

LOCATION MAP

LATITUDE: 41°29'08"      LONGITUDE: 81°37'22"




PORTION TO BE IMPROVED.....	_____
INTERSTATE HIGHWAY .....	_____
FEDERAL ROUTES .....	_____
STATE ROUTES .....	_____
COUNTY & TOWNSHIP ROADS.....	_____
OTHER ROADS .....	_____

DESIGN DESIGNATION

CURRENT ADT (2017) .....	35,820
DESIGN YEAR ADT (2020) .....	48,230
DESIGN HOURLY VOLUME (2020) .....	3,580
DIRECTIONAL DISTRIBUTION .....	58%
TRUCKS (24 HOUR B&C) .....	6%
DESIGN SPEED .....	40 MPH
LEGAL SPEED .....	35 MPH
DESIGN FUNCTIONAL CLASSIFICATION .....	URBAN PRINCIPAL ARTERIAL
NHS PROJECT .....	NO

## DESIGN EXCEPTIONS

NONE

<h2 style="text-align: center;">UNDERGROUND UTILITIES</h2> <p style="text-align: center;">CONTACT BOTH SERVICES TWO WORKING DAYS BEFORE YOU DIG.</p>	
 <p><b>OHIO Utilities Protection SERVICE</b></p> <p>(Non-members must be called directly)</p>	<p><i>Call Before You Dig</i></p> <p><b>1-800-362-2764</b></p>
<p style="text-align: center;"><b>OIL &amp; GAS PRODUCERS UNDERGROUND PROTECTION SERVICE</b></p> <p style="text-align: center;"><b>1-800-925-0988</b></p>	



ENGINEERS SEAL:



SIGNED: Alan mly  
DATE: 03/29/2019

ENGINEERS SEAL:



SIGNED: Wanda B. Woellendorf  
DATE: 03/29/2019

STATE OF OHIO

DEPARTMENT OF TRANSPORTATION

**CUY-IR490 / SR010-  
2.09 / 19.28**

**CITY OF CLEVELAND**  
**CUYAHOGA COUNTY**

*INDEX OF SHEETS:*

SEE SHEET 2

**BU-05**  
**E 55TH ST: STORM SEWER,**  
**REGULATOR, AND**  
**SLUDGE FORCE MAIN**

PLAN PREPARED BY:

**Michael Baker**  
INTERNATIONAL

1111 SUPERIOR AVENUE EAST, SUITE 2300  
CLEVELAND, OHIO 44114



ONE CASCADE PLAZA, SUITE 905  
AKRON, OH 44308

[illegible]

### PROJECT DESCRIPTION

THIS PROJECT CONSISTS OF THE CONSTRUCTION OF 2.09 MILES OF A NEW TWO- TO THREE-LANE BOULEVARD FROM E. 55TH ST. TO E. 93RD ST. WORK INCLUDES PAVEMENT, RAILROAD, STRUCTURES, DRAINAGE, WATERWORK, LIGHTING, POWER DISTRIBUTION, TRAFFIC CONTROL, LANDSCAPING, AND ADJUSTMENT OF EXISTING UTILITIES.

### EARTH DISTURBED AREAS

PROJECT EARTH DISTURBED AREA: 87.2 ACRES  
ESTIMATED CONTRACTOR EARTH DISTURBED AREA: 0 ACRES  
NOTICE OF INTENT EARTH DISTURBED AREA: 87.2 ACRES  
(AREA SERVICED BY COMBINED SEWER)

## 2016 SPECIFICATIONS

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING CHANGES AND SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

0	2019-03-29	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		

FEDERAL PROJECT NO.  
**E140 (249)**

PID NO.  
**96833**

CONSTRUCTION PROJECT NO.  
**17-3000**

RAILROAD INVOLVEMENT  
**NORFOLK SOUTHERN**  
**GCRTA**

-IR490/ SR010-  
2.09 / 19.28
$$\frac{1}{67}$$

## RECORD PLANS

RECORD PLANS

RECORD PLANS





OWNERSHIP AND MAINTENANCE RESPONSIBILITY

ONCE CONSTRUCTION IS COMPLETE, ALL STORM, SANITARY, AND COMBINED SEWERS DEPICTED IN THESE PLANS SHALL BE OWNED AND MAINTAINED BY THE CITY OF CLEVELAND, DEPARTMENT OF WATER POLLUTION CONTROL, UNLESS NOTED OTHERWISE IN THE PLANS.

CLEVELAND WATER POLLUTION CONTROL

THE CONTRACTOR SHOULD NOTIFY THE DIVISION OF WATER POLLUTION CONTROL (WPC) PRIOR TO START OF CONSTRUCTION OF ANY CITY OF CLEVELAND SEWERS. CALL THE ENGINEERING OFFICE AT (216) 664-2756 OR (216) 664-3638 TO COORDINATE THE SEWER WORK.

THE CONTRACTOR IS REQUIRED TO SUBMIT SEWER SHOP DRAWINGS TO WPC PRIOR TO ANY CITY SEWER INSTALLATION. THE DRAWINGS SHOUD INCLUDE THE SEWER PIPES, MANHOLES, CATCH BASINS AND OTHER SEWER APPURTENANCES.

ANY PROPOSED CITY OF CLEVELAND SEWERS SHOULD BE CONSTRUCTED IN ACCORDANCE TO THE PLANS AND SPECIFICATIONS APPROVED BY WPC. ANY DEVIATIONS FROM THE APPROVED PLANS OR SPECIFICATIONS REQUIRE A NEW PLAN SUBMITTAL REFLECTING THE CHANGES. UPON REVIEW OF THE REVISED ITEMS, WPC WILL RE-ISSUE A NEW APPROVAL. IT IS STRICTLY PROHIBITED TO CONSTRUCT ANY CITY OF CLEVELAND SEWERS UNLESS THEY ARE APPROVED BY WPC.

UPON COMPLETION OF ANY CITY OF CLEVELAND SEWER INSTALLATION, THE CONTRACTOR IS REQUIRED TO SUBMIT A HARD COPY AND AN ELECTRONIC COPY OF AS-BUILT PLANS, AND A CCTV COPY OF THE NEW CITY SEWERS. WPC RESERVES THE RIGHT NOT TO APPROVE ANY SEWER THAT DOES NOT MEET THE CITY REQUIREMENTS.

ITEM 611 - CATCH BASIN, NO. 2-2A, AS PER PLAN

CATCH BASINS, NO. 2-2A, SHALL BE CONSTRUCTED IN ACCORDANCE WITH O.D.O.T. STANDARD DETAIL CB-1.1 WITH THE ADDITION OF A 12" TRAP AND 2' SUMP.

ITEM 611 - CATCH BASIN, NO. 2-2B, AS PER PLAN

CATCH BASINS, NO. 2-2B, SHALL BE CONSTRUCTED IN ACCORDANCE WITH O.D.O.T. STANDARD DETAIL CB-1.1 WITH THE ADDITION OF A 12" TRAP AND 2' SUMP.

ITEM 611 - CATCH BASIN, NO. 3A, AS PER PLAN

CATCH BASINS, NO. 3A SHALL BE CONSTRUCTED IN ACCORDANCE WITH O.D.O.T. STANDARD DETAIL CB-2.2 WITH THE ADDITION OF A 12" TRAP AND 2' SUMP.

ITEM 611 - MANHOLE, NO. 3, AS PER PLAN

MANHOLE NO. 3, SHALL BE CONSTRUCTED IN ACCORDANCE WITH O.D.O.T. STANDARD DETAIL MH-1.2 WITH THE CITY OF CLEVELAND MH-1 FRAME AND LID.

CITY OF CLEVELAND STANDARD DRAWINGS

THE APPLICABLE STANDARD DRAWINGS AND DETAILS OF THE CITY OF CLEVELAND HAVE BEEN INCORPORATED AS MISCELLANEOUS DETAILS, WATERWORK DETAILS AND POWER DISTRIBUTION DETAILS WITHIN THE PLAN SET. THESE DRAWINGS AND DETAILS REPRESENT THE MOST CURRENT VERSIONS APPROVED BY THE CITY OF CLEVELAND AND HAVE BEEN INCLUDED TO DEPICT THE INTENT OF THE PARTICULAR CONSTRUCTION FEATURES, HOWEVER THEY HAVE NOT BEEN UPDATED FOR CONFORMANCE WITH THE 2016 ODOT CMS. WHEN REFERENCES TO NON-CURRENT CMS ITEMS ARE ENCOUNTERED WITHIN THE DETAILS (I.E. "ITEM 604" OR "CLASS C CONCRETE") THE CURRENT SECTION OF THE CMS (I.E. "ITEM 611 OR "CLASS QC-1 CONCRETE") SHALL APPLY. INTERPRETATIONS REGARDING THE APPLICABLE SECTIONS OF THE 2016 CMS SHALL BE AT THE DIRECTION OF THE ENGINEER.

GENERAL DRAINAGE REQUIREMENTS

THE DBT SHALL REMOVE SEDIMENT AND DEBRIS FROM EXISTING DRAINAGE CONDUITS (MAINLINE AND LATERAL STORM AND COMBINED SEWERS) AND DRAINAGE STRUCTURES AS FOLLOWS:

1. ANY DRAINAGE STRUCTURE TO WHICH THE DBT CONNECTS
2. ANY DRAINAGE STRUCTURE RECEIVING RUNOFF DURING CONSTRUCTION FROM AREAS DISTURBED BY THE WORK.
3. THE ADJACENT DRAINAGE CONDUIT EXTENDING FROM THESTRUCTURE IDENTIFIED IN CONDITIONS (1) OR (2) TO THE NEXT DOWNSTREAM DRAINAGE STRUCTURE.
4. ALL MATERIALS REMOVED SHALL BE DISPOSED OF AS PER C&MS 105.16 AND 105.17.

THE CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE RESULTING FROM CONSTRUCTION ACTIVITIES, PRIOR TO ACCEPTANCE OF WORK.

CONTRACTOR SHALL PREVENT ANY DEBRIS FROM ENTERING THE SEWERS OR THE DIVERSION STRUCTURE. ANY DEBRIS ENTERING THE SEWER OR DIVERSION STRUCTURE SHALL BE REMOVED BY THE CONTRACTOR.

NEW CONNECTIONS TO REINFORCED CONCRETE OR VITRIFIED CLAY PIPE SHALL HAVE A MANUFACTURED BOOT THAT MAKES A WATERTIGHT CONNECTION.

ITEM SPECIAL - FILL AND PLUG EXISTING CONDUIT

THIS ITEM SHALL CONSIST OF THE CONSTRUCTION OF BULKHEADS IN EXISTING CONDUITS AND FILLING THE INSIDE AREA TO SEAL THE CONDUITS OFF WITH ITEM 613, SAND OR OTHER MATERIAL APPROVED BY THE ENGINEER.

PIPES 10 INCHES THROUGH 24 INCHES IN DIAMETER OR RISE WITH LESS THAN 3 FEET OF FINAL COVER SHALL BE REMOVED; WITH MORE THAN 3 FEET OF FINAL COVER THEY MAY BE ABANDONED IN PLACE BY FILLING AND PLUGGING. PRIOR TO FILLING AND PLUGGING, CONDUIT SHALL BE VIDEOTAPED TO ENSURE THAT UNKNOWN CONNECTIONS ARE NOT IMPACTED.

BULKHEADS SHALL BE LOCATED AT THE LIMITS OF THE AREA TO BE FILLED AS INDICATED ON THE PLANS. THE BULKHEADS SHALL CONSIST OF BRICK OR CONCRETE MASONRY WITH A MINIMUM THICKNESS OF 12 INCHES.

THE FILL MATERIAL SHALL BE PUMPED INTO PLACE, OR PLACED BY OTHER MEANS APPROVED BY THE ENGINEER, SO THAT, AFTER SETTLEMENT, AT LEAST 90 PERCENT OF THE CROSS SECTIONAL AREA OF THE CONDUIT, FOR ITS ENTIRE LENGTH, SHALL BE FILLED. THE LENGTH OF FILLED AND PLUGGED CONDUIT TO BE PAID FOR SHALL BE THE ACTUAL NUMBER OF FEET (MEASURED ALONG THE CENTERLINE OF EACH CONDUIT FROM OUTER FACE TO OUTER FACE OF BULKHEADS) FILLED AND PLUGGED AS DESCRIBED ABOVE.

THE LENGTH, MEASURED AS PROVIDED ABOVE, SHALL BE PAID FOR AT THE CONTRACT PRICE PER FOOT FOR, ITEM SPECIAL, FILL AND PLUG EXISTING CONDUIT.

UNRECORDED STORM WATER DRAINAGE

FURNISH A CONTINUANCE FOR ALL UNRECORDED STORM WATER DRAINAGE, SUCH AS ROOF DRAINS, FOOTER DRAINS, OR YARD DRAINS, DISTURBED BY THE WORK. FURNISH EITHER AN OPEN CONTINUANCE OR AN UNOBSTRUCTED CONTINUANCE BY CONNECTING A CONDUIT THROUGH THE CURB OR INTO A DRAINAGE STRUCTURE. THE LOCATION, TYPE, SIZE AND GRADE OF THE NEEDED CONDUIT TO REPLACE OR EXTEND AN EXISTING DRAIN WILL BE DETERMINED BY THE ENGINEER.

UNRECORDED ACTIVE SANITARY SEWER CONNECTIONS

FURNISH A CONTINUANCE FOR ALL UNRECORDED ACTIVE SANITARY SEWER CONNECTIONS SUCH AS SANITARY, WASTEWATER, CURTAIN/GRADIENT DRAINS, AND FOUNDATION FLOOR DRAINS DISTURBED BY THE WORK. FURNISH AN UNOBSTRUCTED CONTINUANCE OF THE UNRECORDED ACTIVE SANITARY SEWER CONNECTIONS TO THE SATISFACTION OF THE ENGINEER. ALL SANITARY AND SANITARY WASTEWATER CONTINUANCE MAY REQUIRE A NPDES PERMIT FROM THE OHIO ENVIRONMENTAL PROTECTION AGENCY. REPORT ALL CONTINUANCE TO THE LOCAL HEALTH DEPARTMENT.

MISCELLANEOUS METALS

FOR ADJUSTMENT OR REPLACEMENT OF EXISTING DRAINAGE STRUCTURE CASTINGS TO BE RETAINED IN THE ROADWAYS, A CONTINGENCY QUANTITY OF 25,000 POUNDS OF MISCELLANEOUS METAL PER CMS 611 HAS BEEN INCLUDED WITHIN THE LUMP SUM BID FOR DRAINAGE WORK. THIS WORK SHALL BE AS DIRECTED BY THE DEPARTMENT. IF THE QUANTITY EXCEEDS 25,000 POUNDS, THE DEPARTMENT WILL PAY THE ADDITIONAL QUANTITIES IN ACCORDANCE WITH THE CONTRACT.

EXISTING CASTINGS

CASTINGS TO REMAIN AFTER EXISTNG ROADWAY AND PAVEMENT REMOVALS SHALL BE RAISED TO 1.0' ABOVE THE FINISHED GRADE UNLESS ADJACENT TO PAVED AREAS.

UNLESS OTHERWISE SPECIFIED IN THESE PLANS, IN AREAS OF PAYMENT REMOVAL, THE PAVEMENT AND BASE COURSE REMOVAL WILL BE FILLED AS NECESSARY TO REESTABLISH EXISTING GRADE. THIS WILL INCLUDE 4" OF TOPSOIL AND SEEDING TO MEET EXISTING GRADE.

TRENCH BACKFILLING

UNLESS OTHERWISE SPECIFIED, ALL BACKFILLING OF TRENCHES WITHIN PAVEMENT LIMITS, WITH THE EXCEPTION OF UNDERDRAINS, SHALL BE BACKFILLED TO THE TOP OF THE TRENCH OR BOTTOM OF SUBGRADE, WHICHEVER IS LOWER, WITH LOW STRENGTH MORTAR (LSM) PER CITY OF CLEVELAND SPECIFICATIONS. LSM SHALL CONSIST OF THE FOLLOWING:

CEMENT (ASTM C-150, TYPE 1): 50 LBS

SAND (PER C&MS 703.03, SSD): 2475 LBS

WATER: 25 GALLONS

ADMIXTURE (AIR): 3 OZ.

APPROVED ADMIXTURES: MASTER BUILDERS-RHEOFILL, AXIM-FLOW AIR, W.R. GRACE-DARAFILL (AN EQUAL MAY BE USED ONLY WITH DEPARTMENT APPROVAL)

USE OF FLY ASH, SPENT FOUNDRY SAND OR CORE SAND IS STRICTLY PROHIBITED.

ITEM SPECIAL - PRE AND POST CONSTRUCTION VIDEOTAPING

EXISTING TRUNK SEWERS IMPACTED BY THE ZONE OF INFLUENCE OF CONSTRUCTION ACTIVITY SHALL BE VIDEO INSPECTED PER C&MS 611 TWICE IN THE COURSE OF THIS PROJECT: FIRST, BEFORE CONSTRUCTION BEGINS; AND SECOND, AFTER CONSTRUCTION IS COMPLETED AND PRIOR TO FINAL ACCEPTANCE OF THE WORK. CONSTRUCTION ACTIVITY AS IT RELATES TO STORM SEWER INSPECTION SHALL BE DEFINED AS RETAINING WALL, BRIDGE, OR ROADWAY CONSTRUCTION ACTIVITY CROSSING OR ADJACENT TO AN EXISTING STORM OR COMBINED SEWER. THE ZONE OF INFLUENCE AREAS SHALL BE DETERMINED BY THE DBT AND APPROVED BY THE GOVERNING AGENCY. THE VIDEO INSPECTION REQUIREMENT SHALL APPLY TO ALL IMPACTED TRUNK SEWERS REGARDLESS OF SIZE, DEPTH, OR TYPE.

UNLESS OTHERWISE SPECIFIED IN THIS SCOPE DOCUMENT, VIDEO INSPECTION LIMITS SHALL INCLUDE THE LENGTH OF SEWER WITHIN THE INFLUENCE AREA AND EXTEND 50 FEET UPSTREAM AND DOWNSTREAM BEYOND THE INFLUENCE AREA LIMITS. VIDEO INSPECTION LIMITS SHALL BE APPROVED BY THE DEPARTMENT AND THE MAINTAINING AGENCY OF THE SEWER PRIOR TO COMMENCEMENT OF WORK. THE DBT SHALL PROVIDE DVD COPIES OF ALL VIDEO/INSPECTION REPORTS TO THE DEPARTMENT OF ALL INSPECTIONS PERFORMED.

SEWERS TO BE VIDEO INSPECTED SHALL BE CLEANED TO FACILITATE THE VIDEO INSPECTION.

SANITARY

ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER SYSTEM ARE PROHIBITED.

ALL SANITARY SEWERS 18" DIAMETER AND SMALLER SHALL BE CLAY PIPE PER ASTM C-700, JOINTS PER ASTM C-425 AND INSTALLED PER ASTM C-12. ALL SANITARY SEWERS SHALL PASS THE AIR-ACCEPTANCE PRIOR TO ACCEPTANCE BY THE CITY OF CLEVELAND. THIS APPLIES TO ALL PROPOSED SANITARY SEWERS OF 18" DIAMETER AND SMALLER. TESTING OF THE SANITARY SEWER SHALL MEET ASTM C-828 REQUIREMENTS.

ALL PROPOSED CONDUIT 21" AND LARGER SHALL BE REINFORCED CONCRETE PIPE WITH PREMIUM JOINTS (CMS 706.02 & 706.11).

WHERE INLET AND OUTLET PIPES CONNECT TO MANHOLES, A FLEXIBLE WATERTIGHT JOINT IS REQUIRED. FLEXIBLE MANHOLE CONNECTIONS SHALL MEET ASTM C-923. PRECAST MANHOLE CONSTRUCTION SHALL MEET ASTM C-478 WITH JOINTS PER ASTM C-443. ALL NEW SEWER MANHOLES SHALL BE VACUUM TESTED IN ACCORDANCE WITH THE PROCEDURES OF ASTM C-1244.

ALL SANITARY SEWERS AND APPURTENANCES SHALL BE CONSTRUCTED IN STRICT ACCORDANCE WITH THESE PLANS, THE CURRENT STANDARDS AND SPECIFICATIONS OF THE NORTHEAST OHIO REGIONAL SEWER DISTRICT AND CITY OF CLEVELAND, AND IN ACCORDANCE WITH THE CURRENT UNIFORM STANDARDS FOR SEWERAGE IMPROVEMENTS.

UNDERDRAINS, TYPE F CONDUIT

WHEN A PIPE UNDERDRAIN SPANS THE TRENCH OF A LOWER CONDUIT (UTILITY, STORM SEWER, ETC.) AND THE VERTICAL DISTANCE BETWEEN THE LOWER CONDUIT AND THE UNDERDRAIN IS LESS THAN OR EQUAL TO 12 INCHES, TYPE F CONDUIT SHALL BE USED TO SPAN THE LOWER TRENCH. USE A MINIMUM OF 10 FEET OF THE TYPE F CONDUIT, CENTERED OVER THE LOWER TRENCH.

NORTH EAST OHIO REGIONAL SEWER DISTRICT (NEORSD)

THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY AND ALL PERMITS REQUIRED FOR THE WORK.

A 72-HOUR NOTICE SHALL BE PROVIDED TO MAINTENACE SERVICES - TECHNICAL SUPPORT AT PERMITS@NEORSD.ORG TO SCHEDULE AN NEORSD INSPECTOR FOR THE CONNECTION TO NEORSD OWNED SEWERS.

REFERENCE:

BU-09 FOR SANITARY SEWER  
BU-10 FOR WATER LINES  
BU-11 FOR CPP DUCT BANKS  
BU-15 FOR ROADWAY, PAVEMENT & GRADING  
BU-27 FOR STREET LEVEL LIGHTING

1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

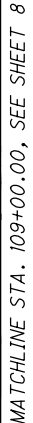
Ref. No.	Station	Offset (ft)	Side	Alignment	604/605 Item	Grate/Rim Elev.	603 Item	Type	Length (ft)	Upstream		Downstream		Comments
							Size (in)			Ref. No.	Invert	Ref. No.	Invert	
D-158	11+55.00	9	LT	BUTLER AVE	CLE. CB-1	677.75	12	B	5	D-158	672.50	EXIST		
D-157	11+45.00	13.8	RT	BUTLER AVE	CLE. CB-1	677.47	12	B	5	D-157	677.47	EXIST		
D-156A	20+07.00	12.25	LT	BOWER AVE	CLE. CB-1	669.23	12	B	12	D-156A	665.32	D-156	665.23	
D-156	19+95.00	11	LT	BOWER AVE	CLE. CB-3	669.16	12	B	11	D-156	661.01	EXIST		
D-155	20+08.00	15.57	RT	BOWER AVE	CLE. CB-1	669.15	12	B	23	D-155	665.29	EXIST		
D-154	13+92.50	12	LT	E 59TH ST	CLE. CB-1	669.62	12	C	44	D-154	665.17	S-111	664.55	
D-153A	10+33.00	12.5	RT	E 59TH ST	CLE. CB-1	676.81	12	B	24	D-153A	672.57	D-152A	671.57	
D-153B	26+04.00	15	LT	FRANCIS AVE	CLE. CB-1	677.00	12	B	6	D-153B	673.32	EXIST		
D-153	21+77.00	14.5	LT	FRANCIS AVE	CLE. CB-1	670.84	12	B	71	D-153	661.53	D-113	660.61	
D-152A	10+33.00	12.5	LT	E 59TH ST	CLE. CB-1	676.81	12	B	37	D-152A	671.57	EXIST	671.20	
D-152	21+77.00	15.28	RT	FRANCIS AVE	CLE. CB-1	671.02	12	B	29	D-152	661.82	D-153	661.53	
D-151	133+00.00	30.5	RT	OC BLVD	CLE. MH-1	653.11	12	B	101	D-151	648.47	D-149	645.80	
D-150	133+00.00	48	RT	OC BLVD	CLE. CB-1	652.76	12	B	17	D-150	648.69	D-151	648.47	
D-149A	131+85.00	21	LT	OC BLVD	CLE. CB-1	650.15	12	B	59	D-149A	644.17	D-149	643.53	
D-149	132+00.00	36	RT	OC BLVD	CLE. MH-1	650.30	15	B	129	D-149	643.28	D-105	639.80	
D-148	134+25.00	8.8	RT	OC BLVD	CLE. CB-1	656.84	12	B	125	D-148	652.65	D-151	648.47	
D-147	132+00.00	48	RT	OC BLVD	CLE. CB-1	650.06	12	B	12	D-147	646.19	D-149	645.89	
D-145	12+75.00	29	LT	E 55TH ST	CLE. CB-1	665.92	12	B	78	D-145	661.92	S-10A REG	661.14	
D-144	12+75.00	29	RT	E 55TH ST	CLE. CB-1	665.92	12	B	37	D-144	661.25	S-101	656.00	
D-143	15+17.00	29	LT	E 55TH ST	CLE. CB-3	664.32	12	B	46	D-143	660.32	D-114	659.86	
D-142A	15+28.59	29	RT	E 55TH ST	CLE. CB-3	664.32	16	B	28	D-142A	660.08	D-138A	659.75	
D-142B	15+38.55	29	RT	E 55TH ST	CLE. CB-3	664.32	12	B	10	D-142B	660.48	D-142A	660.41	
D-140A	15+64.79	29	RT	E 55TH ST	CLE. CB-3	664.55	12	B	26	D-140A	660.55	D-142B	660.55	
D-140B	15+71.37	29	RT	E 55TH ST	CLE. CB-3	664.55	12	B	7	D-140B	660.73	D-140A	660.55	
D-139	16+00.00	28.24	LT	E 55TH ST	CLE. CB-1	664.98	12	B	17	D-139	660.98	D-130	660.81	
D-138	14+95.79	25.85	RT	E 55TH ST	CLE. MH-1	664.48	15	B	37	D-138	651.31	S-112	650.51	
D-138A	15+03.00	41	RT	E 55TH ST	CLE. MH-1	664.61	16	B	19	D-138A	659.75	D-138	659.52	
D-137	101+00.00	24	RT	QUADRANT RD	CLE. CB-3	665.97	12	B	47	D-137	662.04	D-136	661.42	
D-136	101+00.00	24.19	LT	QUADRANT RD	CLE. CB-3	665.94	12	B	55	D-136	661.42	D-113	660.61	
D-135	129+50.00	49	RT	OC BLVD	CLE. CB-1	643.45	12	B	18	D-135	639.95	D-103	639.27	
D-134	107+00.00	57.29	LT	QUADRANT RD	CLE. CB-3	646.49	12	B	44	D-134	642.42	D-105	642.05	
D-133	104+90.00	42.5	RT	QUADRANT RD	CB-2-2A, APP	664.00	12	B	83	D-133	651.80	D-104	650.91	
D-131	106+00.00	24	RT	QUADRANT RD	CLE. CB-3	651.72	12	B	55	D-131	647.57	D-102	645.44	
D-130	16+00.00	10.5	LT	E 55TH ST	CLE. MH-1	665.34	12	B	110	D-130	657.91	S-112	656.51	
D-129	129+50.00	21	LT	OC BLVD	CLE. CB-1	643.88	12	B	52	D-129	639.88	D-103	639.36	
D-128	128+25.00	69	RT	OC BLVD	CB-2-2B, APP	641.75	15	B	46	D-128	636.88	D-100	636.77	
D-127	127+71.00	21	LT	OC BLVD	CLE. CB-1	641.33	12	B	66	D-127	637.17	D-125	636.59	
D-126	127+68.00	49	RT	OC BLVD	CLE. CB-1	640.87	12	B	38	D-126	636.82	D-100	636.49	
D-125	127+04.00	21	LT	OC BLVD	CLE. CB-3	641.12	12	B	56	D-125	636.59	D-99	635.98	
D-124	127+04.00	49	RT	OC BLVD	CLE. CB-3	640.68	12	B	66	D-124	636.68	D-121	635.85	
D-123	125+93.00	49	RT	IR 490	CB-3A, APP	641.24	12	B	48	D-123	636.82	D-121	636.35	
D-122	126+10.00	21	LT	IR 490	CB-3A, APP	641.53	12	B	43	D-122	637.40	D-99	636.97	
D-121	126+40.00	49	RT	OC BLVD	CLE. CB-1	640.87	12	B	31	D-121	635.85	D-98	635.69	
D-120	124+00.00	49	RT	IR 490	CB-3A, APP	644.86	15	B	30	D-120	640.51	D-97	640.21	
D-119	123+38.00	22.62	LT	IR 490	CB-3A, APP	647.20	12	B	74	D-119	642.64	D-97	641.35	
D-118	11+30.00	7.52	LT	E 64TH ST	CLE. CB-1	679.14	12	B	32	D-118	675.14	EXIST	674.82	
D-117	121+41.00	68	RT	IR 490	CLE. CB-1	658.53	12	C	95	D-117	656.67	D-101	654.14	

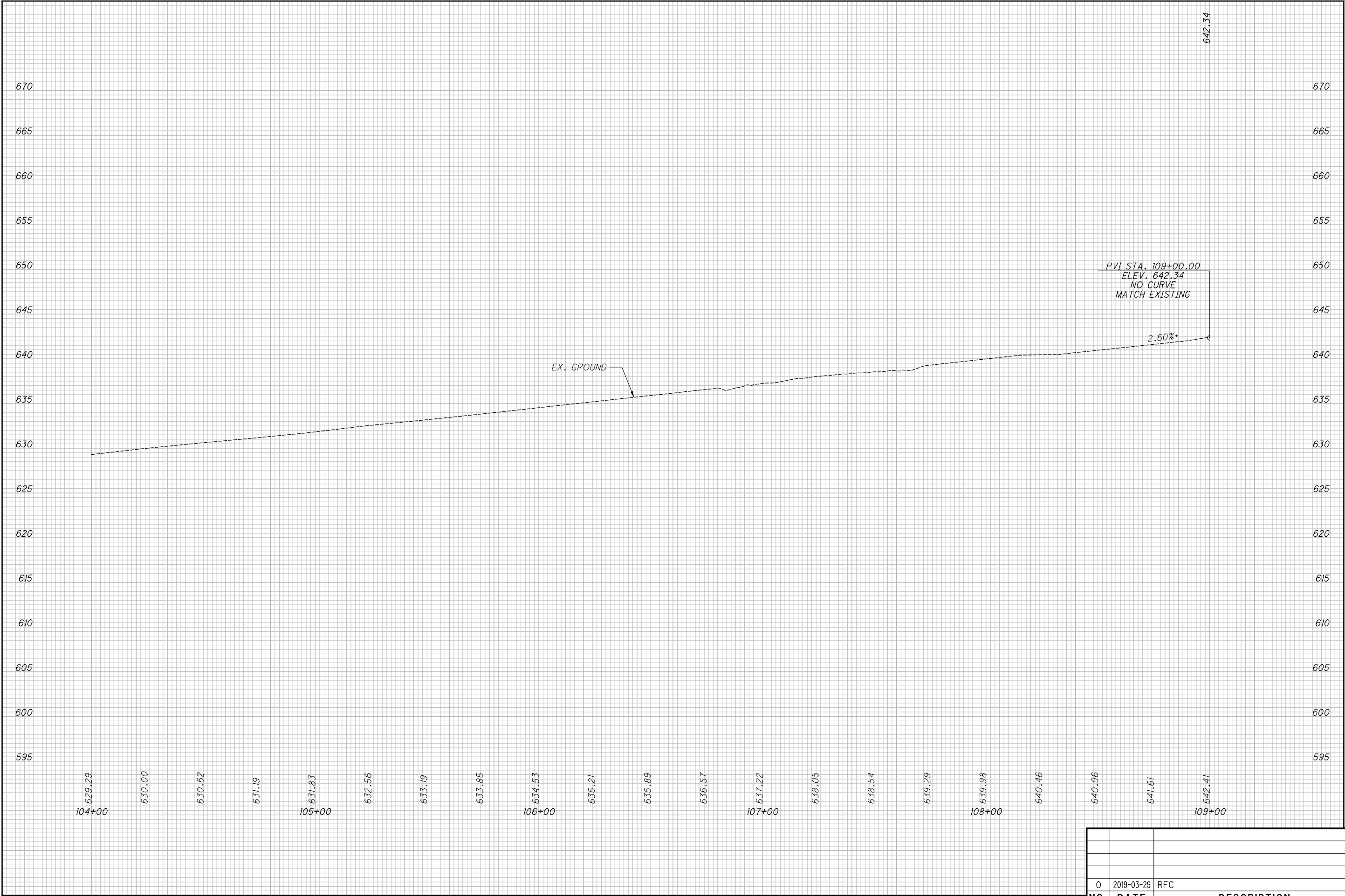
4	2024-09-10	RECORD DRAWINGS
3	2019-10-09	DC020
2	2019-09-11	DRFI015
1	2019-08-27	DC016
0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

