line"
14. Employee Parking
15. Employee/Visitor Parking
16. Maintenance Office Trailer
17. Various Office Trailers
18. Fueling Area

Tonopah Maintenance Station General Location Map



The "green" shaded area represents the Maintenance Facility's property layout.

Tonopah Maintenance Station Map



Maintenance Facility Site Map Legend

Numerical values represented below identify various operational areas of interest within the facility.

1. Administrative Offices
2. Communications Shop
3. Equipment Repair Shop
4. Machine Shop
5. Employee/Equipment Parking Areas
6. Fueling Area
7. Steam Cleaning Pad
8. Equipment/Vehicle "Down Line"
9. Equipment Storage
10. Training
11. Vehicle/Cold Storage
12. Carpenter Shop
13. Sign Production
14. Brine Tanks
15. Brine Production
16. Paint Shop
17. Sand/Salt Spreader Racks
18. Sign Storage
19. Paint Storage
20. Wash Pad
21. Equipment Parking
22. Loading/Unloading Ramp
23. Material Storage
24. Emulsion Tanks
25. Salt Storage
26. Sand/Salt "Sprung Structure"

APPENDIX C

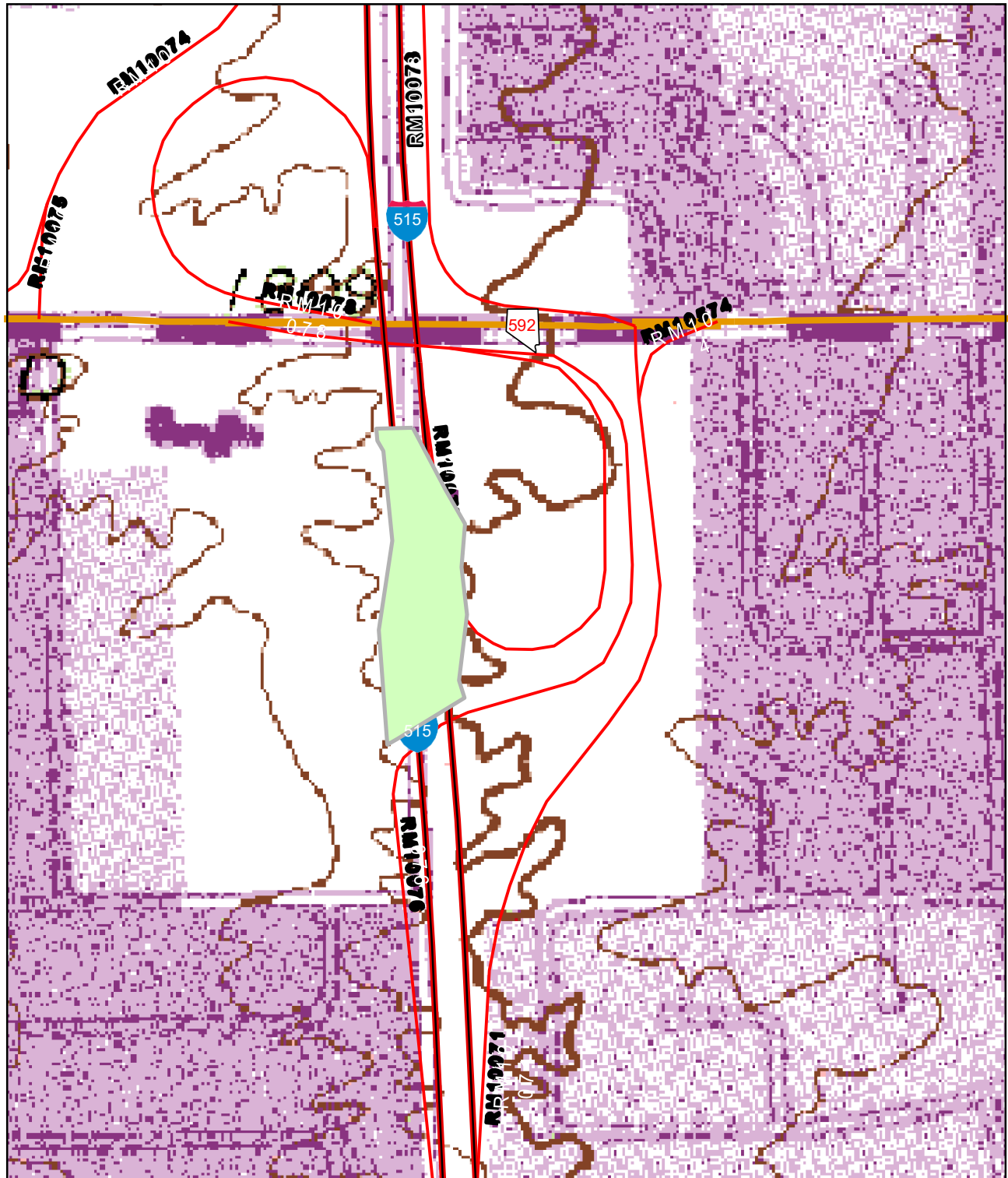
Minor-A Maintenance Facility Listing and Associated Area Maps

District 1 Minor-A

Table B-1a. Minor-A Maintenance facility listing.

Minor-A Facility	Address/ Route	County	Milepost	Latitude	Longitude	Facility Size (Acres)	Drainage Basin	Receiving Waterway	Discharges to Waters of the U.S.	Notes
Flamingo Yard	I-515	Clark	12.8	36° 6' 49.520"	-115° 4' 57.589"	2.6	Colorado River	NDOT MS4	Yes	Surface Water Connection to the Las Vegas Wash
Mt. Charleston Station	SR-157	Clark	5.1	36° 16' 19.160"	-115° 34' 29.222"	4.7	Colorado River	Kyle Canyon Wash	No	
Mountain Springs Station	SR-160	Clark	21.3	36° 1' 22.498"	-115° 30' 24.493"	21.3	Central Region	NDOT MS4	No	
Searchlight Station	SR-164	Clark	18.6	35° 27' 57.160"	-114° 55' 18.401"	2.5	Colorado River	NDOT MS4	No	
Glendale Station	SR-169	Clark	24.2	36° 40' 23.003"	-114° 31' 23.452"	5.9	Colorado River	None	No	
Panaca Station	SR-319	Lincoln	52	37° 47' 26.229"	-114° 22' 33.906"	5.3	Colorado River	None	No	
Big Smokey Station	SR-376	Nye	53.4	38° 47' 0.240"	-117° 10' 26.286"	8.8	Central Region	None	No	
Montgomery Pass Station	US-6	Mineral	8.4	37° 58' 37.645"	-118° 19' 11.181"	2.9	Central Region	None	No	
Blue Jay Station	US-6	Nye	65.8	38° 22' 20.339"	-116° 13' 29.472"	26.7	Central Region	None	No	
Alamo Station	US-93	Lincoln	39	37° 22' 11.210"	-115° 9' 33.533"	3.2	Colorado River	NDOT MS4	No	
Old Indian Springs Station	US-95	Clark	123.3	36° 34' 14.438"	-115° 40' 15.093"	5	Central Region	None	No	
Goldfield Station	US-95	Esmeralda	19.5	37° 42' 18.329"	-117° 14' 32.179"	3.4	Central Region	Rabbit Springs	No	
Mina Station	US-95	Mineral	15.7	38° 23 '8.738"	-118° 6' 23.865"	1.9	Central Region	NDOT MS4	No	
Beatty Station	US-95	Nye	59.9	36° 54' 36.833"	-116 °45' 23.175"	6	Death Valley	None	No	

Flamingo Maintenance Yard Location Map I-515 CL 12.8

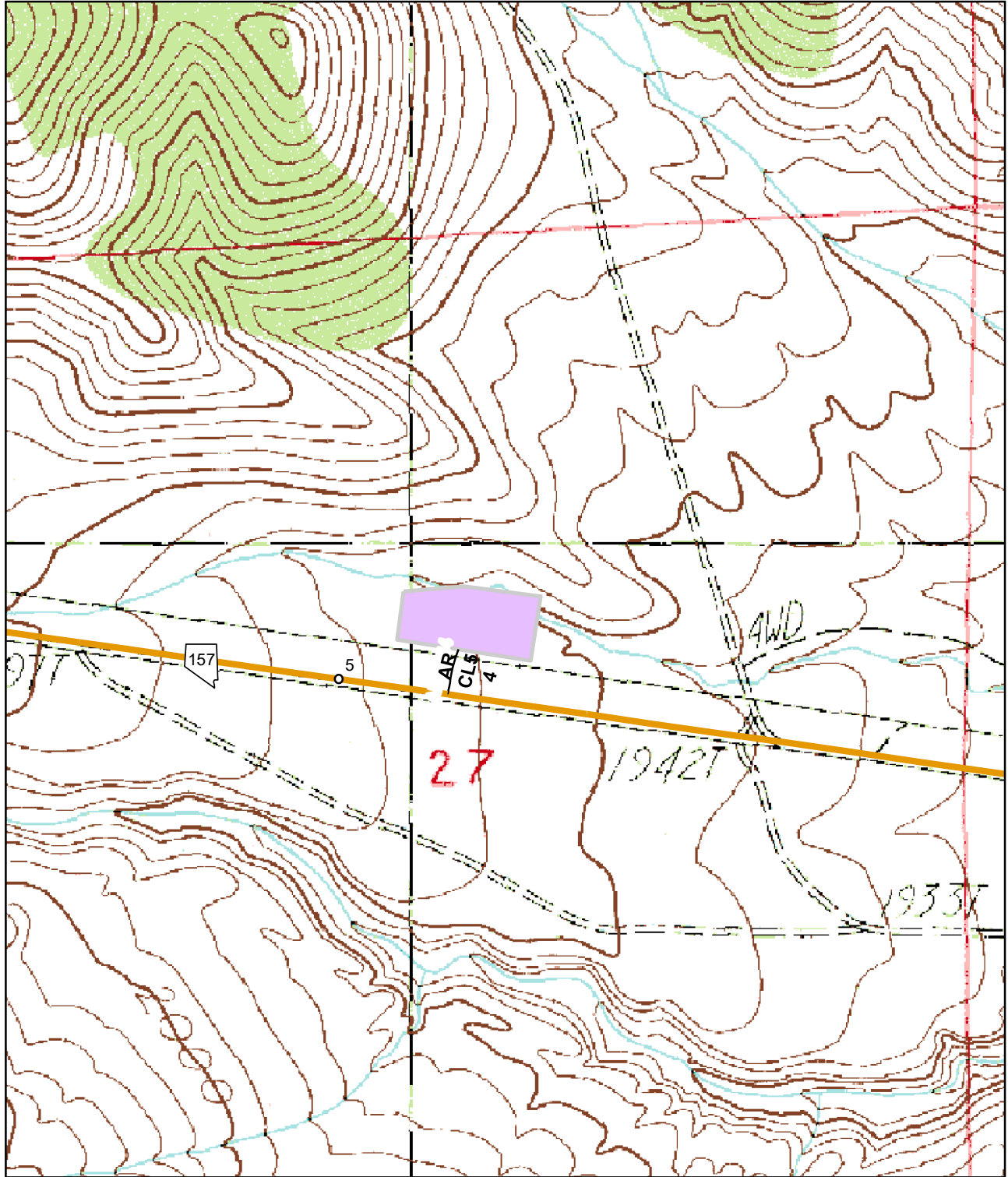


0 0.0275 0.055 0.11 0.165 0.22 Miles



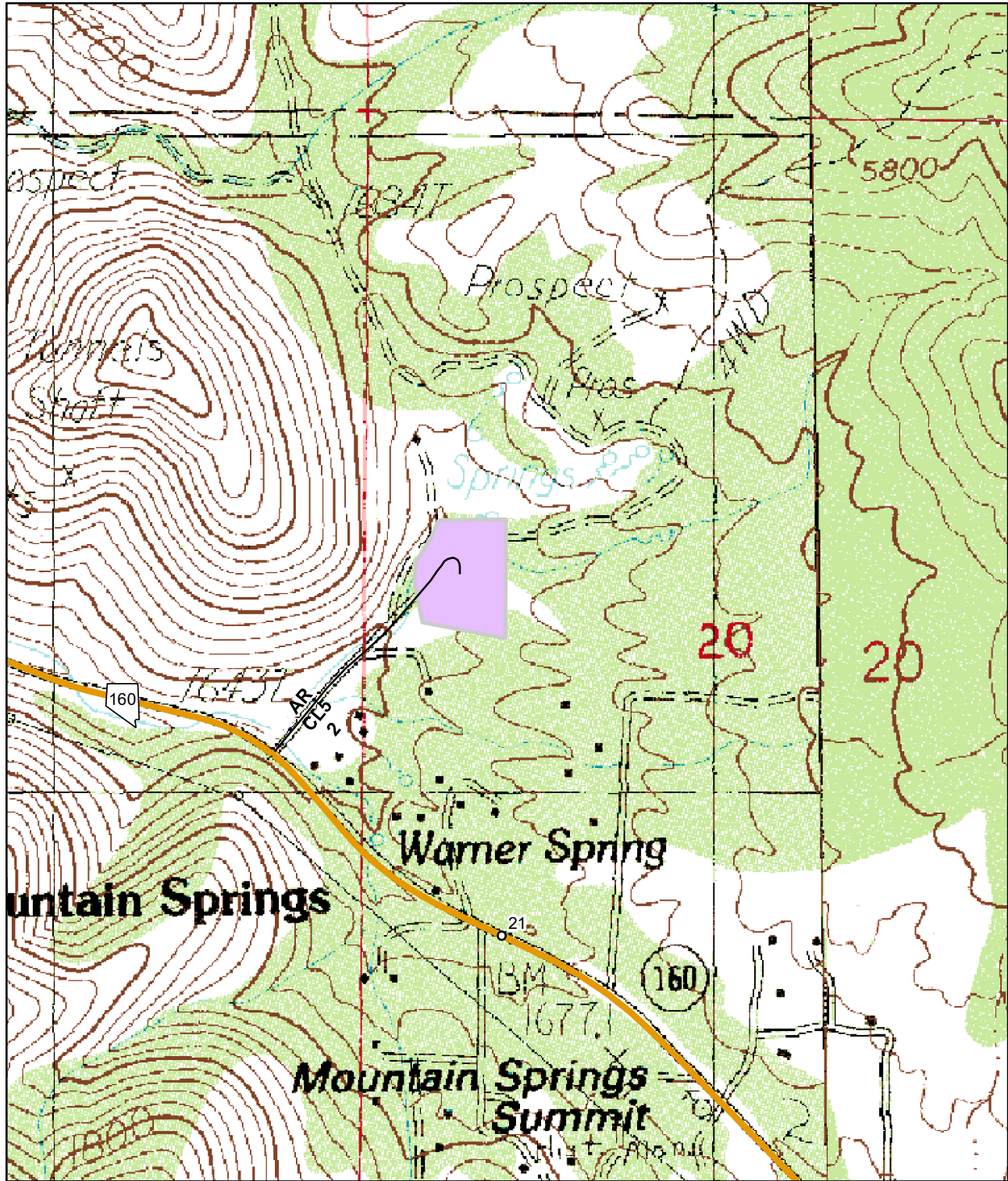
The "green" shaded area represents the Maintenance Facility's property layout.

Mt. Charleston Maintenance Station Location Map SR-157 CL 5.1



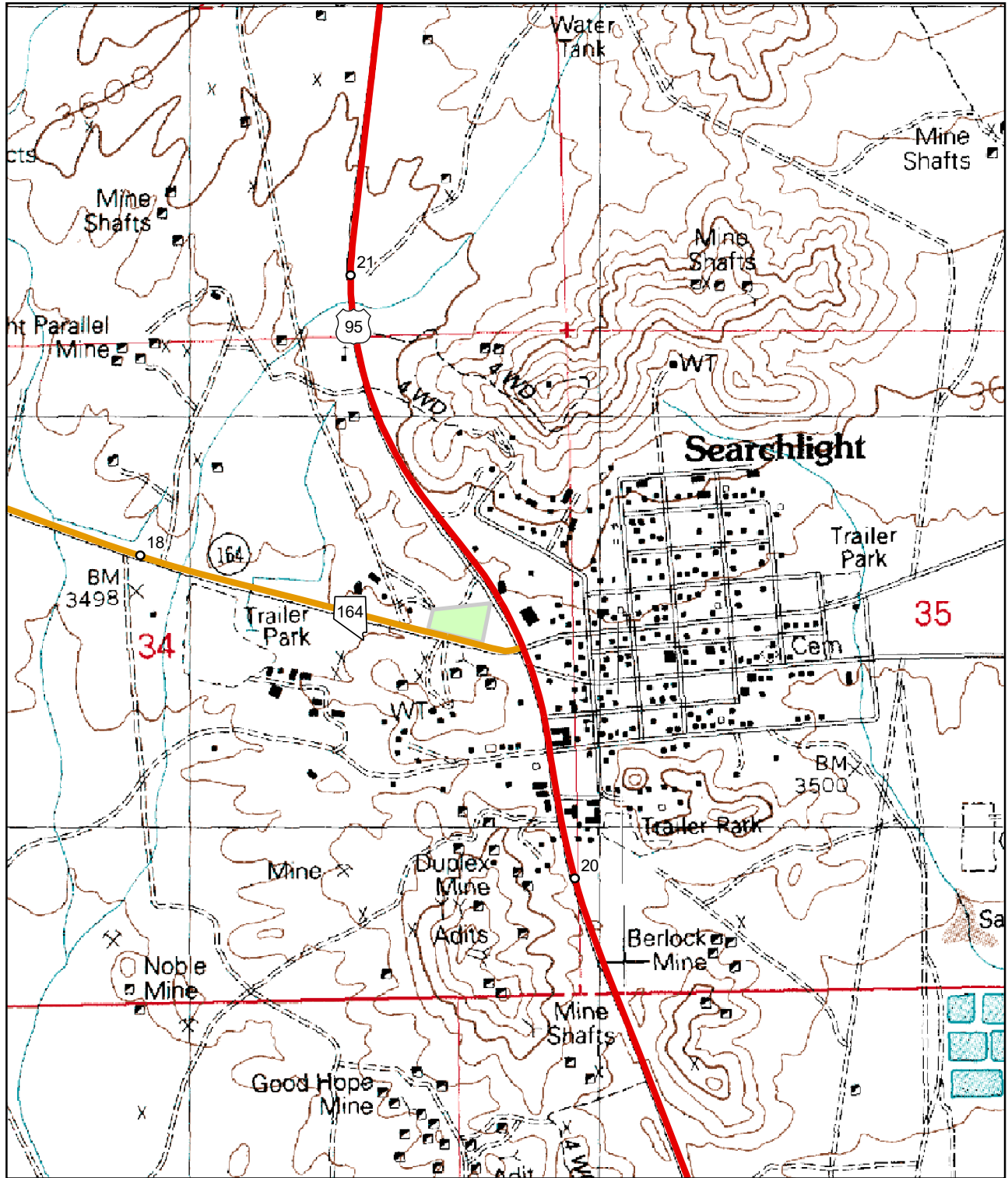
The "purple" shaded area represents the Maintenance Facility's property layout.

Mountain Springs Maintenance Station Location Map SR-160 CL 21.3



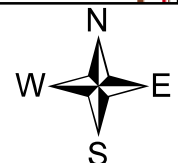
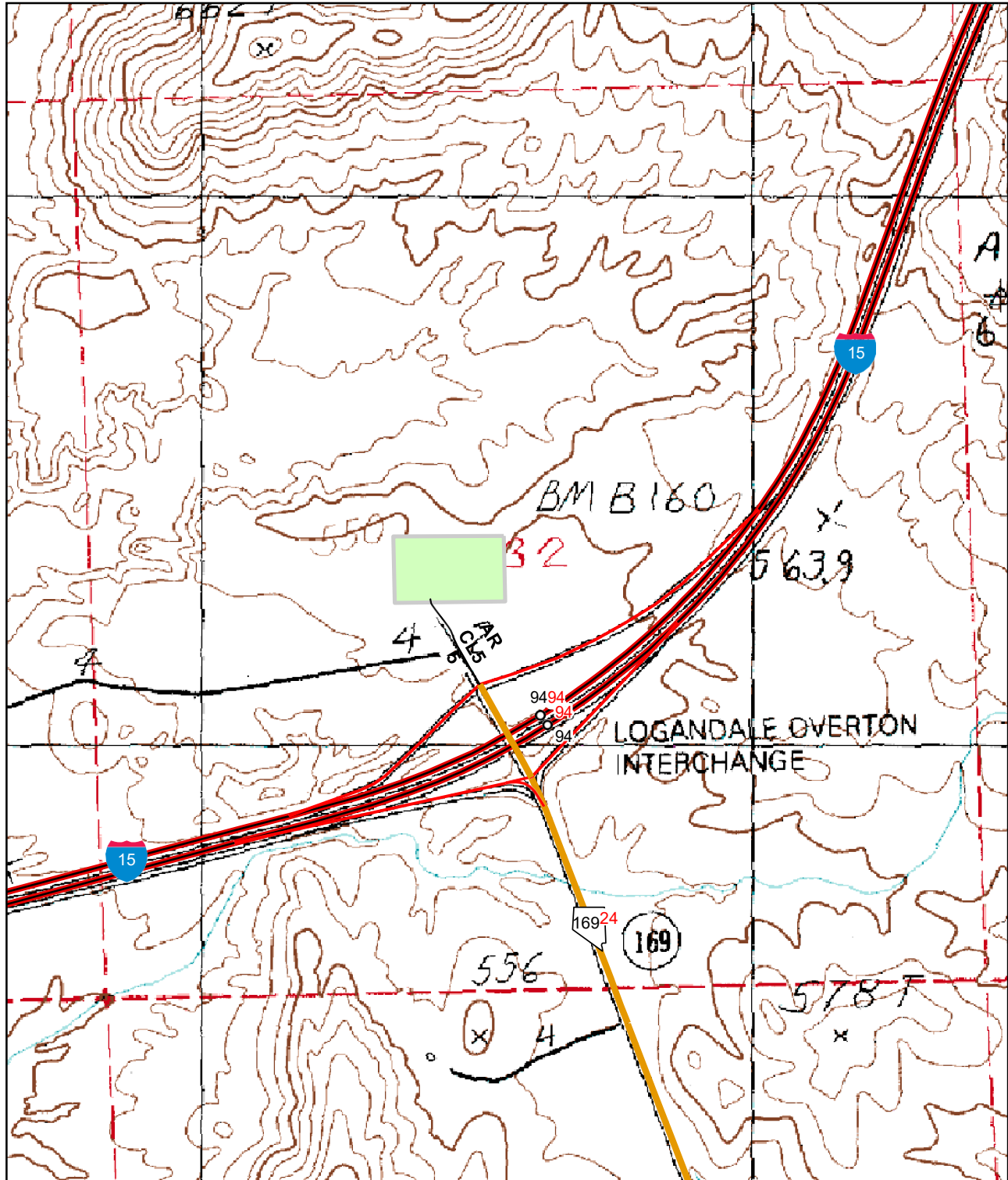
The "purple" shaded area represents the Maintenance Facility's property layout.

Searchlight Maintenance Station Location Map SR-164 CL 18.6



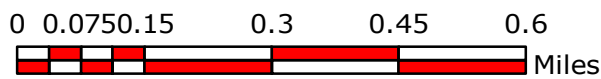
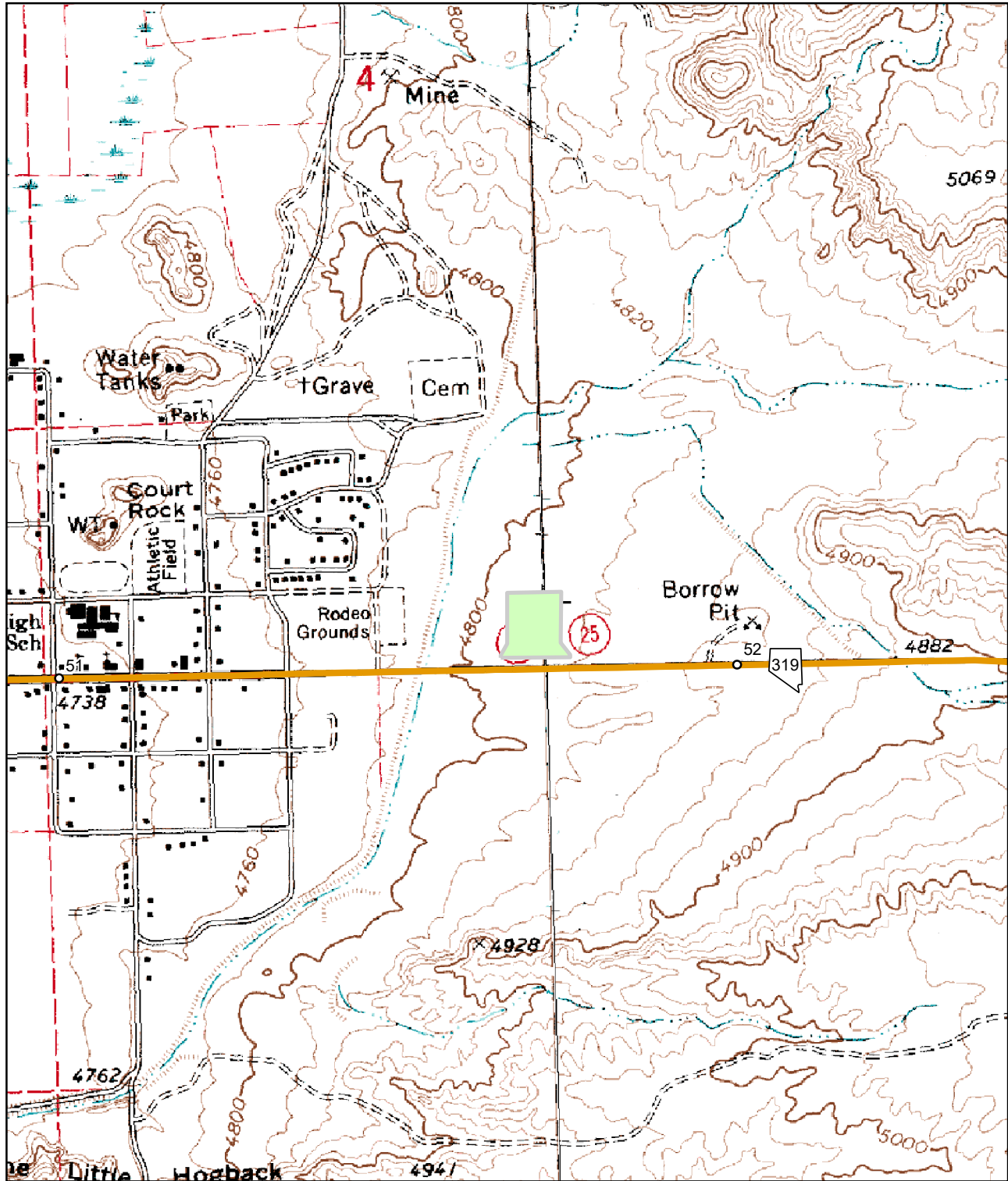
The "green" shaded area represents the Maintenance Facility's property layout.

Glendale Maintenance Station Location Map SR-169 CL 24.2



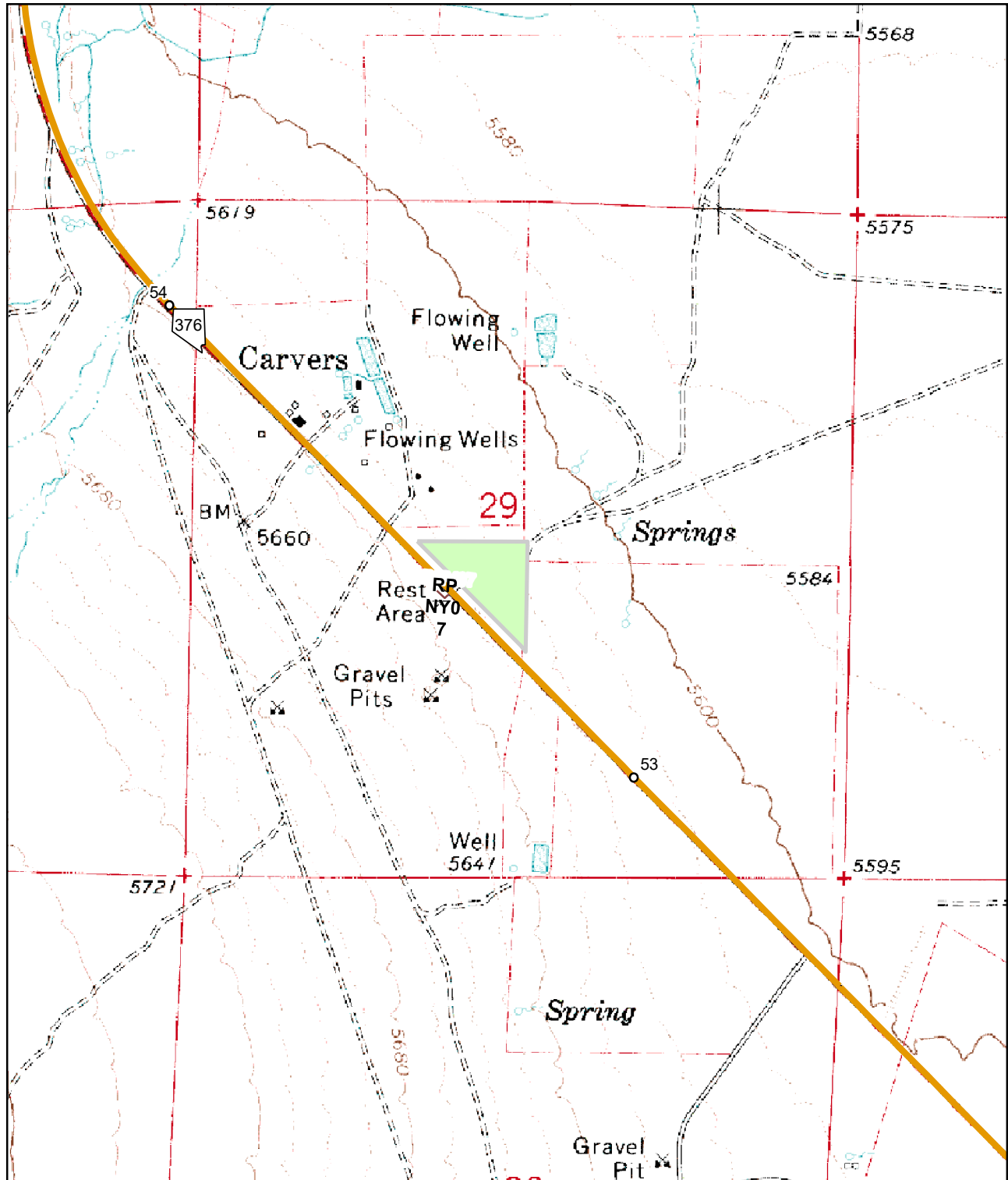
The "green" shaded area represents the Maintenance Facility's property layout.

Panaca Maintenance Station Location Map SR-319 LN 52.0



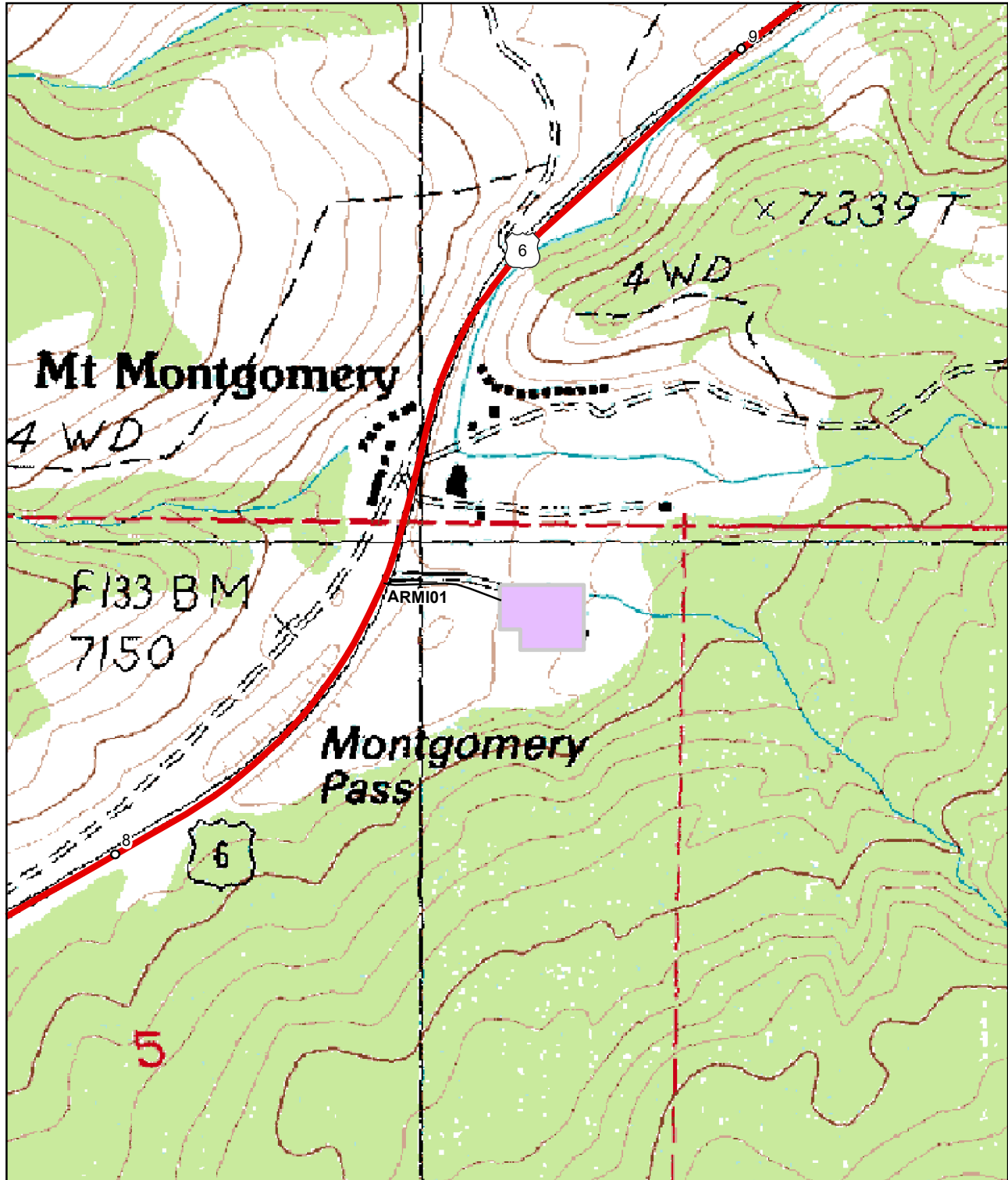
The "green" shaded area represents the Maintenance Facility's property layout.

Big Smokey Maintenance Station Location Map SR-376 NY 53.4



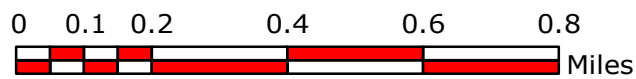
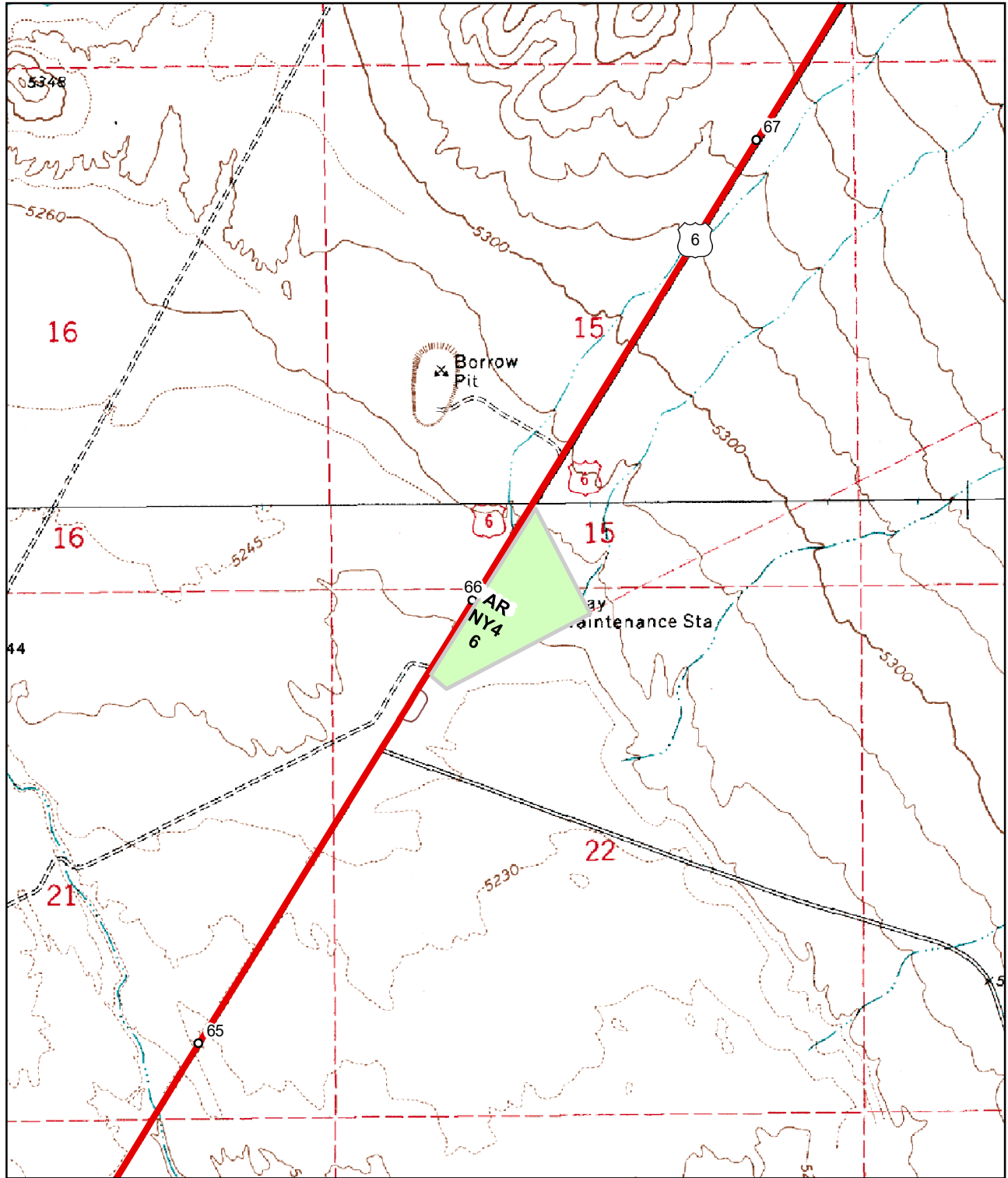
The "green" shaded area represents the Maintenance Facility's property layout.

Montgomery Pass Maintenance Station Location Map US-6 MI 8.4



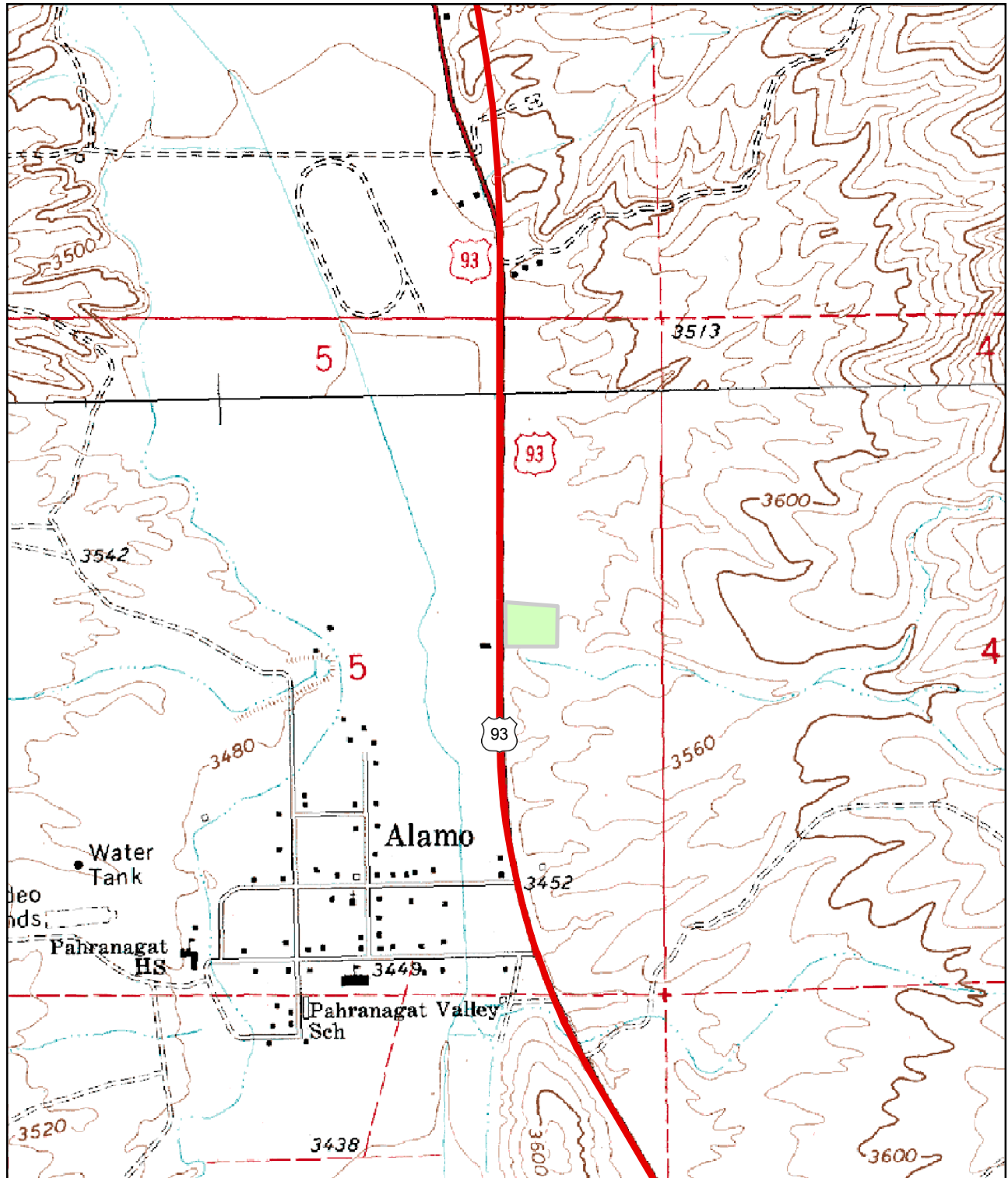
The "purple" shaded area represents the Maintenance Facility's property layout.

Blue Jay Maintenance Station Location Map US-6 NY 65.8



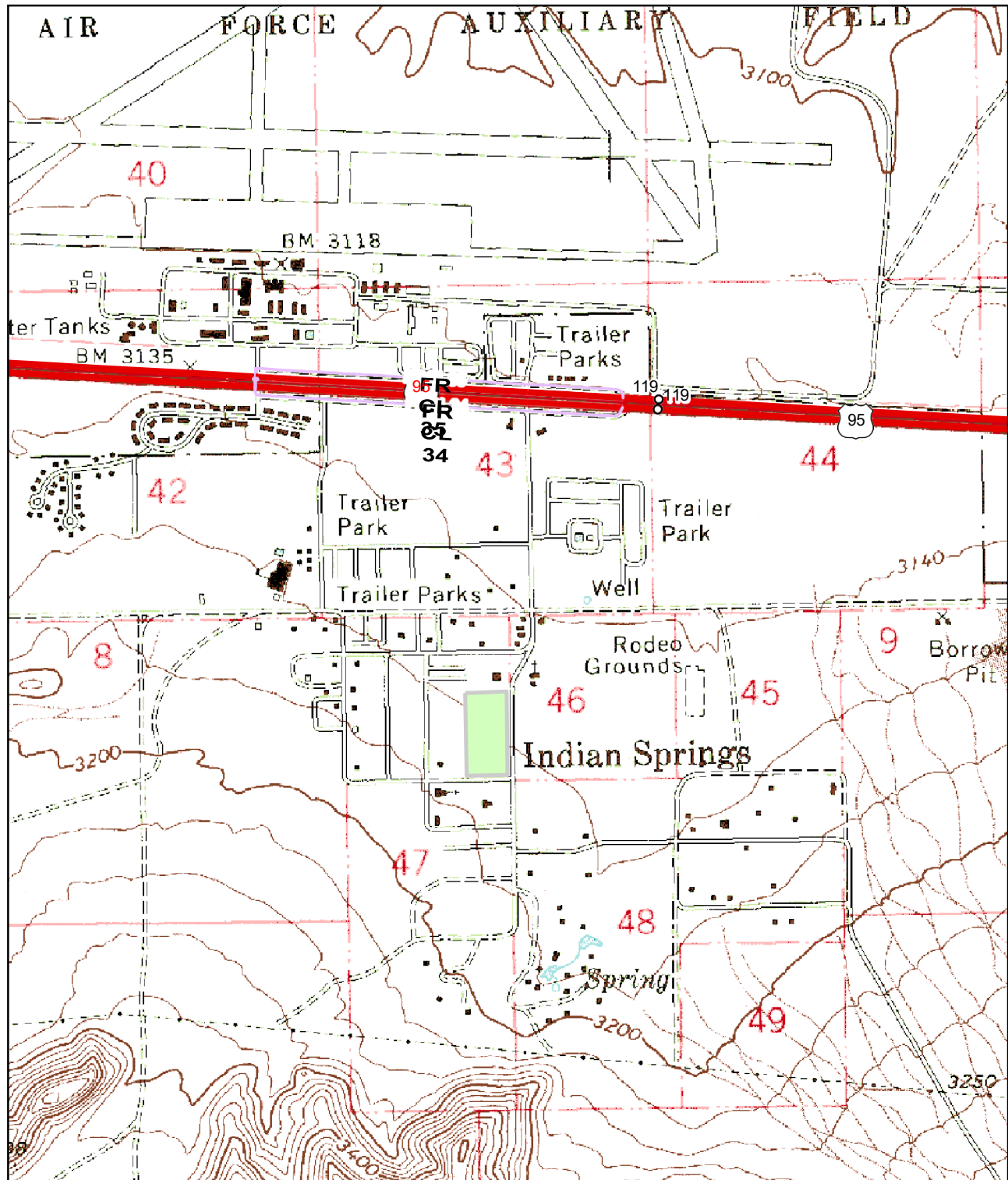
The "green" shaded area represents the Maintenance Facility's property layout.

Alamo Maintenance Station Location Map US-93 LN 39.0



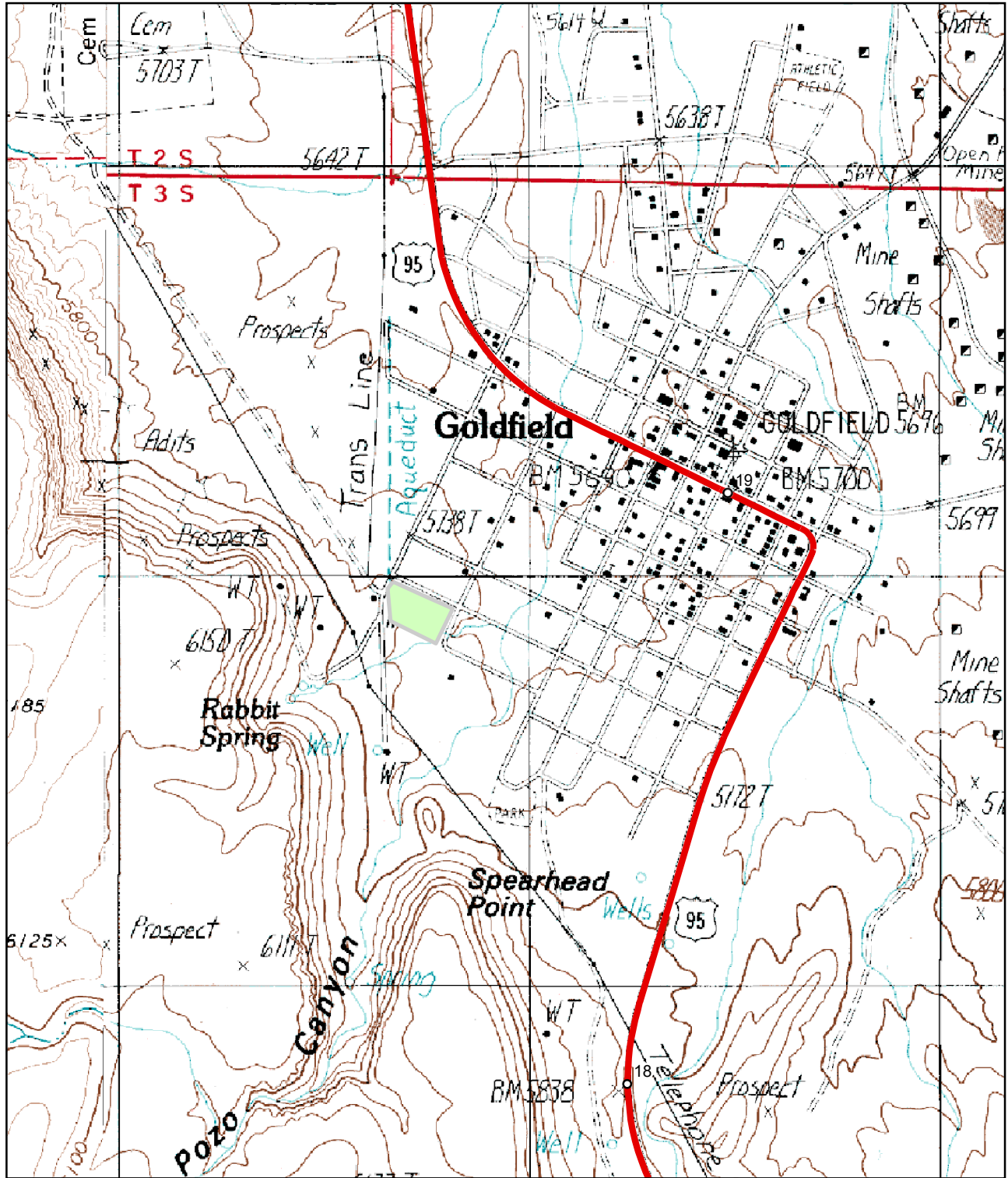
The "green" shaded area represents the Maintenance Facility's property layout.

Old Indian Springs Maintenance Station Location Map US-95 CL 123.3



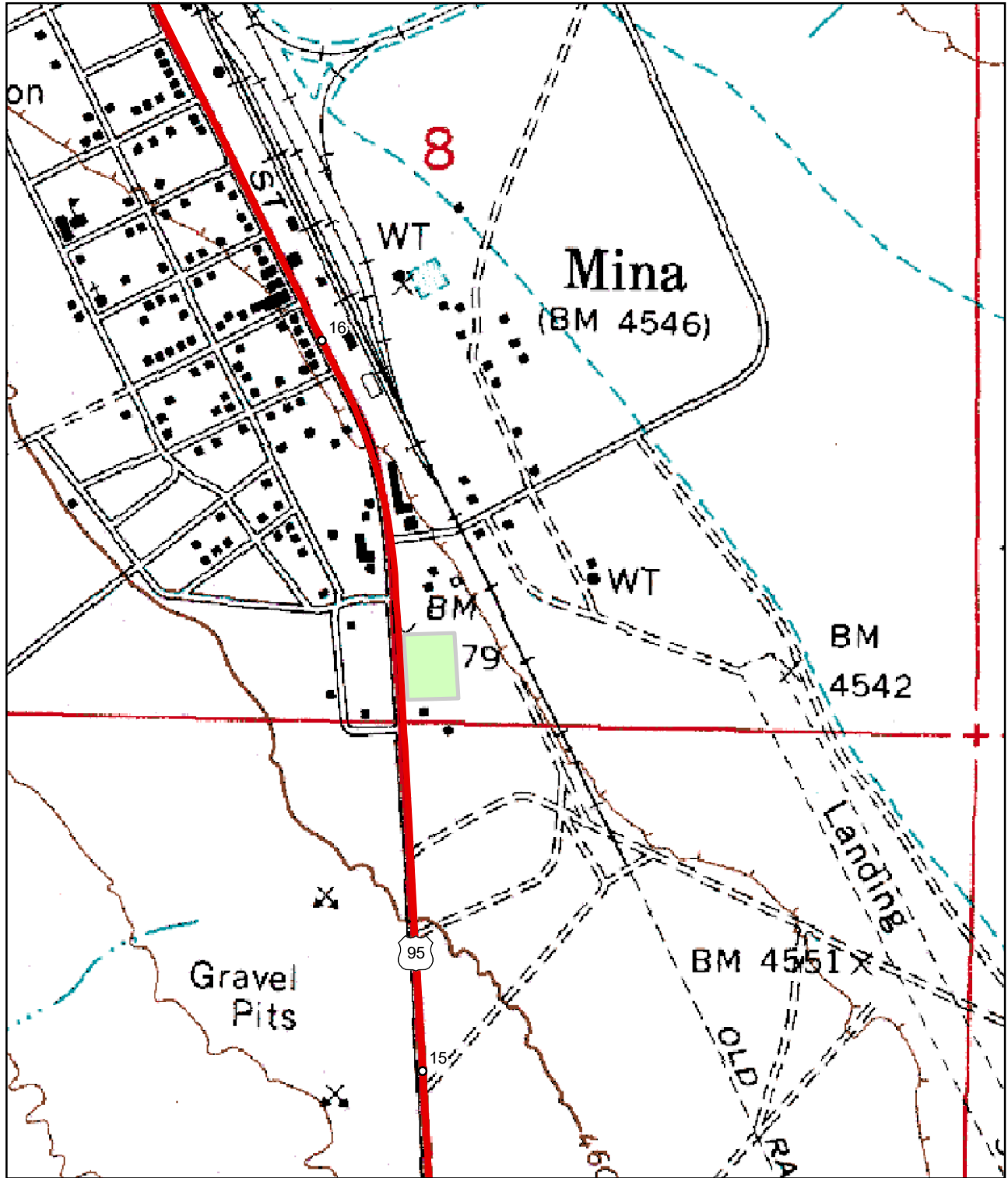
The "green" shaded area represents the Maintenance Facility's property layout.

Goldfield Maintenance Station Location Map US-95 ES 19.5



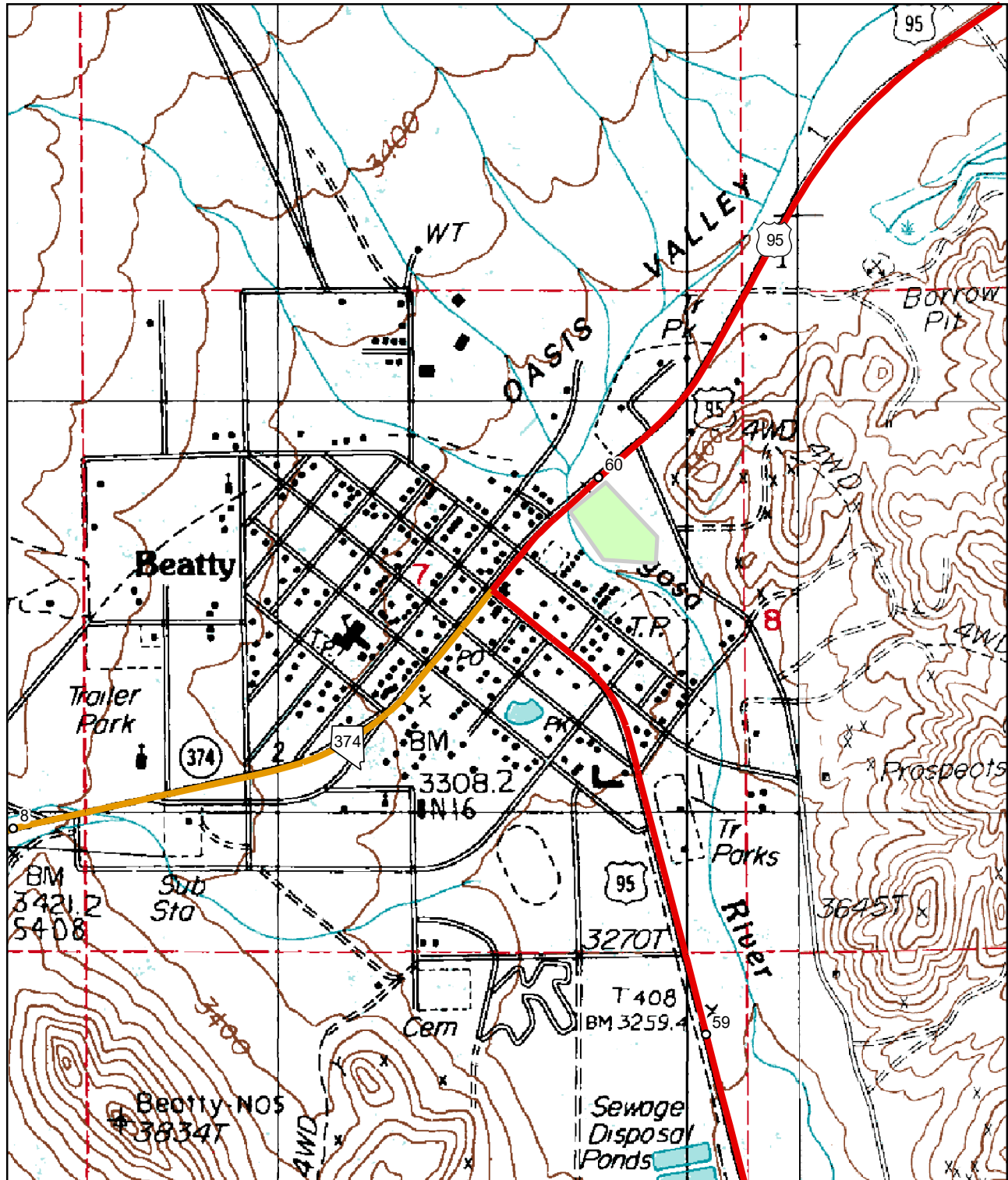
The "green" shaded area represents the Maintenance Facility's property layout.

Mina Maintenance Station Location Map US-95 MI 15.7



The "green" shaded area represents the Maintenance Facility's property layout.

Beatty Maintenance Station Location Map US-95 NY 59.9



The "green" shaded area represents the Maintenance Facility's property layout.

APPENDIX D

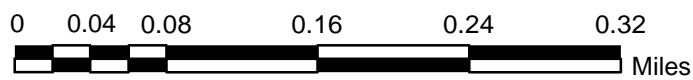
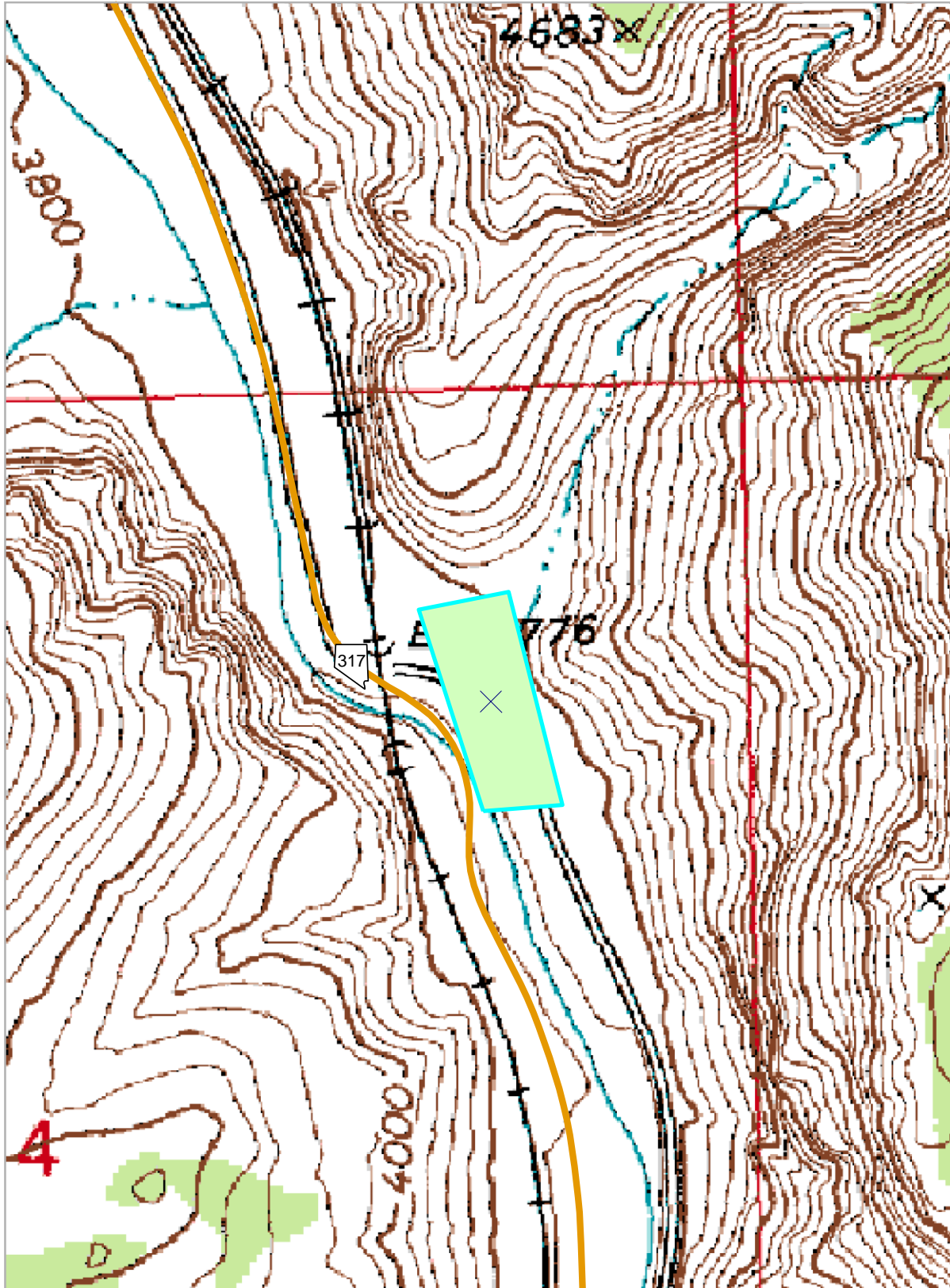
Minor-B Maintenance Facility Listing and Associated Area Maps

District 1 Minor-B

Table C-1a. Minor-A Maintenance facility listing.

Minor-B Facility	Address/Route	County	Milepost	Latitude	Longitude	Facility Size (Acres)	Drainage Basin	Receiving Waterway	Discharges to Waters of the U.S.	Notes
Material Stockpile	SR-317	LN	43.7	37° 25' 46.9"	-114° 33' 44.2"	3.3	Colorado River	Meadow Valley Wash	Yes	-----

**Material Storage
Site Location Map
SR-317 LN 43.7**



The "Green" shaded area represents the facility layout.

APPENDIX E

Major and Minor Maintenance Facility Stormwater Inspection Forms

**Nevada Department of Transportation
Comprehensive Maintenance Facility Inspection Form
Major and Minor-A Maintenance Facilities
Municipal Separate Storm Sewer Systems Permit NV0023329**

Facility Name:	Date:
----------------	-------

Facility Location:	Fiscal Year:
--------------------	--------------

Inspector(s):

Title(s):

FPPP Administrator(s):

Weather Conditions

Temperature (°F):

Precipitation:

Wind (mph):

Documentation

- | | | |
|--|-----|----|
| 1. Is the FPPP accessible on-site? | Yes | No |
| 2. Is the Maintenance Facility BMPs Manual accessible on-site? | Yes | No |

Comments:

Fueling Areas

- | | | |
|--|-----|----|
| 1. Is there a fueling area at this facility? | Yes | No |
|--|-----|----|

If no, skip to next sub-section.

- | | | |
|-------------------------------------|-----|----|
| a. Are fuel pumps actively leaking? | Yes | No |
| b. Are fuel spills present? | Yes | No |
| c. Are BMPs properly implemented? | Yes | No |

If no, describe:

- | | | |
|---|-----|----|
| 2. Is there a "fuel pump house" located at this facility? | Yes | No |
|---|-----|----|

If no, skip to next sub-section.

- | | | |
|---|-----|----|
| a. Are items in the pump house properly stored? | Yes | No |
|---|-----|----|

If no, describe:

- | | | |
|--------------------------|-----|----|
| 3. Is there a spill kit? | Yes | No |
|--------------------------|-----|----|

If no, skip to next sub-section.

- | | | |
|--|-----|----|
| a. Is the spill kit signed and labeled? | Yes | No |
| b. Is the spill kit sufficiently stocked with appropriate spill control and cleanup equipment? | Yes | No |

Comments:

Equipment Storage/Parking Areas

- | | | |
|--|-----|----|
| 1. Are equipment leaks/spills present? | Yes | No |
|--|-----|----|

If no, skip to next sub-section.

- | | | |
|-----------------------------------|-----|----|
| a. Are BMPs properly implemented? | Yes | No |
|-----------------------------------|-----|----|

If no, describe:

Comments:

Equipment Maintenance/Repair Facilities		
1. Are equipment repairs/servicing performed at this facility?	Yes	No
If no, skip to next sub-section.		
a. Are waste and non-waste materials properly stored?	Yes	No
b. Are leaks/spills present?	Yes	No
c. Are BMPs properly implemented?	Yes	No
If no, describe:		
2. Are equipment batteries stored at this facility?	Yes	No
If no, skip to next sub-section.		
a. Are BMPs properly implemented?	Yes	No
If no, describe:		
3. Are equipment tires stored at this facility?	Yes	No
If no, skip to next sub-section.		
a. Are BMPs properly implemented?	Yes	No
If no, describe:		
Comments:		
Material Stockpile/Storage Areas		
1. Does the facility have material stockpiles, e.g. sand/salt?	Yes	No
If no, skip to next sub-section.		
a. Is there evidence of material migration from the stockpile area(s)?	Yes	No
b. Are BMPs properly implemented?	Yes	No
If no, describe:		
2. Does the facility have anti-icing agent tanks?	Yes	No
If no, skip to next sub-section.		
a. Do the tank areas have adequate secondary containment?	Yes	No
b. Are leaks/spills present around the tank areas?	Yes	No
c. Are BMPs properly implemented?	Yes	No
If no, describe:		
3. Does the facility store striping paint and glass beads?	Yes	No
If no, skip to next sub-section.		
a. Are BMPs properly implemented?	Yes	No
If no, describe:		
4. Does the facility temporarily store sweeping spoils?	Yes	No
If no, skip to next sub-section.		
a. Is there evidence of material migration from the spoils area(s)?	Yes	No
b. Are BMPs properly implemented?	Yes	No
If no, describe:		
5. Does the facility temporarily store vector truck waste waste?	Yes	No
If no, skip to next sub-section.		
a. Is there evidence of material migration from the waste area(s)?	Yes	No
b. Are BMPs properly implemented?	Yes	No
If no, describe:		

Material Stockpile/Storage Areas (cont'd)		
6. Is roadside/miscellaneous waste stored onsite?	Yes	No
If no, skip to next sub-section.		
a. Are BMPs properly implemented?	Yes	No
If no, describe:		
7. Are pesticides, herbicides, and/or fertilizers stored at the facility?	Yes	No
If no, skip to next sub-section.		
a. Are BMPs properly implemented?	Yes	No
If no, describe:		
8. Does the facility store treated wood products?	Yes	No
If no, skip to next sub-section.		
a. Are BMPs properly implemented?	Yes	No
If no, describe:		
9. For materials not specifically identified above, are there any BMP concerns?	Yes	No
If yes, describe:		
Comments:		
Equipment Painting Areas		
1. Does the facility conduct equipment painting?	Yes	No
If no, skip to next sub-section.		
a. Are BMPs properly implemented?	Yes	No
If no, describe:		
Comments:		
Equipment Wash Rack/Steam Cleaning Areas		
1. Is equipment washing performed at this facility?	Yes	No
If no, skip to next sub-section.		
a. Is there a designated engineered wash rack area?	Yes	No
b. Are BMPs properly implemented?	Yes	No
If no, describe:		
2. Is equipment steam cleaning performed at this facility?	Yes	No
If no, skip to next sub-section.		
a. Is there a designated engineered steam cleaning area?	Yes	No
b. Are BMPs properly implemented?	Yes	No
If no, describe:		
Comments:		

Field Material Testing Labs		
1. Are field material testing labs present?	Yes	No
If no, skip to next sub-section.		
a. Are they currently in use?	Yes	No
b. Are BMPs properly implemented?	Yes	No
If no, describe:		
Comments:		
Water Truck Filling Stations		
1. Are water truck filling stations present?	Yes	No
If no, skip to next sub-section.		
a. Are water leaks present or is there water running?	Yes	No
b. Are BMPs properly implemented?	Yes	No
If no, describe:		
Comments:		
Spreader Racks		
1. Are spreader racks present?	Yes	No
If no, skip to next sub-section.		
a. Is there any sand and/or salt deposited on the ground?	Yes	No
b. Are equipment leaks present?	Yes	No
c. Are hydraulic hose lines properly stored?	Yes	No
d. Are BMPs properly implemented?	Yes	No
If no, describe:		
Comments:		
Facility Stormwater		
1. Does stormwater discharge into hydraulic facilities, e.g. drop inlets?	Yes	No
If no, skip to next sub-section.		
a. Do any of the facilities require maintenance?	Yes	No
If yes, describe:		
b. Are BMPs properly implemented?	Yes	No
If no, describe:		
c. Were all hydraulic facilities inspected?	Yes	No
If no, indicate why not:		
a. Do any of the facilities require maintenance?	Yes	No
If yes, describe:		
3. Is there evidence of significant run-on onto the facility from adjacent areas?	Yes	No

Facility Stormwater (cont'd)		
If no, skip to next sub-section.		
a. Are control measures necessary?	Yes	No
If yes, describe:		
Comments:		
Illicit Discharge Detection and Elimination		
1. Is there evidence of an illicit discharge into the storm drain system?	Yes	No
If yes, describe:		
If yes, recommended corrective action:		
Comments:		
Overall Facility Condition/General Housekeeping		
1. Overall, are areas within the facility kept neat, clean, and orderly?	Yes	No
If no, describe:		
2. Is there a significant build up of trash and/or waste materials within the facility?	Yes	No
Comments:		
Certification		
<p>I certify under penalty that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system, or those person(s) directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. [40 CFR 122.22(d)]</p>		
Authorized Signature:		
Title:		
Date:		

**Nevada Department of Transportation
Comprehensive Maintenance Facility Inspection Form
Minor-B Maintenance Facilities
Municipal Separate Storm Sewer Systems Permit NV 0023329**

Facility Name:	Date:
----------------	-------

Facility Location:	Fiscal Year:
--------------------	--------------

Inspector(s):

Title(s):

FPPP Administrator(s):

Weather Conditions

1. Temperature (°F):

2. Precipitation:

3. Wind (mph):

Material Stockpile/Storage Areas

1. Does the facility have material stockpiles?	Yes	No
--	-----	----

If no, skip to next sub-section.

a. Is there evidence of material migration from the stockpile area(s)?	Yes	No
--	-----	----

b. Are BMPs properly implemented?	Yes	No
-----------------------------------	-----	----

If no, describe:

2. Does the facility temporarily store sweeping spoils?	Yes	No
---	-----	----

If no, skip to next sub-section.

a. Is there evidence of material migration from the spoils area(s)?	Yes	No
---	-----	----

b. Are BMPs properly implemented?	Yes	No
-----------------------------------	-----	----

If no, describe:

3. Does the facility temporarily store vector truck waste?	Yes	No
--	-----	----

If no, skip to next sub-section.

a. Is there evidence of material migration from the waste area(s)?	Yes	No
--	-----	----

b. Are BMPs properly implemented?	Yes	No
-----------------------------------	-----	----

If no, describe:

4. Is roadside/miscellaneous waste stored onsite?	Yes	No
---	-----	----

If no, skip to next sub-section

a. Are BMPsd properly implemented?	Yes	No
------------------------------------	-----	----

If no, describe:

5. For materials not specifically identified above, are there any BMP concerns?	Yes	No
---	-----	----

If yes, describe:

Comments:

Facility Stormwater (cont'd)		
c. Were all hydraulic facilities inspected?	Yes	No
If no, indicate why not:		
2. Does stormwater discharge into manufactured stormwater treatment devices?	Yes	No
If no, skip to next sub-section.		
a. Do any of the facilities require maintenance?	Yes	No
If yes, describe:		
3. Is there evidence of significant stormwater run-on onto the facility from adjacent areas?	Yes	No
If no, skip to next sub-section.		
a. Are control measures necessary?	Yes	No
If yes, describe:		
Comments:		
Illicit Discharge Detection and Elimination		
1. Is there evidence of an illicit discharge into the storm drain system, or illegal dumping?	Yes	No
If yes, describe:		
If yes, recommended corrective action:		
Comments:		
Overall Facility Condition/General Housekeeping		
1. Overall, are areas within the facility kept neat, clean, and orderly?	Yes	No
If no, describe:		
2. Is there significant build-up of trash and/or waste materials within the facility?	Yes	No
Comments:		
Certification		
<p>I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system, or those person directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. [40 CFR 122.22(d)]</p>		
Authorized Signature:		
Title:		
Date:		

APPENDIX F

Basic Control Measures



Spill kit contents.



"EPIC" Systems installed at HQ in Carson City. Maintain a reasonable buffer zone around the inlet surfaces.



Material organization.



Remove sediment when 75% of the basin capacity has been met.



Accesible Spill Kit.



Facility perimeter control.



Hydraulic hose containment



Neatly swept surface.



Secondary containment measures.



Millings berm installation for stockpile run-on prevention.



Material organization.



Drip containment.



Equipment leak containment.



Salt/sand stockpile containment.

APPENDIX G

Reporting Procedures for Sweeping Maintenance Facilities

Reporting Procedures for Sweeping NDOT

Maintenance Yards

This is to serve as directions for how Sweeping the NDOT Maintenance Yards needs to be reported in EAMS. Reporting this activity should be in conjunction with the sweeping frequency that is required by the NDOT FPPP.

- Create New Work Order in EAMS program

In the task wizard choose the following:

Project – Stormwater – Maintenance of Facilities

Asset Type – Maint. Facilities

Activity – 133.05.01 Pick-Up Broom Sweeping

(133.03.01 Pull Broom Self-Propelled Broom can be used if you are in a rural location and a pick-up broom is not available).

Inv. Elem – This is where you will select the Maintenance Yard that you are reporting the sweeping operation for. All yards have an MY number that can be reported against.

On the Work Order screen, you will need to enter the Plan Amount. For 133.05.01 that will be Cu. Yds. This is how much you swept up in the Maintenance Yard. (Most NDOT pick-up brooms are full at 3 yds.) If you are using the 133.03.01 that is in lane miles so you will have to give your best estimate to what that would be.

Enter the date that work occurred. Save Page.

On the bottom left of the screen you now need to enter the

LABOR – EQUIPMET – MATERIAL that was used for this Work Order.

ACCOMPLISHMENT – should match the Plan Amount entered on top.

LOCATION - If you did not enter the location (MY #, name) on the Task Wizard, this is where you need to do that now. If you right click your mouse and select Find Inv. Item a list will come up on the screen and you can select the Maintenance Yard there.

Click on the Maintenance Yard that you swept and select OK on the bottom right. This will add it to the location tab on the Work Order.

Make DAYCARDS for the LABOR – EQUIPMENT – MATERIAL and fill out the required fields with those. (Labor Hours, Equipment Hours, Equipment Operator)

SAVE Work Order

Select the Approve All Button on Top Left of Work Order Screen.

- If you are hauling away sweepings from a stockpiled location to the dump/landfill, **DO NOT** charge this to sweeping a Maintenance Yard. This should be charged to a section of roadway as 133.05.01 Pick-Up broom Sweeping with a 0 Plan Amount / Accomplishment. Please put the amounts that you hauled in the comments, and put the cost of the dump ticket in the Cost portion of the Accomplishment tab. Select Other as your Cost Type.

***** DO NOT CHARGE SWEEPING A MAINTENACE YARD TO YARD WORK *****



**WAIVER APPLICATION FORM
FOR
PERMIT/PERMIT MODIFICATIONS
TO OPERATE A
SOLID WASTE MANAGEMENT FACILITY**

Section A: Facility Type

- | | |
|---|--|
| <input type="checkbox"/> Class I Disposal Site | <input type="checkbox"/> Class II Disposal Site |
| <input type="checkbox"/> Class III Disposal Site | <input type="checkbox"/> Compost Plant |
| <input type="checkbox"/> Materials Recovery Facility | <input type="checkbox"/> Medical Waste Management Facility |
| <input type="checkbox"/> Recycling Center | <input checked="" type="checkbox"/> Solid Waste Storage Bin Facility |
| <input type="checkbox"/> Transfer Station | <input type="checkbox"/> Waste Grease Facility |
| <input type="checkbox"/> Waste Tire Management Facility | <input type="checkbox"/> Waste to Energy/Fuel Facility |

Section B: Facility


1. Complete name:	Nevada Department of Transportation, Las Vegas Maintenance Yard
2. SNHD control number:	
3. Physical address:	123 East Washington Avenue
4. Parcel number(s):	139-27-603-005 and 139-27-603-019
5. Phone number:	(702) 385-6500
6. Website address:	www.nevadadot.com

Section C: Applicant

<input type="checkbox"/> 1a. Facility operator <input checked="" type="checkbox"/> 1b. Facility owner			
2a. Contact person:	Martin Strganac, PE	2b. Office phone #:	(702) 385-6502
2c. Title:	Asst. District 1 Engineer	2d. Cell phone #:	
2e. Company:	Nevada Department of Transportation		
2g. Mailing address:	1263 South Stewart Street, Carson City, NV 89712		
2f. E-mail address:	MStrganac@dot.nv.gov		

Section D: Consultant

1a. Contact person:	John Buzzone	1b. Office phone #:	(775) 398-1222
1c. Title:	Principal	1d. Cell phone #:	(775) 997-4519
1e. Company:	Stantec Consulting Services, Inc.		
1g. Mailing address:	5390 Kietzke Lane, Suite 103, Reno, NV 89511		
1f. E-mail address:	John.Buzzone@stantec.com		

Section E: Facility Operator		
1. Legal & fictitious names:	Nevada Department of Transportation	
2. Mailing address:	123 East Washington Avenue, Las Vegas, NV 89101	
3. Phone number:	(702) 385-6500	
Section F: Facility Owner		
1. Legal & fictitious names:	Nevada Department of Transportation	
2. Mailing address:	1263 South Stewart Street, Carson City, NV 89712	
3. Phone number:	(775) 888-7000	
Section G: Property Owner		
1. Legal name:	Nevada Department of Transportation	
2. Mailing address:	1263 South Stewart Street, Carson City, NV 89712	
3. Phone number:	(775) 888-7000	
Section H: Certifications		
<p>This application form and supporting documents are hereby submitted to SNHD to apply for at least one waiver from the regulations governing this facility type. We understand that receipt of this application does not constitute an approval of this request. We understand that each waiver must be approved by the Southern Nevada District Board of Health before the implementation of the proposed alternative. We understand that this process will require payment of a Preliminary Plan Review fee per application, a Waiver Candidate Worksheet Meeting fee per meeting, a Waiver fee per waiver, and the cost of each public notice. We certify that, to the best of our knowledge, the information contained above and in the supporting documents is complete and accurate.</p>		
Legal signature of applicant's agent:		
Printed name of applicant's agent:	Martin N. Strganac, P.E. Assistant District Engineer NV Department of Transportation	
Title or authority of applicant's agent:		
Date of signing:	1/16/24	
Section I: Receipt of Application (for SNHD use only)		
SNHD date stamp	Legal signature of SNHD staff:	
	Printed name of SNHD staff:	
	Title of SNHD staff:	
	Date of signing:	



**WAIVER CANDIDATE WORKSHEET
FOR
PERMIT/PERMIT MODIFICATIONS
TO OPERATE A
SOLID WASTE MANAGEMENT FACILITY**

SNHD CONTROL NUMBER:

Section A: Facility name and address

Section B: Detailed description of the regulated activity, including Regulation reference(s)

Section C: Detailed description of the Waiver requested

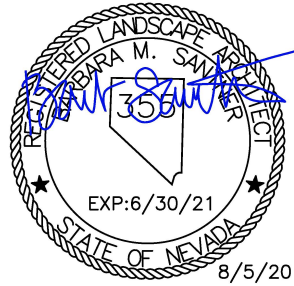
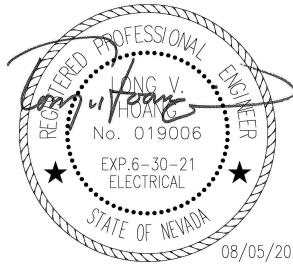
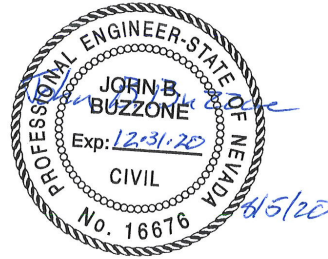
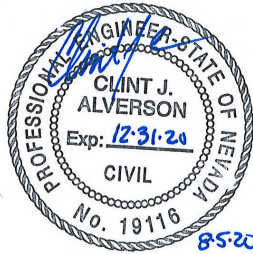
Section D: Proposed alternative to standard specified in the regulations

Section E: How proposed alternative will comply with the intent of the specified standard and will protect public health and the environment

Section F: Describe the extent to which the facility or proposed facility will affect the local environment and the public health under the worst expected adverse conditions if the Waiver is granted.

Even under worst expected adverse conditions, the activities allowed under this Waiver are not anticipated to affect the local environment or public health. The entire facility is fenced to prevent material from leaving the site and to prevent public access to the site.

RESPONSIBLE PARTIES FOR TECHNICAL SPECIFICATIONS



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SECTION 00 31 32

SUBSURFACE CONDITIONS

PART 1 GENERAL

1.1 DESCRIPTION

A soils investigation report, dated July 28, 2017, has been prepared by Nova Geotechnical & Inspection Services, entitled *Geotechnical Exploration Report Infrastructure Improvements NDOT Las Vegas Maintenance Station, 125 East Washington Avenue, Las Vegas, Nevada*. A copy of the report is provided in Appendix A. A copy of the report is provided for information only and is not a guarantee or warranty of subsurface conditions or conditions of engineered fill not yet placed.

1.2 ADDITIONAL INFORMATION

The Contractor should visit the site and acquaint himself with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions but such subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the Owner and the Engineer. By submitting a Bid, each Bidder is certifying that he has visited the site and is satisfied with the conditions and subsurface conditions.

PART 2 PRODUCTS

Not applicable to this Section.

PART 3 EXECUTION

Not applicable to this Section.

END OF SECTION

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SECTION 03 60 00

GROUTING

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide grout, complete and in place, in accordance with the Contract Documents. For concrete repair material and procedures, reference Sheet SO01.
- B. Grout provided as a base support for mechanical and electrical equipment shall conform to manufacturer's requirements and the requirements of this section.
- C. The following types of grout are covered in this Section:
 - 1. Non-Shrink Grout
 - 2. High Strength Non-Shrink Grout
 - 3. Non-Shrink Epoxy Grout
 - 4. Topping Grout and Concrete/Grout Fill

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
- B. ASTM C307 -- Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing
- C. ASTM C531 -- Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
- D. ASTM C579 -- Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
- E. ASTM C580 -- Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
- F. ASTM C827 -- Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
- G. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
- H. ASTM C1090 -- Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout
- I. ASTM C1107 -- Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- J. ASTM C1116 -- Standard Specification for Fiber-Reinforced Concrete

- K. ASTM C1339 – Standard Test Method for Flowability and Bearing Area of Chemical-Resistant Polymer Machinery Grouts

1.3 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

1. Certified testing lab reports for tests indicated herein.
2. Test results and service report from the field tests and the demonstration and training session verifying the requirements indicated herein.
3. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each type of grout used in the WORK, and location of use.
4. Documentation indicating that the grouts contain no chlorides or other chemicals that cause corrosion.
5. Manufacturer's Safety Data Sheet documenting composition of grouts.
6. Submit manufacturer's written warranty as indicated herein.
7. Name and telephone number of grout manufacturer's representative who will give on-site service. The representative shall have at least one year of experience with the indicated grouts.

1.4 QUALITY ASSURANCE

- A. Field Tests

1. Compression test specimens will be taken from the first placement of each type of grout, and at intervals thereafter selected by the ENGINEER. The specimens will be made by the ENGINEER or its representative.
2. Compression tests and fabrication of specimens for cement grout and cement based non-shrink grout will be performed in accordance with ASTM C1107 at intervals during construction selected by the ENGINEER.
3. Compression tests and fabrication of specimens for topping grout and concrete/grout fill will be performed in accordance with Sheet S001 at intervals during construction selected by the ENGINEER.
4. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C579, Method B, at intervals during construction selected by the ENGINEER. A set of 3 specimens will be made for testing at 7 Days and each earlier time period as appropriate.
5. The cost of laboratory tests on grout will be paid by the OWNER except where test results show the grout to be defective. In such case, the CONTRACTOR shall pay for the tests, removal and replacement of Defective Work, and re-testing, all as part of the WORK.
6. The CONTRACTOR shall assist the ENGINEER in obtaining specimens for testing and shall furnish materials necessary for fabricating the test specimens.

- B. Construction Tolerances: Construction tolerances shall be as indicated in Sheet S001 unless indicated otherwise.
- C. Pre-Installation Demonstration and Training
 - 1. Non-Shrink Grouts
 - a. The grout manufacturer shall give a demonstration and training session for the cement based and epoxy non-shrink grouts to be used on the project before any installation of grout is allowed.
 - b. The CONTRACTOR shall transport the test cubes to an independent test laboratory, obtain the test reports, and report these demonstration and training test cube strengths to the ENGINEER.

1.5 SPECIAL CORRECTION OF DEFECTS PROVISIONS

- A. Manufacturer's Warranty
 - 1. Furnish one year warranty for WORK provided under this section.
 - 2. Manufacturer's warranty shall not contain a disclaimer limiting responsibility to the purchase price of products or materials.

PART 2 PRODUCTS

2.1 APPLICATION

- A. Unless indicated otherwise, grouts shall be provided as listed below whether indicated on the Drawings or not.

Application	Type of Grout
Beam and column (1 or 2 story) base plates less than 16-inches in the least dimension.	Non-Shrink
Column base plates (greater than 2 story or larger than 16-inches in the least dimension)	High Strength Non-Shrink
Under precast concrete elements	High Strength Non-Shrink
Storage tanks and other non-motorized equipment or machinery under 30 horsepower	Non-Shrink
Motorized equipment over 30 horsepower and equipment under 30 horsepower but subject to severe shock loads and high vibrations	Non-Shrink Epoxy
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-Shrink
Toppings and concrete/grout fill less than 3-inches thick	Topping Grout

Toppings and concrete/grout fill greater than 3-inches thick	Per Sheet S001
Anchor bolts, anchor rods and reinforcing steel required to be set in epoxy or adhesive.	Per Sheet S001
Repair of holes and defects in concrete members.	Per Sheet S001

2.2 NON-SHRINK GROUTS

A. General

1. All non-shrink grout shall be cement based unless otherwise noted.
2. Cement-based non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas liberating, non-metallic, cement type grout requiring only the addition of water. Cement from kilns burning metal-rich hazardous waste fuel shall not be used.
3. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each non-shrink grout shall be as recommended by the manufacturer for the particular application.
4. The manufacturer's product information shall state the acceptability of the non-shrink grout for the intended purpose and location.
5. Grout shall not contain chlorides or additives that may contribute to corrosion.
6. Grout placed in continuously wet environments or in exterior conditions shall not contain gypsum or calcium salt.
7. All cement-based non-shrink grout shall have the following general properties:
 - a. Meet the requirements of ASTM C1107.
 - b. Have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827. The grout when tested shall not bleed or segregate at maximum allowed water.
 - c. No shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.
 - d. A minimum bond strength (concrete to grout) of 1900 psi per modified ASTM C882.
8. Environmental and ambient conditions shall be a factor in the selection of non-shrink grout. If a non-shrink grout is to be used in a high sulfate environment, marine environment, high temperature environment, or freeze/thaw environment, the manufacturer's product information shall state the acceptability for each environmental condition.

B. Non-Shrink Grout

1. Non-Shrink Grout shall have a minimum 28 Day compressive strength of 5000 psi when mixed at a fluid consistency and tested per ASTM C109.

2. Non-Shrink Grout shall be **Five Star Grout** by **Five Star Products**, **Five Star Fluid Grout 100** by **Five Star Products**, **Sikagrout 212** by **Sika Corporation**, or approved equal.

C. High Strength Non-Shrink Grout

1. High Strength Non-Shrink Grout shall have a minimum 28-Day compressive strength of 10,000 psi when mixed at a fluid consistency and tested per ASTM C109.
2. High Strength Non-Shrink Grout shall be **Five Star High Strength Grout** by **Five Star Products**, **Sikagrout 428 FS**, or approved equal.

2.3 NON-SHRINK EPOXY GROUT

- A. Non-shrink epoxy grout shall be a flowable, non-shrink, 100 percent solids system. The epoxy grout system shall have 3 components: resin, hardener, and specially blended aggregate, each premeasured and repackaged. The resin component shall not contain any non-reactive diluents.
- B. The manufacturer's product information shall state the acceptability of the epoxy grout for the intended purpose and location.
- C. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.
- D. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable.
- E. Non-shrink epoxy grout shall have a negligible (less than 0.0006 in/in) length change after hardening, and a coefficient of thermal expansion less than 0.00003 in/in F when tested in accordance with ASTM C531.
- F. Non-shrink epoxy grout shall develop a minimum compressive strength of 9000 psi in 24 hours and 13,000 psi in seven days when tested in accordance with ASTM C579, method B.
- G. The effective bearing area shall be a minimum of 85 percent effective bearing area (EBA) in accordance with ASTM C1339, for bearing area and flow.
- H. The chemical formulation of the non-shrink epoxy grout shall be that recommended by the manufacturer for the particular application. Do not reduce aggregate loading or add solvents to increase flowability.
- I. Non-shrink epoxy grout shall have the following minimum properties when tested at 7 Days:
 1. Minimum bond strength to concrete of 3000 psi per ASTM C882 modified.
 2. Minimum bond strength to steel of 1700 psi per ASTM C882 modified.
 3. Minimum flexural strength of 2500 psi per ASTM C580.
 4. Minimum tensile strength of 2000 psi per ASTM C307.

- J. Non-shrink epoxy grout shall be **Five Star DP Epoxy Grout** by **Five Star Products, Inc.**, **Masterflow 648** by **BASF Corporation**, **Sikadur 42 Grout-Pak** by **Sika Corporation**, or approved equal.

