

## **DIVISION 33 – UTILITIES**

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## **DIVISION 33 – UTILITIES**

### **33 00 00 UTILITIES**

#### 33 00 50 Design Criteria

- A. Refer to the DFCM website for the latest mechanical design requirements. USU design requirements include the DFCM design requirements.
- B. Comply with the latest (Utah adopted) edition of the International Codes:
  - International Building Code (IBC),
  - International Mechanical Code (IMC)
  - International Plumbing Code (IPC)
  - International Fuel Gas Code (IFGC)
  - International Energy Conservation Code (IECC)
  - International Fire Code (IFC)
  - National Electric Code (NEC)
  - All state amendments.
- C. Comply with all applicable local, state, and federal codes and regulations.
- A. Submit site utility basis of design with schematic design, design development, 100% review documents for all new buildings and major remodels. Submit design calculations for all site utility systems.

#### 33 01 00 General Requirements

- A. Test and inspect all utility installations with a representative of the university present prior to backfill of utility piping.
- B. Schedule all utility shutdowns 7 days in advance. Submit written request to USU project manager.
- C. Obtain a digging permit from USU FD&C prior to starting work. Allow 3 days for processing.
- D. Comply with UPDES Storm Water General Permit for construction activities.

#### 33 05 00 Common Work Results

- A. Refer to Division 32 for irrigation piping.

- B. Manufacturing: Provide USA made utility piping, fittings, and appurtenances.
- C. Piping Installation: Install all piping according to manufacturer's instructions. Use primer and glue on plastic pipe and conduit as recommended by piping manufacturer.
- D. Existing Utilities: Locate and protect all existing utilities, structures, landscaping, and other existing features prior to excavation. "Pot hole" existing utilities as required to locate critical utility lines.
- E. Temporary Service: Provide temporary utility service prior to excavation where critical utilities are affected. Coordinate requirements with USU.
- F. Damaged Utilities: Repair and/or replace utility lines damaged during excavation. Repairs and replacements require inspection by designated USU representative.
- G. Utility Bedding: Provide appropriate compacted pipe bedding consisting of sand or other appropriate material.
- H. Backfill Material: Provide backfill free of boulders larger than 4". Compact and test all backfill according to ASTM compaction standards.
- I. Backfill Density: Provide 96% compaction conforming to ASTM compaction standards for all backfill installed under paved areas, sidewalks, or excavations greater than five feet deep.
- J. Topsoil: Provide 12" of topsoil in landscape areas.
- K. Refer to **Detail No. 1/AE33** for pipe bedding and backfill requirements.
- L. Marking Tape: Install appropriately labeled detectable warning tape 18" to 24" above top of utility line. If conditions cause tape to be less than 12 inches below surface grade then consult with USU representative to determine location.

### 33 05 13 Manholes and Structures

- 33 Place mastic sealer between each precast section.
- 34 Vacuum test underground structures according to ASTM C1244.
- 35 Install flat (to grade) lid structures in landscape areas a minimum of 12 inches below finished surface grade to allow for topsoil.

- 36 Install a maximum of 12 inches of grade rings (total rise of 18 inches including manhole ring) on underground structures. Use a mastic sealer between manhole rings.
- 37 Set manhole access cover to surrounding grade.
- 38 Install underground structure access covers with proper utility identification cast into the cover.
- 39 Provide ladder access into all manholes and structures.

### 33 05 16 Tunnels

A. The purpose of the campus tunnel system is to provide an accessible corridor for the following utilities:

1. Steam
2. Condensate
3. Chilled Water
4. Communications
5. Electrical

B. General Tunnel Requirements:

1. Design all new tunnels to meet all of the requirements in this section.
2. Construct all new tunnels of cast-in-place concrete.
3. Provide tunnel walkway minimum clearance of 4 ft. wide x 8 ft. height between piping support systems. See **Detail No. 2/AE33**.
4. Design tunnel offsets to not exceed 30 degrees.
5. Provide expansion joints at all building connections and in the tunnel sections as required by the structural engineer. See **Detail No. 3/AE33**.
6. Slope tunnels to drain into tunnel nodes.

C. Main Tunnels:

1. Size: 10' wide x 10' height (inside dimensions)
2. Floor: Maintain continuous grade with no drops or rises.
3. See **Detail No. 4/AE33** for typical section of main tunnel.

D. Branch Tunnels:

1. Size: 8' wide x 9' height (inside dimensions)
2. Floor: Provide stairs, steps, or ladders for any change in elevation at building connections.
3. See **Detail No. 5/AE33** for typical section of branch tunnel.
4. Provide water proof seal and an expansion joint at tunnel connections to buildings. See **Detail No. 6/AE33**.

E. Tunnel Nodes:

1. Size: Design node height and width large enough to accommodate piping and walkway clearances. Provide sufficient space for access to all valves, equipment, panels, etc.
2. Nodes shall have a pumping provision to remove water draining from the tunnel.
3. When tunnel nodes create a trap in the condensate line, a pressure-neutralization loop of 3/4" stainless steel shall be provided to ease water-hammer. See **Detail No.19/AE33**.

F. Concrete

1. Refer to Division 03 for concrete requirements.

G. Tunnel Ladders:

2. Provide hot dip galvanized ladders.
3. Provide ladder top extension equal to Bilco "Ladder Up".
4. Provide ladders at all access hatches.
5. Install ladders such that they do not extend into the 4-foot tunnel walkway.
6. Refer to tunnel ladder **Detail Nos. 7/AE33 & 8/AE33**.

H. Tunnel Drainage:

1. Provide a 3-1/2" wide x 1-1/2" deep sloping "drain trough" in the tunnel floor located just outside the clear walking space. Slope the floor slab to the drain trough trench drain. Slope the drain trough to the tunnel node. Remove water from the tunnel system in the tunnel nodes by sump pump systems. See **Detail Nos. 4/AE33 & 5/AE33**.

I. Tunnel Water Proofing:

1. Provide a rolled, self-adhering membrane waterproofing system (equal to Bodyguard) with 1/2" rubberized asphalt sheet drain protection board with filter fabric (equal to Amerdrain 500 sheet drain). Waterproof all penetrations and node and branch connections. See attached **Detail Nos. 4/AE33 & 5/AE33**.
2. Seal all concrete cold joints with a swell seal type water stop.
3. Seal all pipe and conduit penetrations with a modular rubber link mechanical seal system such as Link-Seal. Flash and seal outside pipe penetration. See **Detail No. 11/AE33**.

J. Tunnel Man and Material Access Hatches:

1. Size:

- (a) Provide 3'0" x 3'0" (inside dimensions) man access hatches.
- (b) Provide 3'0" x 6'0" (inside dimensions) material access hatches.

2. Location:

- (a) Provide a man access hatch every 300 feet.
- (b) Provide a material access hatch as required for pipe access.
- (c) Locate all hatches out of traffic areas.

3. Hatch Material and Load Rating:

- (a) Provide aluminum or galvanized steel hatches.
- (b) Provide H20 load rated hatches for hatches located in roads and sidewalks.
- (c) Provide floor door type access hatch equal to Bilco J4-H20.
- (d) See **Detail No. 7/AE33** for material access hatch.
- (e) See **Detail No. 8/AE33** for man access hatch.

4. Locks and Latches:

- (a) Provide manual locks at inside of access hatches with no key locks. Access hatches will be opened from inside of tunnel only.
- (b) Provide inside panic door opening device at underside of hatch lid.

5. Hatch Drainage:

- (a) Provide 1-1/2" drain coupling and piping to a rock sump without 90 deg. elbows.
- (b) See **Detail No. 8/AE33** for hatch drainage.

K. Electrical Requirements:

1. General:

- (a) Match the existing tunnel electrical system including: Service outlets, electrical panels, conduit, cable tray, layout & routing, light switch locations, fixtures, grounding system, antenna system, and identification & labeling.

2. Lighting:

- (a) Connect all tunnel lighting to the central energy plant emergency power system.
- (b) Match the existing tunnel system lighting level (foot-candle).

L. Mechanical and Plumbing:

1. Piping:

- (a) Provide welded or brazed piping in the tunnel. Grooved or rolled pipe connections are not allowed.
- (b) Use drip legs on steam piping instead of sloping pipe. Maintain future piping space in rack.
- (c) Match the pipe guides and anchors installed in the existing tunnel system.
- (d) Provide tunnel piping, fittings, and accessories from the following:

Steam:	3/4" -12" 14" – 18"	Schedule 40 seamless black steel (welded) Schedule 30 seamless black steel (welded)
Condensate:	All sizes	Schedule 10 – 304 stainless steel (TIG welded)
Chilled Water:	3/4" -12" 14" – 18"	Schedule 40 black steel (welded) Schedule 30 black steel (welded)
Wash down Water:	All sizes	Type L copper (brazed or soldered) Galvanized steel
Drainage:	All sizes	Cast Iron with no-hub fittings

## 2. Pipe Layout and Routing:

- (a) Arrange piping to accommodate 4 feet wide x 8 feet height walkway clearance and 4 feet wide x 8 feet height branch tunnel access.
- (b) Provide isolation valves at all branch take-offs and at the building entrance.
- (c) Provide zone valves in the main line on each side of a branch take-off.

## 3. Pipe Support System:

- (a) Provide structural steel pipe supports. Unistrut pipe supports are not acceptable.
- (b) Elevate pipe support system off of the floor with non-shrink grout.
- (c) Provide embedded wall pipe support system in new tunnel installations.
- (d) Provide epoxy bolt system in existing tunnel installations.
- (e) Paint all supports and exposed steel associated with the support system with epoxy paint consistent with the existing tunnel.

4. Valves:

- (a) Provide new valves consistent with the existing tunnel system.
- (b) Provide valves from the following:

Steam:	All sizes	Butterfly	300 psig
Condensate:	All sizes	Butterfly	150 psig
Chilled Water:	All sizes	Butterfly	150 psig
Wash down Water:	All sizes	Ball	150 psig
Steam Drip Leg:	All sizes	Ball	300 psig
- (c) Provide gear driven wheel type butterfly valves with the capability to disconnect the flange from either side with individual flange bolts.
- (d) Provide 300 psig ball valves on all drip legs, Y-strainers, fill valves, air vent valves, and trap assemblies.
- (e) Provide 1" 300 psig steam bypass warm up valves at all main steam valves. See **Detail No. 12/AE33**.
- (f) Match the trap and drip leg assemblies installed in the existing tunnel system. See **Detail No. 13/AE33**.
- (g) All valves for in-tunnel use should be of position-lock type.

5. Expansion Joints:

- (a) Provide bellows type expansion joints rated for 300 psig in the steam system and 150 psig in the condensate system.

6. Insulation and Jacketing:

- (a) Provide fiberglass insulation and aluminum jacketing on all piping consistent with the existing tunnel system.
- (b) Provide removable insulation blankets on all valves and expansion joints.

7. Testing:

- (a) Pressure test (hydro-test) all piping to 1-1/2 times the working pressure or a minimum of 175 psig.
- (b) All steam and chilled water piping systems will be weld tested to conform to ASME B31.3 for plant high pressure piping. Random X-ray tests will be completed by USU on 10% of the welds. If the failure rate is above 10% of x-rayed welds an additional 15% of the welds will be x-rayed. Repairs and retesting of failed welds will be completed at the expense of the contractor.

8. Cleaning and Flushing:

- (a) Clean, flush, and chemically treat all piping as directed by the current water treatment contractor contracted by USU.
- (b) Complete steam piping blow-off under direction from USU.