4	2019-12-13	DC025
3	2019-10-09	DC020
2	2019-09-11	DRFIO15
1	2019-08-27	DC016
0	2019-03-29	RFC

5	2024-09-10	RECORD DRAWINGS

Ref. No.	Station	Offset (ft)	Side	Alignment	604/605 Item	Grate/Rim Elev.	603 Item	Type	Length (ft)	Upstream		Downstream		Comments
							Size (in)			Ref. No.	Invert	Ref. No.	Invert	
D-116	14+80.00	29	RT	E 55TH ST	CLE. CB-1	664.45	12	B	17	D-116	660.45	D-138	660.28	<
D-115	123+38.00	37.89	LT	IR 490	CB-2-2A, APP	647.83	12	C	16	D-115	642.90	D-119	642.64	
D-114	14+71.00	29	LT	E 55TH ST	CLE. CB-1	664.51	12	B	24	D-114	659.86	S-112	659.62	<
D-113	101+50.00	0	NONE	QUADRANT RD	CLE. MH-1	667.01	12	B	267	D-113	660.61	D-104	652.54	
D-112	112+00.00	41	RT	OC BLVD	CB-3A	649.86	15	B	72	D-112	644.18	D-95	643.41	<
D-111	112+00.00	39	LT	OC BLVD	CB-3A	649.82	12	B	79	D-111	645.17	D-112	644.43	
D-110	204+70.00	6.03	LT	RAMP E-N	CB-3A	650.82	12	B	65	D-110	645.69	D-111	645.17	<
D-109	127+51.00	65	RT	OC BLVD	CB-2-2A, APP	642.76	12	C	24	D-109	637.75	D-126	636.82	
D-107	129+47.00	70.31	LT	OC BLVD	CB-2-2B, APP	664.76	12	B	80	D-107	660.86	EXIST CB	660.46	PRIVATE <
D-105	130+75.00	43	RT	OC BLVD	CLE. MH-1	646.82	21	B	129	D-105	639.30	D-103	637.80	<
D-104	104+25.00	0	NONE	QUADRANT RD	CLE. MH-1	660.87	12	B	217	D-104	650.91	D-102	644.07	
D-103	129+50.00	31	RT	OC BLVD	CLE. MH-1	643.80	21	B	153	D-103	637.80	D-100	634.17	<
D-102	106+50.00	0	NONE	QUADRANT RD	CLE. MH-1	649.62	12	B	109	D-102	644.07	D-105	640.05	<
D-101	120+46.82	72.33	RT	IR 490	MH-3	662.46	18	C	5	D-101	653.80	EXIST		
D-100	128+00.00	31	RT	OC BLVD	MH-3, 96", APP	641.46	30	B	38	D-100	633.42	D-96	632.60	<
D-99	126+50.00	3	LT	OC BLVD	CLE. MH-1	641.61	12	B	22	D-99	635.98	D-98	635.89	<
D-98	126+50.00	19	RT	OC BLVD	MH-3, 72", APP	641.41	21	B	153	D-98	634.94	D-100	634.17	
D-97	124+00.00	19	RT	IR 490	MH-3	645.45	15	B	250	D-97	640.21	D-98	635.44	<
D-96	127+85.00	66	RT	OC BLVD	WQS, MH-3, 108"	642.67	30	B	72	D-96	632.60	D-90	630.11	<
D-95	306+50.00	0.4	RT	RAMP S-E	CB-3A	648.75	18	C	30	D-95	643.16	D-91	642.88	
D-91	306+50.00	29.68	RT	RAMP S-E	MH-3	648.20	18	C	217	D-91	642.65	EXIST		<
D-90	12+91.05	80.35	RT	E 55TH ST	MH-3	658.76	36	B	125	D-90	629.61	S-10A REG	624.94	<
D-89	15+13.59	67	RT	E 55TH ST	CB-1	664.56	12	B	14	D-89	660.45	S-115A	660.31	
D-88	15+16.59	60	RT	E 55TH ST	CB-1	664.53	12	B	8	D-88	660.53	D-89	660.45	<
														<
S-10A REG	12+00.00			E 55TH ST	REGULATOR		48	B	47	S-10A REG	637.00	S-101	636.08	<
S-101	12+41.00	42	RT	E 55TH ST	CS MH-1	666.91	48	C	137	S-101	634.08	S-106	632.18	<
S-102	123+33.00	31.00	RT	IR 490	CS MH-1	647.24	30	B	217.0	S-102	636.44	S-104	633.28	
S-103A	123+33.00	63.50	RT	IR 490	CS MH-1	661.19	30	B	33.0	S-103A	636.70	S-102	636.44	<
S-103	123+33.00	81.11	RT	IR 490	EXIST MH	663.42	30	C	18.0	S-103	636.79	S-103A	636.70	
S-104	125+50.00	25.00	RT	IR 490	CS MH-1	642.12	30	B	41.0	S-104	633.28	S-105	632.71	<
S-105	125+77.13	55.69	RT	IR 490	RTG CS MH	641.99				S-105	609.00	EXIST		<
S-106	128+12.00	119.04	RT	OC BLVD	CS MH-1	647.37	48	B	106	S-106	630.18	S-107	629.04	
S-107	128+23.64	3	LT	OC BLVD	CS DROP	642.14				S-107	609.50	EXIST		<
S-109	100+63.00	52.28	LT	QUADRANT RD	CS MH-1	667.04	30	B	82	S-109	643.04	S-10A REG	641.99	<
S-110A	102+44.00	46.6	LT	QUADRANT RD	CS MH-1	667.29	30	C	181	S-110A	645.46	S-109	643.04	
S-110B	104+82.00	98.15	RT	QUADRANT RD	CS MH-1	677.81	30	B	288	S-110B	649.51	S-110A	645.46	<
S-111	131+71.50	87.3	RT	OC BLVD	CS MH-1	670.33	30	C	302	S-111	652.90	S-110B	649.51	<
S-112	14+90.00	13.92	LT	E 55TH ST	CS MH-1	664.68	18	B	88	S-112	648.01	S-116	646.07	
S-115A	15+04.66	78.36	RT	E 55TH ST	CS MH-1	664.73	12	B	56	S-115A	653.91	D-138	651.56	<
S-115	15+06.63	90.78	RT	E 55TH ST	SAN MH-1	664.00	6	B	13	S-115	655.00	S-115A	654.41	<
S-116	125+79.22	42.59	LT	OC BLVD	CS MH-1	660.40	18	DUCTILE IRON	28	S-116	635.37	S-117	634.92	
S-117	125+79.23	15	LT	OC BLVD	CS MH-1	641.95	18	DUCTILE IRON	51	S-117	634.92	S-104	634.08	<





0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

CUY-IR490/ SR010-

2.09 / 19.28

7  
67

DRAINAGE PROFILE - OPPORTUNITY CORRIDOR BLVD.

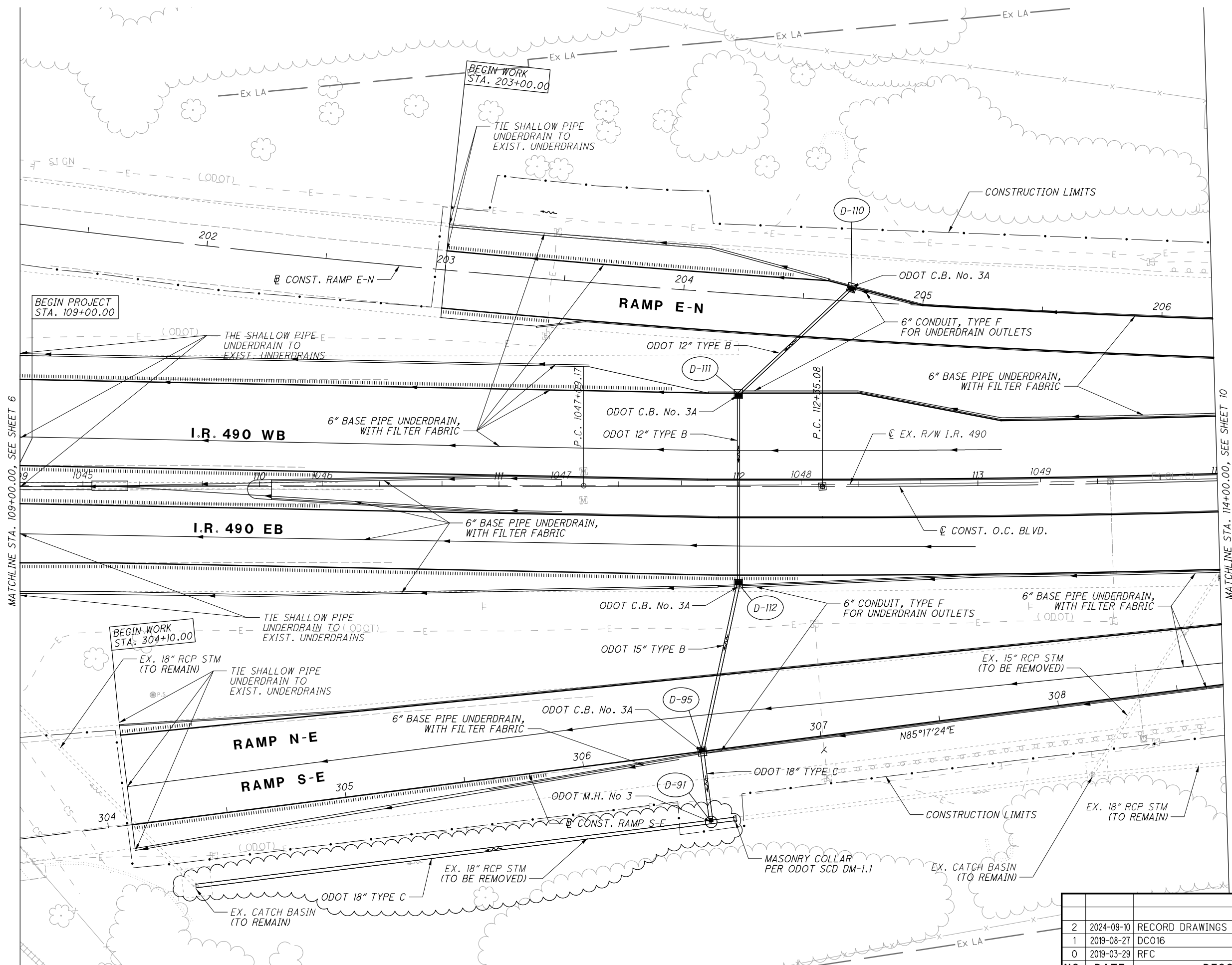
BEGIN PROJECT TO STA. 109+00.00

CALCULATED  
JTH

CHECKED  
SM

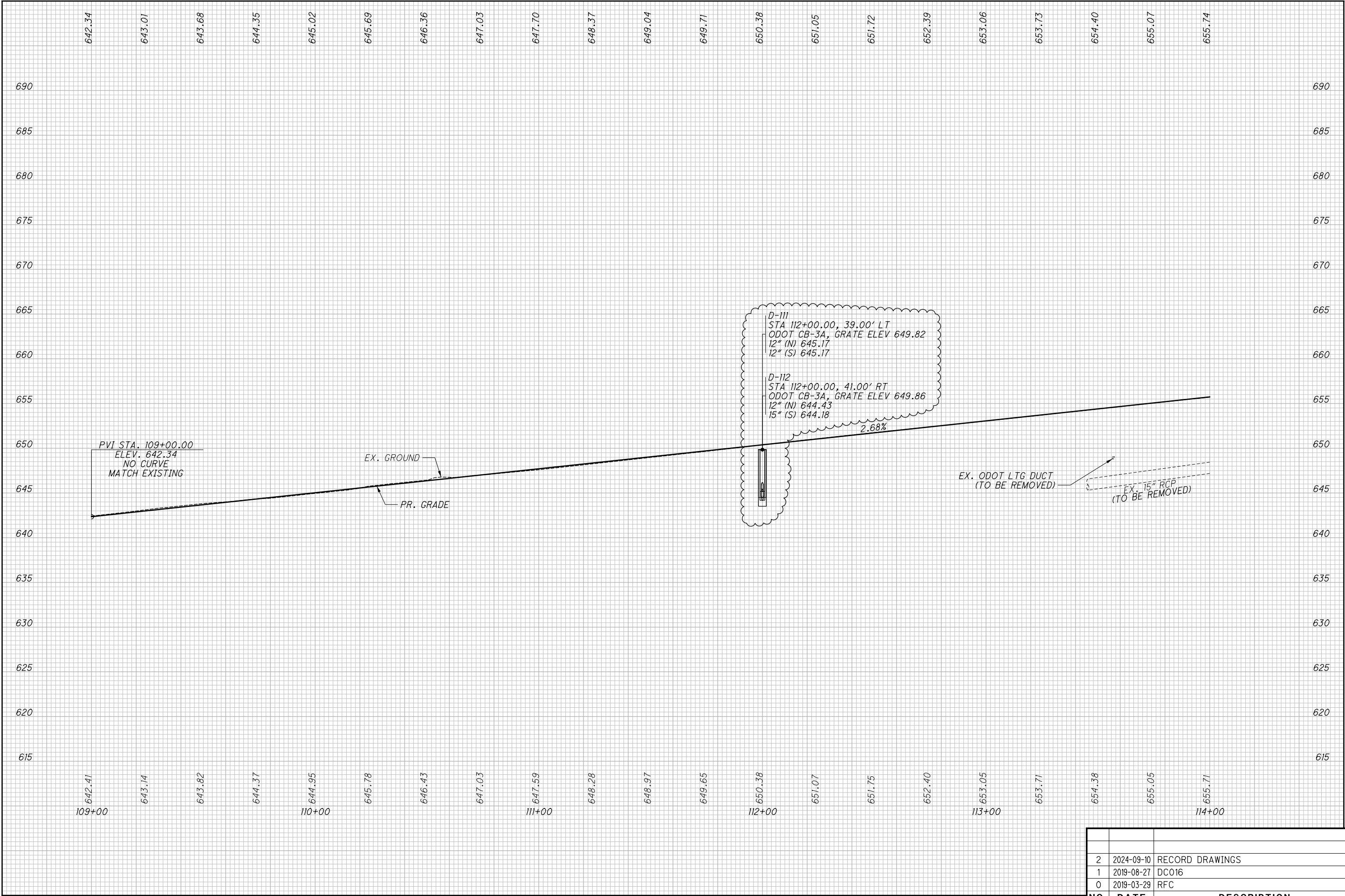
RECORD PLANSRECORD PLANS





1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES  
2. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION

NO.	DATE	DESCRIPTION	
		ISSUE RECORD	
2	2024-09-10	RECORD DRAWINGS	
1	2019-08-27	DC016	
0	2019-03-29	RFC	



NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2019-08-27	DC016
0	2019-03-29	RFC

CUY-IR490/ SR010-2.09 / 19.28

967

DRAINAGE PROFILE - OPPORTUNITY CORRIDOR BLVD.

STA. 109+00.00 TO STA. 114+00.00

CALCULATED JTH

CHECKED SM

RECORD PLANS

RECORD PLANS



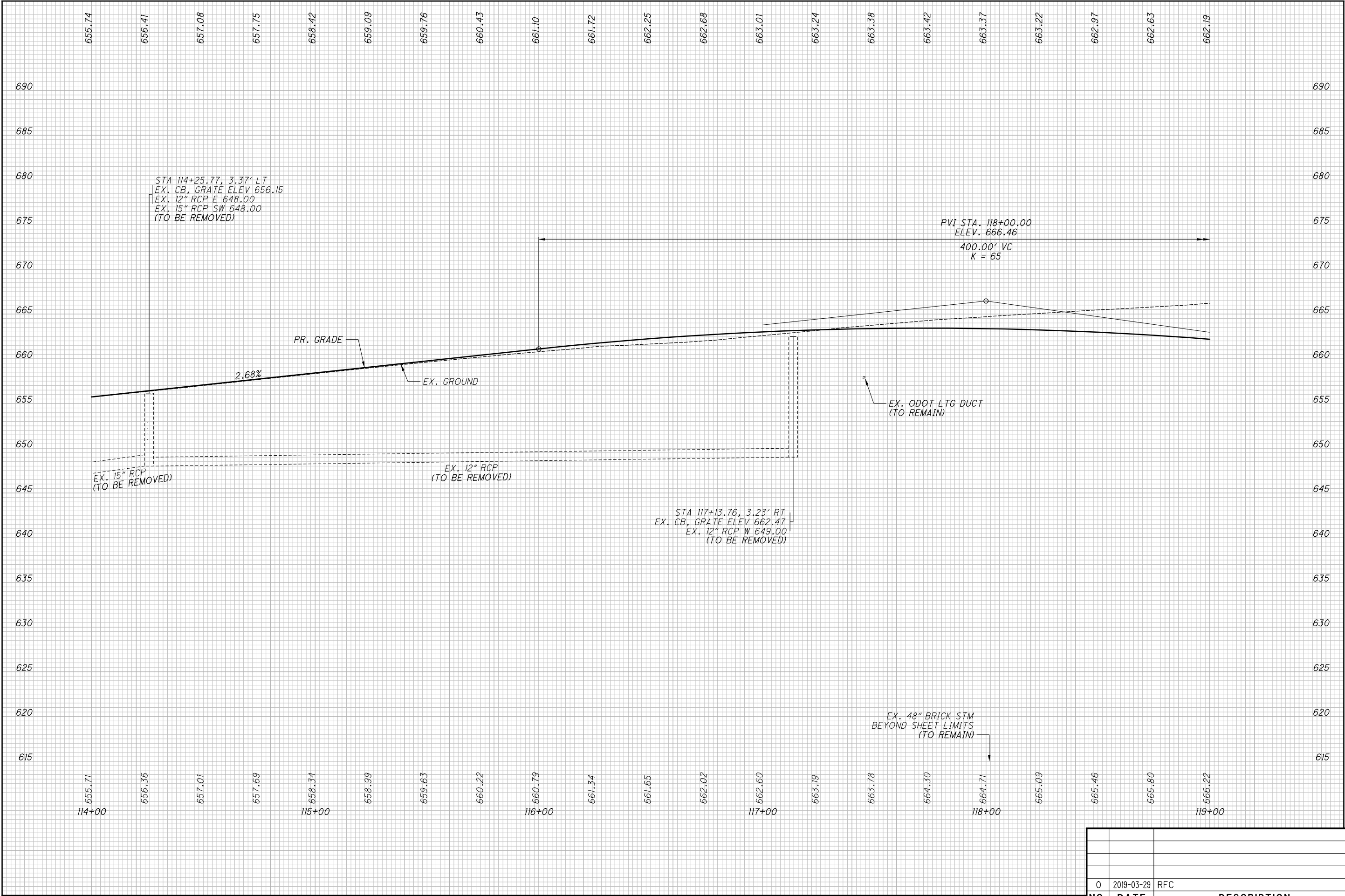
1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES
2. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION

NO.	DATE	DESCRIPTION
0	2019-03-29	RFC
ISSUE RECORD		

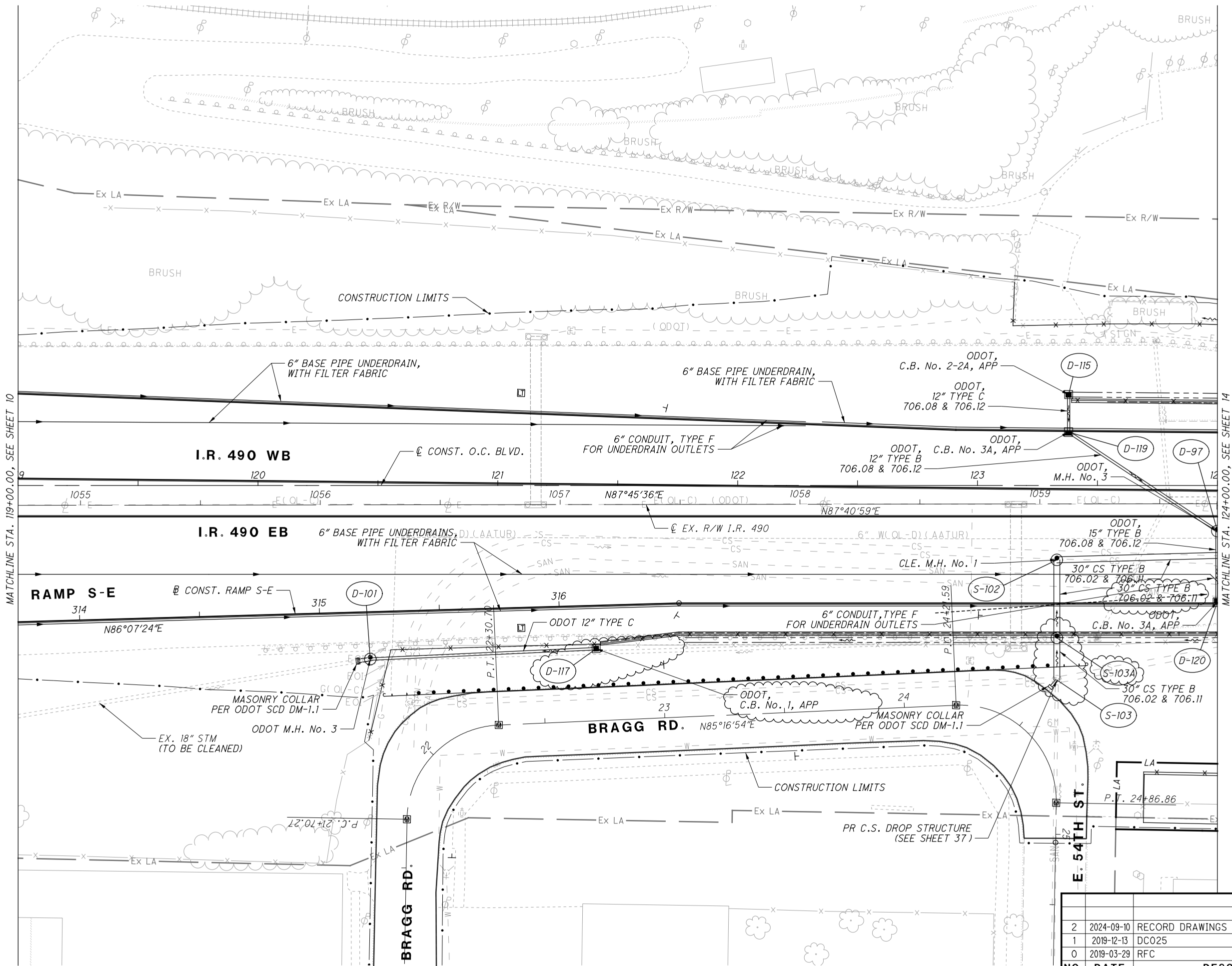
CUY-IR490/ SR010-  
2.09 / 19.28  
DRAINAGE PLAN - O.C. BOULEVARD  
STA. 114+00.00 TO STA. 119+00.00

RECORD PLANS  
RECORD PLANS

CALCULATED JTH  
CHECKED SM  
N  
0 20 40  
HORIZONTAL  
SCALE IN FEET



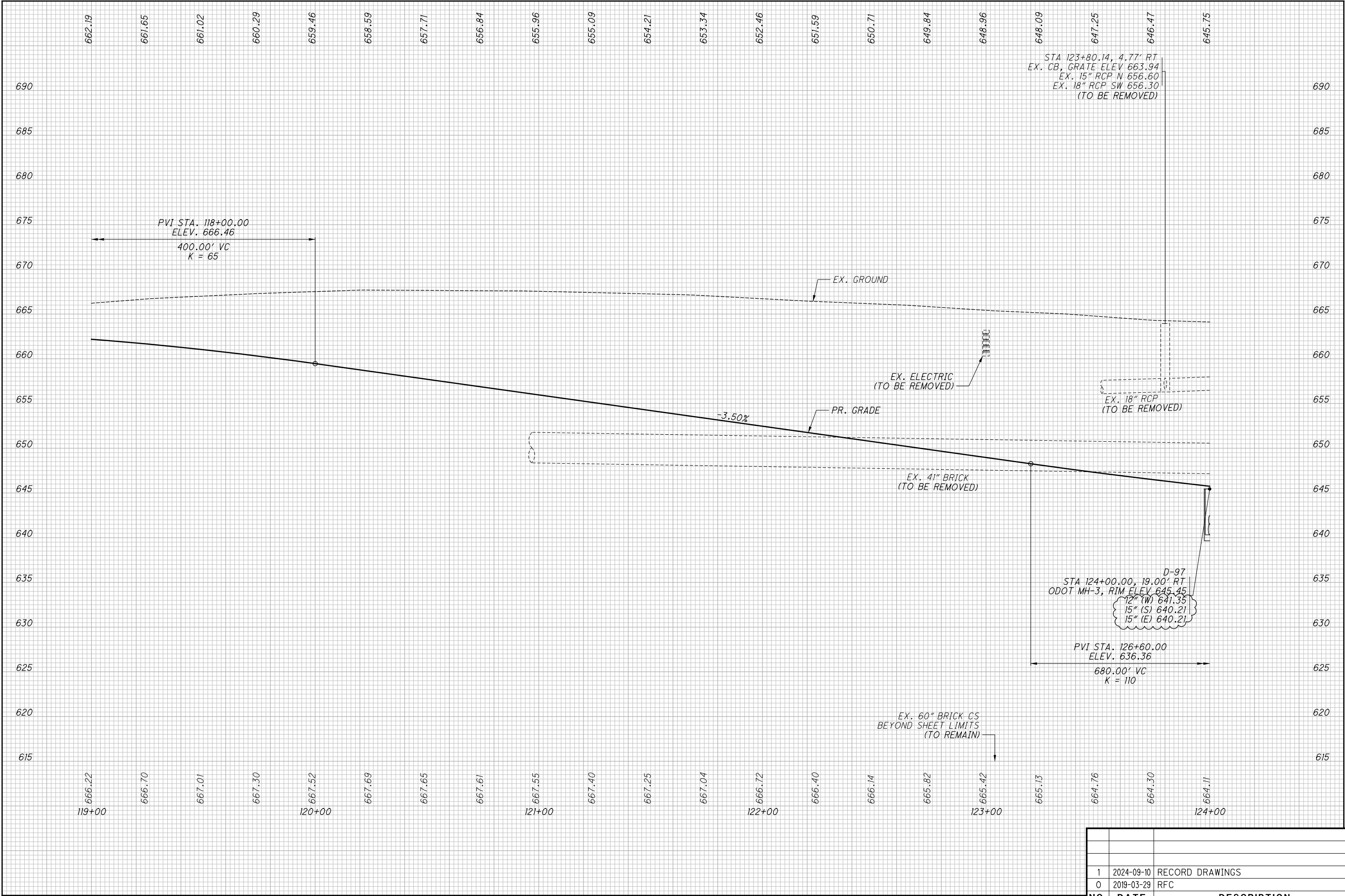
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NO.	DATE	DESCRIPTION
ISSUE RECORD		



1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES  
2. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION

NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2019-12-13	DC025
0	2019-03-29	RFC
		ISSUE RECORD





NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC

CUY-IR490/ SR010-2.09 / 19.28

13  
67

DRAINAGE PROFILE - OPPORTUNITY CORRIDOR BLVD.