2.4 TOPPING GROUT AND CONCRETE/GROUT FILL

- A. Where fill thickness is 3-inches or greater, structural concrete as indicated in Sheet SO01, may be used when accepted by the ENGINEER. Fiber reinforcing shall be as indicated below.
- B. Grout for topping of slabs and concrete/grout fill for built-up surfaces of tanks, channels, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as indicated. Materials and procedures indicated for structural concrete in Sheet SO01, shall apply unless indicated otherwise.
- C. Topping grout and concrete/grout fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water/cement ratio of 0.45.
- D. Coarse aggregate shall be graded as follows:

U.S. Standard Sieve Size	Percent By Weight Passing
1/2 in	100
3/8 in	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

- E. Final mix design shall be as determined by trial mix design as indicated in Sheet SO01, except that drying shrinkage tests are not required.
- F. Topping grout and concrete grout/fill shall contain air-entraining agent per Sheet SO01.
- G. Strength: Minimum compressive strength of topping grout and concrete/grout fill at 28 days shall be 4000 psi.
- H. Topping grout used in clarifiers, or where the fill thickness is 3 inches or greater shall contain fiber reinforcing, unless otherwise shown on the Contract Documents. Fiber reinforcing shall be 100 percent virgin polypropylene fibrillated fibers specifically manufactured in a blended gradation for use as concrete secondary reinforcement. Fibers shall be added at a rate of 1.5 pounds per cubic yard of concrete. Fibers shall conform to ASTM C1116.

2.5 CURING MATERIALS

- A. Curing materials shall be in accordance with Sheet SO01 and as recommended by the manufacturer of prepackaged grouts.

2.6 CONSISTENCY

- A. The consistency of grout shall be as necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is defined such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.
- B. The slump for topping grout and concrete/grout fill shall be adjusted to match placement and finishing conditions but shall not exceed 4-inches.

2.7 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Grout shall be stored in accordance with manufacturer's recommendations.

3.2 GENERAL

- A. CONTRACTOR shall arrange for the manufacturer of prepackaged grouts to provide on-site technical assistance within 72 hours of request, as part of the WORK.
- B. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the ENGINEER.
- C. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of the saturation period, excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.
- D. Surface preparation, curing, and protection of cement grout shall be in accordance with Sheet SO01. The finish of the grout surface shall match that of the adjacent concrete unless otherwise indicated.
- E. Surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete, and other deleterious materials.
- F. Shade the WORK from sunlight for at least 24 hours before and 48 hours after grouting.
- G. Contact the grout manufacturer's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

3.3 GROUTING PROCEDURES

- A. General: Mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

- B. Structural, equipment, tank, and piping support bases shall be grouted, unless indicated otherwise.
1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout or other thickness if indicated.
 2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout through a headbox of appropriate size. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against retaining surfaces, and joints shall be sealed as recommended by the grout manufacturer to be liquid-tight. Forms shall be coated as recommended by the grout manufacturer for easy form release. Where this method of placement is not practical or where required by the ENGINEER, alternate grouting methods shall be submitted by the CONTRACTOR for acceptance by the ENGINEER.
 3. Concrete equipment pads for equipment bases that will be epoxy-grouted shall be sized so that, when the equipment base is fully grouted, the epoxy grout is stopped not less than 4-inches from the edge of the pad.
- C. Topping Grout and Concrete/Grout Fill
1. Mechanical, electrical, and finish WORK shall be completed prior to placement of topping or concrete/grout fill. To ensure bonding to the base slab, the base slab shall be given an exposed aggregate finish. Alternatively, where accepted by the ENGINEER, the base slab shall be given a roughened textured surface by a close-spaced rake while the surface is green. After curing, high pressure washing shall expose the aggregates and produce not less than a 3/16-inch amplitude roughness. Jackhammers or chipping hammers shall not be used.
 2. The minimum thickness of grout topping and concrete/grout fill shall be one-inch. Where the finished surface of concrete/grout fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2 inches wide by 1-1/2 inches deep.
 3. The base slab shall be thoroughly cleaned and wetted to saturated surface dry (SSD) condition per the International Concrete Repair Institute (ICRI) -- Technical Guide for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, prior to placing topping grout and grout fill. No topping grout shall be placed until the slab is completely free from standing pools or ponds of water. A thin coat of neat cement grout shall be broomed into the surface of the slab just before topping or fill placement. The neat cement grout shall not be allowed to dry before topping placement. If it does dry, it must be immediately removed using wet stiff brooms and reapplied. The topping and fill shall be compacted by rolling or thorough tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade. Coat surface with evaporation retardant as needed to prevent plastic shrinkage cracks.
 4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.
 5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping or fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of

mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement, or mixture of dry cement and sand shall be applied to the surface.

6. As soon as topping or fill finishing is completed, coat surface with curing compound. After the topping is set and sufficiently hard in clarifiers and where required by the ENGINEER, the tank shall be filled with sufficient water to cover the entire floor for 14 days.

3.4 CONSOLIDATION

- A. Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

END OF SECTION

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SECTION 09 96 00
PROTECTIVE COATING

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide protective coatings, complete and in place, in accordance with the Contract Documents.
- B. Definitions
 - 1. The term "paint," "coatings," or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.
 - 2. The term "DFT" means minimum dry film thickness, without any negative tolerance.
- C. The following surfaces shall not be coated:
 - 1. Concrete, unless required by items on the concrete coating schedule below or the Drawings.
 - 2. Stainless steel
 - 3. Machined surfaces
 - 4. Grease fittings
 - 5. Glass
 - 6. Equipment nameplates
 - 7. Platform gratings, stair treads, door thresholds, and other walk surfaces, unless specifically indicated to be coated.
 - 8. Platform gratings, stair treads, door thresholds, and other walk surfaces, unless specifically indicated to be coated.
- D. The coating system schedules summarize the surfaces to be coated, the required surface preparation, and the coating systems to be applied. Coating notes on the Drawings are used to show or extend the limits of coating schedules, to show exceptions to the schedules, or to clarify or show details for application of the coating systems.
- E. Where protective coatings are to be performed by a Subcontractor, the Subcontractor shall possess a valid contractor's license as required for performance of the painting and coating WORK called for in this specification.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

- B. Submittals shall include the following information and be submitted at least 30 Days prior to commencing protective coating WORK:
1. Materials List: Eight copies of a coating materials list showing the manufacturer and the product number, keyed to the coating systems herein. The list shall be submitted prior to or at the time of submitting samples.
 2. Manufacturer's Information: For each coating system to be used, provide the following data:
 - a. Manufacturer's data sheet for each product proposed, including statements on the suitability of the material for the intended use.
 - b. Technical and performance information that demonstrates compliance with the system performance and material requirements.
 - c. Paint manufacturer's instructions and recommendations on surface preparation and application.
 - d. Colors available for each product (where applicable).
 - e. Compatibility of shop and field applied coatings (where applicable).
 - f. Material Safety Data Sheet for each product proposed.
- C. Samples
1. Samples of paint, finishes, and other coating materials shall be submitted on 8-1/2 inch by 11-inch sheet metal. Each sheet shall be completely coated over its entire surface with one protective coating material, type, and color.
 2. Two sets of color samples to match each color selected by the ENGINEER from the manufacturer's standard color sheets. If custom mixed colors are indicated, the color samples shall be made using color formulations prepared to match the color samples furnished by the ENGINEER. The color formula shall be shown on the back of each color sample.
 3. One 5 pound sample of each abrasive proposed to be used for surface preparation for submerged and severe service coating systems.
- D. Experience Requirements of the Field Applicator:
1. Three references which verify that the coating CONTRACTOR has demonstrated successful application of the specified coating system in the past 3 years. Provide the size (area of coating), time of completion, name, the owner's address and telephone number for each installation referenced.
 2. A written statement from the CONTRACTOR stating that they are qualified and experienced in the application of the specified coating systems. The letter shall state the manufacturer and model number of mixing, heating, and pumping equipment to be used to apply the specified coating systems.

3. A written statement from the manufacturer certifying that the coating CONTRACTOR's onsite foreman and each applicator performing WORK on the project has been trained and approved to apply the selected coating system.
4. CONTRACTOR shall provide SSPC QP 1 Certification or the manufacturer's certification of the applicator for the specified coating system.

E. Experience Requirements of the Shop Applicator:

1. NACE Coating Inspector Program certification documents for the person responsible for Quality Assurance/Quality Control at the facility. This person will be responsible for submitting inspection reports to the OWNER.
2. A copy of a typical Quality Assurance/Quality Control inspection report containing items listed in 3.18 of this Specification.
3. Three references which verify that the shop painting facility has demonstrated successful application of the specified coating systems in the past 3 years. Provide the structure name and size (area of coating), time of completion, the owner's name, address, and telephone number for each installation referenced.
4. The manufacturer shall provide written certification that the shop painting facility's supervisor and each applicator performing Work on the project have been trained and approved by the manufacturer to apply the selected coating system.
5. The manufacturer shall state whether or not it has verified that the CONTRACTOR is going to use the proper mixing, coating application, heating, and environmental control equipment for the specified coating products. Only heated plural component equipment shall be used for the 100% solids coating application. Equipment shall be capable of performing a ratio test.
6. The Shop Coating Applicator shall provide SSPC QP 3 Certification or the coating manufacturer's certification of the applicator for selected coating system.

1.3 SPECIAL CORRECTION OF DEFECTS REQUIREMENTS

- A. Inspection: An inspection may be conducted during the eleventh month following completion of coating WORK. The CONTRACTOR and a representative of the coating material manufacturer shall attend this inspection. Defective WORK shall be repaired in accordance with these specifications and to the satisfaction of the OWNER. The OWNER may, by written notice to the CONTRACTOR, reschedule the inspection to another date within the one year correction period or may cancel the inspection altogether. The CONTRACTOR is not relieved of its responsibilities to correct defects, whether or not the inspection is conducted.

PART 2 PRODUCTS

2.1 GENERAL

- A. Suitability: The CONTRACTOR shall use suitable coating materials as recommended by the manufacturer. Materials shall comply with Volatile Organic Compound (VOC) limits applicable at the Site.
- B. Material Sources: Where manufacturers and product numbers are listed, it is to show the type and quality of coatings that are required. If a named product does not comply with VOC limits in

effect at the time of Bid opening, that product will not be accepted, and the CONTRACTOR shall propose a substitution product of equal quality that does comply. Proposed substitute materials will be considered as indicated below. Coating materials shall be materials that have a record of satisfactory performance in industrial plants, manufacturing facilities, and water and wastewater treatment plants.

- C. Compatibility: In any coating system only compatible materials from a single manufacturer shall be used in the WORK. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.
- D. Containers: Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, and name of manufacturer, all of which shall be plainly legible at the time of use.
- E. Colors: Colors and shades of colors of coatings shall be as indicated or selected by the ENGINEER. Each coat shall be of a slightly different shade to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the ENGINEER. Finish colors shall be custom mixed to match color samples furnished by the ENGINEER.
- F. Substitute or "Or-Equal" Products
 - 1. To establish equality under Section 01 60 00 - Products, Materials, Equipment, and Substitutions, the CONTRACTOR shall furnish satisfactory documentation from the manufacturer of the proposed substitute or "or-equal" product that the material meets the indicated requirements and is equivalent or better in the following properties:
 - a. Minimum and maximum recoat times
 - b. Minimum and maximum cure time for immersion
 - c. Abrasion resistance per ASTM D4060 using CS17 Wheel
 - d. Maximum and minimum dry film thickness per coat
 - e. Compatibility with other coatings
 - f. Suitability for the intended service
 - g. Resistance to chemical attack
 - h. Temperature limitations during application and in service
 - i. Type and quality of recommended undercoats and topcoats
 - j. Ease of application
 - k. Ease of repairing damaged areas
 - l. Stability of colors
 - 2. Protective coating materials shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially

identical service conditions. When requested, the CONTRACTOR shall provide the ENGINEER with the names of not less than 10 successful applications of the proposed manufacturer's products that comply with these requirements.

3. If a proposed substitution requires changes in the WORK, the CONTRACTOR shall bear such costs involved as part of the WORK.

2.2 INDUSTRIAL COATING SYSTEMS

A. System 1 - Alkyd Enamel

1. Materials

Primer	Manufacturer's recommendation
Finish Coat	1 component alkyd enamel
Type	high quality alkyd, medium long enamel
Demonstrated suitable for	ferrous and nonferrous surfaces in industrial exposure, producing high gloss surface that is resistant to mild corrosion and chemical fumes, has good color and gloss retention, good weathering, and sunlight resistance
VOC Content, max	420 grams per liter

2. Application and manufacturers

Prime Coat (DFT = 2 to 4 mils)	Finish Coat (DFT = 2 to 4 mils)	Total System DFT
PPG Amercoat 5105	Amercoat 5450	4 to 8 mils
Tnemec Series L69	Tnemec Series 2H	
Devoe Devprime 1401	Devoe Devlac 1431	
Carboline Carbocoat 150	Carbocoat 45	
Sherwin Williams Kem Bond HS	S-W Industrial Enamel HS	

B. System 2 - Not Used

C. System 3 – Not Used

D. System 4 - Epoxy/Polyurethane

1. Materials

Primer type	rust-inhibitive, 2 component epoxy
VOC Content, max	285 g/L
Finish type	2 component aliphatic polyurethane
VOC Content, max	300 g/L
Demonstrated suitable for	ferrous surfaces, superior color and gloss retention, exceptional resistance to weathering, chemical fumes, and splash

2. Application and manufacturers

Prime Coat (DFT = 3 - 5 mils)	Finish Coat (DFT = 3 - 4 mils)	TOTAL SYSTEM DFT
PPG- Amerlock 400/2	PPG- Amershield	6 - 9 MILS
Carboline Carboguard 893	Carboline Carbothane 134 HG (2 coats)	
Devoe Devran 224V	Devoe Dethane 379H	
Tnemec Hi-Build Epoxoline II Series L69	TNEMEC SERIES 750UVX	
Sherwin Williams Macropoxy 646	Sherwin Williams Hi-Solids Polyurethane	

E. System 5 - Inorganic Zinc/Epoxy/Polyurethane

1. Material

Prime Coat	Inorganic zinc silicate, water or solvent based, 2 component
zinc content in dry film	83 percent, minimum
VOC Content, max	325 grams per liter
Demonstrated suitable for	Ferrous metal, providing superior corrosion, chemical, and abrasion resistance, recommended for use as primer under epoxy
Intermediate Coat	2 component epoxy, high build, recommended by manufacturer for application over inorganic zinc primer
VOC Content, max	276 grams per liter
Demonstrated suitable for	Outstanding chemical, corrosion, and abrasion resistance
Finish Coat	2 component aliphatic or acrylic polyurethane
VOC Content, max	315 grams per liter
Demonstrated suitable for	Superior color and gloss retention, resistance to chemical fumes and severe weathering, abrasion resistance

2. Application and manufacturers

Surface preparation for primer	SSPC SP 6
Anchor profile for primer	per manufacturer

Prime Coat (DFT = 2 - 4 mils)	Intermediate Coat (DFT = 3 - 5 mils)	Finish Coat (DFT = 2 - 4 mils)	Total System DFT
PPG- Dimetcote 9HS or Dimetcote 21-5	Amercoat 385	Amercoat 450H	7 - 13 mils
Carboline Carbozinc 11HS or 11WB	Carboguard 890	Carbothane 134HG	
Devoe Cathacote 302H	Devran 224V	Devthane 379H	
Tnemec Tnemec-Zinc 94H20	Tnemec Series L69	Tnemec Series 750 UVX	
Sherwin Williams Zinc Clad II Plus	S W Macropoxy 646	S W Hi-Solids Polyurethane	

F. System 6 - Inorganic Zinc, Water Based

1. Material

Type	water based zinc silicate, 2 component
Percent Zinc in dry film	83, min
VOC Content, max	0 grams per liter
Demonstrated suitable for	Severe weathering and moderate chemical fumes, continuous temperatures of 750 deg F

2. Application and manufacturers

Product (2 coats at 2 - 4 mils each)	Total System DFT
PPG- Dimetcote 21-5	4 - 8 mils
Devoe Cathacoat 305	
Carboline Carbozinc 11 WB	
Sherwin Williams Zinc Clad XI	

G. System 7 - Acrylic Latex

1. Material

Primer	Product, surface preparation, and DFT as recommended by manufacturer for the surface
Finish Type	Single component, water based acrylic latex, with fungicide
VOC Content, max	180 grams per gallon
Demonstrated suitable for	PVC piping, weather and mild chemical resistance, excellent color and gloss retention

2. Application and manufacturers

Finish (at least 2 coats required)	Total System DFT
PPG- Amercoat 220	primer plus 6 mils
Carboline Carbocrylic 3359	
Tnemec Series 1028 Enduratone	
Sherwin Williams Metalatex	
Devoe Devcryn 530	

H. System 8 - Epoxy, Equipment

1. Materials

Primer Type	2 component epoxy, recoatable up to one year
Demonstrated suitable for	Rust inhibitive, outstanding chemical, abrasion, and weathering resistance, resistance to splash, washdown, and condensation. Immersion capability is not required
VOC content, max	330
Finish Type	2 component epoxy, available in many colors
Demonstrated suitable for	Outstanding chemical, abrasion, and weathering resistance, resistance to splash, washdown, and condensation. Immersion capability is not required
VOC content, max	330

2. Application and manufacturers

Prime Coat (DFT = 4 to 6 mils)	FINISH COAT (DFT = 3 TO 4 MILS)	TOTAL SYSTEM DFT
PPG-Amerlock 400	Amerlock 400	7 to 10 mils
Tnemec Series L69	Tnemec Series L69	
Devoc Devran 224V	Devran 224V	
Carboline Carboguard 888	Carboguard 888	
Sherwin Williams Macropoxy 646	S W Macropoxy 646	

I. System 9 - Inorganic Zinc/Epoxy, Equipment

1. Materials

Primer type	Water or solvent-based inorganic, self-curing zinc silicate
Zinc content in dry film, min	84 percent
VOC content, g/L, max	323
Demonstrated suitable for	Superior corrosion, chemical and abrasion resistance, recommended as primer under epoxy
Finish type	2 component polyamide epoxy available in many colors
VOC content, g/L, max	250
Demonstrated suitable for	Good resistance to chemical attack, weathering, splash, washdown, and condensation

2. Application

Prime Coat (DFT = 3 to 4 mils)	Finish Coats (2 or more) (DFT = 4 to 8 mils each)	Total System DFT
PPG- Dimetcote 9 HS	Amerlock 400	11 to 20 mils
Carboline Carbozinc 11HS	Carboguard 890	
Tnemec Hydro-Zinc 94H2O	Tnemec Series L69	
Sherwin Williams Zinc Clad II Plus	S W Macropoxy 646	
Devoe Cathacote 302H	Devoe Devran 224V	
International Interzinc 22HS	International Interseal 670HS	

J. System 10 - Acrylic, Concrete

1. Materials

Filler-Sealer Type	Epoxy or acrylic masonry sealer, for concrete and CMU, for wet and dry conditions
Primer	as recommended by manufacturer
VOC Content, g/L, max	75
Finish Type	single component waterborne acrylic, industrial grade, high molecular weight
VOC Content, g/L, max	180
Demonstrated suitable for	concrete under mild to moderate exposure conditions, splash but not immersion

2. Application and manufacturers

Prime Coat (Filler-Sealer)	Finish Coat (DFT = 5 - 7 mils) (2 or more coats)	Total System DFT
Tnemec EnviroFill 130	Tneme-Crete 180 Series	5 - 7 mils plus primer
PPG- Amerlock 400BF and Amercoat 114A	Amercoat 220P	
Carboline Sanitile 500	Carbocrylic 3359DTM	
Sherwin Williams Cement Plex 875 (acrylic) and Kem Cati Coat (epoxy)	S W Metalatex	
Devoc Tru-Glaze 4015	Devoc Devcryn 1449	

K. System 11 - Not Used

L. System 12 - Polyurethane, Fiber Glass

1. Materials

Primer Type	as recommended by manufacturer
Finish Type	2 component aliphatic polyurethane
Demonstrated suitable for	Fiberglass, superior color and gloss retention, resistance to acid and alkali splash, fumes, and severe weathering, no immersion
VOC content, g/L max	300

2. Application and manufacturers

Prime Coat (3 to 4 mils)	Finish Coats (4 to 6 mils)	Total System DFT
PPG- Amerlock 400	Amershield	7 to 10 mils
Tnemec Series 750 UVX	Tnemec Series 750 UVX	
Carboline Carbocrylic 120 (2 coats)	Carbothane 134 HG (2 coats)	
SHERWIN WILLIAMS MACROPOXY 646	S-W Hi-Solids Polyurethane	
DEVOE DEVRAN 224V	Devoe Devthane 379H	

2.3 SUBMERGED AND SEVERE SERVICE COATING SYSTEMS

A. System 100 - Amine Cured Epoxy

1. Material

Type	high build, amine cure epoxy
VOC content, g/L max	220
Demonstrated suitable for	steel, long term immersion in water and wastewater, resistant to corrosion, chemical fumes, good color retention
Certification	NSF 61 if in contact with potable water

2. Application and manufacturers

Products (3 coats or more)	Total System DFT
PPG- Amercoat 133	15 to 17 mils
Carboline Carboguard 891HS	For non-submerged valves and other equipment, DFT = 10 to 12 mils
International Bar-Rust 233H	
Tnemec Epoxoline Series L69	
Sherwin Williams Macropoxy 646 PW	

B. System 101 - (Not used)

C. System 102 - Polyamide Epoxy

1. Materials

Type	high build polyamide cure epoxy
VOC content, max, g/L	366
Demonstrated suitable for	long term immersion in water and wastewater, resistant to corrosion and chemical fumes, good color retention
Certification	NSF 61 if in contact with potable water

2. Application and manufacturers

Products (3 coats or more)	Total System DFT
PPG- Amercoat 370	11 - 13 mils
Tnemec Pota-Pox Series 20	
Carboline Carboguard 61	
Sherwin Williams Macropoxy 646 PW for water and Dura-Plate 235 for wastewater	
Devoe Bar-Rust 233H	

D. System 102 (VOC-Limited) - Polyamide Epoxy

1. Materials

Type	high build polyamide cure epoxy
VOC content, max, g/L	250
Demonstrated suitable for	long term immersion in water and wastewater, resistant to corrosion and chemical fumes, good color retention
Certification	NSF 61 if in contact with potable water

2. Application and manufacturers

Products (3 coats or more)	Total System DFT
Devoc Bar-Rust 233H	12 - 18 mils
Tnemec L140F	
PPG- Amerlock 400/2	
Carboguard 61	
Sherwin Williams Macropoxy 646 PW for water and Dura-Plate 235 for wastewater	

E. System 103 - Not Used

F. System 104 - Not Used

G. System 105 – Not Used

H. System 106 - Fusion Bonded Epoxy

1. Material

Type	100 percent solids fusion bond epoxy
Demonstrated suitable for	fluidized bed or electrostatic spray application, recommended for pumps, valves, pipe appurtenances, tanks, pipe hangers, flow meters, and hydrants
Certification requirement	NSF 61

2. Application in accordance with AWWA C213 and the following:

Product	Surface and DFT
3M Scotchkote 134 or 206N	Valves 12-mils
	All others 16-mils

I. System 107 - Chemical Resistant Sheet Lining:

1. **Materials:** The CONTRACTOR shall use natural rubber, chlorobutyl rubber, ethylene propylene diene monomer (EPDM) rubber, chloroprene polymer (neoprene) rubber, or chlorosulfonated polyethylene (Hypalon) rubber sheet lining materials as indicated. The Shop Drawing submittal shall contain technical information that confirms the suitability of the lining material system for long-term immersion in each chemical to be stored. The service temperatures are expected to be up to 150 degrees F.
2. Neoprene sheet lining material shall be synthetic rubber formulated for steam curing at atmospheric pressure. The minimum lining thickness shall be 3/16 - inch. The lining material shall be **Polymeric Protective Linings BFG 2011 (59688)**, or equal.
3. Chlorobutyl sheet lining material shall be synthetic rubber formulated for steam curing at atmospheric pressure. The minimum lining thickness shall be 3/16-inch. The lining material shall be **Polymeric BFG 1051 (60924)**, or equal.
4. Natural rubber (soft) sheet lining material shall be soft natural rubber formulated for steam curing at atmospheric pressure. The minimum lining thickness shall be 3/16-inch. The lining material shall be **Polymeric BFG 2004 (83160)**, or equal.
5. Natural rubber (hard) sheet lining material shall be a hard, natural rubber resistant to oxidizing agents and formulated for autoclave curing. The minimum lining thickness shall be 3/16-inch. The lining material shall be **Polymeric BFG 1006 (8631)**, or equal.
6. EPDM sheet lining material shall be synthetic rubber suitable for use as a lining for 50 percent sulfuric acid solution and formulated for autoclave or steam curing under pressure. The lining material shall be **Polymeric BFG 1039 (EP156)**, or equal.
7. Hypalon sheet lining material shall be synthetic rubber suitable for use as a lining for 50 percent sulfuric acid solution. The lining material shall be **Polymeric BFG 2045 (8706)**, or equal.
8. Primers, adhesives, activators, accelerators and other necessary materials shall be as required by the sheet material manufacturer.
9. **Metal Surface Preparation:** Prior to abrasive blast cleaning the base metal shall be prepared as required by the sheet lining material manufacturer's installation instructions. If the instructions differ from these specifications, the highest degree of cleaning and surface preparation shall be provided. Abrasive blast cleaning shall be done in accordance with this Section.
10. Installation of lining materials shall be in accordance with the material manufacturer's written installation instructions. All interior surfaces shall be lined, including all piping, vents, fittings, flange faces, manhole covers, and blind flanges.

11. The lining system shall be holiday tested in accordance with this Section before and after curing.
12. The lining system shall be cured by steam using the time and temperature as required by the material manufacturer.

J. System 108 - Polyurethane, Concrete

1. Materials

Filler-sealer type	epoxy material with portland cement and aggregate
Primer type	Phenolicamine or polyamidoamine epoxy
VOC content, g/L max	250
Finish type	aromatic elastomeric polyurethane
Demonstrated suitable for	concrete and concrete block masonry, long term immersion in water and wastewater and service where subject to splash and spill of water and wastewater treatment chemicals
VOC content, g/L max	250
Certification requirement, where coating will be in contact with potable water	NSF 61

2. Application and manufacturers

Filler-Sealer	Primer DFT = 3 - 7-mils	Finish Coat DFT = 100 - 125-mils, 75 mils for potable water
Tnemec MortarClad 218	Tnemec Pota-Pox L140 (potable water) Epoxoprime 201 (wastewater)	Elasto-Shield 406 (max 75 mils for potable water)
PPG-Amerlock 400/BF	Amerlock 400/2	Amerlock 490
Sherwin Williams Steel Seam FT 910	S-W Dura-Plate 235	S-W Sherflex (Max 100 mils for potable water)
International Ceilcote 400 Corocrete	Polibrid 670-S	Polybrid 705

K. System 109 - Epoxy, Concrete

1. Materials

Filler-sealer type	Epoxy material with portland cement and aggregate
Primer type	100% solids epoxy
VOC content, g/L max	100
Finish type	Amine cure epoxy/aggregate-filled epoxy
Demonstrated suitable for	Sewer manhole & wastewater facility, long term immersion in wastewater service where subject to chemical and bacteriological attack found in municipal sanitary sewer system
VOC content, g/L max	100

2. Application and manufacturers

Filler-Sealer	Primer DFT = 5 – 10 mils	Finish Coat DFT = 125 – 150 mils
RLS Raven 210	RLS Raven 155	Raven 405 FS
Sauereisen Filler Compound 209 or 209FS	Per Sauereisen	SewerGard 210
		Warren Environmental

L. System 110 - Not Used

M. System 111 - Vinyl Ester, Concrete

1. Topcoat Material

Type	Vinyl ester, with aggregate or flake fill
Demonstrated suitable for	72 hour immersion in 30 percent sulfuric or hydrochloric acid, sodium hydroxide, sodium hypochlorite, alum, aqueous ammonia, ferric chloride, hydrogen peroxide, sodium chloride, cationic or anionic polymer

2. Application and manufacturers

Filler-Sealer 1/16-inch	Primer DFT = mils	Finish Coat DFT = -mils
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Tnemec MortarClad 218	Vinester Primer 120-5002 1 coat, 15 - 18 mils	Vinester Finish 120-5001 1 coat, 15 - 18 mils
Sherwin Williams Corobond VE Primer	S-W Cor Cote VEN FF or GF	S-W Cor Cote VEN FF or GF
Carboguard 510 or 510SG	Semstone 800, 8 - 10 mils	Semstone 870, 30 mils
International Ceilcote 380M Primer 4-5 mils	International Ceilcote 242 Flakeline, 1 coat 15-25 mils	International Ceilcote 242 Flakeline, 1 coat 15-25 mils

N. System 112 - Acrylic, Wood and Gypsum Board

1. Materials

Primer type	as recommended by manufacturer
Finish type	single component, water based, acrylic, fungicide added
VOC content, max, g/L	250
Demonstrated suitable for	wood, mild to moderate exposure inside and outside building, and gypsum board, inside

2. Application and manufacturers

Prime Coat (1.5 to 2.5 mils)	Finish Coat (4 to 6 mils) (2 coats)	Total System DFT
PPG- Amercoat 220P	Amercoat 220P	5.5 to 8.5 mils
Carbocrylic 120	Carbocrylic 3359	
Tnemec Series 115 Unibond	Tnemec Series 1028 Enduratone	
Sherwin Williams PrepRite ProBlock	S-W Metalatex	
Devoe Devcryn 520	Devoe Devcryn 1449	

PART 3 EXECUTION

3.1 MANUFACTURER'S SERVICES

- A. The CONTRACTOR shall require the protective coating manufacturer to furnish a qualified technical representative to visit the Site for technical support as may be necessary to resolve field problems.
- B. For submerged and severe service coating systems, the CONTRACTOR shall require the paint manufacturer to furnish the following services:
 - 1. The manufacturer's representative shall provide at least 6 hours of on-Site instruction in the proper surface preparation, use, mixing, application, and curing of the coating systems.
 - 2. The manufacturer's representative shall observe the start of surface preparation, mixing, and application of the coating materials for each coating system.

3.2 WORKMANSHIP

- A. Skilled craftsmen and experienced supervision shall be used on coating WORK.
- B. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure thorough surface preparation. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given so that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas, and installations shall be protected by the use of drop cloths or other precautionary measures.
- C. Damage to other surfaces resulting from the WORK shall be cleaned, repaired, and refinished to original condition.

3.3 STORAGE, MIXING, AND THINNING OF MATERIALS

- A. **Manufacturer's Recommendations:** Unless otherwise indicated, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for other procedures relative to coating shall be strictly observed.
- B. Coating materials shall be used within the manufacturer's recommended shelf life.
- C. **Storage and Mixing:** Coating materials shall be stored under the conditions recommended by the Product Data Sheets, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings from different manufacturers shall not be mixed together.

3.4 PREPARATION FOR COATING

- A. **General:** Surfaces to receive protective coatings shall be prepared as indicated prior to application of coatings. The CONTRACTOR shall examine surfaces to be coated and shall correct surface defects before application of any coating material. Marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any field coating application. Surfaces to be coated shall be dry and free of visible dust.
- B. **Protection of Surfaces Not to be Coated:** Surfaces that are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.

- C. Hardware, lighting fixtures, switch plates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked, or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.
- D. Care shall be exercised not to damage adjacent WORK during blasting operations. Spraying shall be conducted under carefully controlled conditions. The CONTRACTOR shall be fully responsible for and shall promptly repair any and all damage to adjacent WORK or adjoining property occurring from blasting or coating operations.
- E. Protection of Painted Surfaces: Cleaning and coating shall be coordinated so that dust and other contaminants from the preparation process will not fall on wet, newly-coated surfaces.

3.5 ENVIRONMENTAL REQUIREMENTS

- A. No coating work shall be performed under the following conditions:
 - 1. Surface or ambient temperatures exceed the manufacturer's recommended maximum or minimum allowable.
 - 2. Dust or smoke laden atmosphere.
 - 3. Damp or humid conditions, where the relative humidity is above the manufacturer's maximum allowable.
 - 4. Substrate and ambient temperatures are less than 5°F above the dew point and are decreasing. Dew point shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce, Weather Bureau psychrometric tables. Elcometer 319 Dew Point meter or equal may also be used.
 - 5. Ambient temperature that is expected to drop below 50°F or less than 5°F above the dew point within 8 hours after application of coating.

3.6 SURFACE PREPARATION STANDARDS

- A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:
 - 1. Solvent Cleaning (SSPC SP 1): Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.
 - 2. Hand Tool Cleaning (SSPC SP 2): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.
 - 3. Power Tool Cleaning (SSPC SP 3): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding.
 - 4. White Metal Blast Cleaning (SSPC SP 5/NACE 1): Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.

5. Commercial Blast Cleaning (SSPC SP 6/NACE 3): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.
6. Brush-Off Blast Cleaning (SSPC SP 7/NACE 4): Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint.
7. Near-White Blast Cleaning (SSPC SP 10/NACE 2): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.
8. Power Tool Cleaning to Bare Metal (SSPC 11) When viewed without magnification, the surface shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portion of pits if the original surface is pitted. The surface profile shall not be less than 1 mil (25 microns).
9. Surface Preparation of Concrete (SSPC-SP 13/NACE 6): Removal of protrusions, laitance and efflorescence, existing coatings, form-release agents, and surface contamination by detergent or steam cleaning, abrasive blasting, water jetting, or impact or power tool methods as appropriate for the condition of the surface and the requirements of the coating system.

3.7 FERROUS METAL SURFACE PREPARATION (UNGALVANIZED)

- A. The minimum abrasive blasting surface preparation shall be as indicated in the coating system schedules included at the end of this Section. Where there is a conflict between these requirements and the coating manufacturer's printed recommendations for the intended service, the higher degree of cleaning shall apply.
- B. The Shop Painting Facility shall use a minimum blast material mixture of 75% grit and 25% shot material to achieve the proper surface profile.
- C. The Field Coating Applicator shall abrasive blast the shop coated surfaces per SSPC SP 7/NACE 4. The previously shop-painted surfaces shall be abraded prior to the application of the final coats. Special attention shall be given to uncoated steel weld joints, coating holdbacks, and bare metal.
- D. Grease, oil, and welding fluxes shall be removed by wiping with MEK or naphtha cleaning or with trisodium phosphate detergent per SSPC SP 1.
- E. All sharp edges shall be rounded or chamfered and all burrs, rust, scale, welding slag, and spatter shall be removed and the surface prepared by SSPC SP 2 hand tool cleaning, and SSPC SP 3 power tool cleaning.
- F. The Contractor shall test the surfaces for soluble salts with the use of Chlor*Test as manufactured by Chlor*Rid International or approved equivalent. Any blasted surfaces shall be tested and shall have a maximum concentration of 5 micrograms per square centimeter ($\mu\text{g}/\text{cm}^2$). A test shall be conducted for every 100 square feet (ft^2) of surface area to be coated at locations determined by the Inspector.
- G. If the soluble salt test indicates chloride concentrations greater than those outlined in these Specifications, the Contractor shall use Chlor*Rid, as manufactured by Chlor*Rid International, in the water source during Water Cleaning to remove the salts from the substrate. A substrate's

surface preparation will be accepted once the soluble salt concentration is below the amounts outlined in these Specifications.

- H. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular coating and service conditions. Abrasive shall not be reused unless an automated blasting system is used for surfaces that will be in non-submerged service. For automated blasting systems, clean oil-free abrasives shall be maintained. The abrasive mix shall include at least 50 percent grit.
- I. The CONTRACTOR shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.
- J. Compressed air for air blast cleaning shall be supplied at adequate pressure from well-maintained compressors equipped with oil and moisture separators that remove at least 95 percent of the contaminants.
- K. Surfaces shall be cleaned of dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming, or another approved method prior to painting.
- L. Enclosed areas and other areas where dust settling is a problem shall be vacuum-cleaned and wiped with a tack cloth.
- M. Damaged or defective coating shall be removed by the blast cleaning to meet the clean surface requirements before recoating.
- N. If the required abrasive blast cleaning will damage adjacent WORK, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, then SSPC SP 2 or SSPC SP 3 may be used.
- O. Shop-applied coatings of unknown composition shall be completely removed before the indicated coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC SP 1 before the abrasive blast cleaning has been started.
- P. Shop primed equipment shall be solvent-cleaned in the field before finish coats are applied.

3.8 FERROUS METAL SURFACE PREPARATION (GALVANIZED)

- A. Galvanized ferrous metal shall be alkaline cleaned per SSPC SP 1 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system, followed by brush off blast cleaning per SSPC SP 7/NACE 4.
- B. Any high spots, sharp protrusions, and rough edges, such as the metal drip line, shall be smoothed to avoid paint film gaps in the areas of the high spots. Surfaces shall be hand tool cleaned per SSPC SP 2 and power tool cleaned per SSPC SP 3.
- C. Pretreatment coatings of surfaces shall be in accordance with the printed recommendations of the coating manufacturer. Galvanized metals may be cleaned with suitable organic solvent such as a rust inhibitor or aqueous alkaline solution per ASTM D6386.
- D. The surfaces of galvanized steel exposed to chemical splashing or within a wastewater head space shall be abraded per SSPC SP 11 or SP 7 prior to coating.

3.9 SURFACE PREPARATION OF FERROUS SURFACES WITH EXISTING COATINGS

- A. General: Grease, oil, heavy chalk, dirt, or other contaminants shall be removed by solvent or detergent cleaning prior to abrasive blast cleaning. The generic type of the existing coatings shall be determined by laboratory testing.
- B. Abrasive Blast Cleaning: The CONTRACTOR shall provide the degree of cleaning indicated in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not indicated in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC SP 6/NACE 3. Areas of tightly adhering coatings shall be cleaned to SSPC SP 7/NACE 4, with the remaining thickness of existing coating not to exceed 3-mils.
- C. Incompatible Coatings: If coatings to be applied are not compatible with existing coatings the CONTRACTOR shall apply intermediate coatings per the manufacturer's recommendation for the indicated coating system or shall completely remove the existing coating prior to abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.
- D. Unknown Coatings: Coatings of unknown composition shall be completely removed prior to application of new coatings.
- E. Water Abrasive or Wet Abrasive Blast Cleaning: Where indicated or where Site conditions do not permit dry abrasive blasting for industrial coating systems due to dust or air pollution considerations, water abrasive blasting or wet abrasive blasting may be used. In both methods, paint-compatible corrosion inhibitors shall be used, and coating application shall begin as soon as the surfaces are dry. Water abrasive blasting shall be done using high pressure water with sand injection. In both methods, the equipment used shall be commercially produced equipment with a successful service record. Wet blasting methods shall not be used for submerged or severe service coating systems unless indicated.

3.10 CONCRETE AND CONCRETE BLOCK MASONRY SURFACE PREPARATION

- A. Surface preparation shall not begin until at least 30 Days after the concrete or masonry has been placed.
- B. At the discretion of the Inspector, the Contractor shall test the surfaces for soluble salts with the use of Chlor*Test as manufactured by Chlor*Rid International or approved equivalent. Any surfaces shall be tested and shall have a maximum concentration of 5 micrograms per square centimeter ($\mu\text{g}/\text{cm}^2$). A test shall be conducted for every 100 square feet (ft^2) of surface area to be coated at locations determined by the Inspector.
- C. If the soluble salt test indicates chloride concentrations greater than those outlined in these Specifications, the Contractor shall use Chlor*Rid, as manufactured by Chlor*Rid International, in the water source during Water Cleaning to remove the salts from the substrate. A substrate's surface preparation will be accepted once the soluble salt concentration is below the amounts outlined in these Specifications.
- D. In accordance with ASTM D4262, test to determine the pH of the concrete surface after the surface has been thoroughly blasted and cleaned. If the pH is outside the range recommended by the coating manufacturer, then the surface must be neutralized by removing concrete until the surface pH of 7 or greater is obtained prior to any coating application. One pH test shall be performed every 200 square feet, or less, and at locations determined by the Inspector.

- E. The Contractor shall test for capillary moisture in accordance with ASTM D4263. Moisture tests shall be taken every 200 square feet or less and at locations determined by the Inspector. If capillary moisture is present, the coating manufacturer shall be consulted to determine primer requirements and special coating application criteria.
- F. For below grade structures with surface areas greater than 2,000 square feet, the Contractor shall install three anhydrous calcium chloride test kits on bare concrete to measure the Moisture Vapor Transmission Rate (MVTR) on a flat horizontal surface. Testing and calculations shall be performed according to ASTM F1869. The MVTR shall be less than 3 lbs per 1,000 square feet per 24 hours. If the MVTR is greater than 3 lbs per 1,000 square feet per 24 hours, the Contractor shall apply a concrete sealant to reduce the MVTR through the concrete. The test kits shall be undisturbed for a minimum of 60 hours.
- G. Surface Voids: Bugholes, honeycomb, or other surface voids greater than 1/4 inch in depth or 1/4 inch in diameter shall be filled in with a resurfacing mortar prior to the application of any primer or finish coat.
- H. Holes or other joint defects in masonry shall be filled with mortar and repainted. All voids and cracks shall be repaired as specified. Loose or spatter mortar shall be removed by scraping and chipping. Masonry surfaces shall be cleaned with clear water by washing and scrubbing to remove foreign and deleterious substances. Muriatic acid shall not be used. After cleaning, masonry surfaces shall be sealed or filled with a sealer or block filler compatible with the specified primer.
- I. Coating Pipe Penetrations: A 1/4-inch wide by 3/8-inch deep saw cut shall be made around the circumference of the pipe as it penetrates the concrete. Prior to the coating application, the saw cut shall be dried and vacuumed to remove all dust and residue.
- J. Coating Floor/Wall Joints: A 1/4-inch wide by 3/8-inch deep saw cut shall be made on the vertical and horizontal concrete surfaces around the perimeter of the floor. The saw cut shall be 2 inches from the joint on both sides. Prior to the coating application, the saw cut shall be dried and vacuumed to remove all dust and residue.
- K. All oil, grease, and form release and curing compounds shall be removed by detergent cleaning per SSPC-SP 1 before abrasive blast cleaning.
- L. New concrete, concrete block masonry surfaces and deteriorated concrete surfaces to be coated shall be abrasive blast cleaned to remove existing coatings, laitance, and deteriorated concrete, and to roughen the surface equivalent to 80 Grit sandpaper or ICRI No. 310.2 Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays Concrete Surface Profile No. 4.
- M. Surfaces shall be clean and as recommended by the coating manufacturer before coating is started.

3.11 PLASTIC, FIBER GLASS AND NONFERROUS METALS SURFACE PREPARATION

- A. Plastic and fiber glass surfaces shall be sanded or brush off blast cleaned prior to solvent cleaning with a chemical compatible with the coating system primer.
- B. Non-ferrous metal surfaces shall be solvent-cleaned SSPC SP 1 followed by sanding or brush-off blast cleaning SSPC SP 7/NACE 4.
- C. Surfaces shall be clean and dry prior to coating application.

3.12 ARCHITECTURAL CONCRETE BLOCK MASONRY SURFACE PREPARATION

- A. The mortar surfaces shall be cured at least 14 Days before surface preparation WORK is started.
- B. Dust, dirt, grease, and other foreign matter shall be removed prior to abrasive blasting.
- C. The masonry surfaces shall be prepared in accordance with the material manufacturer's printed instructions.

3.13 SHOP COATING REQUIREMENTS

- A. Unless otherwise indicated, items of equipment or parts of equipment which are not submerged in service shall be shop-primed and then finish-coated in the field after installation with the indicated or selected color. The methods, materials, application equipment, and other details of shop painting shall comply with this Section. If the shop primer requires top coating within a specific period of time, the equipment shall be finish-coated in the shop and then be touched up after installation.
- B. Items of equipment or parts and surfaces of equipment which are submerged or inside an enclosed hydraulic structure when in service, with the exception of pumps and valves, shall have surface preparation and coating performed in the field.
- C. Shop primed surfaces which are to be incorporated in the work shall be prepared in the field by cleaning all surfaces as necessary in accordance with SSPC SP 1 and SP 2. Damaged shop coating shall be cleaned in accordance with SSPC SP 3, Power Tool Cleaning, and recoated with the primer specified.
- D. For every 500 square feet, or less, of steel surface blasted, the surface profile shall be tested with the use of Press-o-Film as manufactured by Testex, or other RPO287 approved equal, at locations to be determined by the Inspector. The replica tape thickness shall be measured using a dial micrometer manufactured by Testex, or other ASTM D4417 Type C approved equal. For each test area, one replica tape test shall be performed. For each test area, the three replica tape thickness values shall be recorded and must be within 10% of the coating manufacturer's recommended profile. If the surface profile does not meet the manufacturer's recommended profile, two additional tests will be performed within a 12-inch diameter of the initial test. If the values are not satisfactory, the Contractor shall reblast the affected areas.
- E. The interior surfaces of steel water reservoirs, except for Paragraph A surfaces, shall have surface preparation and coating WORK performed in the field.
- F. For certain pieces of equipment it may be undesirable or impractical to apply finish coatings in the field. Such equipment may include engine generator sets, equipment such as electrical control panels, switchgear or main control boards, submerged parts of pumps, ferrous metal passages in valves, or other items where it is not possible to obtain the indicated quality in the field. Such equipment shall be primed and finish-coated in the shop and touched up in the field with the identical material after installation. The CONTRACTOR shall require the manufacturer of each such piece of equipment to certify as part of its Shop Drawings that the surface preparation is in accordance with these specifications. The coating material data sheet shall be submitted with the Shop Drawings for the equipment.
- G. For certain small pieces of equipment the manufacturer may have a standard coating system that is suitable for the intended service conditions. In such cases, the final determination of suitability will be made during review of the Shop Drawing submittals. Equipment of this type generally

includes only indoor equipment such as instruments, small compressors, and chemical metering pumps.

- H. Shop-painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 2 months before being top coated or less time if recommended by the coating manufacturer.
- I. Damage to shop-applied coatings shall be repaired in accordance with this Section and the coating manufacturer's printed instructions.
- J. The CONTRACTOR shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this Section. Copies of applicable coating manufacturer's data sheets shall be submitted with equipment Shop Drawings.

3.14 APPLICATION OF COATINGS

- A. The application of protective coatings to steel substrates shall be in accordance with SSPC PA1 - Paint Application Specification No. 1.
- B. Cleaned surfaces and each coat shall be inspected prior to applying each succeeding coat. The CONTRACTOR shall schedule such inspection with the ENGINEER in advance.
- C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same day.
- D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations and this Section, whichever has the most stringent requirements.
- E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. CONTRACTOR shall use an independent stripe coat per SSPC PA Guide 11 for these areas. Particular care shall be used to ensure that the specified coverage is secured on the edges and corners of all surfaces.
- F. Special attention shall be given to materials that will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.
- G. Finish coats, including touch-up and damage repair coats shall be applied in a manner that will present a uniform texture and color matched appearance.
- H. Coatings shall not be applied under the following conditions:
 - 1. Temperatures exceeding the manufacturer's recommended maximum and minimum allowable.
 - 2. Concrete surfaces will be in direct sunlight during application or within 3 hours after application.
 - 3. Dust or smoke laden atmosphere.
 - 4. Damp or humid weather.

5. Substrate or air temperature is less than 5 degrees F above the dew point.
 6. Air temperature is expected to drop below 40 degrees F or less than 5 degrees F above the dew point within 8 hours after application of coating.
 7. Wind conditions are not calm.
- I. Dew point shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychrometric tables.
 - J. Unburied steel piping shall be abrasive blast cleaned and primed before installation.
 - K. Finish coats shall be applied after concrete, masonry, and equipment installation is complete, and the working areas are clean and dust free.
- 3.15 CURING OF COATINGS
- A. The CONTRACTOR shall maintain curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the most stringent, prior to placing the completed coating system into service.
 - B. In the case of enclosed areas, forced air ventilation, using heated air if necessary, may be required until the coatings have fully cured.
- 3.16 IDENTIFICATION OF PIPING
- A. Identification of piping shall be in accordance with Section 40 05 02 - Piping Identification Systems.
 - B. Unburied pipes in structures and in chemical pipe trenches shall be color-code painted. Colors shall be as selected by the ENGINEER or as indicated.
- 3.17 SHOP AND FIELD INSPECTION AND TESTING
- A. General: The CONTRACTOR shall give the ENGINEER a minimum of 3 Days advance notice of the start of any field surface preparation or coating application, and a minimum of 7 Days advance notice of the start of any surface preparation activity in the shop.
 - B. Such WORK shall be performed only in the presence of the ENGINEER, unless the ENGINEER has granted prior approval to perform such WORK in its absence.
 - C. Inspection by the ENGINEER, or the waiver of inspection of any particular portion of the WORK, shall not relieve the CONTRACTOR of its responsibility to perform the WORK in accordance with these Specifications.
 - D. Scaffolding shall be erected and moved to locations where requested by the ENGINEER to facilitate inspection. Additional illumination shall be furnished on areas to be inspected.
 - E. Inspection Devices: The CONTRACTOR shall furnish inspection devices in good working condition for the detection of holidays and measurement of dry film thicknesses of coatings. Dry-film thickness gauges shall be made available for the ENGINEER's use while coating is being done, until final acceptance of such coatings. The CONTRACTOR shall furnish the services of a

trained operator of the holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the ENGINEER.

- F. Holiday Testing: The CONTRACTOR shall test for continuity all coated ferrous surfaces inside a steel reservoir, other surfaces that will be submerged in water or other liquids, surfaces that are enclosed in a vapor space in such structures, and surfaces coated with any of the submerged and severe service coating systems. Areas that contain discontinuities shall be marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then be retested.
1. Coatings with thickness exceeding 20-mils total DFT: Pulse-type holiday detector such as **Tinker & Razor Model AP-W, D.E. Stearns Co. Model 14/20**, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the required coating thickness.
 2. Coatings with thickness of 20-mils or less total DFT: **Tinker & Razor Model M1** non-destructive type holiday detector, **K-D Bird Dog**, or equal shall be used. The unit shall operate at less than 75 volts. For thicknesses between 10- and 20-mils, a non-sudsing type wetting agent, such as **Kodak Photo-Flo** or equal, shall be added to the water prior to wetting the detector sponge.
- G. Film Thickness Testing: On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC Paint Application Specification No. 2 using a magnetic type dry film thickness gauge such as **Mikrotest Model FM, Elcometer Model 111/1EZ**, or equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.
- H. Surface Preparation: Confirm proper surface profile with Testex Press-O-Film replica tape in accordance with NACE RP0287-02.

3.18 Coating System Schedule, Ferrous Metal - Not Galvanized

	Item	Surface Prep.	System No.
FM-1	All surfaces indoors and outdoors, exposed or covered, except those included below.	Commercial blast cleaning SSPC SP 6/NACE 3	(1) alkyd enamel
FM-2	Surfaces of equipment and ferrous surfaces submerged or intermittently submerged in potable water, utility water, and wastewater including all surfaces lower than 2 feet above high water level in hydraulic structures, and all surfaces inside enclosed hydraulic structures and vents (excluding shop-coated valves, couplings, pumps).	White metal blast cleaning SSPC SP 5/NACE 1	(100) amine cure epoxy
FM-3	Surfaces exposed to high temperature (between 150 and 600 degrees F).	Near white metal blast cleaning SSPC SP 10/NACE 2	(6) inorganic zinc, water-based

FM-4	Surfaces exposed to high temperature (between 600 and 1000 degrees F).	Near white metal blast cleaning SSPC SP 10/NACE 2	(3) (VOC-Limited) aluminum silicone
FM-5	Buried small steel pipe.	Removal of dirt, grease, oil	(200) PVC tape
FM-6	Where indicated, ferrous surfaces in water passages of all valves 2-inch size and larger, exterior surfaces of submerged valves.	White metal blast cleaning SSPC SP 5/NACE 1	(102) (VOC-Limited) polyamide epoxy
FM-7	Where indicated, ferrous surfaces in water passages and submerged surfaces of all pumps which have discharge size of 4 inches or larger.	White metal blast cleaning SSPC SP 5/NACE 1	(100) amine cure epoxy
FM-8	Ferrous surfaces of sleeve couplings.	Solvent cleaning SSPC SP 1, followed by white metal blast cleaning SSPC-SP 10/NACE 2	(106) fusion bond epoxy
FM-9	All ferrous surfaces of sluice gates, flap gates, and shear gates, including wall thimbles.	White metal blast cleaning SSPC SP 5/NACE 1	(102) (VOC-Limited) polyamide epoxy
FM-10	Buried surfaces that are not indicated to be coated elsewhere.	Near white metal blast cleaning SSPC SP 10/NACE 2	(100) amine cure epoxy
FM-11	Interior surfaces of all chemical tanks, including tank nozzles, manholes, nozzle necks, flange faces.	White metal blast cleaning SSPC SP 5/NACE 1	(107) chemical-resistant sheet lining
FM-12	External surfaces of buried steel tanks.	White Metal blast cleaning SSPC SP 5/NACE 1	(100) amine cure epoxy

FM-13	Surfaces of indoor equipment, not submerged	Commercial blast cleaning SSPC SP 6/NACE 3	(8) epoxy, equipment
FM-14	Buried pipe couplings, valves, fittings, and flanged joints (where piping is plastic).	Removal of dirt, grease, oil	(201) rich portland cement mortar
FM-15	Buried pipe couplings, valves, and flanged joints (where piping is ductile or cast iron, not tape-coated), including factory-coated surfaces.	As specified by reference specification	(205) polyethylene encasement
FM-16	Buried pipe couplings, valves, and flanged joints (where piping is mortar-coated steel or reinforced concrete), including factory-coated surfaces.	Removal of dirt, grease, oil	(206) cement mortar coating

3.19 Coating System Schedule, Ferrous Metal - Galvanized: Pretreatment coatings, barrier coatings, or washes shall be applied as recommended by the coating manufacturer. All galvanized surfaces shall be coated except for the following items which shall be coated only if required by other Sections: (1) Floor gratings and frames, (2) Handrails, (3) Stair treads, (4) Chain link fencing and appurtenances.

	Item	Surface Prep.	System No.
FMG-1	All exposed surfaces indoors and outdoors, except those included below.	Solvent cleaning SSPC SP 1	(1) alkyd enamel
FMG-2	Surfaces in chlorinator room, chlorine storage room.	Solvent cleaning SSPC SP 1	(100) amine cure epoxy
FMG-3	Buried small steel pipe.	Removal of dirt, grease, oil	(200) PVC tape
FMG-4	Surfaces buried or submerged in water or wastewater, including all surfaces lower than two feet above high water level and all surfaces inside enclosed hydraulic structures and vents.	Solvent cleaning SSPC SP 1 followed by brush-off grade blast cleaning SSPC SP 7/NACE 4	(100) amine cure epoxy

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3.20 COATING SYSTEM SCHEDULE, NON-FERROUS METAL, PLASTIC, FIBER GLASS

- A. Where isolated non-ferrous parts are associated with equipment or piping, the CONTRACTOR shall use the coating system for the adjacent connected surfaces. Do not coat handrails, gratings, frames or hatches. Only primers recommended by the coating manufacturer shall be used.

	Item	Surface Prep.	System No.
NFS-1	All exposed surfaces, indoors and outdoors, except those included below.	Solvent cleaned SSPC SP 1	(1) alkyd enamel
NFS-2	Chlorination room, chlorine storage room.	Solvent cleaned SSPC SP 1	(100) amine cure epoxy
NFS-3	Aluminum surfaces in contact with concrete, or with any other metal except galvanized ferrous metal.	Solvent cleaned SSPC	(208) aluminum metal isolation
NFS-4	Polyvinyl chloride plastic piping, indoors and outdoors, or in structures, not submerged.	Solvent cleaned SSPC	(7) acrylic latex
NFS-5	Fiber glass surfaces.	Per paragraph 3.10	(12) polyurethane, fiber glass
NFS-6	Buried non-ferrous metal pipe.	Removal of dirt, grease, oil	(200) PVC tape

END OF SECTION

SECTION 13 34 23

GUARD SHACK

PART 1 GENERAL

1.1 SUMMARY

- A. Provide all labor, equipment and materials to furnish and install a complete prefabricated, galvanized steel guard shack as shown on the drawings.

1.2 RELATED SECTIONS

- A. Division 26 00 00 – Electrical

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide guard shack meeting the structural design requirements identified on the structural drawings.

1.4 SUBMITTALS

- A. Shop Drawings: Submit complete shop drawings indicating all components, sizes, installation procedures, wiring diagrams, and all accessories requiring field installation by other trades.
- B. Samples: Submit manufacturer's actual color samples indicating colors and finishes available for all materials for project color selection.
- C. Maintenance Data: Submit manufacturer's suggested procedures for the care and maintenance of the materials comprising the unit.
- D. Submit structural design calculations showing compliance with design requirements, including anchor bolt details and calculations. All calculations shall be stamped by a Professional Engineer licensed in the State of Nevada.

1.5 QUALITY ASSURANCE

- A. Qualifications
- B. Reference Standards:
 - 1. American Society of Testing Material (ASTM)
 - a. ASTM A36, Structural Steel Specifications for Carbon Steel.
 - b. ASTM A123, Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip.
 - c. ASTM A525, Hot Dip Galvanized Annealed Sheet Steel.
- C. Design and Fabrication Criteria:

1. General Requirements: To the maximum extent practicable, the shell of each booth shall be fabricated in the shop and erected in its pre-fabricated condition.
2. All metals shall be free from defects impairing strength, durability, or appearance, and of best commercial quality for purposes specified. Metals shall be made with structural properties, to withstand safely, the strains and stresses to which they will be normally subjected.
3. Visible surfaces of all metal shall be entirely free of dents, fractures, breaks, scratches, scars, patches, burns, stains, or other discolorations and shall possess uniform luster throughout. All metal edges shall be free of burrs; irregularities, sharpness or other defects such as may cause injury to persons encountering same.
4. Welding shall be done in a thorough manner with welding wire of the proper alloy for the base material used. Welds shall be strong, ductile, with excess metal ground off joints, finished smooth to match adjoining surface. Welds shall be free of imperfections such as pits, runs, spatter, cracks, undercuts, etc., and seamlessly welded by an accepted process, except carbon arc welding. Butt welds made by spot welding straps under seams, filling in with solder and grinding will not be acceptable. Welds shall be either made or inspected by welders currently qualified by tests as prescribed in the Structural Welding Code, AWS D1.1 of the American Welding Society.
5. It is the intent of the Specification that all welded joints be homogeneous with the sheet metal itself. Any form of welding permitting carbon pickup will not be acceptable. Where sheet sizes necessitate a joint, such joint shall be skip welded, not tacked or attached by fasteners. Sides of booths shall be fabricated with welded joint to eliminate all field joints.
6. All work must be done in an approved workmanlike manner to the complete satisfaction of the owner or architect. Work to be performed by skilled crafts people experienced and versed in this kind of work.
7. Booth fabrication in the shop shall be subject to inspection by the owner if desired.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Pre-approved Manufacturer: Little Buildings, Inc. Romeo Michigan
- B. Other: Requires approval by ENGINEER. If a guard shack from a manufacturer that is not pre-approved is submitted, the CONTRACTOR shall be responsible for all redesign and project revisions, including design fees, necessary to accommodate the alternative. All redesign and project modifications require pre-approval by the OWNER. No allowance for cost or schedule to implement the redesign or project modifications will be allowed.

2.2 MATERIALS

- A. Guard Shack: Little Building, Inc. Model 614RR or approved equal.
- B. Unless otherwise specified herein, structural steel shapes, plates and bars shall be of carbon steel conforming to the requirements of ASTM A36 and galvaneal sheets conforming to the requirements of ASTM A525.
- C. Structural tubing to conform to ASTM A500B.

D. Other materials shall be as indicated on the Drawings or specified herein.

2.3 WALLS

- A. Outer panels: Prime 14-gauge galvanized steel sheet, welded in place. No exposed edges, coil breaks, sharp edges pits or fasteners allowed.
- B. Insulation: Wall cavity insulated with rigid fiberglass insulation board R=10.
- C. Inner panels: Prime 18-gauge galvanized steel sheet.

2.4 FRAMEWORK

Structural corners and uprights to be 2" x 2" x .078" wall (min.) galvanized, ASTM A500 Grade B welded tube.

2.5 FLOOR

- A. Guard shack to be placed on concrete pad with electric service and grounding per the electrical plan.
- B. Floor to be of 12 gauge G-90 Galvanized 4-way tread plate steel welded in place and properly supported beneath to handle normal loading.

2.6 ROOF

- A. Roof shall be of 14 gauge galvanized steel continuously welded to form a weather tight seal. No mechanical fasteners such as self-drilling screws, or rivets allowed.
- B. Roof seams shall be caulked with a commercial grade caulk suitable for the purpose. Entire roof surface shall be additionally coated with reflective aluminum coating.
- C. Insulation: Roof shall be fully insulated to R=17 (min.).
- D. Roof shall be braced to receive normal loading and to withstand normal snow (if applicable) loading.

2.7 GLAZING

- A. All glazing shall be safety glass, either laminated or tempered. Glazing shall be held in place with removable glass stops. Stops shall be removable from the INTERIOR of the booth only, and shall be held in place with reusable mechanical fasteners for ease of removal/reinstallation.
- B. Glazing shall be sealed with commercial sealant.

2.8 COUNTER

Provide 18" deep, full width steel counter painted to match building.

2.9 ELECTRIC

- A. All wiring devices and components to bear Underwriters Laboratories (UL) labels.
- B. Electric package to include 240V/120 100 amp capacity load center.
- C. Provide 3" x 6" knock out in floor for electric service entrance.

- D. All wiring shall be in metal conduit and include green ground wire.
- E. Wiring methods shall conform to the latest version of the NEC.

2.10 DOOR

- A. Door(s) to be of welded galvanized steel or extruded aluminum, glazed in upper half.
- B. Door shall be top suspended (sliding) on ball bearing rollers or swinging on full five-knuckle, butts.
- C. Lock shall be commercial duty with removable core or cylinder.
- D. Door shall be fully weather-stripped.

2.11 SETTING MATERIALS

- A. Epoxy Anchors: Threaded; stainless steel.

2.12 FINISH

- A. Finish paint to be 2-part polyurethane for long lasting finish. Oil or water based single component paints not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. For record purposes, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify stub-ups and other related items are in position for proper installation of equipment specified in this section.

3.2 INSTALLATION

- A. Install guard shack on 8-inch thick concrete base (Type V, modified Class A, 4500 psi min.) that is 12 inches (minimum) larger than the building in length and width. Provide rebar mat of #4 bar 12" on center each way. Concrete shall be placed on Type II aggregate base 12 inches thick and compacted to 95% relative density.
- B. Set guard shack plumb and aligned. Level base plates true to plane with full bearing on concrete base.
- C. Fasten guard shack to concrete bases using stainless steel epoxy anchors.
- D. Connect electrical power service to power distribution system according to the National Electric Code and local requirements.

3.3 ADJUSTING AND CLEANING

- A. Adjust doors, weather-strip, operable windows, and hardware to operate smoothly easily, properly, and without binding. Confirm that locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.
- C. After completing installation, inspect exposed finishes and restore marred, abraded, and soiled surfaces to original condition.

END OF SECTION

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SECTION 13 60 00

VEHICLE WASH EQUIPMENT

PART 1 GENERAL

1.1 THE SUMMARY

This Section includes the vehicle wash equipment and the water recycle system.

1.2 PREINSTALLATION MEETINGS

Preinstallation Conference: Conduct preinstallation conference at Project site prior to shipping of container units.

1.3 SUBMITTALS

A. Product Data:

1. Provide a list of all equipment to be provided by equipment supplier.
2. Provide manufacturer's data and cut sheets for wash equipment and recycle system.
3. Cut sheets shall be provided for the following components: sand / oil separator unit, holding tank, cyclonic separator, weir tank, media filter units, bag filter units (absolute filters), carbon filter units, cone bottom tanks, fresh water tank, ozone dosing systems, pumps, water softener, hot pressure washer system, steam cleaning system, water cannons, soap dosing system, wheel wash and halo, soap arch, rinse arch, piping, fittings, instrumentation, PLC, HMI display, and card lock system.

B. Shop Drawings:

1. Include plans, elevations, and sections for equipment supports, footings, and anchorage. Design shall be stamped by a Professional Engineer licensed in the State of Nevada. Include structural design calculations.
2. Include plans, elevations, sections, and attachment and assembly details.
3. Submit system drawings. Include detailed scaled site plan drawings including equipment locations, hose reels, and remote panel locations.
4. Include detailed drawings of filtration/treatment containers.
5. Include diagrams for power, signal, and control wiring.
6. Show field measurements, locations and sizes of blocking and reinforcements, and attachments to other work.
7. Show locations and sizes of connections for utilities including water, sewer, gas, electric, and communications.
8. Include a process flow diagram for complete system.

1.4 INFORMATIONAL SUBMITTALS

Qualification Data: Provide qualification data for both fabricator and installer. Experience shall show the installation of five similar units in the last five years, with reference contact numbers.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For vehicle wash system to include in operation and maintenance manuals.
- B. Record Drawings: Provide marked up drawings showing any field adjustments made in the location or installation of components. Provide record drawings in both pdf format and AutoCAD format.

1.6 QUALITY ASSURANCE

- A. Equipment Supplier: Equipment Supplier must have at least (3) similar wash systems installed within the last 5 years at time of bid. CONTRACTOR must submit listing of these systems including address, point of contact with phone number.
- B. Installer Qualifications: The installer shall be an experienced installer who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is approved by the equipment supplier. CONTRACTOR must submit a letter of approval from equipment supplier for proposed installer.

1.7 WARRANTY

- A. Special Warranty: CONTRACTOR shall repair or replace components of vehicle wash system that fail in materials or workmanship within the specified warranty period.
 - 1. Warranty shall provide for parts and labor warranty covering entire system, breakdown items, pumps, filters, wands, hoses, including all consumable items except soap. Installing and equipment contractor must have a full-time service technician able to respond onsite within 48 hours.
 - 2. Failures include, but are not limited to, the following:
 - a. Faulty operations of vehicle wash system, components, or controls.
 - b. Deterioration or corrosion of metals or metal finishes.
- B. Warranty Period: 2 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 EQUIPMENT SUPPLIER

- A. Vehicle Wash System:
 - 1. Pre-approved Equipment Supplier: Riveer Company, South Haven, MI
 - 2. Other: Requires approval by ENGINEER. If a system from an equipment supplier that is not pre-approved is submitted, the CONTRACTOR shall be responsible for all redesign and project revisions, including design fees, necessary to accommodate the alternative equipment supplier's equipment. All redesign and project modifications require pre-approval by the OWNER. No allowance for cost or schedule to implement the redesign or project modifications will be allowed.

2.2 SYSTEM DESCRIPTION

- A. Collection and treatment equipment shall be manufactured in an ISO 9001 certified facility.

- B. System shall be modular, requiring minimal assembly. All equipment shall be pre-tested at OEM facility prior to shipment.
- C. System shall be designed to minimize user interaction with the system. The user will only need to select the type of wash, and if manual options are selected, turn the pressure washer and water cannon on or off. The recycle system will automatically process, purge, backflush, and inject ozone to control odor.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 SYSTEM INSTALLATION

- A. The CONTRACTOR shall provide a complete turnkey equipment installation. Any work or items necessary for completion of the system that are not provided by the equipment supplier shall be provided by the CONTRACTOR.
- B. The CONTRACTOR is responsible for all tools, labor, supplies and rental equipment to unload any provided equipment.
- C. Installation shall be performed by installer approved by the equipment supplier.
- D. Equipment supplier shall require no specialty permits or licenses for installation and hookup of equipment.

2.4 GENERAL REQUIREMENTS

- A. System shall include a wash system and water recycling system as shown on the drawings.
- B. Wash system shall consist of an automatic 300 GPM at 300 psi full vehicle under and side spray with spinners, 15 gpm at 40 psi soap arch, and 200 gpm at 175 psi rinse arch with spinners. It will also include a manual wash system including 300 gph at 400 psi steam cleaner, 5 gpm at 3000 psi pressure washer, and 50 gpm water cannon.
- C. Recycle system shall be capable of treating dirty wash water at a process rate of 50 gallons per minute. Solids will be first separated from the water utilizing sedimentation basin. Discharge from the sedimentation basin will flow through a sand/oil separator and then stored in a holding tank. Water shall be recovered from the holding tank using heavy duty submersible pumps discharging to a cone bottom settling tank, and then processed through a recycling system consisting of a stainless steel settling tank with weir walls and automatic solids removal conveyor, 500 square feet of coalescing material, disk skimmer and then processed through media filters (nominal filtration) and an absolute filter housing (absolute filtration) before being sent to the holding tank.
- D. System shall not have consumable components such as cartridge filters, paper bed media filters, or bio-enzymes. These components are not considered "equal" in nature due to the cost.
- E. System shall be built using the highest quality components utilizing stainless steel where possible. System will not contain low pressure media filters or plastic type pumps.

2.5 SYSTEM COMPONENTS

- A. The system shall consist of the main components as follows:
 - 1. Two, new 40 ft ISO containers with the following:
 - a. Aluminum insulated skin walls.

- b. LED type lights mounted to ceiling.
 - c. Convenience outlet.
 - d. Exterior shall be tan in color.
 - e. A main power disconnect shall be located on the outside of container.
 - f. Power Distribution System, breaker panel shall be inside the container.
 - g. Provide a climate control system including both heating and air conditioning. Climate control system shall be capable of maintaining a maximum temperature of 72 degrees Fahrenheit during cooling periods and minimum temperature of 68 degrees Fahrenheit during heating periods while located at the project site.
 - h. ISO container shall have integrated power distribution in accordance with the electrical drawings.
2. Tire Guides
- a. Shall be provided as shown on the drawings.
 - b. Rails shall be constructed of tubular steel with yellow powder coated finish.
3. Grating
- a. Grating for undercarriage shall be custom fabricated 1" galvanized steel plate with H-20 rating. Shall be slotted for proper nozzle operation.
 - b. Grating for arch drainage shall be Neenah H20 R-4990-HX Type A with Type X frames.
4. Undercarriage and Wrap-Around Arch (Arch #1)
- a. Arch shall provide 13' wide and 14' tall inside width clearance from all spinners.
 - b. Arch shall be constructed of 304 stainless steel.
 - c. Arch shall have piping supports constructed of 304 stainless steel anchored to concrete. Freestanding piping without supports is not permitted. Supports shall be designed per the drawings.
 - d. Arch piping shall have 10 spinner nozzle assemblies constructed of 304 stainless steel. Each nozzle assembly / head shall consist of a spinner head rated to 2500 PSI, 4 nozzle rotary arm, 4 nozzles, and 4 nozzle stabilizers. There shall be a total of 40 (4 per rotary head) nozzles.
 - e. Arch piping shall be 2" stainless steel.
 - f. The stainless piping shall have welded threaded coupling every 24". Piping shall have welded couplings. Drilled and tapped is not allowed.
 - g. Spinner nozzle head shall have 4 nozzles per head. Each nozzle shall be air injected allowing for a greater pressure impact.
 - h. The spinner head shall be bracket mounted and the head shall be adjustable +/- 45 degrees. Swivel shall allow 90 degrees rotation each direction.
 - i. Nozzle head shall have 304 stainless steel guard around the sides and front face of the nozzle per the drawings.
 - j. Nozzles bracket shall have 1000 PSI rated supply hose and fittings.
 - k. Wheel Well: There shall be 4 additional spinner heads which are individually mounted on 304 stainless steel 48" tall pedestals per the drawings.

- l. Nozzle brackets will allow the nozzle to be adjusted in the field for height and direction. Nozzels shall have 1000 PSI supply hose and fittings.
 - m. Under carriage piping shall be 3" stainless steel located in the trench.
 - n. Undercarriage piping shall be 304 stainless steel.
 - o. Undercarriage wash shall have 4 spinner nozzles.
5. Soap Arch (Arch #2)
- a. Arch shall provide 13' wide and 14' tall inside width clearance from all nozzles.
 - b. Arch shall be constructed of 304 stainless steel.
 - c. Arch shall have piping supports constructed of 304 stainless steel which are anchored to concrete. Freestanding piping without supports is not permitted. Supports shall be as shown on the drawings.
 - d. Arch piping shall have 13 nozzles on each side and 10 nozzles mounted on the top of the spray bar. Stainless steel nozzles shall have adjustable direction mounting and include quick change caps and check valve.
 - e. Arch piping shall be 2" stainless steel
 - f. The stainless piping shall have welded threaded couplings. Piping shall not be drilled and tapped.
6. Rinse Arch (Arch #3)
- a. Arch shall provide 13' wide and 14' tall inside width clearance from all spinners.
 - b. Arch shall be constructed of 304 stainless steel.
 - c. Arch shall have piping supports constructed of 304 stainless steel which are anchored to concrete. Freestanding piping without supports is not permitted. Supports shall be as shown on the drawings.
 - d. Arch piping shall have 10 spinner nozzle assemblies which are constructed of 304 stainless steel.
 - e. Each nozzle assembly / head shall consist of a spinner head rated to 2500 PSI, 4 nozzle rotary arm, 4 nozzles, and 4 nozzle stabilizers. There shall be a total of 40 (4 per rotary head) nozzles.
 - f. Arch piping shall be 2" stainless steel.
 - g. The stainless piping shall have welded threaded coupling every 24". Piping shall have welded threaded couplings. Pipe may not be drilled and tapped.
 - h. The nozzles shall be bracket mounted and the nozzle shall be adjustable +/- 45 degrees. Swivel shall allow 90 degrees rotation each direction.
 - i. Nozzle shall have 304 stainless steel guard around the sides and front face of the nozzle per the drawings.
 - j. Nozzle shall have 1000PSI supply hose and fittings.
7. Stainless Hose Reels
- a. Manual reels shall be provided for each wash device as shown on the drawings.
 - b. Reels shall be 100% 304 or 316 stainless steel construction.
 - c. Water cannon reels (2 total) shall have 50' of 1" general purpose 200PSI rated hose and shall have a fire fighter style nozzle with bale shutoff type gun.

- d. Pressure washer reels (2 total) shall have 50' of 2 wire, 6000 PSI rated hose with a dual lance 36" wand with adjustable pressure control.
 - e. Steam reels (2 total) shall have 50' of steam rated hose with a single lance wand with impact steam nozzle and shutoff gun.
 - f. All reels shall be mounted on a stainless steel stand (1 stand per side to hold 3 reels) to elevate the reels for easy use and not requiring excessive bending.
 - g. Stand shall be constructed from 304 stainless steel.
8. Wash System Control
- a. Wash system shall be activated via control panel at the entrance of the wash system.
 - b. There shall be two control panels mounted (one for tall vehicles and one for shorter vehicles such as pickup trucks). Each control panel shall have a C-cure card reader (see specification section below for reader).
 - c. Driver shall scan ID card at C-cure reader. Upon validation of ID the system on light shall illuminate.
 - d. The control panel shall be stainless steel NEMA 4x construction. Fiberglass NEMA 4x or other materials will not be considered.
 - e. Each control panel shall have the following selection buttons:
 - 1) Automatic Truck Wash
 - 2) Automatic Truck Wash No Soap
 - 3) Manual System Use Only
 - 4) Automatic and Manual System Use
9. Manual Wash System Control
- a. The manual wash devices (pressure washer, steamer, water cannon and 200GPM clean out hose) shall be controlled via remote control panel mounted at the hose reels.
 - b. The control panel shall be stainless steel NEMA 4x construction. Fiberglass NEMA 4x or other materials will not be considered.
10. C-cure Card Reader
- a. Card reader shall be a C-cure HID Thinline 2 5395CK100.
 - b. 18/6 Shielded to C-cure Hut for communication.
 - c. 18/2 Non Shield to C-cure Hut for connection to dry contact in card access panel.
 - d. General Contractor to coordinate with NDOT Card Access System Administration for reader system configuration.
11. Equipment Housing
- a. All equipment shall be housed in a 40' steel ISO containers. All recycle equipment (except the holding tanks) shall be integrated into the containers. The equipment will be tested prior to delivery.
 - b. Equipment housing shall be equipped with the following:
 - 1) Ozone Destruct Device

- 2) Ambient Ozone Monitoring System
 - 3) Gas Monitor System
 - 4) E-Stop
 - 5) Alarms
 - c. Containers shall be insulated with a minimum of R8 rigid insulation.
 - d. Provide a heating and HVAC system to prevent equipment from freezing in winter and keep equipment cool in summer.
 - e. Containers shall have power distribution system (breaker panels and transformers).
 - f. Have a minimum of three florescent lights mounted to ceiling.
 - g. Provide 120v convenience outlets (minimum 1 inside the container, 1 outside)
 - h. Sump box with pump to collect and remove any water from leaks.
 - i. External electrical disconnect located on the rear of the container.
 - j. Internal plumbing and electrical wiring required for complete functionality of system.
 - k. Electrical wires must be run in conduit or SOOW cable trays.
12. Equipment Control
- a. System must be controlled via Allen Bradley PLC with minimum 10" HMI touch screen.
 - b. Touchscreen allow for automatic or manual control of all pumps and motors.
 - c. Adjustable timer screen to adjust all system timers.
 - d. Must be able to display all inputs, alarms, and status conditions.
 - e. HMI to have custom login with password to restrict access to timer adjustments and programing to authorized personnel only.
 - f. System shall be equipment with cellular remote monitoring. Inputs / outputs shall be viewable and programing changes shall be able to be made remotely.
 - g. Water quality monitoring instrumentation.
 - h. pH shall be monitored in the final holding tank. pH levels shall be displayed on the HMI.
13. Automatic Wash System Pumps
- a. The automatic wash shall consist of the following minimum components:
 - 1) Two 50 HP 150 gpm pumps at 300 psi for Arch #1
 - 2) One 15 gpm at 40 psi soap feed pump
 - 3) One 200 gpm @ 175 psi pump feeding final rinse arch with spinners
 - 4) Pumps shall have viton seals.
 - 5) Pumps shall have stainless steel impellers and casings.
14. Recovery Pumps
- a. Two 1 HP heavy duty submersible pumps located in the 10,000 gallon holding tank.

- b. Pump shall be 1 HP with a capacity of 140 gpm at 20 FT.
 - c. Holding tanks to have low level float switch for pump control.
 - d. Each pump shall be fitted with a check valve.
 - e. Each pump to be furnished with a guide rail system consisting of a dual rail system connected to the discharge head and to an upper guide bar holder mounted to the access frame. The guide rail system shall consist of stainless steel guide bar brackets and Schedule 40 type 304 stainless steel pipe. Each pump shall be equipped with complete attachments necessary for lifting the pump and motor from the holding tank.
 - f. The holding tank piping shall be 4" CL53 ductile iron discharge piping and fittings from the pump discharge elbow up and through the holding tank structure.
 - g. The piping shall include operational check valves along all in holding tank discharge piping.
15. Dirty Cone Bottom Tank #1
- a. Settled recycle water is pumped from the 10,000-gallon holding tank to a single cone bottom tank. The cone bottom tank shall have the following features:
 - b. 4900-gallon capacity.
 - c. Bottom slope shall be a minimum of 15 degrees.
 - d. Tank shall be HDPE and be black or green in color with UV inhibitors.
 - e. Auto purge valve to automatically purge solids collected in the bottom of the tank. The timer shall be adjustable at the HMI.
 - f. Purge valve shall be air operated.
 - g. Level site tube.
16. Spin-Down Separator and Transfer Pump
- a. Transfer pump shall be 1 HP with a capacity of 50 gpm at 40 FT.
 - b. Spin down separator shall be designed to remove suspended solids from the fluid.
 - c. Spin-down separator shall have an automatic solids purge valve.
17. 850 Gallon Solids Settling and Oil Water Separator Module
- a. Riveer RTS 5000 or approved equal.
 - b. Minimum volume of 850 gallons, single vessel module constructed of stainless steel. No alternate materials are acceptable.
 - c. Must be equipped with solids removal conveyor for self-cleaning via conveyor removal system. Solids are automatically removed via automatic drag conveyor.
 - d. Solids will be automatically deposited into a hopper.
 - e. Slurry purge systems are not acceptable.
 - f. All welds shall be passivated.
 - g. Solids settling chamber must contain multiple inclined plates for solids settling
 - h. 6 cu ft of coalescing media with over 600 sq ft of surface area.

- i. Weir wall structures to contain oil on “dirty” side of module. Liquids shall flow under and then over the wire wall to “clean” side of module.
 - j. Prior to entering the “clean” side of the module liquids must flow across a compartment containing oil absorbing strips.
 - k. Disc skimmer to remove oil. Belt type skimmers will not be accepted.
 - l. High and low level floats in final chamber for pump control.
18. Filter Pump
- a. Grundfos or approved equal
 - b. Stainless steel impeller and casing with cast iron or stainless discharge head.
 - c. Two filter pumps:
 - 1) 5.5 HP TEFC motor, minimum capacity of 50 gpm at 205 FT.
 - 2) 25 HP TEFC motor, minimum capacity of 300 gpm at 150 FT.
19. Media Filter Pumps
- a. Two media filter pumps shall be 2.28 HP with a capacity of 25 gpm at 150 FT.
20. Backwash / Ozone Pump
- a. Backwash supply pump shall be 1.5 HP with a capacity of 20 gpm at 117 FT.
21. Media Filters
- a. 100% composite fiberglass construction.
 - b. Media filters to be filled with 6 cubic feet of media in three layers consisting of course stone, fine sand and Zeolite.
 - c. Media filter must be capable of removing suspended solids to a nominal diameter of 50 microns.
 - d. Filter housing rated to a minimum of 600 psi and have an operating pressure of 150 psi.
 - e. Media filter must be capable of automatic back washing via PLC control timer utilizing air powered valves. This process shall be automatic and require no user interaction.
22. Absolute Filters
- a. Constructed of 304 Stainless Steel.
 - b. Rated to 150 psi operating pressure, 600 psi maximum.
 - c. Canister styled unit with stainless steel housing capable of 5 micron zero bypass multilayer, non-proprietary bag filter.
 - d. Digital pressure sensor with readout and connection to PLC for auto shut down when filter full and red indicator light to indicate full filter.
 - e. 10 spare filter bags shall be provided.
23. Carbon Filter
- a. 100% composite fiberglass construction.
 - b. Media filter to be filled with 6 cubic feet of carbon.
 - c. Rated to 150 psi operating pressure, 600 psi maximum.

- d. Filter must be capable of automatic back washing via PLC control timer utilizing air powered valves. This process shall be automatic and requires no user interaction.
24. Cone Bottom Tanks
- a. One 4900-gallon capacity tank and one 2600-gallon capacity tank.
 - b. Bottom slope shall be a minimum of 15 degrees.
 - c. Tank shall be HDPE and be black or green in color with UV inhibitors.
 - d. Auto purge valve to automatically purge solids collected in the bottom of the tank. The timer shall be adjustable at the HMI.
 - e. Purge valve shall be air operated.
 - f. Level site tube.
25. Ozone Injection
- a. Odor and Biological Control.
 - b. Ozone will be circulated utilizing a dedicated HP recirculation pump with Mazzei Injector.
 - c. Automatic PLC-controlled ozone injection system via corona discharge ozone generator.
 - d. Minimum dose rate of 1 gram/hour cell ozone generator per loop.
26. Fresh Water Tank
- a. 4200-gallon capacity tank.
 - b. Tank shall be HDPE and be black or green in color with UV inhibitors.
 - c. Level site tube.
 - d. Shall include an automatic fill system from water softener with a minimum fill capacity of 140 gpm.
27. Water Softener
- a. 140 gpm capacity.
 - b. Dual tank system for continuous operation during regeneration cycle.
 - c. Brine tank.
 - d. Automatic digital readout display for easy system control.
28. Hot Water Pressure Washers
- a. Two with rated capacity of 5 gpm at 3000 psi.
 - b. CAT pump or equal.
 - c. Belt drive.
 - d. Thermal protection.
 - e. Adjustable thermostat.
 - f. Automatic shutdown timer.
 - g. 400,000 BTU gas-fired heater.
 - h. Two 0.8 HP supply pumps with a rated capacity of 10 gpm at 75 FT.

- i. Provide 50' hose with quick connects.
 - j. Controlled via remote control station.
 - k. 36" dual wand.
29. Water Cannons
- a. Rated capacity of 50 gpm at 120 psi.
 - b. Two 8 HP pumps with a capacity of 50 gpm at 263 FT.
 - c. Stainless steel impeller and casing.
 - d. Controlled via remote control station.
30. Steamers
- a. Steamer capacity of 300 gph at 400 psi.
 - b. 880,000 BTU system.
 - c. Steam temperature: 250 degrees Fahrenheit.
 - d. Automatic shut off timer.
 - e. Control via remote station.
 - f. 0.8 HP water supply pump with a capacity of 10 gpm at 75 FT.
31. Fill station / cleanout pump
- a. 25 HP pump with a rated capacity of 300 gpm at 197 FT.
 - b. Provide 3" cam lock at wash pad.

PART 3 INSTALLATION

3.1 PREPARATION

- A. Visit the worksite and become fully aware of all existing conditions.
- B. Review the Contract Documents and make proper provisions to avoid interference and construction delays. Determine the exact route of each pipe. Make offsets and changes in direction required to maintain proper head room and pitch or to accommodate the structure and the work of other trades.
- C. Furnish other trades with information to properly locate and size openings in the structure required for this work.
- D. Coordinate utility connections for water, sewer, gas, and electric.
- E. Furnish anchor bolts, sleeves, inserts, and supports required for this work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND REQUIREMENTS

- A. Perform work using personnel skilled in the trade involved.
- B. Provide competent supervision.
- C. Furnish new equipment, fixtures, materials, and accessories bearing the manufacturer's identification and conforming to recognized commercial standards.

- D. Provide guards around high-temperature equipment and materials.
- E. When exposed to weather, provide a weather protected enclosure around electrical equipment, controls and other items that are not satisfactorily protected.
- F. All required demolition, including saw cutting and chipping of concrete to remove or install fixtures and piping shall be provided as well as patching, repair and painting at no additional cost.
- G. Provide all extra materials and labor for a complete operable system at no additional cost to the OWNER.
- H. Equipment supplier shall certify the installation. CONTRACTOR to provide a copy of certification letter to OWNER.

3.3 ACCESS TO EQUIPMENT

Install all control devices, specialties, valves, and related items to provide easy access for operation, inspection, repair and maintenance.

3.4 EQUIPMENT INSTALLATION

- A. Install equipment in the space allotted with sufficient clearance for proper operation and maintenance.
- B. Where equipment differs in arrangement or connections from those shown, provide all required changes in piping, supports and appurtenances and cost of work of any other trades affected.
- C. Provide equipment accessories necessary for proper pardon and support.

3.5 TESTING AND INSPECTION

- A. CONTRACTOR shall furnish all equipment for testing and verifying compliance with specifications. Tests shall be performed in presence of, and to satisfaction of, OWNER's inspector.
- B. Defective Work: If inspection or test shows defects, such defective work or material shall be replaced and inspection and tests repeated. Repairs to piping shall be made with new material. No caulking of screwed joints or holes will be accepted.
- C. Protection to Fixtures, Materials, and Equipment: Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, chemical, or mechanical injury. Upon completion of all work, fixtures, materials, and equipment shall be thoroughly cleaned, repainted as required, adjusted, and operated.

3.6 ADJUST AND CLEAN

- A. Clean up work areas and fixtures.
- B. Adjust system for proper operation, ready for use.
- C. Touch up coatings with matching paint all damaged factory finishes.

3.7 PAINTING AND IDENTIFYING OF PIPING

- A. General: All non-factory finished (i.e. finish painted) items furnished under this section are to be painted. Refer to Specification Section 09 96 00 Protective Coatings for requirements. Do not paint over name plates or other identifying labels.
- B. Identification of Piping: Provide piping identification for all above ground plumbing system piping, including piping within filter unit. Refer to Specification Section 40 05 02 Piping Identification.
- C. Identification of Valves: Provide valve tags for all above ground valves.

3.8 INSTRUCTIONS

- A. Instruct OWNER personnel in the proper operation and maintenance of the systems.
- B. Review the maintenance manuals with the OWNER.
- C. Submit a list of manufacturer's warranties for the equipment furnished.

3.9 TWO YEAR MAINTENANCE SERVICE AGREEMENT

- A. As part of the Bid, the installer or the equipment supplier shall provide a two-year full service maintenance service.
- B. Provide monthly maintenance service for all wash systems, plumbing systems and Reclaimed Water Treatment System components as specified in and in accordance with the requirements and schedule of the OWNER. The CONTRACTOR is responsible for all consumable items and any required repairs for the equipment at no cost to the OWNER for the first two years.
- C. Service visits will be set on a scheduled basis with the OWNER.
- D. Service tech will arrive in a fully stocked service vehicle and perform preventative maintenance checks, perform quarterly oil changes on wash equipment, replace filtration components as needed, perform breakdown maintenance.

END OF SECTION

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SECTION 26 00 00

ELECTRICAL WORK, GENERAL

PART 1 GENERAL

1.1 THE SUMMARY

- A. Provide the electrical WORK, complete and operable, as indicated in accordance with the Contract Documents.
- B. The provisions of this Section shall apply to all Sections in Division 26, except as otherwise indicated.
- C. The WORK of this Section is required for operation of electrically-driven equipment provided under Specifications in other Divisions.
- D. The CONTRACTOR'S attention is directed to the requirement for proper coordination of the WORK of this Section with the WORK of equipment Specifications.
- E. Concrete, excavation, backfill, and steel reinforcement required for encasement, installation, or construction of the WORK of the various Sections of Division 26 is included as a part of the WORK under the respective Sections, including duct banks, manholes, handholes, equipment housekeeping pads, and light pole bases.
- F. Equipment supports and foundations shall be in conformance with the requirements of Section 46 01 00 – Equipment General Provisions.

1.2 REFERENCE STANDARDS

NEC (NFPA 70)	National Electrical Code
NETA	International Electrical Testing Association
NEMA 250	Enclosure for Electrical Equipment (1000 Volts Maximum)

- A. Electrical equipment shall be listed by and shall bear the label of Underwriters' Laboratories, Inc. (UL) or an independent testing laboratory acceptable to the local code enforcement agency having jurisdiction.
- B. Installation of electrical equipment and materials shall comply with OSHA Safety and Health Standards (29 CFR 1910 and 29 CFR 1926, as applicable), state building standards, and applicable local codes and regulations.
- C. Where the requirements of the specifications conflict with UL, NEMA, NFPA, or other applicable standards, the more stringent requirements shall govern.

1.3 SIGNAGE AND MARKINGS

- A. Identification
 - 1. Provide danger, caution, and warning signs and equipment identification markings in accordance with applicable federal, state, OSHA, and NEC requirements.

- B. Local Disconnect Switches
 - 1. Legibly mark each local disconnect switch for motors and equipment in order to indicate its purpose, unless the purpose is indicated by the location and arrangement.
- C. Warning Signs
 - 1. 600 Volts Nominal, or Less
 - a. Mark entrances to rooms and other guarded locations that contain live parts with conspicuous signs prohibiting unqualified persons from entering.
- D. Isolating Switches
 - 1. Provide isolating switches not interlocked with an approved circuit-interrupting device with a sign warning against opening them under load.