9. Identification and Labeling:

- (a) Provide identification and labeling consistent with the existing tunnel system including label types and numbering system.

10. Ventilation and Exhaust:

- (a) Provide ventilation as required by the current code. The existing tunnel system ventilation is based on 2 AC/hr.
- (b) Operate fresh air intake dampers as the first stage of cooling based on space temperature sensed by the thermostat.
- (c) Operate tunnel exhaust fans as the second stage of cooling based on space temperature sensed by the thermostat.
- (d) Interlock exhaust fans with air intake dampers. Exhaust fans will not operate when associated air intake damper(s) are closed.
- (e) Locate all exhaust fans and air inlets out of traffic areas (roadways and walkways).
- (f) Provide concrete benches with air inlets/outlets to match the existing benches or provide other approved designs by project design architect. See **Detail Nos. 9/AE33 & 10/AE33**.

M. Building Access:

- 1. Match the existing tunnel system.
- 2. Doors by contractor; locks by USU.

N. Miscellaneous:

- 1. Match the existing tunnel components for the following systems:
  - (a) Radio Antenna System
  - (b) Grating System
  - (c) Tunnel Penetrations
  - (d) Security System
  - (e) Concrete Walks and Curbs
  - (f) Landscaping

33 08 00 Commissioning of Utilities

- A. All utility systems shall be commissioned. Refer to project commissioning requirements.

**33 10 00 WATER UTILITIES**

33 11 00 Water Distribution Piping

- A. Install all undrained water piping with a minimum cover of 5-1/2 feet for freeze protection.
- B. Provide water distribution piping, fittings, and accessories from the following:
 

Culinary Water:	$\frac{3}{4}$ " – 3"	Poly service
		CTS
	4"	Ductile Iron
- C. Minimum diameter for all mainline water piping is 8-inch.
- D. All new connections to existing mainlines shall include a gate valve on the new connection and one on the mainline each side of the new tee (three valves total). Valves shall be cast-iron gate-valves with a resilient wedge seat, non-rising stem, and accept a 2" operating nut. CLOW or equal.
- E. Comply with Utah DAR Code R309-500-5 requirements for all water lines.
- F. All USU mainline water piping must meet requirements of 33 11 13 and 33 11 19.

#### 33 11 13 Public Water Utility Distribution Piping

- A. Install and test water lines according to the latest version of AWWA C600.
- B. Disinfect water lines according to the latest version of AWWA C651.

#### 33 11 19 Fire Suppression Water Distribution Piping

- A. Provide fire suppression water distribution piping, fittings, and accessories from the following:
 

Fire Suppression:	All sizes	Ductile Iron
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- B. Install all fire main piping as per NFPA 24 and Utah Admin. Code 309-550-5. Install thrust blocks per NFPA Appendix B.
- C. Fire hydrant mains shall be a minimum of 8 inches, and shall avoid dead-end situations so that the required fire flow is not compromised.
- D. Fire hydrant laterals, where there's a dead end and only 1 hydrant served, may be a minimum of 6 inches.
- E. Fire sprinkler mains shall be a minimum of 6 inches.

- F. Install fire main piping with a minimum cover of 5-1/2' and wrap all joint connections.
- G. Submit a contractor's material and test certification for underground piping.
- H. Test all piping to 1-1/2 times the working pressure with a minimum of 200 psig minimum
- I. USU authorized representative and USU Fire Marshal must witness and document all testing and flushing.

### 33 12 00 Water Distribution Equipment

- A. Consult with USU representatives for placement of backflow preventers, distribution valves, flow control valves, fire hydrants, pumping stations, meters, and other equipment.

### 33 12 19 Fire Hydrants

- A. Install fire hydrants as per NFPA 24.
- B. Fire hydrants shall be provided along the required fire apparatus access roads and adjacent public streets.
- C. The minimum number of fire hydrants required, spacing, and maximum distance (street to hydrant) shall be based on appendix C of the IFC.
- D. Provide approved dry barrel type fire hydrants having two 2-1/2-inch outlets and one 4-1/2-inch steamer connection, all outlets having NST (National Standard Threads).
- E. Provide protection guard posts where fire hydrants are subject to impact by motor vehicles conforming to section 312 of the IFC.
- F. See **Detail No. 16/AE33** for fire hydrant installation detail.

### 33 19 00 Water Utility Metering Equipment

- A. All water meters shall be ultrasonic or electromagnetic meters with an analog output signal for flow rate and a digital pulse output for totalized flow and shall be designed for culinary water. It shall have a backlit display that is IP67 rated and is direct or remotely mounted depending on the install location. It shall display the current gallons per minute and total gallons.

Provide water metering from the following:

Pipe sizes 1/2" to 2-1/2"	Onicon F-4600 inline ultrasonic
Pipe sizes 3" and larger	Onicon FT-3200 inline electromagnetic

### 33 30 00 SANITARY SEWERAGE UTILITIES

#### 33 31 00 Sanitary Sewerage Piping

- A. Provide sanitary sewerage piping, fittings, and accessories from the following:

Sanitary Sewer:	All sizes	Cast Iron PVC ABS
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- B. Vertical Drops: Open vertical drops are not allowed inside manholes and are strongly discouraged at any location. Provide piped vertical riser. Consult with USU personnel to discuss options. See **Detail No. 18/AE33** for piped vertical riser detail.
- C. Depressed Sewers (inverted siphons): Inverted siphons shall be discussed with USU personnel prior to design.
- D. Pipe Diameter: Sewer mains and laterals shall be designed to maintain a depth of not more than 0.9 times the internal diameter of the line at peak flows.
- E. Velocity: Sewer lines shall be designed to have a minimum velocity of 2 feet per second and a maximum velocity of 10 feet per second.
- F. Alignment: Sewer lines shall be designed with uniform grade and alignment between manholes.
- G. Manholes: Install manholes at the following conditions:
1. Every change in grade
  2. Every change in pipe diameter
  3. Every change in alignment
  3. Every junction of two or more sewer mains
  4. Every building connection (rare exception may be made for 4 inch service lines; consult with USU personnel)
- H. Logan City: Consult with USU and Logan City personnel prior to design sewer connections to confirm that Logan City's system has adequate capacity. Updates of their sewer system model may be required.

### 33 40 00 STORMWATER UTILITIES

#### 33 42 00 Stormwater Conveyance Piping

- A. Connect the building storm drainage system to storm water retention sumps located near each building on the central campus.

- B. Where sumps are necessary, they shall be adequately sized for a 100-year 1-hour storm. Provide a catch basin or a clean-out box at each change in direction or change in grade. Design site drainage, curb, and storm drains to keep water away from buildings and pedestrian walkways. Grates on all catch basins shall have bicycle- safe openings. Surface drains from paved areas shall have oil/water separators prior to discharging into the sumps. Oil/water separators should be premanufactured and sized according to the size of the sump. Bio filters may be used in lieu of oil/water separators when site conditions permit. Roof drains shall have separate sumps from surface drains.
- C. Provide surface water containment site plans to the applicable city in accordance with EPA rules prior to excavation.
- D. Connect all surface water to the storm water retention sumps. No storm water shall be connected to the sanitary sewer system.
- E. Provide storm drainage piping, fittings, and accessories from the following:

Storm Drainage:	All sizes	Cast Iron
		PVC
		ABS
		HDPE

33 46 00 Stormwater Management (Water Quality)

- A. Refer to the USU Stormwater Management guidelines in their dedicated section on the USU Facilities website (Div. 33 46 00).

**33 50 00 FUEL DISTRIBUTION UTILITIES**

33 51 00 Natural Gas Distribution

- A. The central campus natural gas system is 5 psig used for cooking equipment, laundry facilities, and laboratory gas systems. The central campus natural gas system should not be used for building heating or domestic hot water heating.
- B. Use 5 psig pressure for new exterior natural gas systems.
- C. Use 2 psig or 4 oz. pressure for new building natural gas systems installed inside of buildings.
- D. Provide thermoplastic ASTM D2513 exterior gas piping and anode less risers.

- E. Natural-gas pipe installers shall be Questar Gas certified.
- F. All natural-gas piping shall conform to Questar Gas requirements.
- G. Install poly pipe with sand bedding for underground installations. All connections to be fused by Questar certified contractor.
- H. Provide 30" minimum cover for all gas piping.
- I. Provide California automatic seismic shut-off valves as manufactured by Pacific Seismic Products downstream of the gas meter.

See Division 23 11 23 for Facility Natural-Gas Piping requirements.

### **33 60 00 HYDRONIC AND STEAM ENERGY UTILITIES**

#### **33 61 00 Hydronic Distribution**

- A. Provide direct buried chilled water piping, fittings, and accessories from the following:

Chilled Water:	All sizes	Schedule 40 seamless Black steel (welded) Gilsulate Insulation Or pre-insulated
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- B. Refer to utility tunnel section for chilled water piping requirements in tunnels.
- C. Install chilled water piping sloped for drainage and with 5-1/2' minimum ground cover.

#### **33 63 00 Steam and Condensate Distribution**

- A. Provide direct buried steam and condensate piping, fittings, and accessories from the following:

Steam:	All sizes	Schedule 40 seamless black steel (welded) Gilsulate Insulation
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Condensate:	All sizes	Schedule 10 stainless steel (TIG welded) Schedule 80 seamless black steel (welded) Gilsulate Insulation
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- B. Refer to utility tunnel section for steam and condensate piping requirements in tunnels and HVAC section for steam and condensate piping requirements in buildings.
- C. Install direct bury steam and condensate piping within a Gilsulate insulation envelope.
- D. Install steam and condensate piping with 5-1/2' minimum ground cover.

### **33 70 00 ELECTRICAL UTILITIES**

- B. Refer to the Electrical AE Manual.

### **33 80 00 COMMUNICATIONS UTILITIES**

- A. Refer to the Electrical AE Manual.

- END OF SECTION -

#### **Revision Log:**

9/27/20:	33 11 19 C:	Fire mains piping changed to 8-inches.
9/27/22:	33 46 00:	Stormwater Treatment moved to dedicated section.
9/28/22:	33 61 00:	Chilled water pipe changed to schedule 40 steel.
10/5/22:	33 05 16 E:	Added neutralization loop for tunnel nodes.
10/5/22:	33 11 00:	Added spec for water meter requirements.
10/5/22:	33 11 00:	Added three valves on all mainline tees.
10/5/22:	33 11 19:	Updates to fire main size requirements.
10/5/22:	33 51 00:	Added spec for seismic shut-off valves.

MATCH EXISTING ASPHALT EXCEPT  
4" MIN. AND 4" MIN. ROADBASE

BEDDING AND BACKFILL  
WHERE NO PAVEMENT  
EXISTS

12" TOPSOIL  
MATERIAL

MATERIAL PER SOIL  
REPORT

MARKING TAPE 18-24"  
ABOVE LINE

2ND LIFT

1ST LIFT

12" MIN.

NOTE:  
TRENCH SLOPE SHALL BE AS PER O.S.H.A.

SAWCUT EXISTING PAVEMENT  
A MIN. OF 1' BEYOND TRENCH

TACK COAT

EXISTING SUBGRADE

UNDISTURBED SOIL

12" PITRUN GRAVEL  
COMPACTED IN 2 LIFTS

SAND BEDDING MATERIAL

SAND, PVC=4" OR D.I.=2"

TRENCH WIDTH  
PER O.S.H.A.