STA. 119+00.00 TO STA. 124+00.00

CALCULATED  
JTH

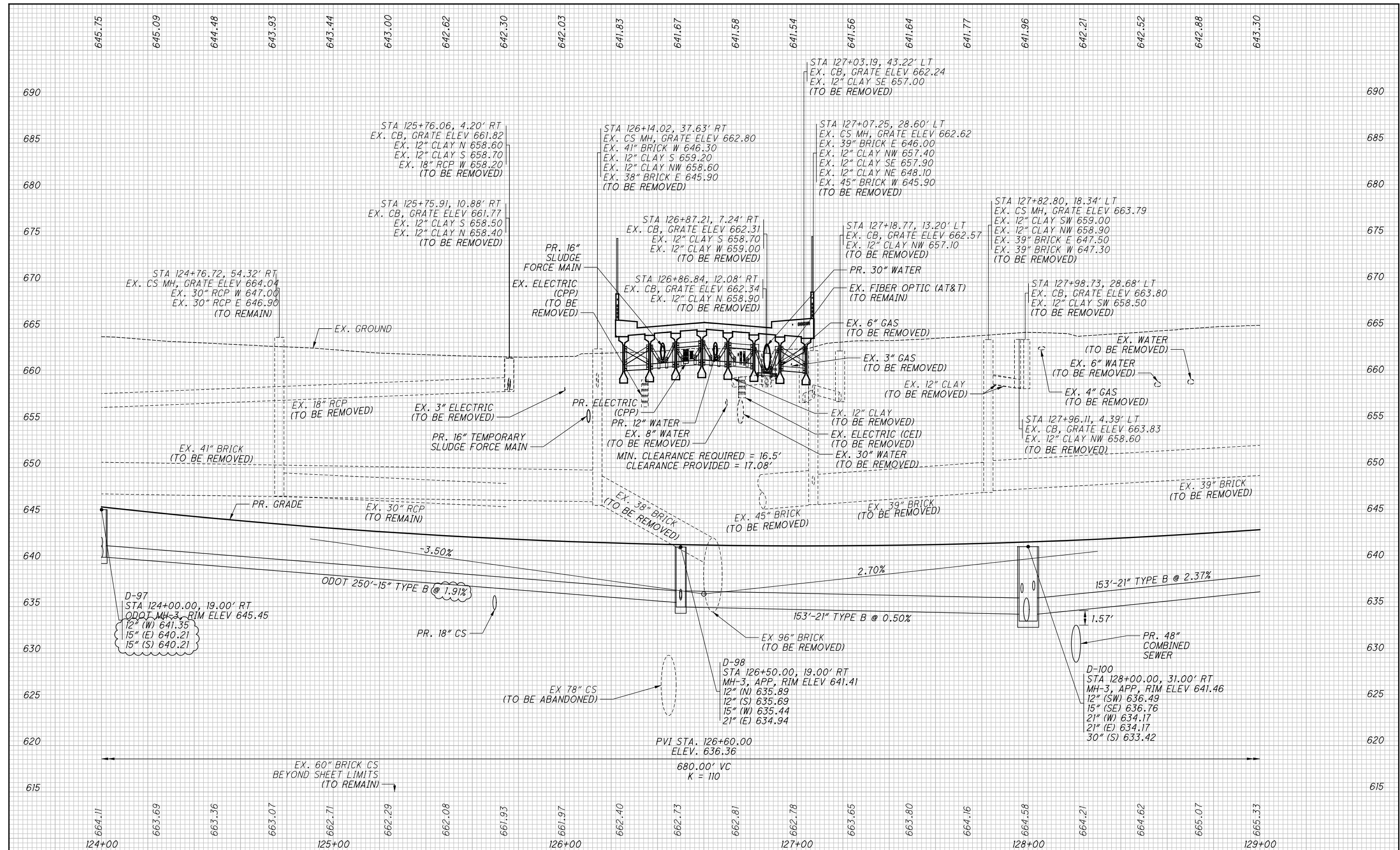
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RECORD PLANS

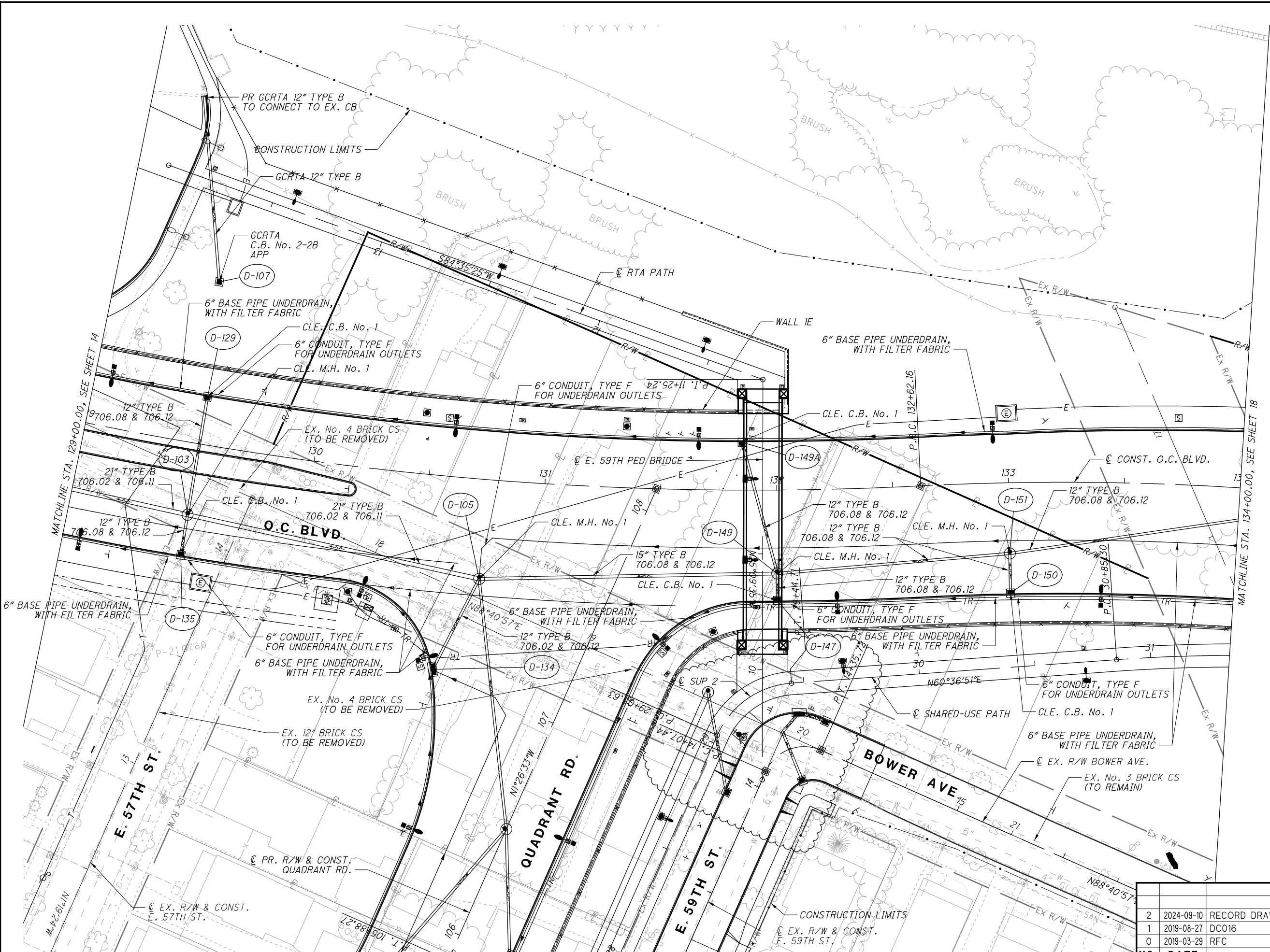


1. SEE SHEETS 30 TO 33 FOR STORM SEWER PROFILES
2. SEE SHEETS 34 TO 35 FOR SANITARY SEWER PROFILES
3. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION
4. SEE SHEETS 48 TO 67 FOR SLUDGE FORCE MAIN DETAILS

3	2024-09-10	RECORD DRAWINGS
2	2019-12-13	DCO25
1	2019-09-11	DRFI015
0	2019-03-29	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



2	2024-09-10	RECORD DRAWINGS
1	2019-12-13	DC025
0	2019-03-29	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



SEE SHEET 22

1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES  
2. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION

NO.	DATE	DESCRIPTION	
		ISSUE RECORD	
2	2024-09-10	RECORD DRAWINGS	
1	2019-08-27	DC016	
0	2019-03-29	RFC	

CUY-IR490/ SR010-2.09/ 19.28

1667

DRAINAGE PLAN - O.C. BOULEVARD  
STA. 129+00.00 TO STA. 134+00.00

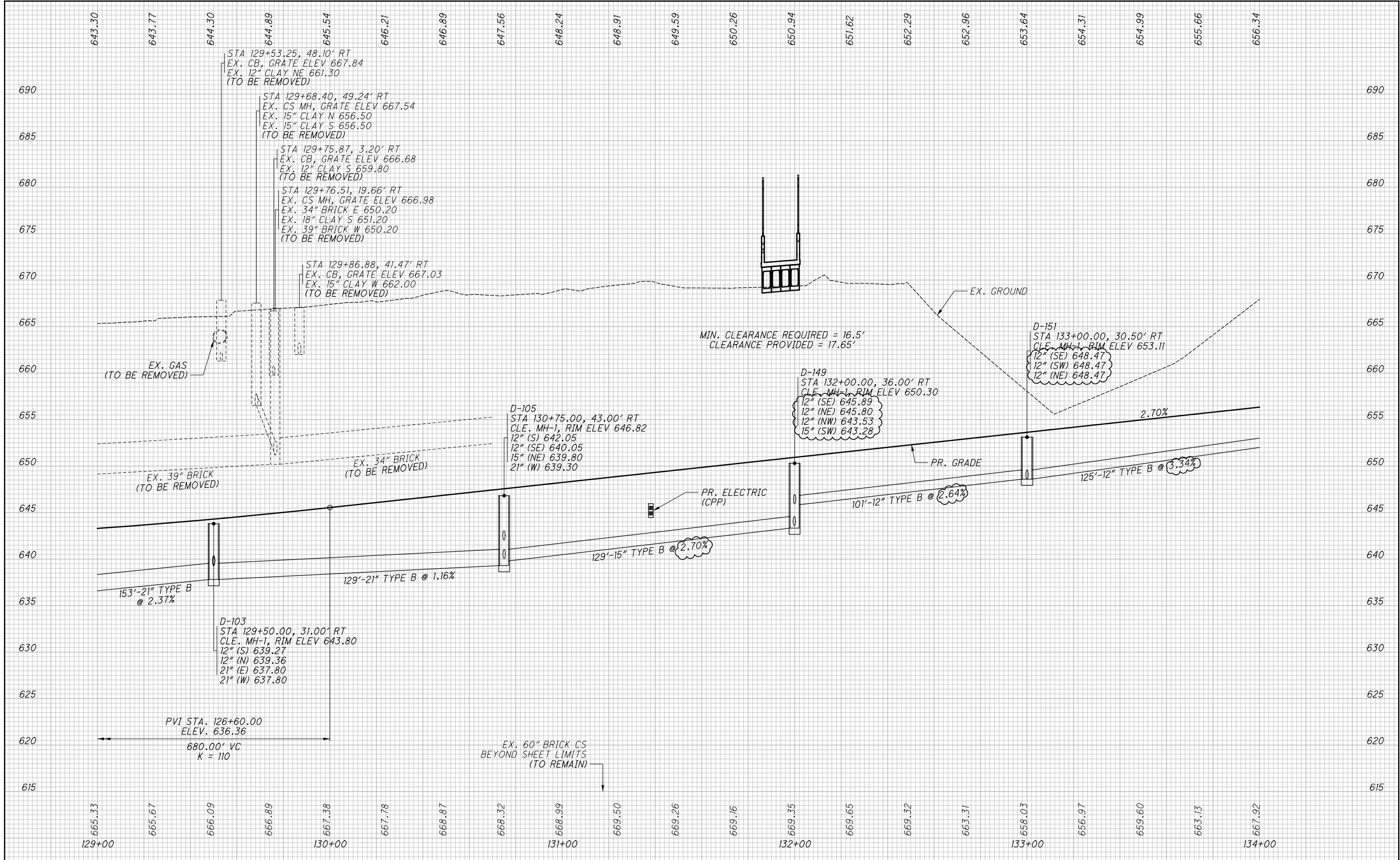
RECORD PLANS

CALCULATED  
JTH

CHECKED  
SM

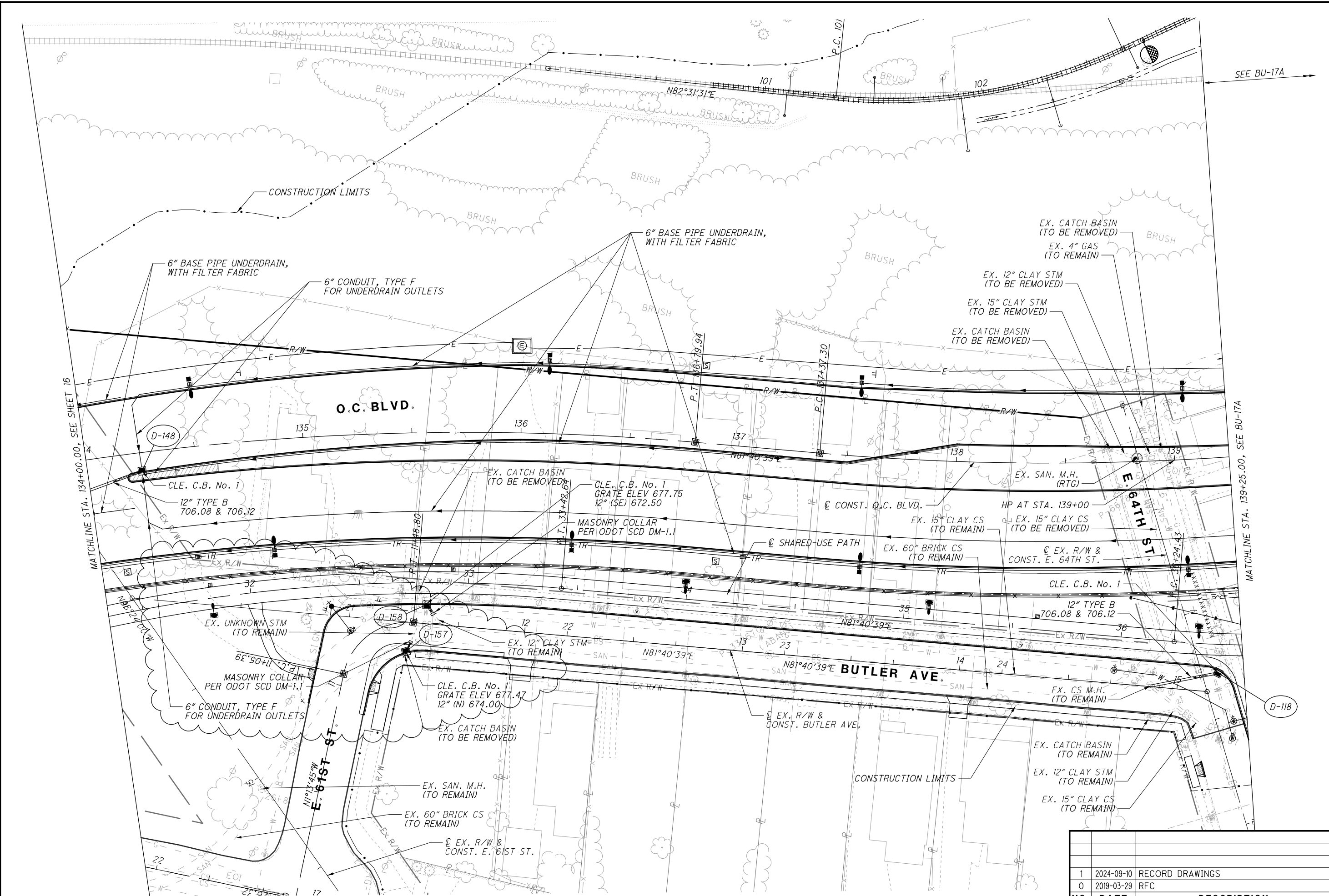
0 10 20 40  
HORIZONTAL  
SCALE IN FEET

RECORD PLANS



NO.	DATE	DESCRIPTION
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0	2019-03-29	RFC
ISSUE RECORD		

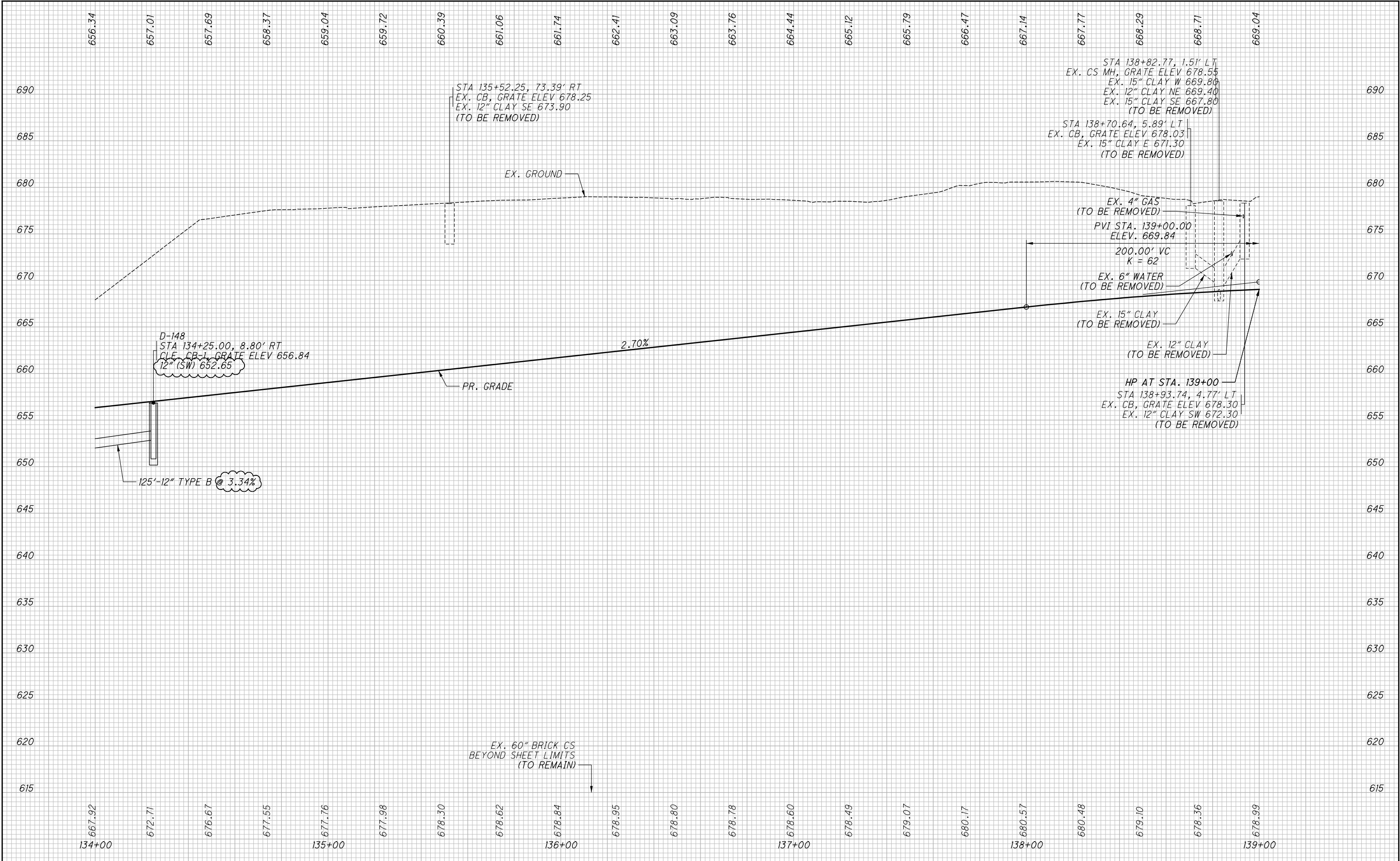




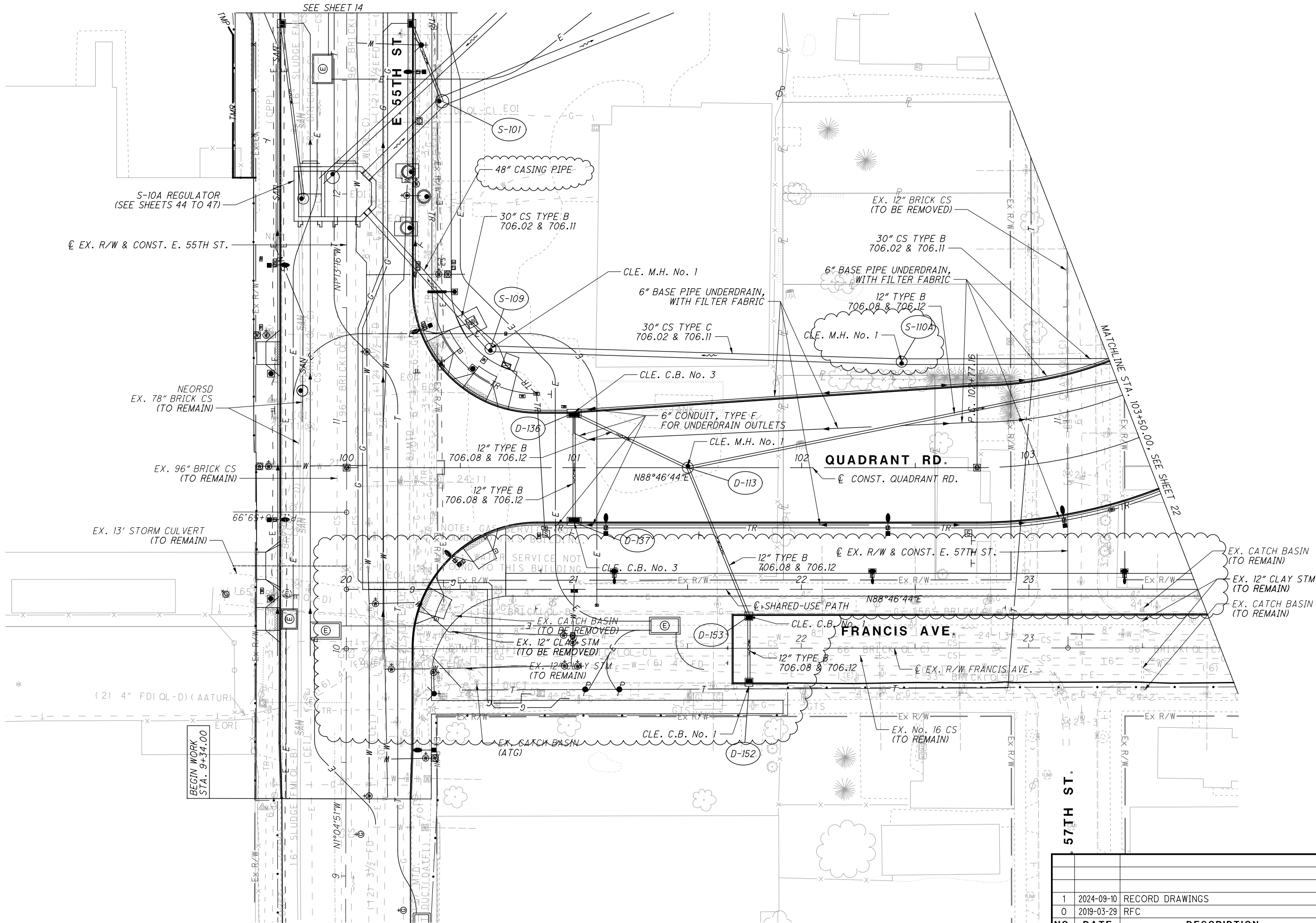
1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES  
2. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC

ISSUE RECORD	
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NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC
ISSUE RECORD		



1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES  
2. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION

NO.	DATE	DESCRIPTION	ISSUE RECORD
1	2024-09-10	RECORD DRAWINGS	
0	2019-03-29	RFC	

CUY-IR490/ SR010-2.09 / 19.28

2067

DRAINAGE PLAN - QUADRANT RD.  
BEGIN TO STA. 103+50.00

RECORD PLANS

CALCULATED  
JTH

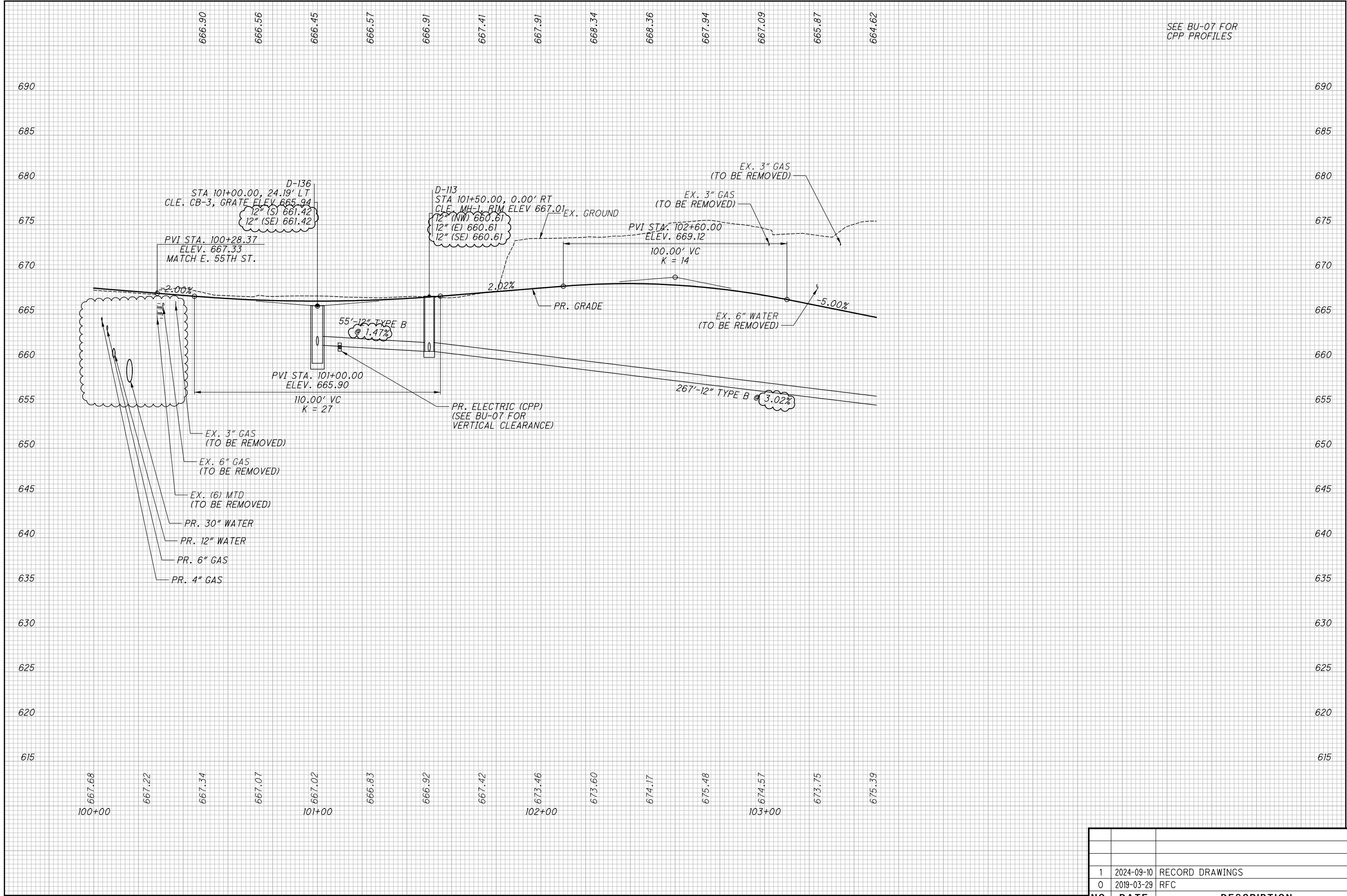
CHECKED  
SM

02040

HORIZONTAL  
SCALE IN FEET

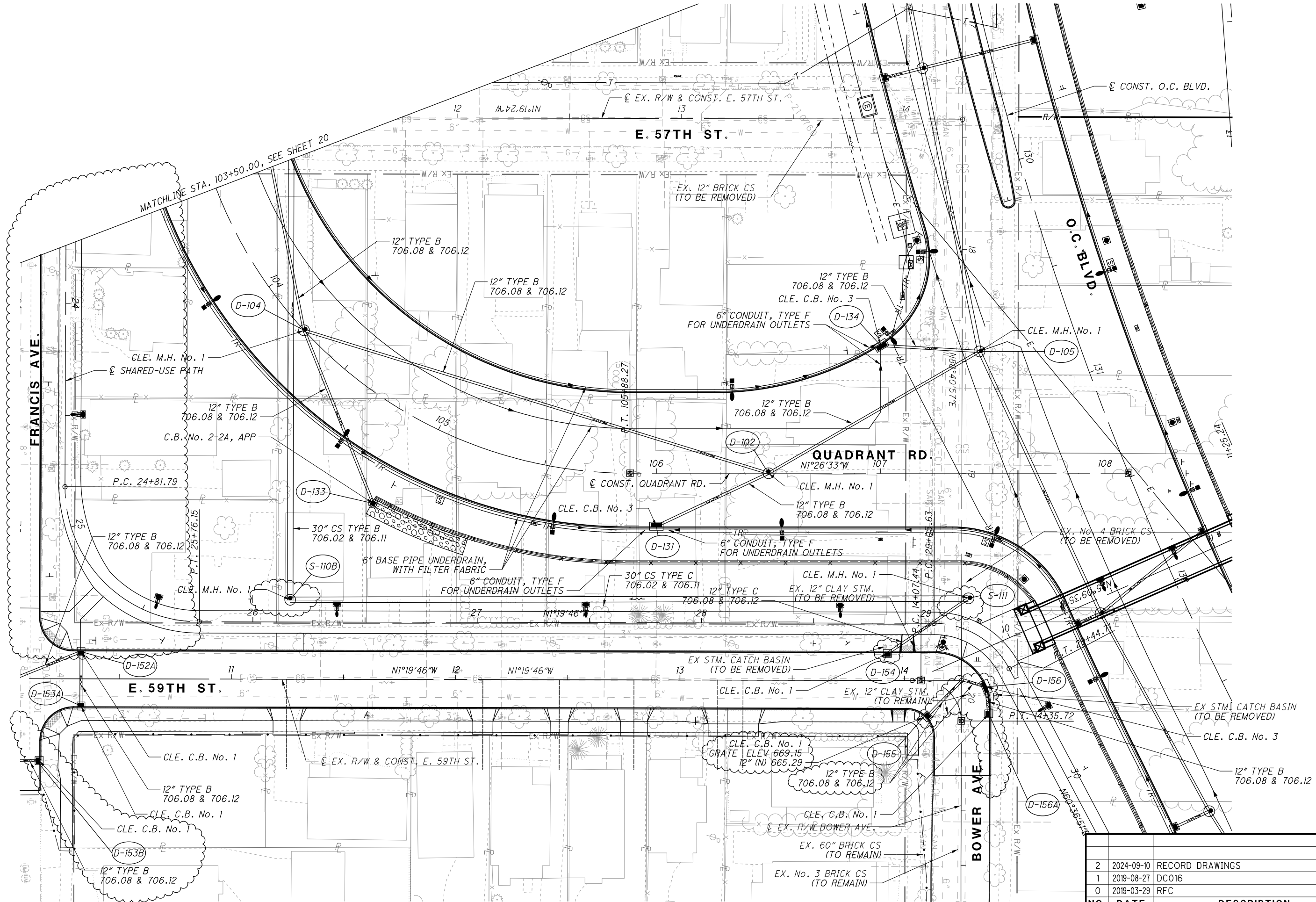
RECORD PLANS

RECORD PLANS



SEE BU-07 FOR  
CPP PROFILES

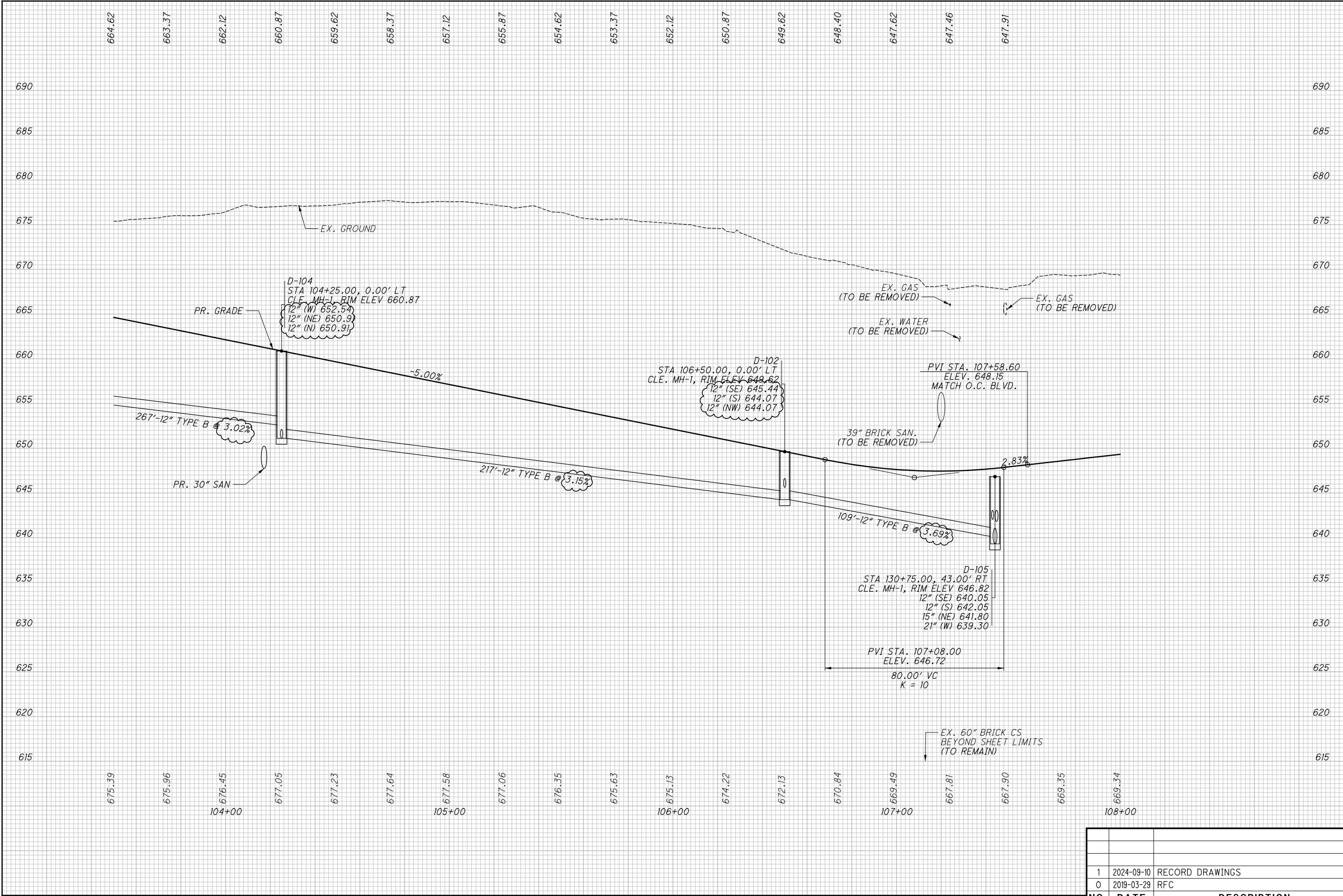
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC
ISSUE RECORD		