1.4 PUBLIC UTILITIES REQUIREMENTS

- A. Contact the serving utility and verify compliance with requirements before construction.
- B. Coordinate schedules and payments for WORK by utilities.
- C. Where conduits and conductors in the WORK are indicated to be larger, heavier schedule, or have greater protective coating than utility requirements, provide the larger size, heavier schedule, or greater protection.
- D. Provide electrical service as indicated and as required by the serving utility.
- E. Verify and provide service conduits, fittings, transformer pad, grounding devices, and service wires not provided by the serving utility.
- F. Verify with the utility the exact location of each service point and type of service, and pay charges levied by the serving utilities as part of the WORK.

1.5 PERMITS AND INSPECTION

- A. Obtain permits and pay inspection fees according to the General Conditions.
- B. Pay connection and turn-on service charges required by the utility company.

1.6 CONTRACTOR SUBMITTALS

- A. General
 - 1. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.
 - 2. Custom-prepare Shop Drawings.
 - 3. Drawings or data indicating "optional" or "as required" equipment will not be accepted.
 - 4. Cross out options not proposed or delete from the Shop Drawings.

- B. Shop Drawings: Include the following:
1. Complete material lists stating manufacturer and brand name of each item or class of material.
 2. Shop Drawings for grounding WORK not specifically indicated
 3. Front, side, rear elevations, and top views with dimensional data
 4. Location of conduit entrances and access plates
 5. Component data
 6. Connection diagrams, terminal numbers, internal wiring diagrams, conductor size, and cable numbers
 7. Method of anchoring, seismic requirements, weight
 8. Types of materials and finish
 9. Nameplates
 10. Temperature limitations, as applicable
 11. Voltage requirement, phase, and current, as applicable
 12. Front and rear access requirements
 13. Test reports
 14. Grounding requirements
- C. Catalog Cuts
1. Submit catalog cuts or photocopies of applicable pages of bulletins or brochures for mass produced, non-custom manufactured material.
 2. Stamp the catalog data sheets in order to indicate the Project name, applicable Specifications Section and Paragraph, model number, and options.
- D. Materials and Equipment Schedules
1. Within 30 Days of the commencement date in the Notice to Proceed, deliver to the ENGINEER a complete list of materials, equipment, apparatus, and fixtures that are proposed for use.
 2. Include in the list the type, size, name of manufacturers, catalog number, and such other information as required to identify the item.
- E. Technical Manuals
1. Submit complete information in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

F. As-Built Drawings

1. Prepare as-built drawings, showing invert and top elevations and routing of duct banks and concealed below-grade electrical installations.
2. Furnish the drawings to the ENGINEER in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

1.7 AREA DESIGNATIONS

A. General

1. Designations for raceway system enclosures shall comply with the requirements of Section 26 05 33 – Electrical Raceway Systems.
2. Designations for electrical WORK specifically indicated in other Sections shall comply with the requirements of those Sections unless indicated otherwise.

B. Material Requirements

1. Provide sealing fittings in chlorine and hydrofluosilicic (HFS) acid areas.
2. Construct NEMA 4X enclosures of Type 304 or 316 stainless steel, except in chlorine and HFS areas where non-metallic enclosures shall be provided.
3. Do not coat NEMA 4X enclosures.
4. Construct NEMA 1, 3R, and 12 enclosures of steel, and prime and coat with ANSI 61 light grey paint.

1.8 ELECTRICAL TESTS

- A. The CONTRACTOR shall be responsible for factory testing in accordance with the individual equipment specification sections, Division 26, as required by the ENGINEER, and as required by other authorities having jurisdiction.
- B. Field testing of the electrical system shall be by a NETA certified testing agency. The CONTRACTOR shall coordinate with OWNER and the testing agency for field testing requirements.
- C. The CONTRACTOR shall pay the costs of replacement parts and installation labor, due to damage resulting from defective equipment or from correction of a faulty installation.
- D. Remove and replace equipment or material that fails a test.
- E. Corrections to equipment or materials with a factory warranty shall be as recommended by the manufacturer and shall be performed in a manner that does not void the warranty.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide equipment and materials that are new and are the products of experienced and reputable manufacturers in the industry.

- B. Provide equipment and materials listed by UL and bearing the UL label, where UL requirements apply.
- C. Provide similar items in the WORK as products of the same manufacturer.
- D. Provide equipment and materials of industrial grade standard of construction.
- E. Where a NEMA enclosure type is indicated in a non-hazardous location, use that type of enclosure despite the fact that certain modifications such as cutouts for control devices may negate the NEMA rating.
- F. On devices indicated to display dates, display the year as 4 digits.
- G. Temperature Ratings of Equipment Terminations
 - 1. Provide terminations and lugs rated for use with 75-degree C conductors.
 - 2. Wire sizes in the Contract Documents are based on NEC ampacity tables using the 75-degree C ratings.
- H. Electrical equipment and devices shall be rated for minimum 3,300 feet elevation above sea level.

2.2 MOUNTING HARDWARE

- A. Miscellaneous Hardware
 - 1. Provide nuts, bolts, and washers constructed of stainless steel.
 - 2. Provide threaded rods for trapeze supports constructed from continuous threaded galvanized steel, 3/8-inch diameter minimum.
 - 3. Struts
 - a. Construct struts for mounting of conduits and equipment of galvanized steel or 304 stainless steel.
 - b. Where contact with concrete or dissimilar metals may cause galvanic corrosion, use suitable non-metallic insulators in order to prevent such corrosion.
 - c. Strut Manufacturer, or Equal: **B-Line, Unistrut**.
 - 4. End Caps
 - a. Provide plastic protective end caps for all exposed strut ends.
 - b. End Caps Manufacturer, or Equal: **Unistrut, Model P2860**
 - 5. Anchors
 - a. Provide stainless steel expansion anchors for attaching equipment to concrete walls, floors, and ceilings.
 - b. Wood plugs will not be accepted.

- c. Anchor Manufacturer, or Equal: "**Power-Bolt**" or "**Power-Stud**" as manufactured by **Power Fasteners, Inc.**; similar by **Star**.
- B. Hardware shall be rated for the environmental condition as noted on the drawings.

2.3 ELECTRICAL IDENTIFICATION

- A. Nameplates
 - 1. Fabricate nameplates from white-letter, black-face laminated plastic engraving stock, such as Formica Type ES-1 or equal.
 - 2. Securely fasten each nameplate, using fasteners constructed of brass, cadmium-plated steel, or stainless steel, and screwed into inserts or tapped holes as required.
 - 3. Provide engraved characters of the block style, with no characters smaller than 1/8 inch top to bottom.
- B. Conductor and Equipment Identification
 - 1. Provide imprinted plastic-coated cloth marking devices, such as manufactured by Brady, Thomas & Betts, or equal.
 - 2. Alternatively, provide heat-shrunk plastic tubing, imprinted split-sleeve markers cemented in place.

PART 3 EXECUTION

3.1 GENERAL

- A. Incidentals
 - 1. Provide materials and incidentals required for a complete and operable system, even if not required explicitly by the Contract Documents.
 - 2. Typical incidentals are terminal lugs not furnished with vendor-supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and control wiring required by vendor-furnished equipment to connect with other equipment indicated in the Contract Documents.
- B. Field Control of Location and Arrangement
 - 1. The Drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items.
 - 2. Exact locations shall be determined by the CONTRACTOR in the field, based on the physical size and arrangement of equipment, finished elevations, and other obstructions.
 - 3. Follow the locations on the Drawings, however, as closely as possible.

4. Conduits
 - a. Where conduit development drawings or "home runs" are indicated, route the conduits in accordance with those requirements.
 - b. Provide exposed or encased routings as indicated, except conceal conduit in finished areas unless indicated otherwise.
 - c. Size conduits encased in a slab for conduit OD not to exceed 1/3 of the slab thickness, and lay out and space as to not impede concrete flow.
5. Placement
 - a. Install conduit and equipment in such a manner as to avoid obstructions, to preserve headroom, and to keep openings and passageways clear.
 - b. Locate luminaires, switches, convenience outlets, and similar items within finished rooms as indicated.
 - c. Where exact locations are not indicated, such locations will be determined by the ENGINEER.
 - d. If equipment is installed without instruction and must be moved, the cost of moving shall be included as part of the WORK.
 - e. Slightly adjust luminaire locations in order to avoid obstructions and to minimize shadows.
6. Circuits
 - a. Wherever conduits and wiring for lighting and receptacles are not indicated, it shall be the CONTRACTOR'S responsibility to provide lighting and receptacle-related conduits and wiring as required, based on the actual installed fixture layout and the circuit designations as indicated.
 - b. Provide No. 12 AWG minimum wiring, and 3/4-inch minimum conduits (exposed) and one-inch minimum conduits (encased).
 - c. Where circuits are combined in the same raceway, derate conductor ampacities in accordance with NEC requirements.
- C. Workmanship
 1. Install materials and equipment in strict accordance with the printed recommendations of the manufacturer and using workers skilled in the WORK.
 2. Coordinate installation in the field with other trades in order to avoid interferences.
- D. Protection of Equipment and Materials
 1. Fully protect materials and equipment against damage from any cause.

2. Cover materials and equipment, both in storage and during construction, in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, plaster, or paint.
 3. Keep moving parts clean and dry.
 4. Replace or refinish damaged materials or equipment, including faceplates of panels and switchboard sections, as part of the WORK.
- E. Provide incoming utility power equipment in conformance with the utility's requirements.

3.2 CORE DRILLING

- A. Perform core drilling as required for the installation of raceways through concrete walls and floors.
- B. Base the locations of floor penetrations, as may be required, on field conditions.
- C. Verify exact core drilling locations based on equipment actually furnished as well as exact field placement.
- D. To the extent possible, identify the existence and locations of encased raceways and other piping in existing walls and floors with the OWNER prior to any core drilling activities.
- E. Repair damage to encased conduits, wiring, and piping as part of the WORK.

3.3 CONCRETE HOUSEKEEPING PADS

- A. Provide concrete housekeeping pads for indoor floor-standing electrical equipment.
- B. Extend housekeeping pads for equipment, including future units, 3-1/2 inches above the surrounding finished floor or grade, and one inch larger in both dimensions than the equipment, unless otherwise indicated.
- C. Provide concrete housekeeping curbs for conduit stub-ups in indoor locations that are not concealed by equipment enclosures.
- D. Extend housekeeping curbs to 3-1/2 inches above the finished floor or grade.

3.4 EQUIPMENT ANCHORING

- A. Floor-supported, wall, or ceiling-hung equipment and raceways shall be anchored in place by methods that will meet seismic requirements in the area where the Project is located. Refer to Structural Design, Support and Anchorage section for support and anchorage requirements.
- B. Provide wall-mounted panels that weigh more than 500 pounds or that are within 18 inches of the floor with fabricated steel support pedestals.
- C. If the supported equipment is a panel or cabinet enclosed within removable side plates, match supported equipment in physical appearance and dimensions.
- D. Provide transformers hung from 4-inch stud walls and weighing more than 300 pounds with auxiliary floor supports.

- E. Provide leveling channels anchored to the concrete pad for MCC's, switchboard and other electrical equipment mounted on housekeeping pads.
- F. Manufacturer's Recommendations
 - 1. Anchoring methods and leveling criteria in the printed recommendations of the equipment manufacturers are a part of the WORK of this Contract.
 - 2. Submit such recommendations as Shop Drawings as indicated.

3.5 EQUIPMENT IDENTIFICATION

- A. Provide nameplates for panelboards, control and instrumentation panels, starters, switches, and pushbutton stations.
- B. In addition to nameplates, equip control devices with standard collar-type legend plates.
- C. Identify control devices within enclosures as indicated and similar to the subparagraph above.
- D. Provide suitable inscribed finish plates for toggle switches that control loads out of sight of switches and for multi-switch locations of more than 2 switches.
- E. Use equipment names and tag numbers, where indicated, on nameplates.
- F. Provide typewritten circuit directories for panelboards, that accurately reflect the outlets connected to each circuit.
- G. Terminal Blocks
 - 1. Label termination points on terminal blocks by identifiers on the blocks.
 - 2. Provide identifiers that have been preprinted by the terminal manufacturer or custom-printed.
 - 3. Hand-lettered markers will not be accepted.
- H. Tag distribution equipment, stand-alone disconnects, starters, and VFDs with appropriate arc-flash labels.

3.6 CLEANING

- A. Before final acceptance, thoroughly clean the electrical WORK of cement, plaster, and other materials.
- B. Remove temporary tags, markers, stickers, and the like.
- C. Remove oil and grease spots with a non-flammable cleaning solvent, by carefully wiping and scraping cracks and corners.
- D. Apply touch-up paint to scratches on panels and cabinets.
- E. Vacuum-clean electrical cabinets and enclosures.

- F. Clean luminaires inside and out. Replace failed lamps.
- G. Dispose cleaning debris and refuse off-Site.

END OF SECTION

SECTION 26 01 26

ELECTRICAL TESTS

PART 1 GENERAL

1.1 DESCRIPTION

Work Included

- A. Electrical testing of the electrical system.

1.2 RELATED SECTIONS

- A. Section 01 33 00 – Contractor Submittals.
- B. Section 26 00 00 – Electrical Work, General.

1.3 SUBMITTALS

Submit electrical test result study in accordance with Section 26 00 00. Submit test results 20 days prior to energizing tested equipment. The study shall include the following:

- A. Project summary.
- B. Description of equipment tested.
- C. Description of tests.
- D. Test Results.
- E. Conclusion and recommendations.
- F. Appendix, including test forms.

1.4 OPERATION AND MAINTENANCE MANUALS

Include the Electrical Test Result Study within the operation and maintenance manuals. Operation and Maintenance Manuals shall be in accordance with Section 26 00 00.

1.5 TESTING ORGANIZATION QUALIFICATIONS

- A. Testing organization shall be corporately and financially independent of the supplier, producer and installer of the equipment.
- B. Testing organization shall meet Federal OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907, 1910 and 1936. Membership in the National Electrical Testing Association constitutes proof of meeting such criteria.
- C. Testing organization shall provide all materials, equipment, labor and technical supervision to perform inspections and tests.
- D. Acceptable Testing organizations are:

- 1. Electric Power Systems Testing and Engineering Services**
- 2. Power Systems Testing Company**
- 3. Electrical Reliability Services, Inc.**

1.6 APPLICABLE CODES, STANDARDS AND REFERENCES

- A. All inspections and tests shall be in accordance with the following codes and standards except as provided otherwise herein:
1. National Electrical Manufacturer's Association - NEMA
 2. American Society for Testing and Materials - ASTM
 3. Institute of Electrical and Electronic Engineers - IEEE
 4. International Electrical Testing Association - NETA Acceptance Testing Specifications - ATS-1991
 5. American National Standards Institute - ANSI C2: National Electrical Safety Code
 6. State and local codes and ordinances
 7. Insulated Cable Engineers Association - ICEA
 8. Association of Edison Illuminating Companies - AEIC
 9. Occupational Safety and Health Administration - OSHA
 10. National Fire Protection Association - NFPA
- B. Inspections and tests shall utilize the following references:
1. Project design specifications.
 2. Project design drawings.
 3. Project power system analysis study.
 4. Manufacturer's instruction manuals applicable to each particular apparatus.
- C. Inspections and tests shall be in accordance with the latest edition of the International Electrical Testing Association Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.7 SAFETY AND PRECAUTIONS

- A. Safety practices shall include, but are not limited to, the following requirements:
1. Occupational Safety and Health Act.
 2. Accident Prevention Manual for Industrial Operations, National Safety Council.

3. Applicable state and local safety operating procedures.
 4. Owner's safety practices.
 5. National Fire Protection Association - NFPA 70E
 6. American National Standards for Personnel Protection
- B. All tests shall be performed with apparatus de-energized. Exceptions must be thoroughly reviewed to identify safety hazards and devise adequate safeguards.
- C. The testing firm shall have a designated safety representative on the project to supervise the testing operations with respect to safety.

1.8 SCHEDULING

Perform Electrical Tests after electrical installation is 100% completed.

1.9 LIST OF ITEMS TO BE TESTED

Test the following items:

- A. Switchboard
- B. Power Panel
- C. Circuit Breakers
- D. Feeder Circuit Conductors
- E. Automatic Transfer Switch
- F. Engine Generator
- G. Any other equipment shown on one-line diagrams.

PART 2 MATERIALS

Not used.

PART 3 EXECUTION

3.1 SWITCHBOARD ASSEMBLIES

- A. Visual and Mechanical Inspection.
 1. Inspect for physical, electrical and mechanical condition.
 2. Compare equipment nameplate information with latest one-line diagram and report discrepancies.
 3. Check for proper anchorage, required area clearances, physical damage and proper alignment.

4. Inspect all doors, panels and sections for paint, dents, scratches, fit and missing hardware.
 5. Verify that fuse and/or circuit breaker sizes and types correspond to drawings.
 6. Verify that current and potential transformer ratios correspond to drawings.
 7. Inspect all bus connections for high resistance. Use low-resistance ohmmeter or check tightness of bolted bus joints by using a calibrated torque wrench. Refer to manufacturer's instructions or Table BTV for proper torque levels.
 8. Test all electrical and mechanical interlock systems for proper operation and sequencing.
 9. Closure attempt shall be made on locked open devices. Opening attempt shall be made on locked closed devices.
 10. Clean entire switchboard using manufacturer's approved methods and materials.
 11. Inspect insulators for evidence of physical damage or contaminated surfaces.
 12. Verify proper barrier and shutter installation and operation.
 13. Lubrication
 - a. Verify appropriate contact lubricant on moving current carrying parts.
 - b. Verify appropriate lubrication on moving and sliding surfaces.
 14. Exercise all active components.
 15. Inspect all mechanical indicating devices for proper operation.
- B. Electrical Tests
1. Perform test on all instrument transformers in accordance with Instrument Transformer paragraphs.
 2. Perform ground-resistance tests in accordance with Grounding Systems paragraphs.
 3. Perform insulation-resistance test on each bus section, phase-to-phase and phase-to-ground for one (1) minute. Test voltages and minimum resistances shall be in accordance with Table SS-1.
 4. Perform insulation-resistance test on control wiring. Do not perform this test on wiring connected to solid-state components.
 5. Perform control wiring performance test. Use the elementary diagrams of the switchboard to identify each remote control and protective device. Conduct tests to verify satisfactory performance of each control feature.
 6. Perform secondary voltage energization test on all control power circuits and potential circuits as detailed below. Check voltage levels at each point on terminal boards and at each terminal on devices.

7. Perform current injection tests on the entire current circuit in each section of switchboard.
 - a. Perform current test by primary injection, where possible, with magnitudes such that a minimum of 1.0 ampere flows in the secondary circuit.
 - b. Where primary injection is impractical, utilize secondary injection with a minimum current of 1.0 ampere.
 - c. Test current at each device.
 8. Determine accuracy of all meters per Metering and Instrumentation paragraphs. Verify multipliers.
 9. Control Power Transformers - Dry Type
 - a. Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring and overall general condition.
 - b. Verify proper primary and secondary fuse ratings or circuit breakers.
 - c. Verify proper interlock function and contact operation.
 - d. Perform insulation-resistance tests. Perform measurement from winding-to-winding and windings-to-ground. Test voltage and minimum resistances shall be in accordance with Table T-3. Results shall be temperature corrected in accordance with Table T-4.
 - e. Perform secondary wiring integrity test. Disconnect transformer at secondary terminals and connect secondary wiring to proper secondary voltage. Check potential at all devices.
 - f. Verify proper secondary voltage by energizing primary winding with system voltage. Measure secondary voltage with the secondary wiring disconnected.
 10. Potential Transformer Circuits
 - a. Perform secondary wiring integrity test. Disconnect transformer at secondary terminals and connect secondary wiring to proper secondary voltage. Check for proper potential at all devices.
 - b. Verify secondary voltage by energizing primary winding with system voltage. Measure secondary voltage with the secondary wiring disconnected.
 11. Test circuit breakers in accordance with Circuit Breaker paragraphs.
- C. Test Values
1. Bolt-torque levels shall be in accordance with Table BTV, unless otherwise specified by manufacturer.
 2. Insulation-resistance test shall be performed in accordance with Table SS-1. Values of insulation resistance less than this table or manufacture's minimum should be investigated.

Table SS-1 Switchboard Insulation-Resistance Test Voltages		
Voltage Rating	Minimum dc Test Voltage	Recommended Minimum Insulation Resistance In Megohms
0 – 250V	500 V	50
251 – 600V	1000 V	100

3.2 CABLES - LOW-VOLTAGE - 600 V MAXIMUM

A. Visual and Mechanical Inspection

1. Inspect cables for physical damage and proper connection in accordance with single-line diagram.
2. Test cable mechanical connections to manufacturer's recommended values using a calibrated torque wrench. In the absence of manufacturer's data use Table BTV.
3. Check cable color coding with applicable engineer's specifications and National Electrical Code standards.

B. Electrical Tests

1. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 1000 volts dc for 1 minute.
2. Perform continuity test to insure proper cable connection.
3. Test Values: Evaluate results by comparison with cables of same length and type. Investigate any values less than 50 megohms.

3.3 CIRCUIT BREAKERS - LOW-VOLTAGE - INSULATED-CASE

A. Visual and Mechanical Inspection

1. Check circuit breaker for proper mounting and compare nameplate data to drawings and specifications.
2. Operate circuit breaker to ensure smooth operation.
3. Inspect case for cracks or other defects.
4. Check tightness of connections using calibrated torque wrench. Refer to manufacturer's instructions or Table BTV for proper torque levels.

B. Electrical Tests

1. Perform a contact-resistance test.
2. Perform a insulation-resistance test at 1000 volts dc from pole to pole and from each pole to ground with breaker closed and across open contacts of each phase.

3. Determine long-time minimum pickup current by primary current injection where practical.
4. Perform long-time delay time-current characteristic test by passing three hundred percent (300%) rated current through each pole separately. Record trip time.
5. Determine short time pickup and delay by primary current injection.
6. Determine ground-fault pickup and time delay by primary current injections.
7. Determine instantaneous pickup current by primary injection using run-up or pulse method.

C. Test Values

1. Compare contact resistance or millivolt drop values to adjacent poles and similar breakers. Investigate deviations of more than fifty percent (50%). Investigate any value exceeding manufacturer's recommendations.
2. Insulation resistance shall not be less than 100 megohms.
3. Trip characteristic of breakers shall fall within manufacturer's published time-current characteristic tolerance band, including adjustment factors.
4. All trip times shall fall within Table ICO. Circuit breakers exceeding specified trip time at three hundred percent (300%) of pickup shall be tagged defective.

Instantaneous pickup values shall be within values shown on Table ICI. Table ICO Insulated-Case Circuit Breaker Overcurrent Trip Test (At 300% of Rated Continuous Current of Circuit Breaker)		
Maximum Breaker Voltage Volts	Range of Related Continuous Current Amperes	Maximum Trip Time in Seconds*
240	15-45	50
240	50-100	70
600	15-45	70
600	50-100	125
240	110-225	200
240	250-400	300
600	110-225	250
600	250-400	300
600	450-600	350
600	700-1200	500
600	1400-2500	600
600	3000-5000	650

*For integrally-fused circuit breakers, trip times may be substantially longer if tested with the fuses replaced by solid links (shorting bars).

Table ICI Insulated-Case Circuit Breaker Instantaneous Trip Tolerances		
Frame Size, Amperes	Tolerances of High and Low Settings	
	High	Low
<250	+40% -25%	+40% -30%
>400	+25%	+30%

3.4 CIRCUIT BREAKERS - LOW-VOLTAGE - POWER

A. Visual and Mechanical Inspection

1. Inspect for physical damage and compare nameplate data with drawings and specifications.
2. Perform mechanical operation test in accordance with manufacturer's instructions.
3. Check cell fit and element alignment and proper operation of racking interlocks.
4. Check tightness of connections using calibrated torque wrench. Refer to manufacturer's instructions or Table BTV for proper torque levels.
5. Check arc chutes for damage.

6. Clean entire circuit breaker using approved methods and materials.
7. Lubricate as required.

B. Electrical Tests

1. Perform a contact-resistance test.
2. Perform an insulation-resistance test at 1000 volts dc from pole-to-pole and from each pole-to-ground with breaker closed and across open contacts of each phase.
3. Determine long-time minimum pickup current by primary current injection.
4. Determine long-time delay by primary injection.
5. Determine short-time pickup and delay by primary current injection.
6. Determine ground-fault pickup and delay by primary current injection.
7. Determine instantaneous pickup value by primary current injection.
8. Make adjustments for final settings in accordance with breaker setting sheet.
9. Activate auxiliary protective devices, such as ground-fault or under voltage relays, to ensure operation of shunt trip devices. Check the operation of electrically-operated breakers in their cubicle.
10. Check charging mechanism.

C. Test Values

1. Compare contact resistance or millivolt drop values to adjacent poles and similar breakers. Investigate deviations of more than fifty percent (50%).
2. Insulation resistance shall not be less than 100 megohms. Investigate values less than 100 megohms.
3. Trip characteristics of breakers when adjusted to setting sheet parameters shall fall within manufacturer's published time-current tolerance band.

3.5 INSTRUMENT TRANSFORMERS

A. Visual and Mechanical Inspection

1. Inspect for physical damage and nameplate information for compliance with drawings and specifications.
2. Verify proper connection of transformers with system requirements.
3. Verify tightness of all bolted connections and assure that adequate clearances exist between primary circuits and secondary circuit wiring.
4. Verify that all required grounding and shorting connections provide good contact.

5. Test proper operation of transformer withdrawal mechanism (tip out) and grounding operation when applicable.
6. Verify proper primary and secondary fuse sizes for potential transformers.

B. Electrical Tests - Current Transformers

1. Perform insulation-resistance test of the current transformer and wiring-to-ground at 1000V dc. Do not perform this test on solid-state devices.
2. Perform a polarity test of each current transformer.
3. Perform a ratio-verification test using the voltage or current method in accordance with ANSI C57.13.1.
4. Perform an excitation test on transformers used for relaying applications in accordance with ANSI C57.13.1.
5. Measure relaying circuit burdens at transformer terminals and determine the total burden in ohms at 60Hz.
6. When applicable, perform insulation-resistance and dielectric withstand tests on the primary winding with secondary grounded. Test voltages shall be per Table SS-1 and ITD respectively.

C. Electrical Tests - Voltage Transformers

1. Perform insulation-resistance tests winding-to-winding and windings-to-ground. Test voltages shall be applied for one (1) minute in accordance with Table SS-1. Do not perform this test with solid-state devices connected.
2. Perform a polarity test on each transformer to verify the polarity marks or H1-X1 relationship as applicable.
3. Perform a ratio test using a transformer-turns-ratio test set or by voltage comparison method.
4. Perform a dielectric withstand test on the primary windings with the secondary windings connected-to-ground. The dielectric voltage shall be in accordance with Table ITD and applied for one (1) minute.

D. Test Values

1. Insulation-resistance measurement on any instrument transformer shall be not less than that shown in Table SS-1.
2. Perform a burden/saturation calculation on current transformers supplying relaying circuits.
3. Ratio accuracies shall be within 0.5% of nameplate or manufacturer's specifications.
4. Withstand tests shall be evaluated as pass/fail.

Table ITD Instrument Transformer Dielectric Test Voltage				
Nominal System Voltage	Test BIL (kV)	Dielectric Withstandability Field Test Voltage (kV)		
		AC	DC	
2.4	45	11.3	15	
4.8	60	14.3	19	
13.8	95	25.5	34	
13.8	110	25.5	34	
25	125	30.0	40	
25	150	37.5	50	

Table is derived from paragraph 8.8.2 and tables 2 and 7 of ANSI/IEEE C57.13, "Standard Requirements for Instrument Transformers."

3.6 METERING AND INSTRUMENTATION

A. Visual and Mechanical Inspection

1. Examine all devices for broken parts, shipping damage, and tightness of connections.
2. Verify that meter types, scales, and connections are in accordance with drawings and specifications.

B. Electrical Tests

1. Determine accuracy of meters at 25/50/75/100% of full scale for each metered parameter.
2. Calibrate meters to one-half percent (0.5%).
3. Verify all instrument multipliers.

3.7 GROUNDING SYSTEMS

A. Visual and Mechanical Inspection: Inspect ground system for compliance with drawings and specifications.

B. Electrical Tests (Small Systems): Perform ground-impedance measurements utilizing the fall-of-potential method per ANSI/IEEE Standard 81 "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System." Instrumentation utilized shall be as defined in Section 12 of the above guide and shall be specifically designed for ground impedance testing. Provide sufficient spacing so that plotted curves flatten in the 62% area of the distance between the item under test and the current electrode.

C. Test Values: The main ground electrode system impedance-to-ground should be no greater than five (5) ohms.

3.8 GROUND-FAULT SYSTEMS (NEC 230-95)

A. Visual and Mechanical Inspection

1. Inspect for physical damage and compliance with drawings and specifications.
2. Inspect neutral main bonding connection to assure:
 - a. Zero-sequence sensing system is grounded.
 - b. Ground-strap sensing systems are grounded through sensing device.
 - c. Ground connection is made ahead of neutral disconnect link on zero-sequence sensing systems.
 - d. Grounded conductor (neutral) is solidly grounded.
3. Inspect control power transformer to ensure adequate capacity for system.
4. Manually operate monitor panels (if present) for:
 - a. Trip test
 - b. No trip test
 - c. Nonautomatic reset
5. Record proper operation and test sequence.
6. Set pickup and time-delay settings in accordance with the settings provided by the owner/user's electrical engineer.

B. Electrical Tests

1. Measure system neutral insulation resistance to ensure no shunt ground paths exist. Remove neutral-ground disconnect link. Measure neutral insulation resistance and replace link.
2. Determine the relay pickup current by current injection at the sensor and operate the circuit interrupting device.
3. Test the relay timing by injecting three hundred percent (300%) of pickup current, or as specified by manufacturer.
4. Test the system operation at fifty-seven percent (57%) rated control voltage, if applicable.
5. Test zone interlock systems by simultaneous sensor current injection and monitoring zone blocking function.
6. On multiple source, tie breaker, etc., systems, devise a simulation scheme that fully proves correct operation.

C. Test Parameters

1. System neutral insulation shall be a minimum of one hundred (100) ohms, preferably one (1) megohm or greater.
2. Relay timing shall be in accordance with manufacturer's published time-current characteristic curves but in no case longer than one (1) second for fault currents equal to or greater than 3,000 amperes.
3. Relay pickup value shall be within +/-10% of setting and in no case greater than 1200A.

3.9 ENGINE GENERATOR

A. Visual and Mechanical Inspection

1. Inspect for physical damage.
2. Compare nameplate information and connection with drawings and specifications.
3. Inspect for proper anchorage and grounding.

B. Electrical and Mechanical Tests

1. Perform an insulation-resistance test on generator winding with respect to ground in accordance with ANSI/IEEE Std. 43. Determine polarization index.
2. Test protective relay devices in accordance with applicable sections of these specifications.
3. Perform phase rotation test to determine compatibility with load requirements.
4. Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other features as applicable.
5. Perform vibration base-line test. Plot amplitude versus frequency for each main bearing cap.
6. Perform load bank test in accordance with the following schedule:
 - a. 25% rated for 30 minutes
 - b. 50% rated for 30 minutes
 - c. 75% rated for 30 minutes
 - d. 100% rated for 3 hours
7. Record voltage, frequency, load current, oil pressure, and coolant temperature at periodic intervals during test.

C. Test Values

1. Perform an insulation-resistance test at voltage listed in Table IR. Polarization index values shall be in accordance with IEEE Standard 43.

2. Vibration levels shall not exceed manufacturer's recommendations.
3. Load test results shall demonstrate the ability of the unit to deliver rated load for the test period.

3.10 AUTOMATIC TRANSFER SWITCHES

A. Visual and Mechanical Inspection

1. Inspect for physical damage.
2. Compare nameplate information and connections to drawings and specifications.
3. Check tightness of all control and power connections.
4. Perform manual transfer operation.
5. Confirm proper lubrication.
6. Check switch to ensure positive mechanical interlock between normal and alternate sources.
7. Insure manual transfer warnings are attached and visible.
8. Check that all covers, barriers, and doors are secure.

B. Electrical Tests

1. Perform insulation-resistance tests phase-to-phase and phase-to-ground with switch in both source positions.
2. Perform a contact-resistance test across all main contacts.
3. Verify settings and operation of control devices in accordance with Section 26 36 23.
4. Calibrate and test all relays and timers including voltage and frequency-sensing relays, in-phase monitor (synchronism check), engine start and cooldown timers, transfer and retransfer timers, etc.
5. Perform automatic transfer tests:
 - a. Simulate loss of normal power.
 - b. Return to normal power.
 - c. Simulate loss of emergency power.
 - d. Simulate all forms of single-phase conditions.
6. Monitor and verify correct operation and timing of the following simulations:
 - a. Normal voltage-sensing relays.
 - b. Engine start sequence.

- c. Time delay upon transfer.
- d. Alternate voltage-sensing relays.
- e. Automatic transfer operation.
- f. Interlocks and limit switch function.
- g. Time delay and retransfer upon normal power restoration.
- h. Engine cooldown and shutdown feature.

C. Test Values

- 1. Insulation-resistance test voltages and minimum values shall be in accordance with Table IR.
- 2. Determine contact resistance in microhms. Investigate any value exceeding 500 microhms or any values which deviate from adjacent poles by more than fifty percent (50%).

**Table BTV
U.S. Standard
Bolt Torque Values for Bus Connections**

Heat-Treated Steel – Cadmium or Zinc-Plated				
Grade	SAE 1 & 2	SAE 5	SAE 6	SAE 8
Minimum Tensile Strength (P.S.I.)	64K	105K	133K	150K
Bolt Diameter (Inches)	Torque (Foot Pounds)			
1/4	4.0	5.6	8.0	8.4
5/16	7.2	11.2	15.2	17.6
3/8	12.0	20.0	27.2	29.6
7/16	19.2	32.0	44.0	48.0
1/2	29.6	48.0	68.0	73.6
9/16	42.4	70.4	96.0	105.6
5/8	59.2	96.0	133.6	144.0
3/4	96.0	160.0	224.0	236.8
7/8	152.0	241.6	352.0	378.4
1	225.6	372.8	528.0	571.2

Silicon Bronze Fasteners*

Torque (Foot Pounds)

Diameter	Non-Lubricated	Lubricated
5/16	15	10

3/8	20	14
1/2	40	25
5/8	55	40
3/4	70	60

*Bronze alloy bolts shall have a minimum tensile strength of 70,000 pounds per square inch.

Aluminum Alloy Fasteners**	
Torque (Foot Pounds)	
Diameter	Lubricated
5/16	8.0
3/8	11.2
1/2	20.0
5/8	32.0
3/4	48.0

**Aluminum alloy bolts shall have a minimum tensile strength of 55,000 pounds per square inch.

Stainless Steel Fasteners***	
Torque (Foot Pounds)	
Diameter	Uncoated
5/16	14
3/8	25
1/2	45
5/8	60
3/4	90

***Bolts, cap screws, nuts, flat washers,
locknuts: 18-8 alloy

Belleville washers: 302 alloy

Table IR		
Insulation-Resistance Test Voltages for Electrical Apparatus		
Maximum Voltage Rating of Equipment	Minimum Test Voltage, dc	Recommended Minimum Insulation Resistance in Megohms
250 V	500 V	25
600 V	1,000 V	100
5,000 V	2,500 V	1,000

8,000 V	2,500 V	2,000
15,000 V	2,500 V	5,000
25,000 V	5,000 V	20,000

Table IRC				
Insulation-Resistance Temperature Conversion Factors For Conversion of Test Temperature to 20°C				
Temperature of Apparatus		Multiplier for Apparatus Containing		
°C	°F	Immersed Oil Insulations	Solid Insulations	
0	32	0.25	0.40	
5	41	0.36	0.45	
10	50	0.50	0.50	
15	59	0.75	0.75	
20	68	1.00	1.00	
25	77	1.40	1.30	
30	86	1.98	1.60	
35	95	2.80	2.05	
40	104	3.95	2.50	
45	113	5.60	3.25	
50	122	7.85	4.00	
55	131	11.20	5.20	
60	140	15.85	6.40	
65	149	22.40	8.70	
70	158	31.75	10.00	
75	167	44.70	13.00	
80	176	63.50	16.00	

Table OTV				
Overpotential Test Voltages For Electrical Apparatus Other Than Inductive Equipment				
Nominal System (Line) Voltage* (kV)	Insulation Class	AC Factory Test (kV)	Maximum Field Applied AC Test (kV)	Maximum Field Applied DC Test (kV)
4.8	5.0	19	11.4	16.1
14.4	15.0	34	20.4	28.8
25.0	25.0	50	30.0	42.4

*Intermediate voltage ratings are placed in the next higher insulation class.

END OF SECTION

SECTION 26 05 19

WIRE AND CABLE

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide wire and cable, complete and operable, in accordance with the Contract Documents.

1.2 ACTION SUBMITTALS

- A. The CONTRACTOR shall submit Shop Drawings in accordance with Sections 01 33 00 – Contractor Submittals and 26 00 00 – Electrical Work, General.

1.3 DELIVERY, STORAGE AND HANDLING

- A. The CONTRACTOR shall protect all cables from damage at all times.
- B. Cable ends shall be protected from water entry in accordance with the manufacturer's recommended procedures. Cable ends shall not be left open in manholes or other locations subject to submergence. If the cable ends become submerged prior to splicing or termination, the cables shall be replaced in their entirety.
- C. Cables shall be pulled into raceways in accordance with the manufacturer's requirements. Under no circumstances shall cable pulling tensions exceed the manufacturer's written instructions.
- D. Pulling tensions on raceway cables shall be within the limits recommended by the cable manufacturer. Wire pulling lubricant, where needed, shall be UL approved.

PART 2 PRODUCTS

2.1 EQUIPMENT

- A. Conductors, include grounding conductors, shall be stranded copper. Aluminum conductor and/or solid conductor wire and cable will not be permitted. Insulation shall bear the UL label, the manufacturer's trademark, and identify the type, voltage, and conductor size. Conductors except flexible cords and cables, fixture wires, and conductors that form an integral part of equipment such as motors and controllers shall conform to the requirements of Article 310 of the National Electric Code, latest edition, for current carrying capacity. Flexible cords and cables shall conform to Article 400, and fixture wires shall conform to Article 402. Wiring shall have wire markers at each end.
- B. Low Voltage Power and Lighting Wire
 - 1. Wire shall be rated for 600 volts insulation, single conductor, Class B Type THHN/THWN.
 - 2. Minimum conductor size: No. 12 AWG.
 - 3. Conductors for feeders as defined in Article 100 of the NEC shall be sized to prevent a voltage drop exceeding 2 percent at the farthest outlet of power, heating, and lighting

loads, or combinations of such loads, and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.

4. Conductors for branch circuits as defined in Article 100 of the NEC shall be sized to prevent voltage drop exceeding 3 percent at the farthest connected load or combinations of such loads and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.
5. Wiring for 600 volt class power and lighting shall be as manufactured by **General Cable, Houston Wire & Cable, Southwire**, or equal.

C. Low Voltage Control Wire

1. Low voltage control wire in duct or conduit shall be the same type as power and lighting wire indicated above.
2. Control wiring shall be No.14 AWG.
3. Control wires inside panels and cabinets shall be machine tool grade type MTW, UL approved, rated for 600V, 90 degrees C at dry locations, and be as manufactured by **General Cable, Houston Wire & Cable, Southwire**, or equal.

D. Instrumentation Cable

1. Instrumentation cable shall be rated at 600 volts, minimum.
2. Individual conductors shall be No. 16 AWG stranded, tinned copper. Insulation shall be color coded polyethylene: black-red for 2 conductor cable and black-red-clear for 3 conductor cable.
3. Instrumentation cables shall be composed of the individual conductors, an aluminum polyester foil shield, a No. 18 or larger AWG stranded, tinned copper drain wire, and a PVC outer jacket with a thickness of 0.047-inches.
4. Single pair, No. 18 AWG, twisted, shielded cable shall be **Belden Part No. 1120A**, similar by **General Cable**, or equal.
5. Single triad, No. 16 AWG, twisted, shielded cable shall be **Belden Part No. 8618**, similar by **General Cable**, or equal.

E. Fiber Optic Cable

1. Multimode Fiber Optic (MMFO) cable shall be 6 fiber, outdoor rated, all- dielectric, single jacketed, water blocking, gel-free, fiber optic cable.
2. Fiber optic cable shall be per ANSI/ICEA S-87-640.
3. Multi-mode fibers within the finished cable shall meet the following requirements:
 - a. Core Diameter 50.0 ± 2.5 μm
 - b. Cladding Diameter 125.0 μm + 2.0 μm

- c. Core-Clad Concentricity 1.5 μm maximum
- d. Cladding Non-circularity 1.0 % maximum
- e. Core Non-Circularity 5.0 % maximum
- f. Coating Diameter 245 μm + 5 μm
- g. Coating-Cladding Concentricity < 12 μm
- h. Proof/Tensile 100 kpsi, minimum
- i. Attenuation:
 - 1) @ 850 nm 2.3 dB/km maximum
 - 2) @ 1300 nm 0.6 dB/km maximum
- j. Macrobending Loss measured at 1500 nm on loose tube fiber of 100 turns of 75mm diameter (tested in accordance with EIA-455-62), shall be less or equal to:
 - 1) 0.5 dB @ 850 nm
 - 2) 0.5 dB @ 1300 nm

- 4. Fiber insulation shall have factory color coding with solid color insulation.
- 5. MMFO cable shall be **Corning ALTOS**, or equal.

F. Low Voltage Power and Control, Multi-Conductor/Tray Cable

- 1. Multi-conductor tray cable shall be rated 600 volts, listed by UL as Type TC cable per Article 336 of the NEC. The individual conductors shall be UL listed as Type THHN/THWN, with a sunlight-resistant PVC overall jacket.
- 2. Minimum conductor sizes shall be the same as for power and lighting wire and control wire as specified above.
- 3. Multiple conductor power cables include the following:

Phase Conductor Size (AWG)	Minimum Ground Wire Size (AWG)	No. of Conductors (not incl. Ground)
12	12	2 3
10	10	2 3
8	10	3
6	8	3
4	6	3
2	6	3
1/0	6	3
2/0	4	3
4/0	4	3

4. Multi-conductor control cables include the following:

Conductor Size (AWG)	No. of Conductors (Including 1#14 AWG Ground)
14	3
14	4
14	5
14	7
14	9
14	12
14	19

G. Cable Splices and Terminations

- Where cable lugs are required for power cable terminations, utilize compression lugs – **3M Scotchlok 30000 and 31100 Series, Burndy Hylug, Penn Union HBBLU and BLU**, or equal. Utilize compression tools as recommended by the manufacturer. Pressure type, twist-on connectors (wire nuts) will not be acceptable.
- Pre-insulated fork tongue lugs shall be **Burndy, Thomas & Betts**, or equal.

3. General purpose insulating tape shall be **Plymouth Slip-knot, Scotch No. 33**, or equal. High temperature tape shall be polyvinyl as manufactured by **Plymouth, 3M**, or equal.
4. Labels for coding 600 volt wiring shall be computer printable or pre-printed, self-laminating, self-sticking, as manufactured by **W.H. Brady, 3M**, or equal.
5. Stress cone material for make-up of medium voltage shielded cable shall be as manufactured by **Raychem, 3M**, or equal.
6. Shielded power cable shall be spliced using kits specifically designed to splice medium voltage, shielded power cables. Splice kits shall be designed for continuous submergence. Heat shrink splice kits shall be **Raychem "Type HVS"**, or equal. "Cold" shrink splice kits shall be **3M "5760 Series"**, or equal. The CONTRACTOR's personnel shall be trained by the splice kit manufacturer for proper installation of the splices, and shall submit certification of training as a shop drawing. A certified trainee shall perform the splice work.

PART 3 EXECUTION

3.1 INSTALLATION

- A. The CONTRACTOR shall provide, terminate and test all power, control, and instrumentation conductors.
- B. The CONTRACTOR shall, as a minimum, provide the number of control wires listed in the conduit schedule or on the Contract Drawings. Excess wires shall be treated as spares for future use.
- C. Conductors shall not be pulled into any raceway until raceway has been cleared of moisture and debris.
- D. Instrumentation wire shall not be run in the same raceway with power and control wiring except where specifically indicated.
- E. Wire in panels, cabinets, and wireways shall be neatly grouped using nylon tie straps, and shall be neatly fanned out to terminals.

3.2 FIELD ASSEMBLY

- A. General
 1. Wire taps and splices shall be properly taped and insulated according to their respective classes.
 2. In general, there shall be no cable splices in underground manholes or pullboxes. If splices are necessary, the cables shall be spliced using submersible cable splices, suitable for continuous submergence. Splices in underground manholes and pullboxes may be made only with the approval of the ENGINEER.
 3. Stranded conductors shall be terminated directly on equipment box lugs making sure that conductor strands are confined within lug. Use forked-tongue lugs where equipment box lugs have not been provided.

4. Excess control and instrumentation wires shall be long enough to terminate at any terminal block in the enclosure, be properly taped, be identified with origin, and be neatly coiled.

B. Control Wire and Cable

1. Control conductors shall be spliced or terminated only at the locations indicated and only on terminal strips or terminal lugs of vendor furnished equipment.
2. In motor control centers, and control panels, control wire and spare wire shall be terminated to terminal strips.
3. The CONTRACTOR shall provide as a minimum the number of control wires listed in the conduit schedule or as indicated in the Contract Documents. Excess wires shall be treated as spares.

C. Instrumentation Wire and Cable

1. Shielded instrumentation cables shall be grounded at one end only, preferably the receiving end on a 4 - 20 mA system.
2. Two and 3 conductor shielded cables installed in conduit runs which exceed available standard cable lengths may be spliced in pullboxes with the prior approval of the ENGINEER. Such cable runs shall have only one splice per conductor.

D. Power Wire and Cable

1. 120/208-volt, 120/240-volt, and 480/277-volt branch circuit conductors may be spliced in suitable fittings at locations determined by the CONTRACTOR. Cables rated above 2,000 volts shall be spliced or terminated only at equipment terminals indicated.
2. Splices to motor leads in motor terminal boxes shall be wrapped with mastic material to form a mold and then shall be taped with a minimum of 2 layers of varnished cambric tape overtaped with a minimum of 2 layers of high temperature tape.
3. Shielded power cable shall be terminated with pre-assembled stress cones in a manner approved by the cable and terminal manufacturer. The CONTRACTOR shall submit the proposed termination procedure as a Shop Drawing.

E. Cable Identification

1. General: Wire and cable shall be identified for proper control of circuits and equipment and to reduce maintenance effort. Identification shall be installed at every termination point.
2. Identification Numbers: The CONTRACTOR shall assign to each control and instrumentation wire and cable a unique identification number. Numbers shall be assigned to conductors having common terminals and shall be shown on "as built" drawings. Identification numbers shall appear within 3-inches of conductor terminals. "Control and Instrumentation Conductors" shall be defined as any conductor used for control, interlock, alarm, annunciator, or signal purposes.

- a. Multiconductor cable shall be assigned a number which shall be attached to the cable at intermediate pull boxes and at stub-up locations beneath free-standing equipment. It is expected that the cable number shall form a part of the individual wire number. Individual control conductors and instrumentation cable shall be identified at pull points as described above. The instrumentation cable numbers shall incorporate the loop numbers assigned in the Contract Documents.
- b. 120/208-volt system feeder cables and branch circuit conductors shall be color coded as follows: Phase A - black, Phase B - red, Phase C - blue, and Neutral - white. The 120/240-volt system conductors shall be color coded as follows: Line 1 - Black, Line 2 - Red, and Neutral - White. The 480/277-volt system conductors shall be color coded as follows: Phase A - Brown, Phase B - Orange, Phase C - Yellow, and Neutral - Gray. Branch circuit switch shall be yellow. Insulated ground wire shall be green, and neutral shall be gray. Color coding and phasing shall be consistent throughout the Site, but bars at panelboards, switchboards, and motor control centers shall be connected Phase A-B-C, top to bottom, or left to right, facing connecting lugs. Color coding tape shall be used where colored insulation is not available. Colored identification tape may be used on conductors between the local disconnect and the load, where permitted by the NEC. Any phase changes necessary for proper rotation shall be made at the driven equipment where colored insulation is used. Phase changes may be made on the load side of the local disconnect, where phase colors are identified using tape.
- c. General purpose AC control cable shall be yellow. General purpose DC control cable shall be blue.
- d. Spare cable shall be terminated on terminal screws and shall be identified with a unique number as well as with destination.
- e. Terminal strips shall be identified by computer printable, cloth, self-sticking marker strips attached under the terminal strip.

3.3 FIELD QUALITY CONTROL

- A. Cable Assembly: Cable assembly shall comply with applicable requirements of ICEA Publication No. S-95-658/NEMA WC70 - Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy. Factory test results shall be submitted in accordance with Section 01 33 00 – Contractor Submittals, prior to shipment of cable.
 1. Cables failing the tests shall be replaced with a new cable or be repaired. Repair methods shall be as recommended by the cable manufacturer and shall be performed by persons certified by the industry.
- B. Continuity Test: Control and instrumentation cable shall be tested for continuity, polarity, undesirable ground, and origination. Such tests shall be performed after installation and prior to placing cable in service.

END OF SECTION

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SECTION 26 05 26

GROUNDING

PART 1 GENERAL

1.1 THE SUMMARY

- A. Provide the electrical grounding system, complete and operable, as indicated in accordance with the Contract Documents.
- B. The requirements of Section 26 00 00 – Electrical Work, General apply to this Section.
- C. Single Manufacturer
 - 1. Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts, and manufacturer's services.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals and Section 26 00 00 – Electrical Work, General.
- B. Shop Drawings
 - 1. Submit manufacturer's product information for connectors, clamps, and all grounding system components, showing compliance with the requirements of this Section.

PART 2 PRODUCTS

2.1 EQUIPMENT

- A. Components of the grounding electrode system shall be manufactured in accordance with UL 467 - Standard for Safety Grounding and Bonding Equipment, and shall conform to the applicable requirements of National Electrical Code Article 250 and local codes.
- B. Grounding System
 - 1. Grounding loop conductors shall be bare annealed copper conductors.
 - 2. Conductors shall be No. 4/0 unless indicated otherwise.
 - 3. Ground Rods
 - a. Unless indicated otherwise, provide ground rods minimum of 3/4 inch in diameter, 10 feet long, and with a uniform covering of electrolytic copper metallically bonded to a rigid steel core.
 - b. Provide corrosion-resistant copper-to-steel bond.
 - c. The rods shall conform to UL 467.

- d. The rods shall be of the sectional type, joined by threaded copper alloy couplings.
4. Make buried, concrete-encased, or otherwise inaccessible cable-to-cable and cable-to-ground rod connections using exothermic welds by **Cadweld**, **Thermoweld**, or equal.
5. Exposed Connectors
 - a. Exposed grounding connectors shall be of the compression type (connector-to-cable), constructed of high-copper alloy, and manufactured specifically for the particular grounding application.
 - b. The connectors shall be **Burndy**, **O.Z. Gedney**, or equal.
6. Use grounding clamps to bond each separately-derived system to the grounding electrode conductors.
7. Equipment Grounding Circuit Conductors
 - a. The conductors shall be the same type and insulation as the load circuit conductors.
 - b. The minimum size shall be as indicated. Where not indicated, sizes shall conform to Table 250.122 of the National Electrical Code.
 - c. Metallic conduit systems shall have an equipment grounding wires as well as being equipment grounding conductors themselves.
8. Grounding Materials Manufacturer, or Equal
 - a. **Burndy**
 - b. **Copperweld**
 - c. **O.Z. Gedney**
 - d. **Thermoweld**
 - e. **Thomas and Betts**

PART 3 EXECUTION

3.1 PREPARATION

- A. Provide a separate grounding conductor, securely grounded in each raceway independent of raceway material.
- B. Provide a separate grounding conductor for each motor and connect at motor box. Provide a supplemental ground connection for motor shaft grounding rings, where applicable.
- C. Do not use bolts for securing the motor box to the frame or the cover for grounding connectors.

- D. Sizes shall be as indicated on the Conduit Schedule and in accordance with NEC Article 250.
- E. Route the conductors inside the raceway.
- F. Provide a grounding-type bushing for secondary feeder conduits that originate from the secondary section of each MCC section, switchboard, or panelboard.
- G. Individually bond the raceway to the ground bus in the secondary section.
- H. Provide a green insulated wire as grounding jumper from the ground screw to a box grounding screw, and, for grounding type devices, to the equipment grounding conductor.
- I. Provide a separate grounding conductor in each individual raceway for parallel feeders. Connect the parallel ground conductors together at each end of the parallel run, as required by the NEC.
- J. Interconnect the secondary switchgear MCC or panelboard neutral bus to the ground bus in the secondary switchgear compartment only at the service entrance point. For wye connected, 3 phase, separately derived systems with 3 wire distribution, connect the transformer neutral to the grounding electrode system at the transformer. Connections shall be in accordance with the NEC.
- K. Provide the duct bank ground system as indicated, including trenching, splices, ground rods, and connections to equipment and structures.
- L. Measure ground impedance in accordance with IEEE STD 81 after installation but before connecting the electrode to the remaining grounding system. Provide additional grounding system testing in accordance with Section 26 01 26 – Electrical Tests.
- M. Low Voltage Grounded System (600V or less)
 - 1. A low-voltage grounded system is defined as a system where the local power supply is a transformer, with the transformer secondary grounded.
 - 2. Grounding system connections for a premises-wired system supplied by a grounded AC service shall be provided with a grounding electrode connector connected to the grounded service conductor at each service, in accordance with the NEC.
 - 3. The grounded circuit conductor shall not be used for grounding non-current-carrying parts of equipment, raceways, and other enclosures except where specifically listed and permitted by the NEC.
- N. Embedded Ground Connections
 - 1. Underground and grounding connections embedded in concrete shall be UL-listed ground grid connectors.
 - 2. The connection shall be made in accordance with the manufacturer's instructions.
 - 3. Do not conceal or cover ground connections until the ENGINEER or an authorized representative has established that every grounding connection conforms to the

requirements of the Contract Documents and has given the CONTRACTOR written confirmation.

O. Ground Ring

1. Furnish trenching and materials as necessary to install the ground ring as indicated.
2. The bonding conductor shall be in direct contact with the earth and of the indicated size.
3. Provide a minimum burial depth of 36 inches or as indicated on the Drawings, whichever is greater.
4. Re-compact disturbed soils to their original density in 6-inch lifts.

P. Duct Bank Ground

1. Embed a grounding conductor in every duct bank as indicated. The ground conductor shall be terminated at the ground grid at each end of the duct bank. Where no ground grid is installed, terminate at a suitable grounding electrode conductor near the end of the duct bank in accordance with the NEC.

Q. Ground Rods

1. Provide ground rods at the indicated locations.
2. A single electrode that does not have resistance-to-ground of 5 ohms or less shall be augmented by additional electrodes to obtain this value.
3. Take the resistance-to-ground measurement during dry weather, a minimum of 48 hours after a rainfall.
4. Rods forming an individual ground array shall be equal in length.

R. Instrumentation Shield Grounding

1. Shielded instrumentation cable shall have its shield grounded at one end only unless the approved Shop Drawings indicate that the shield will be grounded at both ends.
2. The grounding point shall be at the control panel or at the receiving end of the signal carried by the cable.
3. The termination of the shield drain wire shall be on its own terminal screw.
4. Jumper together the terminal screws, using manufactured terminal block jumpers or a No. 14 green insulated conductor.
5. Connect the ground bus via a green No. 12 conductor to the main ground bus for the panel.

END OF SECTION

SECTION 26 05 33

ELECTRICAL RACEWAY SYSTEMS

PART 1 GENERAL

1.1 THE SUMMARY

- A. Provide electrical raceway systems, complete and in place, as indicated in accordance with the Contract Documents.
- B. In the event that individual equipment loads provided are larger than indicated in the Contract Documents, revise raceways, conductors, starters, overload elements, and branch circuit protectors as necessary in order to control and protect the increased connected load in conformance to NEC requirements as part of the WORK.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 – Contractor Submittals, and Section 26 00 00 – Electrical Work, General.
- B. Shop Drawings
 - 1. Submit complete catalog cuts of raceways, fittings, boxes, supports, and mounting hardware, marked where applicable to show proposed materials and finishes.
- C. As-Built Drawings
 - 1. Prepare as-built drawings of encased concealed and exposed raceways, ducts, raceways, junction boxes, pull boxes, and electrical and instrumentation equipment.
 - 2. Furnish the drawings to the ENGINEER in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

PART 2 PRODUCTS

2.1 GENERAL

- A. Pull and junction boxes, fittings, and other indicated enclosures that are dedicated to the raceway system shall comply with the requirements of this Section.

2.2 CONDUIT

- A. Rigid Galvanized Steel (RGS) Conduit
 - 1. Provide rigid steel conduit manufactured from mild steel, hot-dip galvanized inside and out.
 - 2. Provide rigid steel conduit manufactured in accordance with NEMA C80.1 – Electrical Rigid Steel Conduit, and UL-6 – Electrical Rigid Metal Conduit - Steel.

3. Manufacturer, or Equal
 - a. **Allied Tube & Conduit**
 - b. **Triangle**
 - c. **Wheatland Tube**
- B. Rigid Non-Metallic Conduit
 1. Provide rigid non-metallic conduit manufactured from Schedule 40 PVC, as indicated, and sunlight-resistant.
 2. Provide rigid non-metallic conduit manufactured in accordance with NEMA TC-2 - Electrical Plastic Tubing and Conduit, and UL-651 - Standard for Rigid Non-metallic Conduit.
 3. Manufacturer, or Equal
 - a. **Allied**
 - b. **Cantex**
 - c. **Carlton**
- C. Liquid-Tight Flexible Conduit
 1. Provide liquid-tight flexible conduit constructed of a flexible galvanized metal core with a sunlight-resistant thermoplastic outer jacket.
 2. Provide liquid-tight flexible conduit manufactured in accordance with the requirements of UL-360 - Steel Conduits, Liquid-Tight Flexible.
 3. Manufacturer, or Equal
 - a. **Anaconda, Sealtite**
 - b. **Electriflex, Liquatite**
 - c. **Southwire, Titan 2**
- D. **Electrical Metallic Tubing (EMT) or Intermediate conduit (IMC) will only be accepted inside Guard Shacks 1 and 2 and Building N/Fiber Hut, and where not subjected to physical damage with written approval by the ENGINEER or OWNER.**
 1. Material: Steel, hot-dipped galvanized inside and out conforming to ANSI C80.3 and UL-797.
 2. Couplings: Zinc plated steel, gland compression type.
 3. Box Connectors: Zinc plated steel, gland compression type with 105° rated insulated throat.

4. Manufacturer, or Equal
 - a. **Allied Tube & Conduit**
 - b. **Triangle**
 - c. **Wheatland Tube**

2.3 FITTINGS AND BOXES

A. General

1. For use with metallic conduit, provide cast and malleable iron fittings of the threaded type with 5 full threads.
2. Fittings and Boxes
 - a. Provide fittings and boxes with neoprene gaskets and non-magnetic stainless steel screws.
 - b. Attach covers by means of holes tapped into the body of the fitting.
 - c. Covers for fittings attached by means of clips or clamps will not be accepted.
3. Provide boxes larger than standard cast or malleable types manufactured of Type 304 or Type 316 stainless steel, NEMA 4X.
4. Terminations
 - a. Terminate all conduits in rain-tight hubs as manufactured by **Myers, O.Z. Gedney, Appleton**, or equal.

B. Malleable Iron Fittings and Boxes

1. For use with galvanized steel conduit, provide fittings and boxes constructed of malleable iron or gray-iron alloy with zinc plating.
2. Manufacturer, or Equal
 - a. **Appleton**
 - b. **Crouse-Hinds**
 - c. **O.Z. Gedney**

C. PVC Fittings and Boxes

1. For use with rigid non-metallic conduit, provide fittings manufactured of solvent-welded PVC.
2. Provide boxes manufactured of PVC or fiberglass reinforced polyester (FRP).
3. Manufacturer, or Equal

- a. **Carlton**
 - b. **Crouse-Hinds**
 - c. **Hoffman**
4. Provide welding solvent as required for the installation of non-metallic conduit and fittings.
- D. Stainless Steel Boxes
1. Provide stainless steel boxes where indicated.
 2. Provide NEMA 4X stainless steel boxes, constructed of Type 304 stainless steel.
 3. Provide stainless steel of a minimum of 14-gauge thickness, with a brushed finish.
 4. Door Hinges
 5. Provide doors with full-length stainless steel piano hinges.
 6. Non-hinged boxes will not be accepted.
 7. Manufacturer, or Equal
 - a. **Hammond**
 - b. **Hoffman**
 - c. **Rohn**
- E. Sheet Steel Boxes
1. Sheet steel boxes shall be galvanized steel outlet and switch boxes.
 2. Manufacturer, or Equal
 - a. **Appleton Electric**
 - b. **Raco**
 - c. **Steel City**
- F. All bushings shall be insulated type.

2.4 WIREWAY

A. General

1. Provide wireway of the lay-in type and NEMA-rated for the area in which it is to be installed in accordance with the requirements of Section 26 00 00 – Electrical Work, General.

2. Separate power, control, signal and communications cables by grounded metallic dividers in wireways or run in separate wireways.
- B. Fittings and Covers
1. Provide fittings and sections with non-magnetic stainless steel screws.
 2. Attach covers by hinges and clamps to the bodies.
 3. Covers attached by means of clips or screws will not be accepted.
 4. Provide covers and bodies constructed of minimum 14-gauge steel.
- C. Grounding
1. Ground the steel wireway bodies.
 2. Provide steel dividers with steel wireways and ground by means of an individual grounding conductor.
 3. Non-metallic dividers will not be accepted.
- D. Terminations
1. Terminate all conduits in rain-tight hubs as manufactured by **Myers, O.Z. Gedney, Appleton** or equal.

PART 3 EXECUTION

3.1 GENERAL

- A. Run wiring in raceway unless indicated otherwise.
- B. Install raceways between equipment as indicated.
- C. Provide raceway systems that are electrically and mechanically complete before conductors are installed.
- D. Bends and Offsets
1. Provide bends and offsets that are smooth and symmetrical, and accomplished with tools designed for this purpose.
 2. Provide factory elbows wherever possible.
- E. Combined Raceways
1. Raceways other than those containing power conductors may be combined in strict accordance with the NEC and with prior written permission from the ENGINEER.
 2. In general, combine only raceways containing the same type (control, signal, and the like) and voltage of conductors/cables, or dedicated conduits from one source to one device/equipment, in accordance with the NEC.

3. Permission from the ENGINEER shall not relieve the CONTRACTOR of responsibility to meet national, state and local requirements.
4. Do not combine wiring for redundant systems into single raceways.

F. Routing

1. Where raceway routings are indicated, follow those routings to the extent possible.
2. Where raceways are indicated but routing is not indicated, such as home runs or on conduit developments and schedules, raceway routing shall be the CONTRACTOR's choice and provided in strict accordance with the NEC as well as customary installation practice.
3. Provide the raceway encased, exposed, concealed, or under-floor as indicated, except conceal conduit in finished areas unless specifically indicated otherwise.
4. Adjust routings in order to avoid obstructions.

G. Coordination

1. Coordinate between trades prior to installing the raceways.
2. The lack of such coordination shall not be justification for extra compensation, and any costs for removal and re-installation to resolve conflicts shall be part of the Contract Price.

H. Support wireways in accordance with the manufacturer's recommendations for the seismic requirements indicated in Section 26 00 00 – Electrical Work, General.

I. Install exposed raceways parallel or perpendicular to structural beams.

J. Expansion Fittings

1. Install expansion fittings with external bonding jumpers wherever exposed raceways cross building expansion joints.
2. Install expansion/deflection fittings where conduit movement is expected in more than one dimension, and where conduits transition out of structures in locations where differential settlement may occur.
3. Encased Expansion Fittings
 - a. Install encased expansion fittings wherever encased conduits cross building expansion joints.
 - b. Deflection type fittings shall not be required for encased conduits crossing an expansion joint within a single structure.
4. Provide expansion and expansion/deflection fittings constructed of the same material as the raceway to which they are installed.
5. Install expansion fittings with bonding jumpers wherever raceways cross building expansion joints.

- K. Install exposed raceways at least 1/2 inch from walls or ceilings except that at locations above finished grade where damp conditions do not prevail, install exposed raceways at least 1/4 inch from the face of walls or ceilings by the use of clamp backs or struts.
- L. Wherever contact with concrete or dissimilar metals can produce galvanic corrosion of equipment, provide a means of suitable insulation in order to prevent such corrosion.

3.2 CONDUIT

- A. Exposed, Protected Indoor Areas: Provide EMT as noted above.
- B. Exposed, Indoor and Outdoor Areas Subject to Physical Damage: Provide rigid galvanized steel conduit.
- C. Corrosive Areas: Provide Schedule 80 PVC conduit.
- D. Underground Direct Burial
 - 1. Conduit shall be constructed of Schedule 80 PVC.
 - 2. For conduit containing only grounding system bonding conductors, provide Schedule 80 PVC conduit.
 - 3. Elbows and sweeps, excluding stub-ups (horizontal underground runs): Tape wrapped RGS.
 - 4. Stub-ups from below grade to above grade, exposed (includes elbows and sweeps from horizontal underground to stub-up): Tape wrapped RGS.
 - 5. Stub-ups from below grade to above grade when entering bottom of electrical equipment installed on slabs-on-grade: Schedule 80 PVC conduit with end bells. Elbows and sweeps from horizontal underground to stub-up shall be tape wrapped RGS.
- E. Below Concrete Slabs
 - 1. Provide Schedule 80 PVC conduit.
 - 2. Elbows and sweeps, excluding stub-ups (horizontal underground runs): Tape wrapped RGS.
 - 3. Stub-ups from below grade to above grade, exposed (includes elbows and sweeps from horizontal underground to stub-up): Tape wrapped RGS.
 - 4. Stub-ups from below grade to above grade when entering bottom of electrical equipment installed on slabs-on-grade: Schedule 80 PVC conduit with end bells. Elbows and sweeps from horizontal underground to stub-up shall be tape wrapped RGS.
- F. Concrete Encasement
 - 1. Conduit shall be constructed of Schedule 80 PVC.
 - 2. Elbows, sweeps and stub-ups, provide tape wrapped RGS.

3. The conduit shall emerge from the concrete in a direction perpendicular to the surface whenever possible.
 4. Do not encase conduit in the bottom floor slab below grade.
- G. Size, unless otherwise indicated:
1. Provide concealed and exposed conduit of one-inch minimum trade size.
 2. Provide encased conduit of two-inch minimum trade size.
 3. For runs that are not sized on drawings, compute the maximum conduit fill using NEC requirements for type XHHW/XHHW-2 conductors (larger if applicable), although the actual wiring may be with types of conductors having smaller cross-sections.
- H. Install conduit supports at distances required by the NEC.
- I. Concrete cover for conduit and fittings shall not be less than 1-1/2 inches for concrete exposed to earth or weather, or less than 3/4 inch for concrete not exposed to weather or in contact with the ground.
- J. Penetrations
1. Provide conduit passing through walls or floors with plastic sleeves.
 2. Perform core drilling in accordance with the requirements of Section 26 00 00 – Electrical Work, General.
 3. Conduits passing through a slab, wall, or beam shall not significantly impair the strength of the construction.
- K. Conduits embedded within a slab, wall, or beam (other than those merely passing through) shall meet the following requirements:
1. Conduits with their fittings embedded within a column shall not displace greater than 4 percent of the gross area of cross section;
 2. Conduits shall not be larger in outside dimension than 1/3 the overall thickness of the slab, wall, or beam in which it is embedded; and,
 3. Conduits shall not be spaced closer than 3 outside diameters on centers.
- L. Place the conduit such that cutting, bending, or displacing reinforcement from its proper location will not be required.
- M. Coat threads with a conductive lubricant before assembly.
- N. Joints
1. Provide joints that are tight, thoroughly grounded, secure, and free of obstructions in the pipe.

2. Adequately ream the conduit in order to prevent damage to the wires and cables inside.
 3. Use strap-wrenches and vises to install the conduit, in order to prevent wrench marks on the conduit.
 4. Replace conduit with wrench marks.
- O. Slope
1. Wherever possible, slope the conduit runs to drain at one or both ends of the run.
 2. Wherever conduit enters a substructure below grade, slope the conduit in order to drain water away from the structure.
 3. Take extreme care in order to avoid pockets or depressions in the conduit.
- P. Installation of rigid steel conduit through a core-drilled hole in an exterior wall below-grade shall utilize a sealing device as manufactured by **Link Seal**, or equal.
- Q. Connections
1. Make connections to lay-in-type grid lighting fixtures by using flexible metal conduit not exceeding 4 feet in length.
 2. Make connections to motors and other equipment subject to vibration by using liquid-tight flexible conduit not exceeding 3 feet in length.
 3. Provide equipment subject to vibration that is normally provided with wiring leads with a cast junction box for the make-up of connections.
- R. Provide conduit seal fittings at the following locations:
1. In chlorine, ammonia, sulfur dioxide, and hydrofluosilicic acid areas in order to prevent passage of gases to other areas.
- S. Empty Conduits
1. Tag empty conduits at both ends to indicate the final destination.
 2. Where it is not possible to tag the conduit, identify the destination by means of a durable marking on an adjacent surface.
 3. Install a pull-cord in each empty conduit in floors, panels, manholes, equipment, and the like.
 4. Install a removable plug on empty conduits that terminate below grade, in vaults, manholes, handholes, and junction or pullboxes.
- T. Identification of Conduits
1. Identify conduits at ends and at pulling points.

2. Identification shall be the unique conduit number assigned in the Contract Documents.
 3. Other than 120 VAC panelboard circuits, if a conduit has not been assigned a unique number in the Contract Documents, assign a unique number following the numbering scheme used in the Contract Documents.
 4. Assign a unique number to 120 VAC panelboard circuits, similar to the cable numbering scheme used in the Contract Documents.
 5. Provide conduit identification by a stamped or engraved non-corroding metal tag attached to the conduit bushing.
 6. Provide an engraved phenolic nameplate in accordance with the requirements of Section 26 00 00 – Electrical Work, General, or a computer printed self-adhesive label attached to the equipment or enclosure inside which the conduit terminates.
 7. Markings with a pen or paint will not be accepted.
- U. Identification of Pullboxes and Junction Boxes
1. Identify pullboxes and junction boxes.
 2. Identification shall be the unique conduit number assigned in the Contract Documents, or if not assigned a unique number the CONTRACTOR shall assign one following the numbering scheme used in the Contract Documents.
 3. Provide box identification by a stamped or engraved non-corroding metal tag or an engraved phenolic nameplate, in accordance with the requirements of Section 26 00 00 – Electrical Work, General, and attached to the box or enclosure.
 4. Markings with a pen or paint will not be accepted.
- V. Provide conduit for data cables in accordance with the equipment manufacturer's recommendations, especially regarding separation from low- and medium-voltage power raceways.

END OF SECTION

SECTION 26 05 36

WIRING DEVICES

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide wiring devices, complete and operable, as indicated in accordance with the Contract Documents.
- B. The requirements of Section 26 00 00 – Electrical Work, General apply to this Section.
- C. Single Manufacturer
 - 1. Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts, and manufacturer's services.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.
- B. Shop Drawings
 - 1. Submit complete catalog cuts of switches, receptacles, enclosures, covers and appurtenances, marked to clearly identify the proposed materials.
 - 2. Submit documentation showing that the proposed materials comply with the requirements of NEC and U.L.
 - 3. Submit documentation of the manufacturer's qualifications.

PART 2 PRODUCTS

2.1 GENERAL

- A. Devices shall carry the U.L. label.
- B. Color
 - 1. General purpose duplex receptacles and toggle switch handles shall be brown everywhere except in finished rooms where they shall be ivory.
 - 2. Special purpose receptacles shall have a body color as indicated.
- C. Receptacles and switches shall be of specification grade and shall conform to NEMA WD-1, Federal Specifications W-C-596E and W-S-896E, respectively.

2.2 LIGHTING SWITCHES

- A. Local branch switches shall be of the toggle type, rated at 20 amperes, 120-277 VAC, and shall be General Electric Cat. No. GE-5951-1 for single pole, GE-5953-1 for 3 way and GE-5954-1 for 4 way, similar types as manufactured by **Hubbell, Leviton**, or equal.
- B. Hatch door switches shall be stainless steel normally-closed momentary switches rated 20 amperes 120VAC.

2.3 GENERAL PURPOSE RECEPTACLES

- A. Duplex receptacles that are rated at 125V, 20 amperes, shall be of the polarized 3-wire type for use with a 3-wire cord with grounded lead, and one designated stud shall be permanently grounded to the conduit system in accordance with NEMA 5-20R.
- B. Dry Areas
 - 1. Duplex 120V receptacles for dry areas shall be **G.E. 5362, Hubbell 5362**, or equal.
 - 2. Single receptacles for dry areas shall be **G.E. 4102, Hubbell 6361**, or equal.
- C. Damp/Wet Areas
 - 1. Receptacles for damp/wet locations shall be weather-resistant-listed in accordance with NEC-2008, Article 406.8.
 - 2. Duplex 120V receptacles for damp/wet areas shall be **Hubbell HBL5362IWR**, or equal.
- D. GFCIs
 - 1. Ground-fault circuit-interrupting receptacles (GFCIs) shall be installed at the indicated locations and as required by the NEC.
 - 2. GFCIs shall be duplex receptacles, of specification grade, and tripping at 5 mA.
 - 3. GFCI ratings shall be 125V, 20 amperes, NEMA WD-1, Configuration 5-20R, and capable of interrupting 5,000 amperes without damage.
 - 4. GFCIs shall be weather resistant-listed in accordance with NEC-2008, Article 406.8.
 - 5. Feed-through-type GFCIs serving standard receptacles will not be permitted.
 - 6. GFCIs shall be **Hubbell GFR5362SGI** or similar as manufactured by **Bryant, Leviton**, or equal.

2.4 ENCLOSURES AND COVERS

- A. Surface-mounted switches and receptacles shall be housed in FS- or FD-type weatherproof conduit fittings.
- B. Switch and receptacle covers on surface-mounted boxes shall be constructed of die-cast copper-free aluminum.

- C. In finished areas, switch and receptacle boxes shall be provided with "super stainless steel covers" as manufactured by **Arrow Hart, Bryant, Harvey Hubbell**, or equal.
- D. In areas where cast boxes are used, switch and receptacle covers shall be **Adalet No. WSL** and **WRD**, or **Crouse-Hinds Catalogue No. DS185** and **WLRD-1**, or equal.
- E. Wet Locations and where noted as WP on contract drawings
 - 1. Receptacles in indoor locations shall be provided with a hinged non-metallic cover/enclosure marked "Suitable for Wet Locations when in use" and "UL Listed."
 - 2. Receptacles in outdoor locations shall be provided with a hinged, pad-lockable metallic cover/enclosure marked "Suitable for Wet Locations when in use" and "UL Listed."
 - 3. Provide a gasket between the enclosure and the mounting surface, and between the hinged cover and mounting plate/base.
 - 4. The cover shall be **TayMac Specification Grade**, or equal.

2.5 RECEPTACLE – SPECIAL PURPOSE

- A. Special purpose receptacles shall be provided with the ratings and number of poles as indicated or required for the proposed purpose.
- B. Provide a matching plug with cord-grip features with each special purpose receptacle.

2.6 NAMEPLATES

- A. Provide nameplates or equivalent markings on the switch enclosures to indicate the ON and OFF positions of each switch.
- B. ON and OFF for 3-way or 4-way switches will not be accepted.
- C. All receptacles shall have nameplate indicating panelboard name and circuit number.
- D. Provide receptacles for special purposes with nameplates indicating their use.
- E. Receptacles indicated to be powered by UPS shall have a nameplate installed directly above the receptacle that reads:
 - 1. (first line) "UPS POWERED"
 - 2. (second line) "NO TOOLS"
 - 3. Nameplates shall consist of a red plate with white letters.
- F. Nameplates shall meet the requirements of Section 26 00 00 – Electrical Work, General.

PART 3 EXECUTION**3.1 GENERAL**

- A. Perform WORK in accordance with the requirements of the NEC.

3.2 CONNECTION

- A. Rigidly attach wiring devices in accordance with the NEC and as indicated, avoiding interference with other equipment.
- B. Securely fasten nameplates using screws, bolts, or rivets centered under or on the device, unless otherwise indicated.

3.3 GROUNDING

- A. Devices, including switches and receptacles, shall be grounded in accordance with NEC, Article 250, and Section 26 05 26 – Grounding.
- B. Switches and associated metal plates shall be grounded through the switch mounting yoke, outlet box, and raceway system.
- C. Flush Receptacles
 - 1. Flush receptacles and their metal plates shall be grounded through positive ground connections to the outlet box and grounding system.
 - 2. Maintain the ground to each receptacle by a spring-loaded grounding contact to the mounting screw, or by a grounding jumper, each making a positive connection to the outlet box and grounding system at all times.
- D. Receptacles served from an uninterruptible power supply shall be provided with an isolated grounding conductor from the serving power panelboard.

1.1 FIELD TESTING

- E. Provide checkout, field, and functional testing of wiring devices in accordance with Section 26 00 00 – Electrical Work, General.
- F. Test each receptacle for polarity and ground integrity, using a standard receptacle tester.

END OF SECTION

SECTION 26 05 43

UNDERGROUND RACEWAY SYSTEMS

PART 1 GENERAL

1.1 THE SUMMARY

- A. Provide underground raceway systems, complete and in place, as indicated in accordance with the Contract Documents.
- B. Manholes, pullboxes, and fittings that are dedicated to the underground raceway system shall comply with the requirements of this Section.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals, and Section 26 00 00 – Electrical Work, General.
- B. Shop Drawings
 - 1. Submit complete catalog cuts of all raceways, fittings, pullboxes, and manholes, marked where applicable in order to show proposed materials and finishes.
- C. As-Built Drawings
 - 1. Prepare as-built drawings of encased concealed and exposed raceways, ducts, raceways, junction boxes, pull boxes, and electrical and instrumentation equipment.
 - 2. Show routings, burial depths, manhole and handhole locations and sizes, and where applicable, connections to drainage systems.
 - 3. Furnish the drawings to the ENGINEER in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

PART 2 PRODUCTS

2.1 MANHOLES AND PULLBOXES

- A. Frames and Covers
 - 1. Provide traffic-type covers with an H-20 loading, except as otherwise indicated.
 - 2. Identify manhole and pullbox covers as "ELECTRIC" by providing raised letters cast into the covers.
 - 3. Provide frost-proof and water-tight grey iron frames and covers with solid lids and inner lids, and with 28-inch clear openings.
 - 4. Bolt the covers and lids to cast-in-place steel frames using corrosion-resistant hardware.

5. Factory-prime the frames.
 6. Provide covers constructed of cast-iron and provide pick holes.
 7. Provide frames with a 1/2-inch drilled and tapped hole and lug in order to accommodate a No. 4/0 AWG bare stranded copper conductor connected to a ground rod and the ground conductor of power cables passing through the manhole.
- B. Equip manholes and pullboxes with pulling-in irons, opposite and below each ductway entrance.
- C. Provide manholes and pullboxes with closed bottoms; open-bottom manholes and pullboxes will not be accepted.
- D. Provide ductbank conduits with end bells.
- E. Brackets
1. Provide brackets in manholes as required for racking wiring through the manholes
 2. Brackets: **Unistrut Cat. No. P2515** or equal
 3. Concrete Inserts: 60-inch; **Unistrut Cat. NO. P3261** or equal
- F. Precast Manholes and Pullboxes Manufacturer, or Equal
1. **Jensen Precast**
 2. **Mack**
 3. **Quikset**
 4. **U.S. Precast**
- G. Cast-Iron Covers and Frames Manufacturer, or Equal
1. **U.S. Foundry**
 2. **Neenah Foundry**

2.2 DUCTBANKS

- A. Ductbank conduit types shall in accordance with the requirements of Section 26 05 33 – Electrical Raceway Systems.
- B. Encase ducts in red-dyed concrete with steel reinforcing bars.
- C. Provide concrete with a 3,000-psi compressive strength conforming to the requirements per the standard specification.
- D. Colorant
 1. The concrete shall be dyed red throughout the ducts; surface treatment will not be accepted.

2. Provide colorant consisting of an integral red-oxide coloring pigment in the proportion of 8 pounds per cubic yard of concrete.
 3. The costs, if any, of cleaning coloring pigment from the concrete delivery equipment and other related cleanings shall be considered as part of the WORK.
- E. Ductbanks
1. Ductbanks shall contain a No. 4/0 bare stranded copper ground wire.
 2. The ground wire shall be continuous through the ductbank and terminate at power distribution equipment and the grounding grid.
- F. Identification Tape
1. Provide continuous lengths of underground warning tapes located 12 inches above and parallel to the ductbanks.
 2. Provide tape consisting of 6-inch wide polyethylene film, imprinted with "CAUTION - ELECTRIC UTILITIES BELOW."
 3. Tape Manufacturer, or Equal: **Brady**

PART 3 EXECUTION

3.1 GENERAL

- A. Install underground raceways between manholes and pullboxes as indicated.
- B. Raceway systems shall be electrically and mechanically complete before conductors are installed.
- C. Provide bends and offsets that are smooth and symmetrical, and fabricated with tools designed for this purpose.
- D. Use factory elbows wherever possible.
- E. To the extent possible, follow the raceway routings as indicated on the Drawings.
- F. Adjust the indicated routings as necessary in order to avoid obstructions.
- G. Coordination with Other Trades
 1. Coordinate with other trades prior to installation of raceways.
 2. The lack of coordination shall not be justification for extra compensation.
 3. Perform removal and re-installation to resolve conflicts as part of the WORK.

3.2 DUCTBANKS

- A. Install ductbanks in accordance with the following criteria:
1. Assemble the duct using high-impact, non-metallic spacers and saddles in order to provide conduits with vertical and horizontal separation.
 2. Set the plastic spacers every 5 feet.
 3. Anchor the duct array every 5 feet in order to prevent movement during the placement of concrete.
 4. Lay the duct on a grade line of at least 3 inches per 100 feet, sloping towards pullboxes or manholes.
 5. Install the duct and adjust the pullbox and manhole depths such that the top of the concrete envelope is a minimum of 18 inches below grade and a minimum of 24 inches below roadways.
 6. Accomplish changes in direction of the duct envelope by more than 10 degrees horizontally or vertically by using bends with a minimum radius 24 times the duct diameter.
 7. Stagger duct couplings a minimum of 6 inches.
 8. Provide select backfill or sand for the bottom of the trench.
 9. Cleaning
 - a. Clean each bore of the completed ductbank by drawing through it a standard flexible mandrel, one foot long and 1/4 inch smaller than the nominal size of the duct.
 - b. After passing the mandrel, draw through a wire brush and swab.
 10. For spare raceways that are not indicated to contain conductors, provide a 1/8-inch polypropylene pull cord installed throughout the entire length of the raceway.
- B. Grout duct entrances smooth and terminate ducts with flush end bells.
- C. Assemble sections of pre-fabricated manholes and pullboxes using waterproof mastic and set on a 6-inch bed of gravel as recommended by the manufacturer or as required by field conditions.
- D. Provide watertight ductbank penetrations through walls of manholes, pullboxes, and building walls below grade.
- E. Terminate concrete-encased ductbanks at building foundations.
- F. When duct enters the building on a concrete slab on grade, do not encase the duct but transition to rigid steel PVC-coated conduits on stub-ups.

G. Sealing

1. Where an underground conduit enters a structure through a concrete roof or a membrane-waterproofed wall or floor, provide a **Link-Seal** or equal sealing device.
2. Use the sealing device with rigid steel conduit.
3. Transition from PVC to rigid steel conduit prior to building entry.

END OF SECTION

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SECTION 26 05 73

PROTECTIVE DEVICE STUDIES

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall perform the indicated short circuit study, protective device evaluation, and arc-flash hazard analysis studies for the electrical power system in accordance with the Contract Documents.
- B. The studies shall begin at the utility's feeder protective device to the main switchboard and include electrical equipment and protective devices down to and including all feeder circuit breakers and power distribution panelboards as shown on the contract drawing one-line diagrams. Normal and Emergency power system connections and those which result in maximum fault condition shall be adequately covered in the study.
- C. The WORK of this Section shall include protection studies for motors with solid state overload and overcurrent protection devices.
- D. It is the responsibility of the CONTRACTOR to obtain the information required from the electric utility, equipment packaged system vendors, and field data for existing equipment and facilities required for studies. Existing as-built data and drawings may not be available.

1.2 QUALIFICATIONS

- A. Short circuit studies, protective device evaluation studies, arc-flash hazard analysis studies, and protective device coordination studies shall be performed by a manufacturer who has been regularly engaged in short circuit and protective device coordination services for a period of at least 15 years.
- B. The indicated studies shall be signed by the professional electrical engineer, registered in the State of Nevada, responsible for the studies.
- C. The studies shall utilize computer programs with proven reliability and accuracy for performing 3-phase fault-duty calculations.

1.3 CONTRACTOR SUBMITTALS

- A. The indicated studies shall be submitted and approved by the ENGINEER prior to final approval of the distribution equipment Shop Drawings and release of equipment for manufacture.
- B. An initial short circuit study shall be submitted and reviewed before the ENGINEER will approve the Shop Drawings for medium-voltage switchgear, transformers, or 480-volt distribution equipment.
- C. Submit an initial protective device coordination study shall be submitted with 90 days after the approval of the initial short circuit study.
- D. The short circuit, arc-flash hazard analysis, and protective device coordination studies shall be updated prior to Project Substantial Completion; utilize characteristics of as-installed equipment and materials.

- E. The adequacy of the equipment "withstand" and interruption ratings shall be approved by the ENGINEER.

1.4 MANUFACTURERS' SERVICES

- A. The low-voltage switchboard manufacturer shall furnish the services of a qualified field engineer and necessary tools and equipment in order to test, calibrate, and adjust the protective relays and circuit breaker trip devices as recommended in the power system coordination study.

PART 2 PRODUCTS

2.1 COMPUTER SOFTWARE

Protective Device Studies shall utilize the following commercially available computer software programs or approved equivalent:

- A. **Power*Tools, SKM Systems Analysis, Inc.**
- B. **EasyPower, ESA International LLC.**
- C. **Paladin Designbase, Power Analytics Corporation.**
- D. **ETAP, Operation Technology, Inc.**

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

- A. Comply with IEEE 399.
- B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.
 - 1. Optional Features:
 - a. Arcing faults.
 - b. Simultaneous faults.
 - c. Explicit negative sequence.
 - d. Mutual coupling in zero sequence.

PART 3 EXECUTION

3.1 GENERAL

- A. The studies shall include development of single-line and impedance diagrams of the power system.
- B. The diagrams shall identify components considered in the study and the ratings of power devices, including transformers, circuit breakers, relays, fuses, busses, and cables.

- C. The resistances and reactances of cables shall be identified in the impedance diagram.
- D. The studies shall contain written data from the electric utility company regarding maximum available short circuit current, voltage, and X/R ratio of the utility power system.
- E. The studies shall include every protective device and feeder included within the WORK.
- F. The first upstream overcurrent device outside the WORK shall be used as a fixed reference.
- G. The studies shall include all portions of the electrical distribution system for normal and standby power sources down to and including the 480-volt distribution system.

3.2 SHORT CIRCUIT STUDY

- A. The short circuit study shall be performed with the aid of a digital computer program, and shall be in accordance with the following Standards:
 - 1. ANSI/IEEE 141 Recommended Practice for Electrical Power Distribution for Industrial Plants
 - 2. ANSI/IEEE 242 Recommended Practice for Protection, and Coordination of Industrial, and Commercial Power Systems
 - 3. ANSI/IEEE C 37.010 Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
 - 4. ANSI/IEEE C 37.13 Low-Voltage AC Power Circuit Breakers Used in Enclosures

3.3 PROTECTIVE DEVICE EVALUATION STUDY

- A. A protective device evaluation study shall be performed in order to determine the adequacy of circuit breakers, molded case switches, and fuses.
- B. Any problem areas or inadequacies in the equipment due to prospective short-circuit currents shall be promptly brought to the attention of the ENGINEER.
- C. Do not utilize series-rated circuit breakers to meet short circuit requirements for this project.
- D. Devices shall be fully rated to withstand available fault currents.

3.4 PROTECTIVE DEVICE EVALUATION STUDY

- A. A protective device coordination study shall be performed in order to develop the necessary calculations to select power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low-voltage breaker trip characteristics and settings.
- B. Any problem areas or inadequacies in the equipment due to prospective short-circuit currents shall be promptly brought to the ENGINEER's attention.

3.5 TIME/CURRENT COORDINATION CURVES

- A. As a minimum, the time/current coordination curves for the power distribution system shall include the following items plotted on 5-cycle log-log graph paper:
1. Time/current curves for each protective relay, circuit breaker, or fuse demonstrating graphically that the settings will provide protection and selectivity within industry standards
 2. Each curve shall be identified, and tap and time dial settings shall be specified.
 3. Provide individual curves for each feeder unless identical to others.
 4. Selectivity
 - a. Time/current curves for each device shall be positioned to provide the maximum selectivity to minimize system disturbances during fault clearing.
 - b. Where selectivity cannot be achieved, the ENGINEER shall be notified as to the cause.
 - c. Recommendations shall be included for alternate methods that would improve selectivity.
 5. Time/current curves and points for cable and equipment damage.
 6. Circuit interrupting device operating and interrupting times
 7. Indicate maximum fault values on the graph.
 8. Sketch of bus and breaker arrangement
 9. Magnetizing inrush points of transformers
 10. Thermal limits of dry-type and liquid-insulated transformers (ANSI damage curve)
 11. Every restriction of the ANSI and National Electrical Code shall be followed, and proper coordination intervals and separation of characteristics curves shall be maintained.

3.6 ARC FLASH STUDY

- A. An arc flash study shall be performed with the aid of a digital computer program in order to determine the “Arc Flash Protection Boundary” and “Personal Protective Equipment” (PPE) levels for applicable electrical distribution equipment, stand-alone disconnects, starters, and VFDs in the power distribution system.
- B. The arc flash study shall be performed in conjunction with short circuit calculations and protective device coordination.
- C. The arc flash study shall be in accordance with the latest version of the following Standards:
1. NFPA 70E Standard for Electrical Safety Requirements for Employee Workplaces

2. IEEE 1584 IEEE guide for performing Arc Flash Hazard Calculations
 3. OSHA (29 CFR PART 1910) Occupational Safety and Health Standards for General Industry
 4. ANSI Z535.4 Product Safety Signs and Labels
- D. The recommended values for the “Arc Flash Protection Boundary” and PPE levels, based on the arc flash study results, shall be tabulated in the study.
- E. Labeling
1. The digital computer program shall provide the “Arc Flash Protection Boundary” and PPE values in a format that can be directly printed on to labels.
 2. The CONTRACTOR shall provide and install these labels in accordance with Section 26 00 00 – Electrical Work, General.
 - a. Provide one 3.5” x 5” thermal transfer type label of high adhesion polyester that is rated for outdoor use, UV, water and abrasion resistant for each electrical equipment included in the analysis. Provide two labels for the main switchboard.
 - b. The label shall have an orange header with the wording: WARNING, ARC FLASH HAZARD, and shall include at a minimum the following information:
 - 1) Location or equipment designation
 - 2) Nominal voltage
 - 3) Flash protection boundary
 - 4) Hazard risk category
 - 5) Incident energy
 - 6) Working distance
 - 7) Engineering report number, revision number and issue date
 - c. Where the electrical equipment was not included as part of the analysis, a generic warning label per NFPA 70 shall be provided.
 - d. Machine print all labels with thermal transfer printers or equivalent, field markings will not be accepted.
 - e. Field install labels so as to be clearly visible to qualified persons per NFPA 70.