1  
AE33

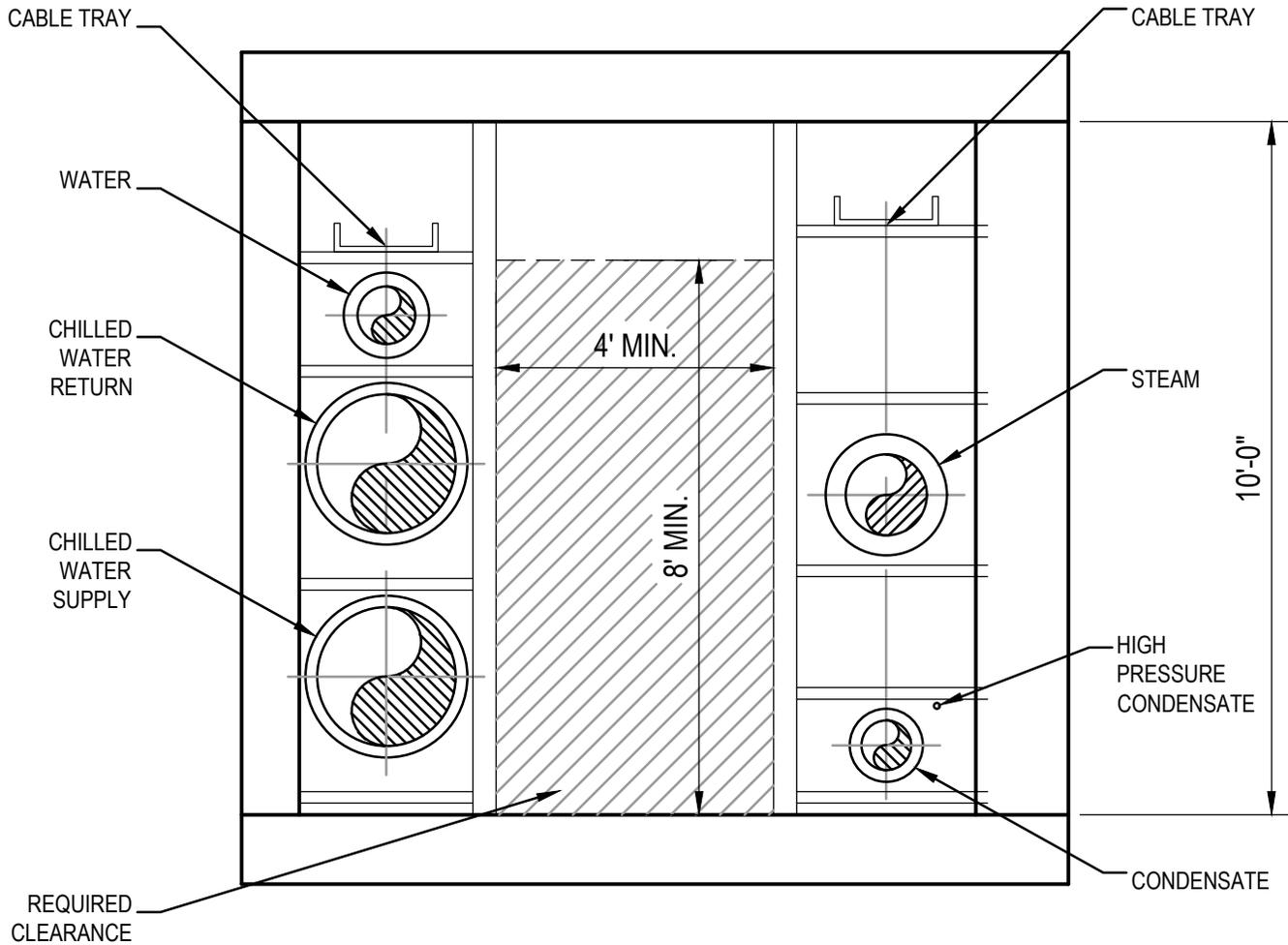
# UTILITY LINE INSTALLATION

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DETAIL NUMBER:	1
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



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2  
AE33

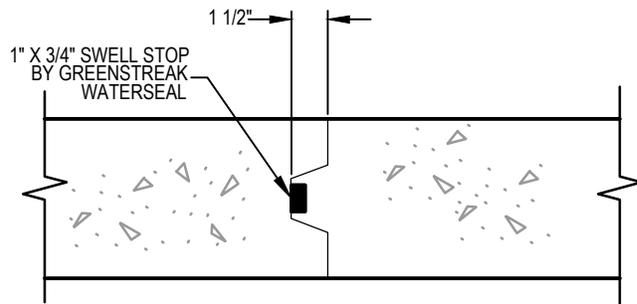
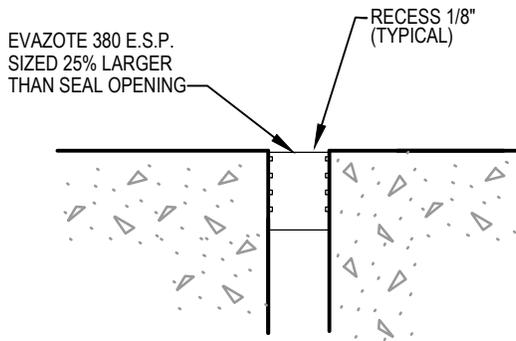
## TYPICAL MAIN TUNNEL SECTION

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SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



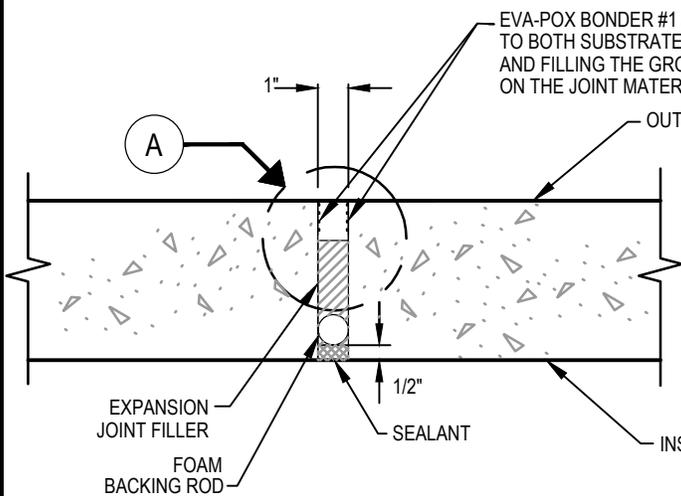
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PH (435) 797-3737 - F (435) 797-3888



CONSTRUCTION JOINT DETAIL  
TUNNEL WALLS AND BASE SLAB

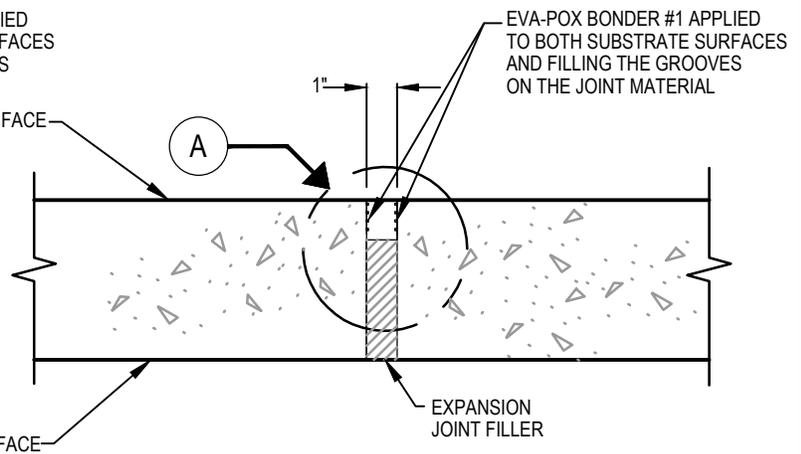
NOT TO SCALE

**A** DETAIL  
NOT TO SCALE



EXPANSION JOINT DETAIL  
TUNNEL WALLS

NOT TO SCALE



EXPANSION JOINT DETAIL  
TUNNEL BASE SLAB & TOP SLAB

NOT TO SCALE

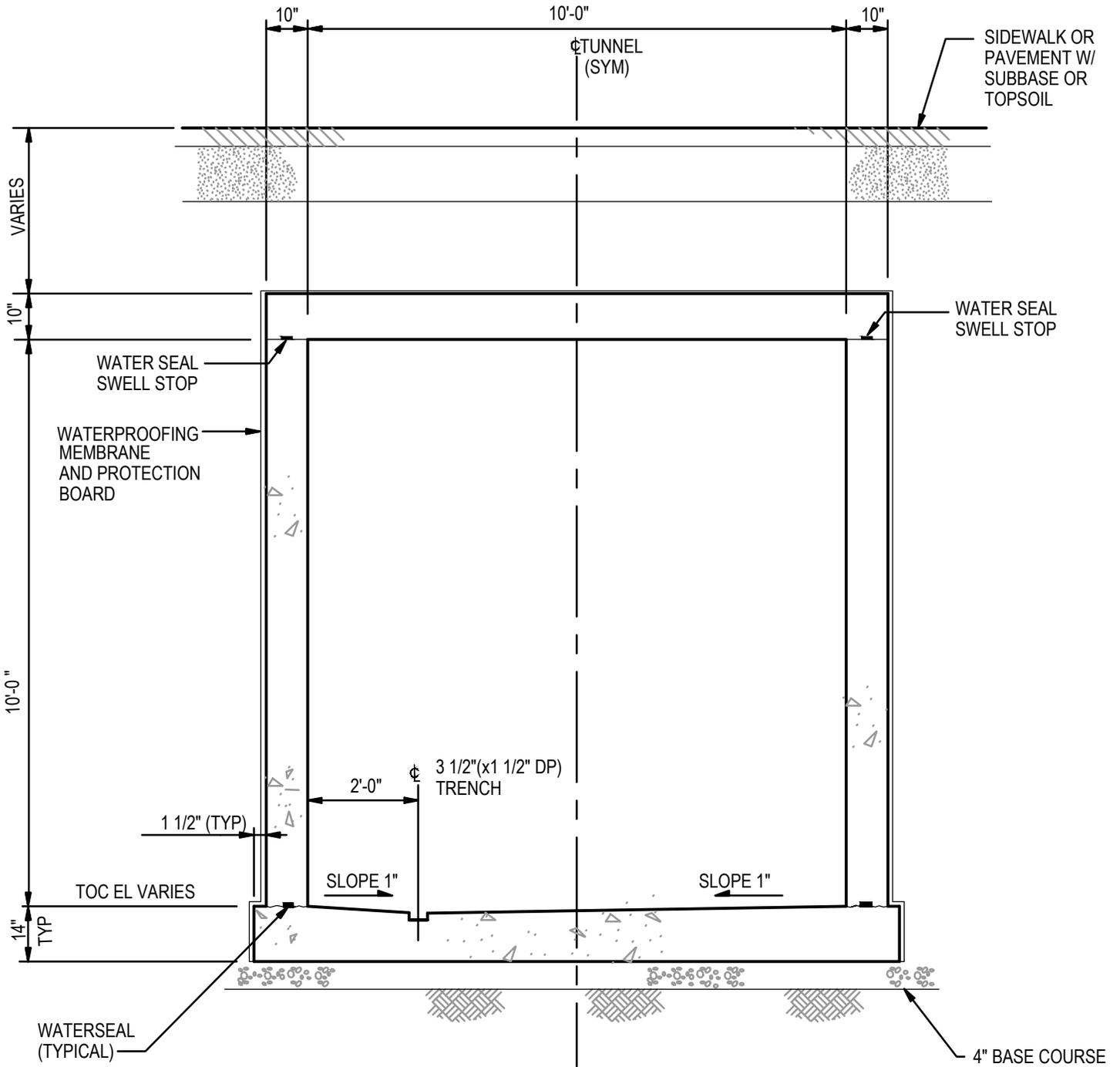
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AE33