1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES  
2. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION

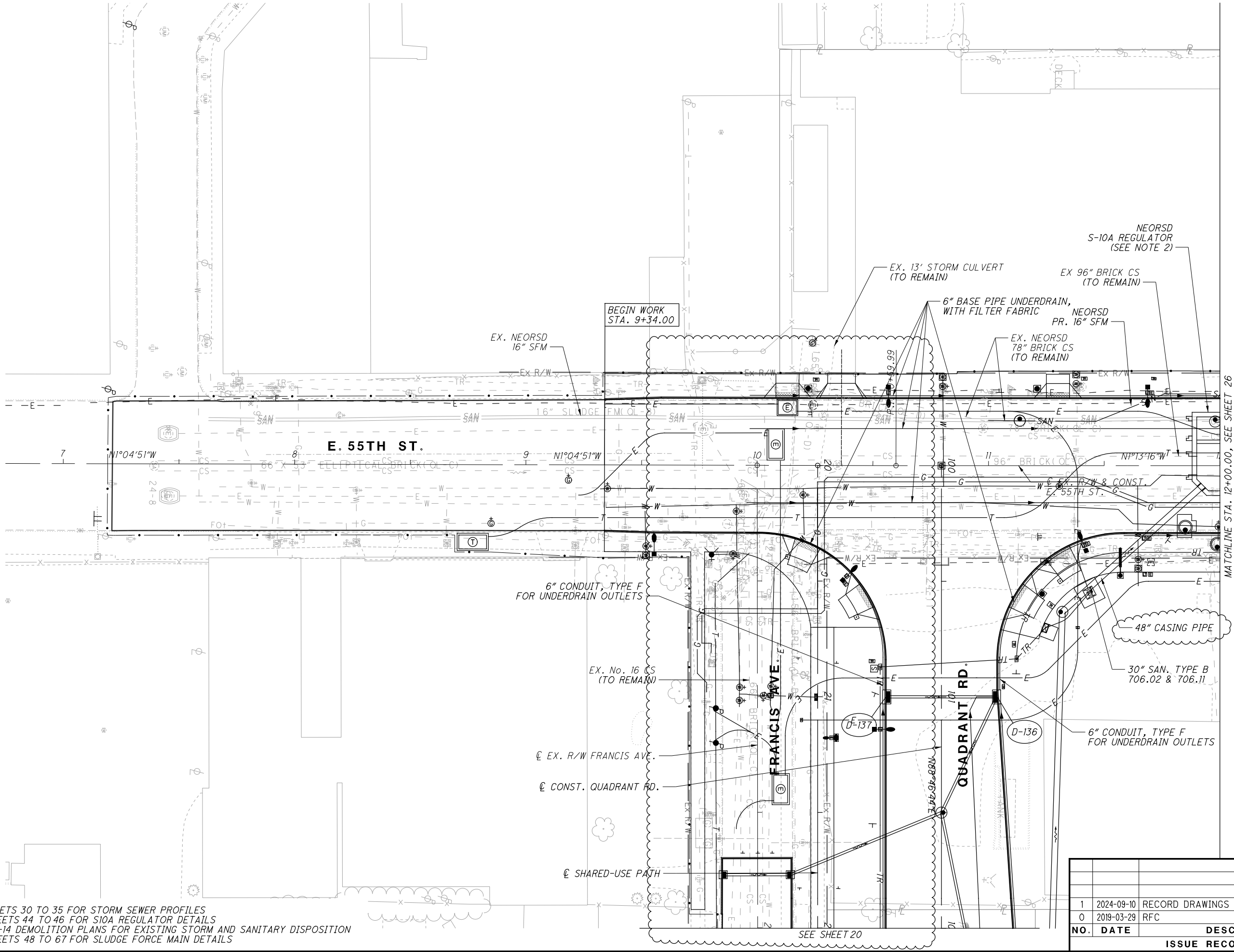
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2	2024-09-10	RECORD DRAWINGS
1	2019-08-27	DC016
0	2019-03-29	RFC
		ISSUE RECORD





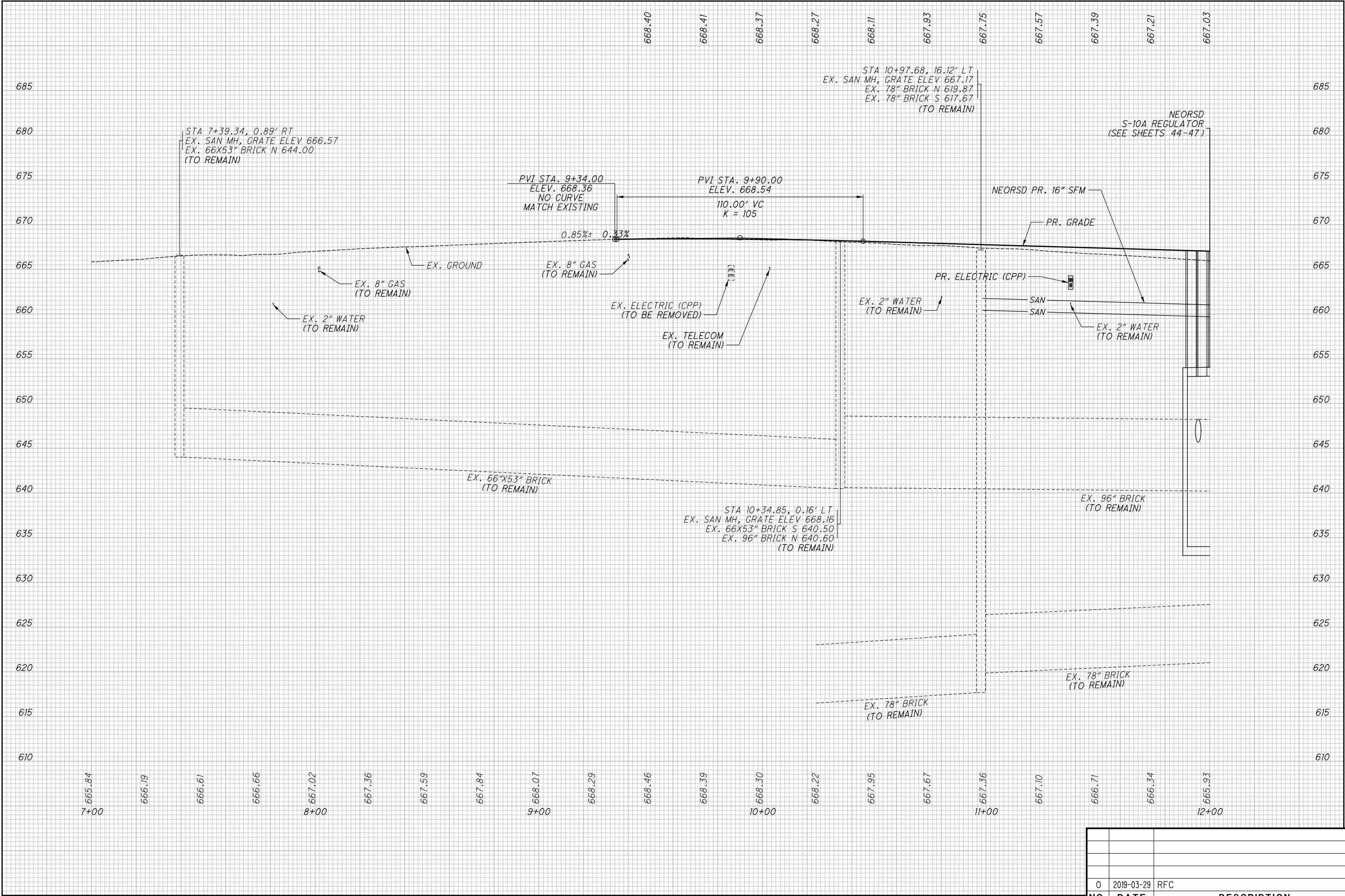
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC
ISSUE RECORD		

1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES
2. SEE SHEETS 44 TO 46 FOR S10A REGULATOR DETAILS
3. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION
4. SEE SHEETS 48 TO 67 FOR SLUDGE FORCE MAIN DETAILS

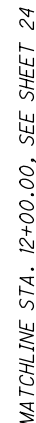


NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC

ISSUE RECORD		
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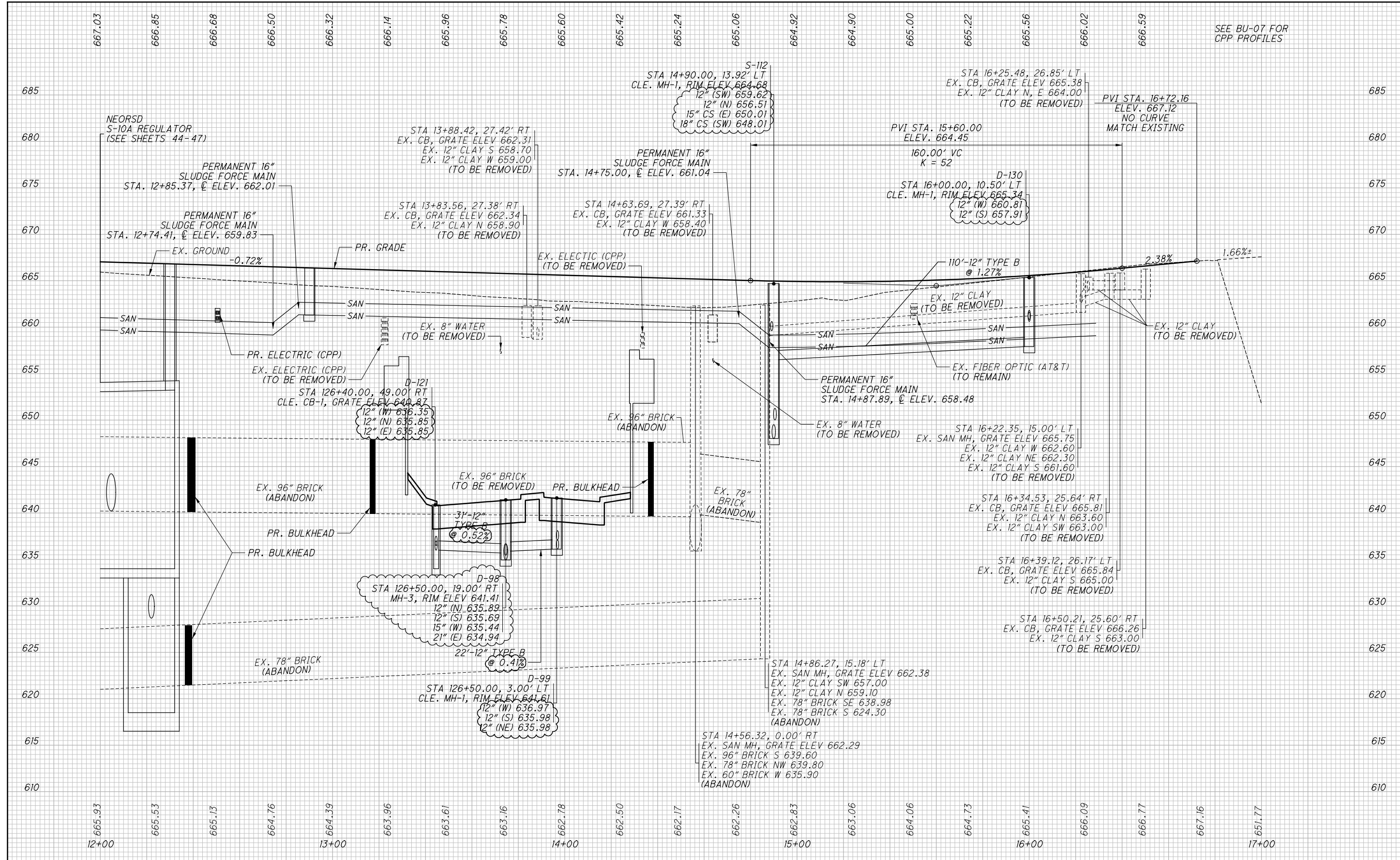


NO.	DATE	DESCRIPTION
0	2019-03-29	RFC
ISSUE RECORD		



MATCHLINE STA. 17+00.00, SEE SHEET 28

4	2024-09-10	RECORD DRAWINGS
3	2019-12-13	DC025
2	2019-10-09	DC020
1	2019-09-11	DRFI015
0	2019-03-29	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2019-10-09	DCO20
0	2019-03-29	RFC
		ISSUE RECORD



MATCHLINE STA. 17+00.00, SEE SHEET 26

E. 55TH ST.

EX. R/W & CONST. E. 55TH ST.

N1°13'16"W

1. SEE SHEETS 30 TO 35 FOR STORM SEWER PROFILES
2. SEE SHEETS 44 TO 46 FOR S10A REGULATOR DETAILS
3. SEE BU-14 DEMOLITION PLANS FOR EXISTING STORM AND SANITARY DISPOSITION
4. SEE SHEETS 48 TO 67 FOR SLUDGE FORCE MAIN DETAILS

NO.		DATE	DESCRIPTION
0		2019-03-29	RFC
		ISSUE RECORD	

CUY-IR490/ SR010-2.09 / 19.28

DRAINAGE PLAN - E. 55TH ST. STA. 17+00.00 TO END

CALCULATED  
JTH

CHECKED  
SM

0 20 40

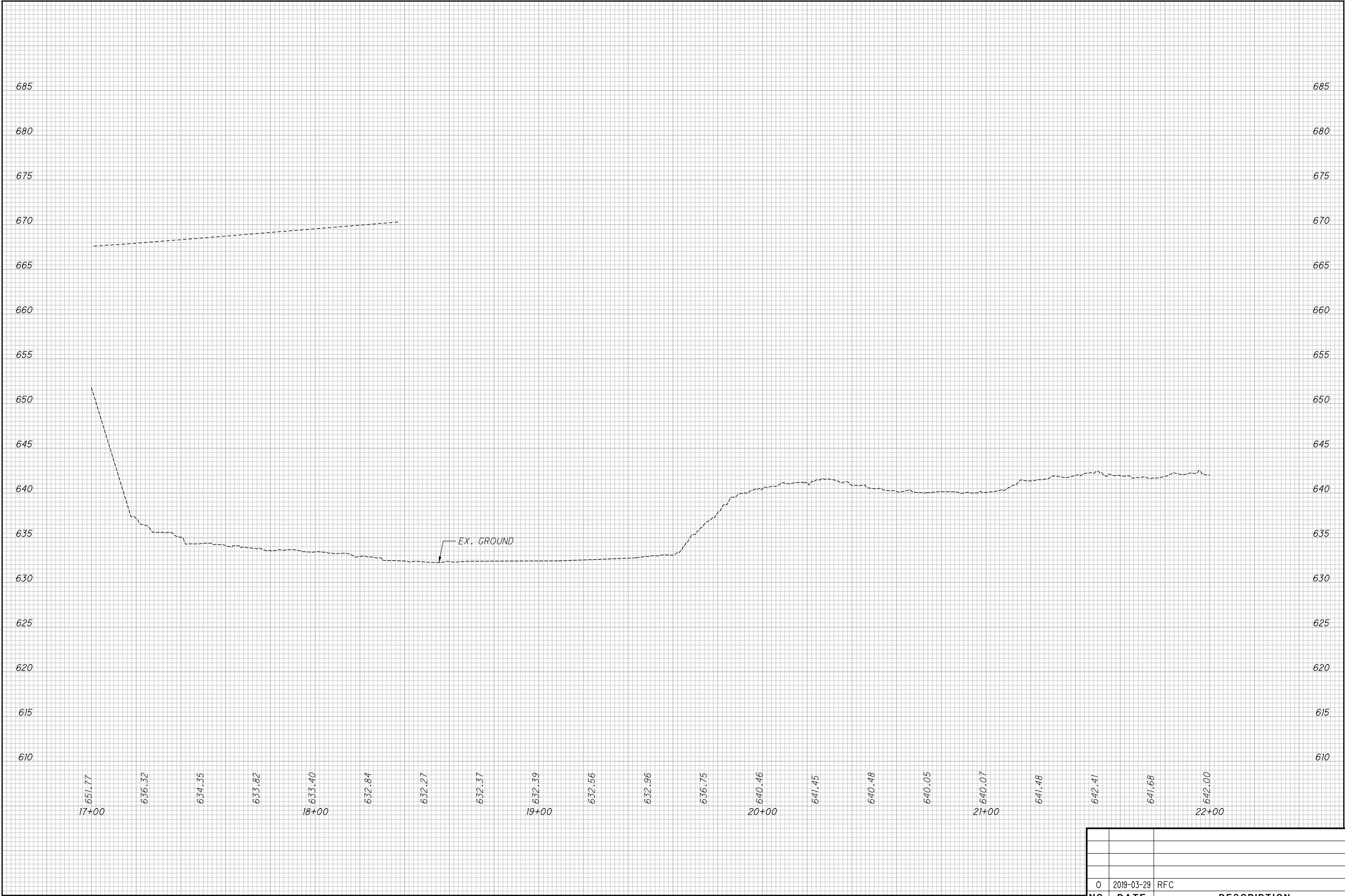
HORIZONTAL  
SCALE IN FEET

N

RECORD PLANS

RECORD PLANS

RECORD PLANS



0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

CUY-IR490/ SR010-2.09 / 19.28

29  
67

DRAINAGE PROFILE - E. 55TH ST.

STA. 17+00.00 TO END

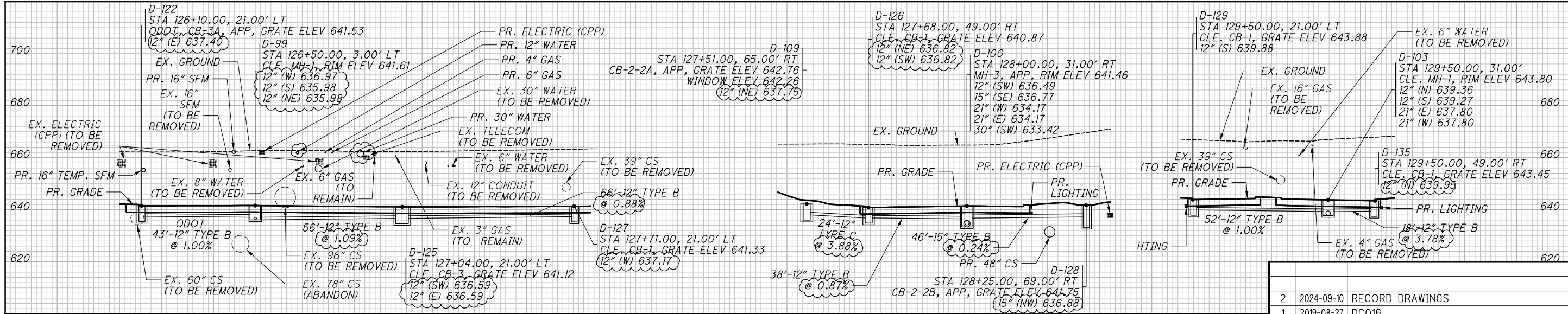
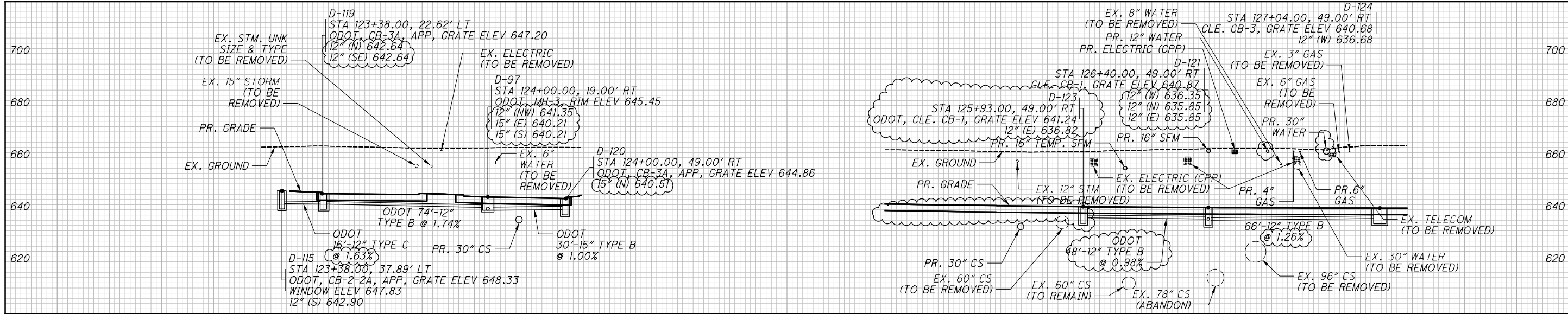
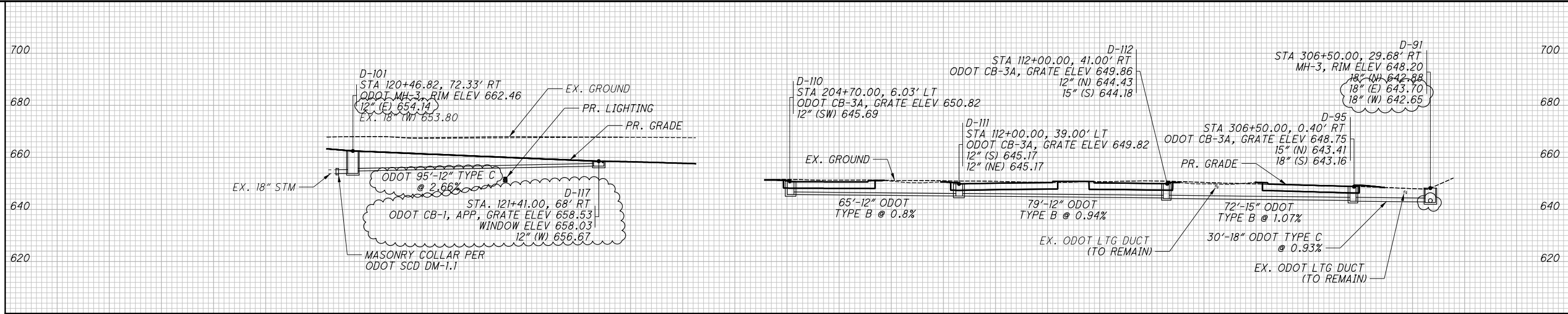
CALCULATED  
JTH

CHECKED  
SM

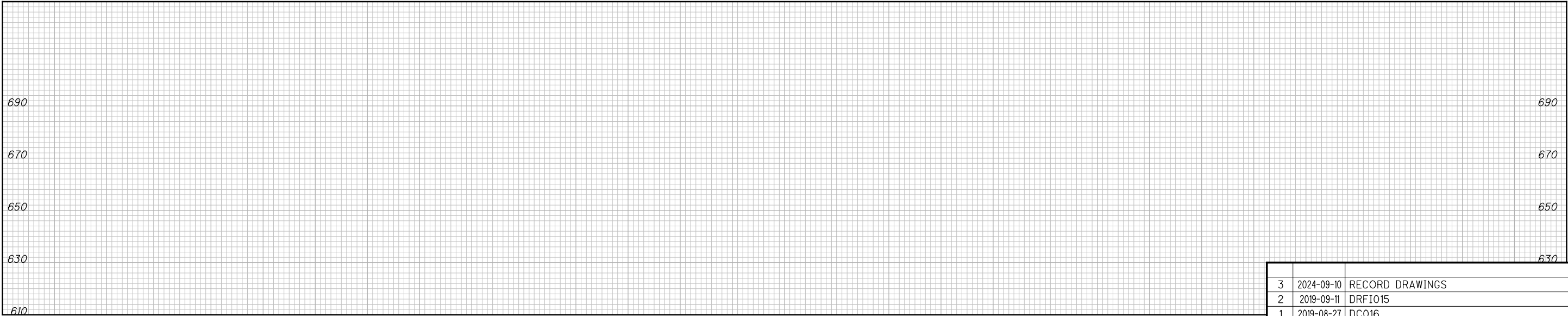
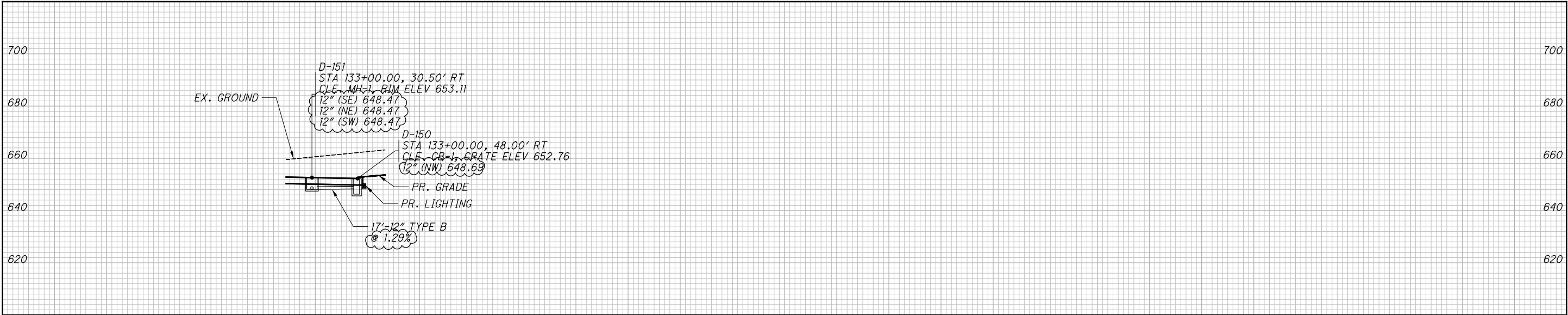
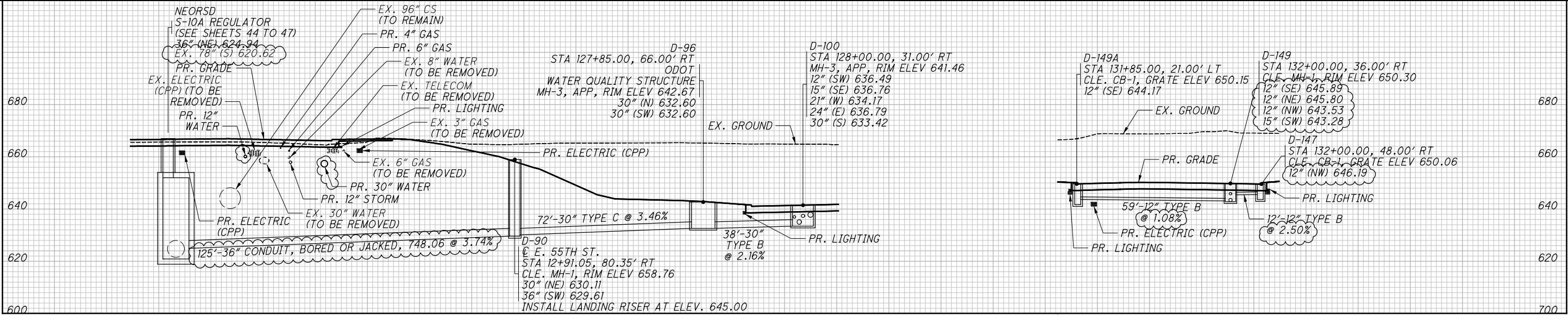
RECORD PLANS

RECORD PLANS

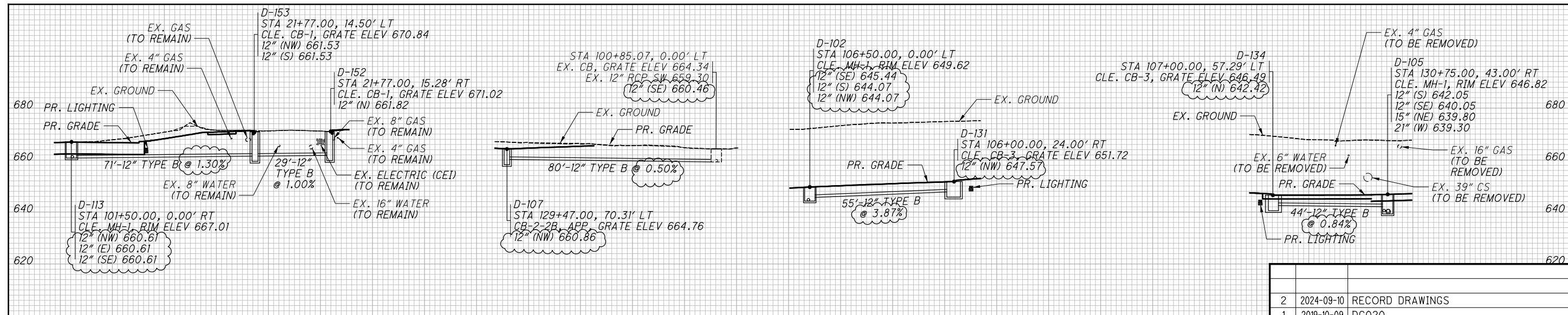
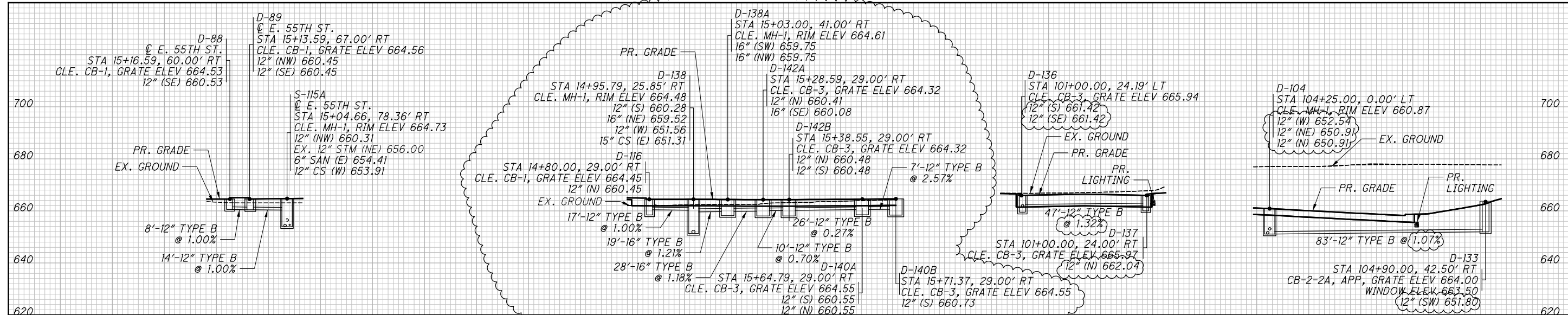
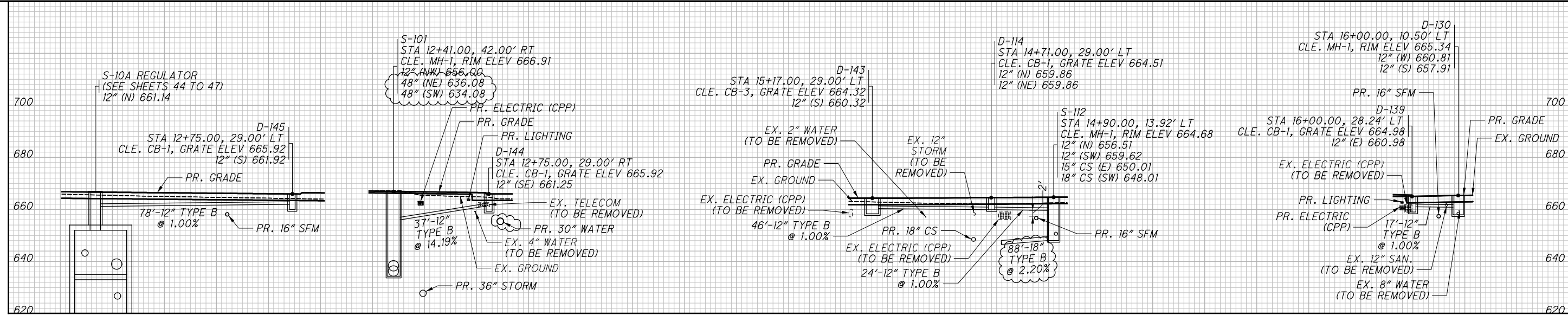