3.7 FINAL SUMMARY REPORT

- A. Summarize the results of the indicated power system studies in a final report.
- B. The report shall include the following items:
1. single-line diagram
 2. impedance diagram
 3. tabulation of all protective devices identified on the single line diagram

4. time/current coordination curves
 5. specific recommendations, if any
 6. test instrumentation, condition, and connections, as applicable, for each study
 7. computerized fault current calculations
 8. any suggested changes to the protection scheme or equipment selection that will result in improved system reliability and safety
 9. recommendations to minimize the arc flash energy
- C. The report shall include information concerning the computer program used for the study, as well as a general discussion of the procedure, items, and data considered in the preparation of the study.
- D. Submit 8 bound copies of the report to the ENGINEER.

3.8 PROTECTIVE DEVICE TESTING, CALIBRATION, AND ADJUSTMENT

- A. Test, calibrate, and adjust the protective relays and circuit breaker trip devices in accordance with the recommendations in the power system coordination study.
- B. Calibrate the MCPs as in accordance with the recommendations in the power system study.
- C. Adjustments shall be made prior to energizing any electrical equipment.

END OF SECTION

SECTION 26 09 00

LOCAL CONTROL STATIONS AND MISCELLANEOUS ELECTRICAL DEVICES

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide complete industrial control panels and/or local control stations as indicated herein or in other Sections of the Specifications.
- B. This section also specifies miscellaneous electrical devices used throughout this project. These devices are not limited to use within industrial control panels or local control stations.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Industrial control panels and/or local control stations shall comply with the requirements of NEC (including Article 409), NEMA, and UL.

1.3 CONTRACTOR SUBMITTALS

- A. Furnish Shop Drawings in accordance with Sections 01 33 00 – Contractor Submittals and 26 00 00 – Electrical Work, General.
 - 1. Ladder diagrams and written descriptions explaining ladder diagram operation and system operation.
 - 2. Include catalog cuts of control equipment including enclosures, overcurrent devices, relays, pilot devices, terminations, and wire troughs.

PART 2 PRODUCTS

2.1 GENERAL

- A. The CONTRACTOR shall provide the equipment, panels and stations to satisfy the functional requirements in the relevant mechanical equipment and Instrumentation and Control specifications and the Electrical Elementary Schematics. Each panel and station shall be fabricated with UL labeled components. Equipment not specifically indicated as being WORK of other Sections shall be provided under this Section. All equipment, panels and stations shall be wired under this Section.
- B. The controls shall be 120 V maximum. Where the electrical power supply is 208 V, three phase or 480 V, 3 phase, the station shall be provided with a fused control power transformer. Control conductors shall be provided in accordance with Section 26 05 19 – Wires and Cables.
- C. Each panel and/or station shall be provided with identified terminal strips for the connection of external conductors. The CONTRACTOR shall provide sufficient terminal blocks to connect 25 percent additional conductors for future use. Termination points shall be identified in accordance with Shop Drawings. The panels and/or stations shall be the source of power for all 120 VAC solenoid valves interconnected with the panels and/or stations. Equipment associated with the panels and/or stations shall be ready for service after connection of conductors to equipment, controls, panels and/or stations.

- D. Wiring to door-mounted devices shall be extra flexible and anchored to doors using wire anchors cemented in place. Exposed terminals of door-mounted devices shall be guarded to prevent accidental personnel contact with energized terminals.
- E. Enclosures
1. In finished rooms, enclosures shall be NEMA 12 steel enclosures painted with ANSI 61 exterior and white interior.
 2. In all other areas, enclosures shall be NEMA 4X stainless steel with brushed finish. Where possible, penetrations shall be made in such a manner to maintain the NEMA 4X rating. If this is not possible, the penetrations shall be made in such a manner to minimize entry of foreign materials into the enclosure, subject to approval by the ENGINEER.
 3. In chemical areas for alum, sodium hypochlorite, etc., NEMA 4X fiberglass enclosures shall be used.
 4. Enclosures shall be freestanding, pedestal-mounted, or equipment skid-mounted, as indicated. Internal control components shall be mounted on a removable mounting pan. Mounting pan shall be finished white.
 5. Outdoor mounted enclosures shall be provided with thermostatically-controlled heaters. Heaters shall be operated at 1/2 rated voltage (240 volt heaters shall be sized and operated at 120 volts).
 - a. Provide screened weep holes for draining condensation.
- F. Identification of panel-mounted devices, conductors, and electrical components shall be in accordance with Section 26 00 00 – Electrical Work, General.
- G. Panel-mounted devices shall be mounted a minimum of 3-feet above finished floor elevation, but not higher than 6'-6" above finished floor, unless noted otherwise.

2.2 DISCONNECT SWITCHES

1. Heavy duty, single throw switches shall be rated not less than 65 KAIC at 480 VAC.
2. Horsepower rated
3. UL listed
4. Padlockable in "Off" position and door interlock
5. Enclosure per area classification in Section 26 00 00 – Electrical Work, General.
6. 480 V, 3-phase, 3-pole (6-pole when used with 2-speed motor).
7. Auxiliary control contact as applicable and where indicated.
8. As manufactured by **Eaton, General Electric, Schneider Electric**, or equal.

2.3 PANEL/STATION COMPONENTS

- A. Pushbuttons, selector switches, and pilot lights shall be the heavy-duty, oil-tight type, sized to 30-mm. Miniature style devices are not acceptable. Devices shall be as manufactured by **Eaton, General Electric, Schneider Electric**, or equal.
 - 1. Lens colors shall be red for "run," "open," or "on"; green for "stopped," "closed," or "off"; and amber for alarm.
 - 2. Pilot lights shall be full voltage, push-to-test, LED cluster type.
- B. Relays shall be 3 PDT with 10 amp contacts, plug-in type with indicating light, rectangular blades and provided with sockets for screw-type termination and hold-down clips. Relays shall be as manufactured by Potter Brumfield, Schneider Electric, or equal.
- C. Elapsed time meters shall be non-resettable type, read to a maximum of 99999.9 hours and shall be as manufactured by Eaton, General Electric, or equal.
- D. Magnetic starters shall be:
 - 1. NEMA rated, Size 1 minimum. IEC or dual NEMA/IEC rated type are not acceptable.
 - 2. FVNR type unless indicated otherwise.
 - 3. Combination starters with magnetic only instantaneous trip circuit breakers such as Eaton HMCP, General Electric Mag-Break, or equal. Breakers shall be rated 65 KA minimum.
 - 4. Control transformers shall be provided with primary and secondary fuses, 120 V maximum control voltage. VA rating of transformer shall be based on devices on the control schematic.
- E. Terminal strips shall be provided for every panel and shall be the flanged fork or ring lug type suitable for No. 12 AWG stranded wire minimum. Provide 25 percent spare terminals in each panel.
- F. Time delay relays shall be combination on delay and off delay (selectable) with adjustable timing ranges. Provide socket with screw terminal connections and retaining strap. Time delay relays shall be ATC, Eaton, Schneider Electric, or equal.

2.4 AUTO DIALER

- A. Provide telephone remote alarm notification system.
 - 1. 120VAC with 20hours battery backup.
 - 2. 4-input channels expandable to 32.
 - 3. Solid-state message recording. User recording or built-in default messages.
 - 4. Up to 16 (60 digits long) telephone number assignable to each alarm input channels.
- B. Autodial shall be by **RACO Verbatim**, or equal.

2.5 C-CURE ACCESS CONTROL

- A. Access control devices shall match the site's existing **Software House/Tyco Security Products C-CURE 800/8000 Access Control + Security Management system**, no equal to match site's security system standard.

2.6 FACTORY TESTING

- A. Each panel/station shall be factory assembled and tested for sequence of operation prior to delivery.

2.7 SPARE PARTS

- A. Provide a minimum of 10 percent spare lamps (minimum 2) and one spare lens for each color pilot lamp in each panel.

PART 2 EXECUTION**2.8 INSTALLATION**

- A. Panels/stations shall be installed in accordance with in Section 26 00 00 – Electrical Work, General and in accordance with the manufacturer's recommendations.
- B. Panels/stations shall be protected at the site from loss, damage, and the effects of weather. Panels/stations shall be stored in an indoor, dry location. Heating shall be provided in areas subject to corrosion and humidity.
- C. Panels/station interiors and exteriors shall be cleaned, and coatings shall be touched up to match original finish upon completion of the WORK.
- D. Conduit, conductors, and terminations shall be installed in accordance with Section 26 00 00 – Electrical Work, General.

2.9 FIELD TESTING

- A. Each panel/station shall be tested again for functional operation in the field after the connection of external conductors and prior to equipment startup.

END OF SECTION

SECTION 26 22 00

LOW VOLTAGE SWITCHBOARD

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide electrical service sections, distribution switchboards, special control panels, control and terminal cabinets, control devices, circuit breakers, and all appurtenant work, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 26 00 00 - Electrical Work, General, apply to the WORK of this Section.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of these specifications, all WORK herein shall conform to or exceed the applicable requirements of the National Electrical Code (NEC); provided, that where a local code or ordinance is in conflict with the NEC, the provisions of said local code or ordinance shall take precedence.
- B. Codes
 - 1. NEC National Electrical Code
- C. Commercial Standards
 - 1. ANSI/IEEE C37.20 Switchgear Assemblies, including Metal-Enclosed Bus
 - 2. ANSI/NEMA ICS-2 Devices, Controllers, and Assemblies for Industrial Control
 - 3. ANSI/UL 1008 Automatic Transfer Switches, Safety Standard for
 - 4. IEEE Institute of Electrical and Electronic Engineers
 - 5. NFPA National Fire Protection Association
 - 6. UL Underwriters' Laboratories, Inc.

1.3 QUALITY ASSURANCE

- A. General: All materials shall be inspected for compliance with Section 26 00 00 - Electrical Work, General and shall be tested per Section 26 01 26 - Electrical Tests.
- B. Factory Tests: Design test reports conducted on similar assemblies at the factory testing facilities shall be submitted.

1.4 WARRANTY

- A. The system warranty shall be no less than one year after initial startup and shall include all costs for repair, parts, travel and living expenses, and labor.

1.5 OPERATION AND MAINTENANCE

- A. The CONTRACTOR shall submit operation and maintenance procedures for the ENGINEER's review. The data sheets shall be supplemented by written text and shall include the following:
 - 1. Operating procedures.
 - 2. Maintenance procedures.
 - 3. Manufacturers parts list, illustrations, assemblies, and diagrams.

1.6 CONTRACTOR SUBMITTALS

- A. The CONTRACTOR shall submit Shop Drawings of the service section and switchboards in accordance with the requirements for of Section 01 33 00 - Contractor Submittals.
- B. After review by the ENGINEER, the Shop Drawings of the service section shall be submitted to the utility company for approval prior to fabrication.

PART 2 PRODUCTS

2.1 GENERAL

- A. **Materials:** All materials and equipment provided under this Specification shall be new; they shall be in accordance with the requirements of the Institute of Electrical and Electronic Engineers, the National Electrical Manufacturer's Association, the National Fire Protection Association, and the National Electrical Code. Where available, all materials and equipment shall bear the Underwriters' Laboratories label.
- B. **Standard Products:** Materials and equipment submitted for approval shall be the cataloged products of companies regularly engaged in the manufacture of such items, of the latest standard design that conforms to the specification requirements, and shall essentially duplicate material and equipment that has been in satisfactory use for several years.
- C. **Equipment:** All equipment for the same purpose shall be of the same make.
- D. **Enclosure Requirements:** All outdoor equipment, fixtures, and wiring devices shall be of approved, weatherproof construction.
- E. Provide switchboards installed outdoors with an outdoor non-walk-in type enclosure. Provide 10-inch-minimum front access space between the exterior door and the front of the interior switchboard door. Coordinate section and door widths with additional equipment manufacturers and provide proper access.

2.2 SWITCHBOARD

- A. Main service and distribution switchboards shall be in accordance with NEMA PB2 and UL 891. Provide metal enclosed floor standing, dead front and rear enclosure, requiring front access only.
- B. Construct sections with a minimum thickness of 12-USSG formed sheet steel and of overall dimensions that will fit within the space limitation indicated on the drawings.

- C. Switchboard enclosure shall be NEMA 3R.
- D. Bus bar shall be copper fully insulated. Copper shall be silver plated at joints. Bus bars shall be braced for short circuits of 65,000 amperes minimum, or more if so indicated on the Drawings. A full length copper ground bus bar shall be provided at the bottom of the switchboard enclosure.
- E. Floor-standing distribution switchboards, and main service switchboard, shall be cataloged products of the main circuit breaker manufacturer. Switchboard shall be shipped fully assembled and tested.
- F. Switchboard shall be by **Eaton, General Electric, Schneider Electric**, or equal.

2.3 MAIN SERVICE SWITCHBOARD

- A. General: The main service switchboard shall consist of a freestanding assembly that complies with the Contract Documents, with particular reference to the provisions of the above paragraph entitled, "Switchboard."
- B. Switchboard: Switchboards shall be front- and side-accessible. Switchboards shall be constructed to accommodate additional distribution sections. The switchboards shall consist of the sections described in the following paragraphs.
- C. Service Section: The service section shall consist of an underground pull compartment and a revenue metering compartment all to utility requirements. Components such as meter bases, busses, lugs, and auxiliaries shall be furnished.
- D. Main Circuit Breaker Compartment: The main circuit breaker compartment's circuit breaker unit shall have the ratings indicated. Service neutral shall be brought to a terminal in the main circuit breaker compartment. A disconnecting link shall be provided in a bus bar connection between the neutral terminal and the switchboard ground bus.
 - 1. The circuit breaker shall have protective features with capability of selective tripping which can be used to provide overcurrent protection from overloads, short circuits, and ground faults.
- E. The circuit breaker shall be individually mounted stationary of the size and type indicated. Manual charging shall be provided where indicated.
- F. Distribution Section: The distribution section shall consist of individually mounted molded case circuit breakers of the size indicated. A full length vertical bus shall be provided for each distribution section. The rating shall be 300 amperes, or more where indicated.

2.4 SWITCHBOARD INSTRUMENTS

- A. All indicating instruments shall be approximately 4-1/2 inches square with 250 degree scales and white dials with black graduations. The cases shall be semi-flush mounted with anti-glare glass, front access zero adjustment, and indication accuracy within 2 percent.
- B. The instrument transformer shall comply with ANSI/IEEE C37.20 and shall have standard accuracy for relaying with the burdens imposed. Mechanical and thermal ratings of current transformers shall be coordinated with short circuit ratings of related circuit breakers. Potential transformers shall be mounted on a disconnecting rack and shall have primary fuse protection.

- C. The protective relays shall be mounted within draw-out cases; current measuring circuits shall be fitted with jacks to short circuit current transformers when relays are withdrawn. The relays shall have means for testing measuring circuitry with the relay in place. The relays shall be solid state type and the product of the switchboard manufacturer.

2.5 OVERCURRENT PROTECTIVE DEVICES

- A. Circuit breakers having a frame size of 150 amperes or less shall be molded-case type with thermal, magnetic, non-interchangeable, trip-free, sealed trip units. The breaker contact material shall be a non-weldable silver alloy. The breakers shall have arc-extinguishing chutes. Ground fault tripping, where required, shall be as required below.
- B. Circuit breakers with a frame size of 225 amperes to 600 amperes shall be molded case with interchangeable thermal and adjustable magnetic trip elements. Ground fault protection shall be provided by means of a core balance transformer encircling all feeder leads. The transformer shall energize a surface-mounted, solid-state relay, adjustable from 10 - 20 percent of phase current with an adjustable time delay of zero to 36 cycles. Ground fault protection shall include a test panel containing indication and test tripping circuits.
- C. Circuit breakers with a frame size more than 600 amperes shall be molded case as described above. Molded case circuit breakers shall have an integral, solid state over-current trip unit and line current sensors. Trip units shall have adjustable long time tripping in the range of 60 to 100 percent of continuous rating, instantaneous tripping adjustable in the range of 300 to 1000 percent of continuous rating, and ground fault tripping adjustable in the range of 20 to 60 percent of continuous rating, with adjustable delay of approximately 5 to 40 cycles.

2.6 POWER MONITORS

- A. Meter Module:
 - 1. Manufacturers, or equal:
 - a. **Allen-Bradley Bulletin 1404 Powermonitor 5000, Model M5.**
 - b. **Schneider PowerLogic ION7550.**
 - c. **Eaton Power Xpert PXM1000.**
 - 2. The meter module shall be a microprocessor-based monitoring and control instrument.
 - 3. The meter module shall accept the following:
 - a. A three-phase, 0.5-10.6 A AC current signal.
 - b. A three-phase, 0 – 600 VAC line to line voltage signal.
 - 4. Provide a 480 V to 120 VAC fuse protected switchboard control power transformer inside transition section to provide power to meter and display modules. Mount the meter module inside the transition section (not on a door) in a location protected from electrical noise.
 - 5. Connect the meter module to the display module via manufacturer's cable.
- B. Display Module:
 - 1. Display module shall be the display portion of the multi-function meter. The display module shall be used to configure the meter module and display the electrical

metered parameters. The display module shall be powered from the meter module and shall be mounted on the switchboard transition section door.

- 2. Display module shall be from the same manufacturer as the power meter.
- C. Accessories: The power monitor shall be supplied with Ethernet communication module.
- D. Configuration: The metered parameters shall include, but not be limited to, the following:
 - 1. AC line current (each phase).
 - 2. AC line-to-line voltage (all three).
 - 3. Total power.
 - 4. Total reactive power.
 - 5. Power factor.
 - 6. Demand.
 - 7. Frequency.
 - 8. Energy kW Hrs.
 - 9. Total harmonic distortion.

2.7 SURGE-PROTECTIVE DEVICE (SPD)

- A. Provide parallel configured 320 kA per phase main service surge-protective device (SPD) with remote alarm capability. Device shall be designed to protect a 480 / 277 VAC 3 phase main service and incorporate the following features:

Enclosure:	NEMA 12
Warranty:	Twenty (20) year free replacement of TVSS device
Protection Modes:	All Modes, including L-N, L-L, L-G, N-G
Protection Method:	Provide with Threshold Suppression Network suppression features
Response Time:	≤1 nanosecond
Diagnostics:	LED indicators, one per phase, normally on, Remote Alarm form C dry contacts with optional surge counter
Circuit Design:	Totally Encapsulated

- B. Provide TVSS device as manufactured by **Innovative Technology, Inc., model No. PTX 320-3Y 201-SD**, or equivalent.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- A. All electrical equipment shall be installed securely in place. Equipment shall be mounted parallel and perpendicular to the walls, floors, and ceilings.
- B. All anchors and fasteners shall be types designed for the intended purpose and shall be capable of adequately, safely, and permanently securing the material in place. Generally, screws shall be used on wood surfaces, masonry anchors in concrete or brick, toggle bolts

on hollow walls, machine screws, bolts, or welded studs on steel. Nails shall be used only for temporary attachment or support.

- C. Omissions or conflicts on Drawings or between Drawings and Specifications shall be brought to the attention of the ENGINEER for clarification before proceeding with the work.
- D. The CONTRACTOR shall make all necessary provisions throughout the Site to receive all equipment as construction progresses and shall provide adequate backing, supports, inserts, and anchor bolts for the hanging and support of all electrical cabinets, enclosures, conduits, panelboards, and switches, and shall provide sleeves through walls, floors, or foundations where electrical lines are required to penetrate.
- E. Floor standing equipment shall be leveled with shims as required to maintain horizontal surfaces within 1/32-inch per horizontal foot; after leveling, equipment shall be anchored, then grouted so that no space exists between concrete and equipment support beams.

END OF SECTION

SECTION 26 32 14

STANDBY GENERATOR SYSTEMS

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide an engine-driven standby electrical generating system, complete and operable, in accordance with the Contract Documents.
- B. The CONTRACTOR shall be responsible for coordination of interface with other equipment and for any special construction necessary to complete the WORK of this Section in an acceptable manner.
- C. The supplier of the generator set shall also be the manufacturer of the engine for the generator system; however, the CONTRACTOR shall be responsible to the OWNER for the WORK of this Section.
- D. Required Schedule: The delivery of the engine-generator set is expected to be a "Critical Path" item on the CONTRACTOR's schedule. Suppliers are advised that the schedule for the completion of construction for this contract is accelerated and should review the CONTRACTOR's schedule to ensure the CONTRACTOR's required delivery dates can be met. Suppliers shall not be relieved of any liability for delay under the contract, or for any loss or liquidated damages sustained by the CONTRACTOR from an inability to meet the scheduled time of completion or Clark County Air Quality Management Division (CCAQMD) emissions standards. All submittals required of the supplier must be accurate, timely and complete.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Materials shall conform with applicable requirements of the National Electrical Code (NEC), and any other State or Municipal codes which apply. Generator system shall meet applicable standards and codes, including IEEE, NEMA, ANSI, OSHA, and UL.
- B. The generator-set shall meet the emissions regulatory requirement of the installation site's Authority Having Jurisdiction.

1.3 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals and Section 26 00 00 – Electrical Work, General.
- B. Shop Drawings
 - 1. Detailed, dimensioned Shop Drawings and data demonstrating adherence to the requirements of these specifications shall be submitted and approved before fabrication, shipment, or other WORK under this Section begins.
 - 2. Anchor bolt calculations. Submit stamped calculations by a Nevada licensed Structural Engineer.
 - 3. Certified custom drawings and custom wiring diagrams of each component in the system and a master wiring diagram showing the entire system on one sheet. This

diagram shall include all AC and DC power control connections between the generator, engine, fuel tank system, batteries, and circuit breakers and shall be a custom drawing for this specific installation. A master drawing of the engine/generator set shall also be provided, showing general dimensions, bill of materials, location and size of all connections for fuel, cooling, exhaust, direct current connections, conduit locations, and connections for control and power wiring. Include wire and terminal numbers for all diagrams. Furnish KW output curves, fuel consumption curves, and certified air emission data sheets.

4. Outline drawings and connection diagrams shall be complete enough to enable the installation to be designed completely, and connection diagrams shall give both internal and external connections. Include foundation loading and clearances.
5. Ten copies of complete and detailed instructions for the operation, lubrication, and maintenance of equipment in the system. The manuals shall be furnished after final approval of Shop and working drawings but prior to shipment of equipment. Manuals shall be complete with wiring diagrams, lubrication schedules and recommended lubricants, drawings, cuts, parts lists, and other necessary data. All parts shall be numbered or otherwise clearly identified to facilitate ordering of replacements. Descriptions of all operational control devices and their functions shall also be included.

1.4 QUALITY ASSURANCE

- A. The engine/generator shall be the product of a manufacturer who has been regularly engaged in the design and production of similar engine/generator sets for a minimum of 10 years.
- B. The supplier shall maintain a local parts and 24-hour service facility within 100 mile of the City of Las Vegas. The supplier shall have factory trained and authorized service representatives to furnish necessary installation, test, and start-up supervision as well as operation and maintenance training necessary for final approval and acceptance.
- C. Permits from Local Air Quality District: Contractor shall submit engine emissions data and required fees and obtain a "Permit to Construct" from the CCAQMD in the Owner's name prior to delivery of engine-generator set to job-site if permits are required by the CCAQMD.

PART 2 PRODUCTS

2.1 SYSTEM COMPONENTS

- A. Provide one new diesel engine-powered electric generator set, in an outdoor, waterproof, sound attenuated enclosure. The engine generator will be site rated at 3,300 feet above mean sea level (AMSL), 120 degrees F, and have a nominal standby rating of 700 KW, 875 KVA, 0.8 power factor, 480 volts, three phase, four wire, grounded neutral, 60 Hertz. The equipment package shall include in general, and as applicable, engine and generator on a common vibration isolating base, with auxiliaries, accessories, and controls, including intake filters, discharge silencer, turbocharger, heat exchangers, foundation bolts, isolators, piping, flexible couplings, supports, complete exhaust piping, ring, and silencer, insulation, control panels, lubrication system, water jacket heaters, cooling system, fuel tank, batteries and battery rack, battery charger, spare parts, and all materials necessary to permit installation, testing and placing the system in successful operation.
- B. Provide circuit breakers located in the generator enclosure as noted in 2.8 below.

- C. Provide one sub-base fuel storage tank sized for 24 hours run time at full load with double wall steel construction, integral with the base of the generator-set and generator-set enclosure.
- D. The generator-set, enclosure, base-mounted fuel tank, and accessories shall be assembled and shipped to the Site as a complete, coordinated package, ready for installation. The engine generator base, cooling system, etc, shall be factory painted before installation in the enclosure.
 - 1. The generator-set manufacturers shall be **Caterpillar, Cummins Onan, Generac, Kohler**, or equal.

2.2 SYSTEM OPERATION

- A. The system shall operate as follows:
 - 1. Automatic Control
 - a. A maintained remote contact closure from the automatic transfer switch shall cause the generator-set to start and run.
 - b. When the remote startup contact opens, the engine shall continue to operate for an adjustable cool-down time (typically 5 to 30 minutes).
 - 2. Local Control: The generator-set shall be capable of manual initiation or stopping from the locally mounted generator control panel. The local generator control panel shall be provided as part of this Contract.
 - 3. Emergency Stop Control: An emergency stop pushbutton shall be provided at the generator control panel that shall cause the unit to stop without any delay.
 - 4. Fire Department Shunt Trip: When shunt trip button is activated, the generator's main circuit breaker shall be tripped open.

2.3 ENGINE

- A. The CONTRACTOR shall provide a complete engine-powered standby electrical generating system of the type and capacity indicated.
- B. The diesel engine shall be mounted on a common base with the generator and the direct connected radiator and shall be rated for standby service, continuously for the duration of the electric power interruption, with engine jacket water cooled by means of a direct mounted water-to-air radiator under SAE conditions at 85 degrees F, 3,300 feet AMSL. It should be noted that this is the rating of the engine. The minimum generator rating shall be 750 KW.
- C. The diesel engine shall be four-cycle, turbocharged, aftercooled, 1800 rpm, with individual fuel pumps and injection valve for each cylinder.
- D. The engine shall have a dry type air cleaner with service indicator, fuel oil filter, full pressure positive pump lubrication with full-flow oil filters, thermostatic regulated oil cooling system, and crankcase drain with valving to be able to drain the crankcase oil without reaching under the engine.

- E. The engine shall also be equipped with 208 volt, thermostatically controlled jacket water heaters. Power shall be derived from a suitably-rated dry-type transformer and panelboard, also provided as part of the generating system, and including facilities to provide power to the battery charger, fuel oil transfer pumps if required, and other generator-related facilities.
- F. The diesel engine shall perform as indicated when operating on a commercial grade of non-premium distilled petroleum fuel oil such as No. 2 domestic burner oil and diesel fuel.
- G. The engine shall be equipped with an electric 24 volt dc starting system of sufficient capacity to crank at a speed which will start the engine under conditions indicated. Include a charging alternator. The starting pinion shall disengage automatically when the engine starts. The starting system shall include relays for fully automatic operation from a remote signal.
- H. Electronic governor shall maintain engine speed at rated frequency operation to within 0.25 percent steady state and 5 percent no load to full load.
- I. The engine shall minimize discharge of gaseous pollutants and shall comply with the discharge limitations of the Clark County Air Quality Management District. The CONTRACTOR shall furnish a certification from the manufacturer that the proposed generator set will comply with the limitations.

2.4 BATTERIES AND BATTERY CHARGER

- A. Provide Absorbed Gas Mat (AGM) batteries with sufficient capacity for three 30 second cranking cycles, allowing 10 seconds between cycles. Submit calculations verifying adequate capacity. The battery shall be on a plastic rack, with seismic restraints, as close as practical to the starter motor. The CONTRACTOR shall provide vented, nonmetallic protective covers or red and black plastic or rubber boots covering all terminals to protect against an accidental short circuit as might be caused by laying a metallic object on the battery. Metallic racks and covers are not acceptable.
- B. A unit-mounted battery charger for 120 V, single phase, 60 Hz input shall be provided. The battery charger shall be voltage regulated, with separate float and equalize charge voltage adjustment having a 10 amp rating. The battery charger shall include alarm relays to sense high and low dc voltage, zero current, and ac power failure, with individual output contacts wired to terminal strips for tie into remote alarms. Also, provide an AC "on" indicating pilot LED light and dc voltmeter and ammeter and annunciator. The battery charger shall be **LaMarche Model A46**, or equal.

2.5 EXHAUST SYSTEM

- A. The engine shall be provided with an exhaust system consisting of flexible connection, exhaust silencer, exhaust piping, fittings, stainless steel hardware and supports, brackets, and rain collar and cap.
- B. The flexible connection shall be of the stainless steel bellows type with flanged ends. Flexible elements shall be stainless steel suitable for exhaust temperatures recommended by the engine manufacturer. The flexible connection shall be suitable for vibration isolation and for relieving stress caused by thermal expansion.
- C. The exhaust silencer shall be a critical grade.

- D. Exhaust piping shall be pitched upward from the engine and be provided with sufficient drains to eliminate condensation and rain water. Exhaust piping shall be welded steel pipe. Elbows shall be welding type, standard wall. Flanges shall be welding slip-on type, 125 pound, either forged or plate steel. Exhaust piping shall be supported independently of the silencer. The silencer and exhaust piping shall be insulated with a minimum of 2-1/2 inches of calcium silicate with a stainless steel jacket and shall be supported as required.
- E. The generator system supplier shall provide all support and mounting fittings.

2.6 COOLING SYSTEM

- A. The engine shall be equipped with a cooling system having sufficient capacity to effectively cool the engine when delivering full rated horsepower at the conditions stated above. A radiator and engine-driven fan of a type and capacity recommended by the engine manufacturer shall be included.
- B. The radiator shall be sized in accordance with the engine manufacturer's recommendation for use with 50 percent aqueous ethylene glycol. Air flow shall be controlled by a power inlet damper and a gravity discharge damper, both provided as part of the outdoor enclosure. Design ambient air temperature shall be 100 degrees F at sea level.
- C. The engine shall have an engine-driven, gear driven centrifugal type water circulating pump for circulating water through the cooling system.

2.7 GENERATOR

- A. The generator shall be nominally rated 750 KW at .8 PF, 480 V 3 phase, 60 Hz, 4 wire wye and shall be a brushless design with solid state permanent magnet generator (PMG) exciter. Other excitation methods are not acceptable. The voltage regulator shall be solid state, generator mounted. Provide radio-interference suppression meeting commercial standards.
- B. If a line to neutral short circuit occurs, the generator shall be capable of supporting 300 percent rated current for 10 seconds without externally mounted devices.
- C. Voltage Regulation Tolerance: Plus or minus 1 percent of any present value over the 3 phase load range. Instantaneous voltage dip or rise, when measured with an oscilloscope, shall not exceed 25 percent upon full load application or rejection, and shall return to preset value within 0.5 seconds.
- D. Waveform: Deviation factor of output voltage shall not exceed 5 percent and the value of any individual harmonic shall not exceed 2 percent of the fundamental when operating with an unbalanced load.
- E. Temperature Rise: Temperature rise of any component shall not exceed the rise permitted by NEMA standards. The voltage regulator shall be adjustable minus 25 percent to plus 10 percent.
- F. Bearing: Double sealed ball bearing, lubricated for life.

2.8 LOCAL DISCONNECT CIRCUIT BREAKER

- A. A 1200 ampere 100% rated molded case circuit breaker with shunt trip shall be provided, mounted in a NEMA 12 enclosure located at the generator.

- B. Provide main circuit breaker with ON/OFF position auxiliary contacts for remote indication.
- C. A 600 ampere 100% rated molded case circuit breaker for external load bank connection shall be provided.

2.9 VIBRATION ISOLATORS

- A. The engine and generator shall be mounted on a common system base and shall be provided with vibration isolators of number and size as recommended by the engine supplier to support the engine, generator, radiator, and base. The isolation mountings shall consist of steel or cast iron top and bottom housings incorporating steel springs or "donut" style isolators, located between the genset and the base, and shall be provided with built-in leveling bolts and built-in resilient chocks to control isolation and withstand lateral forces in all directions.
- B. The vibration isolators shall be **Korfund Dynamics Corporation Series L**, or equal.

2.10 LUBRICATION AND COOLING FLUIDS

- A. The supplier shall furnish the engine fully charged with lubricating oil and grease as specified by the manufacturer for continuous service. The cooling system shall be furnished with a full charge of 50 percent ethylene glycol.

2.11 GENERATOR SYSTEM CONTROL PANEL

- A. The engine shall be provided with an integrally mounted instrument and control panel.
- B. Wiring
 - 1. Signal wiring shall be segregated from power wiring and be arranged neatly to facilitate tracing of circuits.
 - 2. Plastic wiring wraps shall be used to bundle wires, except within wiring ducts. The bundles shall be securely fastened to the steel structure at suitable intervals not exceeding 12-inches in length. No open space hanging of wires will be permitted. Flexible stranded copper wiring shall be used throughout. No solid conductor wire shall be permitted.
 - 3. Terminal blocks shall be provided for interconnections between remote devices and local control panel wiring. The terminal blocks shall be factory assembled on a mounting channel, and the channel shall be bolted to the inside of the panel. The terminals shall have a continuous marking strip using the nomenclature on the schematic diagrams. No more than 2 wires shall be terminated at any one terminal. Wire terminals shall have sleeve wire markers properly marked to match the schematic diagrams.

2.12 GENERATOR ENCLOSURE AND FUEL TANK

- A. Generator Enclosure
 - 1. A weatherproof, sound attenuated, type enclosure shall be provided to house the engine/generator and accessories. The following standards and codes shall be met at a minimum:

- a. NEPA 70 (National Electric Code)
- b. NFPA 30
- c. NFPA 37
- d. NFPA 110
- e. UL 142
- f. API 620

- B. The enclosure shall be constructed of galvanized steel for mounting on a concrete pad. The enclosure shall conform to the following design criteria:

Rigidity wind test equal to	150 MPH
Roof load equal to	50 lbs. per sq. ft.
Floor load equal to	200 lbs. per sq. ft.
Rain test equal to	4-inches per hour
Enclosure certified to meet	BOCA base building and mechanical codes

- C. Test data on similar construction by the manufacturer shall be available to the ENGINEER upon request.
- D. Enclosure shall consist of a roof, steel floor, fuel tank base, 2 side walls and 2 end walls, of stressed skin, semi-monocoque construction, sized as required to meet dimensional, sound attenuation, and code requirements for the actual generator provided.
- E. The system shall include a cooling and combustion air inlet silencer section, an equipment enclosure section, and a cooling air discharge silencer section. It shall be designed to reduce source noise by an estimated average 25 dB(A) as measured at a distance of 7-meters from the enclosure. The enclosure shall also be bird- and rodent-proof with all openings screened.
- F. Roof and walls shall be of one-piece semi-monocoque construction. Framing members shall be aluminum or aluminized steel. Skin material shall be minimum thickness 0.040-inch, prepainted earth bronze color, aluminum (roof shall be mill finish) or minimum thickness 18-gauge aluminized steel. Other materials of construction may be acceptable; however, the CONTRACTOR shall furnish data verifying that the proposed system is equivalent or better than that indicated. Alternative skin colors may be submitted to the ENGINEER for selection. Skin panels shall be hard-riveted to framing members on 3-inch centers maximum. Pop rivets and bolts are not acceptable fasteners to attach exterior skin to framing. Roof assembly shall be cambered to aid in rain runoff.
- G. Insulation in walls and roof shall be semi-rigid, thermo acoustic, thickness as required to meet the noise criteria. Lining shall be perforated mill finish aluminum. Self-adhesive foam and loose or batt-type insulating materials will not be accepted.

- H. Lifting provisions shall be provided at the enclosure base, with capacity suitable for rigging the entire assembly. Quality assurance procedures of the manufacturer shall include regular testing of the lift devices.
- I. A minimum of 4 single personnel access doors shall be provided. A hinged access door for the load bank controls shall also be provided. Doors shall consist of an extruded frame with skin material matching enclosure. Doors shall be fully gasketed to form a weathertight perimeter seal and be padlockable. Hinges shall be stainless steel, and lock mechanisms shall be 3 point, with panic hardware to allow opening from inside even when padlocked. The door threshold, if needed, shall be aluminum. Stairs and handrails shall be aluminum and shall be manufactured to meet field-installed conditions.
- J. Air handling shall be as follows: Air shall enter the enclosure through a removable hood. Motor-operated dampers shall be provided, wired to be spring operated to open upon engine startup. Radiator discharge shall be through a gravity-operated damper and into a hood. The system shall not exceed 0.5-inch wg total external static pressure to ensure adequate airflow for cooling and combustion.
- K. A bolt-in-place removable end wall panel shall be provided for maintenance and/or equipment installation. Bolts, nuts, and washers shall be stainless steel.
- L. Enclosure manufacturer shall provide all necessary hardware to externally mount the exhaust silencer and maintain the weatherproof integrity of the system. A bird screen shall be installed on exhaust outlet.
- M. An electrical package shall include minimum four 60 watt equivalent LED lights, one battery-backed emergency light with two 25 watt LED heads, one light switch, and one duplex GFCI receptacle. These items, as well as the motor-operated air inlet damper, shall be factory wired to a 60A 120/240V Load Center. Input power to the load center shall be as indicated on drawings.
- N. Fuel Tank
1. Provide a horizontal fuel oil storage tank of welded steel construction mounted within or beneath the structural skid below the generator set. Provide 12 gauge steel for bottom, top and baffles; provide 7 gage channel side supports. The tank shall have fill, vent, bottom drain, top supply and return lines. Furnish tank with a two level float switch with cast iron float chamber, Type 316 SS float and trim, SPDT contacts, NEMA 7 explosion proof switch enclosure and a 120 VAC form C dry contact. One shall be set to activate at 25% fuel level, the other set to activate at 50% fuel level. Furnish a normally closed solenoid valve with brass body and vitron steel, explosion proof enclosure, 24 VDC in the fuel oil supply line to the engine. The valve shall open when the engine starts. The tank shall comply with UL 142, NFPA 30 and 31 and shall be UL listed. Provide Pryco subbase tanks or equivalent. Fuel tank shall have double wall containment and include 2 fill inlets, one on each side of the long tank dimension. In the event of a fuel tank failure, the secondary containment shall contain any fuel spillage and shall activate an audible and visual alarm.
 2. The fuel storage tank capacity shall be sufficient for operating the engine at 100% load for twelve (12) hours, generator rating.
 3. Pipe and Fittings

- a. Pipe and fitting materials shall be new and the best of their respective classes. Pipe shall be clearly marked with the manufacturer's standard trade mark or identification mark. Pipe and fittings, unless otherwise indicated, shall meet the requirements of these specifications.
 - b. Piping carrying fuel oil shall be copper type "L" with wrought copper fittings silver soldered. Flexible connections shall be provided between fuel lines and the engine.
4. Hangers, Supports, and Miscellaneous Metalwork: The CONTRACTOR shall provide all necessary hangers, supports, concrete inserts, anchors, and guides for the standby generator equipment.
 5. Valves: The CONTRACTOR shall provide ball valves for installation at all required points and on at least each fuel supply line. Ball valves shall be stainless steel, rated 125 pounds working pressure and in every respect be suitable for the purpose intended.

2.13 SPARE PARTS

- A. Four sets of the following spare parts shall be furnished:
 1. Air filters
 2. Oil filters
 3. Fuel filters

PART 3 EXECUTION

3.1 FACTORY TESTING

- A. Factory witness testing is not required.
- B. The generator system shall be factory tested and test report shall be submitted for review before shipment to the Site. The manufacturer's standard testing procedure shall be followed, and in the event the system does not satisfy the test criteria or the requirements of this Section, it shall be repaired, modified, or replaced until it conforms.

3.2 START-UP ASSISTANCE AND TRAINING

- A. The manufacturer's representative shall furnish on-site start-up assistance and shall inspect the installation prior to start-up to verify that equipment is installed in accordance with the manufacturer's requirements.
- B. Upon completion of startup and after acceptance by the OWNER, the CONTRACTOR shall completely fill the fuel tank.
- C. In addition, the manufacturer's representative shall provide on-Site training for operation and maintenance of all equipment included in this Section.

- D. The following times shall be included, as a minimum, for the above tasks. A Day is defined as 8 hours on-Site, exclusive of meals and travel. Each task shall be considered a separate trip to the site. Dates and times for the trips shall be coordinated with the OWNER.
1. Inspection of the installation: 2 Days
 2. Startup assistance: 3 Days
 3. Operation and Maintenance Training: One Day

END OF SECTION

SECTION 26 36 23

AUTOMATIC TRANSFER SWITCHES

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide automatic transfer switch (ATS) and all appurtenant work, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 26 00 00 - Electrical Work, General, apply to the WORK of this Section.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of these specifications, all WORK herein shall conform to or exceed the applicable requirements of the National Electrical Code (NEC); provided, that where a local code or ordinance is in conflict with the NEC, the provisions of said local code or ordinance shall take precedence.
- B. Codes
 - 1. NEC National Electrical Code
- C. Commercial Standards
 - 1. ANSI/IEEE C37.20 Switchgear Assemblies, including Metal-Enclosed Bus
 - 2. ANSI/NEMA ICS-2 Devices, Controllers, and Assemblies for Industrial Control
 - 3. ANSI/UL 1008 Automatic Transfer Switches, Safety Standard for
 - 4. IEEE Institute of Electrical and Electronic Engineers
 - 5. NFPA National Fire Protection Association
 - 6. UL Underwriters' Laboratories, Inc.

1.3 QUALITY ASSURANCE

- A. General: All materials shall be inspected for compliance with Section 26 00 00 - Electrical Work, General and shall be tested per Section 26 01 26 - Electrical Tests.
- B. Factory Tests: Design test reports conducted on similar assemblies at the factory testing facilities shall be submitted.

1.4 WARRANTY

- A. The system warranty shall be no less than one year after initial startup and shall include all costs for repair, parts, travel and living expenses, and labor.

1.5 OPERATION AND MAINTENANCE

- A. The CONTRACTOR shall submit operation and maintenance procedures for the ENGINEER's review. The data sheets shall be supplemented by written text and shall include the following:
 - 1. Operating procedures.
 - 2. Maintenance procedures.
 - 3. Manufacturers parts list, illustrations, assemblies, and diagrams.

1.6 CONTRACTOR SUBMITTALS

- A. The CONTRACTOR shall submit Shop Drawings of the service section and switchboards in accordance with the requirements for of Section 01 33 00 - Contractor Submittals.
- B. After review by the ENGINEER, the Shop Drawings of the service section shall be submitted to the utility company for approval prior to fabrication.

PART 2 MATERIAL

2.1 GENERAL

- A. ATS shall be listed per UL 1008 as a recognized component for emergency systems and rated for all classes of loads.
- B. ATS shall be enclosed within a NEMA 12 enclosure as shown on the drawings. Provide ATS with number of poles, amperage and voltage ratings (continuous) as shown on the drawings. Withstand rating shall not be less than 65,000 amperes symmetrical.
- C. Equip ATS with grounding lug and fully rated neutral terminals.
- D. The ATS shall be manufactured by **ASCO, Eaton, GE Zenith, Schneider**, or equal.

2.2 AUTOMATIC TRANSFER SWITCH (ATS)

- A. ATS shall be electrically operated and mechanically held by a single operating mechanism energized from the source to which the load shall be transferred.
- B. Manual Operator: Provide an operator capable of actuating the switch with the same action and speed as the electric operator.
- C. Where a four pole switch is indicated on the drawings, the fourth pole shall be used to switch the neutral. The neutral transfer switch shall momentarily interconnect the neutrals of the two sources during the transfer/retransfer operations. The neutrals shall remain interconnected until the power source contacts close on the source to which the load is being transferred. The overlapping neutral contacts shall not be overlapped for a duration greater the 100 milliseconds.

2.3 CONTROL PANEL

- A. Provide a solid-state sensing and control logic panel. Include the following operations characteristics:
 - 1. Adjustable (0 to 10 seconds) time delay on engine starting to override momentary dips in normal source, set at three (3) seconds.
 - 2. Full phase voltage relay supervision of the normal source with at least one close differential relay to detect "brownout" conditions, set at 70% dropout and 90% pickup.
 - 3. Voltage/frequency lockout relay to prevent premature transfer, set at 90% voltage and 90% frequency.
 - 4. Engine starting control contacts (one normally open and one normally closed) rated at 10A, 32VDC.
 - 5. Adjustable (0 to 60 minutes) time delay on retransfer to normal, set at 30 minutes.
 - 6. Unloaded running time delay for generator cool down (adjustable 0 to 60 minutes), set at five (5) minutes.
 - 7. Transfer to emergency time delay (adjustable 0 to 5 minutes), set at 1 second.

2.4 SEQUENCE OF OPERATION

- A. When the voltage of any phase of the normal sources is reduced to the dropout voltage and after the engine starting time delay the engine starting contacts shall change states.
- B. When the standby plant is delivering not less than 90% of rated voltage and 95% of rated frequency, the load shall be transferred to the emergency source.
- C. When the normal source has been restored to not less than 90% of rated voltage on all phases, the load shall be retransferred to the normal source after the set time delay. The standby plant shall run unloaded and then automatically shut down and be ready for start upon the next failure of the normal source.
- D. If the standby plant should fail while carrying the load, retransfer to the normal source shall be made instantaneously upon restoration of the normal source on all phases.
- E. Accomplish transferring between sources by the following method:
 - 1. An in-phase monitor shall control transfer/retransfer operation between live sources when the sources are approaching and are sufficiently close to a zero-phase angle difference so as to avoid excessive motor inrush currents. The monitor shall cause in-phase transfer/retransfer to take place over engine/generator frequency ranges to 59 to 62 Hz with a utility source of 60 Hz. Normal transfer/retransfer operation shall automatically occur, without the use of manual overrides, in the event of a complete failure of the load-carrying source.

2.5 ACCESSORIES

A. Equip the ATS with the following:

1. Test switch.
2. Two form C contacts at 10 A, 120 VAC which indicate ATS switch position.
3. One form C contact rated at 10 amperes, 12 or 24V DC. The N.C. (open with utility power available, closed upon loss of utility power) contact shall be used as the start signal to start the standby generator.
4. Two form C contacts rated at 10 amperes, 120 volts which indicate normal power source is available.
 - a. One N.O. contact (closed when utility power is available, open upon loss of utility power) contact shall be used as part of the signal to enable/disable the automatically controlled load bank.
5. Two form C contacts rated at 10 amperes, 120 volts which indicate emergency power source is available.
6. Engine Exerciser – An engine generator electronic exercising timer shall be provided, including a selector switch to select exercise with or without load transfer. The exerciser shall be programmable to enable exercise for 1 minute to 24 hours per day in 1 minute increments for 1 to 7 days per week. The exerciser shall be fully programmable and backed up by a permanent battery.

2.6 ENCLOSURE

Mount the ATS within a NEMA 3R outdoor rated floor standing enclosure.

2.7 NAMEPLATES

Provide nameplates with 1/4-inch high lettering as specified in Section 26 00 00. Provide a main nameplate indicating ATS name, voltage, amperes, number of poles, and what the ATS feeds. Provide a second nameplate indicating where the normal source is fed from, and a third nameplate indicating where the emergency source is being fed from.

PART 3 EXECUTION

3.1 TESTING

- A. Field test and calibrate timing and monitoring logic. All adjustments shall be within 5% of the previously specified setpoints.
- B. Field test the transferring of loads between normal and emergency power sources as follows:
 1. Start loads located downstream of the ATS.
 2. De-energize the normal power source. Verify that the standby generator starts and the load is transferred to the emergency source.

3. Energize the normal source. Verify that after the selected time delay, the load is transferred to the normal power source. Verify that after the load is switched the generator continues to operate unloaded for the time specified. At the end of the period verify that the generator shuts off.
- C. Field test and calibrate the in-phase monitor. Demonstrate that the switch transfers when source phase differences are within 20 degrees under varying generator speeds.

END OF SECTION

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SECTION 26 50 00

LIGHTING

PART 1 GENERAL

1.1 THE SUMMARY

- A. Provide luminaires and accessories, complete and operable, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes

1. NFPA 70 National Electric Code
2. NEMA 250 Enclosures for Electrical Equipment (1,000 Volts Maximum)
3. International Building Code (IBC) Earthquake Requirements
4. UL-595 Standard for Safety Marine-Type Electric Lighting Fixtures
5. UL-844 Standard for Safety Electric Lighting Fixtures for Use in Hazardous (Classified Locations)
6. UL-924 Standard for Safety Emergency Lighting and Power Equipment
7. ANSI C82.1 Specifications for Fluorescent Lamp Ballasts
8. ANSI C84.4 Specifications for High-Intensity-Discharge Lamp Ballasts (Multiple SupplyType)
9. Standards of the Certified Ballast Manufacturer's Association

1.3 CONTRACTOR SUBMITTALS

- A. Furnish the following product information in accordance with the requirements of Section 01 33 00 – Contractor Submittals and 26 00 00 – Electrical Work, General.
- B. Furnish the following information:
 1. Interior Luminaires
 - a. catalog data sheets and photos
 - b. luminaire finish and metal gauge
 - c. lens material, pattern, and thickness
 - 1) candlepower distribution curves in 2 or more planes
 - d. candlepower chart, 0 to 90 degrees

- e. lumen output chart
 - f. average maximum brightness data in foot-lamberts
 - g. coefficients of utilization for zonal cavity calculations
 - h. mounting or suspension details
 - i. heat exchange and air handling data
2. Exterior Luminaires
- a. catalog data sheets and photos
 - b. luminaire finish and metal gauge
 - c. lens material, pattern, and thickness
 - d. IES lighting classification and isolux diagram
 - e. fastening details to wall or pole
 - f. ballast type, location, and method of fastening
 - g. for light poles: wind loading; complete dimensions; and finish
3. Lamps
- a. voltages
 - b. colors
 - c. approximate life (in hours)
 - d. approximate initial lumens
 - e. lumen maintenance curve
 - f. lamp type and base
4. Ballasts/LED Drivers
- a. type
 - b. wiring diagram
 - c. nominal watts and input watts
 - d. input voltage and power factor
 - e. starting current, line current, and restrike current values
 - f. sound rating

- g. temperature rating
 - h. efficiency ratings
 - i. low-temperature characteristics
 - j. emergency ballasts rating and capacity data
5. Photocells
- a. voltage and power consumption
 - b. capacity
 - c. contacts and time delay
 - d. operating levels
 - e. enclosure type and dimensions
 - f. temperature range

PART 2 PRODUCTS

2.1 LUMINAIRES

A. General

1. Additional WORK requirements are indicated in the Luminaire Schedule on the Contract Drawings.
2. Fixture and lamp combination shall be provided with minimum 5-year manufacturer replacement warranty.

B. Provide a feed-through type or separate junction box.

C. Provide minimum 18 AWG wire leads.

D. Provide components that are accessible and replaceable without removing the luminaire from the ceiling.

E. Soffit Installations

1. Installations shall be UL-labeled as "Suitable for Damp Locations."
2. Provide removable and prewired ballasts.

F. Exterior Installations

1. Installations shall be UL-labeled as "Suitable for Wet Locations."
2. Provide removable and prewired ballasts.

3. When factory-installed photocells are provided, the entire assembly shall be UL-labeled.

2.2 LAMPS

- A. LED
- B. Manufacturer, or Equal
 1. **Cree**
 2. **North American Philips**
 3. **Sylvania**

2.3 BALLASTS

- A. General
 1. UL-Listed, ETL-certified
 2. High power factor, energy-efficient type
- B. LED Driver: Shall be installed integral to LED lamp and light fixture. Driver shall have power factor >0.9, Total Harmonic Distortion (THD) <20%, and efficiency >92%. Provide driver with universal input voltage capable of operating on 120, 208, 240 or 277V. Driver shall be LED light fixture manufacturer's standard.
- C. Photocell
 1. Photo Control: automatic ON-OFF switch
 2. Housing: self-contained; die-cast aluminum; unaffected by moisture, vibration, or temperature changes
 3. Settings: ON at dusk; OFF at dawn
 4. Provide a time delay feature in order to prevent false switching.
 5. field-adjustable to control operating levels
 6. Manufacturer, or Equal
 - a. **Paragon**
 - b. **Tork**

2.4 POLES

- A. Rating (with luminaire): 125-mph steady winds without incurred damage
- B. Material: steel

LIGHTING

26 50 00

PART 3 EXECUTION

3.1 LUMINAIRES

A. General

1. Install in accordance with the manufacturer's recommendations.
2. Provide necessary hangers, pendants, canopies, and other accessories.
3. Provide additional ceiling bracing, hanger supports, and other structural reinforcements to the building and to concrete pole bases as required to safely mount the luminaire.
4. Install the luminaire plumb and level.
5. The mounting heights indicated for wall-mounted or pendant-mounted luminaires are from the bottom of the luminaire to finished floor or finished grade, whichever is applicable.
6. Install each luminaire outlet box with a galvanized stud.

B. Pendant Mounting

1. Provide swivel-type hangers and canopies to match the luminaires, unless otherwise indicated.
2. Space single-stem hangers on continuous-row fluorescent luminaires 48 inches apart.
3. Provide twin-stem hangers on single luminaires.

C. Pole Mounting

1. Provide a cast-in-place concrete base.
2. Provide branch circuit in-line fuses, located within the pole base handhole.
3. Install the pole base flush with the finished grade where located in grassy areas not subject to vehicular traffic, and 30 inches above the finished grade when the pole is located in areas subject to damage from vehicular traffic.
4. Set the luminaire poles on anchor bolts and secure with double nuts on each bolt.
5. After the luminaire has been leveled and plumbed, dry-pack the luminaire base with grout.

D. Finished Areas

1. Install the luminaires symmetrically with tile pattern.
2. Locate with the centerline of tile or with centerline of the joint between adjacent tile runs.

3. Install recessed luminaires tight to the finished surface such that no spill light will show between the ceilings and the sealing rings.
 4. When installing on combustible low-density cellulose fiberboard, provide spacers and mount luminaires 1-1/2 inches from ceiling surface, or use luminaires suitable for mounting on low-density ceilings.
 5. Junction Boxes
 - a. Flush and Recessed Luminaires: Locate a minimum of one foot from the luminaire.
 - b. In concealed locations, install junction boxes to be accessible by the removal of the luminaire.
 6. Wiring and Conduit
 - a. Provide wiring of a suitable temperature rating as required by the luminaire.
 - b. Provide flexible steel conduit.
 7. Provide plaster frames when required by ceiling construction.
 8. Independent Supports
 - a. Provide each recessed fluorescent luminaire with 2 safety chains or 2 No. 12 soft-annealed galvanized steel wires of length needed to secure the luminaire to the building structure, independent of the ceiling structure.
 - b. Ensure that the tensile strength of chain or wire, and the method of fastening to the structure, is adequate to support the weight of the luminaire.
 - c. Fasten the chain or wire to each end of the luminaire.
- E. Unfinished Areas
1. Locate the luminaires to avoid conflicts with other building systems and blockage of the luminaire light output.
 2. Luminaire Suspension
 - a. Provide 1/4-inch threaded steel hanger rods.
 - b. Scissor-type hangers will not be accepted.
 3. For attachments to steel beams, provide flanged beam clips and straight or angled hangers.

3.2 LIGHTING CONTROL

A. Outdoor Luminaires

1. All outdoor and exterior mounted light fixtures shall be manually switched or photocell controlled.

3.3 CLEAN-UP

- A. Remove labels and other markings, except the UL listing mark.
- B. Wipe the luminaires inside and out in order to remove construction dust.
- C. Clean the luminaire plastic lenses with an antistatic cleaner only.
- D. Touch up painted surfaces of the luminaires and the poles with matching paint provided by the manufacturer.
- E. Replace defective lamps and/or fixtures at the Date of Substantial Completion.

END OF SECTION

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

1. Submit to the owner for approval a minimum of four full-size samples of each concrete paver type/size/thickness/color/finish specified. The samples shall represent the range of shape, texture, and color permitted for the respective type. Color(s) will be selected by the Owner from Manufacturer's standard colors.
2. Prior to delivery of the associated material to the site, the Contractor shall submit the following product-specific documentation for approval:
 - a. Aggregates.
 - b. Sieve analysis per ASTM C136 for subbase, base, bedding and joint aggregate materials.
 - c. Minimum 3 lb. sample of each material for independent testing.
3. Concrete Pavers:
 - a. Test results from an independent testing laboratory for compliance to ASTM C936.
 - b. Safety Data Sheets (SDS).

1.4 QUALITY ASSURANCE

A. Contractor Qualifications:

1. Contractor shall submit a list of five (5) previously constructed projects of similar size and magnitude prior to the bid date to be qualified. Contact names, telephone numbers, and date of completion shall be listed for each project.
2. The Contractor's site foreman shall hold a PICP Specialist Designation from the Interlocking Concrete Pavement Institute (ICPI). The site foreman shall be onsite for the entire installation.
3. Contractor shall conform to all local, state/provincial licensing and bonding requirements.

B. Mockups: Build mockups to verify selections made under submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Install a 10 ft x 10 ft paver area following the installation practices described in this specification section. This area shall be used to verify joint sizes; lines; laying pattern(s); stitching details (for mechanical installation); color(s); and, texture of the job.
2. To provide a proper representation of color blend, blending during installation of sample mock-up will be pulled from a minimum of 3 cubes.
3. This area shall be the standard from which the work will be judged.
4. Subject to approval by the Owner, the mock-up may be retained as part of the finished work. If mock-up is not retained, remove and dispose of mock-up at the completion of the project.

C. Field Tests

1. Base material shall be tested by OWNER for required minimum density. Contractor shall coordinate with OWNER for the testing and shall provide access to the base material.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall coordinate delivery and paving schedule to minimize interference with normal use of the site.
- B. Contractor shall check all materials upon delivery to assure that the proper materials have been received and are in good condition before signing off on the manufacturer's packing slip.
- C. Contractor shall protect all materials from damage or contamination due to job site conditions and in accordance with manufacturer's recommendations. Damaged or contaminated materials shall not be incorporated into the work.
- D. Concrete pavers shall be delivered to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift. Unload and store concrete pavers at the job site in such a manner that no damage occurs to the product.
- E. Contractor shall handle and transport aggregates to avoid segregation, contamination, and degradation and keep different materials sufficiently separated as to prevent mixing. The material shall not be dumped or stored one material on top of another unless it is part of the installation process. Materials shall be covered to prevent removal by wind.

1.6 ENVIRONMENTAL CONDITIONS

- A. Pavers shall not be installed during heavy rain, freezing conditions or snowfall.
- B. Pavers shall not be installed on frozen soil subgrade or aggregates.

1.7 MAINTENANCE MATERIALS

- A. Provide 100 square feet of additional paver material for use by Owner for maintenance and repair.
- B. Store extra paver materials in Owner-designated location.

PART 2 PRODUCTS

2.1 PERMEABLE INTERLOCKING CONCRETE PAVERS

- A. Permeable Interlocking Concrete Pavers Basis-of-Design:
 1. Paver Name: Aqualine 4.5" x 9", or approved equal.
 - a. Thickness: 3-1/8 inches
 - b. Color: Color to be Selected by Owner
 - c. Finish: Standard (Smooth)
- B. Pavers shall meet the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units.

- 1) Measured length or width of test specimens shall not differ by more than +/- 0.063 in, while measured thickness shall not differ by more than +/- 0.125 in.
- 2) Average compressive strength of 8,000 psi (55 MPa) with no individual unit under 7,200 psi (50 MPa) when tested in accordance with ASTM C140.
- 3) Average absorption of 5% or less with no unit greater than 7% when tested in accordance with ASTM C140.
- 4) Pigment in Concrete Pavers shall conform to ASTM C979.

2.2 AGGREGATE MATERIALS

A. General Requirements:

1. Clean, non-plastic aggregate, free from deleterious or foreign matter, manufactured from crushed rock. Recycled aggregates shall not be used.
2. Percent of angular and sub-angular particles greater than 90%. Rounded river gravel shall not be used.
3. LA Abrasion of the aggregate used shall be less than 40 as per ASTM C131.
4. All aggregates shall be washed and have less than 2% passing the No. 200 (0.075 mm) sieve.
5. All aggregate material gradations shall be tested in accordance with ASTM C136.

B. Bedding Course/Joint Fill Material – open-graded aggregate conforming to the following gradation:

Note: No. 89 or No. 9 stone may be used as joint fill material. If No. 8 stone material is not available locally, No. 89 can be used as a bedding course if choke criteria is met with underlying base aggregate.

ASTM C33 size No. 8

<u>Sieve Size</u>	<u>Percent Passing</u>
1/2 in. (12.5 mm)	100
3/8 in. (9.5 mm)	85 to 100
No. 4 (4.75 mm)	10 to 30
No. 8 (2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5
No. 200 (0.075 mm)	0 – 2

C. Base Course Material - open graded aggregate conforming to the following gradation:

ASTM C33 size No. 57

<u>Sieve Size</u>	<u>Percent Passing</u>
1-1/2 in. (37.5 mm)	100
1 in. (25 mm)	95 to 100
1/2 in. (12.5 mm)	25 to 60
3/8 in. (9.5 mm)	0 to 10
No. 4 (4.75 mm)	0 to 5

No. 200 (0.075 mm) 0 – 2

- D. Subbase Course Material – open-graded aggregate conforming to the following gradation:

Note: ASTM No. 3 or No. 4 may be used as subbase material if No. 2 stone is unavailable locally.

ASTM C33 size No. 2

<u>Sieve Size</u>	<u>Percent Passing</u>
3 in. (75 mm)	100
2- 1/2 in. (63 mm)	90 to 100
2 in. (50 mm)	35 to 70
1-1/2 in. (37.5 mm)	0 to 15
3/4 in. (19 mm)	0 to 5
No. 200 (0.075 mm)	0 – 2

2.3 EDGE RESTRAINTS

- A. Edge restraints shall be cast in place concrete curbs in general conformance with the specifications and dimensions in the construction documents

PART 3 EXECUTION

3.1 GENERAL

- A. Prior to commencement of any work, the Contractor shall conduct a pre-construction meeting with the Owner, Designer, and affected sub-trades. The pre-construction meeting should establish contractor responsibilities and at a minimum verify:
1. The location of the mock-up, and whether it will be part of the final construction or need to be removed.
 2. The site layout is in general conformance to the construction documents. In particular, the location and elevation of discharge points (if any) of the pipe underdrains.
 3. The subgrade lines and elevations are in general conformance with the construction documents. The subgrade elevations shall be within +/- 0.1 ft of the specified grades.
 4. The minimum slope of subgrade shall be at least 0.5% or as specified in the design.
 5. Subgrade soil conditions and grades meet the requirements in the construction documents.
 6. The details of the site's erosion and sediment control plan.
- B. Proof-roll prepared subgrade according to project requirements to identify soft pockets and areas of excess yielding. Proceed with subbase installation only after deficient subgrades have been corrected. Scarify subgrade surface following any stabilization efforts before installing subbase course.
- C. Subgrade shall be compacted in accordance with the construction documents prior to placing subbase materials.

- D. Once the Contractor has confirmed the subgrade conditions are in general conformance with the requirements in the construction documents, the Contractor shall begin installing the subbase material. By initiating installation of the subbase material, the Contractor acknowledges acceptance of the subgrade.

3.2 INSTALLATION OF SUBBASE AND BASE COURSES

- A. Keep the area where the pavement is to be constructed free from sediment during the entire job. Any materials contaminated with sediment shall be removed and replaced with clean material.
- B. Install geotextiles as required in accordance with the specifications and drawings. The geotextile is applied to the bottom and sides of the excavation with overlapping joints a minimum of 24 inches. Overlaps to be constructed to “shingle” moisture from upstream panel to downstream panel. Allow for enough geotextile to exceed the final elevation of the surface. After completion of the surface, the excess geotextile should be cut flush with the finished grade.
- C. Install the subbase course and base course at the thicknesses, compaction rates, surface tolerances, and elevations outlined below.
 - 1. To prevent damage, tracked vehicles shall not be allowed directly on geomembranes.
 - 2. The aggregate should be spread and compacted in uniform layers not exceeding 6-inch loose thickness. Compaction is performed using either a 10 T (10 ton) vibratory roller or a minimum 13,500 lb-f centrifugal force reversible vibratory plate compactor. For each lift, make at least two passes in the vibratory mode and at least two passes in the static mode and continue compaction until there is no visible movement in the materials.
 - 3. Final subbase surface tolerance shall be plus or minus 0.1 ft over a 10-foot straight edge laid in any direction.
 - 4. Final base surface tolerance shall be plus or minus 3/4 inch over a 10-foot straight edge laid in any direction.
 - 5. Provide proper compaction near curbs, grade beams, concrete collars around utility structures, lights standards, tree wells, building edges and other protrusions as applicable to the project.
- D. Before starting to place the bedding course, the base shall be inspected and approved by the Owner.

3.3 INSTALLATION OF EDGE RESTRAINTS

- A. All concrete edge restraints shall be constructed to dimensions and grades in general conformance with the construction documents and shall be supported on a compacted base not less than 6-inch thick and meet project requirements.

3.4 INSTALLATION OF BEDDING COURSE, PAVERS, AND JOINT MATERIAL

- A. Spread the bedding course evenly over the base course and screed to a nominal 2 in. thickness utilizing an approved mechanical spreader or by screed rails and boards. Do not use the bedding material to fill depressions in the base course surface. Surface tolerances shall be +/- 3/8 inch over a 10-foot straight edge.

- B. Ensure that concrete pavers are free of foreign material before installation. Concrete pavers shall be inspected for color distribution and all chipped, damaged, or discolored concrete pavers shall be replaced. Initiation of concrete paver placement shall be deemed to represent acceptance of the pavers.
- C. Lay the concrete pavers in the pattern(s) shown on the drawings. Maintain straight pattern lines. For mechanical installations, follow the stitching details as submitted and verified during the mock-up.
- D. Paving units shall be installed simultaneously from a minimum of three bundles for hand installations, and six bundles for mechanical installations to provide proper color blending.
- E. Joints between the individual concrete pavers shall be uniformly maintained and installed in accordance with the in-place dimensions
- F. Fill gaps at the edges of the paved area with cut pavers or edge units. Do not install cut pavers smaller than one-third of a whole paver along edges subject to vehicular traffic – trim two pavers to fit.
- G. Cut pavers using a masonry saw or splitting device. Upon completion of cutting, the area must be swept clean of all debris.
- H. Using a low amplitude plate compactor capable of at least 5,000 lbs. (22 kN) compaction at a frequency of 75 Hz –100 Hz, compact and seat the concrete pavers into the bedding course.
- I. The pavers shall be compacted to achieve consolidation of the bedding course and brought to level and profile by not less than three passes. Initial compaction should proceed as closely as possible following the installation of the paving units and prior to the acceptance of any traffic.
- J. Any units that are structurally damaged during compaction shall be immediately removed and replaced.
- K. Apply the joint material to the surface and sweep into the joints and voids. Fill joints and voids then sweep off excess material before vibrating the material down into the joints using a plate compactor. This will typically require two to three passes with the plate compactor.
- L. Do not compact within 6 feet of unrestrained edges of the paving units.
- M. All work to within 6 feet of the laying face must be left fully compacted at the end of each day.
- N. Sweep off excess aggregate when the job is complete.

3.5 AS-BUILT CONSTRUCTION TOLERANCES

- A. Final inspection shall be conducted to verify conformance to the drawings after removal of excess aggregate. All pavements shall be finished to lines and levels to ensure positive drainage at all drainage outlets and channels.
- B. The final surface elevations shall not deviate more than +/- 3/8 inch under a 10 ft long straight edge.
- C. Lippage shall be no greater than 1/8-inch difference in height between adjacent pavers.
- D. Bond lines for the pavers shall be +/- 1/2-inch over a 50-foot string line.

- E. Verify the in-situ surface infiltration rate of the permeable pavement is a minimum of 100 in/hour using ASTM C1781.

3.6 MAINTENANCE AND PROTECTION

- A. At the completion of the work, the Contractor shall provide the Owner with the manufacturer's PICP System Operation and Maintenance Guidelines.
- B. Once the work is complete, the Owner shall be responsible for protecting the work from sediment deposition and damage due to subsequent construction activity on the site.
- C. The Contractor shall return to the site after 12 months from the completion of the work and conduct an inspection of the PICP System with the Owner, Designer, and Contractor in accordance with the PICP System Operation and Maintenance Guidelines. Deficiencies identified by the inspection will be repaired at the expense of the Contractor and to the satisfaction of the Owner.

END OF SECTION

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SECTION 32 31 19

STEEL FENCING

PART 1 SCOPE

1.1 DESCRIPTION OF WORK.

The work to be performed in accordance with this section includes the furnishing and placement of 8' steel fence.

All work and materials shall be in accordance with these technical specifications and "Uniform Standard Specifications for Public Works Construction," latest edition as adopted by City of Las Vegas (Hereby referred to as the Standard Specifications). In cases where there is a conflict between these technical specifications and the Orange Book the more stringent will apply.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 32 31 19.1 – Cantilever Rolling Gate
- B. Section 32 31 19.2 – Vertical Pivot Lift Gate
- C. Section 32 31 19.3 – Cantilever Swing Gate

1.3 SYSTEM DESCRIPTION

The manufacturer shall supply a total fence system of the **Ameristar Montage II** design, Invincible style or approved equal. The ornamental fence system shall be 8' height from finish grade. The system shall include all components (i.e., panels, posts, gates and hardware) required.

1.4 QUALITY ASSURANCE / REFERENCES

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- C. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- D. ASTM D523 - Test Method for Specular Gloss. 0020
- E. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.

- F. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- G. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- H. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- I. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- J. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- K. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.5 SUBMITTAL

- A. Shall be submitted and met the requirements of specification Section 01 33 00 - Submittals.
- B. The manufacturer's literature and shop drawings shall be submitted and approved prior to ordering the fencing material.

1.6 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.7 PRODUCT WARRANTY

- A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 20 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.
- B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufacturer's warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 MATERIALS

2.1 MANUFACTURER

- A. The fence system shall conform to Ameristar Montage II design, Invincible style, extended bottom picket, and 3-Rail style manufactured by **Ameristar Fence Products, Inc.**, in Tulsa, Oklahoma or approved equal.

2.2 MATERIAL

- A. Steel material for fence framework (i.e. tubular pickets, rails and posts), when galvanized prior to forming, shall conform to the requirements of ASTM A924/A924M, with a minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90.
- B. Material for fence pickets shall be 1" square x 14 Ga. tubing. The cross-sectional shape of the rails shall be steel channel 1.75" x 1.75" x 0.105". Picket holes in the rail shall be spaced 4.715" O.C. Fence posts and gateposts shall meet the minimum size requirements of Table 1 below.

<u>Fence Posts</u>	<u>Panel Height</u>		
2-1/2" x 12 Ga.	Up to & Including 6' Height		
3" x 12 Ga.	Over 6' Up to & Including 8' Height		
<u>Gate Leaf</u>	<u>Gate Height</u>		
	<u>Up to & Including 4'</u>	<u>Over 4' Up to & Including 6'</u>	<u>Over 6' Up to & Including 8'</u>
Up to 4'	2 1/2" x 12Ga.	3" x 12 Ga.	4" x 11 Ga.
4'1" to 6'	3" x 12Ga.	3" x 12 Ga.	4" x 11 Ga.
6'1" to 8'	4" x 11 Ga.	4" x 11 Ga.	6" x 3/16"
8'1" to 10'	4" x 11 Ga.	6" x 3/16"	6" x 3/16"
10'1" to 12'	6" x 3/16"	6" x 3/16"	6" x 3/16"
12'1" to 16'	6" x 3/16"	6" x 3/16"	8" x 1/4"

2.3 FABRICATION

- A. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.
- B. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to-rail intersection by welding, thus completing the rigid panel assembly
- C. The manufactured panels and posts shall be subjected to an inline electrodeposition coating (E-Coat) process consisting of a multi-stage pretreatment/wash, followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be Black. The coated panels and posts shall be capable of meeting the performance requirements for each

quality characteristic shown in Table 2 (Note: The requirements in Table 2 meet or exceed the coating performance criteria of ASTM F2408).

- D. Pedestrian swing gates shall be self-closing, having a gate leaf no larger than 48" width. Integrated hinge-closer set (2 qty) shall be ADA compliant that shall include a variable speed and final snap adjustment with compact design (no greater than 5" x 6" footprint). Hinge-closer set (2 qty) shall be tested to a minimum of 500,000 cycles and capable of self-closing gates up to a maximum gate weight of 260 lbs. and maximum weight load capacity of 1,500 lbs. Hinge-closer device shall be externally mounted with tamper-resistant security fasteners, with full range of adjustability, horizontal (.5" - 1.375") and vertical (0 - .5"). Maintenance free hinge-closer set shall be tested to operate in temperatures of negative 20 F to 200 F degrees, and swings to negative 2 degrees to ensure reliable final lock engagement. Gates to be equipped Best Lock 8K Series Storeroom lock with core. Contractor to provide four keys.

Table 2 – Coating Performance Requirements		
<u>Quality Characteristics</u>	<u>ASTM Test Method</u>	<u>Performance Requirements</u>
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 3,500 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

- E. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for Industrial weight fences under ASTM F2408.

PART 3 - EXECUTION

3.1 PREPARATION

- A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 INSTALLATION

- A. Fence post shall be spaced according to Table 3 below, plus or minus 1/2". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36". The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

Table 3 – Montage II – Post Spacing By Bracket Type							
Span	8' Nominal (92" Rail)						
Post Size	2-1/2"	3"	2-1/2"	3"			
Bracket Type	Industrial Flat Mount (BB301)		Industrial Line (BB310) 2-1/2" (BB319) 3" (BB320)		Not Used		Not Used
Post Settings ± 1/2" O.C.	94-1/2"	95"	94-1/2"	95"			

3.3 FENCE INSTALLATION MAINTENANCE

- A. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces;
1. Remove all metal shavings from cut area.
 2. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry.
 3. Apply 2 coats of custom finish paint matching fence color.
 4. Manufacturer supplied spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray.
 5. Use of non-fence manufacturer parts or components will not be acceptable.

3.4 GATE INSTALLATION

- A. Shall be as specified in the gate specifications.

3.5 CLEANING

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION

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SECTION 32 31 19.1

STEEL CANTILEVER SLIDE GATES

PART 1 GENERAL

1.1 DESCRIPTION

The contractor shall provide all labor, materials, and appurtenances necessary for installation of the industrial cantilever gate system defined herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 33 00: Submittals
- B. Section 32 31 19: Steel Fence

1.3 SYSTEM DESCRIPTION

- A. The manufacturer shall supply a total industrial ornamental cantilever gate system of the **Ameristar® TransPort II** design, Classic style or approved equal. The system shall include all components (i.e., tracks, uprights, bracing, pickets, hardware, fittings, fasteners, and operator) required.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.5 REFERENCES

- A. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- B. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- C. ASTM D523 - Test Method for Specular Gloss.
- D. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- E. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.

- F. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- G. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- H. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- I. ASTM F1184 – Industrial & Commercial Horizontal Slide Gates.
- J. ASTM F2200 – Standard Specification for Automated Vehicular Gate Construction
- K. UL 325 – Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- L. NEMA ICS 6 – Industrial Control Systems: Enclosures.

1.6 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft.

1.7 WARRANTY

- A. Products from qualified manufacturer's standard limited warranty covering cantilever slide gate, truck assembly, and operator against failure resulting from normal use for period of 5 years from date of purchase. Failure is defined as any defect in manufacturing that prevents the gate from operating in a normal manner.

1.8 SUBMITTALS

- A. The manufacturer's submittal package shall consist of gate elevations, hardware details, operators, and installation details, shall be submitted per specification requirements.
- B. Cantilever Rolling Gate submittal shall be submitted at the same time as the Steel Fencing Submittal 32 31 19.
- C. Operations and Maintenance manuals.
- D. Shall be submitted and meet the requirements of specification Section 01 33 00 - Submittals.

PART 2 MATERIALS

2.1 MANUFACTURER

- A. Products from qualified manufacturers having a minimum of 5 years experience manufacturing cantilever slide gate and operator will be acceptable as equal, if approved in writing, ten days prior to bidding, and if they meet all of the following specifications for design, size gauge of metal parts and fabrication.
- B. Obtain fences and gates, including accessories, fittings, and fastening, from a single source.
- C. Approved Manufacturers:
 - 1. Gate: **Ameristar Fence Products, Inc.**, in Tulsa, Oklahoma or approved equal.
 - 2. Operator: **DoorKing, Inc.** Inglewood, California or approved equal

2.2 CANTILEVER SLIDE GATES

- A. The manufacturer shall supply a total industrial ornamental cantilever gate system of the **Ameristar® TransPort II** design, Classic style or approved equal. The system shall include all components (i.e., tracks, uprights, bracing, pickets, hardware, fittings, fasteners, and operator) required.
- B. The materials used for cantilever gate framing (i.e., uprights, diagonal braces and pickets or pales) shall be manufactured from ASTM B221 aluminum (designation 6063-T-6) with a yield strength of 25,000 PSI, a tensile strength of 30,000 PSI and a standard mill finish. The **TransPort® Fast-Trak™** rails or approved equal shall be manufactured from ASTM B221 aluminum (designation 6063-T-6) with minimum yield strength of 25,000 PSI, a tensile strength of 30,000 PSI and a standard mill finish.
- C. Material for diagonal bracing and uprights shall be 2" sq. x 1/4" aluminum. The design of the top and bottom enclosed track shall conform to the manufacturers 5" x 2" Fast-Trak system or approved equal. Material for pickets shall be 1" x 1/8" wall aluminum.
- D. Internal roller truck assembly shall be self-aligning swivel ball-and-socket type running on four bearing wheels. Internal roller truck assembly shall be affixed to the hanger bracket by means of a 5/8" diameter industrial-grade rod end/center bolt, with a minimum static load rating of 10,000 pounds. Attachment of the center bolt to the truck body shall be by means of a swivel joint to ensure equivalent and consistent loading on all bearing wheels and internal track surfaces throughout the travel of the gate.

2.3 FABRICATION

- A. Pickets, enclosed track, uprights and diagonal bracing shall be pre-drilled and labeled for easy assembly. All components shall be precut to specified lengths.
- B. Top and bottom rail extrusions shall be mechanically fastened to vertical uprights and reinforced with diagonal braces, as required by drawing.

- C. The manufactured components shall be subjected to the Ameristar thermal stratification coating process (high-temperature, in-line, multi-stage, and multi-layer) including, as a minimum, a six-stage pretreatment/wash and an electrostatic spray application of a polyester finish or an equivalent process. The topcoat shall be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm) or approved equal. The color shall be Black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 1.

Table 1 – Coating Performance Requirements		
Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 3,500 hours (Scribed per D1654; failure mode is accumulation of 1/8” coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625” ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

- D. Finish and Style to match fence as specified in 32 31 19 – Steel Fencing.

2.4 GATE OPERATOR

- A. The manufacturer shall supply a DoorKing Model 9100 electric slide gate operator or approved equal. The system shall include all components and items for a complete and operable system.
- B. Microprocessor based solid-state control board interacting with card readers, RF transmitters, access control systems, ticket machines, other activating devices as required, external devices (photo-eyes, contact edges) for entrapment protection and vehicle (loop) sensing systems. Control board shall include built-in close timer (1-25 seconds), built-in ports for two (2) plug-in loop detectors, partial open input, programming switches to set various operating modes, inherent magnetic pulse obstruction sensing reverse system. System shall employ Fail-Safe operation upon primary (AC) power outage.
1. Compliance: Compliant to UL 325, UL 991 and CSA C22.2 No. 247
 - a. This model is intended for use in Class I, II, III and IV vehicular slide gate applications.
 2. Operator speed: approximately 11-inches per second.
 3. Enclosure: 12 gage, 0.108 inch (2.6 mm) G90 hot-dipped galvanized steel, finished with polyester powdercoat, exterior grade semi-gloss texture gray.
 4. Mounting: Pad mount.

5. Electrical Power Requirements: 115 VAC.
6. Motor: 1/2 HP, continuous duty.
7. Dead Bolt Lock: Solenoid dead bolt engages if an attempt is made to force the gate open.
8. Fail-Safe Operation: Upon loss of primary (AC) power, system shall automatically be transferred to a fail-safe mode allowing the gate to be pushed open without the use of special knowledge, keys or other releasing mechanisms.
9. Primary Reduction: Adjustable clutch, single cog belt drive train.
10. Pulling Medium: #40 roller chain
11. Magnetic Limit Switches: Automatic setting with no mechanical switches to set, wear out or break.
12. Operating Switches: Built-in power (on-off), reset and operating switches.
13. Convenience Outlets: Two (2) 115 VAC for accessory transformers.
14. Entrapment Protection:
 - a. Photo-electric eye (non-contact sensor).
 - b. Sensing edge (contact sensor).
15. Key pad.
16. Traffic loop detector.

2.5 SETTING MATERIALS

- A. Concrete: Per specification Section 03 33 00.

PART 3 EXECUTION

3.1 PREPARATION

- A. All new gate installations shall be laid out by the contractor in accordance with the construction plans.
- B. All hardware shall be installed in accordance with the Transport installation instructions. Transport cantilever gates shall be installed so they comply with current ASTM F2200 & UL325 standards.
- C. Gate stops shall be installed on each track in a way that conforms to current ASTM F2200 standards.

3.2 GATE INSTALLATION

- A. Gate post shall be spaced according to specified gate elevation. Posts shall be set in concrete footers having a minimum depth of 48" with a minimum diameter of 12" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

- B. Gate operator shall be tested to demonstrate that the system and all components are working in proper order, the gate fully opens and closes, and that the gate does not bind during opening or closing.

3.3 CLEANING

The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION

SECTION 32 31 19.3
STEEL SWING GATES

PART 1 GENERAL

1.1 DESCRIPTION

The contractor shall provide all labor, materials, and appurtenances necessary for installation of the industrial swing gate system defined herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01 33 00: Submittals
- B. Section 03 33 00: Concrete
- C. Section 32 31 19: Steel Fence

1.3 SYSTEM DESCRIPTION

- A. The manufacturer shall supply a swing gate system of the **Ameristar® Montage II** design, Classic or Invincible style as noted on the plans or approved equal. The system shall include all components (i.e., uprights, bracing, pickets, hardware, fittings, fasteners, and operator) required.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.5 REFERENCES

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- C. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- D. ASTM D523 - Test Method for Specular Gloss.
- E. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.

- F. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- G. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- H. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- I. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- J. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- K. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.
- L. UL 325 – Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- M. NEMA ICS 6 – Industrial Control Systems: Enclosures.

1.6 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft.

1.7 WARRANTY

- A. Products from qualified manufacturer's standard limited warranty covering swing gate, hardware, and operator against failure resulting from normal use for period of 5 years from date of purchase. Failure is defined as any defect in manufacturing that prevents the gate from operating in a normal manner.

1.8 SUBMITTALS

- A. The manufacturer's submittal package shall consist of gate elevations, hardware details, operators, and installation details, shall be submitted per specification requirements.
- B. Swing Gate submittal shall be submitted at the same time as the Steel Fencing Submittal 32 31 19.
- C. Operations and Maintenance manuals.
- D. Shall be submitted and meet the requirements of specification Section 01 33 00 - Submittals.

PART 2 MATERIALS

2.1 MANUFACTURER

- A. Products from qualified manufacturers having a minimum of 5 years of experience manufacturing steel swing gates and operators will be acceptable as equal, if approved in writing, ten days prior to bidding, and if they meet all of the specifications for design, size, coating, gauge of metal parts and fabrication.
- B. Obtain fences and gates, including accessories, fittings, and fastening, from a single source.
- C. Obtain gate operators, including accessories, fittings, fastenings, motors, controls panels, from a single source.
- D. Approved Manufacturers:
 - 1. Gate: **Ameristar Fence Products, Inc.**, in Tulsa, Oklahoma or approved equal.
 - 2. Operator: **DoorKing, Inc.** Inglewood, California or approved equal

2.2 SWING GATES

- A. The manufacturer shall supply a swing gate system of the **Ameristar® Montage II** design, Classic or Invincible style as noted on the drawings or approved equal. The system shall include all components (i.e., uprights, bracing, pickets, hardware, fittings, fasteners, and operator) required.
- B. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (310 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90.
- C. Swing gates shall be fabricated using 1.75" x 14ga Forerunner double channel rail, 2" sq. x 12ga. gate ends, and 1" sq. x 14ga. pickets. Picket holes in the rail shall be spaced 4.715" o.c. Gate leaves that exceed 6' in width shall have a 1.75" sq. x 14ga. intermediate upright. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding. Gusset plates shall be welded at each upright to rail intersection. Cable kits shall be provided for additional trussing for all gates leaves over 6'.
- D. Swing gates shall be single or double leaf gates as indicated on the plans and have the dimensions noted.

2.3 FABRICATION

- A. Pickets, uprights and diagonal bracing shall be pre-drilled and labeled for easy assembly. All components shall be pre-cut to specified lengths.
- B. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and

rails shall be joined at each picket-to-rail intersection by a fusion welding process, thus completing the rigid panel assembly.

- C. The manufactured panels and posts shall be subjected to an inline electrodeposition coating (E-Coat) process consisting of a multi-stage pretreatment/wash, followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be Black.
- D. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for Industrial weight fences under ASTM F2408.
- E. Finish and Style to match fence as specified in 32 31 19 – Steel Fencing.

2.4 GATE OPERATOR

- A. The manufacturer shall supply a DoorKing Model 6300 electric gate operator or approved equal. The system shall include all components and items for a complete and operable system.
- B. A dedicated gate operator shall be provided for each gate leaf. A single control panel shall be provided for double leaf gates that controls both operators.
- C. Microprocessor based solid-state control board interacting with card readers, RF transmitters, access control systems, ticket machines, other activating devices as required, external devices (photo-eyes, contact edges) for entrapment protection and vehicle (loop) sensing systems.
- D. Control board shall include built-in close timer (1-25 seconds), dual-gate overlap feature, built-in ports for two (2) plug-in loop detectors, programming switches to set various operating modes, inherent magnetic pulse obstruction sensing reverse system. System shall employ Fail-Safe operation upon primary (AC) power outage.
 - 1. Compliance: Compliant to UL 325, UL 991 and CSA C22.2 No. 247
 - a. This model is intended for use in Class I, II, III and IV vehicular swing gate applications.
 - 2. Operator speed: approximately 90-degrees in 17 seconds.
 - 3. Enclosure: Polyethylene .125-inch texture gray.
 - 4. Frame: G90 hot dipped 10 gage galvanized steel.
 - 5. Mounting: Pad mount.
 - 6. Electrical Power Requirements: 115 VAC.
 - 7. Motor: 1/2 HP (minimum), continuous duty.
 - 8. Fail-Safe Operation: Upon loss of primary (AC) power, system shall automatically be transferred to a fail-safe mode allowing the gate to be pushed open without the use of special knowledge, keys or other releasing mechanisms.

9. Primary Reduction: Adjustable clutch, single cog belt drive train to worm reduction gear.
10. Magnetic Limit Switches: Automatic setting with no mechanical switches to set, wear out or break.
11. Operating Switches: Built-in power (on-off), reset and operating switches.
12. Magnetic Limit Switches: Automatic setting with no mechanical switches to set, wear out or break.
13. Operating Switches: Built-in power (on-off), reset and operating switches.
14. Convenience Outlets: Two (2) 115 VAC for accessory transformers.
15. Entrapment Protection:
 - a. Photo-electric eye (non-contact sensor).
 - b. Sensing edge (contact sensor).
16. Key pad.
17. Traffic loop detector.

2.5 SETTING MATERIALS

- A. Concrete: Per specification Section 03 33 00.

PART 3 EXECUTION

3.1 PREPARATION

- A. All new gate installations shall be laid out by the contractor in accordance with the construction plans.
- B. All hardware shall be installed in accordance with the manufacturer's installation instructions. Montage II gates shall be installed so they comply with current ASTM F2200 & UL325 standards.
- C. Gate stops shall be installed in a way that conforms to current ASTM F2200 standards.

3.2 GATE INSTALLATION

- A. Gate post shall be spaced according to specified gate elevation. Posts shall be set in concrete footers having a minimum depth of 48" with a minimum diameter of 12" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

- B. Gate operator shall be tested to demonstrate that the system and all components are working in proper order, the gate fully opens and closes, and that the gate does not bind during opening or closing.

3.3 CLEANING

The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION

SECTION 32 82 00
PLANTING IRRIGATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Piping
2. Automatic control valves.
3. Quick couplers.
4. Drip irrigation specialties.
5. Boxes for automatic control valves.
6. All labor, materials, equipment, and appurtenances necessary for a complete and functioning irrigation system.

1.2 DEFINITIONS

- A. Lateral Piping: Downstream from control valves to outlet devices, specialties, and drain valves. Piping is under pressure during flow.
- B. Mainline Piping: Downstream from point of connection to water distribution piping to, and including, isolation valves, control valves and quick couplers. Piping is under water distribution system pressure.
- C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50V or for remote-control, signaling power-limited circuits.

1.3 PERFORMANCE REQUIREMENTS

- A. Irrigation zone control shall be automatic operation with controller and automatic control valves.
- B. Location of Emitters and Specialties: Design location is approximate. Make adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage for all plants and of areas indicated.
- C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
 1. Irrigation Mainline Piping: 200 psig (1380 kPa).
 2. Lateral Piping: 150 psig (1035 kPa).

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Wiring Diagrams: For power, signal, and control wiring.
- C. Coordination (“As-built”) Drawings: Irrigation systems, drawn to scale, on which components are shown and coordinated with each other, using input from Installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions such as signs and light standards.
- D. Zoning Chart: Show each irrigation zone and its control valve on existing charts for existing controller located in the pool room.
- E. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
- F. Field quality-control reports.
- G. Operation and Maintenance Data: For controllers and automatic control valves to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic piping protected from direct sunlight. Support pipe to prevent sagging and bending.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Emitters: Equal to one percent of amount installed for each type indicated, but no fewer than 10 units.
 - 2. Drip-Tube System Tubing (Flexible PVC): Equal to one percent of total length in-stalled for each type and size indicated, but not less than 100 feet (30 m).
 - 3. Valve Keys: Provide 2 quick-coupling valve keys.

PART 2 PRODUCTS

2.1 PIPES, TUBING AND FITTINGS

- A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

- B. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedules 40 and 80 and ASTM D 2241 for Class 200 and 315.
 - 1. PVC Socket Fittings: ASTM D 2466, Schedule 40.
 - 2. PVC Threaded Fittings: ASTM D 2464, Schedule 80.
 - 3. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.
 - 4. PVC Socket Fittings: ASTM D 2467, Schedule 80.
 - 5. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.