**TYPICAL TUNNEL EXPANSION JOINT DETAIL**  
SCALE: N.T.S.

DETAIL NUMBER:	<b>3</b>
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



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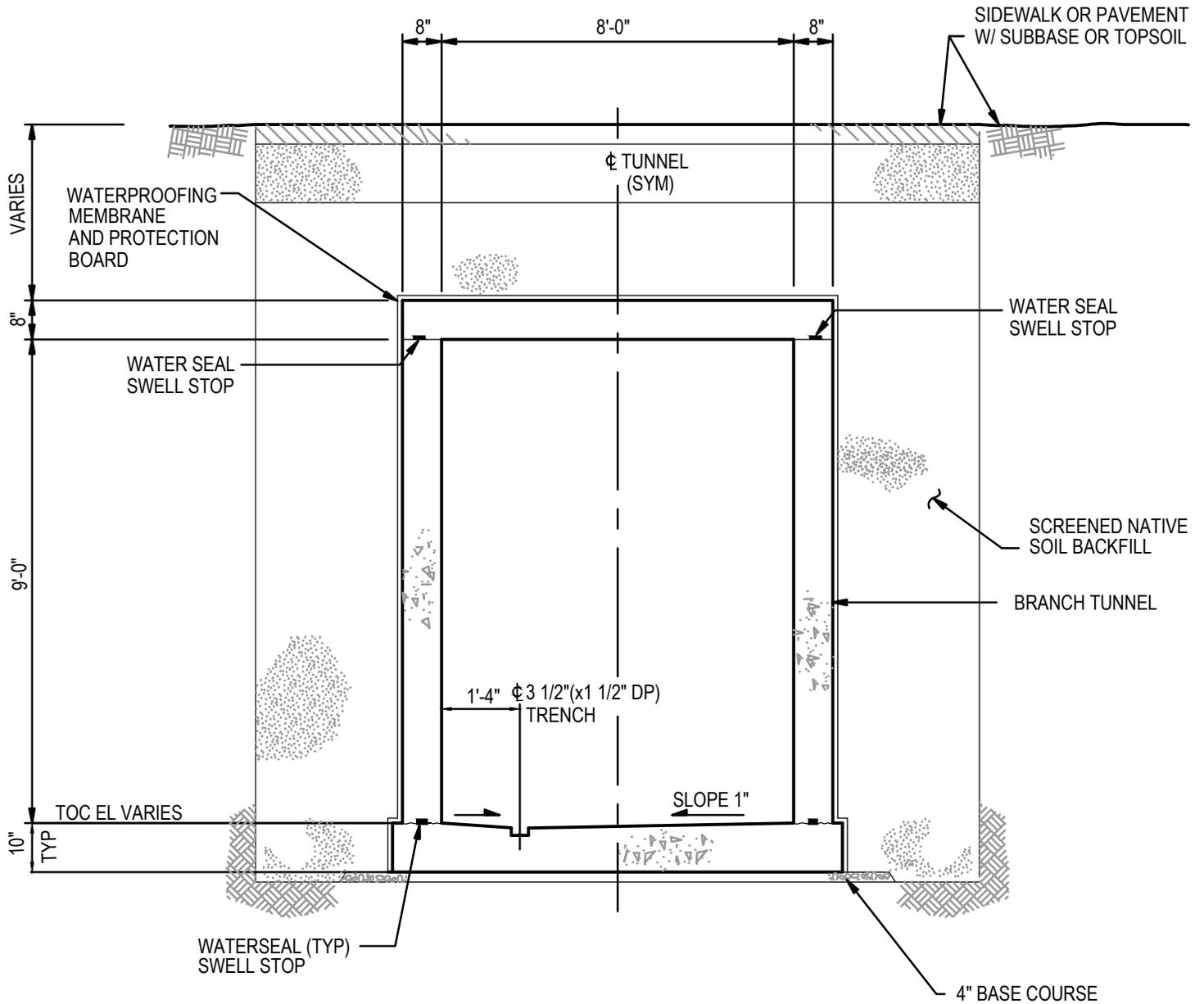


**4** TYPICAL MAIN TUNNEL SECTION  
 AE33 SCALE: N.T.S.

DETAIL NUMBER:	<b>4</b>
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CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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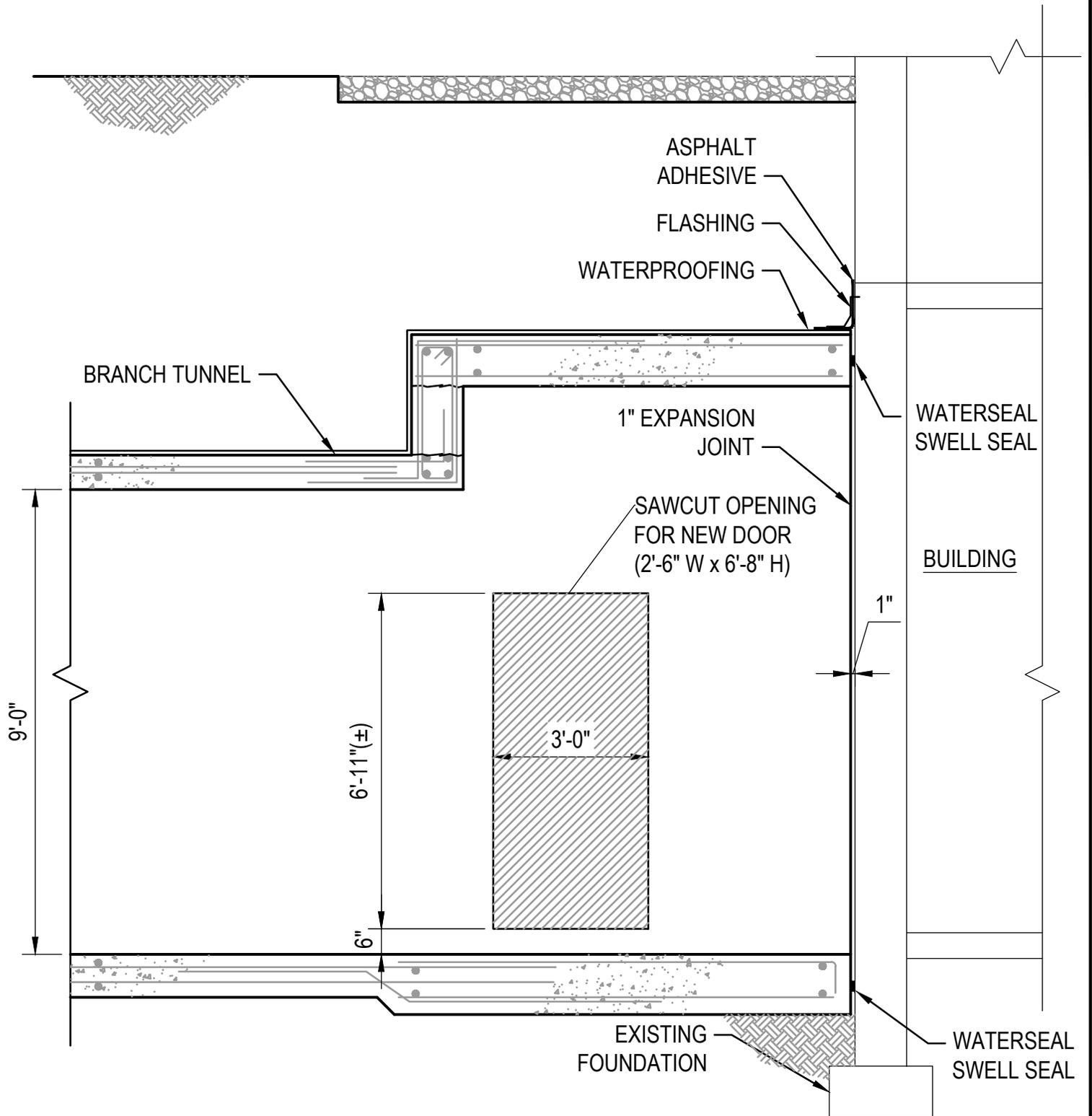


**5** TYPICAL BRANCH TUNNEL SECTION  
 AE33 SCALE: N.T.S.

DETAIL NUMBER:	<b>5</b>
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



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6  
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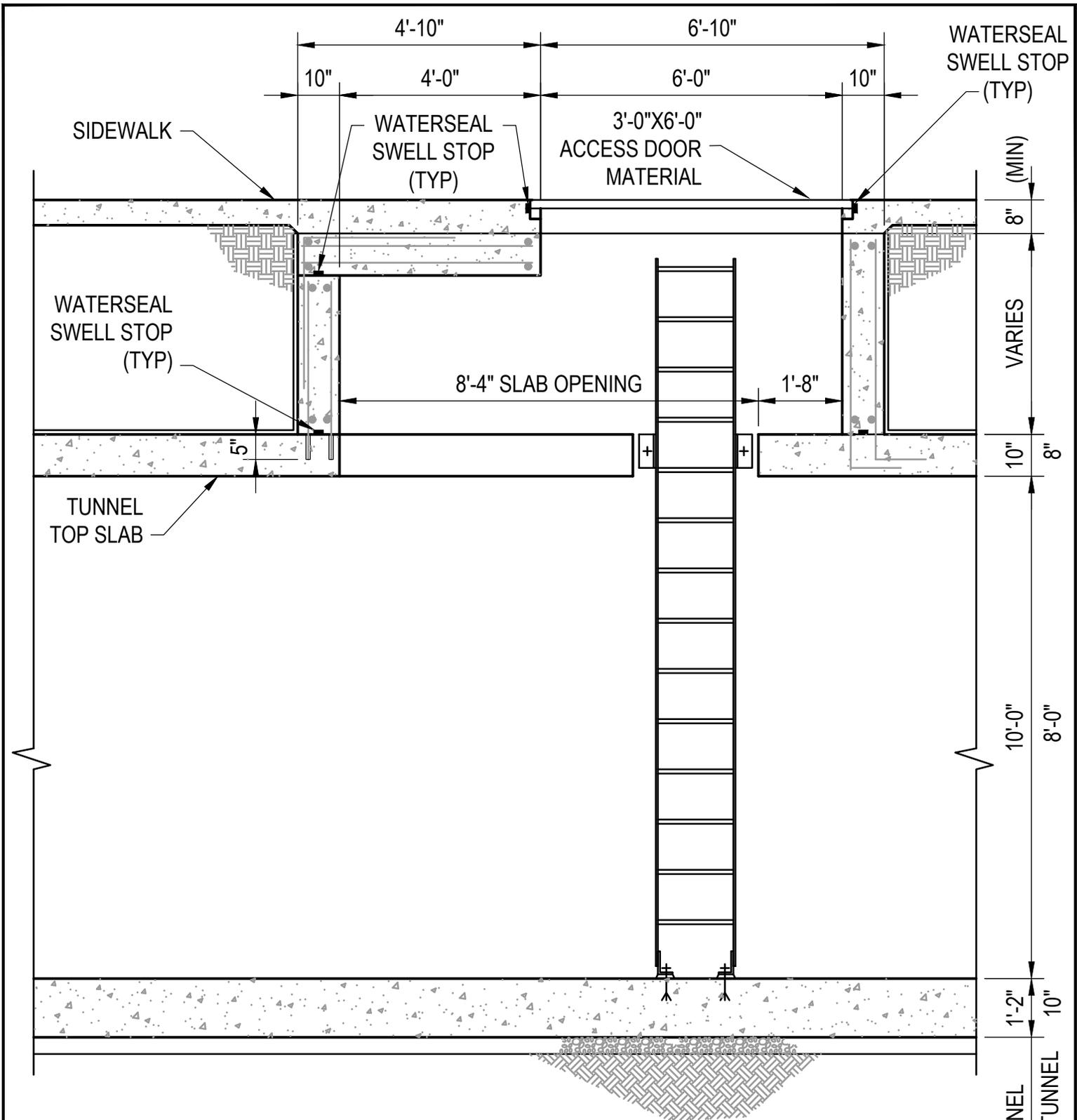
# BRANCH TUNNEL SECTION

SCALE: N.T.S.