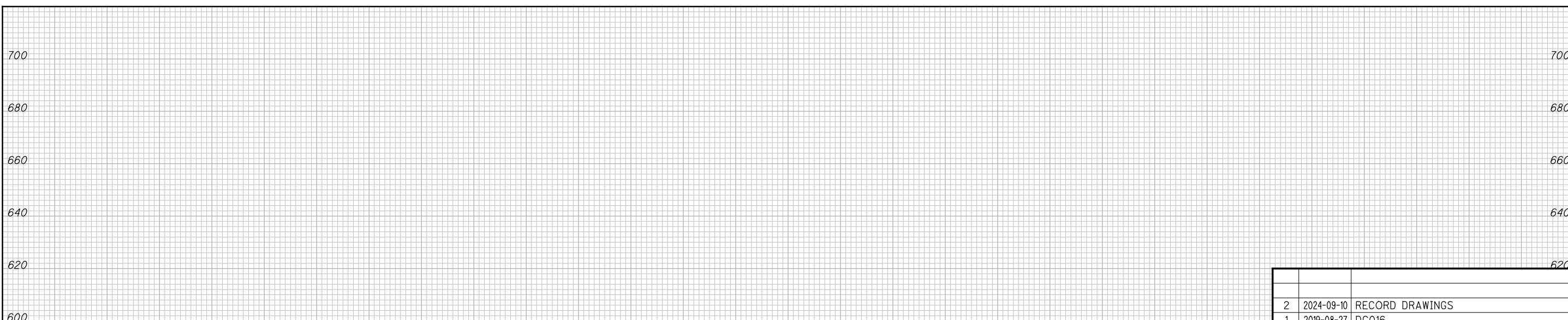
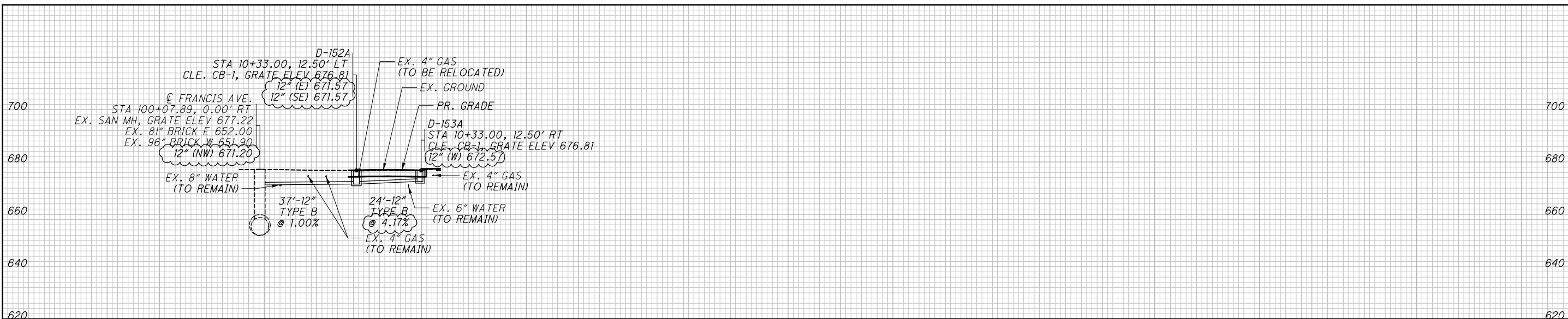
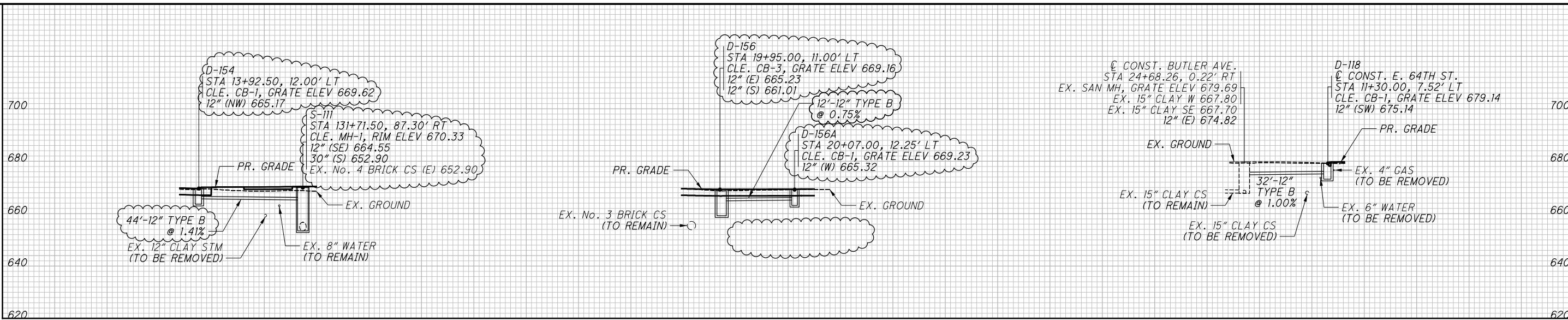
NO.	DATE	DESCRIPTION
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1	2019-08-27	DCO16
0	2019-03-29	RFC
ISSUE RECORD		



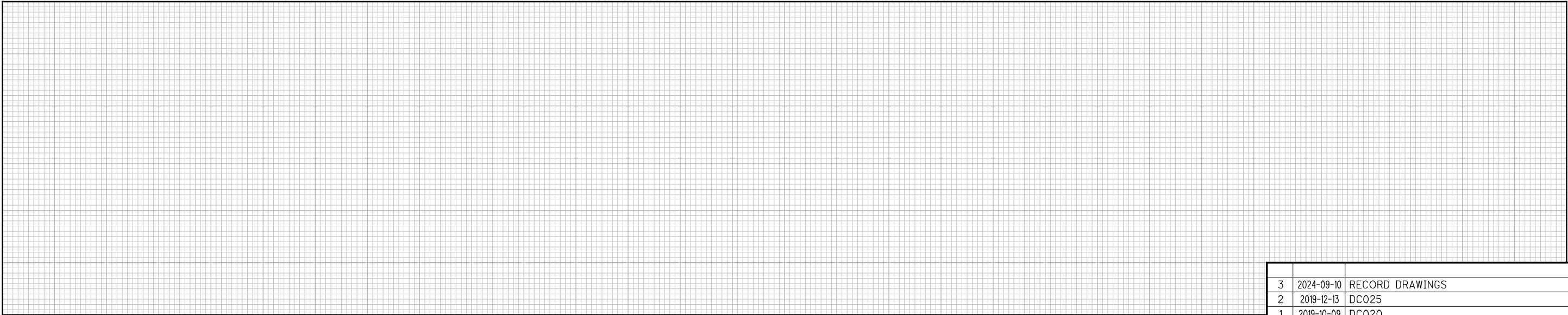
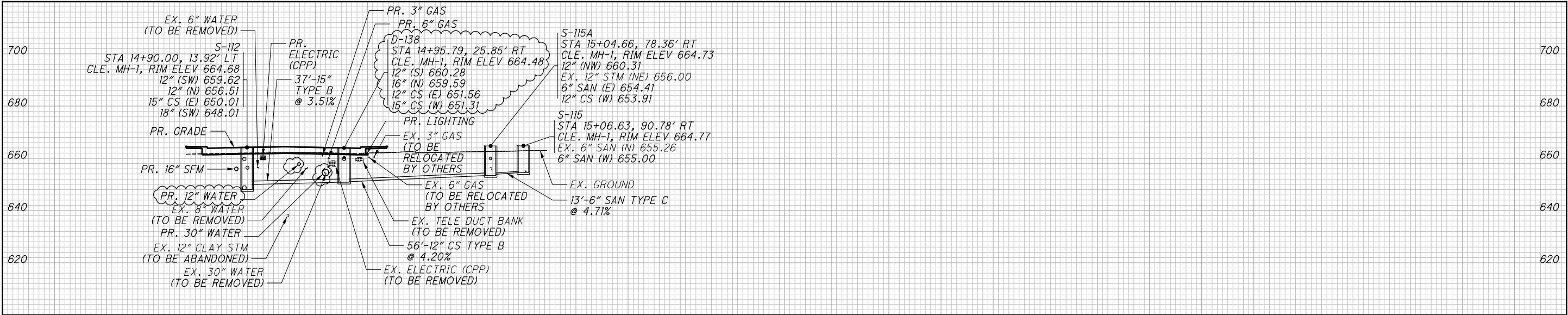
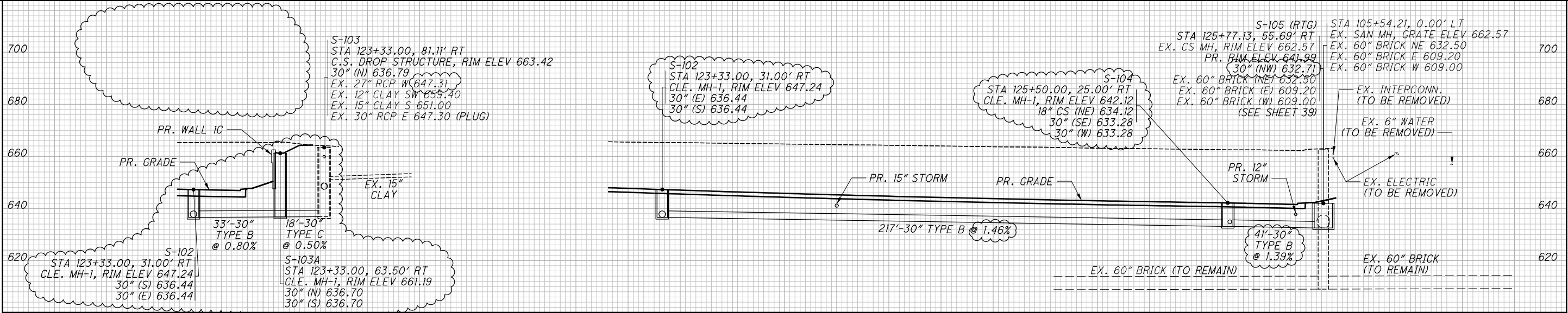
NO.	DATE	DESCRIPTION
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2	2019-09-11	DRFI015
1	2019-08-27	DC016
0	2019-03-29	RFC
ISSUE RECORD		



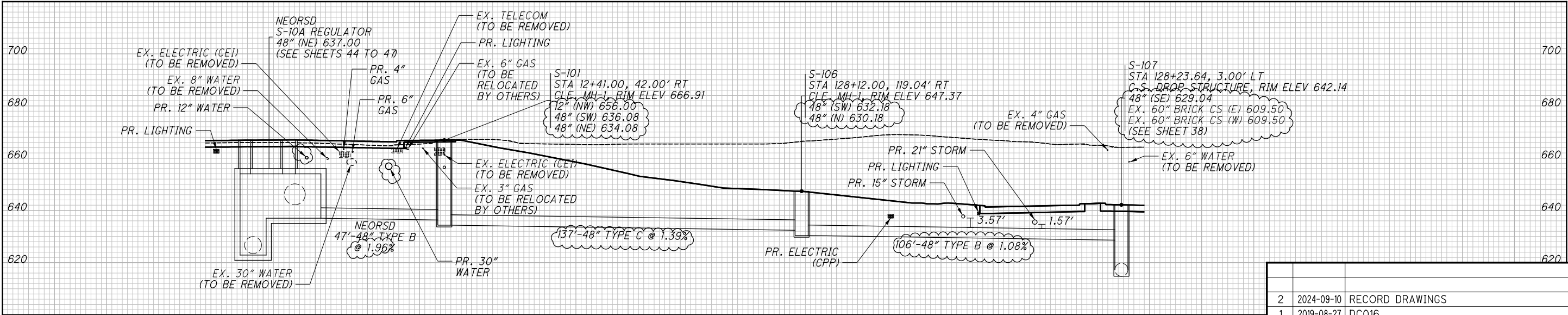
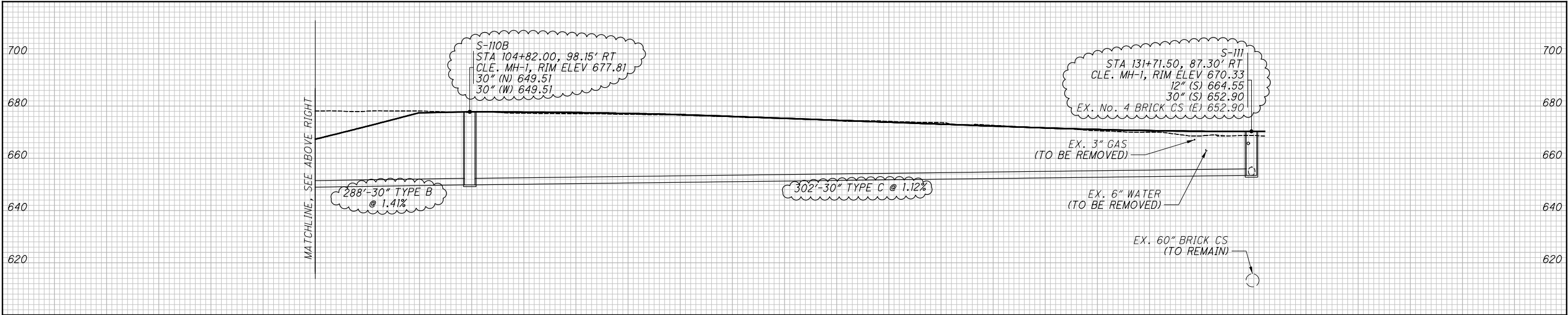
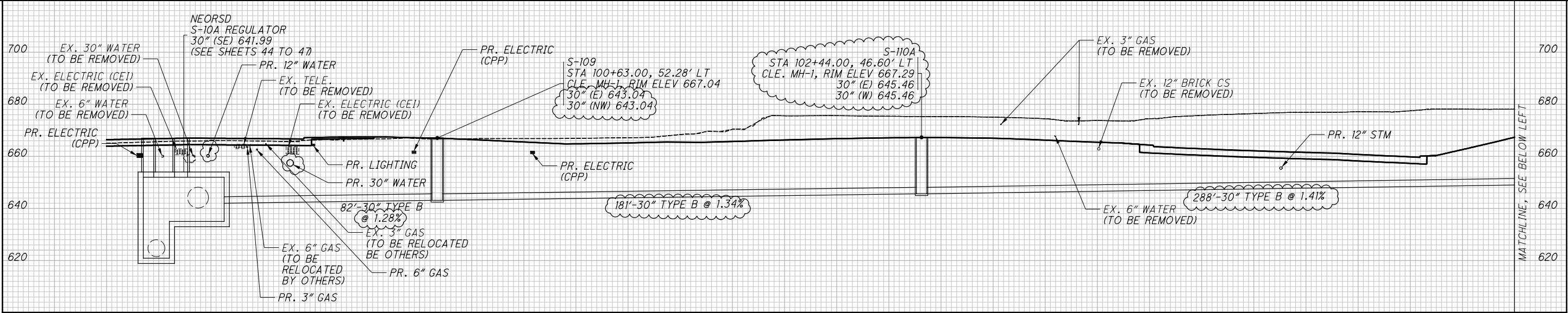
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0	2019-03-29	RFC



2	2024-09-10	RECORD DRAWINGS
1	2019-08-27	DC016
0	2019-03-29	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		

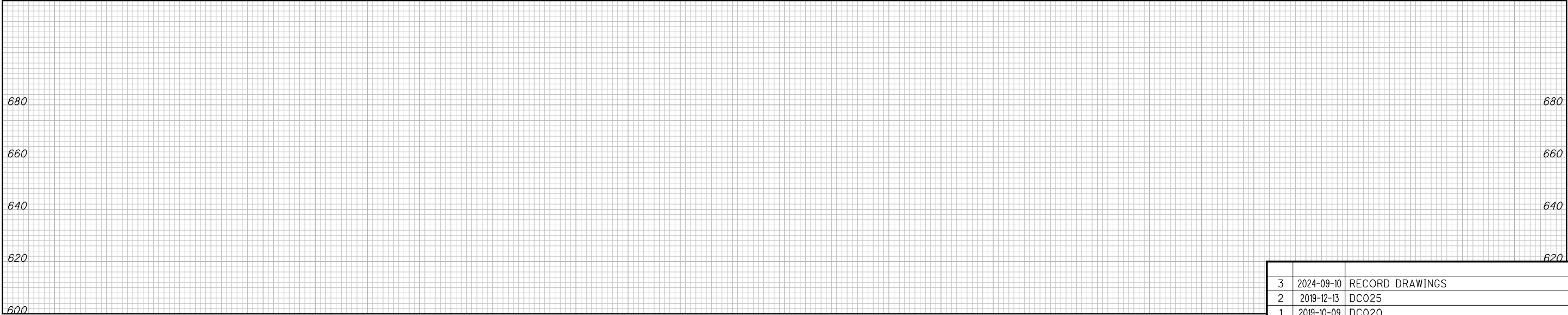
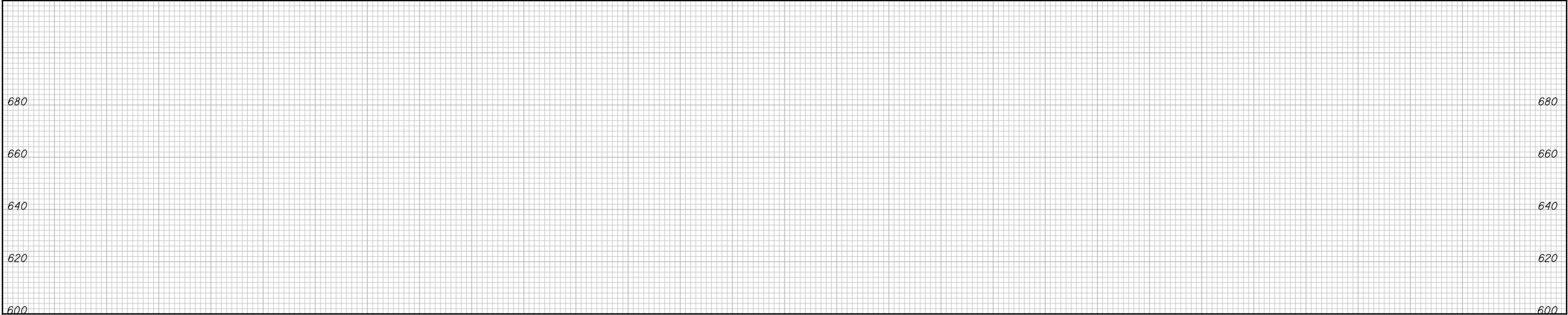
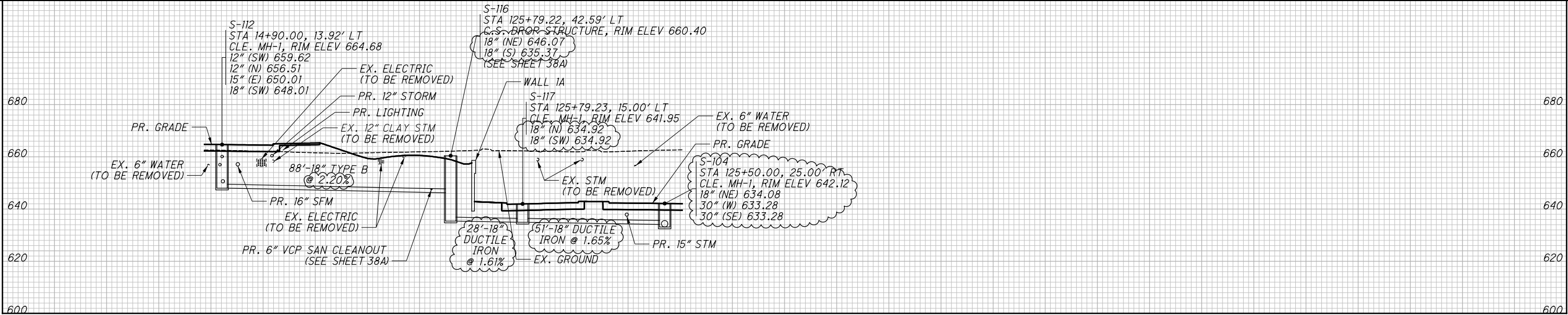


NO.	DATE	DESCRIPTION
3	2024-09-10	RECORD DRAWINGS
2	2019-12-13	DC025
1	2019-10-09	DC020
0	2019-03-29	RFC
ISSUE RECORD		

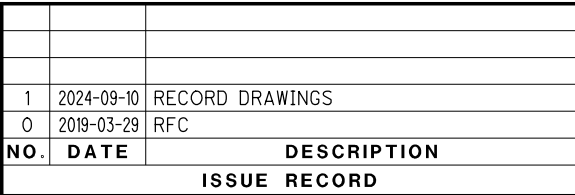


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0	2019-03-29	RFC
ISSUE RECORD		

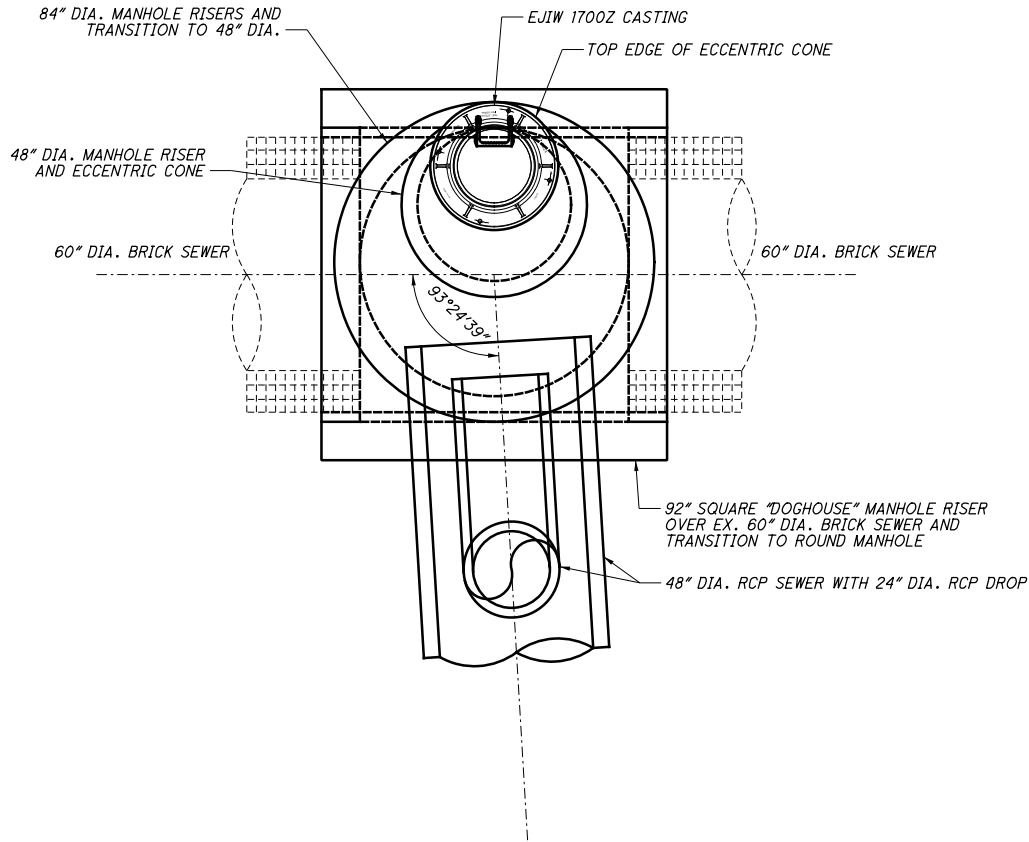
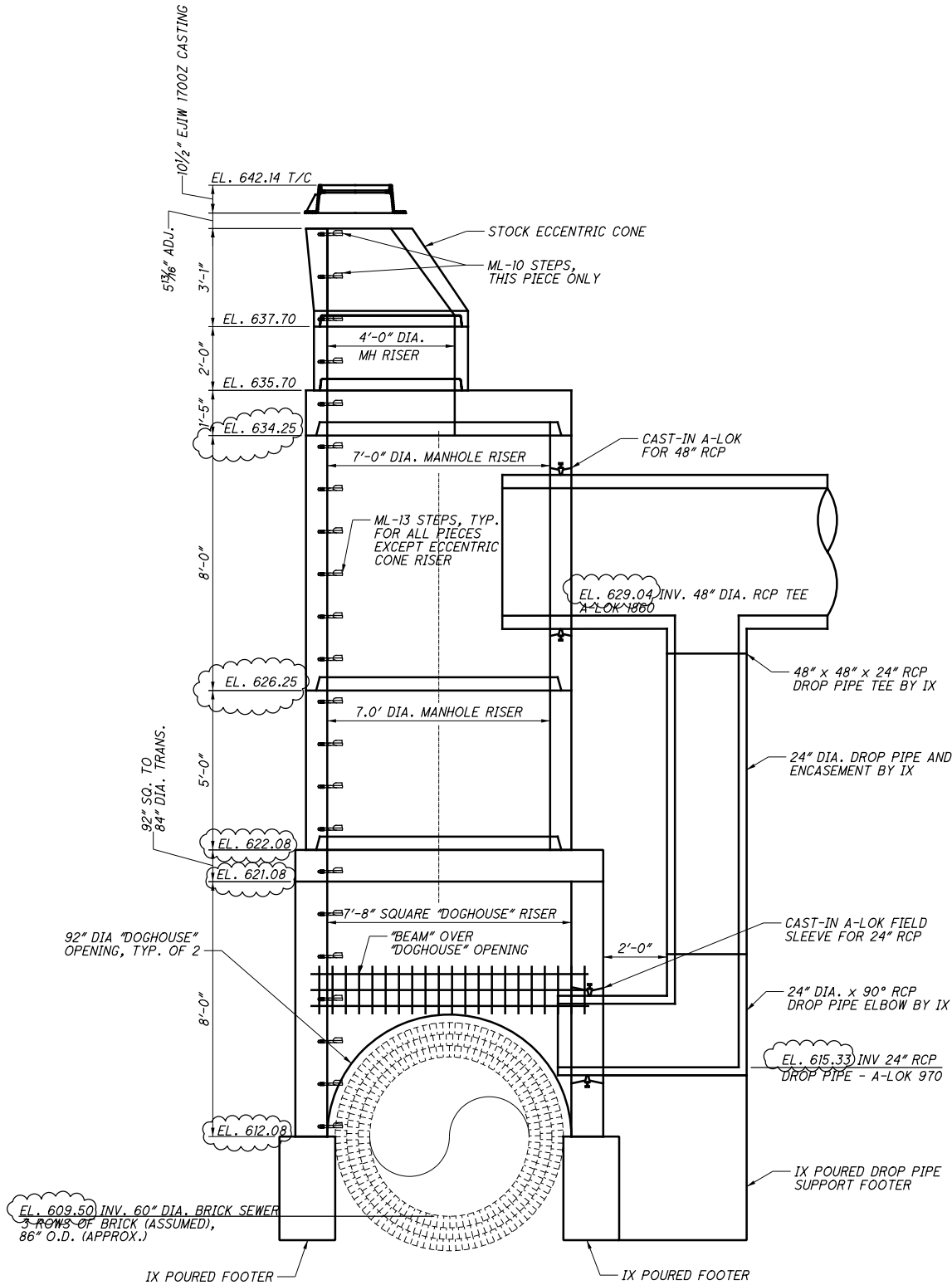