2.2 PIPING JOINING MATERIALS

- A. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 MANUAL VALVES

- A. Bronze Ball Valves – 2 1/2 inches and smaller:
 - 1. Two-Piece Ball Valve, rated 150 psi SWP and 600 psi non-shock WOG and shall have 2-piece cast bronze bodies, TFE seats, full port, and separate pack nut with adjustable stem packing, anti-blowout stems and chrome-plated brass/bronze ball. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS SP-110. Equal to NIBCO T580-70 (threaded); S580-70 (solder).
 - 2. Use for isolation valves and for shut-off valves with the remote control valves.
 - 3. Plastic Ball Valves: per plan or as required.

2.4 AUTOMATIC CONTROL VALVES

- A. Plastic, Automatic Control Valves: per plan.
 - 1. Shall be completely serviceable while installed in line or shall have a union connection on the downstream side; shall have body and bonnet constructed of heavy-duty glass-filled nylon with stainless steel studs molded into the body; flow control device; one-piece solenoid with captured plunger and spring for easy servicing; manual internal bleed for operating the valve and not allowing water into the valve box; external bleed for flushing debris from the valve; normally closed, forward flow design, and globe configuration.
 - 2. Valve shall operate between from 20 to 200 psi, flow of 0.25 to 200 gpm.
 - 3. Valve shall operate on approximately 24 volts, be normally closed, and be slow-closing. Valve shall open and close properly at the flows required for the project.
- B. Controller I.D. and Station Number Tag: Plastic tag approximately 2 inches square with band to secure it to the valve wires. Lettering shall be permanently embossed into the tag and shall identify the Controller I.D. and Station Number (“A-18”).

2.5 BUBBLERS

As noted on the plans.

2.6 QUICK-COUPLING VALVE AND VALVE KEY

- A. Quick-coupling Valve: Factory-fabricated, bronze or brass, two-piece, spring-loaded, compression type, normally closed, opening against line pressure assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap. Inlets shall be tapped for National Standard pipe thread of the pipe riser size or sizes shown on the drawings. Valves shall be suitable for operation pressure from 5 to 125 psi and flow of 10 to 125 gpm.
- B. Valve Key: Key shall twist into top of quick-coupling valve to provide water access. Constructed of same material as the valve body with galvanized pipe handle and shall be from same manufacturer as the quick-coupling valve. Provide with a 360 degree brass hose thread swivel. Provide two valve keys unless otherwise specified herein or on the plans.

2.7 DRIP IRRIGATION SPECIALTIES

- A. Single-outlet Drip Emitters: Device to deliver water at approximately 30-40 psi.
 - 1. Body Material: PE or vinyl, with flow control. Emitters shall be of the permanently assembled, pressure compensating, single outlet type with 1/2" FPT inlet. The flow rate per outlet shall be nearly the same at inlet pressures of 15 to 50 psi. The single outlet emitter manufacturer and model shall be as noted on the Project Plans.
 - 2. Riser to Emitter: PVC flexible tubing, 1/2-inch outside diameter or 1/4" poly tubing for barbed type emitters specified in pots.
- B. Application Pressure Regulators: Not required due to the low pressure of the utility water distribution system.
- C. Flexible PVC Pipe:
 - 1. Flexible thick-wall PVC Flex Hose (flexible PVC) shall contain a special chemical that inhibits the growth of algae within the hose. It is compatible with of-the-shelf fittings, adaptors, adhesives, most emitters as well as chemicals and fertilizers normally used in irrigation systems. Pipe size: 1/2-inch, 0.68 O.D., 0.090 Wall; max. 0.84 diameter.
 - 2. Use where specified on the plans.
 - 3. Joints: Solvent welded conforming to the manufacturer's instructions. Male adapter fittings shall be solvent welded to the end of the emitter riser to accept the threaded emitter.
- D. Filter Units – Non-Pressure Regulating:
 - 1. Basket type glass-filled nylon body with removable, 200 mesh, stainless steel screen; male pipe threads on ends, 3/4-inch or 1-inch to match the valve size.

2. Quick filter replacement by removing threaded top with O-ring and indicator that tells when to clean the filter. Shall have a no-spill feature to make sure dirt doesn't fall back into the filter during cleanup operation.

E. Air Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.

2.8 CONTROLLERS

A. Description:

1. Controller Stations for Automatic Control Valves: Each station is variable from approximately one minute to 12 hours. Include switch for manual or automatic operation of each station.
2. Exterior or Interior Controller Enclosures: Manufacturer provided weatherproof, with locking cover and two matching keys; include provision for grounding.
 - a. Body Material: Stainless steel, enamel-coated sheet metal or durable weather-resistant plastic.
 - b. Mounting: Wall-mounted.
3. Control Transformer: 24-V secondary, with primary fuse.
4. Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, four independent programs that can overlap, 8 start times per program.
 - a. Manual or Semi-automatic Operation: Allows this mode without disturbing preset automatic operation.
 - b. Program Day Cycles: Custom days of the week, odd and even days, skip days.
 - c. Season Adjust: Allow seasonal adjustment from 0 percent to 300 percent (16 hours maximum station run time).
 - d. Water Management: Rain delay, programmable station delay by program, weather sensor programmable, program season adjust, global monthly seasonal adjust.
 - e. Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during power outages.
 - f. Surge Protection: Metal-oxide-varistor type on each station and primary power.
5. Moisture Sensor: Adjustable from one to seven days, to shut off water flow during rain.
6. Wiring: UL 493, Type UF solid annealed copper conductor insulated with polyvinyl chloride (PVC) compound, abrasion, acid, chemical, oil and moisture resistant, suitable for direct burial.
 - a. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.

- b. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench. Wire size for common ground wires shall be #2 AWG or as noted on the drawings.
- c. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

2.9 VALVE ACCESS BOXES

A. Plastic Boxes:

- 1. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
 - a. Size: As required to easily hold irrigation components and allow easy access for servicing all components within the box without removing the box.
 - b. Shape: Rectangular, except for drip line flush valves that may be round.
 - c. Lid lettering: Controller and station number ("A-18") branded into lid; Quick-coupling valve ("QC"); Isolation valve ("IV"); Flush cap access valve ("FV"). Remove control valve boxes shall also be permanently marked with the words "Control Valve" or "Irrigation".
 - d. Boxes shall have lockable covers.
- B. Drainage Backfill: Clean 3/8-inch pea gravel, minimum of 4 inches deep placed in the bottom of each box. Maintain a minimum of 3 inches clear between the bottom of the valves and the top of the gravel.

2.10 DETECTABLE MARKING TAPE

A. Detectable marking tape to be installed above all mainlines.

- 1. Shall be a five-mil thick, five-ply composition, polyethylene tape. The tape shall have a 20-gauge solid aluminum foil core that is encapsulated within the polyethylene material. The tape shall be three inches (3") wide.
- 2. Tape for Reclaimed Water Irrigation Systems: Tape shall have the words "CAUTION, RECYCLED / RECLAIMED WATER LINE BELOW" printed at regular intervals. Tape color shall be purple.
- 3. Tape for Potable Water Irrigation Systems: Tape shall have the words "CAUTION, IRRIGATION LINE BELOW" printed at regular intervals. Tape color shall be green.

PART 3 EXECUTION

3.1 UTILITY STAKING

- A. Contractor shall request that the project be Blue Staked prior to the start of any excavation or trenching work. Blue Staking shall be kept current during the course of the project, including location of all utilities installed under the Work of this contract. All utilities damaged by the

Contractor shall be repaired or replaced by the Contractor, as required by the Owner or appropriate utility company, at the Contractor's expense.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 31.
- B. Trench excavations shall bed straight and true with uniform bottom for bearing of pipe.
- C. Provide minimum cover over top of underground piping, unless otherwise specified on the plans, according to the following:
 - 1. Irrigation Mainline Piping: Minimum depth of 18 inches below finished grade and 18 inches below bottom of structures or hardscape features.
 - 2. Lateral Piping: 12 inches below finish grade and 18 inches below bottom of structures or hard-scape features.
 - 3. Sleeves: 18 inches below finish grade and below bottom of structures or hardscape features.
 - 4. Control and Common Wires: 6 inches below irrigation piping, but not less than 18 inches below finish grade.
 - 5. Communication Cable / Conduit: 18 inches.
 - 6. Detectable Marking Tape over Mainline: 8 inches below finish grade or below bottom of hardscape.

3.2 LAYOUT

- A. Layout of Irrigation System: Prior to the start of trenching and excavation work, the Contractor shall layout the irrigation system, staking out the location of mainlines, remote control valves, lateral lines and other equipment as shown on the drawings. All deviations from the layout shown on the drawings impacting the length of piping runs or the configuration of the system shall be approved by the NDOT representative. Obtain Landscape Architect's approval of the staked locations before excavation.

3.3 PIPING INSTALLATION

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. In-stall piping as indicated unless deviations are approved on Coordination Drawings.
- B. Install piping free of sags and bends.
- C. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- D. Install fittings for changes in direction and branch connections.
- E. Install unions adjacent to valves and to final connections to other components.
- F. Install expansion loops in control-valve boxes for plastic piping.
- G. Lay piping on solid sub-base, uniformly sloped without humps or depressions.

- H. Install PVC piping in dry weather when temperature is above 40 deg F (5 deg C). Allow joints to cure at least 24 hours at temperatures above 40 deg F (5 deg C) before testing.
- I. Install piping in sleeves under parking lots, roadways, sidewalks and other hardscaping.
- J. Install sleeves made of Schedule 40 PVC pipe and socket fittings, and solvent-cemented joints.

3.4 PLACEMENT OF SLEEVES AND MAINLINE / LATERAL LINE PIPE

- A. Sleeves: Sleeves shall be installed as detailed. Separate sleeve shall be provided for pipe and control wire. Sleeve size shall be as noted. If not noted, the sleeve shall be a minimum of two standard pipe sizes larger than the pipe enclosed.
- B. Mainline and Lateral Line Pipe: Place select backfill material in bottom of trench as detailed before laying pipe. Do not install pipe in trench that is wet or when conditions are otherwise unsuit-able for the Work. Keep inside of pipe clean during installation. Snake pipe from side to side of trench to allow for expansion and contraction. Provide 2-inch minimum vertical and horizontal clearance between irrigation pipes. Provide 12-inch minimum clearance between irrigation pipes and pipe, conduit, or cable of other trades.

3.5 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel and copper pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Only Sch. 80 PVC plastic pipe may be threaded. Install pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified. Thread compound may only be used on steel or copper pipe connections, 1 1/4 inches and larger.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 3. PVC Non-pressure Piping: Join according to ASTM D 2855 and the pipe manufacturer's instructions.

3.6 CONTROL WIRE INSTALLATION

- A. Control Wiring: Wires shall be snaked in trench locations shown on drawings at a uniform depth of 18 inches minimum relative to finish grade. A minimum of 1 foot in every 10 feet of trench shall be in excess for snaking the wire. Where ever possible, mainline trenches shall be used for installation of wire. Tie a loose 20-inch loop in all wiring at changes of direction of greater than 30 degrees and untie all loops after all connections have been made. All wiring shall be taped together every 10 feet using plastic electrical tape wrapped at least 2 times around the bundle of wires.
- B. Wire Splices: Each end of the control or "hot" wire and the common or "ground" wire shall be brought to the remote-control valve and a coil of wire shall be neatly looped in the access box as detailed. Splices shall be made using waterproof wire splices. Wire shall be spliced at remote control valve locations only.

3.7 INSTALLATION OF VALVES

A. Valves:

1. All valves shall be installed prior to the hydrostatic test.
2. Isolation valves, ball valves, remote control valves and quick coupling valves shall be installed as detailed.
3. Use Teflon tape on all threaded joints. No pipe thread compound shall be used.
4. On each valve attach a plastic tag with the Controller I.D. and Station Number ("A-18") on each tag. Letters shall be a minimum of 3/4-inch high.

3.8 INSTALLATION OF VALVE ACCESS BOXES

A. Valve Access Boxes:

1. Install valve access boxes such that top of box is parallel to and flush with the surrounding finished grade, or as detailed.
2. Provide gravel sumps and brick footings or as detailed.
3. Where more than one access box is to be installed in a given location, group boxes together and keep boxes within a uniform alignment. Provide 12 inches of clear space between adjacent valve boxes. Provide adequate clearance around enclosed valves to allow for valve operation and/or removal.

3.9 DRIP IRRIGATION SPECIALTY INSTALLATION

- A. Install single-outlet emitters on flexible PVC pipe riser to the mounting height indicated.
- B. Emitters shall be located as shown on the plans.
 1. Tree emitters shall be equally spaced around the perimeter of the tree as indicated. In no case shall the emitters be grouped around the base of the tree.
 2. Emitters for shrubs with one emitter shall be placed approximately 14 inches from the center of the shrub.

3. Emitters for shrubs with two emitters shall be placed approximately 16 inches from the center of the shrub, equally spaced around the perimeter.

3.10 AUTOMATIC IRRIGATION CONTROLLER INSTALLATION

- A. Equipment Mounting: Securely mount to the building wall. Coordinate the exact location with the electrical and general contractors.
 1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Sleeves: Coordinate location for control wire sleeve from the exterior of the building to rise directly under the controller. Verify that a long-sweep ell is used below the floor slab.
- C. Power: Coordinate provisions for power to operate the irrigation controller with the electrical and general contractors.
- D. Control Wiring: Install control wires in same trench as irrigation piping and at least 6 inches (150 mm) below piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.11 CONNECTIONS

- A. Install piping adjacent to equipment, valves, and devices to allow for proper service and maintenance.
- B. Connect wiring between controllers and automatic control valves.

3.12 IDENTIFICATION

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.
- B. Valves: As specified under "Installation of Valves".

3.13 FIELD QUALITY CONTROL

- A. Flushing and Pressure Testing of Mainline:
 1. Notification: The Contractor shall notify the NDOT representative of his intent to perform pressure testing 72 hours prior to the scheduled test time. Except as otherwise approved, all tests shall be performed in the presence of the NDOT representative. The entire mainline shall be test-ed at one time except for instances where project phasing requires testing of individual segments of the mainline system.
 2. Tools and Equipment: The Contractor shall furnish all tools, materials, fittings, and equipment required for testing and shall make all temporary connections.
 3. Trench and Backfill Conditions for Testing: The trench(es) shall not be backfilled until pressure testing of mainline has been successfully completed. Center loading of mainline pipe during testing is acceptable. All joints shall be exposed during testing operations.

4. Flushing: After all mainline piping and risers are connected in place and all related work is complete, open each control valve(s) and use a full head of water to flush the mainline system.
 5. Testing: The mainline shall be tested at a pressure of 100 psi for a period of 4 hours. For acceptance, the original test pressure shall be maintained for the duration of the test.
 6. Repairs: All leaks or defects which develop under pressure testing shall be promptly repaired and the test repeated until satisfactory results have been achieved. Repairs shall be made using only materials and procedures specified herein.
- B. Electrical Testing:
1. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment
- C. Any irrigation product will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.14 ADJUSTING

- A. Adjust settings of controllers.
- B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each circuit.
- C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2 inch (13 mm) above, finish grade.

3.15 CLEANING

- A. Maintain the site and work area in a clean condition at all times. Properly dispose of debris and refuse daily. Maintain sidewalks clean and usable at all times. Do not pile soil against building walls or other structures, or on top of curbs, paving and sidewalks.

3.16 PIPING SCHEDULE

- A. Install components having pressure rating equal to or greater than system operating pressure.
- B. Underground irrigation mainline piping shall be as follows, unless specified otherwise on the plans:
 1. Sch. 40 PVC pipe and Sch. 80 socket fittings, with solvent-cemented joints.
- C. Lateral piping shall be one of the following:
 1. Schedule 40, PVC pipe and socket fittings, with solvent-cemented joints.
 2. Class 200 PVC, pressure-rated pipe with Schedule 40, PVC socket fittings and solvent-cement-ed joints.

- D. Piping for Remote Control Valve Assemblies:
 - 1. Sch. 80 PVC threaded pipe and Sch. 80 PVC threaded fittings.
- E. Underground Branches and Offsets at Devices: Schedule 80 PVC pipe, threaded PVC fittings, and threaded joints.
 - 1. Use plastic swing-joint assemblies, with offsets for flexible joints, manufactured for this application.
- F. Risers to Emitters:
 - 1. Thick-walled Flexible Sch. 40 PVC pipe and socket fittings, with solvent-cemented joints. Provide solvent-welded Sch. 40 PVC male adapters where required.

END OF SECTION

SECTION 32 93 00

PLANTS

PART 1 GENERAL

1.1 SCOPE

A. Work of this Section includes all material, equipment, and labor necessary for and incidental to completing all Landscape Planting work as indicated on the Drawings, or as reasonably implied, or as designated herein, including, but not limited to, the following.

1. Weed abatement.
2. Soil preparation.
3. Finish grading.
4. Preparation of all planting holes.
5. Furnishing and installation of all plant materials unless otherwise noted.
6. Decorative Rock
7. Furnishing and installation of all required fertilizers, planting backfill materials, top dressing, and miscellaneous materials.
8. Staking and tying trees.
9. Salvaging and Transplanting Palms.
10. Providing plant establishment (30 days).
11. Providing landscape maintenance (90 days).
12. Clean up and weeding of all landscape areas.
13. One-year guarantee.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Irrigation system: Section 32 82 00.

1.3 QUALITY ASSURANCE

- A. The Contractor shall provide at least one person who shall be present at all times during execution of this portion of the work, who shall be thoroughly familiar with the type of materials being installed and the proper materials and methods for their installation, and who shall direct work performed under this Section.
- B. Plants and planting material shall meet or exceed the specifications of Federal, State and County laws requiring inspection for plant disease and insect control.
- C. Quality and size shall conform to the current edition of "Horticultural Standards" for number

one grade nursery stock as adopted by the American Association of Nurserymen, and Nevada Department of Agriculture regulations.

- D. The Applicator of all weed control materials shall be licensed by the State of Nevada as a Pest Control Operator and a Pest Control Advisor in addition to any subcontractor licenses that are required.
- E. Materials and methods used for Weed Abatement must conform to Federal, State, and Local Regulations.
- F. Palm Trees
 - 1. Review: Select palm trees on the project site have been selected for salvage and relocation to new locations on the project site. Refer to demolition and planting plans for locations.
 - 2. Temporary nursery: The Contractor shall coordinate with NDOT representative to determine where palm trees excavated shall be temporarily planted until ready for final planting. Contractor shall make provisions to provide irrigation and staking. The temporary nursery shall be removed and restored to its original conditions to the satisfaction of NDOT representative. Contractor may choose to set up a temporary nursery off-site if no suitable location is available on-site.
 - 3. Refer to Salvage and Transplant section.

1.4 APPROVALS

- A. Irrigation system work shall be inspected for recommended approval by NDOT representative prior to start of any work in this section.

1.5 PROJECT CONDITIONS

- A. Subsurface Improvements:
 - 1. Protection: Protect all existing underground and surface utility structures.
 - 2. Repair: Restore all damaged improvements to original condition at no cost to Owner.

1.6 SUBMITTALS

- A. Materials lists: Within 30 days of award of the Contract, submit a complete list of materials proposed to be furnished and installed under this Section, demonstrating complete conformance with the requirements specified.
 - 1. Materials list shall include the weed control materials and quantities per acre intended for use in controlling the weed types prevalent and expected on the site, as supplied by the Pest Control Advisor. Pest Control Advisor shall furnish the Landscape Installer and NDOT representative with data demonstrating the compatibility of the weed control materials and methods with the intended plant and seed varieties.
 - 2. Documentation: Submit documentation within 30 days after Award of Contracts that all trees have been ordered.
- B. Certificates: Deliver all certificates to the NDOT Representative upon delivery to job site. Include:

1. Quantity of commercial fertilizers used.
2. Quantity of soil amendments.
3. Quantity of plant material.

1.7 PRODUCT HANDLING

A. Delivery and Storage:

1. Deliver all items to the job site in their original containers with labels intact and legible at time of NDOT representative's review.
2. Immediately remove from the site plants which are not true to name and materials which do not comply with the specified requirements.
3. Use all means necessary to protect plant materials before, during, and after installation and to protect the work and materials of all other trades.

B. Delivery and Storage:

1. Labeling: All plants shall be labeled to show genus, species, height, and name of grower or point of origin.
2. Storage: Store plants with protection from weather or other conditions which would damage or impair their vigor. Protect plants during transport and storage.
3. Transporting in Hot Weather: When outside temperatures exceed 100 degrees during the day and night time temperatures are above 70 degrees, transportation of trees shall occur in the early morning hours to project site. All plants delivered from sources outside southern Nevada, the rootballs shall be wetted at nursery or source prior to delivery and the transport shall either be an enclosed trailer or flatbed provided all trees are covered with tarps to prevent drying out foliage.

- ##### C. Replacements: In the event of damage, immediately make repairs and replacements as necessary to the recommended approval of NDOT's Representative and at no additional cost to NDOT.

1.8 RESPONSIBILITY AND COORDINATION DURING WEED ABATEMENT

- A. During Weed Abatement procedures, the Landscape Installer is responsible for the erection of signs and barriers required to prevent intrusion into the treated areas and to notify the public.
- B. No material or methods used for Weed Abatement shall affect the landscape planting. No material or method shall render the job site unusable for more than ten days from date of application.

1.9 PLANTING IN HOT WEATHER

- A. Hot weather: No plants shall be planted when daytime temperatures exceed 105 degrees. Any plants delivered to the project site shall be shaded from the sun using mesh cloth or fabric that allows a minimum 40% light through. Water plants to keep root balls moist at all times.

PART 2 PRODUCTS

2.1 MATERIALS

Plant materials quality and size shall conform to the current edition of "Horticultural Standards" for number one grade nursery stock as adopted by the American Association of Nurserymen, Nevada Department of Agriculture regulations and Arizona Nurseryman's Association for Trees.

2.2 NON-SELECTIVE HERBICIDES

- A. Non-selective contact herbicide and/or non-selective systemic herbicides (as recommended by the Pest Control Advisor).

2.3 SELECTIVE HERBICIDES

- A. Selective pre-emergent herbicides (**Ronstar G** or equal or as recommended by the Pest Control Advisor).

2.4 SOIL CONDITIONERS AND FERTILIZERS

- A. Soil conditioners may include any or all of the conditioners herein specified and shall be applied at rates indicated on the plans.
- B. Organic Mulch: Nitrogen stabilized organic amendments derived from redwood sawdust, fir sawdust, or finely ground bark of fir or pine containing the following physical properties:

1. Sieve Analysis:

<u>Percent Passing</u>	<u>Sieve Size</u>
95 – 100	6.33 mm (1/4 inch)
80 – 100	2.38 mm (No. 8, 8 mesh)
0 – 30	500 Micron (No. 35, 32 mesh)

2. Nitrogen Content: Dry weight 0.56% - 0.84%

3. Iron Content: Minimum 0.08% dilute acid soluble Fe on dry weight basis.

4. Total Soluble Salt Concentration: Shall be less than 3.0 mmhos/cm (millimhos/centimeter at 25 degrees Celsius) as determined by maximum saturation extract method.

5. Boron: Shall not exceed 1.0 ppm.

6. Ash: (Dry weight) 0 - 6.0%

- C. Fertilizer: Commercial fertilizers with an analysis of 5-3-1 Gro Power Plus, 16-20-0, and 12-8-8 Gro-Power Controlled Release Nitrogen, as designated herein, or approved substitute as required by the Agronomical soils report.

1. Fertilizer shall be delivered to the site in the original unopened containers, bearing the manufacturer's guaranteed analysis. Fertilizer that becomes caked or damaged, making it unsuitable for use, will not be accepted.

2. Available from: **Gro-Power** at (909) 393-3744 or approved equal.

2.5 PLANTING TABLETS

- A. Fertilizer planting tablets shall be tightly compressed commercial grade planting tablets having a 12-8-8 formula, weighting 7 grams each, as **Gro-Power** planter tablets or equal. The planting tablets shall be delivered to the site in the original, unopened containers, bearing the manufacturer's guaranteed analysis. Damaged tablets will not be accepted.

2.6 PLANT MATERIALS

- A. Nomenclature: The scientific and common names of plants herein specified conform to industry standards. (Refer to list of plant materials on Drawings).
- B. Labeling: Each group of plant materials delivered to the site shall be clearly labeled as to species and variety and nursery source.
- C. Quality and size:
 1. Plants shall be in accordance with the Nevada State Department of Agriculture's regulation for nursery inspections, rules and grading. Plants shall have a normal habit of growth and shall be sound, healthy, vigorous, and free of insect infestations, plant diseases, sun scalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. Plants shall have normally well-developed branch system, with vigorous and fibrous root systems which are not root or pot bound. In the event of disagreement as to condition of the plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than two plants or more than 2% of the total number of plants of each species or variety. Where container grown plants are from several sources, the roots of not less than two plants of each species or variety from each source will be inspected. In case the sample plants reviewed are found to be defective, the NDOT Representative may judge acceptability. Any plants rendered unsuitable for planting because of this review will be considered as samples and will be provided at the expense of the Contractor.
 2. The size of the plants will correspond with that normally expected for species and variety of commercially available nursery stock and in accordance with Arizona Nurserymen Association for tree sizes, or as specified in the special Conditions or Drawings. The minimum acceptable size of plants measured before pruning with the branches in normal position, shall conform with the measurements, if any, specified on the Drawings in the list of plants to be furnished. Plants larger in size than specified may be used with the recommended approval of the NDOT representative, but the use of larger plants will make no change in contract price. If the use of larger plants is recommended for approval, the ball of earth or spread of roots for each plant shall be increased proportionately.
- D. Rejection or Substitution: Plants not conforming to the requirements herein specified shall be considered defective, and such plants, whether in place or not, shall be marked as rejected and immediately removed from the site of the work and replaced with new plants at the contractor's expense. The plants shall be of the species, variety, size and condition specified herein or shown on the drawings. Under no condition will there be any substitution of plants or sizes for those listed on the accompanying plans, except with the expressed written consent of the NDOT representative.
- E. Pruning: At no time shall the tree or plant materials be pruned, trimmed or topped prior to delivery, and any alteration of their shape shall be conducted only with the recommended approval and when in the presence of the NDOT representative.

- F. Protection: Plants shall be handled and stored so that they are adequately protected from drying out, from wind burn, or from other injury.
- G. Right of Review: The NDOT representative reserves the right to recommend approval or rejection at any time upon delivery or during the work, any or all plant material regarding size, variety or condition.

H. Palm Tree - Pruning/Tying/Untying:

1. Prior to salvaging, tie fronds to protect crown bud. Untie all palms at 45 to 60 days after final planting. If windy, keep tied longer. Watch for new growth out of the center (spikes) - good indicator. Spot check for new root growth by digging down +/- three feet on a few trees after four weeks if no new growth is evident. Do not permit fronds to become damaged by means of restraint.
2. Disease Prevention: Exercise extreme caution while pruning palms to prevent spread of vascular diseases. Dip pruning tools in sterilizing agent before beginning pruning and before moving from one palm to another.
3. Prune only dead fronds. DO NOT PRUNE ANY LIVE FRONDS after untying.
4. Arborist: Contractor shall retain the services of a Nevada certified arborist to provide direction on pruning palms prior to salvaging, observation excavating palms, inspection of root balls and inspection of root balls at final planting. Arborist shall provide a report to NDOT representative documenting observations.

I. Palm Tree - Backfill Mix for Plant Pits:

1. 100% washed plaster sand free of all deleterious chemicals, oils or other materials (submit sample to NDOT representative for approval)
2. Amendments to the backfill: "Stern" manufactured by Peters; "Basic H" by the Shaklee Corporation. 8 oz. of "Basic H" and 2 capfuls of "Roots" in a five gallon bucket of water, mix and pour into basin evenly and water in with +/- 50 gallons of water.

2.7 MULCH

- A. Ground wood product shall be as specified in the "Standard Specifications for Public Works Construction," latest edition, Section 212.

2.8 TREE SUPPORTS

- A. Tree ties shall be "CINCH TIE" black rubber ties, and shall be uniform throughout the project.
- B. Tree support stakes shall be minimum two inches diameter lodge pole pine, copper naphthenate treated, ten feet length.
- C. Palm Trees shall be staked on three sides per plan detail at temporary and final plant locations. Arborist shall provide direction on how long to keep braces in place. Contractor shall remove when directed by arborist.

2.9 ANTI-DESICCANT

- A. Anti-Desiccant: Anti-desiccant shall be **Wilt Pruf** or equal, delivered in manufacturer's containers and used according to the manufacturer's instructions. This product shall be used

by plant originator and by contractor on-site for trees shipped in hot weather and to be sprayed on plants sensitive to moisture evaporation in hot water.

2.10 DECORATIVE ROCK

- A. Landscape rock will be made available by NDOT at their service yard located off-site. Contractor shall make arrangements to obtain, deliver and install the landscape rock where specified on the plans. Coordinate work with NDOT representative.

PART 3 – EXECUTION

3.1 GENERAL

- A. Installation shall conform to the requirements as described herein.
- B. Prior to the start of work of this Section, trash and deleterious materials on the surface of the ground shall be removed and legally disposed of.

3.2 WEED ABATEMENT

- A. Prior to the installation of the irrigation system, weed growth shall be removed from within the areas designated to be cleared and grubbed.
- B. If in the opinion of the Pest Control Advisor perennial grasses and weeds existing in the planting areas will require control prior to removal, spray these areas per Pest Control Adviser's recommendations. Allow herbicide to kill weeds. Rake or hoe off dead weeds to a depth of one to two inches below the surface of the soil. Physically remove weeds from the site.
- C. Upon completion of the irrigation system and rototilling of soil amendments into the soil and immediately preceding the installation of plant material, perform weed abatement as follows, and per Pest Control Advisors recommendation.
 - 1. Apply by spray a non selective herbicide to eradicate existing weeds. Do not irrigate for seven days after application.
 - 2. Remove weeds after herbicide has had time to sufficiently kill. Remove dead weeds by rake or hoe to a depth of one to two inches below the surface of the soil. Remove weed residue and top growth and dispose of in a legal manner.

3.3 TREE AND SHRUB PLANTING FOR SALVAGE AND TRANSPLANTED TYPE PLANTS

- A. For any plant identified on plans as Salvage and Transplant or similar terminology.
- B. Contractor Qualifications. Company shall have a minimum of 5 years' experience with plant salvage, plant transplant and maintenance experience in working with these plants. Submit resumes of qualified personnel to perform and oversee project work and documentation with photos of a minimum 2 previous projects where this type of work successfully completed. Projects must demonstrate 80% minimum plant survival rate per same plant species specified one year after completion. Other plant work performed will not be considered. Specify project name, date project started and completed, scope of work performed, native plants salvaged and transplanted, quantities of each plant type, location where project can be seen and client/owner's contact information.

- C. Salvage: Coordinate all salvage work with NDOT representative.
- D. Carefully extract all materials in order not to damage any of the roots that extend out from the base, stems, or any part of the plant.
- E. Palms: Care shall be taken when handling these plants to not damage the palm heart.
 - 1. Carefully excavate a minimum 4' x 4' square rootball by cutting roots cleanly on sides and bottom. Use of mechanical equipment to pull palm out of the ground is prohibited. Use cloth type straps when handling palms by the trunk. Do not scar or damage trunk. After palm is removed or able to be laid down, tie fronds up around heart using landscape string prior to moving to new plant location. Plant palm in accordance with plan details. Once installed, keep fronds tied for minimum 60 days but no more than 90 days after installing. Untie as weather permits with evidence of new growth at the heart is pushing out.
- F. Schedule work to relocate and replant material immediately where possible.
- G. Stockpiling: If plants cannot be planted straight from their source to their final location and should require temporary stockpiling, transfer the salvaged plant to a prepared 3 foot wide, 18 inches deep trenches of any desired length (larger for palms and trees). If using multiple, parallel trenches, space far enough apart to allow heavy equipment access to each trench. Thoroughly water trenches prior to transplanting material (for cacti: plant in trench with native soil). Properly tamp down and compact all soil around roots of plants to remove all air pockets. Form a depression around each plant to hold water. After planting, thoroughly water 1 time (Water approximately 15 days after planting to remove or minimize any air pockets and assure proper soil compaction). Place plant in trenches and tamp soil by hand around the base of plant to remove air pockets. Form a watering well around the plant at the surface. Afterward, thoroughly water the plant again.
- H. Final Planting: Replant all plants at locations shown on the plans. Do not damage stems, roots, the base of the plants or palm trunks and crowns.
- I. Prepare a hole in accordance with plan details for each plant and all other on-site transplanted plants.
- J. Adjust plant hole to accommodate stem size for multiple stem plantings.
- K. Dig holes at the location of each individual plant, with the stake or marking being considered the center of the hole. The holes shall be dug in accordance with plan details. Walls of the undisturbed soil shall be rough and sloping.
- L. Backfill material shall be screened to remove all clods, rocks, or other debris over 1 inch in largest dimension from the excavated material and dispose of off-site. Use only clean, non-contaminated site soil excavated from each plant pit as backfill excavation.
- M. Amend backfill material as follows (for salvaged trees and plants only):
 - 1. 15% organic mulch (humus)
 - 2. 1/4 pound of Nitroform (38-0-0, 27%, WIN) per cubic yard of backfill mix, or approved equal.
 - 3. Thoroughly blend together. Provide a sample of the amended planting soil backfill for approval. Use this sample as reference material as the project progresses.

4. Fill the hole with water and allow to drain once, then fill with water again and back-fill with soil to form a muddy matrix to about 18 inches from the surface. Plant the transplanted plant and tamp the soil around the plant to remove air pockets. Form a watering well around the plant at the surface. Afterward, thoroughly water again. Thoroughly water upon being transplanted into the field.
5. Watering all transplanted plants: During installation to before beginning plant establishment period: For all plants-use a minimum 9-inch commercial grade soil moisture probe (probe shall be capable to read 0-100% moisture content with an accuracy of approximately 10%). Probe weekly to perform random measurements of the moisture of the soil at different planting locations (final planted and temporary planted areas). When the probe reads "dry" on the moisture scale apply further watering as needed for each plant species. Use only clean potable water. For the first month and depending on climatic conditions, watering may need to occur every week unless moisture probes reads "dry" then apply additional watering, per plant species needs, until beginning of plant establishment period. Under no circumstances should over-watering occur. Continuous wet/saturated soil will harm plants without "brief" dry out periods. Consult with a Nevada certified arborist or horticulturalist for recommended watering. When temporary watering all plants by hand, avoid over-spray onto adjacent landscape areas that may incur weed growth.
6. Contractor shall prepare a watering report for watering plants in temporary staging area. Indicate on report days watered and submit to NDOT representative on a monthly basis signed off.

3.4 PALM TREE INSTALLATION

A. General:

1. Protect palms at all times from sun or drying winds.
 2. Maintain palms that cannot be planted immediately upon delivery in a well-protected and well watered state.
 3. Arrange delivery time so that installation may take place no more than 48 hours after delivery.
 4. Coordination of palm planting: Contractor shall coordinate palm tree planting with the installation of site walls, columns, pilasters, site pavements and tree grate installations. Installation of palms may require their installation prior to these site improvements due to tight planting spaces. If palms are planted prior to site improvements It shall be the contractor's responsibility to install palms at their proper final grade elevations and to protect palms, planting pits and rootballs from damage, contamination of materials and compaction. Wrap trunks with outdoor blankets to protect and cover rootballs/pits with boards. Ability to water palms shall not be compromised.
- B. Handling: Lift and handle palms ONLY from the bottom of ball. Use carpet remnants or soft straps to protect trunks from contact with metal equipment. If root ball is cracked or broken during handling, palm will be rejected. Do not drop palms or will be rejected.
- C. Positioning: Position palm in plant pit.
- D. Backfilling: Backfill plant pit with clean, moistened, 100% washed plaster sand, amendments as specified in 2.6.I and as shown on drawings. Continuously adjust palm to insure a plumb

and rigidly based trunk. Solidly compact and water jet in sand around the ball to stabilize palm into position. While backfilling, watering in must occur in lifts during backfilling to provide optimum compaction and root interface.

- E. Fertilizing after Planting: After trees have been installed four weeks, fertilize with 4-5 pounds "Woodace Palm Special", 11-4-6 analysis. Dig a small basin inside the six foot inside diameter basin, distribute evenly and fill the six foot basin with water. (Fertilize at least two times per year - Owner.)
- F. Watering Basin: Refer to details as shown on drawings. All palms shall have a depressed basin six inches deep to hold irrigation water. Install irrigation as shown on details for planting on slopes.
- G. Watering: For the first two to three weeks, inspect the 4" pipe for water. If water is in pipe, back off irrigation. Palms in summer (110 - 115 degrees) require 150 -200 gallons per day. If no water is in inspection pipe, continue to increase irrigation until determined how much water the tree and soil are taking up.
- H. Inspecting 4" pipe: Continue to inspect the 4" pipe for water throughout the warranty period and stress their importance to maintenance personnel.

3.5 LEANING PALMS

- A. After planting, palms may lean over time due to windy conditions. Contractor shall check all palm trees every two months during warranty period and straighten. Protective straps shall be used when moving trees. No metal objects from construction equipment shall come in contact with the palm trunk at any time.
- B. Rootballs will require re-jetting of water around base to stabilize palms. Contractor shall provide bracing of palms as shown on the details where required. Care shall be taken to not over-wet the backfill.

3.6 FINAL GRADES

- A. After the foregoing specified deep watering, minor modifications to grade may be required to establish the final grade. These areas shall not be worked until the moisture content has been reduced to a point where working it will not destroy soil structure.
- B. Finish grading shall ensure proper drainage of the site.
- C. Finished earth berm surfaces shall be smooth and even between contours. Shapes shall be to the satisfaction of the NDOT representative.
- D. Areas shall be graded so the final grades will be one inch below adjacent paved areas, sidewalks, valve boxes, clean outs, drains, manholes, etc.
- E. Shrub areas to receive three inches of wood mulch.
- F. Surface drainage shall be away from building foundations. G. Eliminate erosion scars.
- G. The Contractor shall request a review by the NDOT representative for recommended approval of the final grades and elevations before beginning planting operations.

3.7 TREE AND SHRUB INSTALLATION

- A. Planting and bare dirt areas are to be treated with a pre-emergent chemical (subject to approval by NDOT representative prior to application). Chemicals are to be applied by a licensed Pest Control Agent at the rates recommended by the manufacturer. This treatment shall be applied at the following times during the contract:
 - 1. before planting,
 - 2. at the beginning of plant establishment period, and
 - 3. at the end of the plant establishment period.
- B. Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice, as reviewed by the NDOT representative.
- C. Irrigation work shall have been reviewed by the NDOT representative prior to beginning any planting.
- D. Installation of plant material shall be in accordance with the details on the Planting Plans.
- E. Locations for plants and outlines of areas to be planted shall be marked on the ground by the Contractor before any plant pits are dug. Such locations shall be reviewed by the NDOT representative. If an underground construction or utility line is encountered in the excavation of planting areas, notify NDOT representative so that other locations for planting may be selected.
- F. Excavation for Planting:
 - 1. Excavation for planting shall include the stripping and stacking of acceptable topsoil encountered within the areas to be excavated for trenches, tree holes, plant pits, and planting beds.
 - 2. Protect areas from excessive compaction when trucking plants or other material to the planting site.
 - 3. Excavated holes shall have vertical sides with roughened surfaces and shall be of a size that is at least two times the width and depth of the original plant container. The holes shall be large enough to permit handling and planting without injury or breakage to the roots or root ball.
- G. Planting:
 - 1. No planting shall be done in any area until the area concerned has been satisfactorily prepared in accordance with these Specifications.
 - 2. No more plants shall be distributed in the planting area during a single day than can be planted and watered on that day.
 - 3. Containers shall be cut and plants shall be removed in such a manner that the ball of earth surrounding the roots is not broken and they shall be planted and watered as herein specified immediately after the removal from the containers. Containers shall not be cut prior to placing the plants in the planting area.
 - 4. The amended surface soil can be used for backfill around trees and shrubs; where

additional quantities are required, use the following formula (thoroughly blended):

- a. Native On Site Soil (No rock larger than 1")
 - b. 15% Organic Mulch
 - c. Commercial Fertilizer Gro-Power Plus, 5 3 1 - 15 lbs/cy d.
 - d. Iron Sulfate - 2 lbs/cy
5. Three inches of amended backfill shall be thoroughly mixed with three inches of native soil at the bottom of each hole to provide a transitional soil mix of at least six inches between the native soil and the backfill.
 6. Backfill shall be placed at the bottom of each hole, and thoroughly compacted to a height that when a plant is placed in the hole, its root crown is slightly above the established final grade. Plants which settle deeper than specified above shall be raised back to the correct level. After the plant has been placed, additional backfill shall be added to the hole to cover approximately one half the height of the root ball. At this stage, water shall be added to the top of the partly filled hole to thoroughly saturate the root ball and adjacent soil.
 7. After the water has completely drained, fertilizer tablets shall be placed as indicated below:
 - a. Three tablets per one gallon container.
 - b. Six tablets per five gallon container.
 - c. Twelve tablets per fifteen gallon container.
 - d. Fourteen tablets per 24" box container.
 - e. Eighteen tablets per 36" box container.
 8. The remainder of the hole shall then be backfilled.
 9. Set the tablets to be used with each plant on the top of the root ball while the plants are still in their containers so the required number of tablets to be used in each hole can be easily verified.
 10. After backfilling, an earthen basin shall be constructed around each plant. Each basin shall be of a depth sufficient to hold at least two inches of water. Basins shall be of a size suitable for the individual plant. In no case shall the basin for a fifteen gallon plant be less than four feet in diameter; a five gallon plant less than three feet in diameter; and a one gallon plant less than two feet in diameter. The basins shall be constructed of amended backfill material. Rake out basins prior to planting lawn areas or groundcover areas.
- H. Pruning: Pruning shall be limited to the minimum necessary to remove injured twigs and branches, and to compensate for loss of roots during transplanting, but never to exceed one third of the branching structure. Upon recommended approval of the NDOT representative, pruning may be done before delivery of plants, but not before plants have been reviewed and recommended for approval.
- I. Staking and Tying:
1. Support stakes tall enough to support the particular tree shall be driven 36 inches into the

soil. Stake shall be placed on the leeward side of the tree from the most troublesome direction, refer to details on Drawings.

2. Ties shall be placed as low on the trunk as possible but high enough so the tree will return to upright after deflection.
3. To find the proper height for tie locations, hold the trunk in one hand, pull the top to one side, and release. The height at which the trunk will just return to the upright when the top is released is the height at which to attach the ties.
4. Ties are to form a loose loop around the tree trunk so that the trunk cannot work towards the support stakes.
5. One tree of each size shall be staked and reviewed by the NDOT representative prior to continued staking.

3.8 DECORATIVE ROCK

A. Decorative Rock:

1. Prior to placing rock, compact subgrade at landscape walls and where adjacent to pavement edges (no plants in area) or as directed by the NDOT representative. Treat areas with a pre-emergent conforming to these specifications and plan details. Remove all existing weeds prior to installation of the pre-emergent product. Use an approved herbicide for weed removal. Apply pre-emergent in accordance with manufacturer's recommendations. Do not apply herbicides during windy conditions and protect adjacent plant areas from contact with herbicides.
2. Locate rock decorative rock pattern edges on final grade prior to installation of rock for review and approval. Field adjustments to line locations may be made to ensure design intent is achieved. After approvals are obtained, installation of rock may proceed as shown on the plans. Water final groomed rock layer to wash off surface dirt and dust. Apply a second treatment of pre-emergent after rock has been installed and groomed.

3.9 WATERING

- A. Apply water to planted areas during operations and thereafter until acceptance of the work.
- B. Immediately after planting, apply water to each shrub by means of a hose. Apply water in a moderate stream in the planting hole until the material about the roots is completely saturated from the bottom of the hole to the top of the ground.
- C. Apply water in sufficient quantities and as often as seasonal conditions require to keep the planted areas sufficiently moist at all times well below the root system of plants.
- D. Intervals between irrigation (OFF) sequence should be judged by the length of the time mulch remain damp. Once the mulch begins to dry out, the water (ON) sequence should be repeated.

3.10 ESTABLISHMENT AND MAINTENANCE PERIOD

- A. The Contractor shall continuously maintain areas involved in this contract during the progress of the work and during the establishment and maintenance period until final acceptance of the work by the NDOT representative.
- B. Plant establishment period: The contractual establishment period shall be for no less than 90

continuous calendar days. The contractual establishment period begins on the first day after planting in this project is completed and accepted and the planted areas are brought to a neat, clean, and weed free condition.

1. Days upon which no work will be required, as determined by the NDOT representative, will be credited as one of the plant establishment working days regardless of whether or not the Contractor performs plant establishment work.
 2. Days when the Contractor fails to adequately maintain plantings, replace unsuitable plants, or do weed control or other work, as determined necessary by the NDOT representative, will not be credited as one of the plant establishment working days.
 3. In order to carry out the plant establishment work, the Contractor shall furnish sufficient workers and adequate equipment to perform the work during the plant establishment period.
 4. Improper maintenance or possible poor condition of any planting at the termination of the scheduled establishment period may cause postponement of the final acceptance of Plant Establishment. Contractor shall bear all costs for extension of the Plant Establishment period.
- C. Plant Maintenance Period: The contractual maintenance period shall be no less than 90 continuous calendar days, and shall begin at the acceptance of the Plant Establishment Period.
1. Areas shall be kept free of debris, and planted areas shall be weeded at intervals of not more than ten days. Watering, trimming, fertilization, spraying, and pest control, as may be required, shall be included in the maintenance period. Maintenance shall include pest control (squirrel, gopher, rabbits, etc.).
 2. The Contractor shall maintain the irrigation systems in a like new operating condition, adjusting head heights and spray arcs as necessary. The Contractor is responsible for proper watering of planting areas, for providing necessary supplemental water as may be required, and shall replace material damaged due to improper moisture.
 3. During the maintenance period, the Contractor shall be responsible for maintaining adequate protection for planting areas. Damaged areas shall be repaired and plant materials replaced at the Contractor's expense.
 4. The Contractor's maintenance period will be extended past 90 days if these provisions are not filled.

3.11 GUARANTEE AND REPLACEMENT

- A. All plant material installed under the contract shall be guaranteed against poor, inadequate, or inferior materials and/or workmanship for a period of one year. Any plant found to be dead or in poor condition due to such faulty materials or workmanship, as determined by the NDOT representative, shall be replaced by the Contractor at his expense.
- B. All transplanted palms shall be guaranteed by the contractor for 12 months after final acceptance of the project. Contractor liability shall cover cost of labor, equipment, and materials to replace trees of similar size during the covered period.
- C. Material found to be dead, missing, or in poor condition during the establishment period shall be replaced immediately. The NDOT representative shall be the judge as to the condition of material. Material to be replaced within the guarantee period shall be replaced by the

contractor within 15 days of written notification by the NDOT representative.

- D. Replacement shall be made to the same specifications required for original plantings within five working days after written notification.
- E. Material and Labor involved in the replacing of material shall be supplied by the Landscape Contractor at no additional cost to the NDOT representative.
- F. Palms:
 - 1. Warranty/Guaranty: Warrant and guaranty that all palms planted under this contract will be healthy and in flourishing condition of active growth 1 year from Date of Substantial Completion.
 - 2. Delays: All delays in completion of planting operations which extend the planting into more than 1 planting season shall extend the Warranty/Guaranty period correspondingly.
 - 3. Condition of Plants: Palms shall be free of dead or dying fronds, with all fronds of a normal size and color. Excessive scarring of the trunk will not be permitted and subject to rejection by NDOT representative. NDOT representative will determine degree of scarring permitted. Dried thatch from older leaves shall be removed, and resulting stems shall be cut back to within 2" of the base of trunk.
 - 4. Replacements: As soon as weather conditions permit, replace, without cost to owner, all dead palms and all palms not in a vigorous, thriving condition, as determined by NDOT representative during Warranty Period. Report such conditions in writing.
 - 5. Replacements of Failed Palms:
 - a. Plant materials exhibiting conditions which are determined as being unacceptable shall be repaired and/or replaced at no additional cost to the owner. Closely match replacements to adjacent specimens of the same species. Apply all requirements of this Specification to all replacements.
 - b. Replacement Qualities: Contractor shall be held responsible for a maximum of 2 replacements for each palm tree during Warranty Period in the event of discovery of disease, or failure to thrive or survive.
 - c. Contractor is responsible to not damage any buildings, paving, site improvements, lighting, plants, utilities and or other site features during replacement of failed palms. Any damage shall be repaired to original condition at the contractor's expense.

3.12 REVIEWS

- A. Normal progress reviews shall be requested from the NDOT representative at least 48 hours in advance of an anticipated inspection. A review will be made by the NDOT representative on each of the steps listed below. The Contractor will not be permitted to initiate the succeeding steps of work until he has received written recommendation of approval to proceed by the NDOT representative.
 - 1. Immediately prior to the commencement of the work on this Section.
 - 2. Spotting of shrubs, trees and palms, and minor adjustments prior to planting.

3. Final review, start of establishment and maintenance period.
4. After 90-day plant establishment and maintenance.
5. Final acceptance of project at the end of the 90-day maintenance period.

END OF SECTION

SECTION 33 05 16

PRECAST CONCRETE MANHOLES AND VAULTS

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide precast concrete manholes and vaults, complete and in place, in accordance with the Contract Documents.

1.2 SPECIFICATIONS, CODES AND STANDARDS

ASTM A 48	Gray Iron Castings
ASTM C 150	Portland Cement
ASTM C 443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	Precast Reinforced Concrete Manhole Sections
ASTM C 890	Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
ASTM C 913	Standard Specification for Precast Concrete Water and Wastewater Structures
ASTM C 923	Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

1.3 CONTRACTOR SUBMITTALS

- A. General: Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.
- B. Shop Drawings
 - 1. Show dimensions, locations, lifting inserts, reinforcement, and joints.
 - 2. Structural design calculations for vaults, signed by a registered engineer.
- C. Manufacturer's Certification for Vaults: Written certification that the vault complies with the requirements of this Section.
- D. **Manufacturer's Test Results:** Pull out force for manhole steps.

1.4 QUALITY ASSURANCE

- A. Inspection: After installation, the CONTRACTOR shall demonstrate that manholes and vaults have been properly installed, level, with tight joints, at the correct elevations and orientations, and that the backfilling has been carried out in accordance with the Contract Documents.

PART 2 PRODUCTS

2.1 MANHOLES

- A. The CONTRACTOR shall provide precast manhole sections and conical sections conforming to ASTM C 478 and the requirements of this Section. Adjusting rings shall be standard items from the manufacturer of the manhole sections. Minimum wall thickness of rings shall be 4-inches if steel reinforced and 6-inches if not reinforced.
- B. Axial length of sections shall be selected to provide the correct total height with the fewest joints.
- C. Conical sections shall be designed to support cast iron frames and covers under an H-20 loading, unless indicated otherwise.
- D. Where the manhole barrel diameter is greater than 48-inches, a flat slab-transition, either concentric or eccentric, shall be used to transition to 48-inch diameter riser sections. Underside of the transition shall be at least 7-feet above the top of the bench.
- E. Where indicated on the Drawings, manholes supplied for 48-inch and larger pipes shall be of a "T" Base-style fabrication. The pipeline portion of the "Base T" section shall conform to ASTM C-76 and be of the same pipe class as the deepest connected sewer. The riser section shall conform to ASTM C-478.
- F. Design Criteria: Manhole walls, transitions, conical sections, and base shall be designed per ASTM C 478 for the depths indicated and the following:
 - 1. AASHTO H-20 loading applied to the cover.
 - 2. Unit weight of soil of 120 pcf located above all portions of the manhole.
 - 3. Lateral soil pressure based on saturated soil producing 100 pcf acting on an empty manhole.
 - 4. Internal fluid pressure based on unit weight of 63 pcf with manhole filled from invert to cover with no balancing external soil pressure.
 - 5. Dead load of manhole sections fully supported by the base and transition.
 - 6. Additional reinforcing steel in walls to transfer stresses at openings.
 - 7. The minimum clear distance between the edges of any 2 wall penetrations shall be 12-inches or one-half of the diameter of the smaller penetration, whichever is greater.
- G. Joints shall be sealed with o-ring gaskets conforming to ASTM C 443.
- H. Concrete for base and channel formation shall be 4000 psi concrete conforming to Sheet S001.
- I. Except were otherwise indicated on the Drawings, manholes shall have a precast concrete base and a factory installed bench.
- J. Barrel section to sewer pipe connections shall be sealed with resilient connectors complying with ASTM C 923. Mechanical devices shall be stainless steel.

K. Manhole steps shall be comprised of 1/2-inch grade 60 steel reinforcement rod encased in polypropylene copolymer plastic. Steps shall have tread width of 14-inches. Furnish test results demonstrating step capability to resist a pull-out force of 2200 pounds. Provide **PS2-PF Manhole Step** by **M.A. Industries**, or equal.

L. Manhole Manufacturers, or Equal

1. **Atlantic Concrete Products, Inc.**
2. **Hanson Concrete Products, Inc.**
3. **Hardwall Fabricators, Inc.**
4. **Teichert Precast**

2.2 FRAMES AND COVERS

A. Castings: Castings for manhole frames and covers shall be non-rocking and shall conform to the requirements of ASTM A 48, Class 30. Unless otherwise indicated, cast iron covers and frames shall be heavy traffic type, 30 inches in diameter, with embossed lettering saying "Sewer" to meet the requirements of the City or the local utility company. Frame and cover shall be designed for H-20 traffic loading.

B. Castings Manufacturers, or Equal

1. **Alhambra Foundry Co., Ltd.**
2. **Neenah Foundry Co.**
3. **Vulcan Foundry, Inc**

2.3 VAULTS

A. The CONTRACTOR shall provide precast vaults designed for the indicated applications and of the sizes indicated.

B. The minimum structural member thickness for vaults shall be 5-inches. Cement shall be Type V portland cement as specified in ASTM C 150. The minimum 28-day concrete compressive strength shall be 4,000 psi. All reinforcing steel shall be embedded in the concrete with a minimum clear cover as recommended by ACI 318.

C. Design Loading: Vaults in areas subject to vehicular traffic shall be designed for H-20 traffic loading. Vaults in other areas shall be designed for a vertical live load of 300 psf. Lateral loads on vaults in all areas shall be calculated from:

L = 90 h, plus surcharge of 240 psf in areas of vehicular traffic

Where L = loading in psf

h = depth of fill in feet

- D. Where joints are designed in pre-cast concrete vaults, such joints shall be interlocking to secure proper alignment between members and prevent migration of soil through the joint. Structural sections at joints shall be sized sufficiently to reinforce the section against localized distress during transportation and handling and against excess contact bearing pressures through the joint.
- E. Where openings for access to the vault are required, the full clear space opening indicated shall be provided, without obstructions from brackets or supports. For large openings where brackets or supports are designed to protrude into the opening for support of required covers, such brackets or supports shall be designed to be easily removed and replaced with a minimum of effort and without cutting or welding.
- F. Covers for access openings shall be provided. Frames for covers shall be fabricated from steel, galvanized after fabrication, and shall be integrally cast into the vault concrete sections. All covers shall be tight fitting to prevent the entrance of dirt and debris. Where edge seams are permitted, no gaps greater than 1/16-inch between edges will be accepted. All covers, except round, heavy-weight, cast iron manhole covers, shall have securing mechanisms to hold the covers firmly in place against the effects of repetitious live loads such as pedestrian or vehicle traffic.
- G. Where penetration of the pre-cast concrete vault are required for piping, conduit, or ducts, such penetrations shall be accommodated through pre-cast openings or thin-wall knock-out sections. All openings for penetrations shall be smooth and free of surface irregularities and without exposed steel reinforcing. Vaults need not be designed to resist thrust from piping passing through the vault.
- H. Warning Signs
 - 1. The entrance to every manhole and vault shall be fitted with a permanently affixed, plastic warning sign, located above and centered on the top step.
 - 2. Sign Manufacturer, or Equal
 - a. **W. H. Brady Company**
 - b. **Seton Nameplate Corporation**

PART 3 EXECUTION

3.1 GENERAL

- A. Pre-cast concrete sections shall be transported and handled with care in accordance with the manufacturer's written recommendations. Where lifting devices are provided in pre-cast sections, such lifting devices shall be used as intended. Where no lifting devices are provided, the CONTRACTOR shall follow the manufacturer's recommendations for lifting procedures to provide proper support during lifting.
- B. Buried pre-cast concrete vaults shall be assembled and placed in excavations on properly compacted soil foundations as indicated. Pre-cast concrete vaults shall be set to grade and oriented to provide the required dimensions and clearances from pipes and other structures.

- C. Prior to backfilling, all cracks and voids in pre-cast concrete vaults shall be filled with non-shrink grout or polyurethane sealant, or both. Around pipe and conduit penetrations, openings shall be sealed with polyurethane sealant. With the authorization of the ENGINEER, grout or a closed-cell flexible insulation may be used as filler material prior to placing a final bed of polyurethane sealant.
- D. Steps shall be driven into tapered holes formed in the concrete by inserts from the step manufacturer or 1-inch holes drilled 3-3/4 inches deep into the manhole wall in the field. No more than 6-1/8 inches of plastic arm, measured on the inside of the step, shall be exposed outside the concrete.
- E. Steps shall be installed 12-inches on centers vertically, not more than 1/2 inch out of plumb. The top step shall be no more than 12-inches below the manhole cover.

END OF SECTION

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SECTION 40 05 00

PIPING, GENERAL

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide piping systems indicated, complete and operable, in accordance with the Contract Documents.
- B. The provisions of this Section shall apply to piping in Division 40 and on the Drawings.
- C. The Drawings define the general layout, configuration, routing, method of support, pipe size, and pipe type. The Drawings are not pipe construction or fabrication drawings. The CONTRACTOR shall prepare pipe spooling and fabrication drawings and shall submit them to the ENGINEER for review.
- D. Where pipe layout details are not indicated on the Drawings, it is the CONTRACTOR'S responsibility to develop the details necessary to design and construct piping systems to accommodate the specific equipment provided, and to provide spacers, adapters, and connectors for a complete and functional system.

1.2 DEFINITIONS

- A. Pipe, piping, pipe work, pipe system, piping system, or similar words, singular or plural shall mean and include, any type of pipes, tubes, fittings, valves, piping specialties, appurtenances, supports, restraints, anchors, coatings and linings and items related to piping.
- B. Submerged piping, underwater piping or similar words, shall include any piping located two feet above water surface in basins or tanks
- C. Potable water or similar words, shall mean and include any type of potable water or process water that be deemed potable after treatment processes.
- D. Corrosive service shall mean and include in locations listed below:
 - a. Buried locations
 - b. Submerged locations or submerged piping.
 - c. Inside buried vaults, manholes, and structures that do not drain through a gravity sewer or to a sump with a pump.
 - d. Chemical handling areas
 - e. Inside trenches, containment walls, and curbed areas
 - f. Locations indicated or designated in the contract documents.

1.3 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 – Contractor Submittals.

B. Shop Drawings: Shop Drawings shall contain the following information:

1. Drawings: Layout drawings including necessary dimensions, details, pipe joints, fittings, specials, bolts and nuts, gaskets, valves, appurtenances, anchors, guides, and material lists. Pipe spooling and fabrication drawings shall indicate spacers, adapters, connectors, fittings, and pipe supports to accommodate the equipment and valves in a complete and functional system.
2. Welding Qualifications and Procedures
3. Pipe Supports: Submit pipe support fabrication drawings including calculations in accordance with Section 40 05 07 – Pipe Supports.
4. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and shall be specifically identified with the applicable style or series designation, and restraint system if applicable.
5. Thermoplastic Pipe Joints: Submit solvent cement manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.
6. Gasket Material: Submit gasket manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.
7. Seals and Seating Materials: Submit elastomer material and manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.
8. Modular Seals for Pipe: Manufacturer's catalog sheet showing materials and installation procedures.
9. Expansion Joints: Submit detailed calculations and manufacturer's Shop Drawings of proposed expansion joints, piping layouts, and anchors and guides, including information on materials, temperature, and pressure ratings
10. Flexible Connectors: Submit pressure and thermal expansion calculations

C. Samples

1. Performing and paying for sampling and testing as necessary for certifications are the CONTRACTOR'S responsibility.

D. Certifications

1. Necessary certificates, test reports, and affidavits of compliance shall be obtained by the CONTRACTOR.
2. A certification from the pipe fabricator that each pipe will be manufactured subject to the fabricator's or a recognized Quality Control Program. An outline of the program shall be submitted to the ENGINEER for review prior to the manufacture of any pipe.

1.4 MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. Piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact.

- B. Defective or damaged materials shall be replaced with new materials.

PART 2 PRODUCTS

2.1 GENERAL

A. Extent of Work

1. Pipes, fittings, and appurtenances shall be provided in accordance with the requirements of the applicable Sections of Division 40 and as indicated.
2. Materials in contact with potable water or process water that be deemed potable after treatment processes shall be listed as compliant with NSF Standard 61.

B. Piping Supports

1. Pipes shall be adequately supported, restrained, and anchored in accordance with Section 40 05 07 – Pipe Supports, and as indicated.
2. Piping support seismic and wind loads shall be sized in accordance with the design criteria as specified on Sheet S001 – Basis of Design.

C. Lining

1. Application, thickness, and curing of pipe lining shall be in accordance with the applicable Sections of Division 40, unless otherwise indicated.

D. Coating

1. Application, thickness, and curing of coating on buried pipe shall be in accordance with Section 09 96 00 - Protective Coating, unless otherwise indicated.
2. Pipes above ground or in structures shall be coated in accordance with Section 09 96 00 – Protective Coating.

E. Pressure Rating

1. Piping systems shall be designed for the pressure as defined in respective pipe sections.

F. Inspection

1. Pipe shall be subject to inspection at the place of manufacture.
2. During the manufacture, the ENGINEER shall be given access to areas where manufacturing is in progress and shall be permitted to make inspections necessary to confirm compliance with requirements.

G. Tests

1. Except where otherwise indicated, materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards.
2. Welds shall be tested as indicated.

3. The CONTRACTOR shall be responsible for performing material tests.

H. Welding Requirements

1. Qualification of welding procedures used to fabricate pipe shall be in accordance with the provisions of AWS D1.1 - Structural Welding Code or the ASME Boiler and Pressure Vessel Code, Section 9, whichever is applicable.

I. Welder Qualifications

1. Welding shall be performed by skilled welders and welding operators who have adequate experience in the methods and materials to be used.
2. Welders shall be qualified under the provisions of AWS D1.1 or the ASME Boiler and Pressure Vessel Code, Section 9, whichever is applicable.
3. Machines and electrodes similar to those used in the WORK shall be used in qualification tests.
4. Qualification testing of welders and materials used during testing is part of the WORK.

2.2 PIPE FLANGES

A. General

1. Flanges shall be provided with flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise indicated.
2. Flange faces shall be perpendicular to the axis of the adjoining pipe.
3. Flanges for miscellaneous small diameter pipes shall be in accordance with the standards indicated for those pipes.

B. Pressure Ratings

1. 150 psig or less: Flanges shall conform to either AWWA C207 - Steel Pipe Flanges for Waterworks Service--Sizes 4 In. Through 144 In., Class D, or ASME B16.5 - Pipe Flanges and Flanged Fittings, Class 150.
2. 150 psig to 275 psig: Flanges shall conform to either AWWA C207 Class E or Class F, or ASME B16.5, Class 150.
3. 275 psig to 700 psig: Flanges shall conform to ASME B16.5, Class 300.
4. 700 psig to 900 psig: Flanges shall conform to ASME B16.5, Class 400.
5. Selection Based on Test Pressure
 - a. Do not expose AWWA flanges to test pressures greater than 125 percent of rated capacity.
 - b. For higher test pressures, the next higher rated AWWA flange or an ANSI-rated flange shall be selected.

C. Blind Flanges

1. Provide blind flanges in accordance with AWWA C207, or as indicated for miscellaneous small pipes.
2. Blind flanges for pipe diameters 12 inches and greater shall be provided with lifting eyes in the form of welded or threaded eye bolts.

D. Flange Coating

1. Machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

E. Flange Fasteners

1. Unless otherwise shown on the drawings, or indicated in the applicable Sections of Division 40, Bolts and nuts shall conform to the following requirements;
 - a. Threads shall be in accordance with ANSI/ASME B1.1, Class 2, UNC for bolt diameters 1" and smaller and UN8 for bolt diameters greater than 1".
 - b. Bolts shall have heavy hexagon heads and heavy hexagon nuts. Length of studs shall provide a projection of not less than 0.25 inch and no more than 0.5 inch through the nut when it is drawn tight.
 - c. Thread studs on flange connections are not permitted except where space restrictions preclude the use of standard bolts and where approved by the ENGINEER.
 - d. Through bolt holes shall be drilled in accordance with the applicable flange standard.
 - e. All bolts fastening metallic flanges shall be provided with plain washers installed under the nut. Washer materials shall be of the same material as the bolt. If the through bolt holes are drilled larger than the applicable standard by 1/8 inch in diameter or more, bolts shall be also installed with a plain washer under the bolt head as well.
 - f. All bolts fastening non-metallic flanges shall be provided with plain washers installed under both the bolt head and nut.
 - g. Washer materials shall be of the same material as the bolt.
 - h. Anti-seize compound shall be used on carbon steel fasteners, and shall be **Husk-ITT, Husky 2000**; or equal.
 - i. Anti-galling compound used for stainless steel fasteners in LOX, nitrogen injection, oxygen, ozone process/off-gas/vent and ozone contactor maintenance air service shall be **DuPont "Krytox"**; or equal.
 - j. Anti-galling compound used for stainless steel fasteners for other services shall be certified for potable water use and shall be **Husk-ITT, Lube O'seal; Hercules, Real-Tuff; La Co, Slic-Tite**; or equal.
2. Fastener Material Group Numbering System

- a. Flange fasteners shall conform to the following material standards and shall be categorized within the Fastener Material Schedule Groups as indicated:
 - 1) Material Group C1 (Carbon steel): ASTM A307 Grade B bolts, ASTM A563 Grade B nuts with ASTM F436 washers
 - 2) Material Group C2 (Carbon steel): ASTM A193 Grade B7 bolts, ASTM A194 Grade 2H nuts with ASTM F436 washers
 - 3) Material Group S1 (316 SS): ASTM A193, Grade B8M bolts, ASTM A194 Grade 8M nuts with Type 316 SS plain washers.
 - 4) Material Group S2 (304 SS): ASTM A193, Grade B8 bolts, ASTM A194 Grade 8F nuts with Type 304 SS plain washers.
 - 5) Material Group S3 (Hastelloy C-276): ASTM F468 N10276 bolts ASTM F467 N10276 nuts with type Hastelloy plain washers.
 3. Fastener Material Group Numbers used in Non-Corrosive Service Applications
 - a. AWWA C115 ductile iron flanges - Material Group C1
 - b. AWWA C207 steel flanges - Material Group C2
 - c. ASME B31 group piping flanges – Material Group C2
 - d. Non-metallic pipe flanges - Material Group S1
 - e. Stainless steel pipe flanges and all others not listed above - Material Group S1
 - f. Where mating flanges are of different flange material standards and the specified Fastener Material Groups are in conflict, then fasteners of the higher grade shall be utilized unless otherwise indicated. For the purpose of this requirement, the Material Groups in order of decreasing grade shall be S1, C2, C1. Provide insulating flange sets for dissimilar metal flanged piping to electrically isolate the dissimilar piping.
 - g. Where gaskets of Teflon or Viton-A are required, fasteners of Material Group C2 shall be utilized for all C1 flange standards.
 4. Fastener Material Group Numbers used in Corrosive Service Applications
 - a. All Flange fasteners shall be of Material Group S1 unless S2 and S3 are otherwise indicated on the drawings.
- F. Insulating Flanges
1. Insulated flanges shall be provided with bolt holes 1/4-inch diameter greater than the bolt diameter.
- G. Insulating Flange Sets
1. In order to prevent corrosion, insulating flange sets shall be furnished on all piping connections where two dissimilar metals are to be connected. Each insulating flange set shall consist of an insulating gasket, insulating sleeves and washers, and a steel washer.

2. For bolt diameters 1-1/2 inches or smaller, insulating sleeves and washers shall be one piece and shall be made of acetyl resin.
3. For bolt diameters larger than 1-1/2 inches, insulating sleeves and washers shall be 2-piece and shall be made of polyethylene or phenolic material.
4. Insulating flange sets materials used for fluids other than general water and wastewater shall be made of materials compatible with the fluid services.
5. Insulating gaskets shall be full-face.

H. Insulating Flange Manufacturer, or Equal

1. **JM Red Devil, Type E**
2. **Fluid Sealing Products, Inc.**
3. **Enpro Industries, Inc. (GPT)**

I. Flange Gaskets

1. Gaskets for flanged joints used in general water and wastewater service shall be full faced type in accordance with AWWA C207, suitable for temperatures to 700 degrees F, a pH of one to 11, and pressures to 1000 psig.
2. Blind flanges shall be provided with gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange.
3. Ring gaskets will not be accepted unless otherwise indicated.
4. Unless otherwise indicated, flange gaskets up to 150 psi shall be EPDM sheet material, NSF 61 approved, **Garlock, Style 98206-U (unbranded), or similar products from John Crane, or equal.**
5. Unless otherwise indicated, flange gaskets up to 500 psi shall be aramid fiber with rubber binder material, NSF 61 approved, **Garlock, Style 3760-U (unbranded), or similar products from John Crane, or equal.**
6. Gaskets for flanged joints used in water with chloramines shall be Teflon material, NSF 61 approved, **Garlock, Gylon Style 3505, or similar products from John Crane, or equal.**
7. Gaskets for flanged joints used in water with ozone shall be Teflon material, NSF 61 approved, **Garlock, Gylon, Style 3504, or similar products from John Crane, or equal.**
8. Gaskets for flanged joints used in cryogenic oxygen (LOX and GOX) service shall be Teflon material, **Garlock Gylon, Style 3502 and 3503 or similar products from John Crane, or equal.**
9. Gaskets for flanged joints in PVC and CPVC piping used in general water and wastewater service shall be NSF 61 approved, full-faced, 1/8-inch thick, and made of fluoroelastomer having a durometer hardness of 50 to 70. Gaskets for pipe sizes up to 24-inch and 150 psi shall be Garlock Style XP or similar products from John Crane, or equal.

10. When the mating flange has a raised face, provide stainless steel flat ring gasket filler between the PVC flange and gasket and the adjacent flange.
11. Gaskets for flanged joints used in chemicals, hot air, ozone gas, solvents, hydrocarbons, steam, chlorine and other fluids shall be made of materials compatible with the service, pressure, and temperature. Consult gasket Manufacturer for recommended gasket material.

2.3 PIPE THREADS

- A. Pipe threads shall be in conformance with ASME B1.20.1 - Pipe Threads, General Purpose (inch), and be made up with Teflon tape unless otherwise indicated.
- B. Unless otherwise indicated, use metal FNPT and plastic MNPT for threaded pipe connections between metal and plastic pipes.

2.4 THREADED INSULATING CONNECTIONS

A. General

1. Threaded insulating bushings, unions, or couplings, as appropriate, shall be furnished for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.

B. Materials

1. Threaded insulating connections shall be constructed of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

2.5 MODULAR MECHANICAL SEALS FOR PIPING PENETRATIONS

- A. Where indicated and where required in order to prevent flow of water or air, the passages of piping through wall sleeves and cored openings shall be sealed with modular interlocking link mechanical closures.
- B. Individual links shall be constructed of EPDM rubber, be suitable for temperatures between minus 40 and plus 250 degrees F, and be shaped to fill the annular space between the outside of the pipe and the inside of the wall sleeve or cored opening.
- C. Assemble the links using Type 316 stainless steel bolts and nuts to form a continuous rubber belt around the pipe.
- D. Pressure plates under each bolt and nut shall be fabricated of a corrosion-resistant composite material.
- E. After the seal assembly is positioned in the sleeve, tighten the bolts against the pressure plates to expand the rubber links and form the watertight seal.
- F. Sizing and installation of sleeves and assemblies shall be in accordance with the manufacturer's recommendations.
- G. Modular Mechanical Seals Manufacturer, or Equal

1. **EnPro Industries Company (GPT), Link-Seal**

2. Proco Products, Inc., Pen-Seal

2.6 AIR AND GAS TRAPS

- A. Air and gas pipes shall slope to low points and shall be provided with drip legs, shut-off valves, strainers, and traps.
- B. Pipe the traps to the nearest drain.
- C. Air and gas traps shall be not less than Class150 iron body float-type, with a copper or stainless steel float.
- D. Bracket, lever, and pins shall be constructed of stainless steel.
- E. Drain traps shall be provided with threaded connections.
- F. Air and Gas Traps Manufacturer, or Equal

1. Armstrong International, Inc.

2. Spirax Sarco, Inc.

2.7 PIPE INSULATION

- A. Hot and cold liquid piping, flues, and engine exhaust piping shall be insulated as indicated and in accordance with the requirements of Section 40 42 00 – Pipe and Equipment Insulation.
- B. No unprotected hot piping shall be within reach of operating personnel or other persons.

PART 3 EXECUTION

3.1 GENERAL

- A. This section specifies the general installation requirements for piping, valves, and related items and shall be installed in accordance with the manufacturer's technical data and printed instructions. Specific piping materials, systems, appurtenances, and related installation and testing requirements are specified in related sections of Division 40, and as noted on the Drawings.
- B. Piping shall be installed in a neat and workmanlike manner, properly aligned and cut from measurements taken at the Site to avoid interferences with structural members, architectural features, openings, and equipment. Exposed pipe shall afford maximum headroom and access to equipment, and where necessary piping shall be installed with sufficient slopes for venting or drainage of liquids and condensate to low points.
- C. CONTRACTOR shall obtain the assistance of the pipe manufacturer to instruct the pipe fitters in the correct installation and support of the piping system. Valves and flanges attached to the pipe shall be provided with adequate supports.
- D. Lined Piping Systems
 - 1. The lining manufacturer shall take full responsibility for the complete, final product and its application.

2. Pipe ends and joints of lined pipes at threaded flanges shall be epoxy-coated in order to assure continuous protection.

3.2 INSTALLATION

- A. Installation shall be free from defects. Prior to installation, each pipe length shall be carefully inspected, be flushed clean of any debris or dust, and be straightened if not true straight. Ends of threaded pipes shall be reamed and filed smooth. Groove ends shall be clean and free from indentations, projections, and roll marks in the area from the pipe end to the groove. Fittings shall be equally cleaned before assembly.
- B. Building gravity flow plumbing pipes shall be installed in a neat and workmanlike manner, in accordance with the prevailing plumbing and building codes. Pipes shall have the required slopes for proper drainage. Pipe locations inside buildings shall be coordinated with the rest of the WORK to avoid interferences and to provide sufficient headroom. Installations shall be acceptable to the local plumbing inspector.
- C. Supports and Anchors: Piping supports, thrust, and seismic restraints shall be provided where shown on the Drawing or where determined to be required in according to Section 40 05 07 - Pipe Supports. Where necessary to avoid stress on equipment or structural members, the pipe shall be anchored or harnessed. Expansion joints and guides shall compensate for pipe expansion due to temperature differences. Pipe shall be firmly supported with fabricated or commercial hangers or supports.
- D. Piping Joints: Pipe joints requirements shall conform to the applicable piping sections of Division 40.
 1. Threaded Joints: Pipe threads shall be full and cleanly cut with sharp dies. Not more than 3 threads shall remain exposed after installation.
 2. Welded Joints: Welded joints shall conform to the specifications and recommendations of ASME B 31.1 - Power Piping. Welding shall be done by skilled and qualified welders. Pipe surface residues, oxides, and heat stains are to be removed from a field weld and the affected areas adjacent by the use of stainless steel wire brushes. For alloy and stainless steel pipe, the post welding surfaces shall be cleaned with a pickle agent such as nitric/hydrofluoric acid solutions or pickle paste or equal, then complete removal of the agent by wash the surface thoroughly with clean water.
 3. Flange Joints: Flanged joints shall be made with gaskets with bolts and nuts as specified. Care shall be taken not to over-torque the bolts, in accordance with the manufacturer's written recommendations.
 4. Fusion-Welded Joints: Fusion-welded joints shall be made with the manufacturer's recommended equipment on clean, dry pipe ends. The joints shall be made up at the recommended ambient temperatures, to the pipe manufacturer's written recommendations. The pipe supplier shall be consulted to obtain machinery and expertise for the joining by fusion welded of pipe and fittings. No pipe or fittings shall be joined by fusion by any of the Contractor's personnel unless they are adequately trained and qualified in the techniques involved. Butt fusion joining shall yield a joint strength equal to or greater than the tensile strength of the pipe. Socket fusion, extrusion welding and hot gas welding shall not be used for field connections.
 5. Brazed and Soldered Joints: Brazed and soldered joints shall conform to the manufacturer's recommendations and to the specifications and recommendations of ASME B 31.1 - Power

Piping. Brazing shall be done by skilled and qualified welders. Prior to the application of flux, the ends of tubes shall be thoroughly dried and cleaned

6. Grooved Joints: Grooves for grooved couplings and fittings shall be made with specially designed grooving tools to the manufacturer's recommendations and conform to AWWA C 606 – Joints, Grooved and Shouldered Type. Grooves shall be clean and sharp without flaws, and the pipe ends shall be accurately cut at 90 degrees to the pipe axis.
 7. Push On Joints: Push on joints and gasket installation shall be in accordance with the manufacturer's recommendations and lubricants. Pipe ends shall be beveled to facilitate assembly. Lubricants shall be suitable for potable water service and shall be kept clean in closed containers.
 8. Solvent-Welded Joints: Solvent-welded joints shall be made with fresh primer and solvent cement on clean, dry pipe ends. The primer and cement cans shall be kept closed at all times and the joints shall be made up at the recommended ambient temperatures, to the pipe or cement manufacturer's written recommendations. PVC socket connections shall be joined with PVC cement conforming to ASTM D2564 Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC). CPVC socket connections shall be joined with CPVC solvent cement conforming to ASTM F493. For chemical service applications, solvent cement shall be formulated and labeled for use on that chemical.
 9. Adhesive Joints: Adhesive joints shall be made with freshly-mixed 2-part epoxy on clean, dry pipe ends per pipe manufacturer recommendations. The joints shall be made up at the recommended ambient temperatures, to the pipe or adhesive manufacturer's written recommendations. Pipe ends shall be inserted to the full depth of the socket.
- E. Valves and Unions: Unless otherwise indicated, connections to fixtures, groups of fixtures and equipment shall be provided with a shutoff valve and union, unless the valve has flanged ends. Unions shall be provided at threaded valves, equipment, and other devices requiring occasional removal or disconnection.
- F. Branch Connections: Branch connections in horizontal runs of air and gas piping shall be made from the top of the pipe, to avoid drainage of condensate into the equipment. Unless otherwise indicated for threaded pipe connections between metal and plastic pipes, use metal FNPT and plastic MNPT.
1. Pipe ends and joints of lined pipes at threaded flanges shall be epoxy-coated in order to assure continuous protection.
- G. Isolation Joints / Dielectric Protection: Provide electrically isolate connections between dissimilar metal piping connections. Electrical checks shall be made to assure no contact is made between dissimilar metal piping elements.
1. Use dielectric couplings specially designed for the prevention of galvanic reaction between dissimilar metals.
 2. For flanged connections, use stainless steel bolts with isolation bushings, washers, and full-face flange gaskets.
- H. Core Drilling: Where core drilling is required for pipes passing through existing concrete, core drilling locations shall be determined by radiograph of concrete construction in order to avoid damage to embedded raceways and reinforcing bars.

- I. Coating: Exposed pipes shall be coated with a finish coat to the pipe manufacturer's standard protective coating, with the manufacturer's recommended prime coat and a finish coat in accordance with Section 09 96 00 - Protective Coating.
- J. Low points in piping systems and driplegs in steam, gas, and air systems shall have drainage valves.
- K. Care shall be taken to insure that piping flanges, mechanical-type couplings, sleeve-type couplings, flexible connectors, and expansion joints are properly installed as follows:
 - 1. Gasket surfaces shall be carefully cleaned and inspected prior to making up the connection. Gasket shall be centered properly on the contact surfaces.
 - 2. Connections shall be installed to prevent inducing stress to the piping system or the equipment to which the piping is connected.
 - 3. Contact surfaces for flanges, couplings, and piping ends shall be aligned parallel, concentric, and square to each axis at the piping connections.
 - 4. Flange Bolts
 - a. Flange bolts shall be initially hand-tightened with the piping connections properly aligned.
 - b. Bolts shall be tightened with a torque wrench in a staggered sequence to the recommended torque for the applicable piping material per AWWA or manufacturer's recommendation. Care shall be taken to avoid over-torquing the bolts especially on plastic flanged joints.
 - c. Harness, thrust restraint, and tie rod bolts used for sleeve couplings, flange coupling adapters, or flexible joints shall be tightened gradually and equally at diametrically opposite sides until snug, in order to prevent misalignment and to insure that all studs carry equal loads.
 - d. In order to prevent induced stress or misalignment, do not over-torque connections to adjoining pump or equipment. Flanges shall not be deformed nor cracked.

3.3 INSPECTION

- A. After completion of the WORK, cuttings, joining and wrapping materials, and other scattered debris shall be removed from the Site. The entire piping system shall be in a clean and functional condition.
- B. Inspection: Finished installations shall be carefully inspected for proper joints and supports, interferences, and damage to pipe, fittings, and coating. Temporary plugs and covers shall be removed from openings and floor drains. Defective WORK shall be repaired to the satisfaction of the field engineer or plumbing inspector.

3.4 FIELD TESTING FOR PRESSURE PIPING

- A. Prior to enclosure or burying, piping systems shall be pressure tested as required in the Piping Schedule for a period of not less than two hours without exceeding the tolerances listed in the Piping Schedule. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the

maximum working pressure. The CONTRACTOR shall furnish test equipment, labor, materials, and devices as part of the WORK.

- B. Leakage may be determined by loss of pressure, soap solution, chemical indicator, or other positive and accurate method. Fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines plugged or capped as required during the testing procedures.
- C. Leaks shall be repaired, and the system shall be re-tested until no leaks are found.

3.5 FIELD TESTING FOR GRAVITY PLUMBING PIPING

- A. Prior to enclosure or burying, drains and vents shall be tested in the presence of the local plumbing inspector and the ENGINEER for a period of not less than one hour, or as requested by the plumbing inspector if the request is more stringent. The CONTRACTOR shall furnish test equipment, labor, material, and devices as part of the WORK. Defective WORK shall be repaired to the satisfaction of the plumbing inspector, and the piping shall be re-tested until no leaks are found.
- B. Leakage may be determined by loss of pressure, soap solution, chemical indicator, or other positive and accurate method. Fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines plugged or capped as required during the testing procedures.
- C. Testing and defective WORK shall be repaired to the satisfaction of the plumbing inspector.

END OF SECTION

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SECTION 40 05 02

PIPING IDENTIFICATION

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide identification for the piping and valves, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Commercial Standards

ASME A13.1 Scheme for the Identification of Piping Systems

1.3 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.
- B. Shop Drawings: Provide a list of the suggested wording for each pipe label and valve tag, prior to fabrication.
- C. Samples
 - 1. Sample of each type of identification device.

PART 2 PRODUCTS

2.1 EXPOSED PIPING OR ABOVE GROUND PIPING IDENTIFICATION

- A. Pipe markers, type as indicated below, suitable for outdoor application from -40 degrees to 180 degrees Fahrenheit; in accordance with ASME A13.1 requirements.
 - 1. Marker Type: Stenciled lettering painted directly on surface of pipe inside color coded marker area.
 - 2. Marker Area: Sized per pipe size according to ASME A13.1 and conforming to the color codes in the Identification Colors table below.
 - 3. Lettering: Sized per pipe size according to ASME A13.1 and conforming to the color codes in the Identification Colors table below.
 - 4. Arrows: At least one arrow at each marker area, showing direction of flow.
- B. Pipe 1-inch diameter and smaller or pipe not suitable for the marker type(s) listed above shall be identified with aluminum or stainless steel pipe identification tags with stamped-in 1/4" high identification lettering.

2.2 BURIED PIPELINE IDENTIFICATION

- A. Underground Warning Tape

1. Material:
 - a. Polyethylene tape or polyolefin film. The material and ink shall be chemically inert and shall not degrade when exposed to acids, alkalis and other destructive substances commonly found in soil.
 - b. 6” wide tape with a minimum 4 mil thickness.
 - c. Message: “CAUTION, LINE BURIED BELOW” with the name of the fluid service in black lettering on a colored background.
 - 1) Water: Blue
 - 2) Sewer: Green
 - 3) Gas and other services: Yellow
 - 4) Other services: colors as approved by the OWNER.
 2. Manufacturer, or Equal
 - a. **Reef Industries, Inc.**
 - b. **Seton Identification Products**
 - c. **T. Christy Enterprises, Inc.**
- B. Tracer Wire
1. Material:
 - a. Solid copper conductor with 30 mil HMWPE.
 - b. 10 gauge or thicker wire.
 2. Manufacturer, or Equal
 - a. **Kris-Tech Wire**
 - b. **Corrpro Companies, Inc.**
- C. Witness Markers
1. Material:
 - a. UV resistant glass fiber and resin reinforced thermosetting composite material.
 - b. Constructed as a single pipe with pointer at the bottom end.
 - c. Message of the markers “CAUTION, LINE BURIED BELOW” with the name of the fluid service, and the following information:
 1. Phone number for underground service alert.

2. Phone number for OWNER in case of emergency.
 3. Application station number and offset information if marker is not directly over the pipe.
 4. Name of buried appurtenance or fitting if applicable.
2. Manufacturers, or Equal
 - a. **Carsonite Composites, Utility Marker**
 - b. **Berntsen International, Inc.**

2.3 EXISTING IDENTIFICATION SYSTEMS

- A. In installations where existing piping identification systems have been established, the CONTRACTOR shall follow the existing system. Where existing identification systems are incomplete, utilize the existing system as far as practical and supplement with the system indicated herein.

2.4 IDENTIFICATION OF VALVES AND SHORT PIPE LENGTHS

- A. Valves and sections of pipe that are too short to be identified with markers and arrows shall be identified with metal or plastic tags.
- B. Metal tags shall be stainless steel with embossed lettering. Plastic tags shall be solid black plastic laminate with white embossed letters. Tags shall be designed to be firmly attached to the valves or short pipes or to the structure immediately adjacent to the valves or short pipes.
- C. Wording on valve tags shall describe the exact function of each valve (e.g., "HWR-BALANCING," "CLS THROTTLING", "RAS-PUMP SHUT-OFF," etc.) and include the valve number as indicated in the Contract Drawings. Wording on small pipes shall describe the contents of the pipe.

2.5 Pipe Coating:

- A. Unless otherwise indicated, pipe coating shall be in conformance with Section 09 96 00 - Protective Coatings.

PART 3 EXECUTION

3.1 GENERAL

- A. Markers and identification tags shall be installed in accordance with the manufacturer's printed instructions, and shall be neat and uniform in appearance. Tags and markers shall be readily visible from all normal working locations.

3.2 VALVE TAGS

- A. Valve tags shall be permanently attached to the valve or structure by means of 2 stainless steel bolts or screws.

3.3 MARKER LOCATIONS

- A. Each pipe shall be marked at:

1. Intervals of 20-feet in straight runs.
2. At least once in every room.
3. Within 2 feet of turns, elbows, and valves.
4. On the upstream side of tees, branches, and other distribution points.
5. On both sides of walls and floors through which the piping passes.

3.4 IDENTIFICATION COLORS

1. Conform to the following color codes:

Pipe Contents		Marker Color	Letter Color
	Service		
	POTABLE WATER SUPPLY	blue	white
	TREATED WATER	purple	white
	PROCESS WATER	lt. brown	white
	OZONE	yellow	black
	UNTREATED WATER	dk. brown	white
	STEAM	red	white
	HOT WATER	red	white
	SANITARY	green	white
	OTHER	per engineer	per engineer

END OF SECTION

SECTION 40 05 06

PIPE COUPLINGS

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide pipe couplings indicated, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 40 05 00 - Piping, General apply to the WORK of this Section
- C. The provisions of this Section shall apply to piping in Division 40, and on the Drawings.
- D. The couplings, adapters and joints shall be provided with restraining devices to restrict pipe axial movement. Where the restraining devices and/or details are not indicated on the Drawings, it is the CONTRACTOR'S responsibility to provide the devices/details necessary to restrain the piping system.
- E. The Items specified in this section include the following:
 - 1. Groove Couplings
 - 2. Sleeve Couplings
 - 3. Flanged Coupling Adapters
 - 4. Dismantling Joints
 - 5. Expansion Joints
 - 6. Flexible Connectors
 - 7. Transition Couplings
 - 8. Quick Disconnect Couplings
 - 9. Tapping Sleeves
 - 10. Miscellaneous Adapters

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 – Contractor Submittals.
- B. Shop Drawings: Shop Drawings shall contain the following information:
 - 1. Product submittals, and shall be specifically identified with the applicable style or series designation, pressure rating and restraint system if applicable.
 - 2. Couplings schedule or layout indicating where the couplings will be installed.

3. Expansion Joints: Submit detailed calculations and manufacturer's Shop Drawings of proposed expansion joints, piping layouts, and guides, including information on materials, temperature, and pressure ratings
4. Flexible Connectors: Submit pressure and thermal expansion calculations

C. Certifications

1. Necessary certificates, test reports, and affidavits of compliance shall be obtained by the CONTRACTOR.

1.3 MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. Piping couplings, adapters and joints accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact.
- B. Defective or damaged materials shall be replaced with new materials.

PART 2 PRODUCTS

2.1 GENERAL

A. Extent of Work

1. Piping couplings, adapters, joints and accessories shall be provided in accordance with the requirements of the applicable Sections of Division 40 as indicated.
2. The CONTRACTOR shall not be allowed to substitute any other type of coupling in lieu of the couplings as specified herein unless approved by the ENGINEER.
3. The CONTRACTOR shall assign the responsibility to the coupling manufacturer to review the piping connection to the equipment and submit any modifications to the ENGINEER for review.

B. Pressure Rating

1. Couplings, adapters and joints shall be designed for the pressure as defined in respective pipe sections, or as indicated on the Piping Schedule, whichever is greater.

C. Seals

1. Seal elastomer materials shall be selected to be compatible with the fluid service, pressure and temperature. They shall be composed of elastomeric-compound material that will not deteriorate from age under normal storage or use conditions.
2. Where couplings are used in water containing dissolved ozone residual or chloramines, seal material shall be Viton-A.

D. Coating

1. Couplings shall be lined and coated at the factory, unless otherwise indicated.
2. Coating shall be in accordance with the Section 09 96 00 - Protective Coating, unless otherwise indicated.