DETAIL NUMBER:	6
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



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7  
AE33

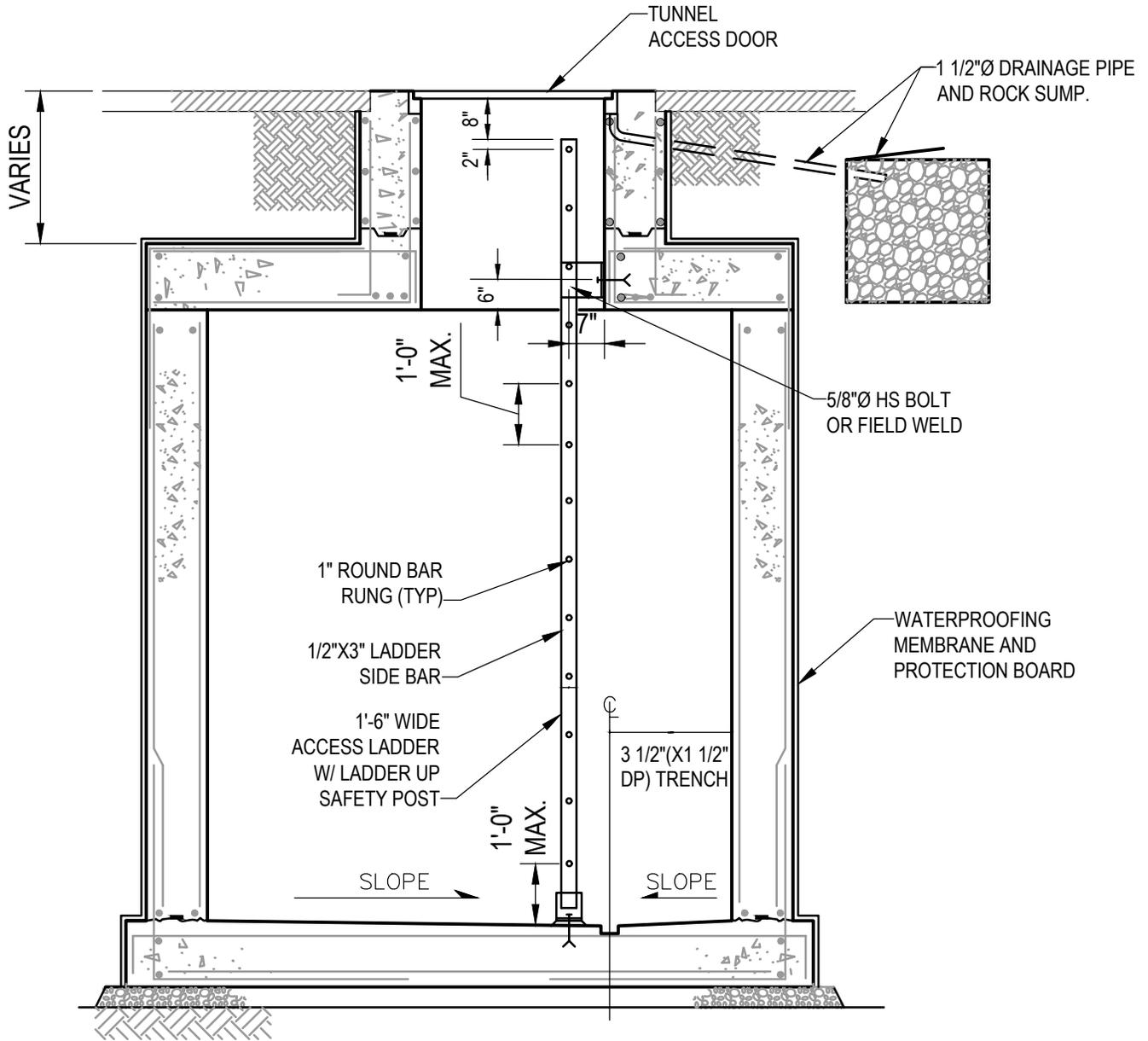
# TUNNEL SECTION

SCALE: N.T.S.

DETAIL NUMBER:	7
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



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8  
AE33

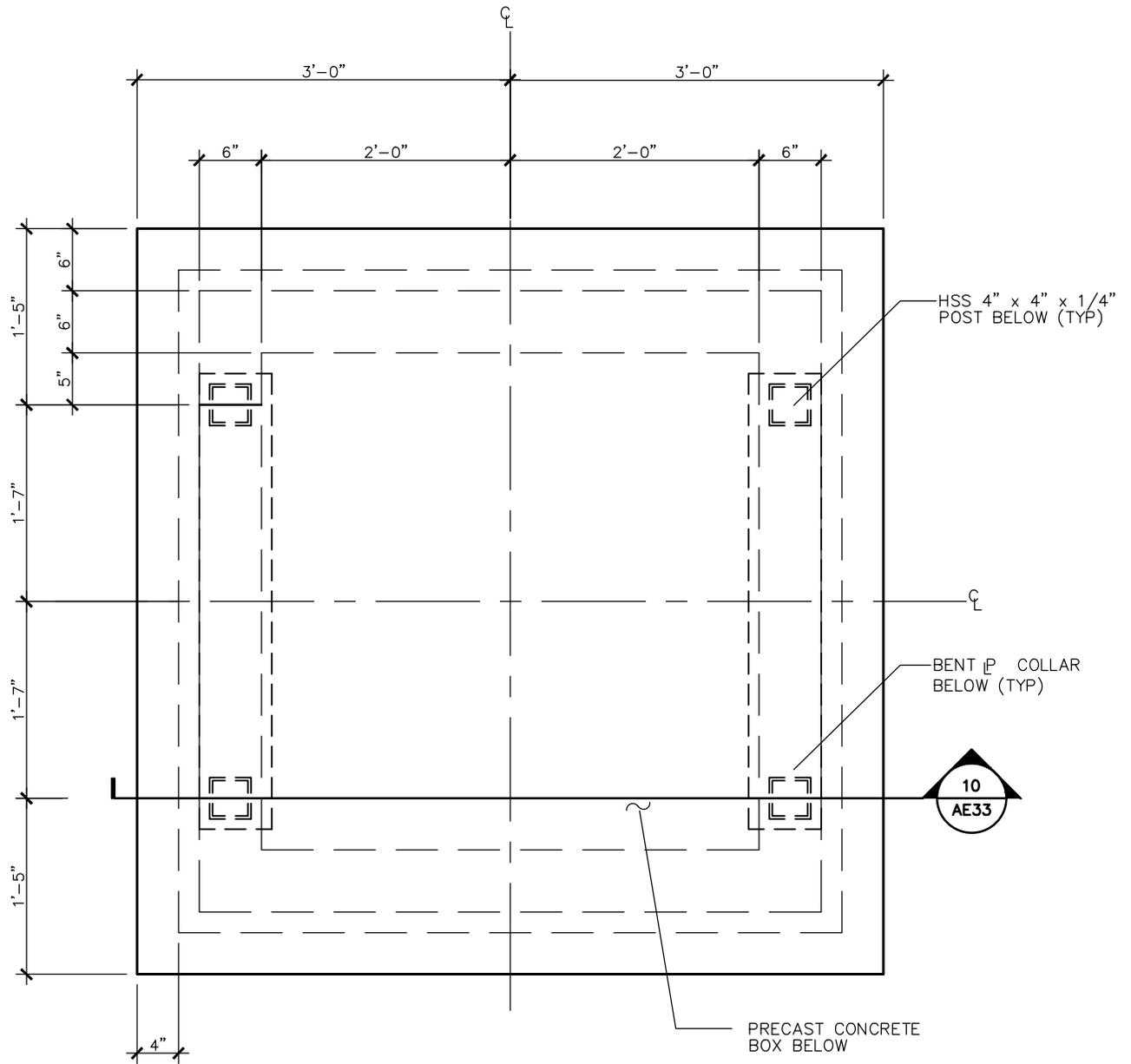
# TUNNEL SECTION

SCALE: N.T.S.

DETAIL NUMBER:	8
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



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9  
AE33

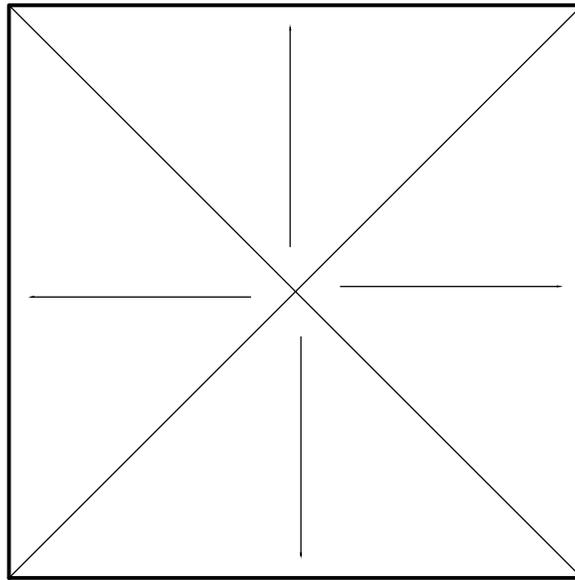
# PLAN- BENCH OVER AIR PLENUM

SCALE: N.T.S.