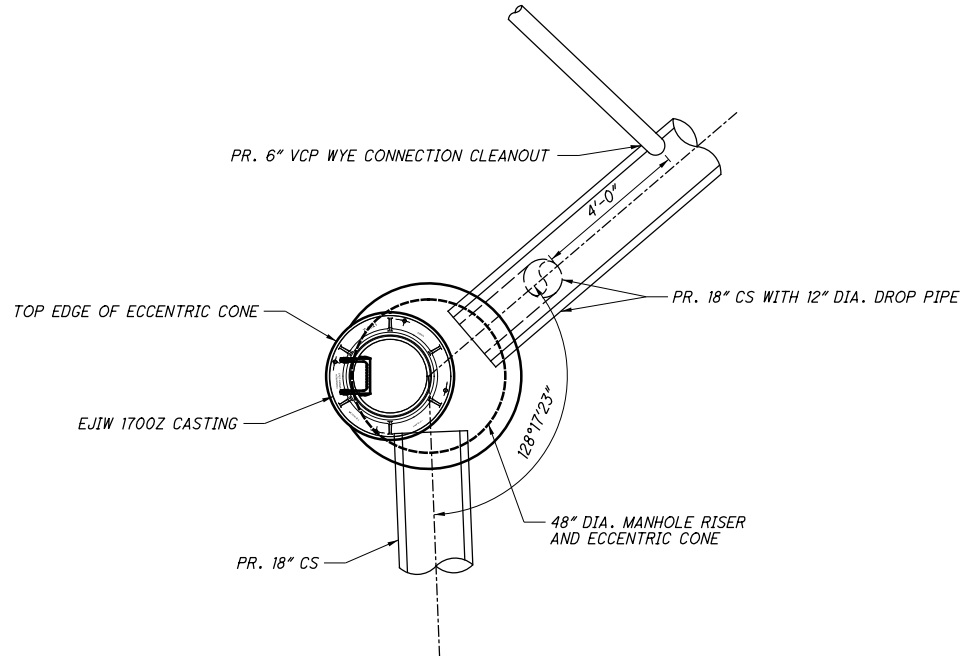
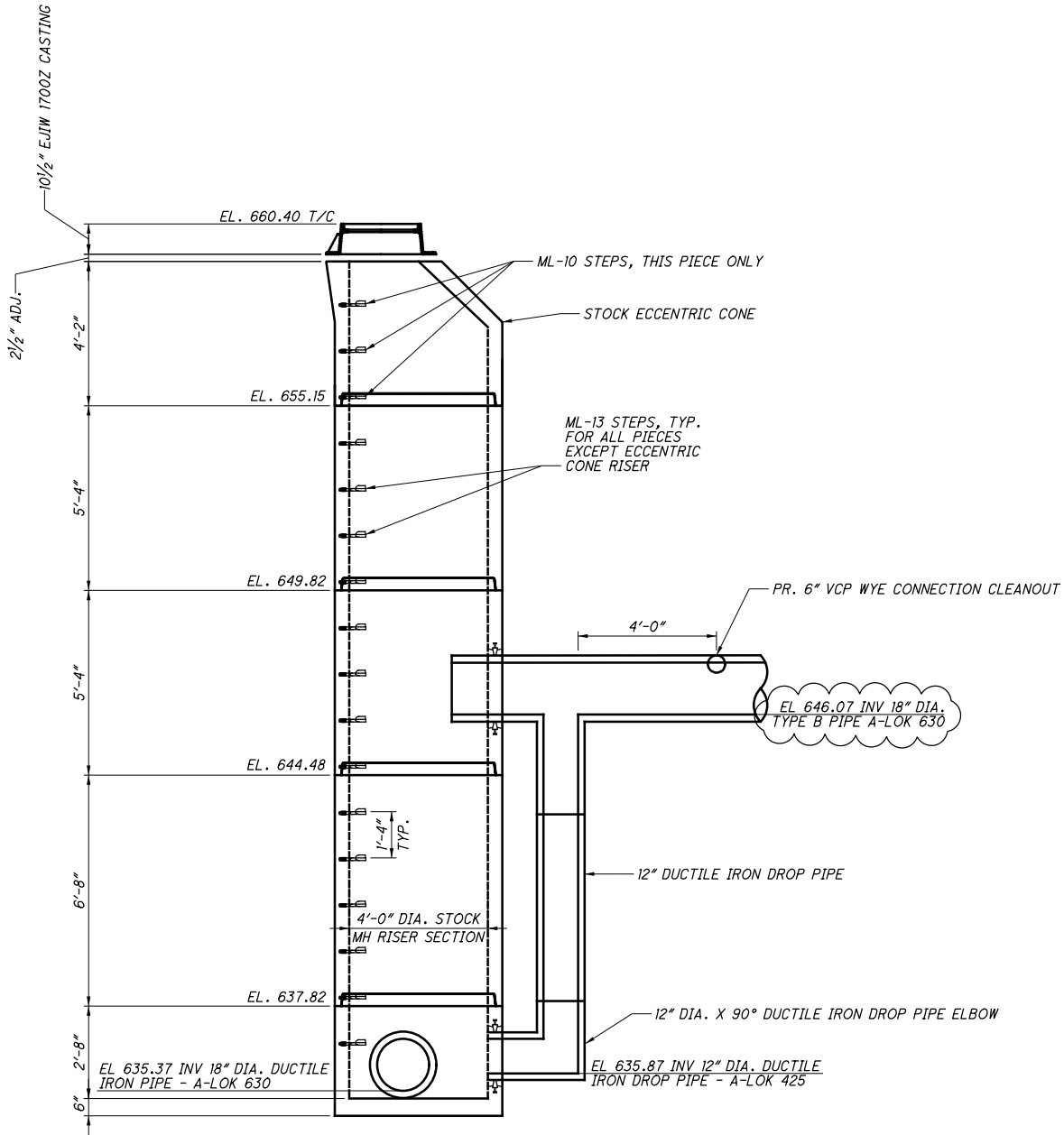
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2	2019-12-13	DC025
1	2019-10-09	DC020
0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



- NOTES:  
1.) CONCRETE MIN. 5,000 PSI @ 28 DAYS  
2.) REINFORCING GRADE 60 ASTM A615-A617 60,000 PSI YIELD STRENGTH  
3.) HS-20 LOADING  
4.) ALL MANHOLE SECTIONS SHALL CONFORM TO THE PROVISIONS OF ASTM C-478  
5.) RUBBER GASKETED JOINTS SHALL CONFORM TO THE PROVISIONS OF ASTM C-443.  
6.) EX. 60" DIA. SEWER SIZE, COMPOSITION AND WALL THICKNESS TO BE CONFIRMED BY OTHERS.



NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC
ISSUE RECORD		



NOTES:  
1.) CONCRETE MIN. 5,000 PSI @ 28 DAYS  
2.) REINFORCING GRADE 60 ASTM A615-A617 60,000 PSI YIELD STRENGTH  
3.) HS-20 LOADING  
4.) ALL MANHOLE SECTIONS SHALL CONFORM TO THE PROVISIONS OF ASTM C-478  
5.) RUBBER GASKETED JOINTS SHALL CONFORM TO THE PROVISIONS OF ASTM C-443.

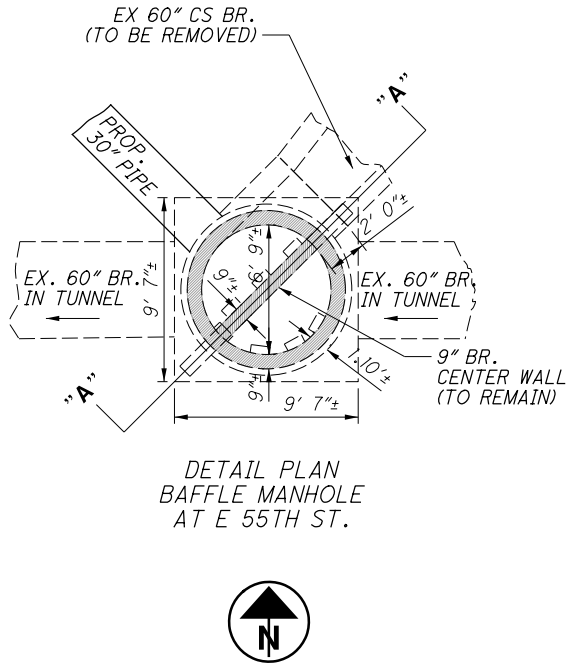
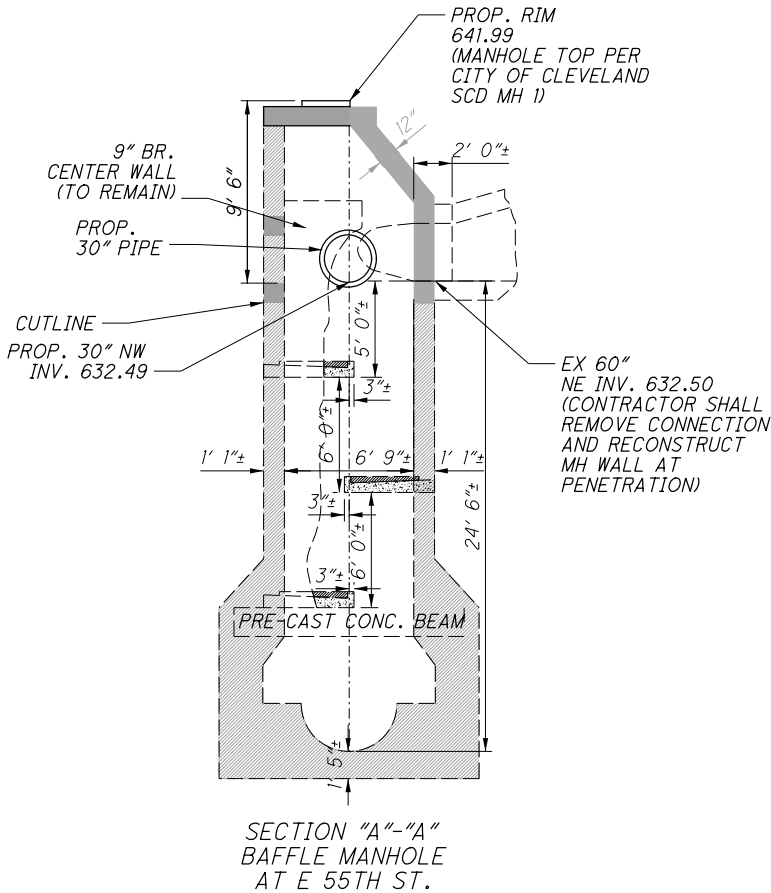
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0	2019-12-13	DC025
NO.	DATE	DESCRIPTION
ISSUE RECORD		

NOTES:

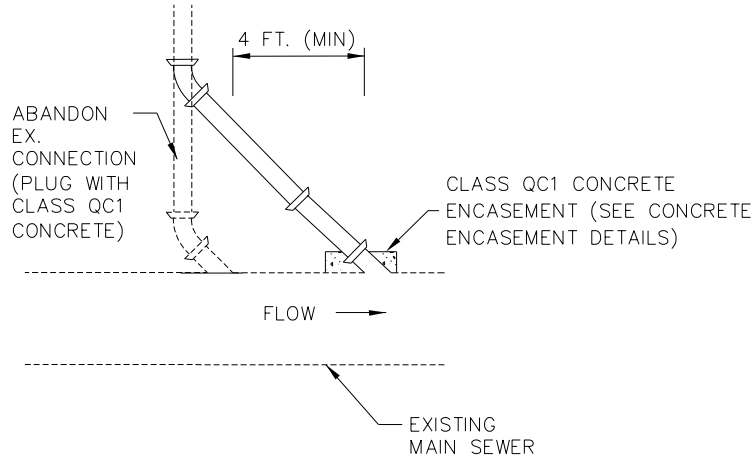
EX. BRICK MANHOLE SHALL BE DEMOLISHED/CUT DOWN TO EL. 639± AND RECONSTRUCTED TO ACCOMMODATE A NEW PRECAST LID AND CASTING AT NEW PROPOSED RIM ELEVATION. A SQUARE OPENING SHALL BE MADE FOR THE PROPOSED 30" PIPE AND REPAIRED WITH CONCRETE.

ELEMENTS OF THE MANHOLE BELOW THE CUT LINE ARE NOT TO BE DISTURBED.

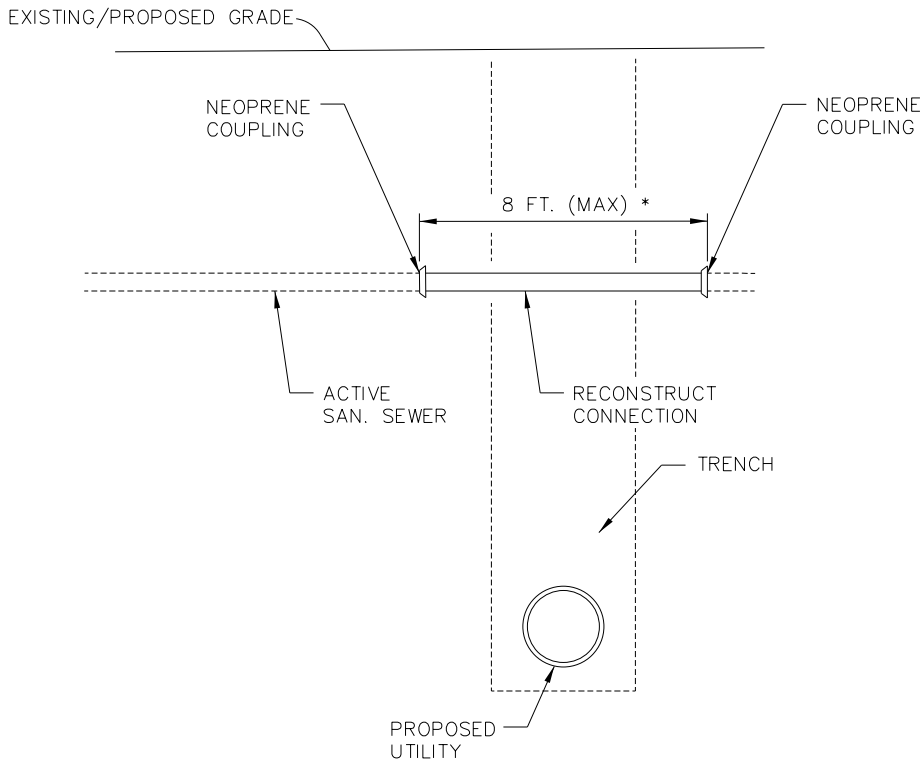
NO CONSTRUCTION DEBRIS IS PERMITTED IN THE MANHOLE.



0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

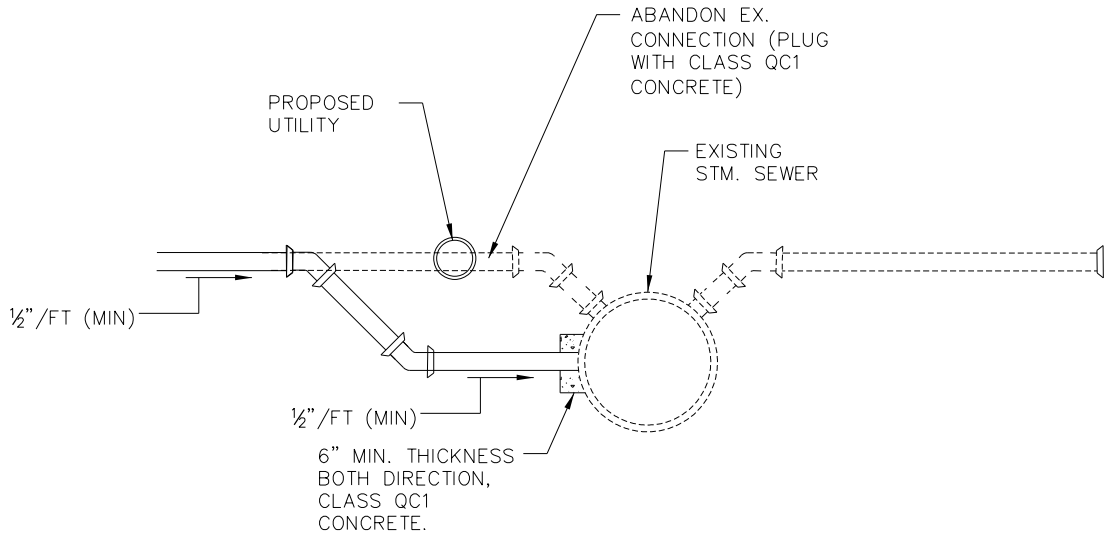


SANITARY CONNECTION LOWERING PLAN VIEW  
NOT TO SCALE

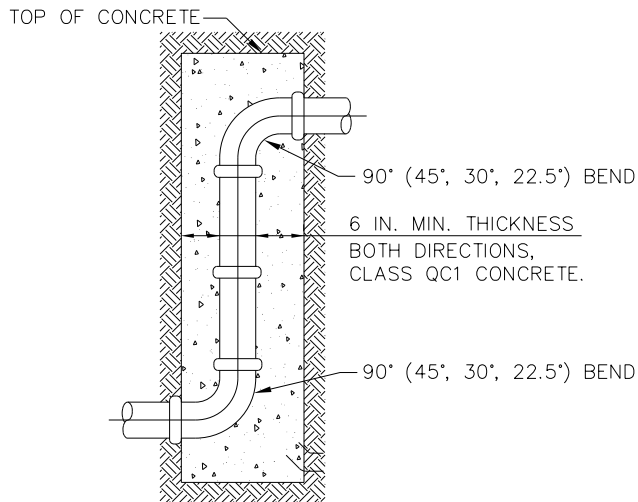


SANITARY CONNECTION TRENCH DETAIL  
NOT TO SCALE

\* ESTIMATED LENGTH OVER TRENCH.



SEWER CONNECTION LOWERING SECTION VIEW  
NOT TO SCALE



TYPICAL SEWER RISER DETAIL  
NOT TO SCALE

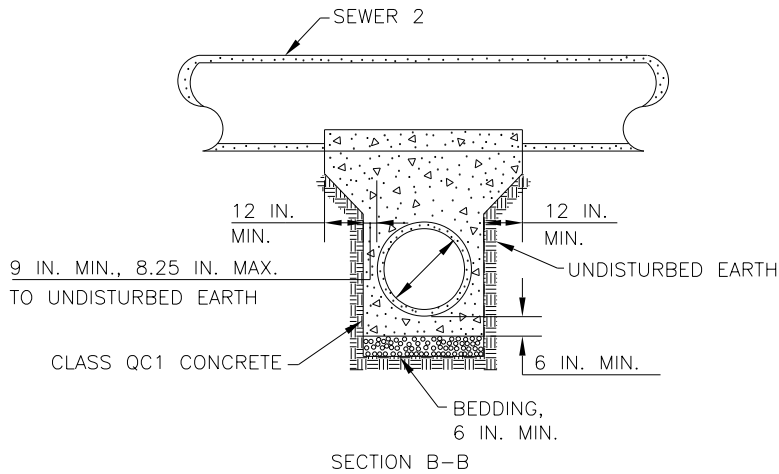
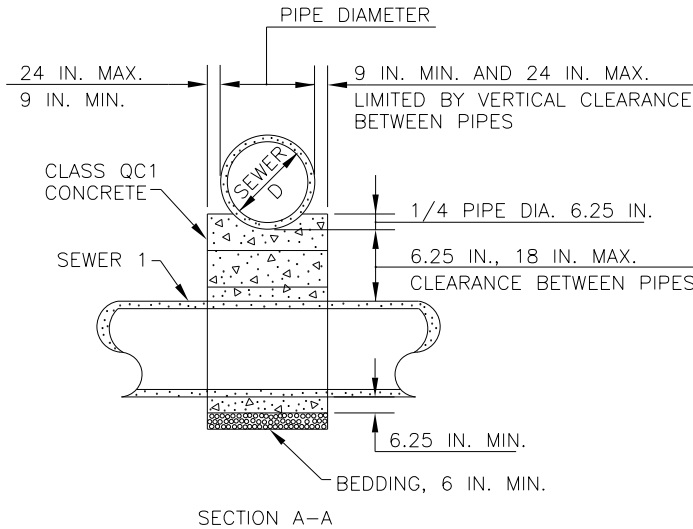
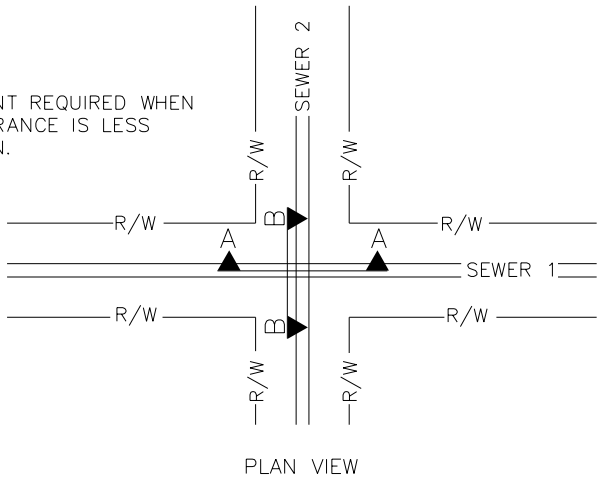
NOTES

- 1.) ABANDON ALL INACTIVE STORM AND SANITARY CONNECTIONS IMPACTED BY CONSTRUCTION.
- 2.) EXISTING CONNECTIONS ARE ANTICIPATED TO RANGE FROM 5" TO 8". EXISTING 5" & 6" CONNECTIONS SHALL BE REPLACED WITH ITEM 611 - 6" CONDUIT, TYPE B(C), 706.08 WITH 706.12 JOINTS.

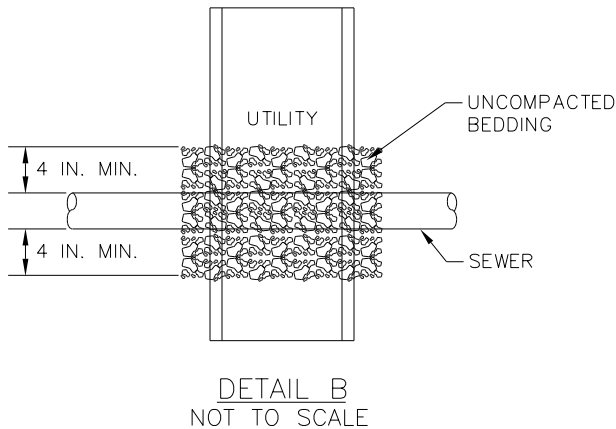
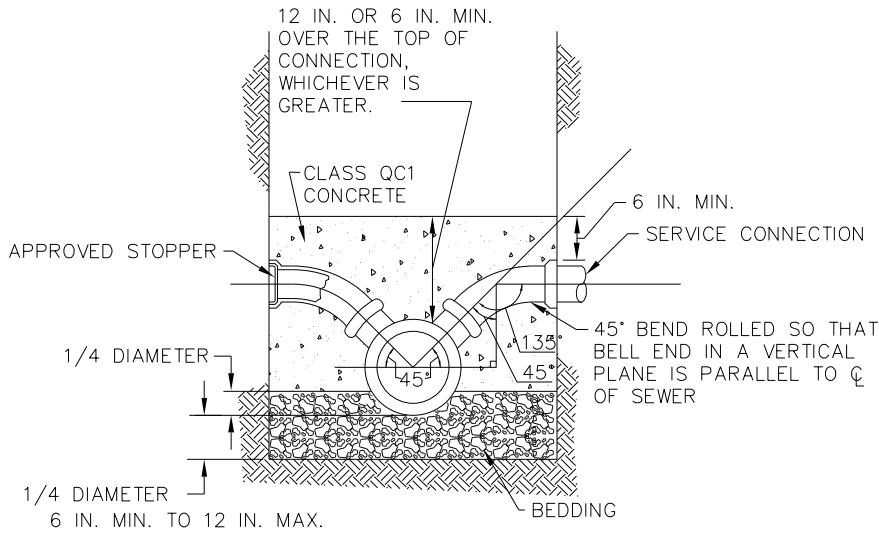
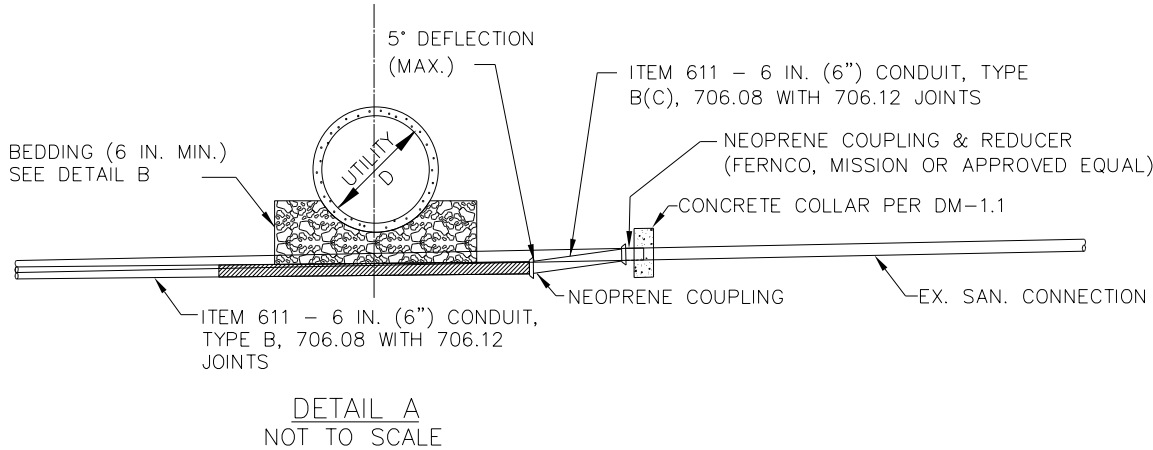
0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



NOTE:  
ENCASEMENT REQUIRED WHEN  
PIPE CLEARANCE IS LESS  
THAN 18 IN.

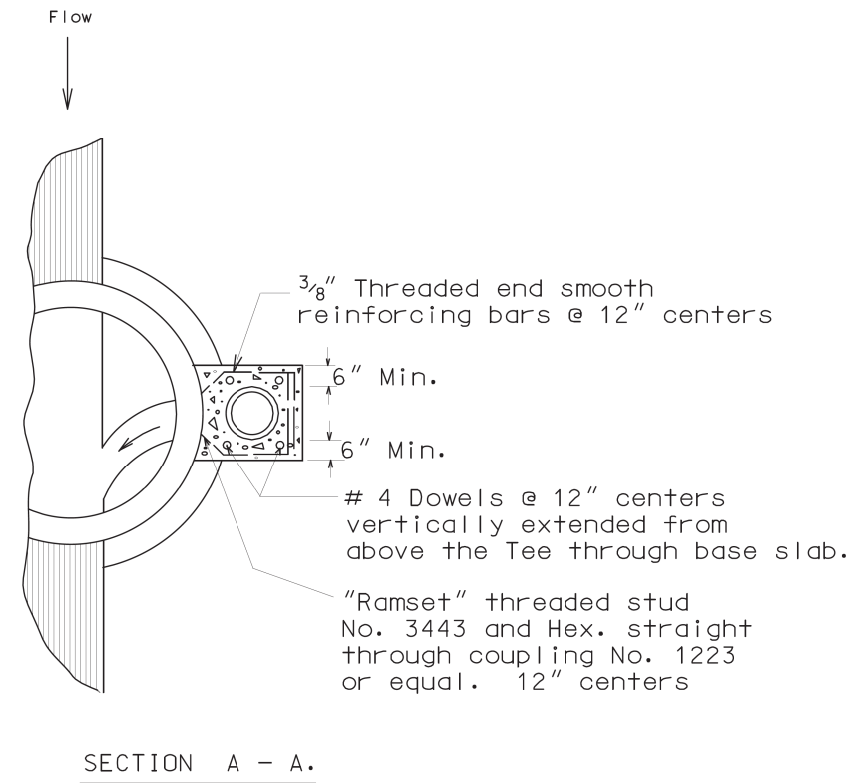
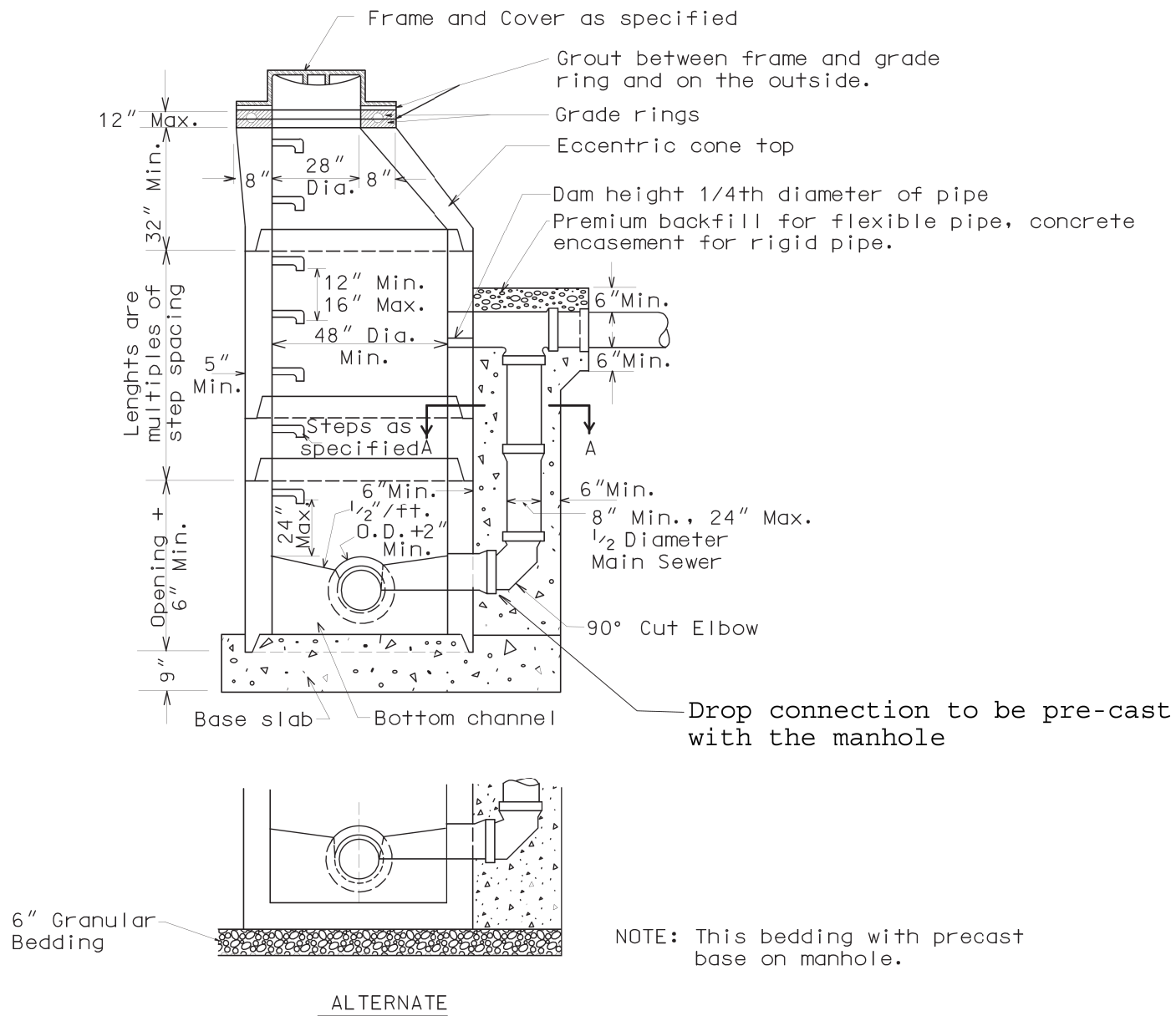


ITEM 611  
STANDARD CONCRETE ENCASEMENT  
(MONOLITHIC CRADLING OF UPPER PIPE)  
NOT TO SCALE



- NOTES:
1. EXISTING SEWER CONNECTION SHALL ONLY BE LOWERED IF FOUND TO BE IN CONFLICT WITH THE PROPOSED CONDUIT. SEE SEWER CONNECTION LOWERING DETAILS FOR NECESSARY VERTICAL RELOCATIONS WHICH ARE GREATER IN DEPTH THAN 18.5 IN.
  2. FOR VERTICAL RELOCATIONS LESS THAN 4.5 IN., THE LOWERING SHALL BE ACCOMPLISHED BY MEANS OF A DEFLECTION AT THE PIPE JOINT. THIS DEFLECTION SHALL NOT EXCEED 5° OR THE MAXIMUM ALLOWABLE DEFLECTION AS RECOMMENDED BY THE MANUFACTURER. SEE DETAIL A.
  3. FOR VERTICAL RELOCATIONS BETWEEN 4.5 IN. AND 18.5 IN. SHALL BE ACHIEVED BY USING SHORT RADIUS CURVE FITTINGS OF 22.5°, 30°, 45°, OR OTHER SUITABLE FITTINGS APPROVED BY THE ENGINEER. THE FITTINGS TO BE USED SHALL BE THAT WHICH MINIMIZES THE LENGTH OF SEWER CONNECTION REPLACEMENT.
  4. TEE CONNECTIONS SHALL BE MADE AT AN ELEVATION ABOVE THE SPRING LINE OF THE LONGITUDINAL SEWER, WHERE POSSIBLE.
  5. ALL NECESSARY BENDS, BRANCHES, COLLARS, FITTINGS, TEES, CONCRETE ENCASEMENTS, COUPLINGS, AND REDUCERS SHALL BE INCLUDED IN PAYMENT FOR THE APPROPRIATE ITEM 611 - CONDUIT PAY ITEM.