2.2 GROOVED TYPE COUPLINGS

A. General

1. Provide cast grooved type couplings where indicated, conforming to the requirements of AWWA C606 - Grooved and Shouldered Joints.
2. Grooved or banded piping shall conform to the coupling manufacturer's recommendations to suit the highest expected pressure.
 - a. If grooved connections are used, the remaining thickness of pipe material after grooving shall be adequate to carry the load imparted to the joint. Joints for thin wall pipes shall be banded or welded with a collared end to fit coupling.
 - b. Rolled pipe ends are not acceptable as a means of connection for metallic piping.
3. Equipment connections with mechanical-type couplings shall be provided with rigid grooved couplings or flexible type coupling with harness in sizes where rigid type couplings are not available, unless thrust restraint is provided by other means.
4. Couplings shall be electrically bonded.
5. For uniformity and compatibility of the piping components; grooving tools, grooved fittings, couplings, and valves shall be furnished by the same manufacturer as the coupling.

B. Grooved Type Couplings Manufacturer, or Equal

1. Grooved couplings for ductile iron piping shall be provided with flush seal gaskets.
 - a. **Victaulic Company**, Style 31 (flexible or rigid)
 - b. **Gustin-Bacon** (banded or grooved)
2. Grooved couplings for steel piping
 - a. **Victaulic Company**, Style 177 / 77 / W77 (grooved, flexible, or rigid)
 - b. **Victaulic Company**, Style 107H / 07 / W07 or HP-70 (grooved, rigid)
 - c. **Gustin-Bacon** (banded or grooved)
3. Grooved couplings for stainless steel piping
 - a. **Victaulic Company**, Style 489 (rigid)
 - b. **Victaulic Company**, Style 77S (flexible)
 - c. **Gustin-Bacon** (banded or grooved)

2.3 SLEEVE COUPLINGS

A. General

1. Provide sleeve couplings specifically designed suitable for the fluid service and pressure rating.

B. Construction

1. Sleeve couplings shall be in accordance with AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe.
2. Couplings shall be constructed without pipe stop.
3. The middle ring shall be at least the same wall thickness as the pipe to which the coupling is connected and not less than 1/4-inch thick.
4. If the strength of the middle ring material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.
5. For standard sleeve couplings, the coupling shall be either 5 or 7 inches long for pipe diameters up to and including 30-inch and 10 inches long for pipe diameters greater than 30-inch. For long sleeve couplings, the coupling shall be 16 inches long for all pipe diameters.
6. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle rings and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling.

C. Insulating Sleeve Couplings

1. Where insulating couplings are required, both ends of the coupling shall be provided with a wedge-shaped gasket which assembles over a sleeve of an insulating compound material compatible with the fluid service in order to obtain insulation of coupling metal parts from the pipe.

D. Sleeve-Type Couplings Manufacturer, or Equal

1. **World Wide Metric, Inc.** (Dresser), Style 38
2. **Ford Meter Box Company, Inc.**, Style FC1 or FC3
3. **Smith-Blair, Inc.**, Style 411

2.4 FLANGED COUPLING ADAPTERS

- A. Provide flanged coupling adapters specifically designed suitable for the fluid service and pressure rating.

B. Construction

1. Coupling bodies shall be fabricated from steel, ASTM A 512 - Cold-Drawn Butt-Weld Carbon Steel Mechanical Tubing or A 513 - Electric-Resistance Welded Carbon and Alloy Steel Mechanical Tubing.
2. Provide flanges in conformance with AWWA C207.

3. The body shall be at least the same wall thickness as the pipe to which the coupling is connected, but not less than 1/4 inch thick.
4. If the strength of the body material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.
5. The follower flange shall be fabricated from steel, ASTM A 576 - Steel Bars, Carbon, Hot Wrought, Special Quality or AISI C1012.

C. Flanged Couplings Adapter Manufacturer, or Equal

1. **Smith-Blair**, Model 913
2. **Dresser**, Model 128-W
3. **JCM**, Model 303

2.5 DISMANTLING JOINTS

- A. Provide dismantling joints products specifically designed suitable for the fluid service and pressure rating.
- B. Construction

1. Coupling bodies shall be fabricated from steel, ASTM A 512 - Cold-Drawn Butt-Weld Carbon Steel Mechanical Tubing or A 513 - Electric-Resistance Welded Carbon and Alloy Steel Mechanical Tubing.
2. Provide flanges in conformance with AWWA C207.
3. The body shall be at least the same wall thickness as the pipe to which the coupling is connected, but not less than 1/4 inch thick.
4. If the strength of the body material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.
5. The follower flange shall be fabricated from steel, ASTM A 576 - Steel Bars, Carbon, Hot Wrought, Special Quality or AISI C1012.

C. Dismantling Joints Manufacturer, or Equal

1. **Smith-Blair**, Model 975
2. **Dresser**, Model 131
3. **JCM**, Model 309

2.6 EXPANSION JOINTS

- A. Piping subject to expansion and contraction shall be provided with sufficient means to compensate for such movement without exertion of undue forces to equipment or structures, accomplished with expansion loops, bellow-type expansion joints, or sliding-type expansion joints.

- B. Expansion joints shall be provided with flanged ends and constructed of stainless steel, Monel, rubber, or other materials best suited for each individual service. Where expansion joints are used in water containing dissolved ozone residual or chloramines, provide Type 316 stainless steel expansion joints.
- C. Where bellows-type expansion joints are mounted near the suction nozzle of the pump, a stainless steel internal liner shall be provided to minimize turbulence as the flow passes through the arches of the bellows.
- D. Expansion joints for Plastic Tanks
 - 1. Expansion joints for piping connections to polyethylene tanks nozzles shall be provided by the tank manufacturer, selected for the fluid service, and sized for up to 4% tank expansion or movement as required by the tank manufacturer. Fastener hardware shall be of Type 316 stainless steel construction.
 - 2. Expansion joints for other plastic tanks shall be constructed of molded PTFE with at least two convolutions and flanged joints. Flanges shall be ductile iron with Type 316 stainless steel bolts and nuts. Flexible connectors shall be **Proco Series 442 molded expansion joint**, or equal.

2.7 FLEXIBLE CONNECTORS

A. Low-Temperature

- 1. Flexible connectors shall be installed in piping connections to engines, blowers, compressors, and other vibrating equipment, and where indicated.
- 2. Flexible connectors for service temperatures up to 180 degrees F shall be flanged-reinforced neoprene or butyl spools, rated for a working pressure of 40 to 150 psig, or reinforced flanged duck and rubber, as best suited for the application.
- 3. Flexible connectors for service temperatures above 180 degrees F shall be flanged, braided stainless steel spools with inner, annular, corrugated stainless steel hose, rated for a minimum 150-psig working pressure, unless otherwise recommended by the equipment manufacturer.
- 4. The connectors shall be a minimum of 9 inches long and provided with face-to-face flanges, unless otherwise indicated.
- 5. The final material selection shall be approved by the manufacturer.

B. High-Temperature (temperature exceeding 250°F (120°C))

- 1. Install flexible connectors in engine exhaust piping and where indicated.
- 2. Connectors shall be sufficient to compensate for thermal expansion and contraction and to isolate vibration between the engine and the exhaust piping system.
- 3. Connectors shall be stainless steel bellows-type, flanged, and rated for minimum 150 psig, 2000 degrees F.

2.8 TRANSITION COUPLINGS

- A. Provide transition-coupling products specifically designed suitable for the fluid service and manufactured for the piping applications.
- B. The transition couplings shall have function and design similar to the flexible couplings, joint and flanged coupling adapters for connecting piping having different outside diameters.

2.9 QUICK DISCONNECT COUPLINGS

- A. Quick disconnect couplings shall be of the cam lock type (cam and groove type) consisting of a male adapter conforming to Specification MIL A-A-59326A. Male adapters shall be designed to receive a female coupler without requiring threading, bolting, or tools. Connections shall remain tight and leak proof up to full system pressures.
- B. Each adapter shall be furnished with a dust cap complete with an 18-in long security chain of corrosion resistant material.
- C. Unless otherwise indicated, the quick disconnect couplings shall be flanged connection to piping and materials shall be Type 316 stainless steel.
- D. Quick connect couplings shall be as manufactured by LMC-Couplings; Dover Corporation; Ever-tite; or equal.

2.10 TAPPING SLEEVES

- A. Provide tapping sleeve products specifically designed suitable for the fluid service and manufactured for the piping applications
- B. Unless otherwise indicated, the tapping sleeves shall be of full circumference band with flanged outlet connection sized to ANSI class 150. Material of construction for the body and fastener shall be stainless steel.
- C. Gasket material: Nitrile (Buna-N) or EPDM.
- D. Tapping sleeves shall be as manufactured by **Smith-Blair; Romac Industries; Dresser** or approved equal.

2.11 MISCELLANEOUS ADAPTERS

- A. A special pipe adapter may be required to provide proper connection between different type of pipes and/or fittings. The adapter may be indicated on the Drawing with the pipe type or equipment. However, it is the CONTRACTOR'S responsibility to ensure proper connection between various type of pipes and pipe appurtenances. Provide adapters as required whether specifically indicated or not.
- B. Provide piping adapter products specifically designed suitable for the fluid service and manufactured for the piping applications.

PART 3 EXECUTION

3.1 GENERAL

- A. Installation, inspection and field testing of the pipes shall in accordance with the requirements of Section 40 05 00 - Piping, General.
- B. The CONTRACTOR shall have the coupling manufacturer's service representative verify the correct choice and application of couplings and gaskets, and the workmanship, to assure a correct installation.
- C. The CONTRACTOR shall assign the responsibility to the couplings manufacturer to review the piping connection to the couplings and submit any modifications to the ENGINEER for review.

3.2 INSTALLATION

- A. Where couplings are shown to connect piping to mechanical equipment such as pumps, compressors, and blowers, the piping shall be aligned with the equipment point of connection and shall be perpendicular to the axis of the flange or fitting for which the piping is to be connected.
- B. The couplings or the piping shall not impose excessive stress to the equipment connection to cause misalignment of the equipment.
- C. Restrained Joints on couplings, adapters and joints
 - 1. Couplings, adapters and joints on pressure lines shall be harnessed unless thrust restraint is provided by other means.
 - 2. Harnesses shall be designed by the pipe manufacturer in accordance with AWWA Manual M11, or as indicated.
 - 3. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed.
 - 4. Where harness sets are installed near the suction and discharge of the pump, harness bolts shall have zero elongation in order to prevent misalignment of the pump imparted by the thrust within the piping system.
 - 5. Other means of restraining the coupling such as set screws on piping will not be accepted.

END OF SECTION

SECTION 40 05 07

PIPE SUPPORTS

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide pipe supports, hangers, guides, and anchors, complete and in place, as indicated in accordance with the Contract Documents.
- B. Where pipe support systems are not indicated on the Drawings, the CONTRACTOR shall design and provide the supports in accordance with this Section. The absence of pipe supports and details on the contract drawings does not relieve the Contractor of responsibility for sizing and providing the pipe supports.
- C. The provisions of this Section shall apply to piping in Division 40.
- D. The CONTRACTOR shall provide supporting devices for supporting and restraining piping as indicated on the Drawings. Where pipe support devices and/or restraining details are not indicated on the Drawings, it is the CONTRACTOR'S responsibility to develop the details necessary to support and restraint the piping for a complete and functional pipe support system.
- E. Seismic and Wind Forces
 - 1. Pipe support details indicated in the Contract Drawings are sized for gravity loads only, and not designed to resist seismic and wind forces. However, pipe support details indicating "SEISMIC COMPLIANCE" on drawings are designed to resist seismic and wind forces.
 - 2. The CONTRACTOR shall arrange for the services of a registered professional engineer experienced in pipe support design to design such pipe supports to resist seismic and wind forces.
 - 3. Piping support seismic and wind loads shall be sized in accordance with Sheet SO01 – Basis of Design.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.
- B. Shop Drawings
 - 1. Submit Shop Drawings which shall include the following information:
 - a. Drawings of pipe supports, hangers, anchors, and guides.
 - b. Pipe support schedule or layout indicating where the supports will be installed.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Code Compliance

1. Piping systems and pipe connections to equipment shall be properly anchored and supported in order to prevent undue deflection, vibration, and dislocation due to seismic events, line pressures, pipe weight, fluid weight, liquid movement, thermal changes, vibration, and probable forces applied during construction as well as stresses on piping, equipment, and structures.
2. Supports and parts thereof shall conform to the requirements of ASME B31.1 - Power Piping – Chapter II, Part 5 -Expansion, Flexibility, and Pipe Supporting Element and design the pipe supporting elements in accordance with the rules of MSS SP-58 -Pipe Hangers and Supports – Materials, Design and Manufacture, except as supplemented or modified in this Section.
3. Supports for plumbing piping shall be in accordance with the latest edition of the applicable plumbing code or local administration requirements.

B. Structural Members

1. Wherever possible, pipes shall be supported from structural members.
2. Where it is necessary to frame structural members between existing members, such supplementary members shall be provided by the CONTRACTOR.
3. Supplementary members shall be in accordance with the requirements of the Building Code and the American Institute of Steel Construction, and shall be as acceptable to the ENGINEER.

C. Pipe Hangers

1. Pipe hangers shall be capable of supporting the pipe in operation, allowing free expansion and contraction of the piping and preventing excessive stress on equipment.
2. Hangers shall have a means of vertical adjustment after erection.
3. Hangers shall be designed to prevent becoming disengaged by any movement of the supported pipe.
4. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of safety valves shall include hydraulic shock suppressors.
5. Hanger rods shall be subjected to vertical loading only.

D. Hangers Subject to Lateral or Axial Movement.

1. At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit such movement.
2. Where lateral or axial pipe movement is greater than 1/2 inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from the cold-to-hot position of the pipe, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.

E. Spring-Type Hangers

1. Spring-type pipe hangers shall be provided for piping subject to vibration or vertical expansion and contraction, such as engine exhausts and similar piping.
2. Spring-type hangers shall be sized per the manufacturer's printed recommendations and for the loading conditions encountered.
3. Variable spring supports shall be provided with means to limit misalignment, buckling, eccentric loading, or to prevent overstressing of the spring, and with means to indicate the compression of the spring.
4. Supports shall be capable of accommodating at least 4 times the maximum travel due to thermal expansion.

F. Thermal Expansion

1. Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or expansion joints shall be provided, together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints permitting the piping to expand and contract freely away from the anchored points.
2. Components shall be structurally suitable to withstand the imposed loads.

G. Heat Transmission

1. Supports, hangers, anchors, and guides shall be designed and insulated such that excessive heat will not be transmitted to the structure or to other equipment.

H. Riser Supports

1. Where practical, risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.

I. Freestanding Piping

1. Freestanding pipe connections to equipment such as chemical feeders and pumps shall be firmly attached to support frames fabricated from angles, channels, or I-beams anchored to the structure.
2. Exterior, freestanding overhead piping shall be supported on fabricated pipe stands consisting of pipe columns anchored to concrete footings, or with horizontal, welded steel angles, and U-bolts or clamps securing the pipes.

J. Materials of Construction

1. Pipe support assemblies, including framing, hardware, and anchors, shall be of steel construction, galvanized after fabrication, unless otherwise indicated.
2. Submerged supports, as well as piping, conduits, and equipment in hydraulic structures located two feet above water level, shall be supported with support assemblies, including framing, hardware, and anchors constructed of Type 316 stainless steel, unless otherwise indicated.

3. Piping in chemical and corrosive service areas shall be supported with support assemblies, including framing, hardware, and anchors constructed of Type 316 stainless steel or FRP, unless otherwise indicated.
4. Corrosive service areas are indicated in Section 40 05 00 - 1.2 Definitions - Corrosive Service.

K. Point Loads

1. Meters, valves, heavy equipment, and other point loads on PVC, FRP, or other plastic pipes, shall be supported on both sides, according to manufacturer's recommendations, in order to avoid undue pipe stresses and failures.
2. In order to avoid point loads, the supports on PVC, FRP, or other plastic piping shall be equipped with extra wide pipe saddles or galvanized steel shields for general service and Type 316 stainless steel shields for chemical or corrosive areas.

L. Concrete Anchors

1. Unless otherwise indicated, concrete anchors for pipe supports shall be according to the following table; consult the ENGINEER for any anchor applications not appearing on the table.
2. Anchor embedment shall be in accordance with the requirements of Sheet S001.

Pipe Support Application	Type of Concrete Anchor
New Concrete	Use embedded concrete insert anchors on a grid pattern. Use Grinnell (Anvil International) , Tolco , or equal.
Existing Concrete	Use non-shrink grouted anchors, expansion anchors, or epoxy anchors. Epoxy anchors are not permitted for vertical hanging applications or where sustained tension is exerted on the anchor. Exceptions: Expansion anchors and epoxy anchors are not permitted for pipe supports subject to vibrating loads. Epoxy anchors are not permitted where the concrete temperature is in excess of 100 degree F or higher than the limiting temperature recommended by the manufacturer.
Vibratory Loads and High-Temperature Conditions	Use non-shrink grouted anchors.

M. Noise Reduction

1. In order to reduce the transmission of noise in piping systems, copper tubes in buildings and structures shall be wrapped with a 2-inch wide strip of rubber fabric or similar suitable material at each pipe support, bracket, clip, or hanger.

2.2 SUPPORT SPACING

- A. Supports for piping with the longitudinal axis in approximately a horizontal position shall be spaced to prevent excessive sag, bending, and shear stresses in the piping, with special consideration given where components such as flanges and valves impose concentrated loads.
- B. Where pipe spacing are indicated on the Drawings and are referenced to a Standard Detail, that requirement shall take preference over the general requirements of this section.
- C. Pipe support spacing shall not exceed the maximum indicated spans. Piping with grooved joint couplings, flexible joints, and bend fittings shall be balanced supported by a minimum of two pipe supports per pipe length, one at near each joint/fitting.
- D. For temperatures other than ambient temperatures or those listed, and for other piping materials or wall thicknesses, the pipe support spacings shall be modified in accordance with the pipe manufacturer's recommendations.
- E. Vertical supports shall be provided to prevent the pipe from being overstressed from the combination of loading effects.
- F. Steel Pipe
 1. Where support spacing is not indicated on the Drawings, the CONTRACTOR shall use the spacing below.
 2. Support Spacing for standard wall or heavier welded steel, stainless steel or alloy steel pipe.

Nominal Pipe Diameter, Inches	Maximum Span, ft (Water Service)	Maximum Span, ft (Gas or Vacuum Service)
1/2	6	7
3/4 and 1	8	9
1-1/4 to 2	10	12
3	12	14
4	14	15
6	16	18
8 and 10	18	20
12 and 14	20	24

16 and 18	22	26
20 and greater	24	30

G. Ductile Iron Pipe

1. Install supports for ductile iron pipe in accordance with the recommendations of the Ductile Iron Pipe Research Association (DIPRA) Design of Ductile Iron Pipe on Supports.
2. As a minimum, where support spacing is not indicated on the Drawings, the CONTRACTOR shall use the spacing indicated in the following schedule:

Nominal Pipe Diameter, inches	Support Configuration
All diameters	two supports per pipe length, with one of the two supports located at a joint

H. Copper Tube

1. Where support spacing is not indicated on the Drawings, the CONTRACTOR shall use the spacing below:

Nominal Tube Size, inches	Support Spacing, feet	
	Water Service	Vapor Service
3/4 and smaller	5	5
1	6	8
1-1/2 to 2-1/2	8	10
3	10	14
4	12	16
5	13	18
6	14	20
8	16	23

I. Schedule 80 PVC and CPVC Pipe

Nominal Pipe Size, inches	Temperature Range		
	100 °F and below	101 to 120 °F	121 to 140 °F
1	5	3.5	3
1-1/2	5.5	3.5	3.5
2	6	4	3.5
3	7	4.5	4
4	7.5	5	4.5
6	9	6	5
8	9.5	6.5	5.5
10 and larger	10	7	6

J. Other Pipe Materials

- Support spacing for pipe constructed of other materials shall be based on design temperature and in accordance with the pipe manufacturer's recommendations.

2.3 MANUFACTURED SUPPORTS

A. Stock Parts

- Where not specifically indicated, designs that are generally accepted as exemplifying good engineering practice and using stock or production parts shall be utilized wherever possible.
- Such parts shall be locally available, new, of best commercial quality, and designed and rated for the intended purpose.

B. Manufacturers, or Equal

- Basic PSA, Inc.**
- Bergen-Paterson Pipe Supports Group**
- Grinnell**
- Power Piping Company**
- TOLCO (Eaton B-Line)**

2.4 COATING

- Unless otherwise indicated, fabricated pipe supports other than stainless steel or non-ferrous supports shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM A 123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products and shall receive protective coatings in accordance with the requirements of Section 09 96 00 – Protective Coating.

PART 3 EXECUTION

3.1 INSTALLATION

A. General

1. Pipe supports, hangers, brackets, anchors, guides, and inserts shall be installed in accordance with the manufacturer's printed instructions and per ANSI/MSS SP-58 Pipe Hangers and Supports- Materials, Design, Manufacture, Selection, Application and Installation.
2. Embedded concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

B. Appearance

1. Pipe supports and hangers shall be positioned in order to produce an orderly, neat piping system.
2. Hanger rods shall be vertical, without offsets.
3. Hangers shall be adjusted to line up groups of pipes at the proper slope for drainage and venting, as close to ceilings or roofs as possible, and without interference with other WORK.

3.2 FIELD FABRICATION

A. Quality Control

1. Field fabricated pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available.
2. Hangers and supports shall be neat in appearance without sharp corners, burrs, or edges.

END OF SECTION

SECTION 40 05 23
STAINLESS STEEL PIPE

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide stainless steel pipe and appurtenances, complete and in place, in accordance with the Contract Documents.
- B. The requirements of Section 40 05 00 – Piping, General and Section 40 05 07 – Pipe Supports apply to the WORK of this Section.

1.2 CONTRACTOR SUBMITTALS

- A. In addition to the submittals required by Section 01 33 00 – Contractor Submittals and Section 40 05 00 – Piping, General, provide proposed post welding cleaning method (including precleaning, descaling, chemicals to be used) or mechanical descaling method and final cleaning/passivation.
- B. Provide written certification that the pipe as supplied are in accordance with ASTM A 409 or ASTM 778, If the pipes are provided, Supplemental testing is not required.

PART 2 PRODUCTS

2.1 PIPE MATERIAL

- A. Unless otherwise indicated, stainless steel pipe shall be in accordance with ASTM A 312 - Seamless and Welded Austenitic Stainless Steel Pipe, Type 316L seamless, of the schedules indicated. Stainless steel pipe 12 inches in diameter and larger shall be in accordance with ASTM A 409 - Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service or ASTM A 778 - Welded, Unannealed Austenitic Stainless Steel Tubular Products, Type 316L, of the schedules indicated, with welded or flanged joints. Piping less than 3 inches in nominal diameter shall have a minimum wall thickness not less than the Schedule 40S.

2.2 PIPE JOINTS

- A. Stainless steel pipe for sizes 2-1/2 inches and smaller shall have threaded ends with NPT threads made up with Teflon tape. Stainless steel pipe 3 inches and larger and where indicated shall have welded joints with socket-welding fittings, butt-welding fittings, or socket welding flanges. Stainless steel flanges shall have stainless steel bolts and nuts. Where indicated, stainless steel pipe shall have grooved ends for shouldered couplings, except that no pipe with less than Schedule 40 wall thickness shall be grooved. Where indicated, stainless steel pipe shall have plain ends for sleeve-type couplings.
- B. Threaded joints (all sizes) are not allowed for the following fluid services: sodium hydroxide, sulfuric acid, oxygen and other fluid services indicated in pipe schedule.

2.3 FITTINGS

- A. Threaded Fittings: Forged stainless steel fittings conforming to ASME B 16.11 - Forged Fittings, Socket-Welding and Threaded, Type 316.

- B. Socket-Welding Fittings: Forged stainless steel fittings conforming to ASME B 16.11, Type 316.
- C. Butt-Welding Fittings: Wrought stainless steel butt-welding fittings conforming to ASTM A 403 - Wrought Austenitic Stainless Steel Piping Fittings, and ASME B 16.9 - Factory-Made Wrought Steel Butt-Welding Fittings, Type 316.
- D. Grooved Fittings: Wrought stainless steel grooved fittings conforming to ASTM A 403 and ASME B 16.9, with grooving conforming to AWWA C606 - Grooved and Shouldered Joints, Type 316.
- E. Flanged Fittings: Type 316 stainless steel flanged fittings and flanges conforming to ASME B 16.5 - Pipe Flanges and Flanged Fittings.
- F. Pressure Class: Unless otherwise indicated, fittings shall be in accordance with the pressure classes called for in the Piping Schedule. Where not indicated, the fittings shall have the same pressure rating as the pipe.

2.4 CLEANING

- A. Stainless steel pipe and fittings shall be pickled at the point of manufacture, scrubbed and washed until all discoloration is removed in accordance with ASTM A 380 – Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems or A 967 - Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.

PART 3 EXECUTION

3.1 GENERAL

- A. Installation, inspection and field testing of the pipes shall in accordance with the requirements of Section 40 05 00 - Piping, General.

END OF SECTION

SECTION 40 42 00

PIPE AND EQUIPMENT INSULATION

PART 1 GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall provide pipe and equipment insulation, complete and in place, as indicated in accordance with the Contract Documents.
- B. In addition to the insulation indicated, the CONTRACTOR shall insulate cold or hot piping and exhausts that could be hazardous to personnel upon contact.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Federal Specifications
 - 1. HH-1-558B - Insulation Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type)
- B. Commercial Standards
 - 1. ASTM C 547 - Mineral Fiber Pipe Insulation
 - 2. TM E 84 - Test Method for Surface Burning Characteristics of Building Materials

1.3 CONTRACTOR SUBMITTALS

- A. Submit complete Shop Drawings of thermal insulation, with manufacturer's data on materials, covering, jackets, and finish, in accordance with the requirements of Section 01 33 00 – Contractor Submittals.
- B. Furnish the following certifications:
 - 1. Certification from the heating system manufacturer that the insulation has been installed in accordance with the manufacturer's recommendations.
 - 2. Certification from the acoustic insulation/duct lining manufacturer that the lining has the indicated sound absorption coefficients.

PART 2 PRODUCTS

2.1 GENERAL

- A. Components of the insulation, including covering, mastics, and adhesives, shall have a flame-spread rating of not greater than 25 and a smoke development rating of not greater than 50.
- B. Ratings shall be as established by tests in accordance with ASTM E 84, and the above federal and commercial specification standards.

C. Insulation shall be applied in strict accordance with the manufacturer's instructions.

2.2 BASIC MATERIALS

A. Unless otherwise indicated, the insulation thickness shall be as follows:

Pipe		Minimum Thickness of Insulation (inches)
Raw and potable water	6-inch and smaller	1
	8-inch and larger	1-1/2
Chemical piping	All sizes	1
Heat-traced piping	3-inch and smaller	1
	4-inch and larger	1-1/2

2.3 PIPING INSULATION

- A. Except as indicated otherwise, piping shall be insulated with heavy density, unfaced, fiberglass pipe insulation.
- B. Pipe insulation shall have an average density of 4 pounds per cubic foot or greater, and its conductivity (k) shall not exceed 0.23 BTU-inch per (hour) (square foot) (degree F) at a mean temperature of 75 degrees F.
- C. The insulation shall have a factory-applied white fire-retardant vapor-barrier jacket of kraft paper and aluminum foil laminated together and reinforced with fiberglass yarn.
- D. Fittings and valves shall be covered with the same material as the pipe, cut in segments to fit snugly without open spaces, held in place with copper wire or cement, and then covered with the same jacketing material as the pipe.
- E. Insulated fittings adjacent to vapor-barrier insulation shall be sealed with an acceptable vapor-barrier cement before installation of the finish jacket.
- F. Supporting Hangers
1. For 3-inch piping and larger, the insulation shall be protected at supporting hangers by suitable hollow steel protection saddles, filled with loose glass fiber insulation as indicated.
 2. For piping smaller than 3-inch, place 1/16-inch thick sheet metal shims between the insulation and the supporting hanger; the shim shall be at least 6 inches long.
 3. The insulation shall be oversized for installation over electric heating cable.
 4. The pipe insulation and vapor-barrier shall be continuous through hangers and supports.

G. Jacketing

1. A final covering of the insulation for piping shall be of 0.030-inch thick PVC or equivalent strength smooth aluminum, preformed jacketing with a factory-attached moisture barrier.
2. Valves, flanges, fittings, and ends of insulation shall be covered with a pre-molded, precision-formed, high-low temperature PVC fitting cover or end cap, or equivalent preformed unit to match the piping insulation jacket.
3. The pre-molded covers shall be sized to receive the same thickness of insulation as used on the adjacent piping and shall be sized to cover and protect the insulated fitting.
4. Joints shall be sealed with silicone mastic or solvent welding to provide a continuous air- and weather-tight joint.
5. Strapping shall be 1/2-inch wide, Type 3003 aluminum or stainless steel.
6. Pre-molded fittings shall be **Zeston 2000 PVC**, or equal.

H. Standard Temperature Insulation

1. Standard temperature insulation shall be used for process, cold and hot water, steam, and condensate piping and equipment with surface temperatures up to 850 degrees F.
2. Pipe insulation and jacketing shall be applied to piping where indicated, including associated fittings, flanges, and valves.
3. Pipe insulation shall consist of a molded-type pipe covering, constructed of fibrous glass with a minimum k-factor of 0.23 at 75 degrees F mean temperature.

2.4 ANTI-CONDENSATION PIPING INSULATION

- A. In general, piping 5 inches and larger in diameter for raw water, settled water, filtered water, service water, water tanks, and as indicated, shall be insulated.
- B. The insulation shall be a flexible closed-cell elastomeric thermal insulation, black in color and provided with a smooth skin on one side to form the outer exposed insulation surface.
- C. The insulation shall be supplied in sheets and rolls, as follows:

Thickness	1/8 inch to 2 inches
Thermal conductivity	6.75 W-mm per (minute) (degrees K) (0.27 BTU-inch per (hour) (square foot) (degrees F)) at a mean temperature of 75 degrees F
Water vapor permeability	0.10 perm-inch
Water absorption	6 percent maximum

Upper use limit	180 degrees F
Lower use limit	-40 degrees F
Flame-spread rating	25 or less
Smoke-developed rating (thickness to 3/4-inch)	50 or less
Smoke-developed rating (thickness 1-inch or greater)	100 or less

D. Manufacturer, or Equal

1. **Armstrong, AP Armaflex Sheet and Roll.**

2.5 EQUIPMENT AND TANK INSULATION

A. Low Temperature Insulation:

1. For equipment and tank insulation up to 250 degrees F, use pipe insulation as described above.
2. The installation shall be in strict accordance with the Manufacturer's recommendations.
3. An aluminum or PVC jacket shall be installed over the insulation for protection.

B. High Temperature Insulation

1. High temperature insulation shall be employed for engine exhaust pipes, flues, and similar pipes and equipment with surface temperatures up to 1200 degrees F.
2. High temperature insulation shall consist of 4-inch thick calcium silicate or similar pre-molded blocks, constructed in 2 layers of 2-inch thickness each with staggered joints, and applied over a 3/4-inch-high metal rib lath.
3. The inner layer shall be suitable for 1200 degrees F, and the outer layer for 1000 degrees F.
4. Bends, voids, joints, fittings, and other parts of the piping system shall be filled with insulating cement.
5. Aluminum lagging with preformed aluminum fittings shall be banded to the insulation in a similar fashion as required for standard insulation.
6. Allowance shall be made for thermal expansion.

C. Manufacturers, or Equal

1. **Armstrong Contracting and Supply Corp.**

2. **Certain-Teed Corporation**
3. **Johns Manville**
4. **Owens-Corning**
5. **P.P.G. Industries, Inc.**

PART 3 EXECUTION

3.1 GENERAL

- A. Insulation and liners shall be installed by a qualified insulation contractor in strict accordance with the manufacturer's recommendations.

3.2 PIPING INSULATION

- A. Piping, fittings, and valves to be insulated shall be clean and dry prior to installation of insulation.
- B. Piping indicated to be insulated shall be completely insulated inside structures, except where indicated otherwise.

3.3 JACKETING

- A. Joints shall be neatly finished with no ragged ends.
- B. When finished, the covering shall show no exposed staples or other binding used during installation.
- C. Staples, if used, shall be stainless steel.

END OF SECTION

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SECTION 43 30 00

VALVES, GENERAL

PART 1 GENERAL

1.1 THE SUMMARY

- A. Provide valves, actuators, and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.
- B. The requirements of Section 46 01 00 – Equipment General Provisions, apply to the WORK of this Section.
- C. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated.
- D. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls, as indicated.
- E. Support
 - 1. Where a valve is to be supported by means other than the piping to which it is attached, obtain from the valve manufacturer a design for its support and foundation that satisfies the criteria in Section 46 01 00 – Equipment General Provisions.
 - 2. Submit the support design, including drawings and calculations sealed by an engineer, with the Shop Drawings.
- F. Unit Responsibility
 - 1. The CONTRACTOR shall assign a single manufacturer to be responsible for the supply, coordination of design, assembly, testing, and furnishing of each valve; however, the CONTRACTOR shall be responsible to the OWNER for compliance with the requirements of each valve Section.
- G. Single Manufacturer
 - 1. Where 2 or more valves of the same type and size are required, the valves shall be furnished by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.
- B. Furnish the following information on Shop Drawings:
 - 1. valve name, size, Cv factor, pressure rating, identification number (if any), and specification section number;
 - 2. complete information on the valve actuator, hydraulic power units (HPU), pneumatic air supply system including size, manufacturer, model number, limit switches, and mounting;

3. cavitation limits for control valves;
 4. assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand wheels, position indicators, limit switches, integral control systems, needle valves, and control systems;
 5. complete wiring diagrams and control system schematics; and,
 6. A valve-labeling schedule, listing the valves to be furnished with stainless steel tags, indicating in each case the valve location and the proposed wording for the label.
- C. Furnish a technical manual containing the required information for each valve, as indicated.
- D. Furnish a spare parts list, containing the required information for each valve assembly, as indicated.
- E. Factory Test Data
1. Where indicated, submit signed, dated, and certified factory test data for each valve requiring certification, before shipping the valve.
 2. Furnish a certification of quality and test results for factory-applied coatings.
- F. Field Test Data
1. Submit signed, dated, and certified field test data for each valve.

PART 2 PRODUCTS

2.1 PRODUCTS

- A. General
1. Provide valves and gates of new and current manufacture.
 2. Provide valves 6-inch and larger with actuators with position indicators.
 3. Unless otherwise indicated, provide valve actuators in accordance with Section 43 30 12 – Valve and Gate Actuators.
- B. Protective Coating
1. Coat the exterior surfaces of valves and the wet interior surfaces of ferrous valves of sizes 2-inch and larger in accordance with the requirements of Section 09 96 00 – Protective Coating.
 2. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with the indicated requirements.
 3. Do not coat the machined flange faces of valves except where such flanges are not adjoining a mating flange as shown in the Contract Documents. Apply rust inhibitor coating on machined surfaces of the flange prior to shipment.

C. Valve Labeling

1. Except when such requirement is waived by the ENGINEER in writing, provide a label on shut-off valves and control valves except for hose bibbs and chlorine cylinder valves.
2. Furnish a label composed of 1/16-inch plastic or stainless steel, a minimum of 2 inches by 4 inches in size, as indicated in Section 40 05 02 – Piping Identification, and permanently attached to the valve or on the wall adjacent to the valve as directed by the ENGINEER.

D. Valve Testing

1. As a minimum, unless otherwise indicated or recommended by the reference standards, test valves 3 inches in diameter and smaller in accordance with the manufacturer's standard procedure.
2. Factory-test valves 4 inches in diameter and larger as follows:
 - a. Hydrostatic Testing
 - 1) Subject valve bodies to an internal hydrostatic pressure equivalent to twice the water-rated pressure of the valve.
 - 2) Metallic valves rating pressures shall be based at 100 degrees F.
 - 3) Plastic valves rating pressures shall be based at 73 degrees F, or at a higher temperature according to material type.
 - 4) During the hydrostatic test, there shall be no visible leakage through the valve body, end joints, or shaft seals, nor shall parts of the valve be permanently deformed.
 - 5) Allow test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - b. Seat Testing
 - 1) Test the valves for leaks in the closed position, with the pressure differential across the seat equal to the water rated pressure of the valve.
 - 2) Provide test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - 3) The leakage rate shall be the more stringent of the following:
 - a) As recommended by the reference standard for that type of valve; or
 - b) Leakage past the closed valve not to exceed one fluid ounce per hour per inch diameter for metal seated valves and drop-tight for resilient seated valves.
 - c. Performance Testing
 - 1) Shop-operate the valves from the fully-closed to the fully-open position, and reverse under no-flow conditions in order to demonstrate that the valve assembly operates properly.

E. Certification

1. Prior to shipment of valves with sizes larger than 12-inches in diameter, submit certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, or ASTM.

F. Valve Markings

1. Permanently mark valve bodies in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.2 MATERIALS

A. General

1. Provide materials suitable for the intended application.
2. Provide materials in contact with potable water listed as compliant with NSF Standard 61.
3. Ensure that materials not indicated are of high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended.
4. Unless otherwise indicated, provide valve and actuator bodies conforming to the following requirements:
 - a. Cast Iron: Close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - b. Ductile Iron: ASTM A 536 - Ductile Iron Castings, or to ASTM A 395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
 - c. Steel: ASTM A 216 - Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or to ASTM A 515 - Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
 - d. Bronze: ASTM B 62 - Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B 584 - Copper Alloy Sand Castings for General Applications. Bronze materials in contact with potable water service shall be free of lead content meeting the Lead Reduction Act.
 - e. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A 351 - Steel Castings, Austenitic, for High-Temperature Service, Grade CF8M, or shall be Type 316 stainless steel
 - f. PVC: Polyvinyl chloride materials for valve body, flanges, and cover shall conform to Cell Classification 12454
 - g. CPVC: Chlorinated Poly Vinyl Chloride materials for valve body, flanges, and cover shall conform to Cell Classification 23447
 - h. NSF Standard 61: Materials shall be listed for use in contact with potable water.

- i. Elastomeric materials used for seat, seals and O-rings shall be compatible with temperature, pressures and fluid or gas service.
 - 1) Elastomeric materials for water with chloramines shall be Teflon or Viton-A.
 - 2) Elastomeric materials for water with dissolved ozone residual shall be Teflon suitable for ozone service.
 - 3) Elastomeric materials for oxygen (LOX or GOX) shall be Teflon specially manufactured and packaged suitable for oxygen service.

2.3 VALVE CONSTRUCTION

A. Bodies

1. Provide valve bodies that are cast, molded (in the case of plastic valves), forged, or welded, of the materials indicated, and with smooth interior passages.
2. Provide wall thicknesses uniform and in agreement with the applicable standards for each type of valve, without casting defects, pinholes, and other defects that could weaken the body.
3. Perform welds on welded bodies by certified welders and ground welds smooth.
4. Provide valve ends as indicated and rated for the maximum temperature and pressure to which the valve will be subjected.

B. Valve End Connections

1. Unless otherwise indicated, valves 2-1/2 inches in diameter and smaller may be provided with threaded end connections.
2. Provide valves 3 inches in diameter and larger with flanged end connections.
3. Flanges, bolts and gaskets shall be as specified in Section 40 05 00 - Piping, General.

C. Bonnets

1. Connect valve bonnets to the body by clamping, screwing, or flanging.
2. Provide bonnets of the same material, temperature, and pressure rating as the body.
3. Make provisions for the stem seal with the necessary glands, packing nuts, and yokes.

D. Stems

1. Provide valve stems of the materials indicated, or, if not indicated, of the best commercially-available material for the specific service, with adjustable stem packing, O-rings, chevron V-type packing, or other suitable seal. Bronze materials in contact with potable water shall be NSF 61 approved and free of lead. Elastomeric materials shall be compatible with fluid service.
2. Where subject to dezincification, bronze valve stems shall conform to ASTM B 62.

3. Where dezincification is not a problem, bronze conforming to ASTM B 584 may be used, except that the zinc content shall not exceed 16 percent.

E. Stem Guides

1. Provide stem guides spaced with an L/R ratio not to exceed 200:1. Submit calculations for L/R ratios and guide spacing to the ENGINEER for review.
2. Stem guides shall have slotted holes and shall be adjustable in two directions.
3. Construct submerged stem guides from Type 316 stainless steel.

F. Internal Parts

1. Provide internal parts and valve trim as indicated for each individual valve.
2. Where not indicated, construct valve trim from Type 316 stainless steel or other material best-suited for the intended service.

G. Nuts and Bolts

1. Unless otherwise indicated, provide nuts and bolts on valve flanges and supports in accordance with the requirements of Sheet S001 and Section 40 05 00 – Piping, General.

2.4 Torque Tubes

- A. Submerged or buried valves with a remote gearbox and actuator shall be supplied with a torque tube to transfer torque from the actuator to the valve. Torque tubes shall be directly connected to the valve and the floor stand and gear actuator. Each torque tube and floor stand shall be sized to operate under the maximum service conditions for the valve. Unless otherwise indicated, torque tubes shall be made of schedule 40, steel pipe with epoxy coating suitable for the fluid service. Each submerged valve, torque tube, floor stand and actuator shall be pre-assembled and “matched marked” in the manufacturer’s shop to ensure proper fit when assembled in field.

2.5 Extension Shaft Stem

- A. Valves mounted in dry areas with gearbox attached to the valve and with remote actuator shall be supplied with an extension shaft stem with universal joint attached to the gear and actuator. All components shall be sized to operate under the maximum service conditions for the valve. Unless otherwise indicated, shaft stem and universal joints shall be made of carbon steel with epoxy coating suitable for the fluid service. Each valve, shaft stem, floor stand and actuator shall be pre-assembled and “matched marked” in the manufacturer’s shop to ensure proper fit when assembled in field.

2.6 VALVE ACTUATORS

- A. Valve actuators shall be as indicated and as specified in Section 43 30 12 – Valve and Gate Actuators.

2.7 VALVE ACCESSORIES

- A. Provide valves complete with the accessories required to provide a functional system.

2.8 SPARE PARTS

- A. Furnish the required spare parts, suitably packaged and labeled with the valve name, location, and identification number.
- B. Furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve.
- C. Spare parts are intended for use by the OWNER, after expiration of the correction of defects period.

2.9 MANUFACTURERS

- A. Valve manufacturers shall have a successful record of not less than 5 years in the manufacture of the indicated valves.

PART 3 EXECUTION

3.1 VALVE INSTALLATION AND TRIAL OPERATION

A. General

- 1. Install valves, actuating units, stem extensions, valve boxes, and accessories in accordance with the manufacturer's written instructions and as indicated.
- 2. Adequately brace gates in order to prevent warpage and bending under the intended use.
- 3. Firmly support valves in order to avoid undue stresses on the pipe.

B. Access

- 1. Install valves in a manner to provide easy access for actuation, removal, and maintenance, and to avoid interference between valve actuators and structural members, handrails, and other equipment.

C. Valve Accessories

- 1. Where combinations of valves, sensors, switches, and controls are indicated, properly assemble and install such items such that systems are compatible and operating properly.
- 2. Clearly note the relationship between interrelated items on Shop Drawing submittals.

D. Trial Operation

- 1. After installation, schedule trial operation witnessed by the ENGINEER and the OWNER representative.
- 2. All valves shall be cleaned thoroughly of all foreign materials and final adjustments made. The valves shall then be operated through one complete cycle from a fully closed position to a fully open position and back to a fully closed position to verify that the assembly is functional.
- 3. For control valves that operate in multiple operating scenarios, the CONTRACTOR shall simulate all operational scenarios including the hydraulic power units, pilot control system or pneumatic air supply system to demonstrate compliance to the specifications.

4. A field leakage test meeting the maximum allowable specified requirement shall be conducted.
5. Test certificate shall be signed by the valve manufacturer and the CONTRACTOR and shall be submitted to the ENGINEER.

END OF SECTION

SECTION 43 30 12

VALVE AND GATE ACTUATORS

PART 1 GENERAL

1.1 THE SUMMARY

- A. Provide valve and gate actuators and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.
- B. The provisions of this Section apply to valves and gates except where otherwise indicated in the Contract Documents.
- C. Unit Responsibility
 - 1. Make the valve or gate manufacturer responsible for the coordination of design, assembly, testing, and installation of actuators on the valves and gates; however, the CONTRACTOR shall be responsible to the OWNER for compliance of the valves, gates, and actuators with the Contract Documents.
- D. Where 2 or more valve or gate actuators of the same type or size are required, the actuators shall be produced by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals and Section 43 30 00 – Valves, General.
- B. Submit Shop Drawing information for actuators with the valve and gate submittals as a complete package.
- C. Submit calculations showing dynamic seating and unseating torques versus the output torque of the actuator.

PART 2 PRODUCTS

2.1 GENERAL

- A. Unless otherwise indicated, provide shut-off and throttling valves and externally actuated valves and gates with manual or power actuators.
- B. Provide actuators complete and operable with mounting hardware, motors, gears, controls, wiring, solenoids, hand wheels, levers, chains, and extensions, as applicable.
- C. Provide actuators with torque ratings equal to or greater than required for valve seating and dynamic torques, whichever is greater, and capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering.
- D. Actuator torque ratings for butterfly valves shall be determined in accordance with AWWA C504 - Rubber-Seated Butterfly Valves.
- E. Identify wires of motor-driven actuators by unique numbers.

F. Manufacturers

1. Where indicated, certain valves and gates may be provided with actuators manufactured by the valve or gate manufacturer.
2. Where actuators are furnished by different manufacturers, coordinate the selection to result in the fewest number of manufacturers possible.

G. Materials

1. Provide actuators of current models, of the best commercial quality materials, and liberally sized for the required torque.
2. Provide materials suitable for the environment in which the valve or gate is to be installed.

H. Actuator Mounting and Position Indicators

1. Securely mount actuators by means of brackets or hardware specially designed and sized for this purpose and of ample strength.
2. Cast the word "OPEN" on each valve or actuator, with an arrow indicating the direction to open in the counter-clockwise direction.
3. Equip gear and power actuators with position indicators.
4. Where possible, locate manual actuators between 48 and 60 inches above the floor or the permanent working platform.

I. Standards

1. Unless otherwise indicated and where applicable, provide actuators in accordance with AWWA C 540 - Power-Actuating Devices for Valves and Sluice Gates.

J. Functionality

1. Coordinate electric, pneumatic, and hydraulic actuators with the power requirements of Division 26.

K. Provide fasteners in accordance with the requirements of Sheet SO01.

L. Provide coatings in accordance with the requirements of Section 09 96 00 – Protective Coating.

2.2 MANUAL ACTUATORS

A. General

1. Unless otherwise indicated, provide valves and gates with manual actuators.
2. Provide valves in sizes up to and including 4 inches with direct-acting lever or hand wheel actuators of the manufacturer's best standard design.
3. Provide valves and gates larger than 4-inch with gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the hand wheel.

4. Provide buried and submerged gear-assisted valves, gates, gear-assisted valves for pressures higher than 250 psig, valves 30 inches in diameter and larger, and where indicated, with worm gear actuators, hermetically-sealed water-tight and grease-packed.
5. Valves 6-inch to 24-inch diameter may be provided with traveling-nut actuators, worm gear actuators, spur or bevel gear actuators, as appropriate for each valve.

B. Buried Valves

1. Unless otherwise indicated, provide buried valves with extension stems to grade, with square nuts or floor stands, position indicators, and cast-iron or steel pipe extensions with valve boxes, covers, and operating keys.
2. Where indicated, provide buried valves in cast-iron, concrete, or similar valve boxes with covers of ample size in order to allow operation of the valve actuators.
3. Permanently label the valve box covers as required by the local Utility Company or the ENGINEER.
4. Provide wrench-nuts in compliance with AWWA C 500 - Metal-Seated Gate Valves for Water Supply Service.

C. Chain Actuator

1. Provide manually-activated valves with the stem located more than 7 feet above the floor or operating level with chain drives consisting of sprocket-rim chain wheels, chain guides, and operating chains supplied by the valve manufacturer.
2. Construct the wheel and guide from ductile iron, cast iron, or steel.
3. Chains
 - a. Fabricate the chain from hot-dip galvanized steel or stainless steel, and extend to 5 feet, 6 inches above the operating floor level.
 - b. Provide an extra strong valve stem on chain-actuated valves in order to allow for the extra weight and chain pull.
 - c. Provide hooks for chain storage where chains interfere with pedestrian traffic.

D. Floor Boxes

1. Provide hot-dipped galvanized cast iron or steel floor boxes and covers to fit the slab thickness, for operating nuts in or below concrete slabs.
2. For operating nuts in the concrete slab, provide a bronze-bushed cover.

E. Tee Wrenches

1. Furnish buried valves with floor boxes with 2 operating keys or one key per 10 valves, whichever is greater.
2. Size the tee wrenches such that the tee handle will be 2 to 4 feet above ground, and to fit the operating nuts.

- F. Design and rate buried gear actuators for buried service, provide with a stainless steel input shaft, and double-seal on shaft and top cap.

2.3 PNEUMATIC ACTUATORS

A. General

1. Controls

- a. Provide pneumatic cylinder actuators with every necessary pneumatic or electro-pneumatic control for the intended actuation of the valve or gate.
- b. Manufacturer, or Equal
 - 1) G.H. Bettis/Shafer
 - 2) Fisher Controls
 - 3) Miller Fluid Power
 - 4) Neles-Jamesbury, Inc.
 - 5) Rexroth Corporation

2. Filters, Regulators, and Lubricators

- a. Where required by the service and type of actuator, provide filters, regulators, and oil-lubricators in the air supply to the actuator, according to the manufacturer's instructions.

3. Air Supply

- a. Size pneumatic actuators for the available air pressure as indicated, and provided with isolating valves, adjustable filter-regulators, pressure gauges, and condensate drains.
- b. The filter elements shall be replaceable 40-micron units.
- c. Manufacturer, or Equal
 - 1) Fisher Controls
 - 2) Miller Fluid Power

4. Manufacturer, or Equal

- a. Fisher Corporation
- b. ITT Engineered Valves
- c. Neles-Jamesbury, Inc

PART 3 EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Field Adjustments

1. The adjustment of actuator controls and limit switches in the field for the required function shall be performed by field representatives of the manufacturers of valves or gates with pneumatic, hydraulic, or electric actuators.

3.2 INSTALLATION

- A. Install valve and gate actuators and accessories in accordance with the requirements of Section 43 30 00 – Valves, General.
- B. Locate the actuators to be readily accessible for operation and maintenance without obstructing walkways.
- C. Do not mount actuators where shock or vibrations will impair their operation, and do not attach the support systems to handrails, process piping, or mechanical equipment.

END OF SECTION

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SECTION 43 30 16

CHECK VALVES

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide check valves and appurtenances, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 43 30 00 – Valves, General apply to this Section.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 43 30 00 – Valves, General.

PART 2 PRODUCTS

2.1 SWING CHECK VALVES (3-INCHES AND LARGER)

- A. General: Swing check valves for water, sewage, sludge, and general service shall be of the outside lever and spring or weight type, in accordance with AWWA C 508 - Swing-Check Valves for Waterworks Service, 2-in. through 24-in. NPS, unless otherwise indicated, with full-opening passages, designed for a water-working pressure of 150 psi. Units shall have a flanged cover piece to provide access to the disc. Where indicated, swing check valves shall be provided with position indicators.
- B. Body: The valve body and cover shall be of cast iron conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with flanged ends conforming to ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800, or be mechanical joint ends, as indicated.
- C. Disc: The valve disc shall be of cast iron, ductile iron, or bronze conforming to ASTM B 584 - Copper Alloy Sand Castings for General Applications.
- D. Seat and Rings: The valve seat and rings shall be of bronze conforming to ASTM B 584 or B 148 - Aluminum-Bronze Castings or of Buna-N.
- E. Hinge Pin: The hinge pin shall be of bronze or stainless steel.
- F. Manufacturers, or Equal
 - 1. **APCO (Valve and Primer Corp.)**
 - 2. **Kennedy Valve**
 - 3. **Mueller Company**
 - 4. **Stockham Valves and Fittings**
 - 5. **Golden Anderson**

2.2 SWING CHECK VALVES (2-1/2 INCHES AND SMALLER)

- A. General: Swing check valves for steam, water, oil, or gas in sizes 2-1/2 inches and smaller shall be suitable for a steam pressure of 150 psi and a cold-water pressure of 300 psi. Units shall have screwed ends unless otherwise indicated, and screwed caps.
- B. Body: The valve body and cap shall be of bronze conforming to ASTM B 763 - Copper Alloy Sand Castings for Valve Application, or ASTM B 584 with threaded ends conforming to ASME B1.20.1 - Pipe Threads, General Purpose (inch).
- C. Disc: Valves for steam service shall have bronze or brass discs conforming to ASTM B 16 - Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines, and for cold water, oil, and gas service replaceable composition discs.
- D. Hinge Pin: The hinge pins shall be of bronze or stainless steel.
- E. Manufacturers, or Equal
 - 1. **Crane Company**
 - 2. **Milwaukee Valve Company**
 - 3. **Stockham Valves and Fittings**
 - 4. **Wm. Powell Company**

2.3 INTERNAL SPRING-LOADED CHECK VALVES (GLOBE STYLE)

- A. General: Internal spring-loaded check valves for water pumps, compressors, gas, air, and steam shall be of the full-flow internal spring-loaded poppet type. The valves shall be designed for a water-working pressure of not less than 150 psi unless otherwise indicated.
- B. Body: The bodies of valves 3-inches and larger shall be of cast iron conforming to ASTM A 126 with 125 lb flanged ends conforming to ASME B 16.1 unless otherwise indicated. Where necessary, there shall be a positive, watertight seal between the removable seat and the valve body. The stem guide shall be integrally cast with the body or screwed into the body.
- C. Valves smaller than 3-inches shall have bronze bodies with screwed ends conforming to ASME B 1.201, suitable for a minimum working pressure of 200 psi, and a temperature of 250 degrees F, unless otherwise indicated. The type of bronze shall be suitable for the intended service.
- D. Disc and Stem: The disc and stem of all valves in sizes 3-inches and larger shall be of bronze conforming to ASTM B 584 - Copper Alloy Sand Castings for General Applications, or stainless steel. The stem shall have 2 point bearings. The downstream bearing shall have a bronze or other suitable bushing, to provide a smooth operation.
- E. Valves smaller than 3-inches shall have discs and retaining rings of Teflon, nylon, or other suitable material, and stems of bronze, brass, or stainless steel, suitable for the intended service.
- F. Stem Guide: The stem guide shall be either firmly fixed in the valve body to prevent it from sliding into the adjacent pipe and damaging the pipe lining, or the valve manufacturer shall provide each valve with one matching flange compatible with the adjacent pipe and its lining to prevent damage to the lining. The compatible flange shall be part of the Shop Drawing submittal.

- G. Seat: Valves for general service at temperatures up to 250 degrees F shall have bubble-tight shut-off with resilient seats of Buna-N, Teflon, or other suitable material. Valves for steam service and temperatures over 250 degrees F shall have metal-to-metal seating of bronze or stainless steel, as recommended by the manufacturer for the specific service condition. Resilient seats shall be firmly attached to the seating ring by compression molding or other acceptable method.
 - H. Spring: Valves in sizes 3-inches and larger shall have Type 316 stainless steel springs, and valves smaller than 3-inches shall have stainless steel or beryllium copper springs, as suitable for the service. The spring tension of the valves shall be designed for the individual pressure condition of each valve.
 - I. Manufacturers, or Equal
 - 1. **APCO (Valve and Primer Corp.)**
 - 2. **CPV (Combination Pump Valve Company)**
 - 3. **Miller Valve Co., Inc.**
 - 4. **VAL-MATIC (Valve and Manufacturing Corporation)**
- 2.4 DOUBLE-LEAF CHECK VALVES
- A. General: Double-leaf check valves for air and gas service and where indicated, shall be of the wafer-type designed to fit between ANSI B16.1 flanges for 125 lb rating. The check valve leaves shall be spring-loaded. Flow from one direction shall cause the valve to open, and upon valve shutoff, the spring shall shut the valve leaves before reverse flow starts, acting at a point of zero velocity, for non-slam closure. The spring-tension of each valve shall be designed for the individual operating condition. For check valves installed in discharge piping of multi-stage blowers, the spring tension and seat material shall be suitable for the pressure, temperature, and air or gas service per the blower manufacturer recommendations.
 - B. Body: The valve body shall be of cast iron conforming to ASTM A 126 with integrally-cast seat, rated for minimum 150 lb working pressure at up to 250 degrees F.
 - C. Leaves: The leaves shall be of bronze, aluminum bronze, or ductile iron, revolving on stainless steel or monel hinge pins with retainers.
 - D. Seat: The valves shall have resilient seats for bubble-tight shut-off, suitable for temperatures up to 250 degrees F without sticking. The seats shall be Buna-N, Viton, or other suitable material for the intended purpose. The seat rings shall be firmly attached to a shoulder cast in the body or to the disc by compression-molding or similar acceptable method.
 - E. Springs: The springs shall be of Type 316 stainless steel or Inconel, as best suited for the service condition.
 - F. Manufacturers, or Equal
 - 1. **APCO (Valve and Primer Corporation)**
 - 2. **Proquip International**
 - 3. **VAL-MATIC (Valve and Manufacturing Corporation)**

2.5 SLANTING DISC CHECK VALVES

- A. General: Slanting disc check valves for water service shall have a seating angle of approximately 55 degrees. Valves shall have replaceable seat rings and disc rings. The water passage cross-sectional area shall be equal to the full pipe area. Valves shall have sufficient clearance around the pivot pins to permit free seating of the disc without binding and shall be guaranteed not to stick in the closed position. Slanting disc check valves shall have position indicators and 2 flanged connections for attachment of dashpots or hydraulic snubbers. The valves shall be designed for a water working pressure of 150 psi, unless otherwise indicated.
- B. Body: The valve body shall be of cast iron conforming to ASTM A 48 - Gray Iron Castings, or A 126, Class B, with flanged ends conforming to ASME B 16.1, Class 125, unless otherwise indicated.
- C. Disc: The valve disc shall be designed with an "airfoil" configuration of cast iron or ductile iron, with bronze seating face, except for valves 10-inches or smaller, which may have solid bronze or aluminum bronze discs. The disc shall be partially balanced with a short travel to resist slamming.
- D. Seat Ring: The seat ring shall be of centrifugally-cast bronze, aluminum bronze, or stainless steel, with beveled edges, firmly clamped or screwed into the valve body.
- E. Pins: The pivot pins and bushings shall be of stainless steel, bronze, or aluminum bronze to allow free movement of the disc without binding.
- F. Manufacturers, or Equal
 - 1. **APCO (Valve and Primer Corporation)**
 - 2. **Crane Company** (Without Dashpot, Only)
 - 3. **VAL-MATIC (Valve and Manufacturing Corporation)**

2.6 RUBBER FLAPPER SWING CHECK VALVES

- A. General: Rubber flapper swing check valves for water, sewage, sludge, and abrasives shall have full pipe size flow areas, one moving part only, and body seats at 45 degrees to permit horizontal and vertical up-flow. Valves shall be designed for a minimum water-working pressure of 150 psi, with a flanged cover plate holding down the rubber flapper. The valves shall be of the non-clog design.
- B. Body: The valve body and cover shall be of cast iron conforming to ASTM A 126 with flanged ends conforming to ASME B 16.1. There shall be a threaded tapping in the bottom of the body for insertion of a back-flow device, and provision for mounting of a signal switch.
- C. Disc: The valve disc or flapper shall be of Buna-N or other best-suited elastomer one-piece construction, precision molded, with integral O-ring type sealing surface, steel and nylon or fabric reinforced, with non-slam closing action through a 35 degree disc stroke, for bubble-tight shut off at high and low pressures.
- D. Manufacturers, or Equal
 - 1. **APCO (Valve and Primer Corporation)**
 - 2. **VAL-MATIC (Valve and Manufacturing Corporation)**

2.7 PLASTIC BALL CHECK VALVES

- A. General: Plastic ball check valves for corrosive fluids, in sizes up to 4-inches, shall be used for vertical up-flow conditions only, unless the valves are provided with spring actions.
- B. Construction: The valve bodies and balls shall be of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polyvinylidene fluoride (PVDF), or polypropylene (PP) construction, as best suited for each individual service condition. They shall have unions with socket connections or flanged ends conforming to ASME B16.5 - Pipe Flanges and Flanged Fittings, class 150. Seals shall have Viton O-rings, and valve design shall minimize possibility of the balls sticking or chattering. The valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F.
- C. Manufacturers, or Equal
 - 1. **ASAHI-AMERICA**
 - 2. **George Fischer, Inc.**
 - 3. **NIBCO Inc. (Chemtrol Division)**
 - 4. **Spears Mfg. Co.** (PVC, CPVC, AND PP only)

2.8 METAL BALL AND LIFT CHECK VALVES

- A. General: Metal ball check valves for saturated steam, oil, water, and gas in sizes 1/2- up to 1-inch shall be used for horizontal installation only. Lift check valves for LP gas in sizes 1/4- up to 2-inches shall be used for horizontal installation only.
- B. Construction: The ball check valve body and cap shall be bronze ASTM B 584. Ball disc shall be stainless steel construction, as best suited for each individual service condition. The union cap shall provide a tight joint and be easily dismantled when necessary. They shall have screwed connections. The valves shall be suitable for a maximum working non-shock pressure of 150 psi saturated steam or non-shock cold water, oil, and gas rating of 300 psi.
- C. The lift check valve body, and cap shall be leaded bronze ASTM B 763. Disc shall be special composition, as best suited for petroleum service condition. The disc shall be secured to the disc by means of a disc retaining nut. To protect against leakage on light oils and gases, the disc shall be sealed into the holder. The union cap shall provide a tight joint, easily dismantled when necessary. They shall have screwed connections. The valves shall be suitable for a maximum working non-shock pressure of 400 psi cold water, oil, gas, LP gases, and volatile fluids.
- D. Manufacturers, or Equal
 - 1. **Crane**

2.9 METALLIC BALL SEWAGE CHECK VALVES

- A. General: Metallic ball check valves for sewage service, in sizes up to 24-inches, shall be used for vertical up-flow conditions and horizontal positions only.
- B. Construction: The valve shall be designed with non-clogging feature for raw sewage. The ball shall be guided to and from its seat by smooth ribs integrally cast into the housing wall. An internal clog-proof design shall insure a completely free and unobstructed flow with no

projections or pockets to trap solid material. The valve body and cover shall be of cast or ductile iron and be epoxy-coated suitable for the service condition. Units shall have flanged ends conforming to ASME B16.5 - Pipe Flanges and Flanged Fittings, Class 150. Ball shall be made of hollow metal with vulcanized Buna-N rubber or hypalon cover suitable for the service. The valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F.

C. Manufacturers, or Equal

1. **Flygt (HDL)**

2. **Golden Anderson**

2.10 PLASTIC DIAPHRAGM CHECK VALVES

A. General: Plastic diaphragm check valves shall be the type which require no system pressure for sealing and operate silently with minimal pressure drop in either horizontal or vertical flow conditions. They shall utilize either an elastomer diaphragm or teflon encapsulated spring to cause closure.

B. Construction: The valve bodies shall be PVC, CPVC, polypropylene (PP), or polyvinylidene fluoride (PVDF) as indicated on the piping schedule. Union connections shall be either NPT or socket ends conforming to ASME B 16.5 Class 150. They shall give bubble tight shutoff without dependence on gravity direction, mounting position, or reverse flow. Seats and seals shall be EPDM, Buna-N, or Viton, as best suited for the service. Inlet pressure ratings shall be 150 psi at 73 degrees F for PVC and PVDF and 100 psi at 73 degrees F for PP.

C. Manufacturers or Equal

1. **Plastic-O-Matic Valves, Inc.**

2.11 PLASTIC SWING OR WYE-CHECK VALVES

A. General: Plastic swing or wye-check valves for corrosive fluids, in sizes up to 8-inches or as available, may be used for horizontal or vertical up-flow conditions.

B. Construction: The valve bodies and discs or piston shall be of PVC, PP, or PVDF construction as best suited for each individual service condition. They shall have flanged ends conforming to ASME B16.5 Class 150, and flanged top access covers and shall shut positively at no-flow conditions. The seats and seals shall be of EPDM, Teflon, or Viton. The PVC valves shall be rated for a maximum non-shock working pressure of 150 psi at 73 degrees F for sizes 3-inches and smaller. For larger sizes and other materials and temperatures the pressure rating may be lower.

C. Manufacturers, or Equal

1. **ASAHI-AMERICA**

2. **George Fischer, Inc.**

3. **Spears Mfg. Co.** (Plastic Swing Check only)

PART 3 EXECUTION

3.1 GENERAL

- A. Valves shall be installed in accordance with provisions of Section 43 30 00 – Valves, General.

END OF SECTION

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SECTION 43 30 22

GATE VALVES

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide gate valves and appurtenances, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 43 30 00 - Valves, General apply to this Section.
- C. The requirements of Section 43 30 12 - Valve and Gate Actuators apply to this Section.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 43 30 00 - Valves, General.

PART 2 PRODUCTS

2.1 GENERAL

- A. Buried valves shall be of the inside screw, non-rising stem type. The valve actuators shall be as indicated, with counter-clockwise opening stems, in accordance with Section 43 30 12 – Valve and Gate Actuators.
- B. Gate valves 18-inches and larger shall be provided with a bypass line and isolation valve.

2.2 METAL-SEATED GATE VALVES (3-INCHES AND LARGER)

- A. Construction: Metal-seated gate valves for water and sewage service shall conform to AWWA C 500 - Metal-Seated Gate Valves for Water Supply Service. The valve bodies shall be of cast iron conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, or ductile iron conforming either to ASTM A 395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures, or to ASTM A 536 - Ductile Iron Castings, with flanged, bell and spigot, or mechanical joint-ends as indicated. Body and bonnet wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 2 of AWWA C500. The design working water pressure shall be 200 psig for valves 12-inches and smaller and 150 psig for larger valves. The valves may be of the double-disc type for tighter shut-off, or of the solid-wedge type, with rising or non-rising stem. For sewage or fluids containing solids, an outside thread shall be used. Valves 14-inches and larger installed in vertical pipes shall be fitted with bronze slides, tracks, rollers, and scrapers to assist the travel of the gate assembly. Gate valves 14-inches and larger shall be furnished with bypass assemblies.
- B. Actuators: Unless otherwise indicated, gate valves shall have manual actuators in accordance with Section 43 30 12 – Valve and Gate Actuators.
- C. Manufacturers, or Equal
 - 1. **Clow Valve Co.**
 - 2. **Kennedy Valve**

3. **M & H Valve Company**
4. **Milwaukee Valve Company, Inc.**

2.3 KNIFE-GATE VALVES (2- to 96-inch)

A. Construction: Knife-gate valves shall be of the flanged or wafer design, with raised face and resilient seats for positive seating. Wetted parts shall be constructed of Type 316 stainless steel, and the gates shall be finish-ground on both sides to prevent packing or seat damage. Valves 2- to 12-inches in size shall be furnished with cast stainless steel bodies; valves 14-inches and larger shall have semi-steel bodies with stainless steel linings. The valve stem shall be of stainless steel with a long-life packing. The valves shall be rated for tight shut-off at the following pressures:

1. Valve sizes 4- to 12-inches 150 psi (bi-directional)
2. Valve sizes larger than 12-inches 50 psi

B. Actuators: Knife-gates shall have outside-screw and yoke-rising stems with manual handwheel actuators, unless otherwise indicated, in accordance with Section 43 30 12 – Valve and Gate Actuators.

C. Manufacturers, or Equal

1. **DeZURIK Water Controls Corporation**
2. **Fabri-Valves**
3. **Rovang, Inc.**

2.4 RESILIENT-SEATED GATE VALVES

A. General: Resilient-seated gate valves may be provided in lieu of metal-seated double-disc or solid-disc gate valves, at the discretion of the ENGINEER.

B. For 250-psig applications, consult the valve manufacturer and revise this Section accordingly.

C. Construction: Resilient-seated gate valves shall conform to AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service. The valves shall be suitable for a minimum design working water pressure of 150 psig, with flanged, bell and spigot, or mechanical joint ends. The valve body, bonnet, and disc shall be of cast iron or ductile iron and the disc or body shall be rubber-coated. Body and bonnet wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 1 of AWWA C515. The stem, stem nuts, glands, and bushings shall be bronze, with the stem seal per AWWA C515.

D. Pressure Ratings:

1. AWWA C509 valves that are 3, 4, 6, 8, and 12 inches in size shall be rated for 200 psig minimum design working water pressure, and 16-, 20-, 24-, and 30-inch valves shall be rated for 150 psig minimum design working water pressure.
2. AWWA C515 valves 3- through 36-inch with outside screw-and-yoke (OS&Y) rising stem and 3- through 16-inch for non-rising-stem (NRS), shall be rated for 200 psig minimum design working water pressure.

- E. Protective Coating: Valves shall be factory coated in accordance with Section 09 96 00 - Protective Coating. The CONTRACTOR shall submit a test report from a coating inspector that the coating is holiday-free. The CONTRACTOR shall be aware that it may retain the services of a third-party coating applicator to achieve the holiday-free requirement.
- F. Actuators: Unless otherwise indicated, resilient-seated gate valves shall have manual actuators in accordance with Section 43 30 12 - Valve and Gate Actuators.
- G. Manufacturers, or Equal
 - 1. **Mueller Company**
 - 2. **M & H**
 - 3. **Clow**

2.5 GATE VALVES (SMALLER THAN 3-INCHES)

- A. Construction: Gate valves smaller than 3-inches, for general purpose use, shall be non-rising stem, heavy-duty type for industrial service, with screwed or soldered ends to match the piping. The bodies shall have union bonnets of bronze conforming to ASTM B 62 - Composition Bronze or Ounce Metal Castings. The stems shall be of bronze conforming to ASTM B 62, or ASTM B 371 - Copper-Zinc-Silicon Alloy Rod. The solid wedges shall be of bronze conforming to ASTM B 62. The valves shall have malleable iron handwheels unless otherwise indicated, and stem seals shall be of Teflon-impregnated or other acceptable non-asbestos packing. Valves shall have a pressure rating of minimum 125 psi steam and 200 psi cold water, unless otherwise indicated.
- B. Manufacturers, or Equal
 - 1. **Crane Company**
 - 2. **Milwaukee Valve Company**
 - 3. **Wm. Powell Company**
 - 4. **Stockham Valves and Fittings**
 - 5. **Walworth Company**

2.6 HIGH-PRESSURE GATE VALVES (2- TO 12-INCHES)

- A. Construction: High-pressure gate valves, except for buried valves, shall have cast iron bodies and flanged bonnets with outside screw & yoke rising stems conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with 250 psi flanged ends. The valves shall be rated for 250 psig steam and 500 psig cold water working pressure. The solid wedges shall be of bronze or cast iron, bronze-fitted, and the stem shall be of bronze with non-asbestos fiber packing.
- B. Actuators: Unless otherwise indicated, high-pressure gate valves shall have cast iron or ductile iron handwheels with 2-inch square operating nuts, in accordance with Section 43 30 12 - Valve and Gate Actuators.
- C. Manufacturers, or Equal

1. **Crane Company**
2. **Milwaukee Valve Company**
3. **Wm. Powell Company**
4. **Stockham Valves and Fittings**
5. **Walworth Company**

2.7 PLASTIC GATE VALVES (1-1/2 TO 14-INCHES)

- A. Construction: Plastic gate valves shall have PVC bodies with ANSI 150 lb. flanged ends, and polypropylene or CPVC-SBR-lined wedges for tight shut-off. The non-rising stem shall be of PVC or Type 304 stainless steel construction, with O-ring seal. The valves shall have a coldwater pressure rating of 150 psig for sizes 1-1/2 through 8-inches, 110 psig for size 10-inches, and 70 psig for sizes 12- and 14-inches.
- B. Actuators: Unless otherwise indicated, PVC gate valves shall have manual handwheel actuators with position indicators, in accordance with Section 43 30 12 - Valve and Gate Actuators.
- C. Manufacturers, or Equal
 1. **ASAHI/America**
 2. **Spears Mfg. Co.**

PART 3 EXECUTION

3.1 GENERAL

- A. Gate valves shall be installed in accordance with the provisions of Section 43 30 00 - Valves, General. Care shall be taken that valves in plastic lines are well supported at each end of the valve.

END OF SECTION

SECTION 46 01 00

EQUIPMENT GENERAL PROVISIONS

PART 1 GENERAL

1.1 THE SUMMARY

- A. The CONTRACTOR shall provide equipment and appurtenant WORK, complete and operable, in accordance with the Contract Documents.
- B. The provisions of this Section shall apply to equipment throughout the Contract except where otherwise indicated.
- C. All component and support systems of the equipment shall be designed and manufactured to withstand all forces such as internal or external, static, wind, dynamic and seismic loads (wind and seismic in accordance with Sheet SOO1 – Basis of Design) in order for the equipment to last throughout its expected life without premature failure. If the project is located in a seismically active zone as specified in Sheet SOO1 – Basis of Design, the manufacturer shall submit a certification signed and stamped by a registered engineer stating that the equipment was designed and manufactured to withstand all the loads specified in this paragraph. Submit a copy of that analysis for review by the ENGINEER.
- D. Equipment Arrangement: Unless specifically indicated otherwise, the arrangement of equipment indicated is based upon information available from manufacturers at the time of design and is not intended to show exact dimensions particular to a specific manufacturer. Some aspects of the Drawings are diagrammatic and some features of the illustrated equipment arrangement may require revision by the CONTRACTOR to meet the actual equipment requirements proposed by the CONTRACTOR. Structural supports, foundations, piping and valve connections, and electrical and instrumentation connections indicated may have to be altered by the CONTRACTOR to accommodate the equipment provided. No additional payment will be made to the CONTRACTOR for such revisions and alterations. Substantiating calculations and drawings shall be submitted prior to beginning the fabrication of equipment.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Equipment shall be in accordance with the following standards, as applicable and as indicated in each equipment specification:
 - 1. American Society for Testing and Materials (ASTM).
 - 2. American National Standards Institute (ANSI).
 - 3. American Society of Mechanical Engineers (ASME).
 - 4. American Water Works Association (AWWA).
 - 5. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).
 - 6. American Welding Society (AWS).

7. National Fire Protection Association (NFPA).
8. Federal Specifications (FS).
9. National Electrical Manufacturers Association (NEMA).
10. Manufacturer's published recommendations and specifications.
11. Occupational Safety and Health Administration (OSHA).
12. Hydraulic Institute (HI)

B. The following standards are referenced in this Section:

ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
ASME B16.5	Pipe Flanges and Flanged Fittings, Steel, Nickel Alloy and other Special Alloys
ASME B46.1	Surface Texture
ANSI S12.6	Method for the Measurement of the Real-Ear Attenuation of Hearing Protectors
ASME B1.20.1	General Purpose Pipe Threads (Inch)
ASME B31.1	Power Piping
ASME B31.3	Process Piping
AWWA C206	Field Welding of Steel Water Pipe
AWWA C207	Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm through 3,600 mm)
AWWA D100	Welded Steel Tanks for Water Storage
ASTM A 48	Gray Iron Castings
ASTM A 108	Steel Bars, Carbon, Cold-Finished, Standard Quality

1.3 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.
- B. Shop Drawings: Furnish complete drawings and technical information for equipment, piping, valves, and controls. Where indicated or required by the ENGINEER, Shop Drawings shall include clear, concise calculations showing equipment anchorage forces and the capacities of the anchorage elements proposed by the CONTRACTOR.
- C. Spare Parts List: The CONTRACTOR shall obtain from the manufacturer and submit as part of Shop Drawings a list of suggested spare parts for each piece of equipment. CONTRACTOR shall also furnish the name, address, and telephone number of the nearest distributor for each piece of equipment.

1.4 QUALITY ASSURANCE

- A. Costs: Responsibility shall be the CONTRACTOR'S for performing and paying the costs of inspection, startup, testing, adjustment, and instruction services performed by factory representatives. The OWNER will pay for costs of power and water. If available, the OWNER'S operating personnel will provide assistance in the field testing.
- B. Inspection: The CONTRACTOR shall inform the local authorities, such as building and plumbing inspectors, fire marshal, OSHA inspectors, and others, to witness required tests for piping, plumbing, fire protection systems, pressure vessels, safety systems, cranes, and related items to obtain required permits and certificates, and shall pay inspection fees.
- C. Quality and Tolerances: Tolerances and clearances shall be as shown on the Shop Drawings and shall be closely adhered to.
 - 1. Machine WORK shall be of high-grade workmanship and finish, with due consideration to the special nature or function of the parts. Members without machined or milled ends and which are to be framed to other steel parts of the structure may have a variation in the detailed length of not greater than 1/16-inch for members 30-feet or less in length, and not greater than 1/8-inch for members over 30-feet in length.
 - 2. Castings shall be homogeneous and free from non-metallic inclusions and defects. Surfaces of castings which are not machined shall be cleaned to remove foundry irregularities. Casting defects not exceeding 12.5 percent of the total thickness and where defects will not affect the strength and serviceability of the casting may be repaired by approved welding procedures. The ENGINEER shall be notified of larger defects. No repair welding of such defects shall be carried out without the ENGINEER'S written approval. If the removal of metal for repair reduces the stress resisting cross-section of the casting by more than 25 percent or to such an extent that the computed stress in the remaining metal exceeds the allowable stress by more than 25 percent, then the casting may be rejected. Costs of casting new material shall be the CONTRACTOR'S responsibility as part of the WORK.
 - 3. Materials shall meet the physical and mechanical properties in accordance with the reference standards.
- D. Machine Finish: The type of finish shall be the most suitable for the application as recommended by the equipment manufacturer in micro-inches in accordance with ANSI B46.1. In the absence of manufacturer's recommendations, the following surface finishes shall be used:
 - 1. Surface roughness not greater than 63 micro-inches shall be required for surfaces in sliding contact.
 - 2. Surface roughness not greater than 250 micro-inches shall be required for surfaces in contact where a tight joint is not required.
 - 3. Rough finish not greater than 500 micro-inches shall be required for other machined surfaces.
 - 4. Contact surfaces of shafts and stems which pass through stuffing boxes and contact surfaces of bearings shall be finished to not greater than 32 micro-inches.
- E. Manufacturer's Experience: Equipment manufacturer shall have a record of proven experience of at least 5 years of successful, troublefree operation in similar applications and size equal or larger than the equipment in this Contract. Where indicated in each individual equipment

specifications, the CONTRACTOR shall submit this experience record to the ENGINEER for approval.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. **Noise Level:** When the equipment is in operation, no single piece of equipment shall exceed the OSHA noise level requirement of 105 dBA for one hour exposure per day.
- B. **High Noise Level Location:** The CONTRACTOR shall provide one personal hearing protection station at each location defined as follows:
 - 1. **Outdoor Location:** Any single equipment item or any group of equipment items that produce noise exceeding OSHA noise level requirements for a 2 hour exposure. Where such equipment is separated by a distance of more than 20-feet, measured between edges of footings, the area for each group of equipment shall be provided with a separate hearing protection station.
 - 2. **Indoor Location**
 - a. Any single equipment item or any group of equipment items located within a single room not normally occupied, that produces noise exceeding OSHA noise level requirements for a 2 hour exposure.
 - b. Any single equipment item or any group of equipment items located within a single room normally occupied by workers that produces noise exceeding OSHA noise level requirements for an 8 hour exposure.
- C. **Personal Hearing Protection:** The CONTRACTOR shall furnish 3 pairs of high attenuation hearing protectors in the original unopened packaging. The ear protectors shall be capable of meeting the requirements of ANSI S12.6 and shall produce a noise level reduction of 25 dBA at a frequency of 500 Hz. The hearing protectors shall have fluid filled ear cushions and an adjustable, padded headband. The protectors shall be stored in a weatherproof, labeled, steel cabinet, provided at an approved location near the noise producing equipment.
- D. **Drive Trains and Service Factors:** Service factors shall be applied in the selection or design of mechanical power transmission components. Components of drive train assemblies between the prime mover and the driven equipment shall be designed and rated to deliver the maximum peak or starting torque (whichever is the greatest), speed, and horsepower. Applicable service factors shall be considered, such as mechanical (type of prime mover), load class, start frequency, ventilation, ambient temperature, and fan factors. Drive train components include couplings, shafts, gears and gear drives, drive chains, sprockets, and V-belt drives. Unless otherwise indicated, the following load classifications shall apply in determining service factors:

Type of Equipment	Service Factor	Load Classification
Blowers		
centrifugal or vane	1.0	Uniform
lobe	1.25	Moderate Shock
Centrifugal Fans	1.0	Uniform
Reciprocating Air Compressors		

multi-cylinder	2.0	Heavy Shock
single-cylinder	2.0	Heavy Shock
Pumps		
centrifugal or rotary	1.0	Uniform
reciprocating	1.8	Moderate Shock
progressing cavity	1.0	Uniform
Mixers		
constant density	1.0	Uniform
variable density	1.25	Moderate Shock
rapid mixer	1.25	Moderate Shock
floculator	1.25	Moderate Shock
sludge mixer	2.5	Moderate Shock
surface aerator	2.5	Heavy Shock
Clarifiers	1.0	Uniform
Sludge Thickeners	1.25	Moderate Shock
Vacuum Filters	1.25	Moderate Shock
Dewatering Screws	1.25	Moderate Shock
Grit Handling Equipment	1.25	Moderate Shock
Mechanical Bar Screens	1.0	Uniform
Scum Breakers	1.25	Moderate Shock
Cranes or Hoists	1.25	Moderate Shock

E. Mechanical Service Factors

	Mechanical Service Factors	
	Electric Motor	Internal Combustion Engine
Uniform	1.25	1.50
Moderate Shock	1.50	1.75
Heavy Shock	2.00	2.25

- F. For thermal rating adjustments such as start frequency, ambient temperature, and hourly duty cycle factor, ventilation factor, and fan factor, refer to gear manufacturer sizing information.
- G. Where load classifications are not indicated, the equipment manufacturer's recommendations for service factors shall be utilized.
- H. Welding: Unless otherwise indicated, welding shall conform to the following:
1. Latest revision of AWWA D100.
 2. Latest revision of AWWA C206.

3. Composite fabricated steel assemblies that are to be erected or installed inside a hydraulic structure, including any fixed or movable structural components of mechanical equipment, shall have continuous seal welds to prevent corrosion of hard-to-coat metallic surfaces.
 4. Welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards.
 5. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance with uniform weld contours and dimensions. Sharp corners of material that are to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.
- I. Protective Coating: Equipment shall be painted or coated in accordance with Section 09 96 00 - Protective Coating, unless otherwise indicated. Non-ferrous metal and corrosion-resisting steel surfaces shall be coated with grease or lubricating oil. Coated surfaces shall be protected from abrasion or other damage during handling, testing, storing, assembly, and shipping.
- J. Potable Water Contact: Materials immersed in or exposed to potable water shall be made of materials or coated compliant with NSF Standard 61. Bronze alloy materials in contact with potable water shall be constructed of zero-lead materials or materials whose lead content do not exceed the weighted average criteria as required by the Lead Reduction Act. Equipment manufacturer shall submit to the ENGINEER a certification of compliance with the requirement of NSF Standard 61 and the Lead Reduction Act.
- K. Protection of Equipment: Machined and coated surfaces shall be protected by rust inhibitor material prior to shipment. Equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. Equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry. Equipment with anti-friction bearings or sleeve bearings shall be protected from being damaged due to jarring motion during shipment. Pumps, motors, drives, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weathertight storage facilities prior to installation. For extended storage periods, plastic equipment wrappers should be avoided to prevent accumulation of condensate in gears and bearings. In addition, motor space heaters shall be energized and shafts shall be rotated per manufacturer's recommendation. Equipment delivered to the Site with rust or corroded parts shall be rejected. If equipment develops defects during storage, it shall be disassembled, cleaned, recoated, or otherwise corrected to restore it to original condition.
- L. Identification of Equipment Items
1. At the time of shipping, each item of equipment shall have a legible identifying mark corresponding to the equipment number in the Contract Documents for the particular item.
 2. After installation, each item of equipment shall be given permanent identification.
 - a. Pumps, compressors, and blowers of 150 horsepower or less shall receive acrylic plastic nametags.
 - b. Pumps, compressors, and blowers larger than 150 horsepower shall receive stainless steel plate nametags.

- M. Vibration Isolators: Air compressors, blowers, engines, inline fans shall be provided with restrained spring-type vibration isolators or pads per manufacturer's written recommendations. Vibration isolations shall be provided with seismic restraint.
- N. Equipment Maximum Allowable Vibration Level: Unless otherwise indicated, maximum allowable vibration level shall be in accordance with the acceptance criteria recommended by the reference Standard for that particular type of equipment
- O. Shop Fabrication: Shop fabrication shall be performed in accordance with the Contract Documents and the Shop Drawings.

2.2 EQUIPMENT SUPPORTS AND FOUNDATIONS

- A. Equipment Supports: Equipment components and supports, anchors, and seismic restrainers shall be adequately designed for static, dynamic, wind, and seismic loads. The design horizontal seismic force shall be the greatest of the following design criteria:
 - 1. Design Criteria noted in Sheet SO01 – Basis of Design.
- B. Submit design calculations for equipment supports, anchors, and seismic restrainers signed and sealed by an engineer registered in the State wherein the project is to be built. Calculations shall account for forces and distribution of forces on supporting structures resulting from normal operation, normal operation plus seismic loadings, and normal operation plus wind loadings in accordance with Sheet SO01 – Basis of Design.
 - 1. Wall-mounted equipment weighing more than 250 pounds or which is within 18-inches above the floor shall be provided with fabricated steel supports. Pedestals shall be of welded steel. If the supported equipment is a panel or cabinet or is enclosed with removable sides, the pedestal shall match the supported equipment in appearance and dimensions.
 - 2. Seismic requirements: Freestanding and wall-hung equipment shall be anchored in place by methods that satisfy the requirements of Sheet SO01. Calculations shall be performed and signed and stamped for equipment weighing more than 400 pounds. Calculations shall analyze lateral and overturning forces and shall include a factor of safety against overturning equal to 1.5. Calculations shall include the distribution of forces imposed on the supporting structure and anchors, verifying that each anchor can develop the required resistance forces.
 - 3. Wind requirements: Exterior freestanding equipment shall be anchored in place by methods that satisfy the requirements of Sheet SO01. Calculations shall be performed and signed and stamped, analyzing lateral and overturning forces and shall include a factor of safety against overturning equal to 1.5. Calculations shall include the distribution of forces imposed on the supporting structure and anchors, verifying that each anchor can develop the required resistance forces.
 - 4. Anchors: Anchor bolts shall be in accordance with Sheet SO01. CONTRACTOR shall determine the size, type, capacity, location, and other placement requirements of anchorage elements. Anchoring methods and leveling criteria in the manufacturer's literature shall be followed. Submit methods and criteria with the Shop Drawings.
 - 5. Equipment Foundations: Unless otherwise indicated, mechanical equipment, tanks, control cabinets, enclosures, and related equipment shall be mounted on minimum 3.5-inch high concrete bases. Unless otherwise indicated on the Drawings, pumps, blowers, compressors and engine driven equipment shall be provided with a concrete foundation with a total weight equal to at least five times the weight of the equipment. Concrete foundations shall be

isolated from the building floor in order to prevent transfer of vibration from the equipment to the building structure. The CONTRACTOR through the equipment manufacturer shall verify the size and weight of equipment foundation to insure compatibility with equipment.

6. Equipment Grout: Mechanical equipment installed on top of concrete foundations or bases shall be provided with non-shrink concrete or epoxy grout as indicated and as specified in Section 03 60 00 - Grouting. Grout shall be applied between the base plate and the concrete foundation or base in accordance with the grout manufacturer's recommendation. Grout shall be free of void space.

2.3 COUPLINGS

- A. Mechanical couplings shall be provided between the driver and the driven equipment. Flexible couplings shall be provided between the driver and the driven equipment to accommodate slight angular misalignment, parallel misalignment, end float, and to cushion shock loads. Unless otherwise indicated or recommended by the equipment manufacturer, coupling type shall be furnished with the respective equipment as follows:

Equipment Type	Coupling Type
Horizontal and end suction pumps	Gear or flexible spring
Vertical turbine pumps	3 piece spacer for solid shaft or double nut for hollow shaft
Vertical nonclog pumps, close coupled	Flexible disc pack
Screw pumps	Flexible spring, gear coupling, fluid coupling
Vertical nonclog pumps with extended shaft	Flexible disc pack or Universal joint with carbon fiber composite shaft and steady bearing support(s)
Belt conveyors	Gear coupling for fractional to 7.5 horsepower, Silicone filled fluid coupling for 10 hp and larger
Sludge collector	Gear coupling or jaw clutch
Engine driven pumps	Universal joint type or elastomeric flexible type
Single stage centrifugal blowers	Flexible disc pack
Air compressors	Gear or flexible disc pack

- B. Each coupling size shall be determined based on the rated horsepower of the motor, speed of the shaft, and the load classification service factor. The CONTRACTOR shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application.
- C. Differential Settlement: Where differential settlement between the driver and the driven equipment may occur, 2 sets of universal type couplings shall be provided.
- D. Taper-Lock or equal bushings may be used to provide for easy installation and removal of shafts of various diameters.

2.4 SHAFTING

- A. General: Equipment manufacturer shall be responsible for designing and manufacturing shafting to carry all loads applied to the shaft. Shafting shall be continuous between bearings and shall be sized to transmit the power required. Keyways shall be accurately cut in line. Shafting shall not be turned down at the ends to accommodate bearings or sprockets whose bore is less than the

diameter of the shaft. Shafts shall rotate in the end bearings and shall be turned and polished, straight, and true.

- B. Design Criteria: Shafts shall be designed to carry the steady state and transient loads suitable for unlimited number of load applications.
- C. Materials: Shafting materials shall be compatible with the type of service and load transmitted. Environmental elements such as corrosive gases, moisture, and fluids shall be taken into consideration. Materials shall be as indicated unless furnished as part of an equipment assembly.
 - 1. Low carbon cold-rolled steel shafting shall conform to ASTM A 108, Grade 1018.
 - 2. Medium carbon cold-rolled shafting shall conform to ASTM A 108, Grade 1045.
 - 3. Other grades of carbon steel alloys shall be suitable for service and load.
 - 4. Corrosion-resistant shafting shall be stainless steel or Monel, whichever is most suitable for the intended service.
- D. Differential Settlement: Where differential settlement between the driver and the driven equipment may occur, a shaft of sufficient length with 2 sets of universal type couplings shall be provided.