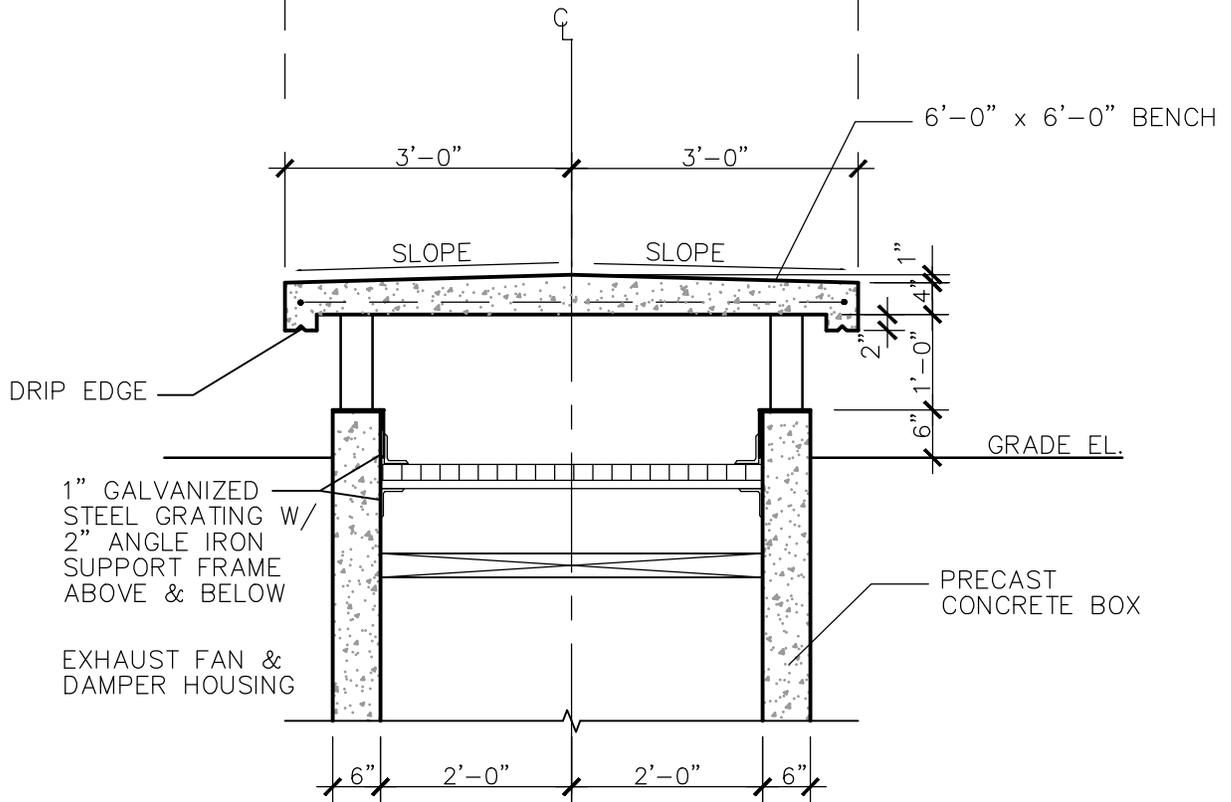
DETAIL NUMBER:	9
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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DRAINAGE PLAN TOP



DRIP EDGE

1" GALVANIZED  
STEEL GRATING W/  
2" ANGLE IRON  
SUPPORT FRAME  
ABOVE & BELOW

EXHAUST FAN &  
DAMPER HOUSING

6'-0" x 6'-0" BENCH

3'-0"

3'-0"

SLOPE

SLOPE

1"

4"

2"

1'-0"

6"

GRADE EL.

PRECAST  
CONCRETE BOX

6"

2'-0"

2'-0"

6"

10

# SECTION THROUGH BENCH @ AIR PLENUM

AE33

SCALE: N.T.S.

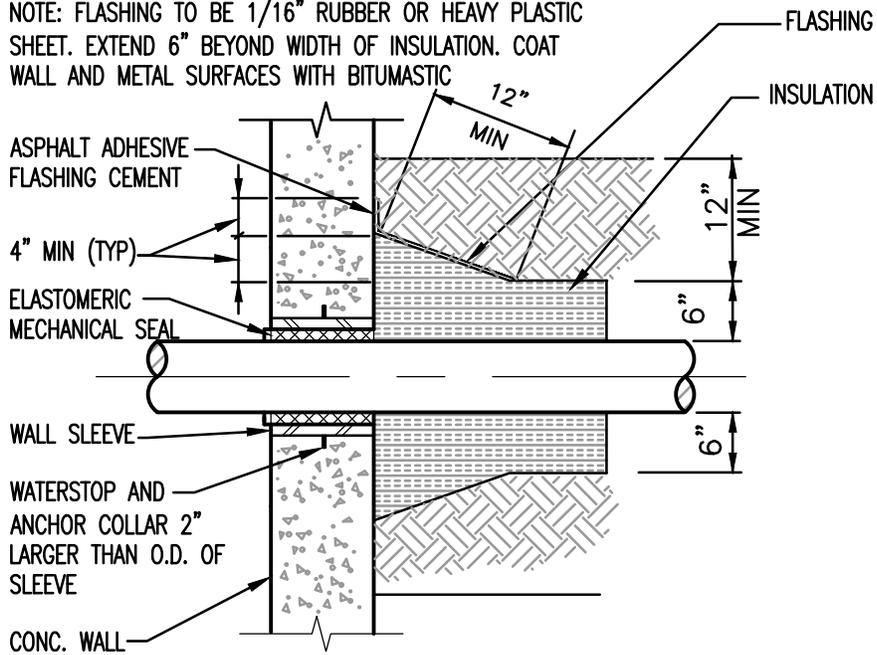
DETAIL NUMBER:	10
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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NOTE: FLASHING TO BE 1/16" RUBBER OR HEAVY PLASTIC SHEET. EXTEND 6" BEYOND WIDTH OF INSULATION. COAT WALL AND METAL SURFACES WITH BITUMASTIC

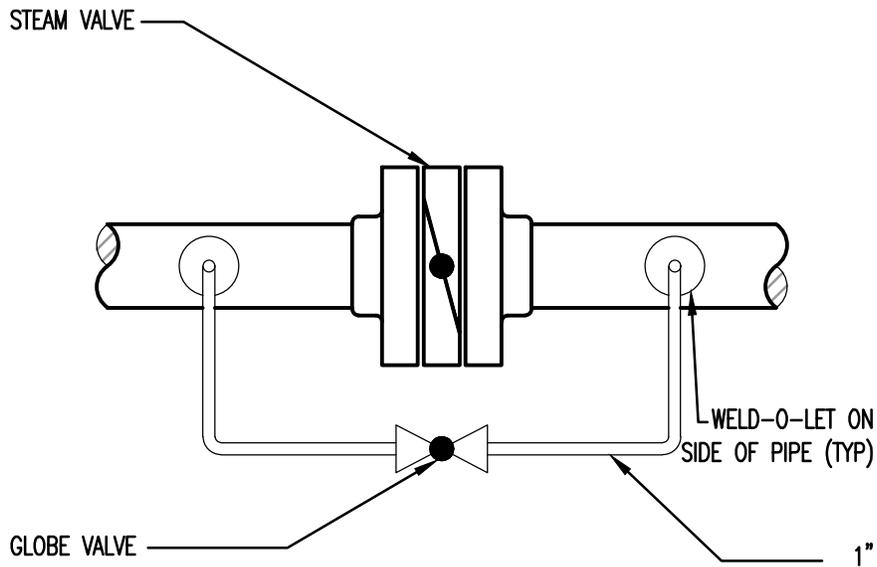


**11** WALL ENTRY DETAIL  
 AE33 SCALE: N.T.S.

DETAIL NUMBER:	<b>11</b>
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



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12  
AE33

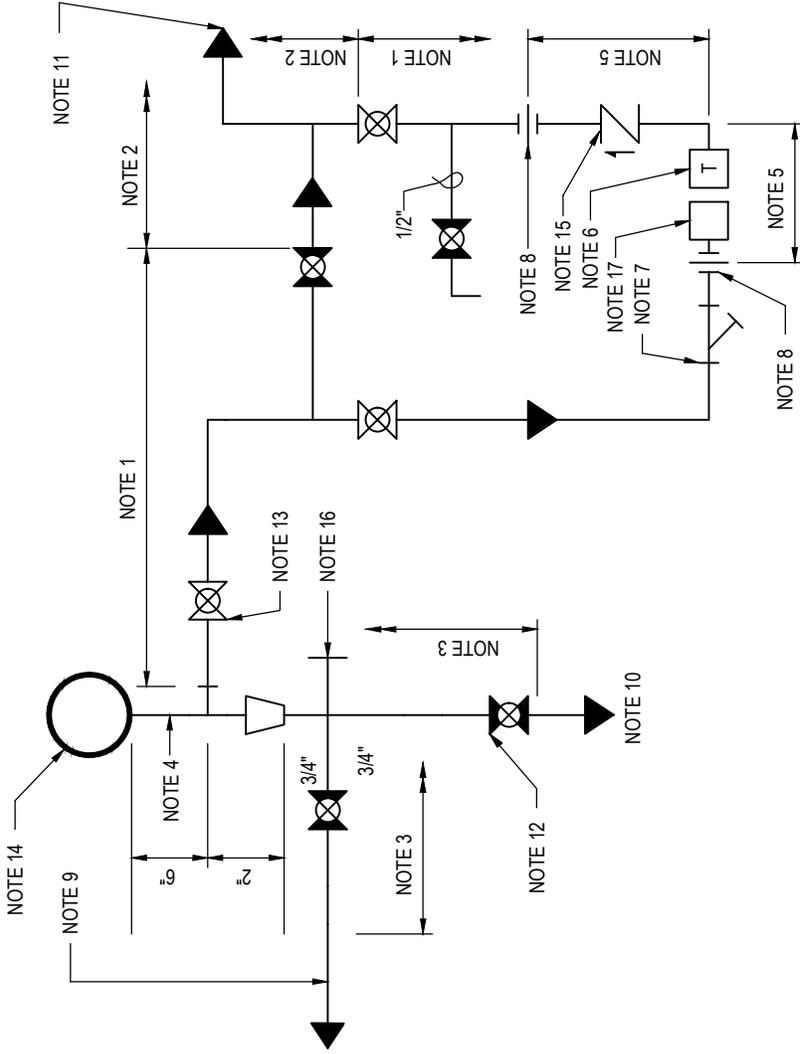
## TYPICAL STEAM VALVE DETAIL

SCALE: N.T.S.

DETAIL NUMBER:	12
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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STEAM TRAP NOTES:

1. PIPING:
  - a) PIPE CLASS SHALL BE SAME CLASS AS STEAM LINE.
  - b) PIPE SIZE SHALL BE SAME SIZE AS TRAP CONNECTION, UNLESS NOTED OTHERWISE.
2. PIPING: PIPE SHALL BE SCHEDULE 40 BLACK STEEL.
3. PIPING: PIPE SHALL BE SAME AS STEAM LINE.
4. DRIP POCKET: STEAM LINE 4" AND LARGER: 1/2 DIAMETER OF LINE SIZE. USE 3" DRIP ON 4" LINE. STEAM LINE 3" AND SMALLER: SAME AS DIAMETER.
5. THIS DIMENSION SHALL BE IDENTICAL FOR ALL TRAP INSTALLATIONS.
6. TRAP SHALL BE SIZED IN ACCORDANCE WITH SPECIFICATIONS.
7. STRAINER SHALL BE SUITABLE FOR MAXIMUM DESIGN PRESSURE AND TEMPERATURE. STRAINER INLET AND OUTLET CONNECTIONS SHALL BE SAME SIZE AS SIZE OF TRAP INLET CONNECTION.
8. PROVIDE UNIONS ON STEAM LINE.
9. ALTERNATE HORIZONTAL ARRANGEMENT OF BLOW-OFF WHERE HEADROOM REQUIREMENTS WILL NOT PERMIT VERTICAL INSTALLATION.
10. BLOW-OFF PIPING:
  - a) EXTEND TO NEAREST TRENCH.
  - b) PIPE CLASS TO SCHEDULE 40 BLACK STEEL.
11. CONNECT DISCHARGE OF ALL TRAPS TO NEAREST CONDENSATE RETURN LINE, UNLESS INDICATED OTHERWISE ON PIPING AND INSTRUMENT DIAGRAMS.
12. BLOW-OFF BALL VALVE WITH POSITION LOCK AND RATE FOR STEAM PRESSURE.
13. ISOLATING BALL VALVE WITH POSITION LOCK AND RATE FOR STEAM PRESSURE.
14. STEAM LINE.
15. CHECK VALVE
16. PLUG.
17. STEAM TRAP LEAK SENSOR.