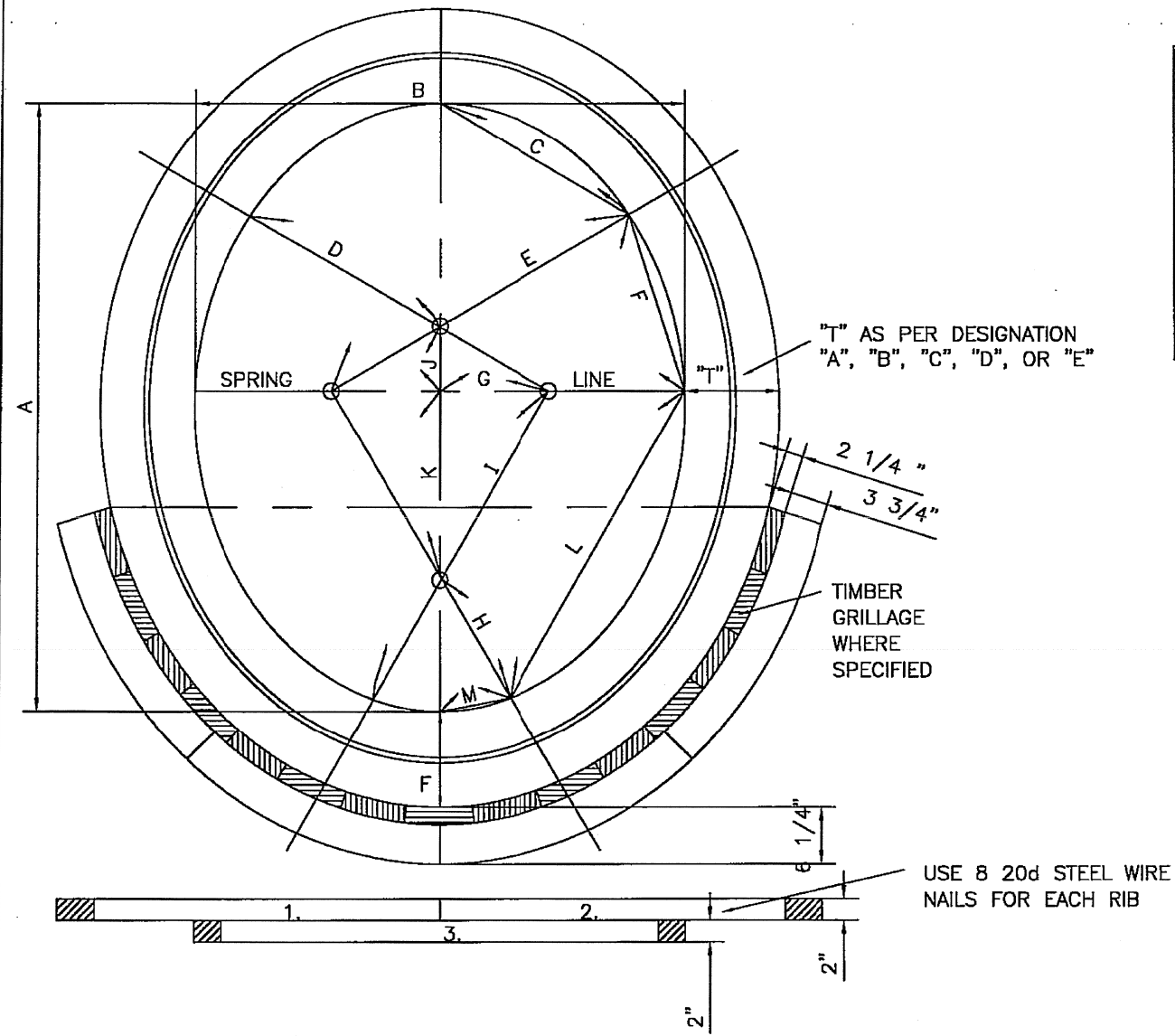
NO.	DATE	DESCRIPTION
0	2019-03-29	RFC
ISSUE RECORD		



MODIFIED  
PRECAST CONCRETE  
DROP MANHOLE

REVISIONS:		SCALE NO SCALE	DATE : DEC. 1998
UNIFORM STANDARDS: CLEVELAND --- CUYAHOGA COUNTY --- NORTHEAST OHIO REGIONAL SEWER DISTRICT			
Sheet No. 6/27			

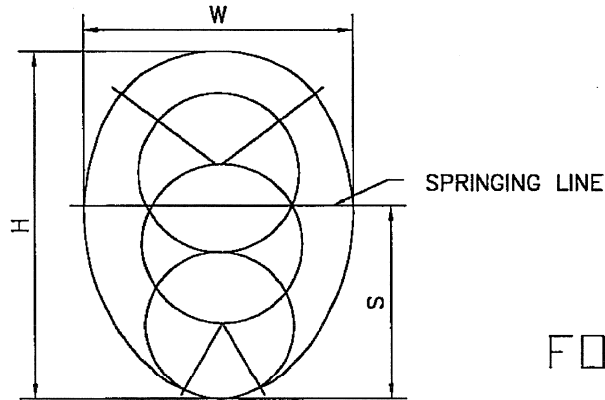
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NO.	DATE	DESCRIPTION
ISSUE RECORD		



EGG SHAPED SEWERS					NO.	H FEET	W FEET	S FEET	AREA SQ. FT.	NO.	H FEET	W FEET	S FEET	AREA SQ. FT.
NO.	H FEET	W FEET	S FEET	AREA SQ. FT.	8	5.12	4.04	2.71	16.00	15	7.79	6.14	4.12	36.99
2	2.25	1.94	1.28	3.41	9	5.54	4.37	2.93	18.72	16	8.13	6.41	4.30	40.32
3	2.75	2.23	1.64	4.75	10	5.94	4.69	3.14	21.54	17	8.47	6.68	4.47	43.71
4	3.23	2.54	1.70	6.35	11	6.33	4.99	3.35	24.46	18	8.79	6.94	4.65	47.17
5	3.74	2.95	1.98	8.55	12	6.71	5.29	3.55	27.47	19	9.12	7.19	4.82	50.70
6	4.23	3.34	2.23	10.90	13	7.08	5.58	3.74	30.57	20	9.43	7.44	4.98	54.29
7	4.69	3.70	2.48	13.39	14	7.44	5.87	3.93	33.74					

### TYPES OF EGG SHAPED SEWERS

- "A"—1 RING OF BRICK ALL AROUND.  
"B"—1 RING OF BRICK ALL AROUND & 1 RING EXTRA ON ARCH.  
"C"—2 RINGS OF BRICK ALL AROUND .  
"D"—2 RINGS OF BRICK ALL AROUND & 1 RING EXTRA ON ARCH.  
"E"—3 RINGS OF BRICK ALL AROUND.

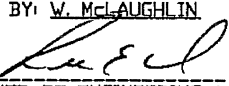


FOR RECORD ONLY

TABULAR DIMENSIONS FOR EGG SHAPED SEWERS NO.2 TO NO. 8													
NO.	A	B	C	D	E	F	G	H	I	J	K	L	M
2	2'-3"	1'-11 1/4"					6 3/8"	9"	1'-6"		6 3/8"		
3	2'-9"	2'-2 3/4"					10 5/8"	9"	2'-0"		10 5/8"		
4	3'-2 3/4"	2'-6 5/8"	1'-2 1/8"	1'-2 1/8"	1'-10 1/2"	11 1/2"	7 3/16"	8 1/8"	1'-10 1/2"	4 1/16"	12 3/16"	1'-10 1/2"	4 1/4"
5	3'-9"	2'-11 3/8"	1'-4 3/8"	1'-4 3/8"	2'-1 7/8"	1'-1 3/8"	8 3/16"	9 1/2"	2'-1 7/8"	4 3/4"	1'-2 1/4"	2'-1 7/8"	4 7/8"
6	4'-2 3/4"	3'-4"	1'-6 1/2"	1'-6 1/2"	2'-5 1/4"	1'-3 1/8"	9 1/4"	10 3/4"	2'-5 1/4"	5 3/8"	1'-4 1/8"	2'-5 1/4"	5 1/2"
7	4'-8 1/4"	3'-8 3/8"	1'-8 1/2"	1'-8 1/2"	2'-8 1/2"	1'-4 3/4"	10 5/16"	11 7/8"	2'-8 1/2"	5 15/16"	1'-5 13/16"	2'-8 1/2"	6 1/8"
8	5'-1 1/2"	4'-0 1/2"	1'-10 1/2"	1'-10 1/2"	2'-11 1/2"	1'-6 1/4"	11 1/4"	1'-1"	2'-11 1/2"	6 1/2"	1'-7 1/2"	2'-11 1/2"	6 3/4"

CITY OF CLEVELAND  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF ENGINEERING & CONSTRUCTION  
JOMARIE WASIK—DIRECTOR OF PUBLIC SERVICE  
STANDARD CONSTRUCTION DRAWING  
STANDARD PLAN FOR EGG SHAPED SEWERS  
DIMENSIONS & AREAS  
NOT TO SCALE

DRAWN BY: R. PLIODZINSKAS      DATE: 4/8/08  
SUBMITTED BY: W. McLAUGHLIN      DATE: 4/8/08

APPROVED:       DATE: 7-8-08  
COMMISSIONER OF ENGINEERING & CONSTRUCTION

FILE NO. 73M      24

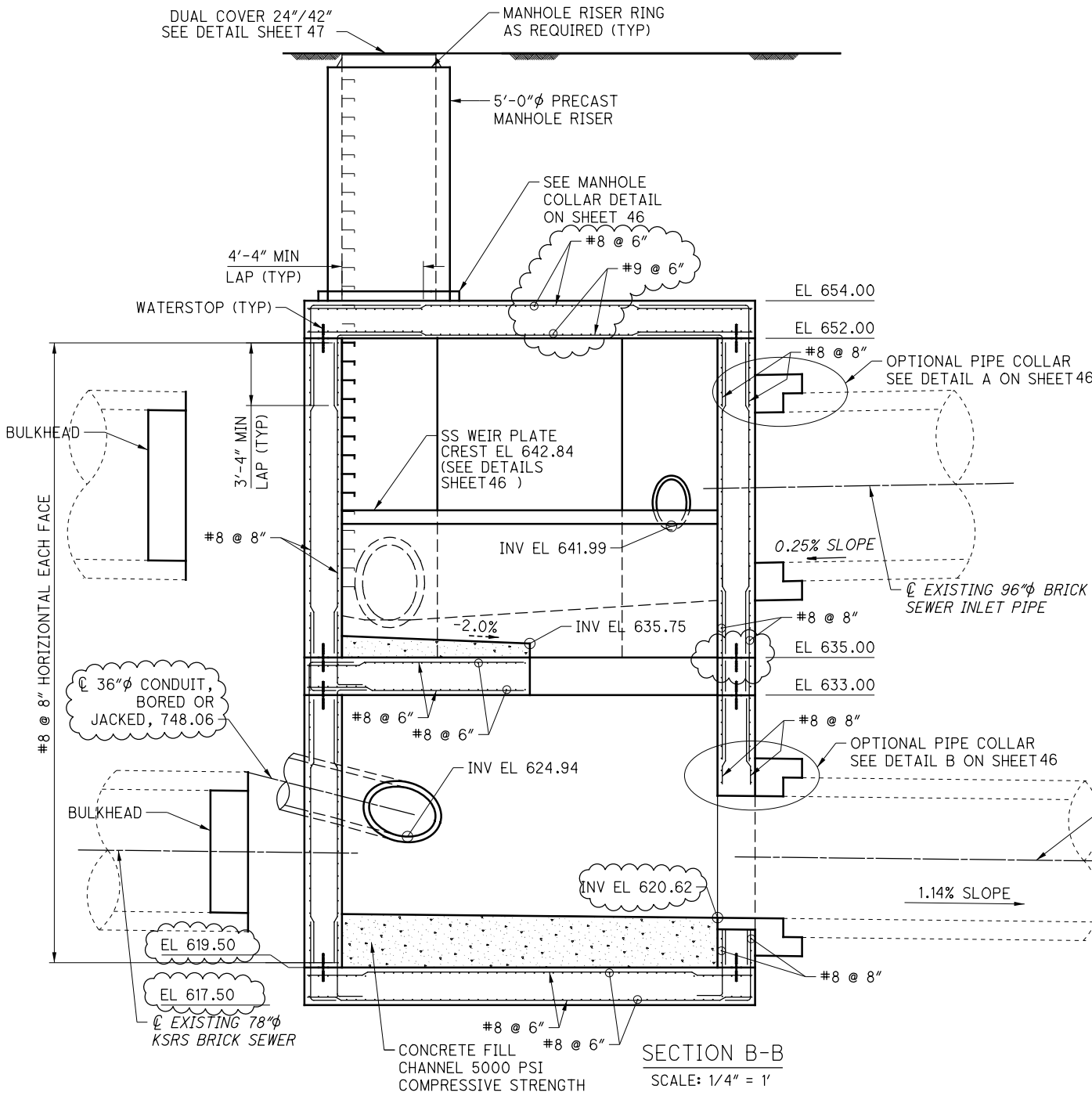
0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



3	2024-09-10	RECORD DRAWINGS
2	2019-09-11	DRFIO15
1	2019-08-27	DCO16
0	2019-03-29	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



HORIZONTAL SCALE IN FEET



GENERAL NOTES:

1. DIMENSIONS AND ELEVATIONS OF EXISTING PIPE SHOWN ON DRAWINGS ARE APPROXIMATIONS.
2. PIPE DIAMETERS REFER TO NOMINAL FLOW DIAMETER.
3. USE QCI CONCRETE ( $f'_c = 4$  KSI MIN.) UNLESS OTHERWISE NOTED.
4. USE GRADE 60 REINFORCING STEEL ( $f_y = 60$  KSI).
5. ALL REINFORCING STEEL SHALL BE EPOXY COATED.
6. JUNCTION CHAMBERS DESIGNED FOR H2O VEHICULAR LIVE LOAD AND CONSTRUCTION VEHICLES.
7. USE MINIMUM COVER OF 3 INCHES FOR ALL REINFORCING STEEL.
8. USE NEORS D SPECIAL PROVISIONS FOR THE REGULATOR STRUCTURE.

SECTION B-B  
SCALE: 1/4" = 1'

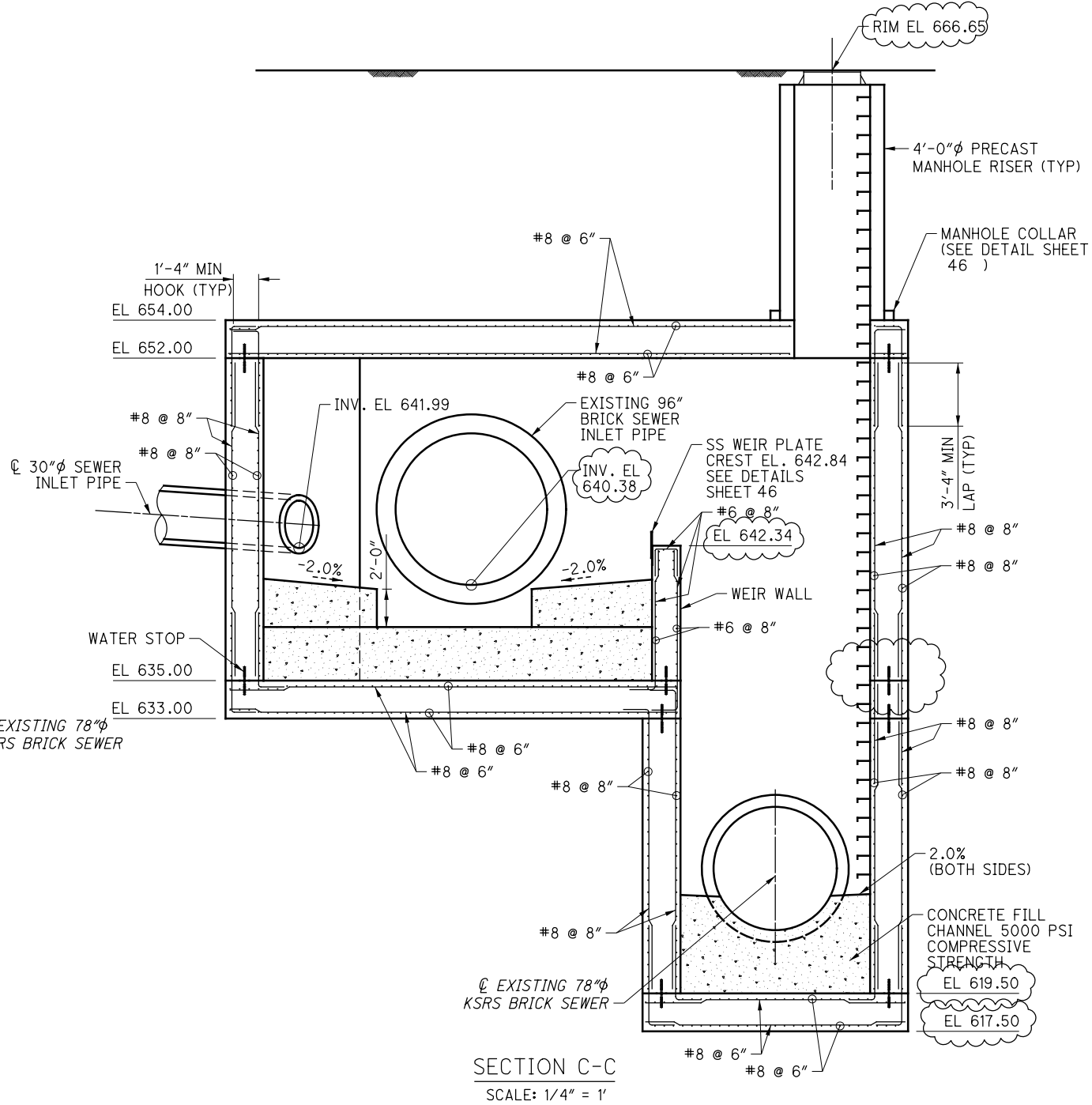
SEQUENCE OF CONSTRUCTION

PHASE 1: (LOWER CHAMBER CONSTRUCTION)

1. LOCATE EXISTING 78" AND 96" SEWERS.
2. INSTALL TEMPORARY EARTH RETAINING SYSTEM (TERS) AROUND DEEP CAST-IN-PLACE CHAMBER (96" SEWER WILL NOT BE IMPACTED DURING THIS PHASE).
3. EXCAVATE WITHIN THE TERS
4. SETUP BYPASS PUMPING TO HANDLE ANY SEEPAGE FLOW FOR THE 78" SEWER. (78" SEWER WILL NOT BE BULKHEADED AT THIS TIME.)
5. DEMOLISH 78" SEWER WITHIN THE TERS EXCAVATION (DURING CHAMBER CONSTRUCTION, WET WEATHER EVENTS TO BE MANAGED BY CONTRACTOR)
6. CONSTRUCT CAST-IN-PLACE CHAMBER.

PHASE 2: (UPPER CHAMBER CONSTRUCTION)

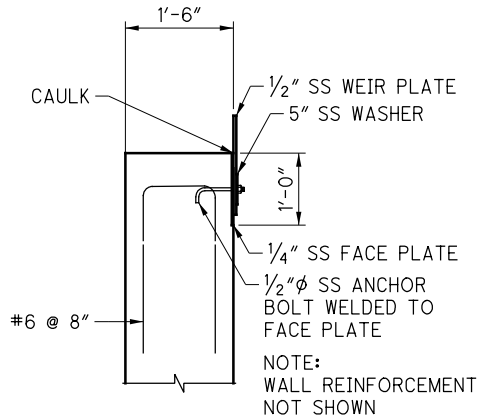
1. INSTALL TERS AROUND REMAINING CAST-IN-PLACE CHAMBER.
2. EXCAVATE WITHIN THE TERS AND SETUP BYPASS PUMPING TO HANDLE DRY WEATHER FLOW FOR THE 96" SEWER.
3. DEMOLISH 96" SEWER WITHIN THE TERS EXCAVATION.
4. CONSTRUCT CAST-IN-PLACE CHAMBER.
5. INSTALL PIPE BULKHEADS IN 78" AND 96" SEWERS NORTH OF THE CHAMBER.
6. BACKFILL, INSTALL INSPECTION/MANHOLE RISERS, AND REMOVE TOP 48" OF TERS BELOW GRADE.



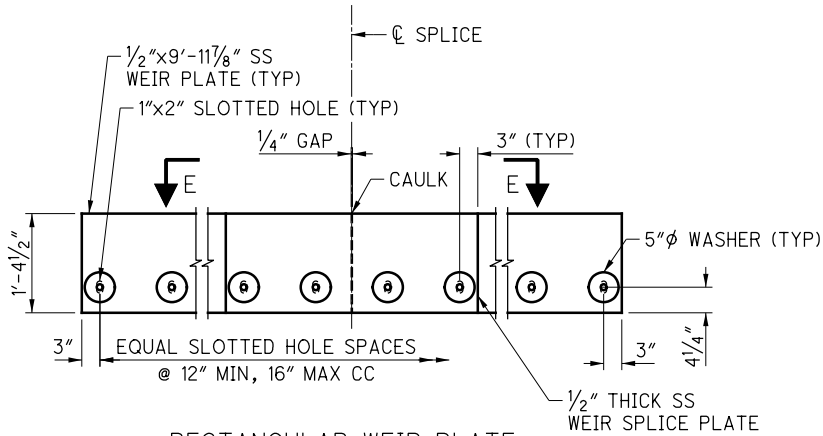
SECTION C-C  
SCALE: 1/4" = 1'

NOTE:  
SS = STAINLESS STEEL

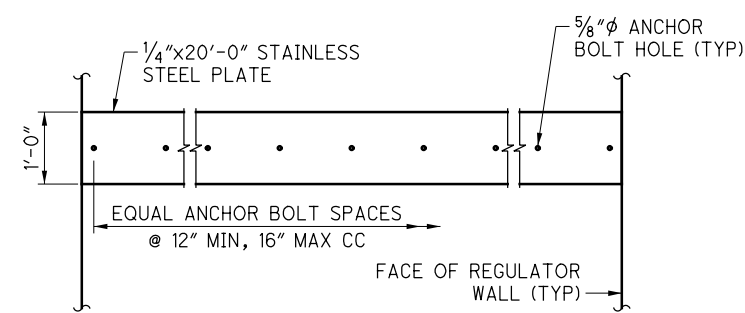
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ISSUE RECORD		



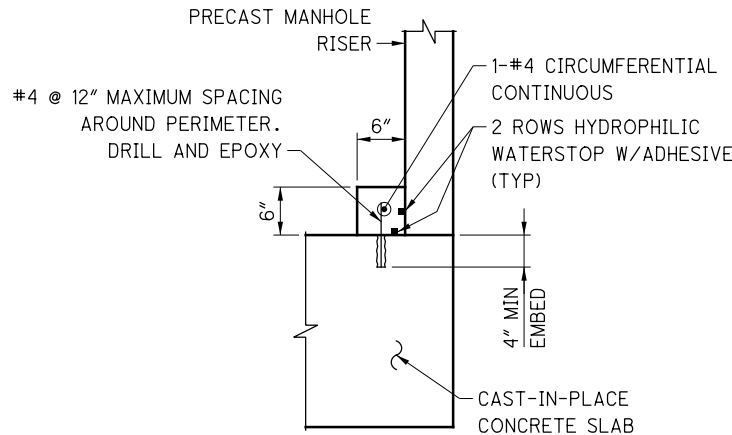
WEIR PLATE DETAIL



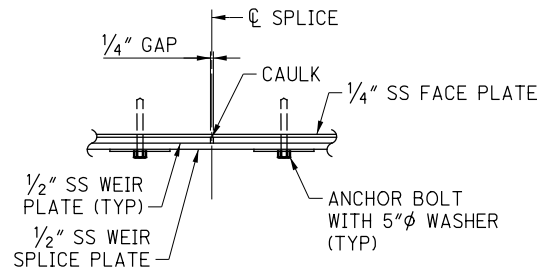
RECTANGULAR WEIR PLATE



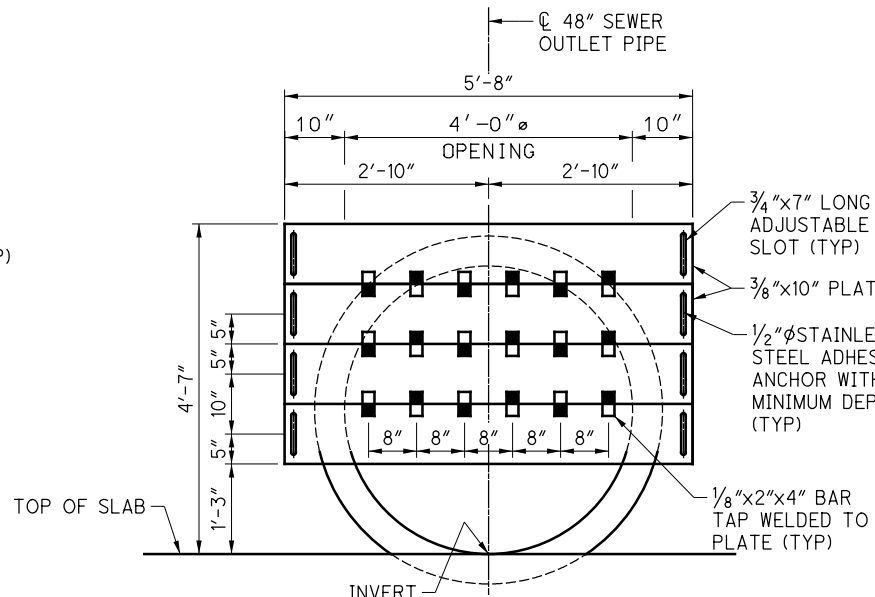
STAINLESS STEEL FACE PLATE



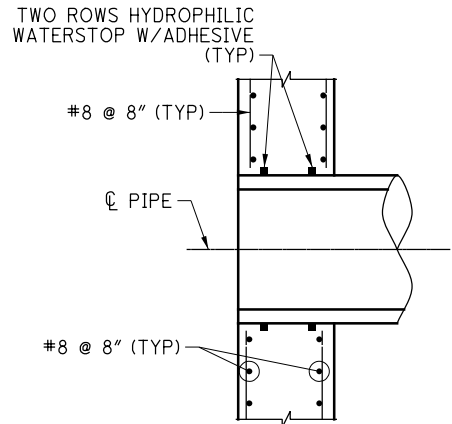
MANHOLE COLLAR AT CONCRETE SLAB CONNECTION



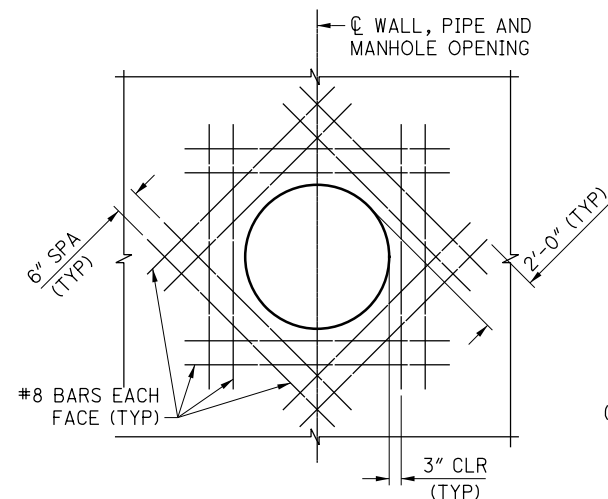
SECTION E-E



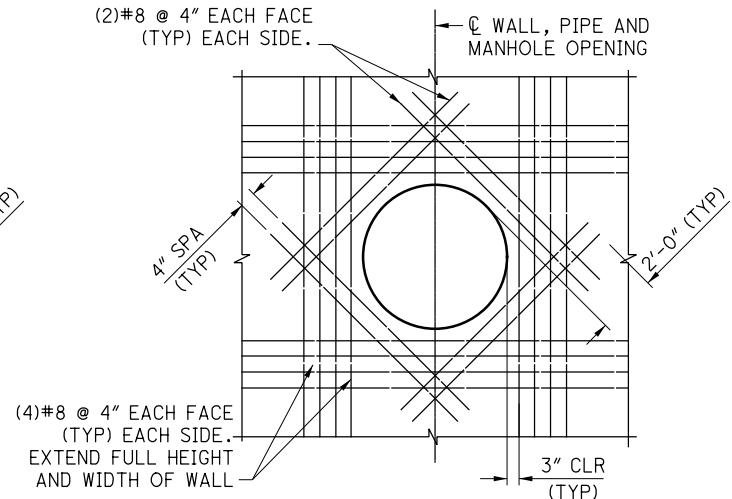
ORIFICE PLATE DETAIL



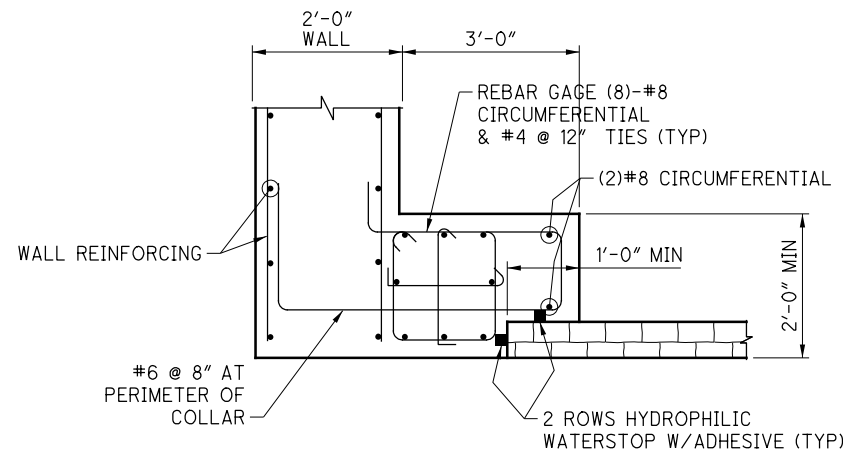
CAST IN PIPE PENETRATION DETAIL



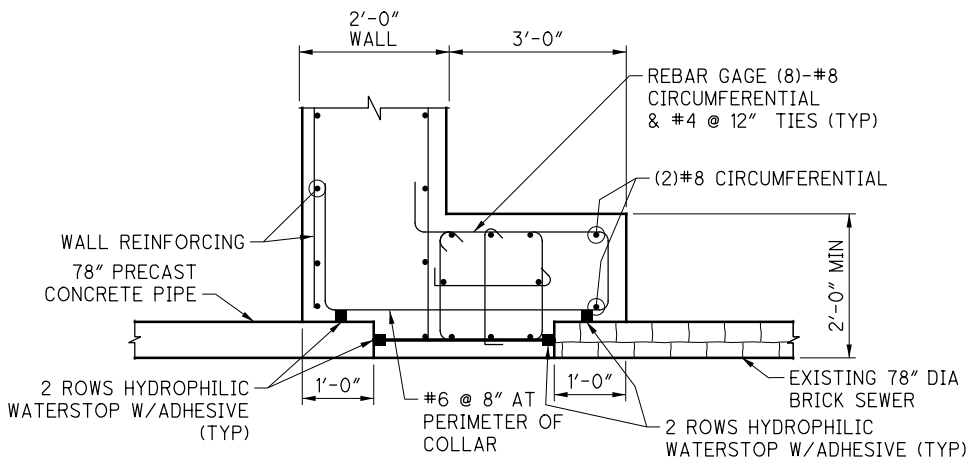
WALL AND SLAB OPENING REINFORCEMENT DETAIL



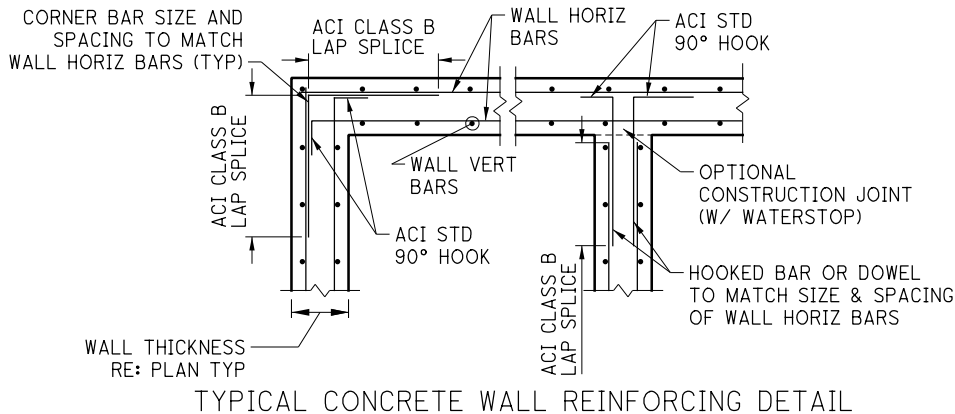
WALL OPENING REINFORCEMENT FOR EXISTING SEWER PIPES DETAIL



PIPE COLLAR DETAIL A



PIPE COLLAR DETAIL B

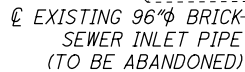


TYPICAL CONCRETE WALL REINFORCING DETAIL

NOTE:  
SS = STAINLESS STEEL

NO.	DATE	DESCRIPTION
0	2019-03-29	RFC
ISSUE RECORD		





# 1120A 1986Z 1986Z Assembly

The technical drawing consists of three main views: a Plan View at the top, a Cover Section in the middle, and a Frame Section at the bottom. The Plan View shows a circular assembly with a central circular component labeled 'CORE BODY'. It features two open pickholes on the left and two closed pickholes on the right. Dimensions include a total diameter of 51 3/8", a central hole of 1 1/8", and a distance of 1 1/2" from the center to the pickholes. The outer diameter is 27 1/2". The Cover Section shows a cross-section of the cover with a 24" diameter and a 1 1/2" thickness. The Frame Section shows a cross-section of the frame with a 44 1/4" diameter, a 24 1/4" diameter for the inner opening, and a 22" diameter for the base. It also shows a 1 1/2" thickness and a 42" diameter for the inner opening. The overall diameter of the frame is 55 1/4".