2.5 GEARS AND GEAR DRIVES

- A. Unless otherwise indicated, gears shall be of the spur, helical, or spiral-bevel type, designed and manufactured in accordance with AGMA Standards, with a service factor suitable for load class, mechanical service and thermal rating adjustment, a minimum L-10 bearing life of 60,000 hours, and a minimum efficiency of 94 percent. Peak torque, starting torque, and shaft overhung load shall be checked when selecting the gear reducer. Worm gears shall not be used unless specifically approved by the ENGINEER.
- B. Gear speed reducers or increasers shall be of the enclosed type, oil- or grease-lubricated and fully sealed, with a breather to allow air to escape but keep dust and dirt out. The casing shall be of cast iron, ductile iron, or heavy-duty steel construction with lifting lugs and an inspection cover for each gear train. An oil level sight glass and an oil flow indicator shall be provided, located for easy reading.
- C. Gears and gear drives that are part of an equipment assembly shall be shipped fully assembled for field installation.
- D. Material selections shall be selected by the manufacturer, provided the above AGMA values are met. Input and output shafts shall be adequately designed for the service and load requirements. Gears shall be computer-matched for minimum tolerance variation. The output shaft shall have 2 positive seals to prevent oil leakage.
- E. Oil level and drain locations shall be easily accessible. Oil coolers or heat exchangers with required appurtenances shall be provided when necessary.
- F. Where gear drive input or output shafts from one manufacturer connect to couplings or sprockets from a different manufacturer, the CONTRACTOR shall have the gear drive manufacturer furnish a matching key taped to the shaft for shipment.

2.6 DRIVE CHAINS

- A. Power drive chains shall be commercial type roller chains meeting ASME Standards.
- B. A chain take-up or tightener shall be provided in every chain drive arrangement to provide easy adjustment.
- C. A minimum of one connecting or coupler link shall be provided in each length of roller chain.
- D. Chain and attachments shall be of the manufacturer's best standard material and be suitable for the process fluid.

2.7 SPROCKETS

- A. General: Sprockets shall be used in conjunction with chain drives and chain-type material handling equipment.
- B. Materials: Unless otherwise indicated, materials shall be as follows:
 - 1. Sprockets with 25 teeth or less, normally used as a driver, shall be made of medium carbon steel in the 0.40 to 0.45 percent carbon range.
 - 2. Type A and B sprockets with 26 teeth or more, normally used as driven sprockets, shall be made of minimum 0.20 percent carbon steel.
 - 3. Large diameter sprockets with Type C hub shall be made of cast iron conforming to ASTM A 48, Class 30.
- C. Sprockets shall be accurately machined to ASME Standards. Sprockets shall have deep hardness penetration in tooth sections.
- D. Finish bored sprockets shall be furnished complete with keyseat and set screws.
- E. To facilitate installation and disassembly, sprockets shall be of the split type or shall be furnished with Taper-Lock bushings as required.
- F. Idler sprockets shall be provided with brass or Babbitt bushings, complete with oil hole and axial or circumferential grooving with stainless steel tubing and grease fitting extended to an accessible location. Steel collars with set screws may be provided in both sides of the hub.

2.8 V-BELT DRIVES

- A. V-belts and sheaves shall be of the best commercial grade and shall conform to ASME, MPTA, and RMA Standards.
- B. Unless otherwise indicated, sheaves shall be machined from the finest quality gray cast iron.
- C. Sheaves shall be statically balanced. In some applications where vibration is a problem, sheaves shall be dynamically balanced. Sheaves operating at belt speeds exceeding 6,500 fpm may be required to be of special materials and construction.
- D. To facilitate installation and disassembly, sheaves shall be provided complete with Taper-Lock or QD bushings as required.

- E. Finish bored sheaves shall be complete with keyseat and set screws.
- F. Sliding motor bases shall be provided to adjust the tension of V-belts.

2.9 DRIVE GUARDS

- A. Power transmission trains, prime movers, machines, shaft extensions, and moving machine parts shall be guarded to conform to the OSHA Safety and Health Standards (29CFR1910). The guards shall be constructed of minimum 10-gauge expanded, flattened steel with smooth edges and corners, galvanized after fabrication, and securely fastened. Where required for lubrication or maintenance, guards shall have hinged and latched access doors.

2.10 BEARINGS

- A. General: Bearings shall conform to the standards of the American Bearing Manufacturers Association, Inc. (ABMA).
- B. To assure satisfactory bearing application, fitting practice, mounting, lubrication, sealing, static rating, housing strength, and lubrication shall be considered in bearing selection.
- C. Re-lubricatable type bearings shall be equipped with hydraulic grease fitting in an accessible location and shall have sufficient grease capacity in the bearing chamber.
- D. Lubricated-for-life bearings shall be factory-lubricated with the manufacturer's recommended grease to insure maximum bearing life and best performance.
- E. Anti-Friction Type Bearing Life: Except where otherwise indicated, bearings shall have a minimum L-10 life expectancy of 5 years or 20,000 hours, whichever occurs first. Where so indicated, bearings shall have a minimum rated L-10 life expectancy corresponding to the type of service, as follows:

Type of Service	Design Life, years	L-10 Design Life, hours
	(whichever comes first)	
8-hour shift	10	20,000
16-hour shift	10	40,000
Continuous	10	60,000

- F. Bearing housings shall be of cast iron or steel and bearing mounting arrangement shall be as indicated or as recommended in the published standards of the manufacturer. Split-type housings may be used to facilitate installation, inspection, and disassembly.
- G. Sleeve Type Bearings: Sleeve-type bearings shall have a cast iron or ductile iron housing and Babbitt or bronze liner. Bearing housing shall be bolted and doweled to the lower casing half. These housings shall be provided with cast iron caps bolted in place and the bearing end caps shall be bored to receive the bearing shells. Sleeve bearings shall be designed on the basis of the maximum allowable load permitted by the bearing manufacturer. If the sleeve bearing is connected to an equipment shaft with a coupling, the coupling transmitted thrust will be assumed to be the maximum motor or equipment thrust. Lubricant, lubrication system, and cooling

system shall be as recommended by the bearing manufacturer. In accordance with the Lead Reduction Act, sleeve bearings containing lead material exposed to drinking water shall not be acceptable.

- H. Plate Thrust Bearings: Thrust bearings shall be the Kingsbury Type, designed and manufactured to maintain the shaft in the fixed axial position without undue heating or the necessity of adjustment or attention. Bearings shall be oil lubricated to suit the manufacturer's standard method of lubrication for the specific bearing. If bearing cooling is required, manufacturer shall provide heat exchangers, including necessary instrumentation and controls, piping, filters, and valves.

2.11 PIPING CONNECTIONS

- A. Pipe Hangers, Supports, and Guides: Pipe connections to equipment shall be supported, anchored, and guided to avoid stresses and loads on equipment flanges and equipment. Supports and hangers shall be in accordance with Section 40 05 07 - Pipe Supports.
- B. Flanges and Pipe Threads: Flanges on equipment and appurtenances shall conform to ASME B16.1, Class 125, or B16.5, Class 150, unless otherwise indicated. Pipe threads shall be in accordance with ASME B1.20.1 and Section 40 05 00 - Piping, General.
- C. Flexible Connectors: Flexible connectors shall be installed in piping connections to engines, blowers, compressors, and other vibrating equipment and in piping systems in accordance with the requirements of Section 40 05 00 – Piping, General. Flexible connectors shall be harnessed or otherwise anchored to prevent separation of the pipe where required by the installation.
- D. Insulating Connections: Insulating bushings, unions, couplings, or flanges, as appropriate, shall be used in accordance with the requirements of the specifications.

2.12 GASKETS AND PACKINGS

- A. Gaskets and packings shall be in accordance with the requirements of the specifications. Gaskets and packings in contact with drinking water shall be NSF 61 approved. Elastomeric materials in contact with water with chloramines, or water with ozone residual shall be made of Teflon or Viton-A, or equal.
- B. Packing around valve stems and reciprocating shafts shall be of compressible material, compatible with the fluid being used. Chevron-type "V" packing shall be Garlock No. 432, John Crane Everseal, or equal.

2.13 NAMEPLATES

- A. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the machine performance ratings.

2.14 TOOLS AND SPARE PARTS

- A. Tools: The CONTRACTOR shall furnish one complete set of special wrenches and other special tools necessary for the assembly, adjustment, and dismantling of the equipment. Tools shall be of best quality hardened steel forgings with bright finish. Wrench heads shall have work faces dressed to fit nuts. Tools shall be suitable for professional work and manufactured by Snap On,

Crescent, Stanley, or equal. The set of tools shall be neatly mounted in a labeled toolbox of suitable design provided with a hinged cover.

- B. Spare parts shall be furnished as indicated in the individual equipment sections. Spare parts shall be suitably packaged in a metal box and labeled with equipment numbers by means of stainless steel or solid plastic nametags attached to the box.

2.15 EQUIPMENT LUBRICANTS

- A. The CONTRACTOR shall provide lubricants for equipment during shipping, storage, and prior to testing, in accordance with the manufacturer's recommendations. Lubricants that could come in contact with potable water shall be food grade lubricants. After successful initial testing, final testing, and satisfactory completion startup testing per Section 13 60 00, the CONTRACTOR shall conduct one complete lubricant change on equipment. In addition, the CONTRACTOR shall be responsible for the proper disposal of used lubricants. The OWNER will then be responsible for subsequent lubricant changes

PART 3 EXECUTION

3.1 SERVICES OF MANUFACTURER

- A. Installation Supervision, Inspection, Startup, and Field Adjustment: An authorized, experienced, and competent service representative of the manufacturer shall visit the Site to perform the following:
 - 1. Supervision of the installation of the equipment
 - 2. Inspection, checking, and adjusting the equipment and approving its installation
 - 3. Startup and field testing for proper operation, efficiency, and capacity
 - 4. Performing field adjustments during the test period to ensure that the equipment installation and operation comply with requirements
 - 5. Certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.
 - 6. Unless otherwise indicated, factory representative shall be present at the job site for the following number of days:
 - a. Half a day per equipment for smaller than 500 horsepower.
 - b. One day per equipment for 500 horsepower and larger.
- B. Owner Staff Training
 - 1. Owner staff training shall be in accordance with Section 01 79 00 – Owner Staff Training.
 - 2. Unless otherwise indicated, a minimum of one day of training shall be provided for each type of equipment.

3.2 INSTALLATION

- A. General: Equipment shall be installed in accordance with the manufacturer's written recommendations.
- B. Alignment: Equipment shall be field tested to verify proper alignment.

3.3 PACKAGED EQUIPMENT

- A. When any system is furnished as pre-packaged equipment, the CONTRACTOR shall coordinate space and structural requirements, clearances, utility connections, signals, and outputs with Subcontractors to avoid later change orders.
- B. If the packaged system has any additional features (as safety interlocks, etc.) other than required by the Contract Documents, the CONTRACTOR shall coordinate such features with the ENGINEER and provide material and labor necessary for a complete installation as required by the manufacturer.

3.4 FIELD ASSEMBLY

- A. Studs, cap screws, bolt and nuts used in field assembly shall be coated with Never Seize compound or equal.

3.5 WELDING

- A. Welds shall be cleaned of weld-slag, splatter, etc. to provide a smooth surface.

3.6 FIELD TESTS

- A. Where indicated by the individual equipment sections, equipment shall be field tested after installation to demonstrate satisfactory operation without excessive noise, vibration, or overheating of bearings or motor.
- B. The following field testing shall be conducted:
 - 1. Start equipment, check, and operate the equipment over its entire operating range. Vibration level shall be within the amplitude limits as indicated or as recommended by the reference applicable standards.
 - 2. Obtain concurrent readings of motor voltage, amperage, capacity, vibration, and bearing temperatures.
 - 3. Operate equipment indicated in Section 13 60 00 – Vehicle Wash Equipment.
- C. The ENGINEER shall witness field-testing. The CONTRACTOR shall notify the ENGINEER of the test schedule 3 Days in advance.
- D. In the event that any equipment fails to meet the test requirements, the equipment shall be modified and retested until it satisfies the requirement.

END OF SECTION

APPENDIX A

**GEOTECHNICAL EXPLORATION REPORT
INFRASTRUCTURE IMPROVEMENTS
NDOT LAS VEGAS MAINTENANCE STATION
123 EAST WASHINGTON AVENUE
LAS VEGAS, NEVADA**

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**GEOTECHNICAL EXPLORATION REPORT
INFRASTRUCTURE IMPROVEMENTS
NDOT LAS VEGAS MAINTENANCE STATION
125 EAST WASHINGTON AVENUE
LAS VEGAS, NEVADA**

**PROJECT NO.: G-17-048
JULY 28, 2017**

Prepared for:

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**GEOTECHNICAL EXPLORATION REPORT
INFRASTRUCTURE IMPROVEMENTS
NDOT LAS VEGAS MAINTENANCE STATION
125 EAST WASHINGTON AVENUE
LAS VEGAS, NEVADA**

1.0 INTRODUCTION

This report presents the results of our geotechnical exploration for improvements to the existing NDOT Las Vegas Maintenance Station. The site is located at 125 East Washington Avenue in Las Vegas, Nevada. The general location of the site is shown on Figure No. 1, Vicinity Map.

The purpose of our services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- General geology of the area
- Foundation design and construction
- Retaining wall design and construction
- Floor slab design and construction
- Pavement design and construction
- Earthwork

This report is for the purpose of providing geotechnical engineering and/or testing information and requirements. The scope of our services for this project did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic material in structures, soil, surface water, groundwater or air, below or around this site.

2.0 PROJECT INFORMATION

The site consists of approximately 16.18 acres and is currently the Las Vegas Maintenance Station for NDOT. Improvements to the existing infrastructure are planned for the site. It is our understanding improvements would consist of:

- Adding a Wash Station, which includes a driving pad, spray bar footings, settling basin, sand/oil interceptor, recycle system skid pad, truck fill pier footings, and light pole pier footings.
- Adding a guard shack as well as relocating an existing guard shack.
- Repaving the entire site.
- Adding drainage improvements to the site including storm water treatment vaults and piping.

- Adding storm drain inlets in Washington Street (public right-of-way) and connecting to the existing storm drain main located across the street.
- Extending and adding a retaining wall and providing a flat paved area for increased turnaround and possibly parking. Will require seismic values and recommendation for the retaining wall.

It is assumed the structures will be one and/or two-stories in height, of wood-frame construction with concrete slab-on-grade lower floors. Structural loads for the proposed buildings were not provided. We have assumed maximum dead- plus live-loads for columns and wall loading at approximately 68 kips and 2 kips per lineal foot, respectively. There will be on-site paved areas. It is further assumed that final grades will generally be at or near existing site grades (plus or minus 4 feet).

3.0 SITE EXPLORATION

The scope of our services for this project included a subsurface exploration program. The subsurface exploration program consisted of drilling 9 borings to depths of approximately 15 feet below existing site grades. The borings were logged during drilling by a graduate geologist and samples were obtained to aid in material classification and for possible laboratory testing. The approximate locations of the borings are shown on Figure No. 2, Site Map. The locations of the borings were determined in the field by approximating distances from existing features or improvements. The location of the borings should be accurate only to the degree implied by the method used. Results of the borings are presented in the Appendix.

4.0 SITE CONDITIONS

4.1 Surface

At the time of our exploration the site was developed. Development consisted of several office/warehouse buildings, fuel pumping stations, heavy equipment storage, paved parking areas and driveways, sidewalks and landscape areas including lawn and several trees. There were also retaining walls on the east and northeast portion of the site. Site drainage was generally by sheet flow toward north-northeast with northeastern portion of the site which was approximately 10 feet lower than the rest of the site.

4.2 Subsurface

Fill was encountered in all explorations. The fill generally consisted of 2 to 4½ inches of asphalt concrete over 8 to 12 inches of aggregate base. Additional fill was encountered in borings B-1, B-2, B-3, B-5, B-6 and B-7 which extended to depths ranging from 2 to 5 feet below site grades consisting of silty clay and sandy clay. However, due to previous site development there could be deeper and/or poorer quality fill in other areas of the site beyond our explorations.

Natural soils at the site generally consisted of firm to very stiff silty clay, sandy clay and gravelly clay; and loose clayey sand. Moderately hard to very hard caliche was encountered in three of the explorations (borings B-1, B-2 and B-3). Caliche was first encountered at depths of 4 and 6 feet below existing site grade. Laboratory test results indicate that the on-site clay soils have a low to high expansion potential. Groundwater was encountered in two explorations (boring B-4 and B-7). The groundwater was measured at depths of 13.3 and 14 feet below existing site grade. Groundwater levels can fluctuate due to seasonal variations, irrigation practices and due to groundwater withdrawal and recharge. The boring logs and laboratory test results presented in the Appendix should be referred to for more detailed information.

5.0 GEOLOGIC INFORMATION

The site is located in the central portion of the Las Vegas Valley. This location places the site in an area underlain by thick alluvial deposits (hundreds of feet).

There are three mapped fault on the site.¹ As indicated on the Clark County Soil Guidelines Map, the site is located within 2,000 feet of a fault. According to published information, 90% of all fissures in the Las Vegas Valley occur within this 2,000 foot zone. The cumulative evidence indicates that fissures are the result of a subsurface erosional process. The erosional process occurs in tensional fractures at or near the surface in uncemented, relatively fine-grained soils. A visual evaluation of the existing surface was performed, but no visible surface expressions of fissures were noted. The nearest mapped fissure zone is approximately 5.5 miles northwest of the site.¹

The Quaternary Age mapped faults are mapped as crossing the western portion of the site generally trending in a north-south direction, eastern portion of the site generally trending in a east-west direction, and southern portion of the site generally trending in a northwest-southeast direction. Locations of the mapped faults were based primarily on the referenced map¹. The Clark County soils map (GIZMO, 2014) was also reviewed, as well as the Las Vegas NW Quadrangle Geologic Map². Historical aerial photographs of the general area were also reviewed. The previous development of the general area has concealed the features visible on the historical aerial photographs used by Bell.

Liquefaction is defined as the condition when saturated, loose, finer-grained sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Due to consistency and cementation of the native soils, liquefaction is not likely to occur at the site during the design seismic event.

¹ Bell, John W., et. al., 2001, "Las Vegas Valley, 1998 Subsidence Report", Nevada Bureau of Mines and Geology, Open-File Report 01-4, Plate No. 1.

² Matti, Jonathan, et.al., 1987, "Las Vegas NW Quadrangle Geologic Map", Nevada Bureau of Mines and Geology, Map 3Dg.

6.0 RECOMMENDATIONS

6.1 General

Our recommendations are based on the assumption that the soil conditions are similar to those disclosed by the explorations. If variations are noted during construction or if changes are made in site plan, structural loading, foundation type or floor level, we should be notified so we can supplement our recommendations, as applicable.

Based on the mapped fault locations, a no build zone of 5 feet in width on each side of the historically mapped Quaternary Age fault has been indicated on Figure 2. It is our opinion that the location of the no-build zone provided in the Geotechnical Exploration report should be suitable for the mapped alignment based on the provided references and historical data.

The owner must recognize that this site has inherent risks to development due to the expansive nature of the on-site soils. As previously indicated, the clay soils ranged from having a low to high expansion potential. The highly expansive clays have the potential to undergo relatively large movements due to increases in moisture content. Foundation designs presented in this report will reflect the potential for highly expansive clays. For these recommendations to be effective the recommendations presented in the Drainage and Moisture Protection section of the report must be strictly adhered to. In addition, the highly expansive clays should not be used as fill in structure areas.

As indicated, there was fill on-site. This fill would be considered uncontrolled fill unless observation and testing was performed during placement. All uncontrolled fill should be removed and replaced with properly compacted fill. The uncontrolled fill soils can be re-used for controlled fill provided almost all oversized material, unsuitable material (as determined by the geotechnical engineer), vegetation and debris is removed.

As previously indicated, the upper on-site soils at some locations are firm in consistency. These soils are not suitable for support of foundations, floor slabs, or paving in their present state. When firm soils encountered (as per Geotechnical Engineer of Record) the upper 4 feet of natural soils or the natural soils within 3 feet below the bottom of foundations, whichever is lower, should be overexcavated and recompacted.

6.2 Foundations

If the grading recommendations presented in the Earthwork section of this report are complied with, the proposed structures and any block walls or retaining walls may be supported by conventional type foundations. Foundations should be established on undisturbed natural soils having a consistency of at least stiff and/or properly compacted fill or caliche. If practical,

foundations for a portion of a structure should not be established partly on caliche deposits and partly on natural soils and/or properly compacted fill.

If caliche deposits are encountered at foundation elevations, foundations for the structure should be supported entirely on caliche deposits. Foundations for a portion of a structure should not be established partly on caliche deposits and partly on natural soils and/or properly compacted fill.

When new foundations are adjacent to an existing structure, the new foundations should be at least as deep as the existing foundations or the deeper foundations should be designed for increased loading. Support of the existing foundations would be required if adjacent new foundations will be constructed lower than the existing foundations.

Foundations should be at least 12 inches wide and the bottom of the foundations should be established at least 18 inches below the lowest adjacent final compacted subgrade (generally pad grade). Foundations established as recommended, may be designed to impose a net dead- plus live-load pressure of 2,000 pounds per square foot (psf). A one-third increase may be used for wind or seismic loads.

Due to the expansive nature of the on-site soil, we recommend reinforcement of foundations and stemwalls. Based on local practice, we suggest that foundations be reinforced with a minimum of two No. 4 bars near the top of the stemwall and two No. 4 bars near the bottom of the foundations. The recommendations for reinforcement are not intended as a structural solution, but are in accordance with local practice and experience in the area. They are not intended to supersede or replace the structural engineers recommendations.

Settlement of the proposed structures, supported as recommended, should be within acceptable limits (less than 1 inch). Differential settlement should be less than ½-inch. However, it should be understood that if the expansive soils beneath foundations experience an increase in moisture, expansion/heave could occur and cause additional movement of a structure. Therefore, it is important that recommendations presented in the Drainage and Moisture Protection section of this report be adhered to.

6.3 Site Class

The 2012 International Building Code (IBC) requires that a default Site Class D be assumed for seismic design when soil conditions for the top 100 feet are not known in sufficient detail for determination in accordance with Table 20.3-1 of ASCE Standard 7.

The site is located at approximately the following latitude and longitude:

LATITUDE	LONGITUDE
36.1827°	-115.1369°

A search of the USGS Earthquake Hazards Program’s U.S. Seismic Design Maps website, 2012 IBC data, indicated the following spectral accelerations parameters for the location indicated above and a Site Class D.

MAPPED ACCELERATION PARAMETERS	
S_s	0.491 g
S₁	0.165 g
DESIGN ACCELERATION PARAMETERS	
S_{DS}	0.460 g
S_{D1}	0.235 g

6.4 Lateral Earth Pressures and Retaining Walls

For soils above any free water surface, with level backfill and no surcharge loads, we recommend the following equivalent fluid pressures and coefficient of friction:

- Active.....35 pcf
- At-Rest.....55 pcf
- Passive250 pcf
- Coefficient of Friction.....0.30
- Unit Weight of Backfill (Native Soils)130 pcf

Notes:

1. Active pressure assumes unrestrained (cantilever) wall and assumes no loading from heavy compaction equipment.
2. Passive pressure should not exceed a maximum of 130 psf. A one-third increase may be used for wind or seismic loads.
3. The passive pressure and the frictional resistance of the soils may be combined without reduction in determining the total lateral resistance.

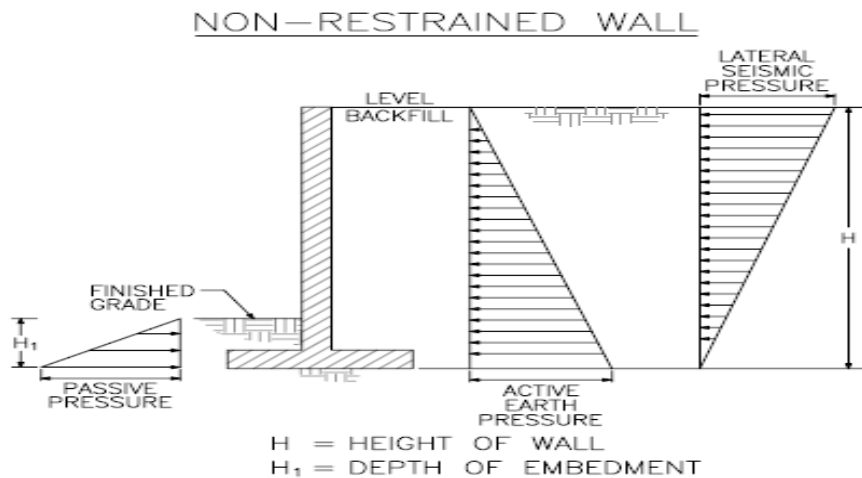
If required by the 2012 IBC, the lateral seismic pressure acting on an unrestrained wall can be estimated by the method presented in Section 1610.1.1 of the Southern Nevada Amendments to the 2012 IBC, where the dynamic (seismic) lateral thrust, ΔP_{AE} , per linear foot of wall may be determined as follows:

$$\Delta P_{AE} = \frac{3}{8}(k_h)H^2\gamma$$

- k_h is equal to $S_{DS}/2.5$
- H is the height of the wall in feet
- γ is equal to the unit weight of the backfill material, in pcf

The resultant dynamic force acts at a distance of $0.6H$ above the base of the wall. This equation applies to level backfill and walls that retain no more than 15 feet.

Where the design includes unrestrained walls, above any free water, with level backfill and no surcharge loads, we recommend the wall be designed to resist an earth pressure with the distribution shown below:



Any surcharge from adjacent loadings should be added to the retaining wall pressures using a factor of 0.30. As indicated, the aforementioned pressures assume that there will be no build-up of hydrostatic pressure. Therefore, if walls will be subject to saturated conditions, we recommend weep holes (if practical) and a wall drainage system. The wall drainage may consist of a minimum of 2 cubic feet of drain rock per foot of length of retaining wall wrapped in filter fabric, Mirafi 140N or equivalent, placed at the base of the wall and discharge to an appropriate outlet. Drain rock should consist of ¾-inch Drain Backfill as per Section 704.03.02 of the USS. The structural fill immediately behind retaining walls (6 to 12 inches) should be granular and free draining. The upper 2 feet of backfill should consist of compacted native soils. As an option, a prefabricated drain may be used behind walls. The wall drainage system is an integral part of the retaining wall design. The retaining wall designer is ultimately responsible for the retaining wall design and shall ensure that the above recommended drainage system is compatible with the design of the wall or select a different drainage system at their discretion. All walls below grade should be waterproofed or at least dampproofed.

Fill against foundations, grade beams and retaining walls should be properly placed and compacted. Backfill should be mechanically compacted in layers (6 to 8 inches maximum thickness); flooding should not be permitted. Backfill within 2 feet of the back of retaining walls should be compacted to at least 90 percent of the maximum dry density obtainable by the ASTM D1557 method. Backfill outside the 2 foot zone should be compacted as outlined in the Fill Placement and Compaction section of this report. Care should be taken when placing backfill so as not to damage the walls. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors. Overcompaction may cause excessive lateral earth pressures which could result in wall movements. Retaining walls should not be backfilled until the concrete or masonry has reached an adequate strength as specified by the wall designer.

6.5 Permanent Slopes

Earthwork activities to construct slopes at the site should be done in accordance with the following:

- * Cut and/or fill slopes should be constructed no steeper than 2 horizontal to 1 vertical.
- * If any slope exceeds 30 feet in height, the slope design should include mid-height benches to intercept surface drainage and divert flow from the slope face.
- * The surfaces of slopes should be compacted (not necessary where caliche is exposed) to the minimum specifications recommended in the Earthwork section of this report and until the slopes are stable and there are no loose soils on the slopes. Alternately, fill slopes could be constructed by over-filling and cutting back to expose fully compacted soil.
- * The ground surface adjacent to the top of slopes should be graded to drain away from the slopes. Any required erosion control measures should be provided for all slopes as soon as possible after grading.

6.6 Earthwork

6.6.1 General

- All earthwork should be performed in accordance with the guidelines presented in Chapter 18 of the 2012 IBC and the Southern Nevada Amendments to the 2012 IBC, except where specific recommendations are presented in this report. It is recommended that contractors perform their own reconnaissance of the site. If the contractors have any questions regarding site conditions, site preparation or recommendations in this report, they should contact a representative of NOVA Geotechnical & Inspection Services.

6.6.2 Site Clearing

- Strip and remove existing vegetation, debris, uncontrolled fill, all loose or disturbed natural soils, and other deleterious materials from proposed building areas, adjacent walks and slabs, and in areas to be paved. If practical, excavations should extend at least 5 feet beyond the areas to be improved in plan view. Uncontrolled fill is defined as any existing fill that was not properly placed, observed and tested.
- All exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.
- If unexpected fills or abandoned improvements are encountered during site clearing, such features should be removed and the excavation thoroughly cleaned and backfilled. All excavations should be observed by the geotechnical engineer prior to backfill placement.
- Demolition of existing structures/improvements should include removal of any foundation system and utilities. Any excavations as a result of demolition and removal should be properly filled.
- All materials derived from the demolition of existing structures/improvements should be removed from the site, and not be allowed for use in any fills.

6.6.3 Excavation

- It is anticipated that excavation of the on-site natural non-cemented deposits for the proposed project can be accomplished with conventional earthmoving equipment.
- Excavations penetrating moderately hard or relatively thin (less than one foot) hard layers of caliche should be able to be excavated using heavy-duty equipment.
- Excavations penetrating hard or very hard caliche will require special consideration where they are to be performed.
- Contractors, especially those excavating for utilities, should satisfy themselves as to the hardness of materials and equipment required.
- Underpinning may be required to protect adjacent structures if excavations will be deeper than existing foundations.
- Excavation, trenching and shoring should be conducted in accordance with the U.S. Department of Labor Occupational Safety and Health Administration's (OSHA) Excavation

and Trenching Standard, Title 29 of the Code of Federal Regulation (CFR), Part 1926.650. Safety of construction personnel is the responsibility of the contractor.

6.6.4 Overexcavation

- Based upon the results of our exploration, in some areas natural soil was generally firm in consistency. As previously mentioned, these soils would not be suitable for support of foundations, floor slabs or paving in their present state. We recommend that firm soils when encountered during grading as per Geotechnical Engineer of Record (GER) be overexcavated and recompacted.
- Within the entire building areas and 5 feet beyond and 2 feet beyond block and retaining walls, overexcavate and recompact the upper 4 feet of natural soils or natural soils within 3 feet below the bottom of foundations, whichever is lower. In areas to be paved (including adjoining sidewalks, patios and other concrete slabs) and at least 2 feet beyond in plan view, it will only be necessary to overexcavate and recompact 3 feet of natural soils below existing grade or final subgrade, whichever is lower.
- Overexcavation may be terminated if caliche is encountered prior to the required depth of overexcavation and it is below foundation embedment in building areas and subgrade in pavement areas.
- It is important that the lower portion (at least 2 feet in structure areas and 1 foot in paved areas) of the fill material placed in the overexcavated area consist of the on-site fine-grained soils that are excavated. This layer will act as a relatively impermeable blanket and help keep moisture from reaching any porous materials below. If porous soils below the compacted fill blanket experience an increase in moisture, additional settlement may occur.

6.6.5 Fill Materials

- On-site non- gypsum soils, meeting the following criteria, may be used in required fills:
 - the majority of the material (85 to 90 percent) is 6 inches or less in maximum dimension.
 - the minus 6-inch material is comprised of at least 40 percent by weight of material finer than $\frac{3}{4}$ -inch in size.
 - the material is free of almost all debris and organic matter.
- Fill containing material greater than 6 inches in diameter should not be used in any utility trenches, behind retaining walls or against foundations or grade beams.
- Imported material should be compatible with on-site soils in addition to being suitable for its intended use. All imported materials should be approved, by the geotechnical firm providing testing during construction, prior to importing. In general, imported soils should have a

maximum expansion potential of 4%, have a maximum solubility of 1.5%, a maximum sulfate content of 0.4% and maximum sodium sulfate content of 0.2%.

- Select free draining granular materials should be used as backfill immediately behind retaining walls (6 to 12 inches). As an option, a prefabricated drain may be used and should be installed in accordance with the manufacturer's recommendations.

6.6.6 Fill Placement and Compaction

- After performing required excavations, the exposed soils should be carefully observed to verify removal of all unsuitable deposits. Exposed soils should then be scarified to a depth of 6 inches (not necessary if caliche exposed), watered as necessary, and compacted as recommended.
- Fill materials should be placed on a horizontal plane unless otherwise accepted by the geotechnical engineer.
- Where the slope ratio of the original ground is steeper than 5 horizontal to 1 vertical, the slope should be benched to create near-level areas for the placement of fill. The maximum allowable height of the bench is 3 feet. Bench excavation should be continued to the top of the existing slope in structural fill areas or the daylight (cut/fill) contact.
- All required fill should be placed in loose lifts generally not over 8 to 12 inches in thickness.
- Materials should be compacted to the following:

MATERIAL	PERCENT COMPACTION (ASTM D1557)	MOISTURE CONTENT
Fine – grained	90 minimum	optimum (minimum)
Granular	95 minimum	-2 percent of optimum (minimum)

Note: For the purpose of compaction, fine-grained soils are soils with at least 30 percent passing the No. 200 sieve and/or soils having an expansion greater than 4 percent.

All fill placed deeper than 5 feet below final grade should be compacted to a minimum of 95 percent at a moisture content of optimum or greater.

Street/pavement subgrade only needs to be compacted to a minimum of 90 percent.

- Clayey soils should not be allowed to dry out such that cracking occurs during or after grading. Sufficient moisture contents should be maintained, to prevent cracking, at least until foundations, floor slabs, flatwork and pavements are constructed. Any significantly dried or cracked soils could be wetted until they reach acceptable moisture contents or they could be excavated and replaced with acceptable properly compacted fill.
- Structural fill should be observed and tested as necessary to determine compliance with the compaction requirements presented in this report. In general, one compaction test should be performed for approximately every 500 cubic yards of fill, one for one foot of fill placed, or change in material.

6.7 Pavement

The on-site pavement area subgrade should be properly prepared as outlined in the Earthwork section of this report before placing any asphalt or base materials. Proper drainage of the paved areas should be provided to increase the pavement life. In addition, pavements must be maintained for durability and integrity during their life. Therefore, periodic seal coating, crack sealing, and/or patching may be required. According to Stantec Consulting Services ESALs of 380,000 should be considered for anticipated traffic on this site.

Based on our test results, the on-site soils should have an R-value on the order of 25. Therefore, based on the Pavement Structure Design Guideline Chart (DWG. Nos. 200 and 200.1) in the Uniform Standard Drawings for Clark County Area, Nevada, the following preliminary pavement sections will be applicable:

TRAFFIC AREA	ASPHALT (Inches)	TYPE II BASE COURSE (Inches)
Automobile Parking	2.0	8.0
Main Corridors and Truck Access	4.5	15.0

Asphalt and base course materials and compaction should meet the criteria set forth in the Uniform Standard Specifications for Public Works' Construction, Off-Site Improvements, Clark County Area, Nevada. Subgrade should be compacted to a minimum of 90 percent (ASTM D1557). Field and laboratory testing of asphalt and base materials should be performed to determine whether specified requirements have been met.

Based on our test results, the on-site soils should have an R-value on the order of 25. Therefore, based on State of Nevada Department of Transportation Pavement Structural Design and Policy Manual, the following preliminary pavement sections will be applicable:

TRAFFIC AREA	ASPHALT (Inches)	TYPE II BASE COURSE (Inches)
Automobile Parking	2.0	8.0
Main Corridors and Truck Access	4.0	9.0

The recommended pavement sections should be adequate for the anticipated traffic volumes. However, laboratory tests indicate that the soils are expansive. Future performance of pavements constructed on these soils will be dependent upon several factors, including maintaining a stable moisture content of the subgrade soils. It should be understood that if the expansive soils experience an increase in moisture, distress/cracking and pavement failure may occur.

The performance of the pavement can be enhanced by minimizing excess moisture which can reach the subgrade soils. The following recommendations should be followed, where possible:

- * Site grading at a minimum 2% grade away from the pavements.
- * Compaction of any utility trenches for landscaped areas to the same criteria as the pavement subgrade.
- * Placing compacted backfill against the exterior side of curb and gutter.

6.8 Drainage and Moisture Protection

Foundation soils should generally not be allowed to become saturated during or after construction, except when necessary to increase moisture contents prior to construction. Infiltration of water into foundation or utility excavations should be prevented during construction. Utility lines should be properly installed and the backfill properly compacted to avoid possible sources for subsurface saturation.

Positive drainage away from the structures should be provided during construction and maintained throughout the life of the structures. Any downspouts, roof drains or scuppers should discharge into splash blocks or extensions and away from the structures. Backfill against footings, exterior walls and in utility trenches should be properly compacted and free of all construction debris to reduce the possibility of moisture infiltration.

As previously indicated the soils are expansive. Performance of the foundation system recommended in this report is dependent on the ability to keep moisture from penetrating the soils below foundations and slabs. Therefore, we recommend the following:

- Positive drainage should be maintained away from the structures, adjoining concrete slabs and block walls. Positive drainage of 5% minimum shall be maintained for areas adjacent to structures or block walls that are not covered by concrete or asphalt. The 5% should be maintained for a distance of 10 feet. Where concrete or asphalt abut structures or block walls, the surface of these materials should be sloped a minimum of 2% away from structures or block walls. If physical obstructions or lot lines prohibit 10 feet of horizontal distance, the slope should be provided to an approved alternate method of drainage.
- No landscaping or sprinklers should be allowed within 10 feet of the structures or block walls. If landscaping or sprinklers are placed within this area, they should be in sealed planters.
- Watering should be kept to a minimum.

It should be understood, if the above recommendations are not followed there would be an increased risk/potential for increasing moisture below foundations and slabs which could result in additional movement and distress to structures and slabs.

6.9 Floor Slabs

If grading recommendations are complied with, concrete floor slabs may be supported on a 6-inch layer of Type II. If the potential for a damp floor slab is a concern, moisture protection should be provided by a relatively impervious vapor barrier/retarder placed beneath interior slabs. The vapor barrier/retarder should be a Class A vapor barrier at least 10 mils in thickness, meeting the requirements of ASTM E1745, and should conform to and be placed in accordance with the requirements of the project structural engineer or architect. If the concrete is to be placed directly

on Type II or sand, the Type II or sand should be moistened (but not saturated) prior to placement of concrete.

Due to the expansive nature of the on-site soils we recommend reinforcement of conventional concrete floor slabs. Based on local practice, we suggest that floor slabs be reinforced with at least No. 4 bars at 24 inches center to center. The recommendations for reinforcement are not intended as a structural solution, but are in accordance with local practice and experience in the area. They are not intended to replace or supersede the structural engineer's recommendations.

Recommendations presented by the American Concrete Institute (ACI 302-1R-96) for slabs-on-grade should be complied with for all concrete placement and curing operations. Improper curing techniques and/or excessive slump (water-cement ratio) could cause excessive drying/shrinkage resulting in random cracking and/or slab curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture sensitive floor coverings.

6.10 Corrosivity

Based on test results and Table 4.3.1 of ACI 318 Section 4.3, the on-site soils classify as having a severe sulfate exposure. Consideration should be given to providing protection to buried metal pipes or use of nonmetallic pipe where permitted by local building codes. Non-corrosive backfill, protective coatings and wrappings, sacrificial anodes, or a combination of these methods could be considered. It should be understood that NOVA Geotechnical & Inspection Services personnel are not experts regarding corrosion and/or corrosion protection and that we recommend a "Corrosion Engineer" be consulted for actual recommendations regarding the necessity and/or method of cathodic protection.

7.0 OTHER SERVICES

NOVA Geotechnical & Inspection Services should be retained to provide a general review of final design plans and specifications in order that grading and foundation recommendations may be interpreted and implemented. In the event that any changes of the proposed project are planned, the conclusions and recommendations contained in this report should be reviewed and the report modified or supplemented as necessary.

NOVA Geotechnical & Inspection Services should also be retained to provide services during excavation, grading, foundation and construction phases of work. Observation of foundation excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present. Field and laboratory testing of concrete and soils should be performed to determine whether applicable requirements have been met. In addition, the level of special inspection required for soils should not be less than **4b** as specified in the Southern Nevada Amendments to the 2012 IBC, Table 1705.6.



The analyses and recommendations in this report are based in part upon data obtained from the field exploration. The nature and extent of variations beyond the locations of the explorations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

8.0 CLOSURE

Our professional services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities. No warranties, either expressed or implied, are intended or made. We prepared this report as an aid in design of the proposed project. This report is not a bidding document. Any contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction techniques to be used on this project.

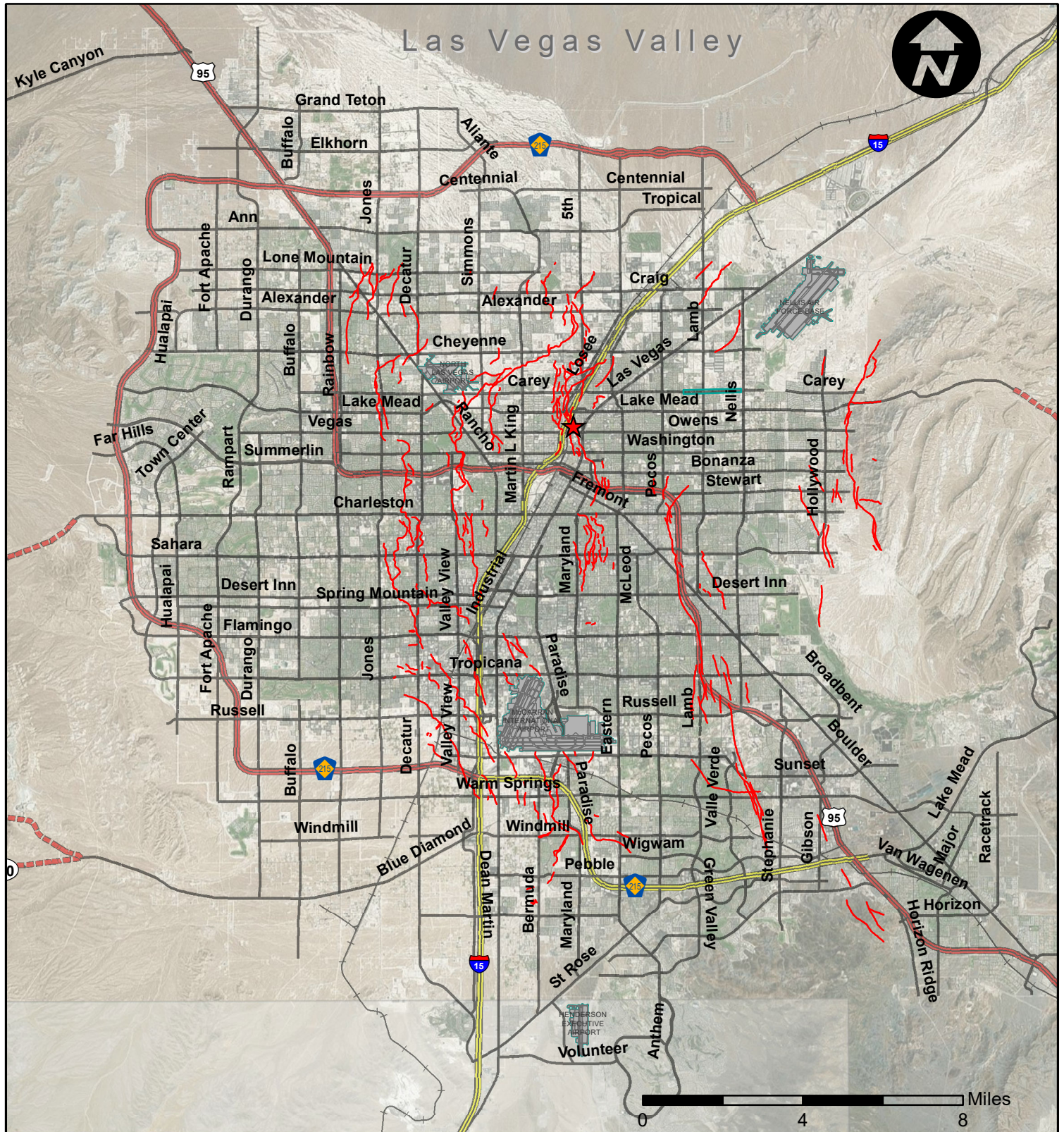
NOVA GEOTECHNICAL & INSPECTION SERVICES

Prepared by:
Mehdi Khalili, Ph.D., P.E.
Project Engineer

Reviewed by:

Larry W. Snedegar, P.E., P.G.
Sr. Project Engineer





Legend

- Las Vegas Faults (CCBD GISMO, 2014)
- ★ Approximate Project Site


The presented layers were obtained from various sources including ESRI, USGS, USDA, CCBD GIZMO, CCFCD, GIS User Community among others. The GIS information is presented for reference only. No warranties, either expressed or implied, are intended or made. If you have any questions regarding this information, please contact NOVA.

NOVA Geotechnical & Inspection Services	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station	VICINITY MAP	
	CLIENT: Arriola Consulting & Inspection, LLC	PROJECT NO: G-17-048	FIGURE NO: 1

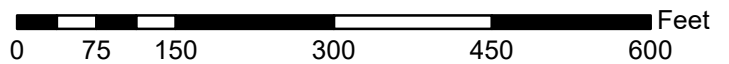


Legend

 Approximate Project Site Boundary

 Approximate Boring Location

 No-Build Zone per Mapped Fault



The presented layers were obtained from various sources including ESRI, USGS, USDA, CCBD GIZMO, CCFCD, GIS User Community among others. The GIS information is presented for reference only. No warranties, either expressed or implied, are intended or made. If you have any questions regarding this information, please contact NOVA.

<p>NOVA Geotechnical & Inspection Services</p>	<p>PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station</p>	<p>SITE MAP</p>	
	<p>CLIENT: Arriola Consulting & Inspection, LLC</p>	<p>PROJECT NO: G-17-048</p>	<p>FIGURE NO: 2</p>

APPENDIX

APPENDIX A

Site Exploration

The subsurface conditions of the site were explored by drilling 9 borings to depths of approximately 15 feet below existing site grades. Borings were drilled using a rotary drill rig.

Soils were logged during drilling by a graduate geologist and samples were obtained to aid in material classification and for possible laboratory testing. Boring logs are presented on Plates 1 through 9. The number of blows required to drive a 2-inch diameter sampler (SPT) or 3-inch diameter sampler (Ring) 12 inches using a 140 pound weight dropped 30-inches are shown on the logs. The soils are generally classified by the Unified Soil Classification System. Plate 10 presents an explanation of material classifications used in this report.

Laboratory Testing

Laboratory testing was performed on selected samples of on-site soils. Tests were performed in general accordance with applicable ASTM or local standards.

Field moisture content and dry density determinations were performed on undisturbed samples. Results of these tests are presented on the boring logs.

Consolidation tests were performed on representative samples to illustrate the compressibility of on-site soils. Water was added during testing to illustrate the influence of moisture on compressibility. The test results are presented on Plates 11a through 11e.

Sieve analyses and Atterberg Limits were performed to determine the grain-size distribution and soil classification of representative materials. The results are presented on Plates 12a through 12e.

Expansion tests were performed on remolded samples of the clayey soils. The tests were performed from oven-dried moisture content to near saturated condition and a 60 psf surcharge load was applied. The test results are presented below:

SAMPLE	EXPANSION
B-2 @ 2½ ft	0.2%
B-3 @ 8½ ft	11.7%
B-4 @ 5½ ft	7.5%
B-6 @ 3½ ft	9.7%
B-7 @ 2½ ft	4.9%

Direct shear tests were performed on samples to determine the strength of the soils. Tests were performed at field moisture content and at various surcharge pressures. Test results are presented on Plate 13.

R-value tests were performed on representative samples. The test results are presented below:

SAMPLE	R-VALUE
B-1 @ 1-5 ft	44
B-5 @ 2-7 ft	24
B-7 @ 2-7 ft	27

Chemical tests were performed on representative samples by Silver State Analytical Laboratories. Tests were performed to determine the percent chloride, water soluble sodium, sulfate and sodium sulfate, as well as the soil solubility. Test results are presented on Plates 14a through 14e.

Laboratory compaction tests were performed on select samples of the material to determine the maximum dry density and optimum moisture in general accordance with ASTM D1557. Test results are presented below and on Plate 15:

SAMPLE	MATERIAL DESCRIPTION	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)
B-1 @ 1-5 ft.	SC – Clayey SAND with gravel	130.9	8.2

BORING LOG B-1

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
	SITE: 125 East Washington Ave

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
13.2	118	R		13	0	FILL		Fill- 4" ASPHALT concrete over 8" AGGREGATE base, brown, slightly moist	
					1			Fill- Silty CLAY with caliche gravel, brown, moist	
8.1	118	B		50/5"	2	CL		Silty CLAY with caliche gravel, gray/brown, moist	Stiff
					3			Sandy CLAY with caliche gravel, light gray, moist	V. Stiff
					4			Gravelly CLAY with sand, light gray, moist	
					5				
32.7	82	R		10	6			CALICHE, light gray, dry	Hard
					7				
					8	CL		Silty CLAY with some sand, caliche gravel, very moist	V. Hard-Hard Firm-Stiff
					9				
					10			Sandy CLAY with silt, brown, very moist	Firm
					11	SC		Clayey SAND, brown, very moist	Firm-Stiff
					12	CL		Sandy CLAY with caliche, brown, very moist	Loose
					13				Firm
					14				
					15				
Bottom of Boring at 15 feet									





THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater not encountered within depth drilled.	DATE DRILLED: 4/18/2017	PAGE NO: 1 of 1
		PROJECT NO.:	FIGURE NO.:
		G-17-048	1

BORING LOG B-2

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
	SITE: 125 East Washington Ave

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	FILL		Fill- 4.5" ASPHALT concrete over 12" AGGREGATE base, brown, slightly moist	
					1			Fill- Silty CLAY with sand, light brown, very moist	
					2				
7.9	116	R		30	3	CL		Gravelly CLAY with sand, light brown, slightly moist-moist	V. Stiff
					4			CALICHE, light gray, slightly moist	M. Hard
					5	CL		Silty CLAY with sand, caliche gravel, light brown, very moist	Stiff
					6				Firm
					7				
38.5	85	R		11	8			-No Caliche gravel, brown	
					9				
					10				
27.1	101	R		33	13			-Light brown/ brown with caliche gravel, moist	
					14				
					15				
Bottom of Boring at 15 feet									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater not encountered within depth drilled.	DATE DRILLED:	PAGE NO:
		4/18/2017	1 of 1
		PROJECT NO.:	FIGURE NO.:
		G-17-048	2

BORING LOG B-3

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
	SITE: 125 East Washington Ave

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
16.4	114	R		18	0	FILL		Fill- 4" ASPHALT concrete over 8" AGGREGATE base, brown, slightly moist	
					1			Fill- Sandy CLAY with sand, gravel, brown, very moist - with organic, dark brown	
29.0	90	R		13	5	CL		Sandy CLAY with caliche gravel, light brown, moist	V. Stiff
					6			CALICHE, light brown, dry	Hard
					7	CL		Silty CLAY with sand, light gray/gray, very moist - light gray	Firm-Stiff
26.4	94	R		13	8				Firm
					9				
					10				
					11				
					12				
					13				
					14				
					15				
Bottom of Boring at 15 feet									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater not encountered within depth drilled.	DATE DRILLED: 4/18/2017	PAGE NO: 1 of 1
		PROJECT NO.:	FIGURE NO.:
		G-17-048	3

BORING LOG B-4

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
	SITE: 125 East Washington Ave

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	FILL		Fill- 4" ASPHALT concrete over 8" AGGREGATE base, brown, slightly moist	
					1	CL		Silty CLAY with caliche gravel, brown, very moist	Stiff
		R		31	2			Sandy CLAY with caliche gravel, light gray, moist	V. Stiff
		B			3			Silty CLAY with sand, caliche gravel, light gray	
					4				Stiff
					5			Sandy CLAY with silt, brown, very moist	Firm-Stiff
31.4	85	R		14	6				
					7				
					8			Silty CLAY with sand, brown, very moist	Firm
					9				
					10				
48.2	72	R		10	11			-Light brown, very moist Sandy CLAY with caliche gravel, light gray, very moist	Firm-Stiff Stiff
					12			Silty CLAY with caliche gravel, sand, brown, very moist	Firm-Stiff
					13				
					14				
					15				
Bottom of Boring at 15 feet									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater was encountered at a depth of 13.3 feet below site grade after completion of drilling.	DATE DRILLED: 4/18/2017	PAGE NO: 1 of 1
		PROJECT NO.:	FIGURE NO.:
		G-17-048	4

BORING LOG B-5

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
	SITE: 125 East Washington Ave

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	FILL		Fill- 3.5" ASPHALT concrete over 8" AGGREGATE base, brown, slightly moist	
					1			Fill- Silty CLAY with sand, organics, brown/ dark brown, very moist	
					2				
20.1	138	R		6	3	CL		Silty CLAY with sand, brown, very moist	Firm-Stiff
		B			4				
					5				
					6				
21.4	109	R		18	8				Stiff
					9			-Light brown	Firm
					10				
					11			Sandy CLAY with caliche gravel, light gray, very moist	Firm-Stiff
					12				
22.7	92	R		13	13				Stiff
					14				Firm
					15				Stiff
Bottom of Boring at 15 feet									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater not encountered within depth drilled.	DATE DRILLED:	PAGE NO:
		4/18/2017	1 of 1
		PROJECT NO.:	FIGURE NO.:
		G-17-048	5

BORING LOG B-6

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
SITE: 125 East Washington Ave	

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	FILL		Fill-2" ASPHALT concrete over 8" AGGREGATE base, brown, slightly moist	
					1			Fill-Silty CLAY with sand, brown, very moist	
					2	CL		Silty CLAY with caliche gravel, sand, brown, slightly moist	Firm-Stiff
21.7	96	R		12	4			-Light brown, moisty	Stiff
					5			-Brown, very moist	
					6				
					7				
					8				Firm-Stiff
25.2	95	R		12	9				Stiff
					10				
					11			-Mottled brown/light brown	Firm-Stiff
					12				
					13				
45.2	80	R		6	14				
					15				
Bottom of Boring at 15 feet									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater not encountered within depth drilled.	DATE DRILLED: 4/18/2017	PAGE NO: 1 of 1
		PROJECT NO.:	FIGURE NO.:
		G-17-048	6

BORING LOG B-7

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
	SITE: 125 East Washington Ave

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	FILL		Fill-4" ASPHALT concrete over 12" AGGREGATE base, brown, slightly moist	
					1				
					2	CL		Silty CLAY with sand, brown, very moist	Firm
30.3	87	R		9	3				
		B			4			Sandy CLAY with sand brown, very moist	
					5				
		SPT		2	6			Silty CLAY with sand, brown, very moist	
62.3	61	R		5	7				
					8				
					9				
					10				
		SPT		1	11				
					12				
53.2	65	R		5	13				
					14				
					15			Bottom of Boring at 15 feet	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater was encountered at a depth of 14 feet below site grade after completion of drilling.	DATE DRILLED: 4/18/2017	PAGE NO: 1 of 1
		PROJECT NO.: G-17-048	FIGURE NO.: 7

BORING LOG B-8

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
	SITE: 125 East Washington Ave

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	FILL		Fill-4" ASPHALT concrete over 12" AGGREGATE base, brown, slightly moist	
					1				
					2	CL		Silty CLAY with sand, brown, moist	Stiff
22.8	97	R		20	3				
		B			4				
					5			-Light brown with caliche gravel, very moist	
					6				Firm-Stiff
24.3	102	R		12	7				
					8				Stiff
					9				
					10				
					11			Sandy CLAY with caliche gravel, light gray, very moist	
					12				
18.6	109	R		6	13	SM		Clayey SAND, light gray, very moist-moist	Loose
					14				
					15				
Bottom of Boring at 15 feet									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater not encountered within depth drilled.	DATE DRILLED:	PAGE NO:
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		PROJECT NO.:	FIGURE NO.:
		G-17-048	8

BORING LOG B-9

CLIENT: Arriola Consulting & Inspection, LLC	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station
BORING LOCATION: See Site Map	ELEVATION (ft): N/A
SITE: 125 East Washington Ave	

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

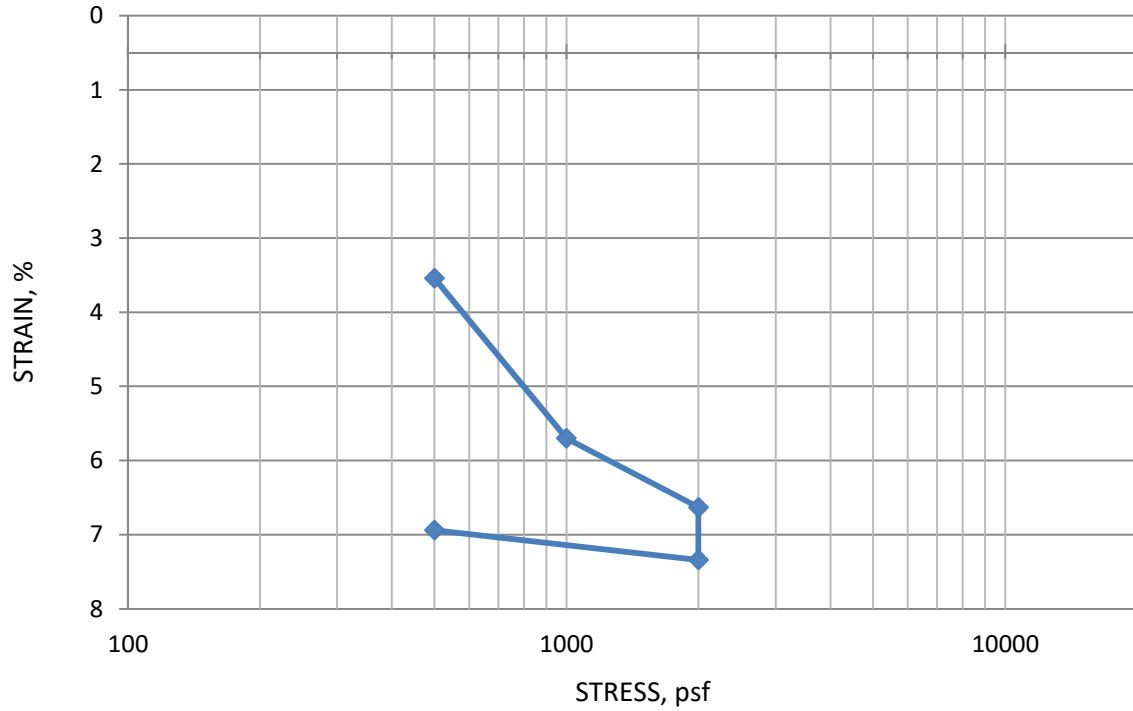
MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	FILL		Fill-4.5" ASPHALT concrete over 12" AGGREGATE base, brown, slightly moist	
					1				
					2	CL		Sandy CLAY with sand, brown, very moist	Firm
					3				Firm-Stiff
		R		8	4				
		SPT		18	5			-Light brown, moist	Stiff
		SPT		24	6			-Light brown/ light gray with caliche gravel	
					7				
					8			Gravelly CLAY with sand, light brown, moist	
		R		17	9				
10.4	116				10			Sandy CLAY with caliche, light brown, very moist-moist	Firm
		SPT		10	10				Stiff
					11				
					12				
					13				
		R		24	14				
12.1	123				15				
Bottom of Boring at 15 feet									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL. * SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES	NOTES: Groundwater not encountered within depth drilled.	DATE DRILLED: 4/18/2017	PAGE NO: 1 of 1
		PROJECT NO.:	FIGURE NO.:
		G-17-048	9

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		CLEAN SANDS (LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES	
FINE GRAINED SOILS	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
		SILTS AND CLAYS	LIQUID LIMIT LESS THAN 40		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			LIQUID LIMIT LESS THAN 40		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	LIQUID LIMIT LESS THAN 40			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
		LIQUID LIMIT GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY	
LIQUID LIMIT GREATER THAN 50			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	
NOVA GEOTECHNICAL & INSPECTION SERVICES	CLIENT:				Materials Classification	
	PROJECT:					PROJECT NO.:

B-3 at 8.5 ft.

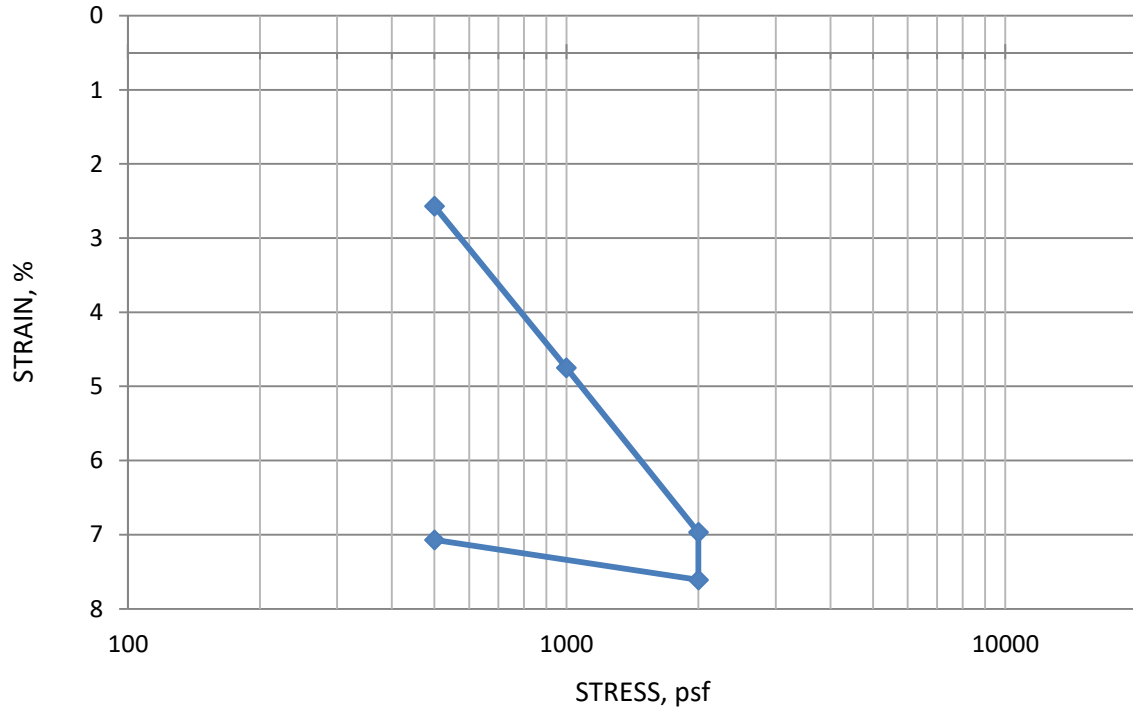


SAMPLE IDENTIFICATION	NOTES	γ_d , pcf	MC%
● B-3 at 8.5 ft.	WATER ADDED AT AT 2000 psf	90	29.0%

γ_d : DRY DENSITY
 PSF: POUNDS PER SQUARE FOOT
 PCF: POUNDS PER CUBIC FOOT
 MC: MOISTURE CONTENT

NOVA GEOTECHNICAL & INSPECTION SERVICES	CLIENT:	Arriola Consulting and Inspection, LLC		CONSOLIDATION TEST	
	PROJECT:	Infrastructure Improvements NDOT Las Vegas Maintenance Station		PROJECT NO.:	PLATE NO.
				G-17-048	11a

B-4 at 5.5 ft.

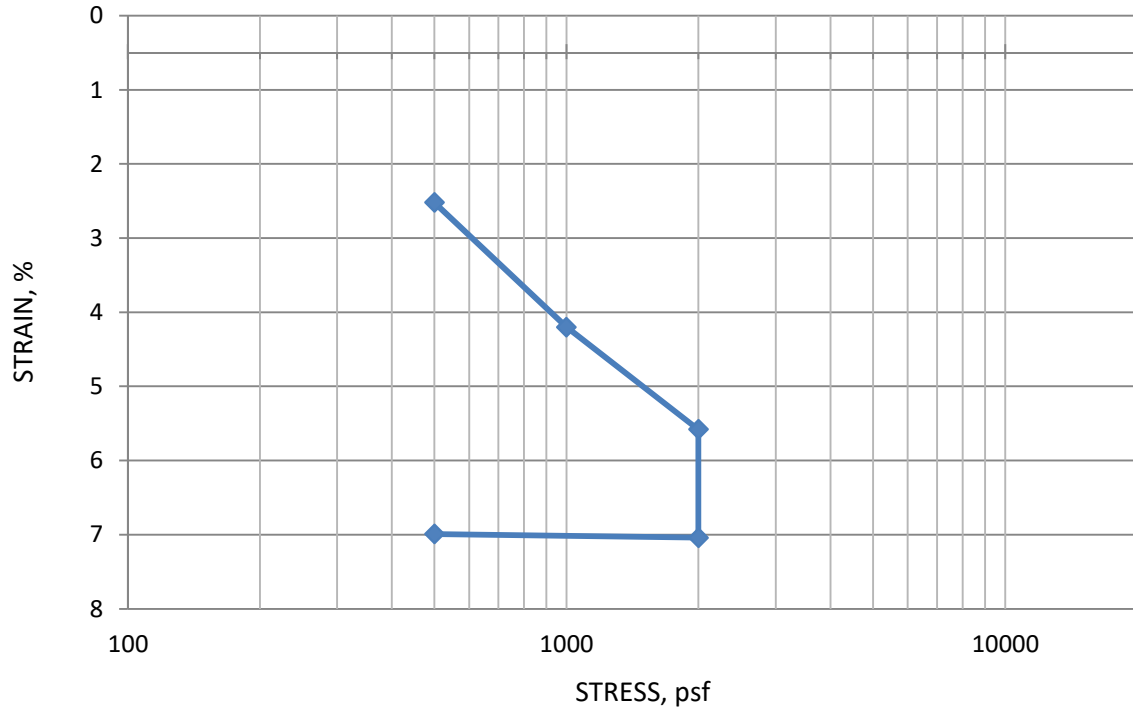



SAMPLE IDENTIFICATION	NOTES	γ_d , pcf	MC%
● B-4 at 5.5 ft.	WATER ADDED AT AT 2000 psf	104	31.4%

γ_d : DRY DENSITY
 PSF: POUNDS PER SQUARE FOOT
 PCF: POUNDS PER CUBIC FOOT
 MC: MOISTURE CONTENT

NOVA GEOTECHNICAL & INSPECTION SERVICES	CLIENT: Arriola Consulting and Inspection, LLC	CONSOLIDATION TEST	
	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station	PROJECT NO.: G-17-048	PLATE NO.: 11b

B-5 at 2.5 ft.

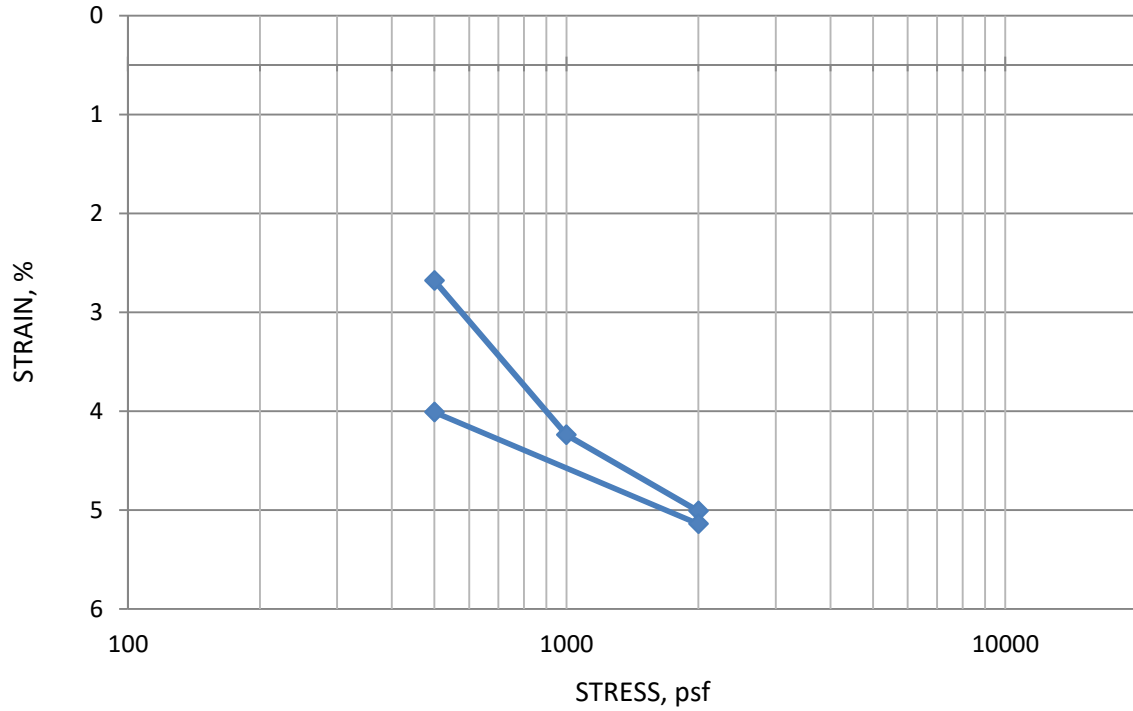



SAMPLE IDENTIFICATION	NOTES	γ_d , pcf	MC%
 B-5 at 2.5 ft.	WATER ADDED AT AT 2000 psf	138	20.1%

γ_d : DRY DENSITY
 PSF: POUNDS PER SQUARE FOOT
 PCF: POUNDS PER CUBIC FOOT
 MC: MOISTURE CONTENT

NOVA GEOTECHNICAL & INSPECTION SERVICES	CLIENT: Arriola Consulting and Inspection, LLC	CONSOLIDATION TEST	
	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station	PROJECT NO.: G-17-048	PLATE NO.: 11c

B-6 at 3.5 ft.

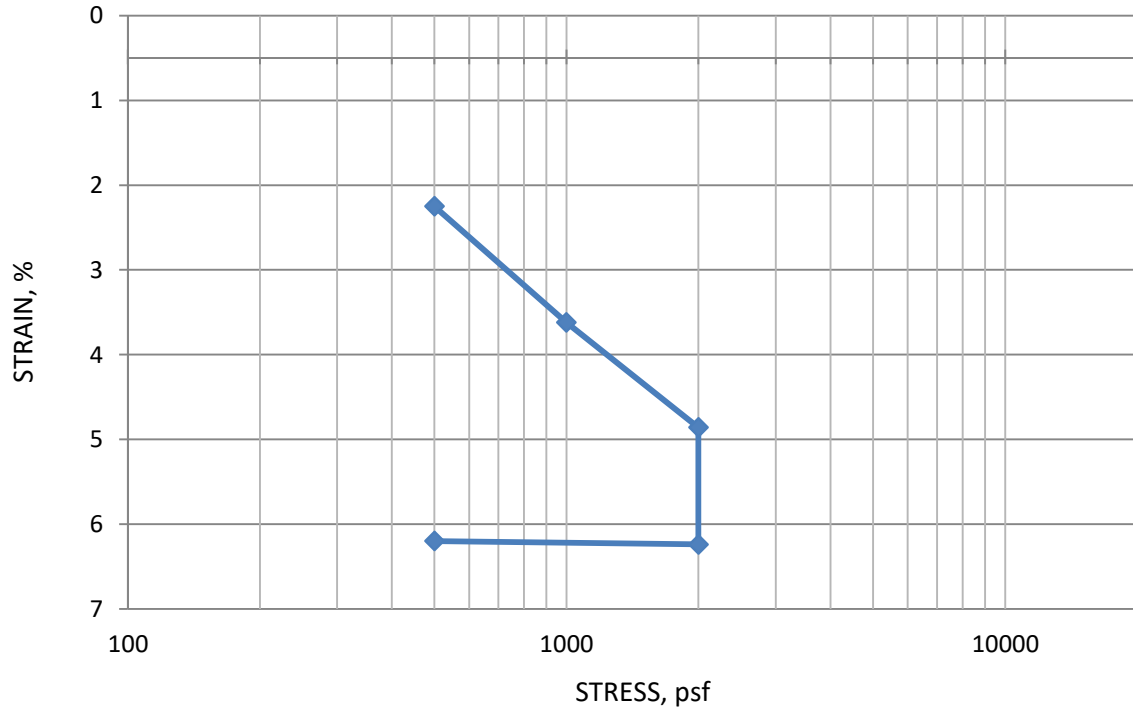


SAMPLE IDENTIFICATION	NOTES	γ_d , pcf	MC%
 B-6 at 3.5 ft.	WATER ADDED AT AT 2000 psf	96	21.7%

γ_d : DRY DENSITY
 PSF: POUNDS PER SQUARE FOOT
 PCF: POUNDS PER CUBIC FOOT
 MC: MOISTURE CONTENT

NOVA GEOTECHNICAL & INSPECTION SERVICES	CLIENT:	Arriola Consulting and Inspection, LLC		CONSOLIDATION TEST	
	PROJECT:	Infrastructure Improvements NDOT Las Vegas Maintenance Station		PROJECT NO.:	PLATE NO.
				G-17-048	11d

B-7 at 2.5 ft.



SAMPLE IDENTIFICATION	NOTES	γ_d , pcf	MC%
● B-7 at 2.5 ft.	WATER ADDED AT AT 2000 psf	87	30.3%

γ_d : DRY DENSITY
 PSF: POUNDS PER SQUARE FOOT
 PCF: POUNDS PER CUBIC FOOT
 MC: MOISTURE CONTENT

NOVA GEOTECHNICAL & INSPECTION SERVICES	CLIENT: Arriola Consulting and Inspection, LLC	CONSOLIDATION TEST	
	PROJECT: Infrastructure Improvements NDOT Las Vegas Maintenance Station	PROJECT NO.: G-17-048	PLATE NO.: 11e

Particle Size Distribution Report



PARTICLE SIZE - MM (AASHTO T27/ASTM C136)

% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
			10	9	31	34

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	99		
1/2"	97		
3/8"	93		
#4	84		
#8	76		
#10	74		
#16	70		
#30	66		
#40	65		
#50	63		
#100	54		
#200	34		

Material Description

SC - Clayey SAND with gravel

Atterberg Limits

PL= 14 LL= 33 PI= 19

Classification

USCS= SC AASHTO= A-2-6(2)

Remarks

F.M.=1.93

* (no specification provided)

Source of Sample: B-1 Depth: 1'-5'

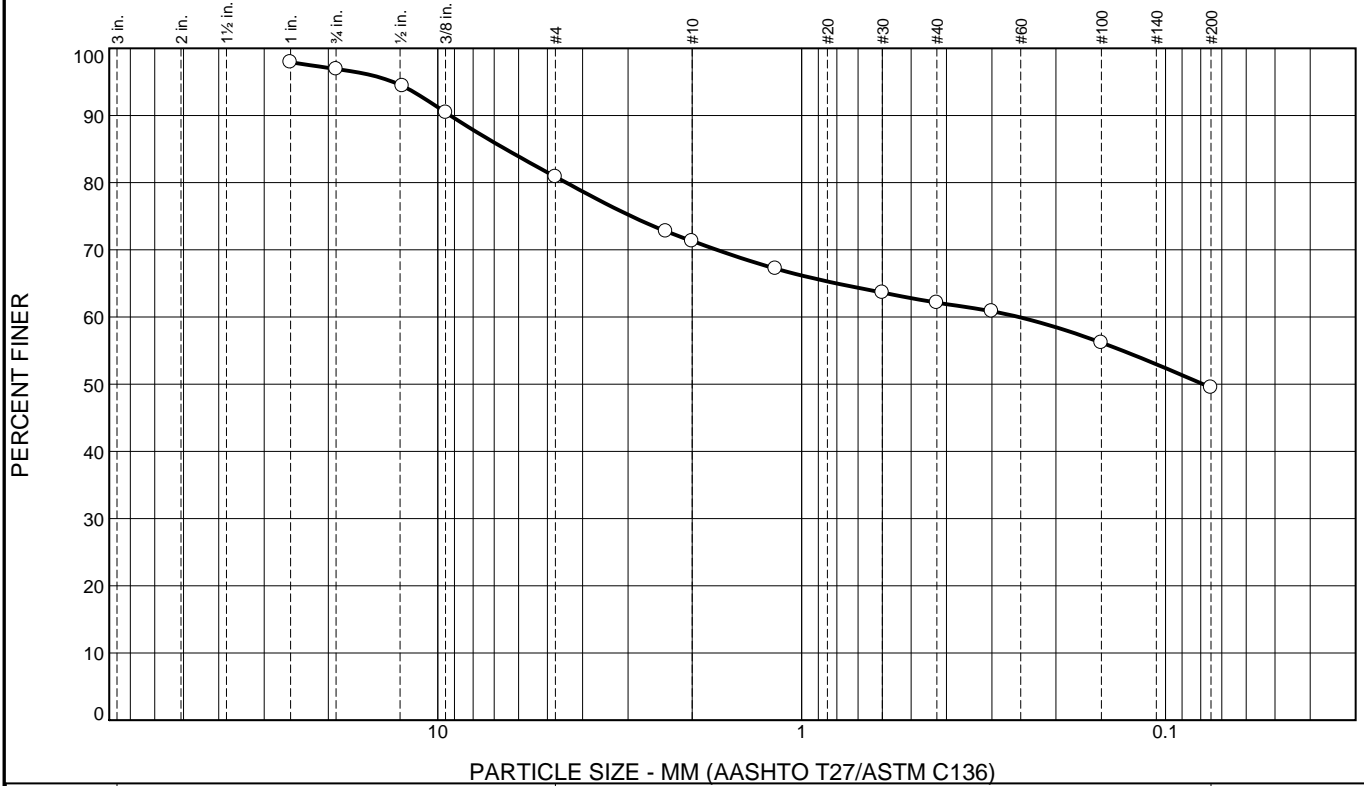
Date: 5/4/2017

**Nova Geotechnical
and Inspection Services
Las Vegas, Nevada**

Client: Arriola Consulting & Inspection, LLC
Project: Infrastructure Improvements NDOT Las Vegas Maintenance Station
Project No: G-17-048 **Figure** 12a

Tested By: DP Checked By: ZB

Particle Size Distribution Report



PARTICLE SIZE - MM (AASHTO T27/ASTM C136)

% +3"	% Gravel		% Sand			% Fines Silt
	Coarse	Fine	Coarse	Medium	Fine	
		16	10	9	12	50

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	98		
3/4"	97		
1/2"	94		
3/8"	90		
#4	81		
#8	73		
#10	71		
#16	67		
#30	64		
#40	62		
#50	61		
#100	56		
#200	50		

* (no specification provided)

Material Description

CL - sandy lean clay with gravel

Atterberg Limits

PL= 19 LL= 42 PI= 23

Classification

USCS= CL AASHTO= A-7-6(8)

Remarks

F.M.=2.11

Source of Sample: B-4 Depth: 1'-5'

Date: 5/4/2017

**Nova Geotechnical
and Inspection Services
Las Vegas, Nevada**

Client: Arriola Consulting & Inspection, LLC
Project: Infrastructure Improvements NDOT Las Vegas Maintenance Station
Project No: G-17-048 **Figure** 12b

Tested By: DP Checked By: ZB

Particle Size Distribution Report



PARTICLE SIZE - MM (AASHTO T27/ASTM C136)

% +3"	% Gravel		% Sand			% Fines Silt
	Coarse	Fine	Coarse	Medium	Fine	
			8	4	16	67

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	99		
3/8"	97		
#4	95		
#8	90		
#10	87		
#16	86		
#30	84		
#40	83		
#50	82		
#100	78		
#200	67		

Material Description

CL - Sandy lean CLAY

Atterberg Limits

PL= 18 LL= 34 PI= 16

Classification

USCS= CL AASHTO= A-6(9)

Remarks

F.M.=0.88

* (no specification provided)

Source of Sample: B-5 Depth: 2'-7'

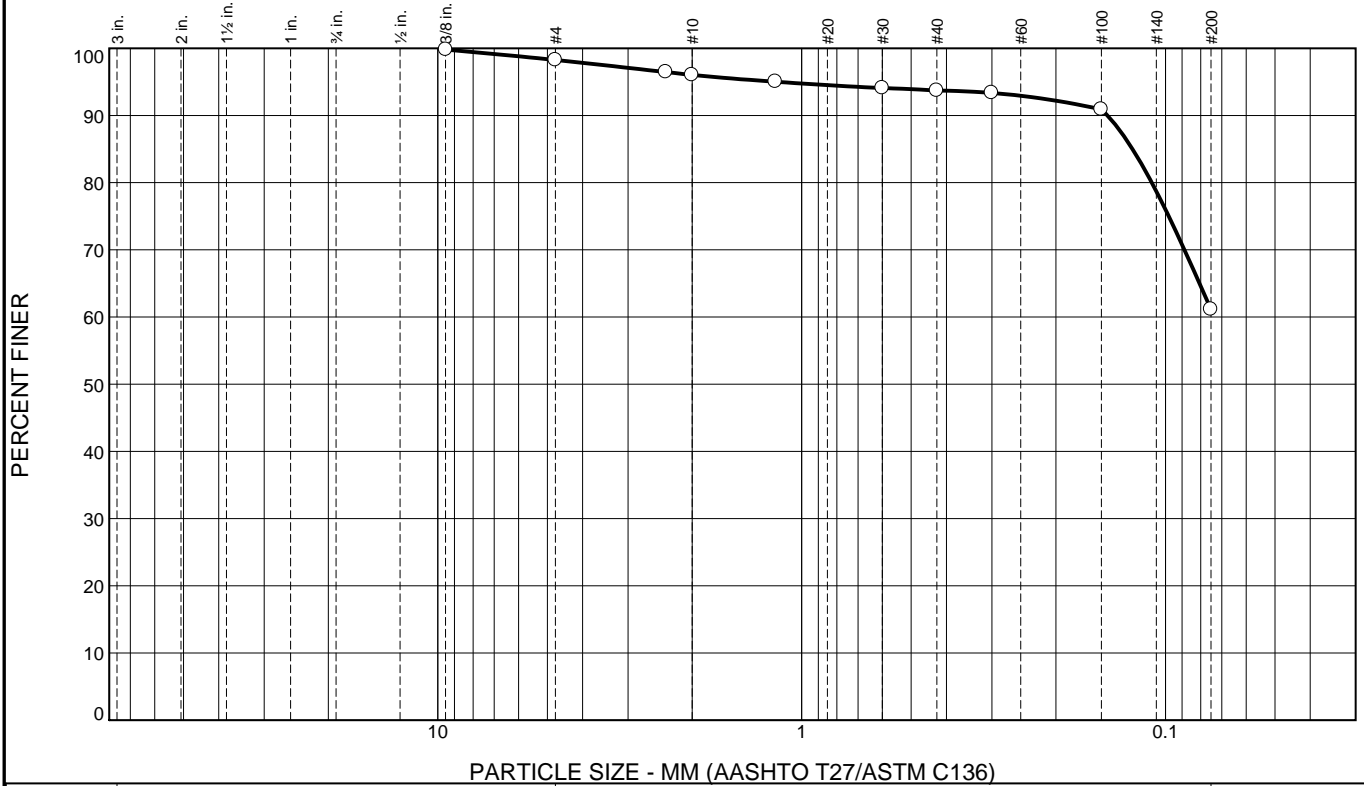
Date: 5/4/2017

**Nova Geotechnical
and Inspection Services
Las Vegas, Nevada**

Client: Arriola Consulting & Inspection, LLC
Project: Infrastructure Improvements NDOT Las Vegas Maintenance Station
Project No: G-17-048 **Figure** 12c

Tested By: DP Checked By: ZB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
			2	2	33	61

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100		
#4	98		
#8	96		
#10	96		
#16	95		
#30	94		
#40	94		
#50	93		
#100	91		
#200	61		

Material Description

CL sandy lean clay

Atterberg Limits

PL= 23 LL= 46 PI= 23

Classification

USCS= CL AASHTO= A-7-6(12)

Remarks

F.M.=0.32

* (no specification provided)

Source of Sample: B-7 Depth: 2'-7'

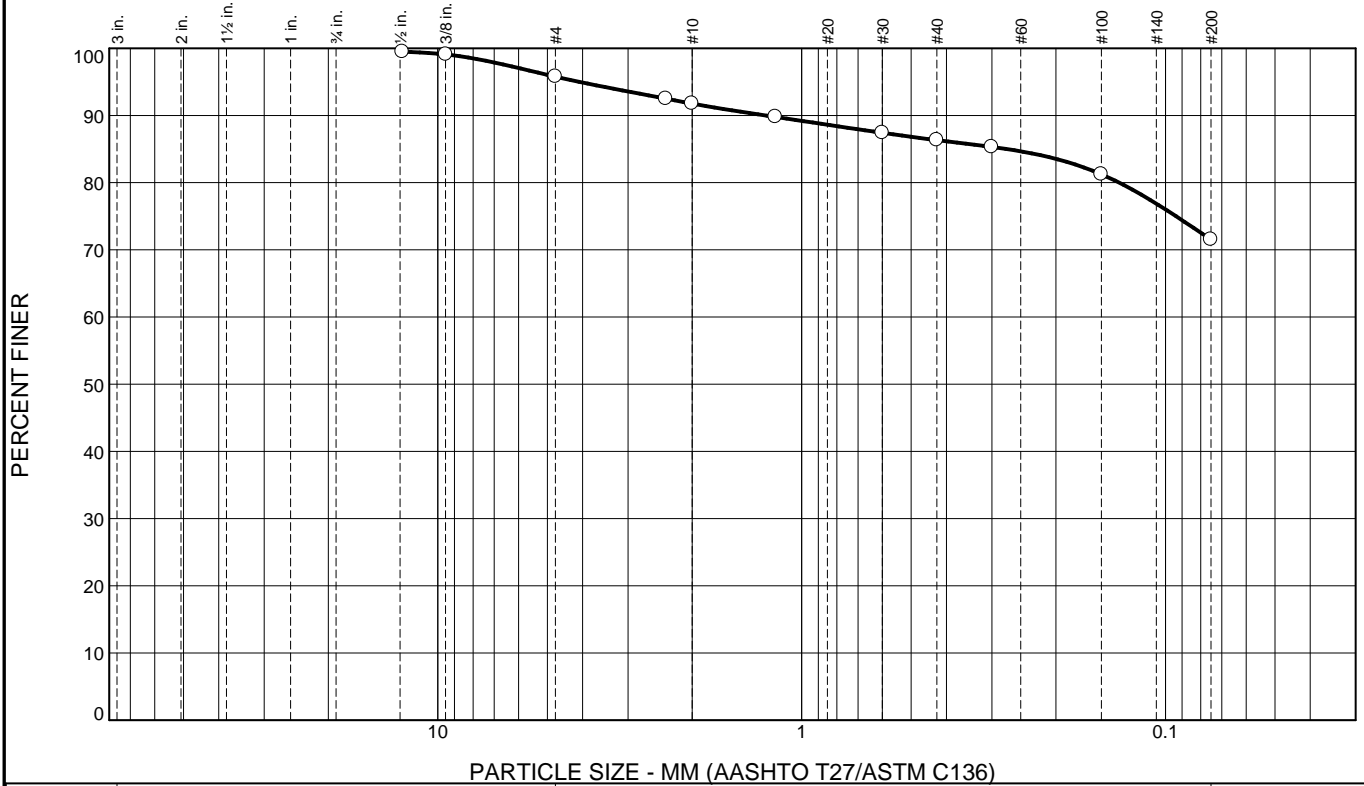
Date: 5/4/2017

**Nova Geotechnical
and Inspection Services
Las Vegas, Nevada**

Client: Arriola Consulting & Inspection, LLC
Project: Infrastructure Improvements NDOT Las Vegas Maintenance Station
Project No: G-17-048 **Figure** 12d

Tested By: DP Checked By: ZB

Particle Size Distribution Report



PARTICLE SIZE - MM (AASHTO T27/ASTM C136)

% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
			4	6	14	72

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	99		
3/8"	99		
#4	96		
#8	93		
#10	92		
#16	90		
#30	87		
#40	86		
#50	85		
#100	81		
#200	72		

Material Description

CL - Lean CLAY with sand

Atterberg Limits

PL= 17 LL= 47 PI= 30

Classification

USCS= CL AASHTO= A-7-6(20)

Remarks

F.M.=0.69

* (no specification provided)

Source of Sample: B-8

Depth: 2'-7'

Date: 5/4/2017

**Nova Geotechnical
and Inspection Services
Las Vegas, Nevada**

Client: Arriola Consulting & Inspection, LLC
Project: Infrastructure Improvements NDOT Las Vegas Maintenance Station

Project No: G-17-048

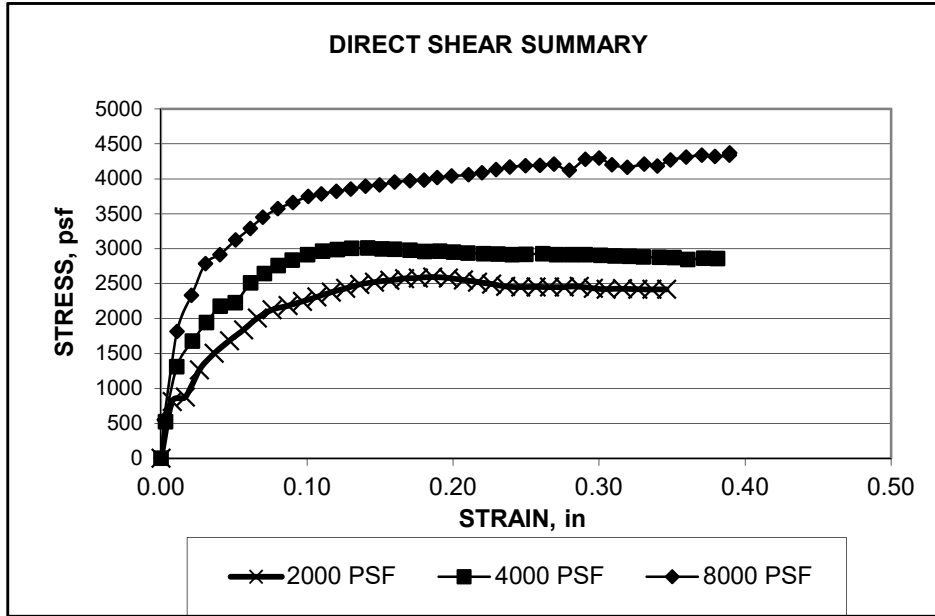
Figure 12e

Tested By: DP

Checked By: ZB

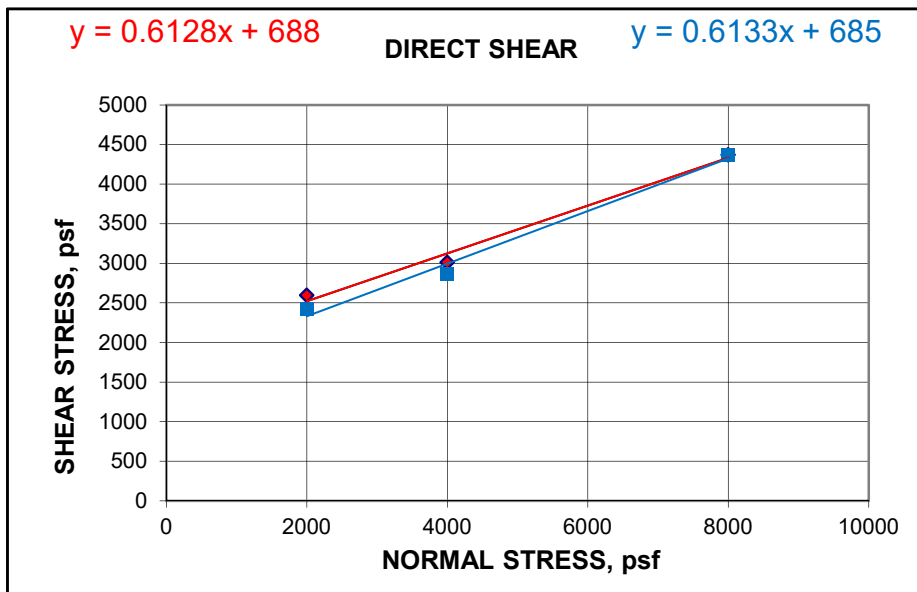
NDOT Las Vegas Maintenance Station

PROJECT NO. G-17-048
B-4 @ 1.5 FT.