# 13 STANDARD STEAM TRAP "ST" DETAIL

SCALE: N.T.S.



DETAIL NUMBER:	<b>13</b>
DATE:	7/7/14
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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36"x 36" REINFORCED  
MANHOLE COVER WITH HANDLE.

FINISHED GRADE.

FILL SPACE AROUND  
SUMP WITH 1" -3" Ø  
WASHED GRAVEL  
OR CRUSHED STONE.

6" REINFORCED  
CONCRETE COVER  
WITH #4 REBAR 6" O.C.  
EACH WAY 1/2"  
OFF BOTTOM.

DURACRETE  
PRECAST  
DRY-WELL.

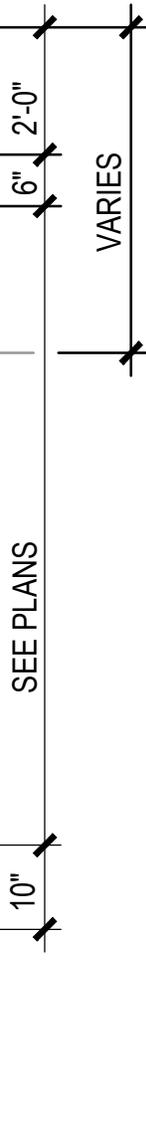
ANNULAR  
CONCRETE FOOTING.

FILL BOTTOM  
WITH GRAVEL

OVERFLOW PIPE SEE  
PLANS FOR SIZE.

INLET PIPE. SEE  
PLAN FOR SIZE.

MIRAFI 140 FILTER  
FABRIC BETWEEN  
GRAVEL AND EARTH.  
TOP, SIDES, AND  
BOTTOM OF SUMP.



14  
AE33

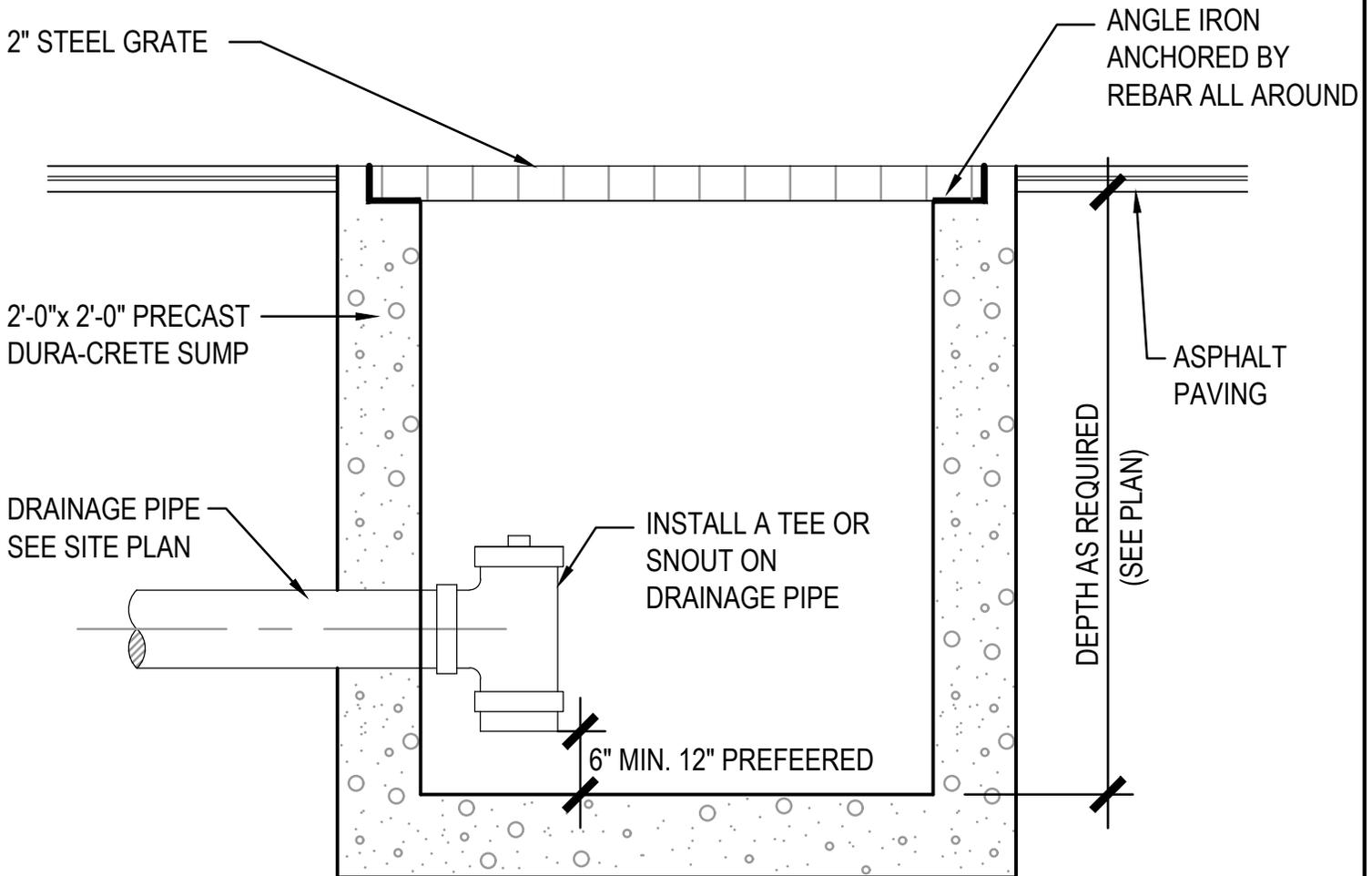
# STORM DRAIN SUMP DETAIL

SCALE: N.T.S.

DETAIL NUMBER:	14
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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NOTE: STEEL GRATE AND SUMP TO BE REINFORCED FOR TRUCK TRAFFIC.

15  
AE33

## CATCH BASIN DETAIL

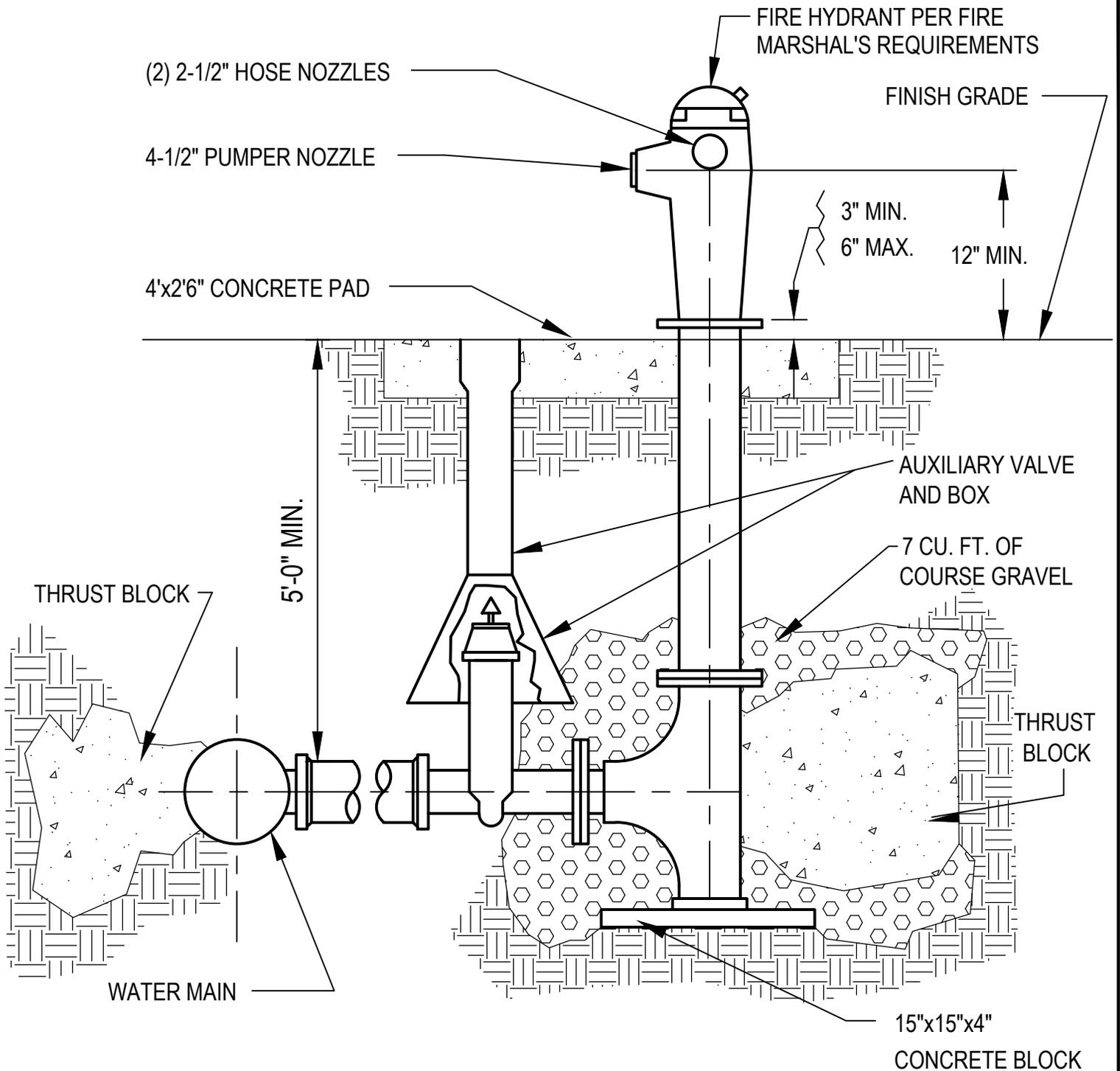
SCALE: N.T.S.