NORMAL STRESS, psf	PEAK SHEAR STRESS, psf	RESIDUAL SHEAR STRESS, psf
2000	2595	2420
4000	3011	2860
8000	4370	4370

PEAK		RESIDUAL	
C	688	C	685
M	0.6128	M	0.6133
Friction Angle, ϕ	31.5	Friction Angle, ϕ	31.5





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 Las Vegas, NV 89120
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 www.ssalabs.com

Analytical Report

WO#: 17041075
 Date Reported: 4/21/2017

CLIENT: Nova Geotechnical
Project: G17-048
Lab ID: 17041075-01
Client Sample ID B1 @ 1' - 5'

Collection Date:
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD CHLORIDE - SOILS						
Chloride	97	50		mg/Kg	5	4/21/2017 11:34:00 AM
						Analyst: SW
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD SODIUM SULFATES - CALCULATION ONLY.						
Sodium Sulfate as Na2SO4	0.0100	0		%	1	4/21/2017 3:53:07 PM
						Analyst: SW
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SULFATE (SO4)						
Sulfate	0.0300	0.0100		%	1	4/21/2017 11:33:42 AM
						Analyst: SW
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SODIUM (NA)						
Sodium	ND	0.0100		%	1	4/21/2017 11:40:00 AM
						Analyst: SW
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD TOTAL SALTS (SOLUBILITY)						
Solubility	0.120	0.0100		%	1	4/21/2017 11:32:00 AM
						Analyst: SW

Qualifiers: * Value exceeds Maximum Contaminant Level. C Value is below Minimum Compound Limit.
 (Qual) DF Dilution Factor. H Holding times for preparation or analysis exceeded.
 MCL Maximum Contaminant Level. ND Not Detected at the PQL.
 PQL Practical Quantitation Limit.

Original



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Analytical Report

WO#: 17041075
 Date Reported: 4/21/2017

CLIENT: Nova Geotechnical
Project: G17-048
Lab ID: 17041075-02
Client Sample ID B5 @ 2' - 7'

Collection Date:
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD CHLORIDE - SOILS						
Chloride	99	50		mg/Kg	5	4/21/2017 11:34:00 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD SODIUM SULFATES - CALCULATION ONLY.						
Sodium Sulfate as Na2SO4	0.0250	0		%	1	4/21/2017 3:53:07 PM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SULFATE (SO4)						
Sulfate	0.180	0.0100		%	1	4/21/2017 11:33:42 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SODIUM (NA)						
Sodium	0.0100	0.0100		%	1	4/21/2017 11:40:00 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD TOTAL SALTS (SOLUBILITY)						
Solubility	0.810	0.0100		%	1	4/21/2017 11:32:00 AM

Qualifiers: * Value exceeds Maximum Contaminant Level.
 (Qual) DF Dilution Factor.
 MCL Maximum Contaminant Level.
 PQL Practical Quantitation Limit.

C Value is below Minimum Compound Limit.
 H Holding times for preparation or analysis exceeded.
 ND Not Detected at the PQL.

Original



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Analytical Report

WO#: 17041075
 Date Reported: 4/21/2017

CLIENT: Nova Geotechnical
Project: G17-048
Lab ID: 17041075-03
Client Sample ID B4 @ 1' - 5.0'

Collection Date:
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD CHLORIDE - SOILS				SM 4500 CL-B		Analyst: SW
Chloride	75	50		mg/Kg	5	4/21/2017 11:34:00 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD SODIUM SULFATES - CALCULATION ONLY.				CALCULATION		Analyst: SW
Sodium Sulfate as Na2SO4	0.00700	0		%	1	4/21/2017 3:53:07 PM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SULFATE (SO4)				SM 4500 SO4 E		Analyst: SW
Sulfate	0.0600	0.0100		%	1	4/21/2017 11:33:42 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SODIUM (NA)				ASTM D2791		Analyst: SW
Sodium	ND	0.0100		%	1	4/21/2017 11:40:00 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD TOTAL SALTS (SOLUBILITY)				SM 2540 C		Analyst: SW
Solubility	0.210	0.0100		%	1	4/21/2017 11:32:00 AM

Qualifiers: * Value exceeds Maximum Contaminant Level.
 (Qual) DF Dilution Factor.
 MCL Maximum Contaminant Level.
 PQL Practical Quantitation Limit.

C Value is below Minimum Compound Limit.
 H Holding times for preparation or analysis exceeded.
 ND Not Detected at the PQL.

Original



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Analytical Report

WO#: 17041075
 Date Reported: 4/21/2017

CLIENT: Nova Geotechnical
Project: G17-048
Lab ID: 17041075-04
Client Sample ID B8 @ 2' - 7.0'

Collection Date:
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD CHLORIDE - SOILS						Analyst: SW
Chloride	390	100		mg/Kg	10	4/21/2017 11:34:00 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD SODIUM SULFATES - CALCULATION ONLY.						Analyst: SW
Sodium Sulfate as Na2SO4	0.0980	0		%	1	4/21/2017 3:53:07 PM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SULFATE (SO4)						Analyst: SW
Sulfate	0.380	0.0100		%	1	4/21/2017 11:33:42 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SODIUM (NA)						Analyst: SW
Sodium	0.0300	0.0100		%	1	4/21/2017 11:40:00 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD TOTAL SALTS (SOLUBILITY)						Analyst: SW
Solubility	1.24	0.0100		%	1	4/21/2017 11:32:00 AM

Qualifiers: * Value exceeds Maximum Contaminant Level. C Value is below Minimum Compound Limit.
 (Qual) DF Dilution Factor. H Holding times for preparation or analysis exceeded.
 MCL Maximum Contaminant Level. ND Not Detected at the PQL.
 PQL Practical Quantitation Limit.

Original



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Analytical Report

WO#: 17041075
 Date Reported: 4/21/2017

CLIENT: Nova Geotechnical
Project: G17-048
Lab ID: 17041075-05
Client Sample ID B7 @ 2' - 7.0'

Collection Date:
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD CHLORIDE - SOILS				SM 4500 CL-B		Analyst: SW
Chloride	130	50		mg/Kg	5	4/21/2017 11:34:00 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD SODIUM SULFATES - CALCULATION ONLY.				CALCULATION		Analyst: SW
Sodium Sulfate as Na2SO4	0.0160	0		%	1	4/21/2017 3:53:07 PM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SULFATE (SO4)				SM 4500 SO4 E		Analyst: SW
Sulfate	0.0100	0.0100		%	1	4/21/2017 11:33:42 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SODIUM (NA)				ASTM D2791		Analyst: SW
Sodium	0.0100	0.0100		%	1	4/21/2017 11:40:00 AM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD TOTAL SALTS (SOLUBILITY)				SM 2540 C		Analyst: SW
Solubility	0.130	0.0100		%	1	4/21/2017 11:32:00 AM

Qualifiers: * Value exceeds Maximum Contaminant Level.
 (Qual) DF Dilution Factor.
 MCL Maximum Contaminant Level.
 PQL Practical Quantitation Limit.

C Value is below Minimum Compound Limit.
 H Holding times for preparation or analysis exceeded.
 ND Not Detected at the PQL.

Original

R-Value Of Compacted Soil Worksheet

ASTM D2844
 AASHTO T190
 Nev T115
 Other: _____

Project Number: G-17-048
 Project Name: NDOT Las Vegas Maintenance Station
 Classification: _____

Sample No.: _____

Source of Material: B-1@1'-5'
 Intended Use: _____

Sampled By: TB Date: 4/18/2017
 Tested By: DP
 Reviewed By: MK Date: 5/1/2017

Specimen / Mold No.				
Compaction Pressure, psi	250	250	250	
Day 1 Water Added, g	40	30	20	
Day 2 Water Added, g	20			
Total Water Added, g	60	30	20	
Water Added, %	1.5	1	1	
Moisture at Compaction, %	1.5	1.0	1.0	
Weight of Specimen + Mold, gms	310.0	3158	3067	
Weight of Mold, gms				
Weight of Specimen, gms				
Height of Specimen, in.	2.50	2.50	2.50	
Dry Density, pcf				
Stabilometer P _h at 1,000 lbs.	40.0	32.0	24.0	
Stabilometer P _h at 2,000 lbs.(P _h)	100.0	83.0	55.0	
Displacement (D)	2.82	2.99	3.07	
R-Value	35	44	61	
Corrected R-Value (From Chart)	35	44	61	
Exudation Pressure, lbs.	2752	3765	4732	
Exudation Pressure, psi	220	300	380	
Expansion Dial Reading X 10 ⁻⁴	90	90	90	
Expansion, psf (Dial X 4.33)				

Calculations:

Exudation Pressure, psi = lbf ÷ 12.57

$$R\text{-Value} = 100 - \frac{100}{(2.5 \div D)(160 \div P_h - 1) + 1}$$

Initial Moisture Data:

Wet Weight: _____ gms.
 Dry Weight: _____ gms.
 Weight of Water: _____ gms.
 Init. Moisture: _____ %

Remarks: Put correction chart here

Corrected R-Value @ 300 psi: 44

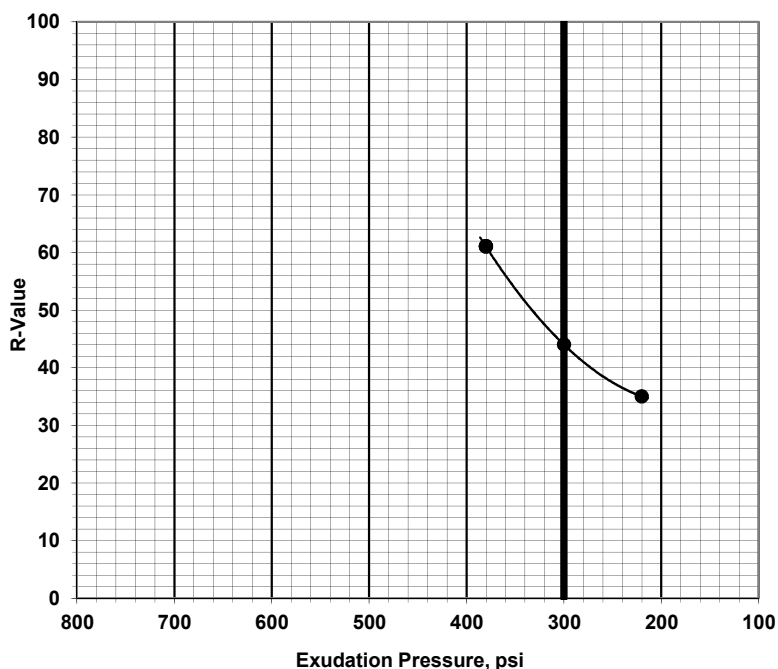
Sample Preparation: Minus 3/4" Minus 1"

Weight of +1"	_____	Percent: _____
Weight of +3/4"	<u>61.2</u>	Percent: _____
Weight of +#4	<u>1323.6</u>	Percent: _____
Weight of -#4	<u>6491.2</u>	Percent: <u>82.1</u>
Weight of Total	<u>7876</u>	

Fabrication of Test Sample:

+ #4 in Test Sample	<u>17.8</u> % Weight	<u>213.6</u> g
- #4 in Test Sample	<u>82.2</u> % Weight	<u>986.4</u> g
Total in Test Sample	<u>100%</u> Weight	<u>1200</u> g

Note: If +3/4" material is greater than 25%, R-Value must be tested on material passing a 1" sieve.



R-Value Of Compacted Soil Worksheet

ASTM D2844 AASHTO T190 Nev T115

Other: _____

Project Number: G-17-048
 Project Name: NDOT Las Vegas Maintenance Station
 Classification: _____

Sample No.: _____

Source of Material: B-5@2'-7'
 Intended Use: _____

Sampled By: TB Date: 4/18/2017
 Tested By: DP
 Reviewed By: MK Date: 5/1/2017

Specimen / Mold No.			
Compaction Pressure, psi	250	250	250
Day 1 Water Added, g	70	90	90
Day 2 Water Added, g	70	60	70
Total Water Added, g	140	150	160
Water Added, %	2	1.66667	1.77778
Moisture at Compaction, %	2.0	1.7	1.8
Weight of Specimen + Mold, gms	3220.0	3048	3115
Weight of Mold, gms			
Weight of Specimen, gms			
Height of Specimen, in.	2.50	2.50	2.50
Dry Density, pcf			
Stabilometer P _h at 1,000 lbs.	22.0	35.0	65.0
Stabilometer P _h at 2,000 lbs.(P _h)	68.0	100.0	143.0
Displacement (D)	2.50	2.75	3.18
R-Value	58	35	9
Corrected R-Value (From Chart)	58	35	9
Exudation Pressure, lbs.	7841	5072	2000
Exudation Pressure, psi	620	400	160
Expansion Dial Reading X 10 ⁻⁴	90	90	90
Expansion, psf (Dial X 4.33)			

Calculations:

Exudation Pressure, psi = lbf ÷ 12.57

$$R\text{-Value} = 100 - \frac{100}{(2.5 \div D)(160 \div P_h - 1) + 1}$$

Initial Moisture Data:

Wet Weight: _____ gms.
 Dry Weight: _____ gms.
 Weight of Water: _____ gms.
 Init. Moisture: _____ %

Remarks: Put correction chart here

Corrected R-Value @ 300 psi: 24

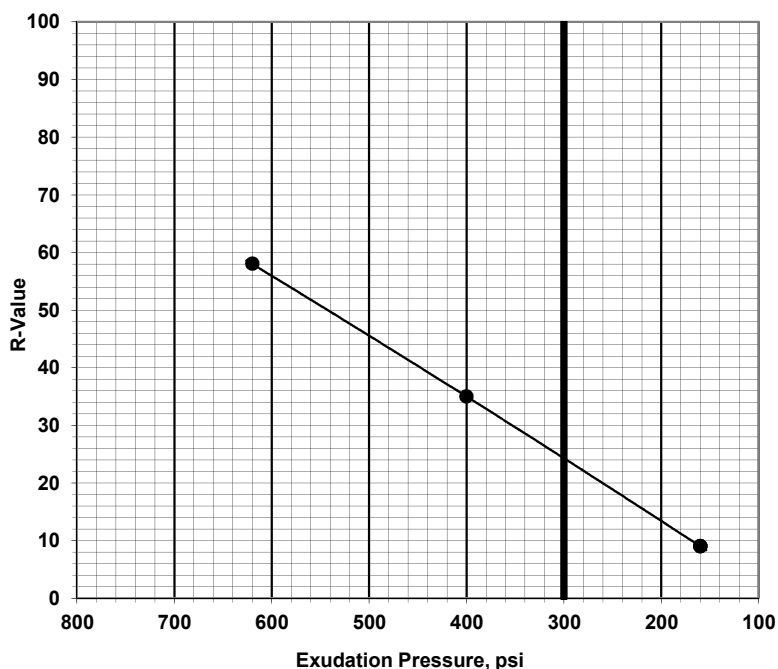
Sample Preparation: Minus 3/4" Minus 1"

Weight of +1"	_____	Percent:	_____
Weight of +3/8"	<u>488.2</u>	Percent:	<u>5.6</u>
Weight of +#4	<u>1878.4</u>	Percent:	<u>21.6</u>
Weight of -#4	<u>6321.9</u>	Percent:	<u>72.8</u>
Weight of Total	<u>8688.5</u>		

Fabrication of Test Sample:

+ #4 in Test Sample	<u>21.6</u> % Weight	<u>259.2</u> g
- #4 in Test Sample	<u>72.8</u> % Weight	<u>873.6</u> g
Total in Test Sample	<u>100%</u> Weight	<u>1200</u> g

Note: If +3/4" material is greater than 25%,
 R-Value must be tested on material passing
 a 1" sieve.



R-Value Of Compacted Soil Worksheet

ASTM D2844
 AASHTO T190
 Nev T115
 Other: _____

Project Number: G-17-048
 Project Name: NDOT Las Vegas Maintenance Station
 Classification: _____

Sample No.: _____

Source of Material: B-7@2'-7'
 Sampled By: TB
 Date: 4/18/2017
 Intended Use: _____
 Tested By: DP
 Reviewed By: MK
 Date: 5/1/2017

Specimen / Mold No.			
Compaction Pressure, psi	250	250	250
Day 1 Water Added, g	70	60	70
Day 2 Water Added, g	55	80	90
Total Water Added, g	125	140	160
Water Added, %	1.78571	2.33333	2.28571
Moisture at Compaction, %	1.8	2.3	2.3
Weight of Specimen + Mold, gms	3000.0	3083	3122
Weight of Mold, gms			
Weight of Specimen, gms			
Height of Specimen, in.	2.50	2.50	2.50
Dry Density, pcf			
Stabilometer P _h at 1,000 lbs.	20.0	35.0	43.0
Stabilometer P _h at 2,000 lbs.(P _h)	43.0	85.0	115.0
Displacement (D)	3.50	3.43	3.11
R-Value	66	39	24
Corrected R-Value (From Chart)	66	39	24
Exudation Pressure, lbs.	6284	4924	2741
Exudation Pressure, psi	500	390	220
Expansion Dial Reading X 10 ⁻⁴	90	90	90
Expansion, psf (Dial X 4.33)			

Calculations:

Exudation Pressure, psi = lbf ÷ 12.57

$$R\text{-Value} = 100 - \frac{100}{(2.5 \div D)(160 \div P_h - 1) + 1}$$

Initial Moisture Data:

Wet Weight: _____ gms.
 Dry Weight: _____ gms.
 Weight of Water: _____ gms.
 Init. Moisture: _____ %

Remarks: Put correction chart here

Corrected R-Value @ 300 psi: 27

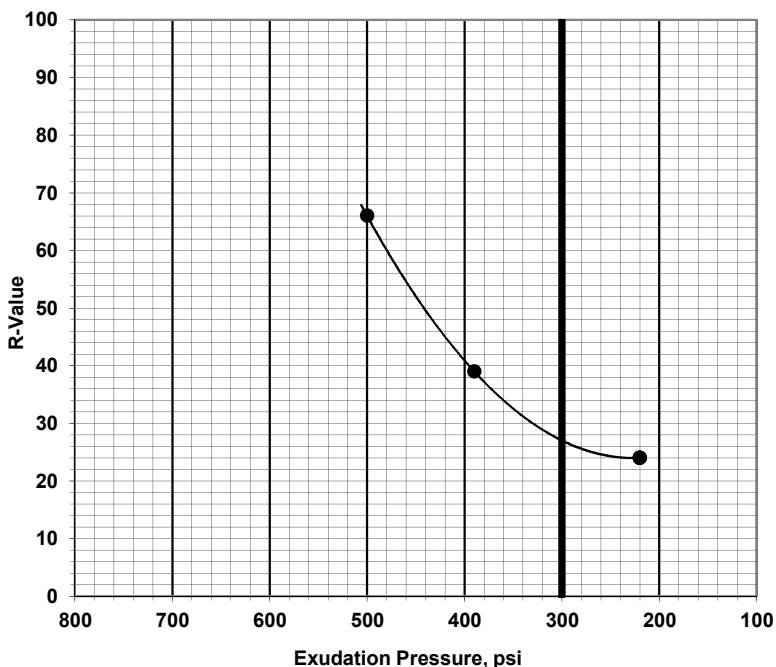
Sample Preparation:
 Minus 3/4"
 Minus 1"

Weight of +1"	_____	Percent:	_____
Weight of +3/8"	<u>0</u>	Percent:	<u>0</u>
Weight of +#4	<u>97</u>	Percent:	<u>1.3</u>
Weight of -#4	<u>7616.3</u>	Percent:	<u>98.7</u>
Weight of Total	<u>7713.3</u>		

Fabrication of Test Sample:

+ #4 in Test Sample	<u>1.3</u>	% Weight	<u>15.6</u>	g
- #4 in Test Sample	<u>98.7</u>	% Weight	<u>1184.4</u>	g
Total in Test Sample	<u>100%</u>	Weight	<u>1200</u>	g

Note: If +3/4" material is greater than 25%,
 R-Value must be tested on material passing
 a 1" sieve.



APPENDIX B

**PRE-DEMOLITION ASBESTOS, LEAD-BASED PAINT, AND POLYCHLORINATED
BIPHENYLS SURVEY REPORT
INFRASTRUCTURE IMPROVEMENTS
NDOT LAS VEGAS MAINTENANCE STATION
123 EAST WASHINGTON AVENUE
LAS VEGAS, NEVADA**

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APPENDIX B

**PRE-DEMOLITION ASBESTOS, LEAD-BASED PAINT, AND POLYCHLORINATED
BIPHENYLS SURVEY REPORT
INFRASTRUCTURE IMPROVEMENTS
NDOT LAS VEGAS MAINTENANCE STATION
125 EAST WASHINGTON AVENUE
LAS VEGAS, NEVADA**



Stantec Consulting Services Inc.
3875 Atherton Road, Rocklin CA 95765

March 22, 2017
File: 181300599

Nevada Department of Transportation
123 East Washington Avenue
Las Vegas, Clark County, Nevada

Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard
Building F
123 East Washington Avenue
Las Vegas, Clark County, Nevada

To whom it may concern:

Stantec Consulting Services Inc. (Stantec) appreciates the opportunity to provide Nevada Department of Transportation (NDOT) with the following asbestos-containing materials (ACM), lead-based paint (LBP), and polychlorinated biphenyls (PCBs) survey report. The survey was performed at Building F located at the property referenced above (herein referred to as the Property) on February 1, 2017.

The purpose of this survey is to evaluate for the presence of ACMs, LBP, and PCBs that would require special handling and/or disposal in accordance with applicable federal, state, and local regulations.

BACKGROUND

At the request of NDOT, Stantec provided a pre-demolition asbestos, lead-based paint, and PCB survey of accessible materials in support of the planned renovation at Building F.

Stantec understands that Building F is planned for demolition. The building is a one-story structure that is approximately 4,300 square feet in size with a loft and storage area. The building is masonry construction (brick and mortar), with a clay tile roof. The interior of the building consists of a concrete slab foundation and brick and mortar columns.

PROJECT PERSONNEL

The survey was performed on February 1, 2017, by Mr. Brian Branscum, Environmental Technician with Stantec, State of Nevada, Division of Industrial Relation (DIR), Asbestos Inspector (IM-1801). All work was performed under the guidance of Mr. Dean Mochrie, Principal with Stantec, State of Nevada, DIR Asbestos Inspector, Management Planner, Project Designer, and Monitor (IJPM-1027) and Environmental Protection Agency (EPA) Lead Risk Assessor (NV-R-119397-2).



**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

SUSPECT ASBESTOS CONTAINING MATERIALS

Asbestos is a potential health hazard capable of causing respiratory system fibrosis and various forms of systemic cancers. Its condition, handling and disposal are regulated by federal, state, and local agencies. Materials that contain asbestos generally do not pose a health threat unless the asbestos fibers are disturbed by renovation, construction or demolition, and may then become airborne and inhaled.

The EPA defines a homogeneous area as a surfacing material, thermal system insulation, or miscellaneous material that is uniform in color and texture. The use, application, and age of installation of the homogeneous area is also used to identify suspect ACMs. The EPA and OSHA define ACM as any material that contains more than one percent (by weight) of asbestos (>1%). Only one sample from a homogeneous area with an asbestos concentration >1% is required to collectively identify that material as an ACM. The EPA additionally categorizes ACM as follows:

- Category I non-friable ACM - asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1% asbestos as determined using the PLM method.
- Category II non-friable ACM - any material, excluding Category I non-friable ACM, containing more than 1% asbestos as determined using the PLM method that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.
- Regulated asbestos-containing material (RACM) - (a) Friable asbestos material, (b) Category I non-friable ACM that has become friable, (c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by this subpart.

The Nevada Division of Industrial Relations (DIR) promulgates occupational safety and health regulations for asbestos under Nevada Administrative Code (NAC) 618.850-986. The NAC 618.850-986 is a hybrid of the various federal regulations (EPA NESHAP, AHERA, OSHA).

Sampling and Analysis

Stantec conducted a pre-renovation survey of materials at the Property in order to identify suspect ACMs in general accordance with the AHERA sampling guidelines as outlined in 40 CFR Part 763. The location, condition, friability, and the potential for suspect ACMs to be impacted (i.e. disturbed) was assessed and documented. Bulk samples of readily accessible suspect ACMs were collected. Consistent with building demolition and renovation regulatory requirements, building material sampling was conducted regardless of the age and/or condition of the structure. A total of 85 bulk samples were collected from 23 homogeneous areas at the Property. The samples were analyzed by Polarized Light Microscopy in accordance with the EPA "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R93/116, July 1993). Analysis was performed by EMSL Analytical, Inc. (EMSL) located in Cinnaminson, New Jersey. This laboratory is accredited through the State of Nevada, Division of Environmental Protection for the analysis of asbestos in bulk materials (NJ003372012-1) and a participant in the National Institute of Standards



**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
 Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

and Testing, National Voluntary Laboratory Accreditation Program. The laboratory is also accredited by the American Industrial Hygiene Association.

A summary of the laboratory analytical results is included in Table 1. Laboratory analytical results and bulk sample logs are provided in Attachment A; sample location figures are provided in Attachment B; and a photographic log is provided in Attachment C.

Findings

Table 1 below provide a summary of the suspect materials identified and sampled during this survey. The tables include the DOSH definition and the EPA category, as applicable.

Table 1 – Asbestos Bulk Sample Results

Sample No.	Homogeneous Area	Location of Material	Asbestos Content	Condition	Quantity Estimate	OSHA Definition	EPA Category
01A 01B 01C 01D 01E	Roofing Shingles, Clay-Style, Red	Roof	ND	Good	4,300 SF	NA	NA
02A 02B 02C 02D 02E	Roofing Cement, Grey	Roof	ND	Good	4,300 SF	NA	NA
03A 03B 03C 03D 03E	Roofing Paper, Black	Roof	ND	Good	4,300 SF	NA	NA
04A 04B 04C	Sealant, at Flashings, Black	Roof	20-25% Chrysotile	Good	20 SF	ACM	CAT I
05A 05B 05C	Window Caulk, Grey	Interior and Exterior Windows	2% Chrysotile	Good	200 SF	ACM	CAT I
06A 06B 06C	Wire Wrap, Various Colors	Bay 3	ND	Damaged	10 SF	NA	NA
07A 07B 07C 07D 07E	Concrete, Grey	Throughout, Flooring	ND	Good	4,300 SF	NA	NA



**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
 Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

Sample No.	Homogeneous Area	Location of Material	Asbestos Content	Condition	Quantity Estimate	OSHA Definition	EPA Category
08A 08B 08C 08D 08E 08F 08G	Brick Masonry, Grey	Throughout, Walls and Columns	ND	Good	7,000 SF	NA	NA
09A 09B 09C 09D 09E 09F 09G	Mortar, Assoc. w/HA#08, Grey	Throughout, Walls and Columns	ND	Good	7,000 SF	NA	NA
10A 10B 10C	Sheetrock, Walls, White	Throughout Bay 1	ND	Good	200 SF	NA	NA
11A 11B 11C	Roofing Material, Sheeting, Black	Exterior Overhang	ND	Good	50 SF	NA	NA
12A 12B 12C	Ceiling Panels, 2'x4' w/Dots & Fissures, White	Office	ND	Good	500 SF	NA	NA
13A 13B 13C	Sheetrock, Walls and Ceilings, White	Office Restroom	ND	Good	400 SF	NA	NA
14A 14B 14C	Mastic, Assoc. w/4" Brown Cove Base	Office	ND	Damaged	10 SF	NA	NA
15A 15B 15C	Ceramic Wall Tile, 4"x4" Smooth, Tan	Office Restroom	ND	Good	200 SF	NA	NA
16A 16B 16C	Ceramic Wall Tile, Assoc. w/HA#15, Brown	Office Restroom	ND	Good	20 SF	NA	NA
17A 17B 17C	Grout, Assoc. w/HA#15, #16	Office Restroom	ND	Good	220 SF	NA	NA
18A 18B 18C	Cement, Assoc. w/HA#15, #16, Grey	Office Restroom	ND	Good	220 SF	NA	NA



**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
 Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

Sample No.	Homogeneous Area	Location of Material	Asbestos Content	Condition	Quantity Estimate	OSHA Definition	EPA Category
19A 19B 19C	Cement Gasket, Red	Office Restroom	ND	Significantly Damaged	<1 SF	NA	NA
20A 20B 20C	Wall Texture, White	Office Restroom	ND	Good	200 SF	NA	NA
21A 21B 21C	Mastic, at Sink, Tan	Office Restroom	ND	Good	2 SF	NA	NA
22A 22B 22C	Caulking, at Sink, White	Office Restroom	ND	Good	2 SF	NA	NA
23A 23B 23C	Concrete, Flooring, Red	Office Flooring	ND	Good	600 SF	NA	NA

Notes and Abbreviations:

Materials in **bold** are identified as being positive for asbestos

ND = Non-detect

SF = Square feet

NA = Not applicable

ACM = Asbestos-Containing Material

Cat I = Category I, Non-Friable ACM

SUSPECT LEAD BASED PAINTS

Lead is a potential health hazard. Its condition, handling and disposal are regulated by federal, state, and local agencies. Lead in paint generally does not pose a health threat unless the material is disturbed or sufficiently deteriorated to produce dust, which may become airborne and inhaled or ingested. Contractors working in the facility should be informed of the type and the location of lead-containing materials. Applicable OSHA regulations may apply depending on the work being performed.

Pursuant to EPA regulations, LBP is defined as paint or other surface coatings containing an amount of lead equal to or greater than one milligram per square centimeter (1.0 mg/cm²) or more than half of one percent [$>0.5\%$ or 5,000 parts per million(ppm)] by weight. Additionally, worker exposure to materials containing lead during construction work is regulated by OSHA [29 CFR 1926.62(a)]. These regulations require worker protection during construction "...where lead or materials containing lead are present."

Sampling and Analysis

Stantec assessed the condition of painted surfaces of the Property, and was to collect paint chip samples of painted surfaces observed to be in fair and/or poor condition as defined within Chapter 5 of the United States, Housing and Urban Development (HUD) guidelines. In addition to paint observed to be in fair or poor condition, bulk samples were collected of the predominant paint at the Property.



**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
 Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

The definitions of paint condition are dependent on the location of the paint and component involved. Table 2 below illustrates how HUD categorizes paint condition under various circumstances.

Table 2 – HUD Categories of Paint Film Quality

Type of Building Component	Total Area of Deteriorated Paint		
	Intact	Fair	Poor
Exterior components with large surface areas.	Entire Surface is Intact.	Less than or equal to 10 square feet.	More than 10 square feet.
Interior components with large surface areas (walls, ceilings, floors, doors).	Entire Surface is Intact.	Less than or equal to 2 square feet.	More than 2 square feet.
Interior and exterior components with small surface areas (window sills, baseboards, soffits, trim).	Entire Surface is Intact.	Less than or equal to 10 percent of the total surface area of the component.	More than 10 percent of the total surface area of the component.

Paint chip samples were collected by removing the material using hand tools to extract representative pieces. A hard sided container was used to contain the samples of suspect material. A unique sample number was assigned to each sample.

Three bulk paint-chip samples were collected from the Property. The samples were analyzed using Flame Atomic Absorption Spectrometry following the EPA SW 846-7000B/7420 analytical protocol. The samples were submitted to EMSL in Cinnaminson, New Jersey. This laboratory is accredited by the American Industrial Hygiene Association (AIHA Lab ID 100194) under the Environmental Lead Laboratory Accreditation Program.

Findings

Table 3 below provides a summary of the paint identified and sampled during this survey. Laboratory analytical results and bulk sample logs are provided in Attachment A and sample location figures are provided in Attachment B.

Table 3 – Lead Paint Sample Results

Sample No.	Sample Location	Paint Color	Material	Paint Condition	Estimated Quantity (SF)	Lead Content
P-01	Exterior Wall	Tan	Masonry	Intact	7,000 SF	0.012% (120 ppm)
P-02	Interior Wall	White	Masonry	Intact	4,000 SF	0.060% (600 ppm)



**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
 Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

Sample No.	Sample Location	Paint Color	Material	Paint Condition	Estimated Quantity (SF)	Lead Content
P-03	Interior Wall	Grey	Masonry	Intact	3,000 SF	2.1% (21,000 ppm)

ppm = parts per million
 Materials in Bold are identified as lead-based paint

POLYCHLORINATED BIPHENYLS (PCB) IN CAULK

PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications. Although no longer commercially produced in the United States, PCBs may be present in products and materials such as caulk, produced before the 1979 PCB ban. The PCBs used in these products were chemical mixtures made up of a variety of individual chlorinated biphenyl components, known as congeners. Most commercial PCB mixtures are known in the United States by their industrial trade names. The most common trade name is Aroclor.

Prior to the 1979 ban, PCBs entered the environment during their manufacture and use in the United States. Today PCBs associated with building demolition or renovation projects can still be released into the environment from illegal or improper dumping of PCB wastes; disposal of PCB-containing consumer products into municipal or other landfills not designed to handle hazardous waste and through improper containment during removal.

Sampling and Analysis

Stantec conducted an inspection of accessible portions of the Property to determine whether PCBs were present in caulk. The EPA defines waste derived from caulk PCBs at greater than or equal to 50 milligrams per kilogram (mg/kg; ppm) *PCB bulk product* in 40 CFR 761.3. The following materials were identified as suspect PCB-containing caulking/sealants and sampled as a part of this survey. Table 4 below provides a summary of the caulk or sealants identified and sampled during this survey. The complete analytical report is included in Appendix A.

Table 4 – PCB in Caulk Sample Results

Sample No.	Sample Location	Material Description	PCB Content (mg/kg)
C-1	Building F, Exterior Window	Tan	<0.95

Mg/kg = milligram per kilogram



**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

Universal Wastes

In addition to the asbestos and lead paint materials summarized above, fluorescent lighting was also observed. Fluorescent light fixtures are known to contain mercury in the light tubes and have a potential for PCBs in the ballasts. Both mercury and PCBs are regulated wastes and should be handled in accordance with applicable regulations during the demolition process.

RECOMMENDATIONS

Asbestos-Containing Materials

OSHA requires employers to implement specific work practices, which protect workers from airborne asbestos exposure when materials are found to contain detectable concentrations of asbestos. Building materials, which contain even low levels of asbestos (trace amounts), can potentially generate high concentrations of airborne asbestos fibers when disturbed. Therefore, control measures should be instituted by those disturbing ACMs which adequately address worker health and safety during planned renovation or demolition activities involving these materials.

It is recommended that asbestos-containing materials be removed by a licensed abatement contractor prior to renovation, refurbishing, or demolition activities. If the entire area of asbestos containing material is not affected by renovation, refurbishing, or demolition activities, spot abatement of the material could be completed. This would entail only abating the affected areas.

It should be noted that the asbestos survey was limited to accessible materials only and did not include underground utilities or wall cavities. Historically, some materials concealed in wall cavities and some underground utility piping has been known to contain asbestos (e.g. Transite pipe, electrical wire wrap, etc.). If renovation/demolition of portions of the Property includes wall cavities or removal of on-site portions of underground utilities (storm drains, sewer, domestic water laterals, etc.), evaluation of the asbestos content of these components must be performed prior to the removal process. Suspect materials identified in these locations are assumed positive for asbestos until sampling and analysis indicates otherwise. If during the course of a renovation/demolition project suspect ACMs are discovered that are not included within this report, those materials are to be assumed positive for asbestos unless additional sampling, analysis, and/or assessment indicates otherwise.

Lead-Based Paint

The grey paint was identified as lead-based paint and the tan paint and white paint were identified as lead-containing paint. The lead-based paint and the lead-containing paint require compliance with applicable portions of the Federal OSHA 29 CFR 1926.62 (Lead in Construction Standard).

PCBs in Caulk

No PCBs were identified in the caulking sampling collected from Building F. No additional assessment appears warranted at this time.



**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

LIMITATIONS

Reasonable efforts have been made by Stantec personnel to locate, sample, and/or identify suspect ACMs, LBPs, or PCBs associated with the Property. For any facility the existence of unique or concealed materials and debris is a possibility. In addition, sampling and laboratory analysis constraints typically hinder the investigation. Stantec does not warrant, guarantee or profess to have the ability to locate or identify all hazardous materials in a facility. The survey is limited in nature, as only full demolition of the Property will reveal all concealed conditions. Stantec cannot warrant the effectiveness or damage thereof, at any of the patches or temporary repairs performed at sampling locations (roof and roof penetrations). This report is intended for use in planning based on the agreed upon scope of work. This report is not intended to be a bidding document. Quantities of materials identified are estimates only and would need to be verified. If during the course of a renovation/demolition project suspect ACMs, LBPs, or PCBs are discovered that are not included within this report, those materials should be treated accordingly until additional sampling, analysis, and/or assessment can be performed.

Additionally, the passage of time may result in a change in the environmental characteristics at the Property. This report does not warrant against future operations or conditions that could affect the recommendations made. The results, findings, conclusions and recommendations expressed in this report are based only on conditions that were observed during Stantec's survey of the Property and test results provided by EMSL Analytical, Inc. These observations are time dependent, are subject to changing site conditions, and revisions to federal, state, and local regulations. Reliance on this letter report by Third Parties (i.e., other than NDOT) shall be at the Third Party's sole risk.



March 22, 2017
Nevada Department of Transportation
Page 10 of 10

**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

If you have any questions regarding this report or require further clarification, please do not hesitate to contact the Stantec personnel identified below.

Regards,

Stantec Consulting Services Inc.

Prepared by:

Handwritten signature of Brian Branscum in blue ink.

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NV DIR #IM-1801
Environmental Technician
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Danielle Manning
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Approved by:

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Dean Mochrie
NV DIR #IJPM-1027
EPA Lead Risk Assessor (NV-R-119397-2)
Principal, Environmental Services
Phone: (916) 472-3932
dean.mochrie@stantec.com

Attachments: A: Laboratory Analytical Results and Bulk Sample Logs
 B: Sample Location Diagram
 C: Photographic Log



March 22, 2017

Nevada Department of Transportation

**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

Attachment A Laboratory Analytical Results and Bulk Sample Logs



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077

Tel/Fax: (800) 220-3675 / (856) 786-5974

<http://www.EMSL.com> / cinnaslab@EMSL.com

EMSL Order: 041703052

Customer ID: SECI62

Customer PO: 180101434

Project ID:

Attention: Dean Mochrie
Stantec Consulting Services Inc
3875 Atherton Road
Rocklin, CA 95765

Phone:
Fax: (916) 773-8448

Received Date: 02/03/2017 2:15 PM

Analysis Date: 02/08/2017

Collected Date: 02/01/2017

Project: DOT Yard 180101434 - Nevada DOT Yard Building f - 181300599.2.4 - 123 E. Washington Ave, Las Vegas, NV

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
01A 041703052-0001	Bay 1 Roof - Roofing Shingles - Red - Rounded Clay-Style	Red Non-Fibrous Homogeneous	HA: 01	100% Non-fibrous (Other)	None Detected
01B 041703052-0002	Storage Shed Roof - Roofing Shingles - Red - Rounded Clay-Style	Red Non-Fibrous Homogeneous	HA: 01	100% Non-fibrous (Other)	None Detected
01C 041703052-0003	Bay 1 Roof - Roofing Shingles - Red - Rounded Clay-Style	Red Non-Fibrous Homogeneous	HA: 01	100% Non-fibrous (Other)	None Detected
01D 041703052-0004	Storage Shed Roof - Roofing Shingles - Red - Rounded Clay-Style	Red Non-Fibrous Homogeneous	HA: 01	100% Non-fibrous (Other)	None Detected
01E 041703052-0005	Bay 1 Roof - Roofing Shingles - Red - Rounded Clay-Style	Red Non-Fibrous Homogeneous	HA: 01	100% Non-fibrous (Other)	None Detected
02A 041703052-0006	Bay 1 Roof - Roofing Cement - Grey - a/w HA #01	Gray Non-Fibrous Homogeneous	HA: 02	100% Non-fibrous (Other)	None Detected
02B 041703052-0007	Storage Shed Roof - Roofing Cement - Grey - a/w HA #01	Gray Non-Fibrous Homogeneous	HA: 02	100% Non-fibrous (Other)	None Detected
02C 041703052-0008	Bay 1 Roof - Roofing Cement - Grey - a/w HA #01	Gray Non-Fibrous Homogeneous	HA: 02	100% Non-fibrous (Other)	None Detected
02D 041703052-0009	Storage Shed Roof - Roofing Cement - Grey - a/w HA #01	Gray Non-Fibrous Homogeneous	HA: 02	100% Non-fibrous (Other)	None Detected
02E 041703052-0010	Bay 1 Roof - Roofing Cement - Grey - a/w HA #01	Gray Non-Fibrous Homogeneous	HA: 02	100% Non-fibrous (Other)	None Detected
03A 041703052-0011	Bay 1 Roof - Roofing Paper - Black - Located under HA #01	Black Fibrous Homogeneous	HA: 03	40% Cellulose 60% Non-fibrous (Other)	None Detected

Initial report from: 02/08/2017 19:10:55



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EMSL Order: 041703052
Customer ID: SECI62
Customer PO: 180101434
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
03B <small>041703052-0012</small>	Storage Shed Roof - Roofing Paper - Black - Located under HA #01	Black Fibrous Homogeneous	40% Cellulose	60% Non-fibrous (Other)	None Detected
<small>HA: 03</small>					
03C <small>041703052-0013</small>	Bay 1 Roof - Roofing Paper - Black - Located under HA #01	Black Fibrous Homogeneous	40% Cellulose	60% Non-fibrous (Other)	None Detected
<small>HA: 03</small>					
03D <small>041703052-0014</small>	Storage Shed Roof - Roofing Paper - Black - Located under HA #01	Black Non-Fibrous Homogeneous	35% Cellulose	65% Non-fibrous (Other)	None Detected
<small>HA: 03</small>					
03E <small>041703052-0015</small>	Bay 1 Roof - Roofing Paper - Black - Located under HA #01	Black Non-Fibrous Homogeneous	40% Cellulose	60% Non-fibrous (Other)	None Detected
<small>HA: 03</small>					
04A <small>041703052-0016</small>	Bay 1 Roof - Sealant - Black - At Roof Flashing	Black Non-Fibrous Homogeneous		75% Non-fibrous (Other)	25% Chrysotile
<small>HA: 04</small>					
04B <small>041703052-0017</small>	Bay 1 Roof - Sealant - Black - At Roof Flashing	Black Fibrous Homogeneous		80% Non-fibrous (Other)	20% Chrysotile
<small>HA: 04</small>					
04C <small>041703052-0018</small>	Bay 1 Roof - Sealant - Black - At Roof Flashing	Black Non-Fibrous Homogeneous		80% Non-fibrous (Other)	20% Chrysotile
<small>HA: 04</small>					
05A <small>041703052-0019</small>	Bay 3 Interior - Window Caulk - Grey - At Windows Interior and Exterior	Gray Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
<small>HA: 05</small>					
05B <small>041703052-0020</small>	Bay 3 Exterior - Window Caulk - Grey - At Windows Interior and Exterior	Gray Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
<small>HA: 05</small>					
05C <small>041703052-0021</small>	Bay 1 Interior - Window Caulk - Grey - At Windows Interior and Exterior	Gray Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
<small>HA: 05</small>					
06A <small>041703052-0022</small>	Bay 3 NW Corner - Wire Wrap - Red/Blue/White - Exposed Hanging Wires	White/Red/Blue Fibrous Homogeneous	60% Cellulose	40% Non-fibrous (Other)	None Detected
<small>HA: 06</small>					
06B <small>041703052-0023</small>	Bay 3 NW Corner - Wire Wrap - Red/Blue/White - Exposed Hanging Wires	White/Red/Blue Fibrous Homogeneous	40% Cellulose	60% Non-fibrous (Other)	None Detected
<small>HA: 06</small>					

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EMSL Order: 041703052
Customer ID: SECI62
Customer PO: 180101434
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
06C 041703052-0024	Bay 3 NW Corner - Wire Wrap - Red/Blue/White - Exposed Hanging Wires	White/Red/Blue Non-Fibrous Homogeneous	65% Cellulose	35% Non-fibrous (Other)	None Detected
			HA: 06		
07A 041703052-0025	Bay 3 - Concrete - Grey - Concrete Flooring	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 07		
07B 041703052-0026	Bay 3 - Concrete - Grey - Concrete Flooring	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 07		
07C 041703052-0027	Bay 2 - Concrete - Grey - Concrete Flooring	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 07		
07D 041703052-0028	Bay 1 - Concrete - Grey - Concrete Flooring	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 07		
07E 041703052-0029	Bay 1 - Concrete - Grey - Concrete Flooring	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 07		
08A 041703052-0030	Bay 1 Exterior - Brick - Grey - Masonry	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 08		
08B 041703052-0031	Storage Shed Exterior - Brick - Grey - Masonry	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 08		
08C 041703052-0032	Bay 1 Exterior - Brick - Grey - Masonry	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 08		
08D 041703052-0033	Bay 1 Interior - Brick - Grey - Masonry	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 08		
08E 041703052-0034	Bay 1 Interior - Brick - Grey - Masonry	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 08		
08F 041703052-0035	Bay 3 Interior - Brick - Grey - Masonry	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 08		
08G 041703052-0036	Bay 2 Interior - Brick - Grey - Masonry	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 08		
09A 041703052-0037	Bay 1 Exterior - Mortar - Grey - a/w HA #08	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 09		

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EMSL Order: 041703052
Customer ID: SECI62
Customer PO: 180101434
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
09B 041703052-0038	Storage Shed Exterior - Mortar - Grey - a/w HA #08	Gray Non-Fibrous Homogeneous	HA: 09	100% Non-fibrous (Other)	None Detected
09C 041703052-0039	Bay 1 Exterior - Mortar - Grey - a/w HA #08	Gray Non-Fibrous Homogeneous	HA: 09	100% Non-fibrous (Other)	None Detected
09D 041703052-0040	Bay 1 Interior - Mortar - Grey - a/w HA #08	Gray Non-Fibrous Homogeneous	HA: 09	100% Non-fibrous (Other)	None Detected
09E 041703052-0041	Bay 1 Interior - Mortar - Grey - a/w HA #08	Gray Non-Fibrous Homogeneous	HA: 09	100% Non-fibrous (Other)	None Detected
09F 041703052-0042	Bay 3 Interior - Mortar - Grey - a/w HA #08	Gray Non-Fibrous Homogeneous	HA: 09	100% Non-fibrous (Other)	None Detected
09G 041703052-0043	Bay 2 Interior - Mortar - Grey - a/w HA #08	Gray Non-Fibrous Homogeneous	HA: 09	100% Non-fibrous (Other)	None Detected
10A 041703052-0044	NW Corner Bay 1 - Sheetrock - White - Walls	White Non-Fibrous Homogeneous	HA: 10	5% Cellulose 95% Non-fibrous (Other)	None Detected
10B 041703052-0045	NW Corner Bay 1 - Sheetrock - White - Walls	White Non-Fibrous Homogeneous	HA: 10	5% Cellulose 95% Non-fibrous (Other)	None Detected
10C 041703052-0046	NW Corner Bay 1 - Sheetrock - White - Walls	Gray/White Non-Fibrous Homogeneous	HA: 10	5% Cellulose 95% Non-fibrous (Other)	None Detected
11A 041703052-0047	West Wall Overhang - Roofing Material - Black - Roof Sheeting	Black Non-Fibrous Homogeneous	HA: 11	100% Non-fibrous (Other)	None Detected
11B 041703052-0048	West Wall Overhang - Roofing Material - Black - Roof Sheeting	Black Non-Fibrous Homogeneous	HA: 11	100% Non-fibrous (Other)	None Detected
11C 041703052-0049	West Wall Overhang - Roofing Material - Black - Roof Sheeting	Black Non-Fibrous Homogeneous	HA: 11	100% Non-fibrous (Other)	None Detected
12A 041703052-0050	Office Ceiling - Ceiling Panels - White - 2'x4' w/ Dots & Fissures	White Fibrous Homogeneous	HA: 12	55% Cellulose 30% Min. Wool 15% Non-fibrous (Other)	None Detected

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Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
12B <small>041703052-0051</small>	Office Ceiling - Ceiling Panels - White - 2'x4' w/ Dots & Fissures	White Fibrous Homogeneous	60% Cellulose 25% Min. Wool	15% Non-fibrous (Other)	None Detected
HA: 12					
12C <small>041703052-0052</small>	Office Ceiling - Ceiling Panels - White - 2'x4' w/ Dots & Fissures	White Fibrous Homogeneous	60% Cellulose 35% Min. Wool	5% Non-fibrous (Other)	None Detected
HA: 12					
13A <small>041703052-0053</small>	Office Restroom - Sheetrock - White - Walls & Ceilings	White Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
HA: 13					
13B <small>041703052-0054</small>	Office Restroom - Sheetrock - White - Walls & Ceilings	White Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
HA: 13					
13C <small>041703052-0055</small>	Office Restroom - Sheetrock - White - Walls & Ceilings	White Non-Fibrous Homogeneous	6% Cellulose	94% Non-fibrous (Other)	None Detected
HA: 13					
14A <small>041703052-0056</small>	Office - Mastic - Tan - a/w 4" Brown Cove Base	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
HA: 14					
14B <small>041703052-0057</small>	Office - Mastic - Tan - a/w 4" Brown Cove Base	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
HA: 14					
14C <small>041703052-0058</small>	Office - Mastic - Tan - a/w 4" Brown Cove Base	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
HA: 14					
15A <small>041703052-0059</small>	Office Restroom Walls - Ceramic Wall Tile - Tan - 4"x4" Smooth	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
HA: 15					
15B <small>041703052-0060</small>	Office Restroom Walls - Ceramic Wall Tile - Tan - 4"x4" Smooth	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
HA: 15					
15C <small>041703052-0061</small>	Office Restroom Walls - Ceramic Wall Tile - Tan - 4"x4" Smooth	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
HA: 15					
16A <small>041703052-0062</small>	Office Restroom - Ceramic Wall Tile - Brown - a/w HA #15	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
HA: 16					
16B <small>041703052-0063</small>	Office Restroom - Ceramic Wall Tile - Brown - a/w HA #15	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
HA: 16					

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Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
16C <small>041703052-0064</small>	Office Restroom - Ceramic Wall Tile - Brown - a/w HA #15	Brown Non-Fibrous Homogeneous	HA: 16	100% Non-fibrous (Other)	None Detected
17A <small>041703052-0065</small>	Office Restroom - Grout - White - a/w HA #15, 16	White Non-Fibrous Homogeneous	HA: 17	100% Non-fibrous (Other)	None Detected
17B <small>041703052-0066</small>	Office Restroom - Grout - White - a/w HA #15, 16	White Non-Fibrous Homogeneous	HA: 17	100% Non-fibrous (Other)	None Detected
17C <small>041703052-0067</small>	Office Restroom - Grout - White - a/w HA #15, 16	White Non-Fibrous Homogeneous	HA: 17	100% Non-fibrous (Other)	None Detected
18A <small>041703052-0068</small>	Office Restroom - Cement - Grey - a/w HA #15, 16	Gray Non-Fibrous Homogeneous	HA: 18	100% Non-fibrous (Other)	None Detected
18B <small>041703052-0069</small>	Office Restroom - Cement - Grey - a/w HA #15, 16	Gray Non-Fibrous Homogeneous	HA: 18	100% Non-fibrous (Other)	None Detected
18C <small>041703052-0070</small>	Office Restroom - Cement - Grey - a/w HA #15, 16	Gray Non-Fibrous Homogeneous	HA: 18	100% Non-fibrous (Other)	None Detected
19A <small>041703052-0071</small>	Office Restroom - Cement Gasket - Red - At Pipe	Red Non-Fibrous Homogeneous	HA: 19	100% Non-fibrous (Other)	None Detected
19B <small>041703052-0072</small>	Office Restroom - Cement Gasket - Red - At Pipe	Red Non-Fibrous Homogeneous	HA: 19	100% Non-fibrous (Other)	None Detected
19C <small>041703052-0073</small>	Office Restroom - Cement Gasket - Red - At Pipe	Red Non-Fibrous Homogeneous	HA: 19	100% Non-fibrous (Other)	None Detected
20A <small>041703052-0074</small>	Office Restroom - Wall Texture - White - Spray-on Texture	White Non-Fibrous Homogeneous	HA: 20	100% Non-fibrous (Other)	None Detected
20B <small>041703052-0075</small>	Office Restroom - Wall Texture - White - Spray-on Texture	White Non-Fibrous Homogeneous	HA: 20	100% Non-fibrous (Other)	None Detected
20C <small>041703052-0076</small>	Office Restroom - Wall Texture - White - Spray-on Texture	White Non-Fibrous Homogeneous	HA: 20	100% Non-fibrous (Other)	None Detected
21A <small>041703052-0077</small>	Office Restroom - Mastic - Tan - Exposed Mastic @ Sink	Tan Non-Fibrous Homogeneous	HA: 21	100% Non-fibrous (Other)	None Detected

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EMSL Order: 041703052
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Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
21B <i>041703052-0078</i>	Office Restroom - Mastic - Tan - Exposed Mastic @ Sink	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 21		
21C <i>041703052-0079</i>	Office Restroom - Mastic - Tan - Exposed Mastic @ Sink	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 21		
22A <i>041703052-0080</i>	Office Restroom - Caulking - White - At Sink Counter	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 22		
22B <i>041703052-0081</i>	Office Restroom - Caulking - White - At Sink Counter	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 22		
22C <i>041703052-0082</i>	Office Restroom - Caulking - White - At Sink Counter	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 22		
23A <i>041703052-0083</i>	Office Floor - Concrete - Red - Flooring	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 23		
23B <i>041703052-0084</i>	Office Floor - Concrete - Red - Flooring	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 23		
23C <i>041703052-0085</i>	Office Floor - Concrete - Red - Flooring	Gray/Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
			HA: 23		

Analyst(s) _____
 Stephen Severn (52)
 Zackary Carbee (33)


 Benjamin Ellis, Laboratory Manager
 or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Analytical, Inc. South Portland, ME

Initial report from: 02/08/2017 19:10:55



EMSL ANALYTICAL, INC.
LABORATORY PRODUCTS TRAINING

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX: (856) 786-5974

Company : Stantec Consulting		EMSL-Bill to: <input checked="" type="checkbox"/> Same <input type="checkbox"/> Different <small>If Bill to is Different note instructions in Comments**</small>	
Street: 3875 Atherton Road		<i>Third Party Billing requires written authorization from third party</i>	
City: Rocklin	State/Province: CA	Zip/Postal Code: 95765	Country: USA
Report To (Name): Dean Mochrie		Telephone #: 916-384-0707	
Email Address: dean.mochrie@stantec.com		Fax #: 916-861-0430	Purchase Order: 180101434
Project Name/Number: DOT Yard . 180101434		Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email <input type="checkbox"/> Mail	
U.S. State Samples Taken: NV		Connecticut Samples: <input type="checkbox"/> Commercial <input type="checkbox"/> Residential	

Turnaround Time (TAT) Options* - Please Check

3 Hour 6 Hour 24 Hour 48 Hour 72 Hour 96 Hour 1 Week 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule. *There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.

PCM - Air <input type="checkbox"/> Check if samples are from NY <input type="checkbox"/> NIOSH 7400 <input type="checkbox"/> w/ OSHA 8hr. TWA PLM - Bulk (reporting limit) <input checked="" type="checkbox"/> PLM EPA 600/R-93/116 (<1%) <input type="checkbox"/> PLM EPA NOB (<1%) Point Count <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%) Point Count w/Gravimetric <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%) <input type="checkbox"/> NYS 198.1 (friable in NY) <input type="checkbox"/> NYS 198.6 NOB (non-friable-NY) <input type="checkbox"/> NIOSH 9002 (<1%)	TEM - Air <input type="checkbox"/> 4-4.5hr TAT (AHERA only) <input type="checkbox"/> AHERA 40 CFR, Part 763 <input type="checkbox"/> NIOSH 7402 <input type="checkbox"/> EPA Level II <input type="checkbox"/> ISO 10312 TEM - Bulk <input type="checkbox"/> TEM EPA NOB <input type="checkbox"/> NYS NOB 198.4 (non-friable-NY) <input type="checkbox"/> Chatfield SOP <input type="checkbox"/> TEM Mass Analysis-EPA 600 sec. 2.5 TEM - Water: EPA 100.2 Fibers >10µm <input type="checkbox"/> Waste <input type="checkbox"/> Drinking All Fiber Sizes <input type="checkbox"/> Waste <input type="checkbox"/> Drinking	TEM- Dust <input type="checkbox"/> Microvac - ASTM D 5755 <input type="checkbox"/> Wipe - ASTM D6480 <input type="checkbox"/> Carpet Sonication (EPA 600/J-93/167) Soil/Rock/Vermiculite <input type="checkbox"/> PLM CARB 435 - A (0.25% sensitivity) <input type="checkbox"/> PLM CARB 435 - B (0.1% sensitivity) <input type="checkbox"/> TEM CARB 435 - B (0.1% sensitivity) <input type="checkbox"/> TEM CARB 435 - C (0.01% sensitivity) <input type="checkbox"/> TEM Qual. via Filtration Technique <input type="checkbox"/> TEM Qual. via Drop-Mount Technique Other: <input type="checkbox"/>
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Check For Positive Stop - Clearly Identify Homogenous Group Filter Pore Size (Air Samples): 0.8µm 0.45µm

Samplers Name: Brian Branscum **Samplers Signature:**

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
	see attached sample logs		

Client Sample # (s): 01A - 23C **Total # of Samples:** 85

Relinquished (Client): **Date:** 2/2/17 **Time:** 1200

Received (Lab): **Date:** **Time:**

Comments/Special Instructions:



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	02
Material Type:	Roofing Cement
Color:	Grey
Description:	Assoc. w/HA# 01
Total Qty.:	4,300 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
R	Roof	4,300 SF	G

SAMPLES	
Sample #	Sample Location
02 A	Bay 1 Roof
02 B	Storage Shed Roof
02 C	Bay 1 Roof
02 D	Storage Shed Roof
02 E	Bay 1 Roof
F	
G	

Notes:

HAZARD ASSESSMENT	
Friable:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Contact by Maintenance:	Low <input checked="" type="checkbox"/> Med <input type="checkbox"/> High <input type="checkbox"/>
Vibration:	Low <input checked="" type="checkbox"/> Med <input type="checkbox"/> High <input type="checkbox"/>
Air Movement:	Low <input type="checkbox"/> Med <input checked="" type="checkbox"/> High <input checked="" type="checkbox"/>

B.B.
B. Branscum

Relinquished By: _____ Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

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Rancho Cordova, CA 95670
Tel: (916) 861-0400
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Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	<u>04</u>
Material Type:	<u>Sealant</u>
Color:	<u>Black</u>
Description:	<u>At roof flashings</u>
Total Qty.:	<u>20 SF</u>

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
<u>R</u>	<u>Roof</u>	<u>20 SF</u>	<u>G</u>

SAMPLES	
Sample #	Sample Location
<u>04 A</u>	<u>Bay 1 Roof</u>
<u>04 B</u>	
<u>04 C</u>	
<u>D</u>	
<u>E</u>	
<u>F</u>	
<u>G</u>	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	<u>Low</u>	High
Vibration:	<u>Low</u>	High
Air Movement:	Low	<u>High</u>

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300549 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	05
Material Type:	Window Caulk
Color:	Grey
Description:	At Windows Interior and Exterior
Total Qty.:	200 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	Windows	200 SF	G

SAMPLES	
Sample #	Sample Location
05 A	Bay 3 Interior
05 B	Bay 3 Exterior
05 C	Bay 1 Interior
D	
E	
F	
G	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	Low	High
Vibration:	Low	High
Air Movement:	Low	Med

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	<u>06</u>
Material Type:	<u>Wire Wrap</u>
Color:	<u>Red / Blue / white</u>
Description:	<u>Exposed hanging wires</u>
Total Qty.:	<u>10 SF</u>

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
<u>01</u>	<u>Bay 3</u>	<u>10 SF</u>	<u>D</u>

SAMPLES	
Sample #	Sample Location
<u>06 A</u>	<u>Bay 3 NW Corner</u>
<u>06 B</u>	
<u>06 C</u>	
<u>D</u>	
<u>E</u>	
<u>F</u>	
<u>G</u>	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	<u>Low</u>	High
Vibration:	<u>Low</u>	High
Air Movement:	<u>Low</u>	High

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	07
Material Type:	Concrete
Color:	Grey
Description:	Concrete Flooring
Total Qty.:	4,300 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	Building F	4,300 SF	G

SAMPLES	
Sample #	Sample Location
07 A	Bay 3
07 B	Bay 3
07 C	Bay 2
07 D	Bay 1
07 E	Bay 1
F	
G	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	Low	High
Vibration:	Low	High
Air Movement:	Low	High

Relinquished By: B.A.B. Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300549 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	08
Material Type:	Brick
Color:	Grey
Description:	Masonry
Total Qty.:	7,060 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	Building F	7,000 SF	G

SAMPLES	
Sample #	Sample Location
08 A	Bay 1 Exterior
08 B	Storage Shed Exterior
08 C	Bay 1 Exterior
08 D	Bay 1 Interior
08 E	Bay 1 Interior
08 F	Bay 3 Interior
08 G	Bay 2 Interior

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	Low	High
Vibration:	Low	High
Air Movement:	Low	High

Relinquished By: B.A.B. Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

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Tel: (916) 861-0400
Fax: (916) 861-0430

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Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	09
Material Type:	Mortar
Color:	Grey
Description:	Assoc. w/08 HA#
Total Qty.:	7,000 SF

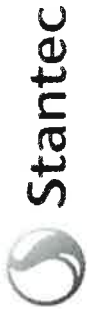
MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	Building F	7,000 SF	G

SAMPLES	
Sample #	Sample Location
09 A	Bay 1 Exterior
09 B	Storage Shed Exterior
09 C	Bay 1 Exterior
09 D	Bay 1 Interior
09 E	↓
09 F	Bay 3 Interior
09 G	Bay 2 Interior

Notes:

HAZARD ASSESSMENT		
	Yes	No
Friable:		<input checked="" type="radio"/>
Contact by Maintenance:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High
Vibration:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High
Air Movement:	<input type="radio"/> Low	<input checked="" type="radio"/> Med <input type="radio"/> High

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Inspector: B. Branscum
Site Address: 123 E. Washington Ave.
Las Vegas, NV

MATERIAL	
HA#	<u>10</u>
Material Type:	<u>Sheetrock</u>
Color:	<u>white</u>
Description:	<u>Walls</u>
Total Qty.:	<u>200 SF</u>

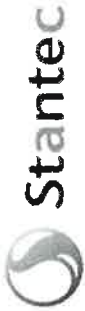
MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
<u>01</u>	<u>Building F Bay 1</u>	<u>200 SF</u>	<u>G</u>

SAMPLES	
Sample #	Sample Location
<u>10 A</u>	<u>NW Corner Bay 1</u>
<u>10 B</u>	
<u>10 C</u>	
<u>D</u>	
<u>E</u>	
<u>F</u>	
<u>G</u>	

Notes:

HAZARD ASSESSMENT		
	Yes	No
Friable:		<u>(No)</u>
Contact by Maintenance:	<u>(Low)</u>	Med High
Vibration:	<u>(Low)</u>	Med High
Air Movement:	Low	<u>(Med)</u> High

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	12
Material Type:	Ceiling Panels
Color:	white
Description:	2'x4' w/dots & fissures
Total Qty.:	500 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	office	500 SF	6

SAMPLES	
Sample #	Sample Location
12 A	office ceiling
12 B	↓
12 C	
D	
E	
F	
G	

Notes:

HAZARD ASSESSMENT	Yes	No
	Friable:	<input checked="" type="radio"/>
Contact by Maintenance:	Low	Med
Vibration:	<input checked="" type="radio"/> Low	Med
Air Movement:	<input checked="" type="radio"/> Low	Med
		High
		High
		High

Relinquished By: B.A.B. Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
 Rancho Cordova, CA 95670
 Tel: (916) 861-0400
 Fax: (916) 861-0430

Project Name: Nevada DOT Yard Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
 Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	<u>13</u>
Material Type:	<u>Sheetrock</u>
Color:	<u>White</u>
Description:	<u>Walls & Ceilings</u>
Total Qty.:	<u>400 SF</u>

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
<u>01</u>	<u>office</u>	<u>400 SF</u>	<u>G</u>

SAMPLES	
Sample #	Sample Location
<u>13 A</u>	<u>office Restroom</u>
<u>13 B</u>	↓ ↓
<u>13 C</u>	↓ ↓
<u>D</u>	
<u>E</u>	
<u>F</u>	
<u>G</u>	

Notes: Did not identify joint compound present, Lab to verify.

HAZARD ASSESSMENT	Yes	No
	Friable:	<input checked="" type="radio"/>
Contact by Maintenance:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High
Vibration:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High
Air Movement:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High

Relinquished By: B.A.B. Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	<u>14</u>
Material Type:	<u>Mastic</u>
Color:	<u>Tan</u>
Description:	<u>Assoc. w/14" Brown Cove Base</u>
Total Qty.:	<u>10 SF</u>

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
<u>01</u>	<u>office</u>	<u>10 SF</u>	<u>G</u>

SAMPLES	
Sample #	Sample Location
<u>14 A</u>	<u>office</u>
<u>14 B</u>	
<u>14 C</u>	
<u>D</u>	
<u>E</u>	
<u>F</u>	
<u>G</u>	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	<u>Low</u>	High
Vibration:	<u>Low</u>	High
Air Movement:	<u>Low</u>	High

Relinquished By: B. Branscum Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	15
Material Type:	Ceramic Wall Tile
Color:	Tan
Description:	4" x 4" smooth
Total Qty.:	200 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	Office Restroom	200 SF	G

SAMPLES	
Sample #	Sample Location
15 A	Office Restroom Walls
15 B	
15 C	
D	
E	
F	
G	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	Low	High
Vibration:	Low	High
Air Movement:	Low	High

Relinquished By: B.A.B. Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: ~~200~~ 2.4 BMB Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	16 16
Material Type:	Ceramic Wall Tile
Color:	Brown
Description:	Assoc. w/ HA# 15
Total Qty.:	20 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	Office	20 SF	G

SAMPLES	
Sample #	Sample Location
16 A	office Restroom
16 B	↓
16 C	
D	
E	
F	
G	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	Low	High
Vibration:	Low	High
Air Movement:	Low	High

Relinquished By: *B. Branscum* Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02/01/2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	<u>18</u>
Material Type:	<u>Cement</u>
Color:	<u>Grey</u>
Description:	<u>Assoc. w/HA# 15, 16</u>
Total Qty.:	<u>220 SF</u>

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
<u>01</u>	<u>Office</u>	<u>220 SF</u>	<u>G</u>

SAMPLES	
Sample #	Sample Location
<u>18 A</u>	<u>Office Restroom</u>
<u>18 B</u>	
<u>18 C</u>	
<u>D</u>	
<u>E</u>	
<u>F</u>	
<u>G</u>	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	<u>Low</u>	High
Vibration:	<u>Low</u>	High
Air Movement:	<u>Low</u>	High

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 20-2.4 Inspector: B. Branscum
RAB Las Vegas, NV

MATERIAL	
HA#	<u>20</u>
Material Type:	<u>Wall Texture</u>
Color:	<u>White</u>
Description:	<u>Spray-on texture</u>
Total Qty.:	<u>200 SF</u> 500 SF <u>RAB</u>

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
<u>01</u>	<u>Office</u>	<u>200 SF</u> 500 SF <u>RAB</u>	<u>G</u>

SAMPLES	
Sample #	Sample Location
<u>20 A</u>	<u>Office Restroom</u>
<u>20 B</u>	↓
<u>20 C</u>	
<u>D</u>	
<u>E</u>	
<u>F</u>	
<u>G</u>	

Notes:

HAZARD ASSESSMENT		
	Yes	No
Friable:		<input checked="" type="radio"/>
Contact by Maintenance:	<input checked="" type="radio"/> Low	<input type="radio"/> High
	<input checked="" type="radio"/> Med	<input type="radio"/> High
Vibration:	<input checked="" type="radio"/> Low	<input type="radio"/> High
	<input checked="" type="radio"/> Med	<input type="radio"/> High
Air Movement:	<input checked="" type="radio"/> Low	<input type="radio"/> High
	<input checked="" type="radio"/> Med	<input type="radio"/> High

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	21
Material Type:	Mastic
Color:	Tan
Description:	Exposed mastic @ sink
Total Qty.:	2 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	Office	2 SF	G

SAMPLES	
Sample #	Sample Location
21 A	Office Restroom
21 B	↓
21 C	
D	
E	
F	
G	

Notes:

HAZARD ASSESSMENT		
	Yes	No
Friable:		<input checked="" type="radio"/>
Contact by Maintenance:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High
Vibration:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High
Air Movement:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	22
Material Type:	Sea Caulking
Color:	White
Description:	At sink counter
Total Qty.:	2 SF

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
01	Office	2 SF	Asbestos

SAMPLES	
Sample #	Sample Location
22 A	Office Restroom
22 B	
22 C	
D	
E	
F	
G	

Notes:

HAZARD ASSESSMENT		
	Yes	No
Friable:		<input checked="" type="radio"/>
Contact by Maintenance:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High
Vibration:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High
Air Movement:	<input checked="" type="radio"/> Low	<input type="radio"/> Med <input type="radio"/> High

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



Asbestos Bulk Sample Log

3017 Kilgore Road, Suite 100
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Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02 / 01 / 2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B. Branscum
Las Vegas, NV

MATERIAL	
HA#	<u>23</u>
Material Type:	<u>Concrete</u>
Color:	<u>Red</u>
Description:	<u>Flooring</u>
Total Qty.:	<u>600SF</u>

MATERIAL LOCATIONS			
Floor #	Location	Quantity Estimate	Cond.
<u>01</u>	<u>Office</u>	<u>600 SF</u>	<u>G</u>

SAMPLES	
Sample #	Sample Location
<u>23 A</u>	<u>Office Floor</u>
<u>23 B</u>	
<u>23 C</u>	
<u>D</u>	
<u>E</u>	
<u>F</u>	
<u>G</u>	

Notes:

HAZARD ASSESSMENT		
Friable:	Yes	No
Contact by Maintenance:	<u>Low</u>	High
Vibration:	<u>Low</u>	High
Air Movement:	<u>Low</u>	High

Relinquished By: [Signature] Date: 2/2/17 Received By: _____ Date: _____



EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Phone/Fax: (856) 303-2500 / (856) 786-5974

<http://www.EMSL.com>

cinnaminsonleadlab@emsl.com

EMSL Order:	201701001
CustomerID:	SECI62
CustomerPO:	180101434
ProjectID:	

Attn: **Dean Mochrie**
Stantec Consulting Services Inc
3875 Atherton Road
Rocklin, CA 95765

Phone: (916) 472-3932
 Fax: (916) 773-8448
 Received: 02/03/17 10:20 AM
 Collected: 2/1/2017

Project: DOT Yard / 180101434

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
P-01	201701001-0001	2/1/2017	2/6/2017	0.012 % wt
Site: East Wall Exterior / Tan				
P-02	201701001-0002	2/1/2017	2/6/2017	0.060 % wt
Site: North Wall Bay 2 Interior / White				
P-03	201701001-0003	2/1/2017	2/6/2017	2.1 % wt
Site: East Wall Bay 3 / Interior Gray				

Phillip Worby, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, AIHA-LAP, LLC ELLAP 100194, A2LA 2845.01

Initial report from 02/07/2017 08:30:02



EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead (Pb) Chain of Custody

EMSL Order ID (Lab Use Only):

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX: (856) 786-5974

Company: Stantec Consulting Services Inc.		EMSL-Bill to: <input checked="" type="checkbox"/> Same <input type="checkbox"/> Different <small>If Bill to is Different note instructions in Comments**</small>		
Street: 3875 Atherton Road		<i>Third Party Billing requires written authorization from third party</i>		
City: Rocklin	State/Province: CA	Zip/Postal Code: 95670	Country: United States	
Report To (Name): Dean Mochrie		Telephone #: 916-472-3932		
Email Address: dean.mochrie@stantec.com		Fax #:	Purchase Order: 180101434	
Project Name/Number: DOT Yard / 180101434		Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email		
U.S. State Samples Taken: NV		CT Samples: <input type="checkbox"/> Commercial/Taxable <input type="checkbox"/> Residential/Tax Exempt		
Turnaround Time (TAT) Options* - Please Check				
<input type="checkbox"/> 3 Hour	<input type="checkbox"/> 6 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 48 Hour	
<input type="checkbox"/> 72 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 1 Week	<input type="checkbox"/> 2 Week	
<small>*Analysis completed in accordance with EMSL's Terms and Conditions located in the Price Guide</small>				
Matrix	Method	Instrument	Reporting Limit	Check
Chips <input checked="" type="checkbox"/> % by wt. <input type="checkbox"/> mg/cm ² <input type="checkbox"/> ppm	SW846-7000B	Flame Atomic Absorption	0.01%	<input checked="" type="checkbox"/>
Air	NIOSH 7082	Flame Atomic Absorption	4 µg/filter	<input type="checkbox"/>
	NIOSH 7105	Graphite Furnace AA	0.03 µg/filter	<input type="checkbox"/>
	NIOSH 7300 modified	ICP-AES/ICP-MS	0.5 µg/filter	<input type="checkbox"/>
Wipe* <small>ASTM <input type="checkbox"/> non ASTM <input type="checkbox"/> *if no box is checked, non-ASTM Wipe is assumed</small>	SW846-7000B	Flame Atomic Absorption	10 µg/wipe	<input type="checkbox"/>
	SW846-6010B or C	ICP-AES	1.0 µg/wipe	<input type="checkbox"/>
	SW846-7000B/7010	Graphite Furnace AA	0.075 µg/wipe	<input type="checkbox"/>
TCLP	SW846-1311/7000B/SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>
	SW846-1131/SW846-6010B or C	ICP-AES	0.1 mg/L (ppm)	<input type="checkbox"/>
Soil	SW846-7000B	Flame Atomic Absorption	40 mg/kg (ppm)	<input type="checkbox"/>
	SW846-7010	Graphite Furnace AA	0.3 mg/kg (ppm)	<input type="checkbox"/>
	SW846-6010B or C	ICP-AES	2 mg/kg (ppm)	<input type="checkbox"/>
Wastewater Unpreserved <input type="checkbox"/> Preserved with HNO ₃ pH < 2 <input type="checkbox"/>	SM3111B/SW846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	<input type="checkbox"/>
	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	<input type="checkbox"/>
	EPA 200.7	ICP-AES	0.020 mg/L (ppm)	<input type="checkbox"/>
Drinking Water Unpreserved <input type="checkbox"/> Preserved with HNO ₃ pH < 2 <input type="checkbox"/>	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	<input type="checkbox"/>
	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	<input type="checkbox"/>
TSP/SPM Filter	40 CFR Part 50	ICP-AES	12 µg/filter	<input type="checkbox"/>
	40 CFR Part 50	Graphite Furnace AA	3.6 µg/filter	<input type="checkbox"/>
Other:				
Name of Sampler: Debbie Lichtenberger			Signature of Sampler:	
Sample #	Location	Volume/Area	Date/Time Sampled	
	see attached logs			
Client Sample #'s	P-01 - P-03	Total # of Samples:	3	
Relinquished (Client):		Date:	2/2/17	Time: 1200
Received (Lab):		Date:		Time:
Comments:				



Paint Chip Sample Log

3017 Kilgore Road, Suite 100
Rancho Cordova, CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

Project Name: Nevada DOT Yard Building F Site Name: Nevada DOT Yard Date: 02/01/2017
Project #: 181300599 Task #: 2.4 Site Address: 123 E. Washington Ave. Inspector: B.Branscum
Las Vegas, NV

Sample Number	Room	Component	Substrate	Sample Location*	Estimated Quantity	Notes/Condition/ Paint Color
P-01	Exterior	Wall	Masonry	East Wall Exterior	7,000 SF	Intact/Tan
P-02	Interior	Wall	Masonry	North Wall Bay 2	4,000 SF	Intact/white
P-03	Interior	Wall	Masonry	East wall Bay 3	3,000 SF	Intact/Gray

* - Include sample dimensions if trying to achieve mg/cm².

Relinquished By: B.A. JS Date: 2/2/17 Received By: _____ Date: _____
Relinquished By: _____ Date: _____ Received By: _____ Date: _____



EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

Attn:

Dean Mochrie
Stantec Consulting Services Inc
3875 Atherton Road
Rocklin, CA 95765

2/20/2017

Phone: (916) 472-3932
Fax: (916) 773-8448

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 2/3/2017. The results are tabulated on the attached data pages for the following client designated project:

Nevada DOT Yard Building F / 181300599.2.4

The reference number for these samples is EMSL Order #011701136. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Approved By:

Phillip Worby, Chemistry Laboratory Manager



The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, CA ELAP 187

EMSL Analytical does not hold SHW certification for PCB analysis in the state of Nevada.

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. The QC data associated with the sample results meet the recovery and precision requirements established by the NELAP, unless specifically indicated. All results for soil samples are reported on a dry weight basis, unless otherwise noted. This report may not be reproduced except in full and without written approval by EMSL Analytical, Inc.

**EMSL Analytical, Inc.**

200 Route 130 North, Cinnaminson, NJ 08077

Phone/Fax: (856) 303-2500 / (856) 858-4571

<http://www.EMSL.com>EnvChemistry2@emsl.com

EMSL Order: 011701136

CustomerID: SECI62

CustomerPO:

ProjectID:

Attn: **Dean Mochrie**
Stantec Consulting Services Inc
3875 Atherton Road
Rocklin, CA 95765

Phone: (916) 472-3932
 Fax: (916) 773-8448
 Received: 02/03/17 9:30 AM

Project: Nevada DOT Yard Building F / 181300599.2.4

Analytical Results**Client Sample Description** C-1

Collected: 2/1/2017
 12:30:00 PM
Lab ID: 0001

Method	Parameter	Result	RL	Units	Prep Date	Analyst	Analysis Date	Analyst
3540C/8082A	Aroclor-1016	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH
3540C/8082A	Aroclor-1221	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH
3540C/8082A	Aroclor-1232	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH
3540C/8082A	Aroclor-1242	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH
3540C/8082A	Aroclor-1248	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH
3540C/8082A	Aroclor-1254	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH
3540C/8082A	Aroclor-1260	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH
3540C/8082A	Aroclor-1262	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH
3540C/8082A	Aroclor-1268	ND	0.95	mg/Kg	2/13/2017	SD	2/14/2017	EH

Definitions:

ND - indicates that the analyte was not detected at the reporting limit

RL - Reporting Limit (Analytical)



EMSL ANALYTICAL, INC.
LABORATORY PRODUCTS • TRAINING

Environmental Chemistry Chain of Custody

EMSL Order Number (Lab Use Only):

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX: (856) 786-5974

Report To Contact Name: Dean Mochrie		Bill To Company: Stantec Consulting Services, Inc.							
Company Name: Stantec Consulting Services, Inc.		Attention To: Dean Mochrie							
Street: 3875 Atherton Rd.		Street: 3875 Atherton Rd.							
City: Rocklin	State/Province: CA	City: Rocklin	State/Province: CA						
Phone: 916-472-3932	Fax: 916-773-8448	Zip/Postal Code: 95765-3716	Zip/Postal Code: 95765						
Project Name: Nevada DOT Yard Building F / 181300599.2.4		Phone: 916-472-3932 Fax: 916-773-8448							
Number of Samples in Shipment:		U.S. State where Samples Collected: NY							
Date of Shipment:		Purchase Order: 185750457							
Please Provide results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email <input type="checkbox"/> Mail		Sampled By (Signature): <i>DM</i>							
Standard Turnaround Time: <input type="checkbox"/> 2 Weeks <input checked="" type="checkbox"/> 4 Weeks <input type="checkbox"/> 6 Weeks		Email Results To: dean.mochrie@stantec.com							
Failure to complete will hinder processing of samples									
The following TAT's are subject to lab approval: <input type="checkbox"/> 1 Week <input type="checkbox"/> 4 Days <input type="checkbox"/> 3 Days <input type="checkbox"/> 2 Days <input type="checkbox"/> 1 Day		List Test(s) Needed							
Client Sample ID	Comp	Grab	Date/Time	Matrix	Preservative	W=Water S=Soil A=Air SL=Sludge O=Other	1=HCL 2=HNO3 3=H2SO4 4=ICE 5=Other	3540C/8082 BPA SW-898	Comments
C-1	X	X	2/17/17 12:20	O	N/A				Soil
Released By (Signature)			Date & Time		Received By		Date & Time		
<i>DM</i>			2/17/17 12:20						
Please indicate reporting requirements: <input type="checkbox"/> Results Only <input type="checkbox"/> Results and QC <input type="checkbox"/> Reduced Deliverables <input type="checkbox"/> Disk Deliverable <input type="checkbox"/> Other _____									
Instructions or Comments: Please Hold sample for directions from client.									



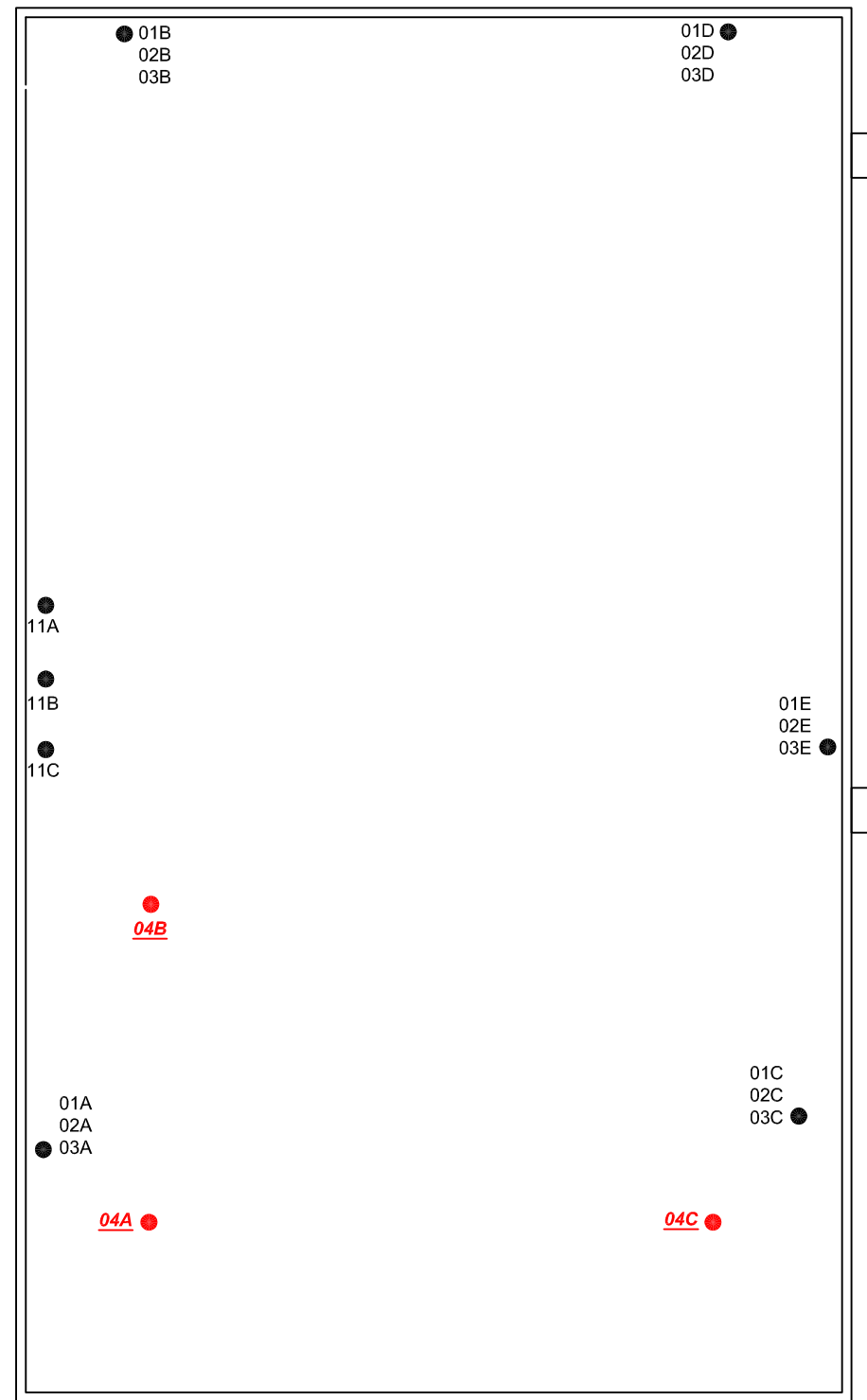
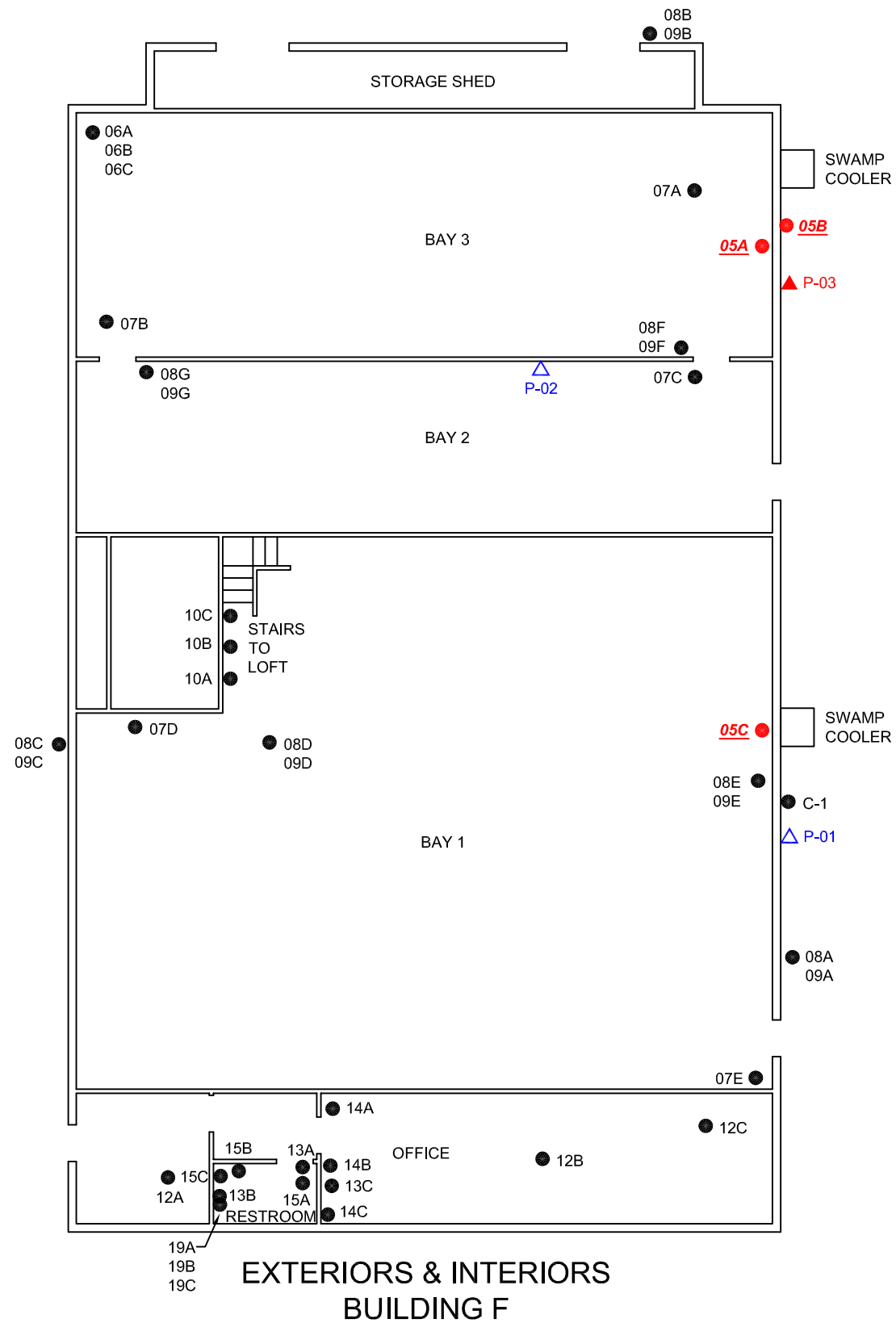
March 22, 2017

Nevada Department of Transportation

**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

Attachment B

Sample Location Figures



- LEGEND**
- NON-ASBESTOS CONTAINING MATERIAL SAMPLE LOCATION
 - ASBESTOS CONTAINING MATERIAL SAMPLE LOCATION
 - △ LEAD-CONTAINING PAINT SAMPLE LOCATION
 - ▲ LEAD-BASED PAINT SAMPLE LOCATION

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:	Project No.:	181300599.2.4	Client:	Fig. No.:	1	Stantec	
	Scale:	N.T.S.					
	Date:	17/03/03	Site Address				
	Dwn. By:	CD VM/DM					123 EAST WASHINGTON AVENUE LAS VEGAS, CLARK COUNTY, NEVADA
	App'd By:	DM					
SAMPLE LOCATION DIAGRAM							



March 22, 2017

Nevada Department of Transportation

**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

Attachment C

Photographic Log



March 22, 2017
Nevada Department of Transportation

**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

PHOTO No. 1, February 1, 2017



View of Building F Facing Northeast

PHOTO No. 2, February 1, 2017



View of Building F Facing Southwest



March 22, 2017
Nevada Department of Transportation

**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

PHOTO No. 3, February 1, 2017



View of Bay 1 Interior

PHOTO No. 4, February 1, 2017



View of Building F Loft (Storage)



March 22, 2017
Nevada Department of Transportation

**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

PHOTO No. 5, February 1, 2017



View of Bay 2 Interior

PHOTO No. 6, February 1, 2017



View of Bay 3 Interior



March 22, 2017
Nevada Department of Transportation

**Reference: Pre-Demolition Asbestos, Lead-Based Paint, and Polychlorinated Biphenyls Survey Report
Nevada DOT Yard, 123 East Washington Avenue, Las Vegas, Nevada**

PHOTO No. 7, February 1, 2017



View of Roof Flashing (HA#04)

PHOTO No. 8, February 1, 2017



View of Office Interior