DETAIL NUMBER:	15
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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16  
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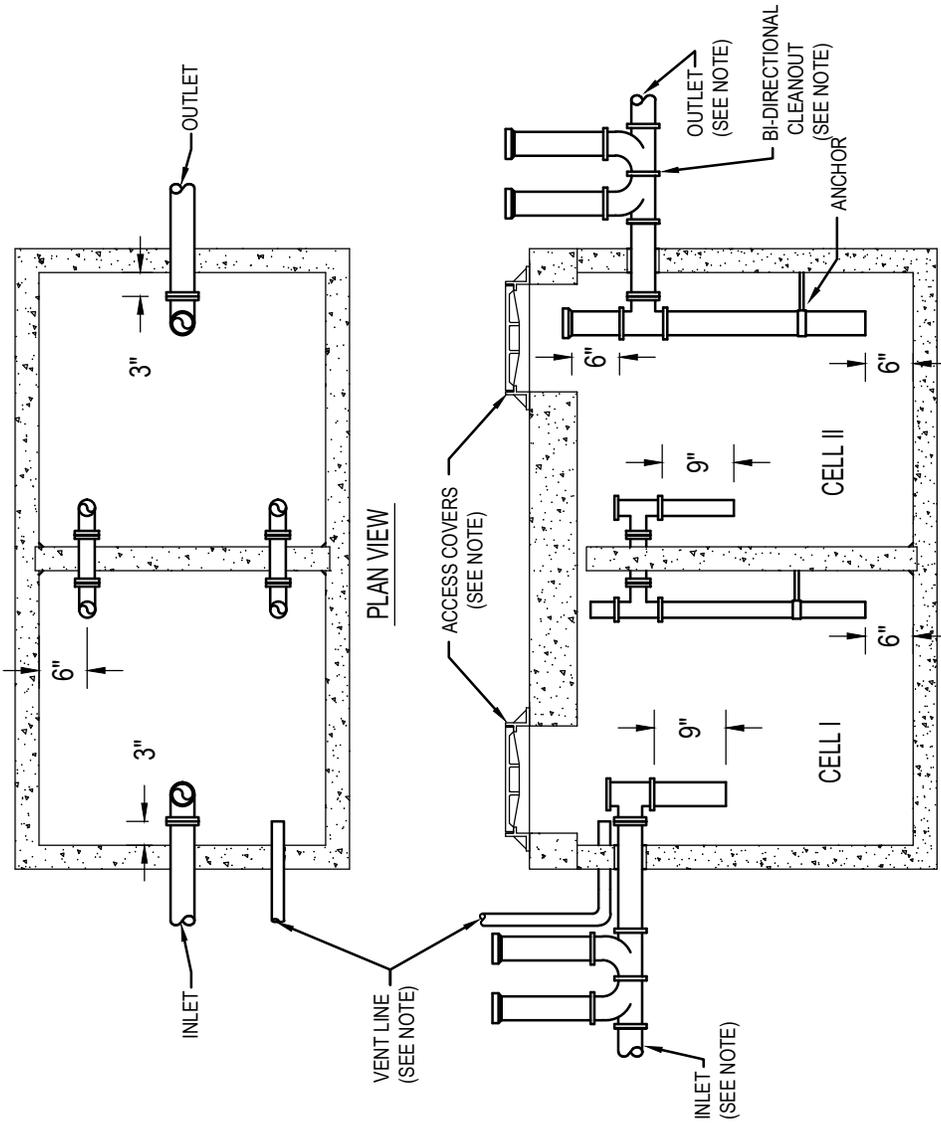
# FIRE HYDRANT

SCALE: N.T.S.

DETAIL NUMBER:	16
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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**NOTES:**

**1- GENERAL CONDITIONS:**

- A- Place a minimum of 6-inches of free draining bedding material under interceptor
- B- Interceptor to be within 1/2-inch of level in any direction from corner to corner
- C- Bi-directional cleanouts required at Inlet and Outlet
- D- No separate sampling manhole is required (Outlet baffle meets requirement of sampling manhole)

**2- ACCESS COVERS:**

- A- Shall be 24-inch diameter and stamped as "SEWER"
- B- Shall be a hinged style rings and covers unless tight covers are required
- C- Tight covers are required when the interceptor is surrounded by buildings on at least three sides and the buildings are within 100 feet or if the interceptor is located in a high traffic area (USU personnel will determine requirement).

- D- Set cover to within 1/8-inch lower than surrounding finish grade
- E- In landscaped areas interceptor lid must be 12-inches below finished grade (i.e. 6-inch grade ring and 6-inch access ring and cover)
- F- Grade ring use is limited to 12-inches

**3- VENT LINE:**

- A- Required only when tight access covers are utilized
- B- Shall be a minimum 2-inch diameter pipe
- C- Shall be sloped TO interceptor
- D- Penetration into interceptor must be sealed
- E- Shall be terminated above roof of building being serviced by interceptor

**4- INLET/OUTLET PIPING:**

- A- Shall be minimum 4-inch diameter
- B- Penetration to be sealed with a flexible, cast-in, pipe to structure connector
- C- Inlet shall be at least 1-inch higher than inlet to Cell II
- D- Outlet shall be at least 2-inches lower than inlet
- E- All joints must be properly connected
- F- Outlet baffle piping must be anchored to interceptor wall in at least one location

**5- BAFFLE WALL:**

- A- Design shown is not the only allowable design
- B- Any configuration that meets the intent of the design is acceptable
- C- Intent is to transfer liquid from Cell I to Cell II while eliminating "short circuits"

**SECTION VIEW**

**GREASE INTERCEPTOR**

SCALE: N.T.S.

17  
AE33

DETAIL NUMBER:	<b>17</b>
DATE:	12/11/09
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	

12" WIDE CONCRETE RING REQUIRED IN PAVEMENTS

FINISH GRADE

NEENAH TYPE R- 1706 MANHOLE FRAME WITH SOLID LID-TOTAL WT. 385#

PROVIDE PRECAST RINGS TO BRING COVER TO PROPER ELEVATION

CONE SELECTIONS TO BE "REINFORCED CONCRETE SEWER PIPE" (C76-CLASS III)

PREFORMED PLASTIC GASKET

WALL SURFACE TO BE MANUFACTURED AND REINFORCED IN CONFORMITY WITH ASTM SPECIFICATION C76-CLASS III

CONCRETE FLOOR SLOPE 2" PER FOOT

SLAB POURED IN PLACE

SET MANHOLE FRAME AND COVER TO BE 1/8" TO 1/4" BELOW FINISHED GRADE AFTER FINAL STREET GRADING IS COMPLETE.

SEAL WITH KENT SEAL, RAM NECK, OR EQUAL

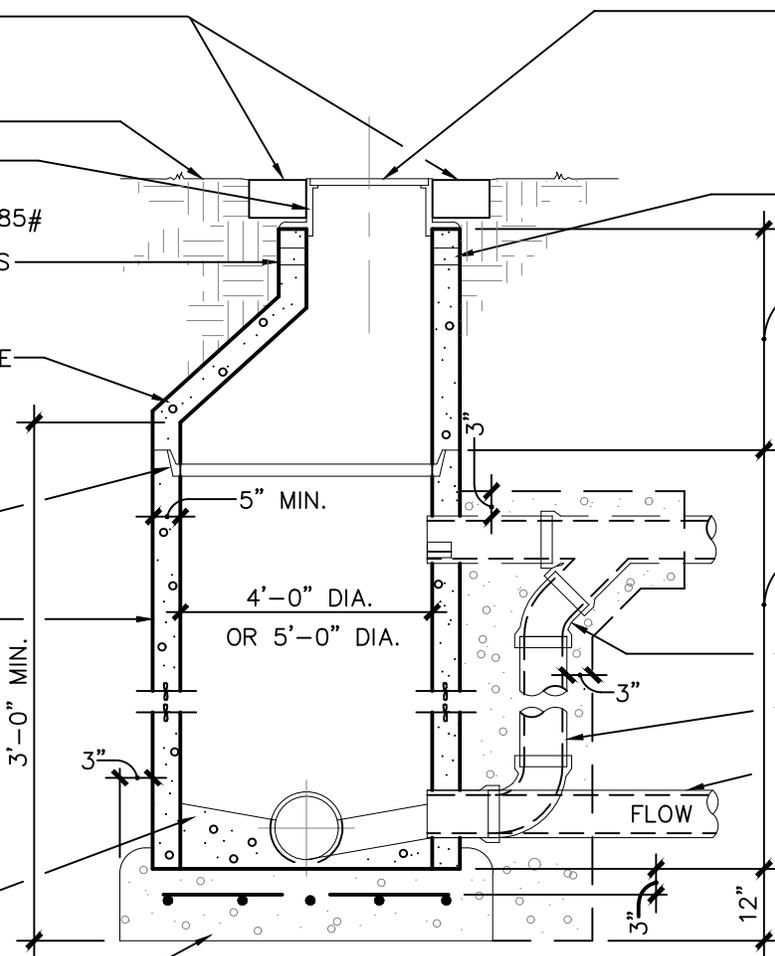
STRAIGHT BACK PRE-CAST MANHOLE CONE

STANDARD PRECAST MANHOLE SECTIONS (DEPTH VARIES)

30° OR 45° BEND

DROP MANHOLE CONNECTION

USUAL CONNECTION



NOTE: PROVIDE FLEXIBLE JOINTS IN PIPELINES 18" FROM OUTSIDE FACE OF MANHOLE.

18  
AE33

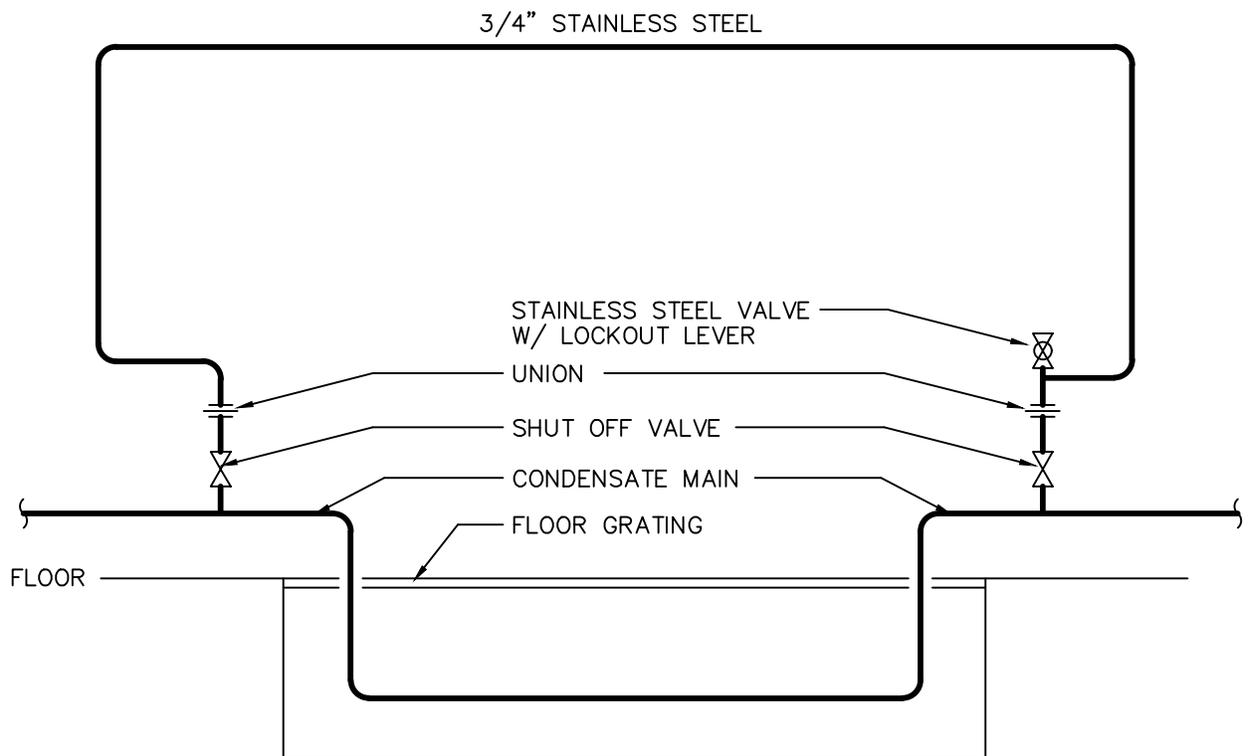
# SEWER MANHOLE DETAIL

SCALE: N.T.S.

DETAIL NUMBER:	18
DATE:	12/16/22
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
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# CONDENSATE NEUTRALIZING LOOP IN TUNNEL

19  
AE33

SCALE: N.T.S.

DETAIL NUMBER:	19
DATE:	12/16/22
CAD DWG FILE:	AE-DETAILS
SCALE:	NTS
SHEET:	AE-DIV 33
DRAWN BY:	-



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