51 3/8"

1 1/8"

1 1/2"

(2) OPEN PICKHOLES

(2) CLOSED PICKHOLES

1 1/2"

(2) 1" THRU HOLES

27 1/2" DIA

PLAN VIEW

24" DIA

1 1/2"

COVER SECTION

44 1/4" DIA

24 1/4" DIA

22" DIA

1 1/2"

COVER SECTION

44 1/2" DIA

1 1/2"

8"

42" DIA

45 5/16" DIA

55 1/4" DIA

FRAME SECTION

Product Number  
00112020A01

Design Features

Materials

- Cover  
Gray Iron (CL35B)
- Frame  
Gray Iron (CL35B)
- Cover  
Gray Iron (CL35B)

Design Load  
Heavy Duty

Open Area  
n/a

Coating  
Dipped

~√ Designates Machined Surface

Certification

- ~ ASTM A48
- 
- ~ Country of Origin: USA

Major Components

- 00112020
- 00198610
- 00198660

Drawing Revision

8/12/2009 Designer: GAD  
11/14/2018 Revised By: MAH

Disclaimer

Weights (lbs/kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

CONFIDENTIAL: This drawing is the property of EJ GROUP, Inc., and embodies confidential information, registered marks, patents, trade secret information, and/or know how that is the property of EJ GROUP, Inc. Copyright © 2012 EJ GROUP, Inc. All rights reserved.

Contact

800 626 4653  
ejco.com



**Certification**  
-ASTM A48  
-  
-  
-Country of Origin:USA

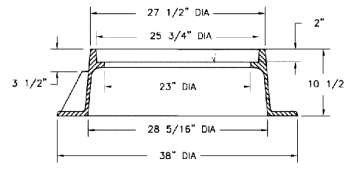
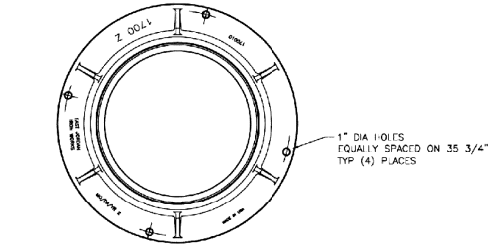
**Major Components**  
00112020  
00198610  
00198660

Drawing Revision  
8/12/2009 Designer: GAD  
11/14/2018 Revised By: MAH

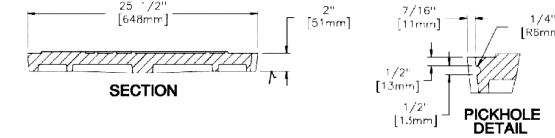
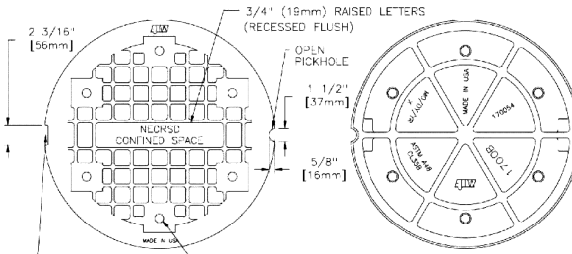
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<b>ENVIROFAST JORDAN</b> 800 628-4853 www.evj.com MADE IN U.S.A.	
PRODUCT NUMBER	
00170010	
CA ALOC NUMBER	
1700Z	
MANHOLE	
FRAME	
LOAD RATING	
HEAVY DUTY	
COATING	
DIPPED	
MATERIAL SPECIFICATION	
COVER - GRAY IRON	
AS'W A48 C13B	
FRAME - GRAY IRON	
AS'W A48 C13B	
CIP-N A9FA	
✓ D. O'BRIEN'S MACHINE/D SURF AC	
DRAWN DEW	DATE 05/22/03
LAST REVISED KKF	DATE 02/05/09
REFERENCE INFORMATION	



EAST JORDAN IRON WORKS, INC.	
P.O. BOX 435 LAS - JORDAN, NH 05277 1-800-874-4100 703-331-5356 FAX 703-331-5458	
DRAWING SBB	DATE 01/28/24
APPROVED	DATE
SPECIAL LETTERED COVER	
PRODUCT NO <b>00170054</b>	
CATALOG NO <b>1700B</b>	
REF. PRODUCT DRAWING 170022	
EST. WT.	
COVER: 212 LBS 96kg	
OPEN AREA N/A	
MATERIAL COVER - GRAY IRON 451W - GRAY C. 35B	
LOAD RATING <b>HEAVY DUTY</b>	

NOTE:  
SS = STAINLESS STEEL

1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		

SLUDGE FORCE MAIN NOTES GENERAL

SCOPE OF WORK

THE WORK COMPLETED UNDER THIS CONTRACT COMPRISES OF THE FURNISHING AND INSTALLING COMPLETE WITH VALVES AND OTHER APPURTENANCES, AND PERFORMING OTHER INCIDENTAL WORK NECESSARY AS SHOWN IN THE PLANS.

THE SLUDGE FORCE MAIN PLANS HAVE BEEN DEVELOPED TO FACILITATE THE REPLACEMENT OF THE 16" SLUDGE FORCE MAIN FROM STA. 10+98+ TO STA. 16+28+, EAST 55TH STREET. CONTRACTOR SHALL EXPOSE THE EXISTING SANITARY FORCE MAIN TO THE NEAREST JOINT TO MAKE THE CONNECTION OF PROPOSED WORK TO EXISTING UTILITY.

TEMPORARY FORCE MAIN CONSTRUCTION IS SHOWN IN THESE PLANS, AND IS CLOSELY COORDINATED WITH THE PROJECT MAINTENANCE OF TRAFFIC PLAN AND CONSTRUCTION PHASING. REFER TO THOSE DOCUMENTS FOR FURTHER INFORMATION REGARDING CONSTRUCTION PHASING.

THE REMAINING PORTIONS OF THE EXISTING FORCE MAIN ARE TO REMAIN IN SERVICE. THE CONTRACTOR SHALL EXERT EXTREME CARE WHEN WORKING IN THE VICINITY OF THE FORCE MAIN. SEE ROADWAY GENERAL NOTES "VIBRATORY ROLLING" AND "UNDERCUTTING AND EXISTING UTILITIES" FOR ADDITIONAL INFORMATION.

DEFINITIONS

WHEREVER IN THESE SPECIFICATIONS OR IN OTHER CONTRACT DOCUMENTS THE FOLLOWING TERMS OR PRONOUNS IN PLACE OF THEM ARE USED, THE INTENT AND MEANING SHALL BE INTERPRETED AS FOLLOWS:

THE STATE: THE STATE IS THE STATE OF OHIO ACTING THROUGH ITS AUTHORIZED REPRESENTATIVE.

ENGINEER: THE ENGINEER IS DISTRICT DEPUTY DIRECTOR OR DISTRICT ENGINEER, THE DISTRICT CONSTRUCTION ENGINEER OR THE DISTRICT MAINTENANCE ENGINEER OR THE PROJECT ENGINEER ASSIGNED TO ADMINISTER THE CONTRACT, OR THEIR DULY DESIGNATED DEPUTIES, AGENTS, OR REPRESENTATIVES.

THE CITY: THE CITY IS THE DIRECTOR OF THE DEPARTMENT OF PUBLIC UTILITIES OF THE CITY OF CLEVELAND, OR HIS DULY DESIGNATED REPRESENTATIVE(S), CITY INSPECTOR, AND/OR THE NORTHEAST OHIO REGIONAL SEWER DISTRICT DIRECTOR (NEORS) AND HIS DULY DESIGNATED REPRESENTATIVE(S).

ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER

WORK INCLUDED

(A) THE CONTRACTOR SHALL, UNDER ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER, FURNISH ALL THE MATERIALS FOR AND SHALL PROPERLY CONSTRUCT AND CONNECT IN PLACE AT THE LOCATIONS SHOWN ON THE DRAWINGS OR AS DIRECTED, ALL DUCTILE IRON PIPE AND FITTINGS, INCLUDING ALL EXCAVATION WORK, THE CUTTING INTO AND REMOVAL OF EXISTING PIPE, BACKFILLING, SAND BEDDING AND PREMIUM BACKFILL, AND REPAVING (BOTH TEMPORARY AND PERMANENT), ALL AS REQUIRED FOR THE PROPER COMPLETION OF THE WORK INCLUDED UNDER THIS CONTRACT.

IN GENERAL THIS WORK SHALL INCLUDE THE FURNISHING, LAYING, CONNECTING, PAINTING, TESTING OF PIPE AND FITTINGS, THE EXCAVATION, REMOVAL AND RESTORATION OF MISCELLANEOUS ITEMS, SHEETING AND SHORING, BACKFILLING, SAND BEDDING AND PREMIUM BACKFILL, SEEDING AND SODDING, THE PERMANENT REPAVING, IF SO NOTED ON THE CONTRACT DRAWINGS, THE CUTTING INTO, REMOVAL AND STORAGE OF EXISTING MAINS, AND THE FURNISHING OF ALL LABOR, MATERIALS, TOOLS AND EQUIPMENT TO COMPLETE THE WORK AS SPECIFIED, SHOWN OR ORDERED.

(B) IN MAKING THE CONNECTION TO EXISTING MAINS, THE CONTRACTOR SHALL SUPPLY, FURNISH, AND INSTALL TEES SLEEVES OR COUPLINGS TO COMPLETE THE CONNECTION. THE CONTRACTOR WILL BE REQUIRED TO MAKE THE NECESSARY EXCAVATION, BACKFILL AND REPAVING (IF NOT PAID FOR SEPARATELY AS PART OF THIS CONTRACT).

DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER

(A) ALL PIPE AND FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH AND IN ALL RESPECTS WITH THE REQUIREMENTS OF THE LATEST SPECIFICATIONS OF THE "AMERICAN NATIONAL STANDARD" FOR ANSI/AWWA C151/A21.51-86, "DUCTILE IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS OR SAND-LINED MOLDS, AND DUCTILE IRON FITTINGS FOR WATER AND OTHER LIQUIDS," AND ANSI/AWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," ADOPTED BY THE AMERICAN WATER WORKS ASSOCIATION; WHICH STANDARDS EXCEPT AS HEREIN MODIFIED ARE MADE A PART OF THESE SPECIFICATIONS. PIPE AND FITTINGS UP TO AND INCLUDING 20-INCHES SHALL HAVE RETAINED MECHANICAL JOINTS EXCEPT WHERE BOLTLESS RESTRAINED PUSH-ON JOINT PIPE AND FITTINGS IS CALLED FOR ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED.

(B) ALL PIPE, UNLESS OTHERWISE APPROVED BY THE ENGINEER, SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED HAVING PUSH-ON JOINTS WITH RADIALY COMPRESSED RUBBER RING GASKET AND INSTALLED AS PER THE MOST CURRENT REVISION OF AWWA C600.

ALL FITTINGS, UNLESS OTHERWISE CALLED FOR, SHALL BE APPROVED DUCTILE IRON, CLASS 350, CEMENT LINED OR FUSION BONDED EPOXY COATED. ALL FITTINGS AND PIPE CONNECTED TO FITTINGS SHALL BE RESTRAINED USING A "RETAINED" MECHANICAL JOINT CONFORMING TO THE MATERIAL AND PERFORMANCE REQUIREMENTS OF ANSI/AWWA C-110/A21.10 AND ANSI/AWWA C-111/A21.11, OR "COMPACT" FITTINGS IN ACCORDANCE WITH ANSI/AWWA C-153/A21.53. EXCEPT FOR ANCHORTEES, REDUCERS OR OTHER SPECIAL CIRCUMSTANCES , ALL FITTINGS ARE TO HAVE BELL ENDS.

ALL BOLTS AND NUTS ON ALL "RETAINED" MECHANICAL JOINTS SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING.

WHERE SHOWN ON THE PLANS, OR WHEN OTHERWISE CALLED FOR, PIPE AND FITTINGS SHALL HAVE AN APPROVED "TYPE I" OR "TYPE II" BOLTLESS RESTRAINED PUSH-ON JOINTS TO THE LIMITS SHOWN ON THE DRAWINGS.

(C) ALL DUCTILE IRON FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C110/A21.10-87, "DUCTILE IRON AND GRAY-IRON FITTINGS, 3-INCH THROUGH 48-INCH, FOR WATER OTHER LIQUIDS," AND ALL SUBSEQUENT AMENDMENTS THERETO. METAL FOR FITTINGS SHALL CONFORM TO AMERICAN NATIONAL STANDARD ANSI A21.10-87. FITTINGS ON PIPE SIZE UP TO AND INCLUDING 12" MAY BE OF THE SHORT BODIED TYPE IN ACCORDANCE WITH ANSI/AWWA C153/A21.53-88, "DUCTILE IRON COMPACT FITTINGS, 3" THROUGH 16" FOR WATER AND OTHER LIQUIDS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

(D) THE CONTRACTOR SHALL FURNISH CENTRIFUGAL CAST DUCTILE IRON CEMENT LINED PIPE. DUCTILE IRON METAL SHALL HAVE A MINIMUM TENSILE STRENGTH OF 60,000 PSI, MINIMUM YIELD STRENGTH OF 42,000 PSI AND MINIMUM ELONGATION OF 10 PERCENT AND SHALL BE FOR THE THICKNESS CLASS NOTED ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED. PIPE MAY BE FURNISHED IN 18 OR 20 FEET NOMINAL LAYING LENGTHS. THE CENTRIFUGALLY CAST DUCTILE SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD ANSI/AWWA C151/A21.51-86, "DUCTILE IRON PIPE CENTRIFUGALLY CAST IN METAL MOLDS OR SAND-LINED MOLDS, AND DUCTILE IRON FITTINGS FOR WATER AND OTHER LIQUIDS," AND ALL SUBSEQUENT AMENDMENTS THERETO. PIPE ON STRAIGHT RUNS SHALL HAVE PUSH-ON SINGLE RUBBER-GASKET COMPRESSION JOINTS, ALL IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO. FOR PIPE SIZES UP TO AND INCLUDING 20-INCHES RETAINED MECHANICAL JOINTS SHALL BE FURNISHED AT BENDS, TEES, CROSSES, SPECIAL FITTINGS AND BETWEEN VERTICAL OFFSETS OR BENDS AND SHALL BE RETAINED AS SPECIFIED IN SECTION "JOINTS", (B),"MECHANICAL JOINTS/RETAINED MECHANICAL JOINTS."

(E) STANDARD THICKNESS AND PIPE CLASS TABLES THE THICKNESS OF THE CENTRIFUGALLY CAST DUCTILE IRON PIPE SHALL CONFORM TO THE FOLLOWING TABLE: STANDARD THICKNESS OF CENTRIFUGALLY CAST, DUCTILE IRON PIPE

STANDARD THICKNESS

PIPE SIZE	WORKING CLASS PRESSURE (PSI)	52	53	54	56	FITTINGS PSI
4"	350	0.29	0.32	0.35	0.41	350
6	350	0.31	0.34	0.37	0.43	350
8"	350	0.33	0.36	0.39	0.45	350
10"	350	0.35	0.38	0.41	0.47	350
12	350	0.37	0.40	0.43	0.49	350
16"	350	0.40	0.43	0.46	0.52	350
20"	350	0.42	0.45	0.48	0.54	350

(F) ALL FITTINGS, UNLESS OTHERWISE NOTED ON THE CONTRACT DRAWINGS, SUCH AS BENDS, TEES, CROSSES, ETC. SHALL HAVE BELL AND BELL, BELL AND PLAIN ENDS OF THE MECHANICAL BOLTED STUFFING-BOX TYPE WITH PIPE OR FITTING PLAIN END SEALING GASKET AND BOLTED FOLLOWER GLAND. MECHANICAL JOINT FITTINGS SHALL BE THE MECHANICAL JOINTED BOLTED STUFFING-BOX TYPE IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO. ALL FITTINGS SHALL BE CEMENT LINED. ALL MECHANICAL JOINTS SHALL BE RETAINED AS SPECIFIED IN SECTION, "JOINTS", (B) "RETAINED MECHANICAL JOINTS".

(G) WHERE CALLED FOR ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED, PIPE AND FITTINGS HAVING BOLTLESS RESTRAINED TYPE JOINTS SHALL BE FURNISHED. BOLTLESS RESTRAINED TYPE JOINTS SHALL BE AS SPECIFIED IN SECTION "JOINTS", (D) "BOLTLESS RESTRAINED SLIP-ON JOINTS."

(H) GLANDS FOR ALL MECHANICAL JOINT PIPE AND FITTINGS SHALL BE DUCTILE IRON. BOLTS AND NUTS SHALL BE CORROSION RESISTANT, HIGH-STRENGTH, LOW ALLOY STEEL IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, "RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

GASKETS SHALL BE OF RUBBER OR OTHER EQUALLY EFFECTIVE PROTECTION AGAINST UNEVEN DISTORTION OF GASKET.

(I) WHERE FITTINGS ARE SHOWN WHICH ARE NOT COVERED BY THE ABOVE SPECIFICATIONS, THEY IN SUCH PARTICULARS AS ARE LACKING THEREON SHALL CONFORM TO THE DIMENSIONS AND OTHERWISE MEET THE SPECIFICATIONS FOR THE RESPECTIVE TYPE WHICH ARE CARRIED IN THE LATEST REVISIONS TO THE CURRENT EDITION OF THE DUCTILE IRON PIPE RESEARCH ASSOCIATION "HANDBOOK OF DUCTILE IRON PIPE" OR WHICH ARE OTHERWISE SHOWN ON THE CONTRACT DRAWINGS.

(J) WHEREVER CHANGES IN LINE AND GRADES OF THE MAIN AS SHOWN ON THE DRAWINGS ARE NOT STANDARD FITTING DEFLECTIONS, THE CONTRACTOR WILL BE PERMITTED TO SUBMIT DETAILS USING COMBINATIONS OF STANDARD FITTINGS AND SMALL DEFLECTIONS (NOT TO EXCEED THE MANUFACTURER'S MAXIMUM SUGGESTED JOINT OPENING) IN THE ADJOINING LENGTHS OF PIPE.

(K) CLOSURE PIECES SHALL BE ACCURATELY MEASURED AND CUT IN THE FIELD AND INSTALLED USING SOLID SHORT PATTERN SLEEVES HAVING MECHANICAL BELL JOINTS. MECHANICAL BELL JOINT SLEEVES SHALL BE OF THE RETAINED TYPE AS SPECIFIED IN SECTION, "JOINTS", (B) "MECHANICAL JOINTS/RETAINED MECHANICAL JOINTS."

(L) TESTS, INSPECTION, REPORTS AND ANALYSES OF TESTS OF SAMPLES FOR ALL MATERIALS SHALL BE FURNISHED IN ACCORDANCE WITH PARAGRAPH "TEST, INSPECTION AND REPORTS" OF THE GENERAL NOTES.

(M) BITUMASTIC COATING SHALL BE APPLIED ON THE EXTERIOR OF ALL DUCTILE IRON PIPE AND FITTINGS IN ACCORDANCE WITH AWWA SPECIFICATIONS.

CEMENT LINING

ALL PIPE FITTINGS, SHALL BE GIVEN A CEMENT MORTAR LINING AT THE POINT OF MANUFACTURE. THE LINING SHALL CONFORM TO THE AMERICAN NATIONAL STANDARD, ANSI/AWWA C104/A21.4-1990, "CEMENT-MORTAR LINING FOR DUCTILE-IRON PIPE AND FITTINGS," AND ALL SUBSEQUENT AMENDMENTS THERETO.

0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

ITEM SPECIAL – DUCTILE IRON PIPE AND FITTINGS – 20” AND SMALLER (CONT.)

MARKING

ALL PIPE AND FITTINGS SHALL BE SUITABLY MARKED TO DENOTE THE MANUFACTURER, CLASS, DATE, WEIGHT AND OTHER ELEMENTS OF IDENTIFICATION.

FACING AND DRILLING

ALL FLANGES SHALL BE CAST SOLID AND FACED ACCURATELY AT RIGHT ANGLES TO THE AXIS OF THE PIPE. ALL FLANGES SHALL BE SHOP COATED WITH A COAT OF COAL TAR EPOXY, EXCEPT THE FACE OF THE FLANGE WHICH SHALL RECEIVE ONE (1) COAT OF A ZINC RICH PRIMER AT THE SHOP IMMEDIATELY AFTER THEY HAVE BEEN FACED AND DRILLED. ALL FLANGED PIPE AND FITTINGS SHALL BE FACED AND DRILLED TO ANSI B16-1, 125 LB. DRILLING, UNLESS SPECIAL DRILLING IS CALLED FOR. WHERE TAP OR STUD BOLTS ARE REQUIRED, FLANGES SHALL ALSO BE TAPPED.

LAYING

(A) PROPER AND SUITABLE TOOLS AND APPLIANCES FOR THE SAFE AND CONVENIENT HANDLING AND LAYING OF THE PIPE AND FITTINGS SHALL BE USED. GREAT CARE SHALL BE TAKEN TO PREVENT THE PIPE COATING AND FITTINGS FROM BEING DAMAGED PARTICULARLY ON THE INSIDE OF THE PIPES AND FITTINGS AND ANY SUCH DAMAGE SHALL BE REMEDIED AS DIRECTED. ALL PIPES AND FITTINGS SHALL BE CAREFULLY EXAMINED BY THE CONTRACTOR FOR DEFECTS JUST BEFORE LAYING AND NO PIPE OR FITTINGS SHALL BE LAID WHICH IS KNOWN TO BE DEFECTIVE.

(B) IF ANY DEFECTIVE PIPE IS DISCOVERED AFTER HAVING BEEN LAID, IT SHALL BE REMOVED AND REPLACED WITH A SOUND PIPE OR FITTING IN A SATISFACTORY MANNER, BY THE CONTRACTOR AT HIS OWN EXPENSE. ALL PIPES AND FITTINGS SHALL BE THOROUGHLY CLEANED BEFORE THEY ARE LAID, SHALL BE KEPT CLEAN UNTIL THEY ARE USED IN THE COMPLETED WORK, AND WHEN LAID, SHALL CONFORM TO THE LINES AND GRADES GIVEN BY THE ENGINEER. OPEN ENDS OF PIPES SHALL BE KEPT PLUGGED WITH A BULK HEAD DURING CONSTRUCTION.

(C) PIPE LAID IN TRENCH SHALL BE LAID TO A FIRM AND EVEN BEARING FOR ITS FULL LENGTH. PRECAUTIONS SHALL BE TAKEN AGAINST FLOATING.

(D) IT IS THE INTENTION OF THESE SPECIFICATIONS TO SECURE FIRST CLASS WORKMANSHIP IN THE PLACING OF PIPE AND ACCESSORIES. IN SUCH DETAILS AS ARE NOT SPECIFICALLY MENTIONED HEREIN OR CALLED FOR ON THE DRAWINGS, THE CONTRACTOR WILL BE REQUIRED TO CONFORM WITH THE APPLICABLE SECTIONS OF THE LATEST AMERICAN NATIONAL STANDARD, ANSI/AWWA C 600-87, INSTALLATION OF GRAY AND DUCTILE CAST IRON WATER MAINS AND APPURTENANCES,” AS ADOPTED BY THE AMERICAN WATER WORKS ASSOCIATION.

CUTTING PIPE

WHENEVER THE PIPES REQUIRE CUTTING TO FIT INTO THE LINES, THE WORK SHALL BE DONE IN A SATISFACTORY MANNER SO AS TO LEAVE A SMOOTH END AT RIGHT ANGLES TO THE AXIS OF THE PIPE. WHEN A PIECE OF PIPE IS CUT TO FIT INTO THE LINE, NO PAYMENT WILL BE MADE FOR THE PORTION CUT OFF AND NOT USED IN THE LINE.

JOINTS

(A) SLIP-ON JOINTS:

ALL PIPE UNLESS OTHERWISE REQUIRED, SHOWN ON CONTRACT DRAWINGS, DIRECTLY SPECIFIED OR CONNECTED TO FITTINGS SHALL HAVE SOCKET BY PLAIN END RUBBER-GASKET PUSH-ON JOINTS WITH RADIALLY COMPRESSED LOCKED IN PLACE WITH APPROVED RUBBER RING GASKETS. SLIP-ON COMPRESSION JOINTS SHALL CONFORM TO THE REGULAR AND SPECIAL REQUIREMENT FOR PUSH-ON JOINTS IN AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, “RUBBER GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS,“ AND ALL SUBSEQUENT AMENDMENTS THERETO.

(B) MECHANICAL JOINTS/RETAINED MECHANICAL JOINTS:

1. ALL FITTINGS AND PIPE BELL ENDS CONNECTED TO FITTINGS, UNLESS OTHERWISE REQUIRED, SHOWN ON CONTRACT DRAWINGS, OR DIRECTLY SPECIFIED SHALL HAVE BELL OR PLAIN END JOINTS OF THE MECHANICAL BOLTED STUFFING-BOX TYPE WITH SEALING GASKET AND BOLTED DUCTILE IRON FOLLOWER GLAND AND SHALL BE OF THE SPECIFIED RETAINED TYPE. BOLTS AND NUTS FOR MECHANICAL JOINTS SHALL BE CORROSION RESISTANT, HIGH STRENGTH, LOW ALLOY STEEL.

2. MECHANICAL JOINTS SHALL CONFORM TO THE REGULAR AND SPECIAL REQUIREMENT THAT ALL GLANDS SHALL BE DUCTILE IRON WITH JOINT DIMENSIONS AND TOLERANCES, BOLT HOLES AND SLOTS, GASKETS, RUBBER, QUALITY CONTROL, BOLTS AND NUTS AND MARKING BE IN CONFORMANCE WITH AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, “RUBBER GASKET JOINTS FOR DUCTILE IRON AND GRAY IRON PRESSURE PIPE AND FITTINGS.“ ON ALL PIPE AND FITTINGS AT BENDS, TEES, CROSSES, SPECIAL FITTINGS, BETWEEN VERTICAL OFFSETS OR BENDS, UP TO AND INCLUDING 16-INCH SIZE, THE CONTRACTOR SHALL FURNISH AND INSTALL RETAINED TYPE MECHANICAL JOINTS.

3. ON ALL PIPE AND FITTINGS AT BENDS, TEES, CROSSES, SPECIAL FITTINGS, BETWEEN VERTICAL OFFSETS OR BENDS, UP TO AND INCLUDING 16-INCH SIZE, THE CONTRACTOR SHALL FURNISH AND INSTALL RETAINED TYPE MECHANICAL JOINTS.

4. PIPE AND FITTING BELL JOINT AND GASKETS SHALL BE FURNISHED AS SPECIFIED. GLANDS FOR RETAINED MECHANICAL JOINTS SHALL BE BOLTED TYPE OF DUCTILE-IRON MATERIAL CONFORMING TO AMERICAN NATIONAL STANDARD, ANSI/AWWA C111/A21.11-85, “RUBBER-GASKET JOINTS FOR DUCTILE-IRON AND GRAY-IRON PRESSURE PIPE AND FITTINGS,“ AND/OR CONFORMING WITH ASTM A 536-84, “SPECIFICATION FOR DUCTILE-IRON CASTINGS.“ RETAINED MECHANICAL JOINT FOLLOWER GLANDS SHALL BE EQUAL TO THE “MEG-A-LUG” AS MANUFACTURED BY EBAA IRON SALES, INC., THE “SUPER-LUG” AS MANUFACTURED BY THE SIGMA CORPORATION OR THE “UNI-FLANGE SERIES 1400” AS MANUFACTURED BY THE FORD METER BOX COMPANY, INC. PROPER TORQUE SHALL BE THAT AS RECOMMENDED BY THE RETAINER GLAND MANUFACTURER. WHERE JOINT DEFLECTION IS NECESSARY FOR ALIGNMENT SUCH DEFLECTION SHALL BE LIMITED TO MANUFACTURER’S MAXIMUM JOINT OPENING. ALL RETAINED JOINTS SHALL BE RATED FOR MINIMUM 250 PSI PRESSURE. ALL RETAINED JOINTS SHALL BE POLYETHYLENE ENCASED AS SPECIFIED IN SECTION, “JOINTS”, (C), EXCEPT WHERE SUCH RETAINED MECHANICAL JOINTS ARE BONDED JOINTS WHERE NO POLYETHYLENE ENCASEMENT WILL BE REQUIRED.

5. RETAINER GLANDS USING PERPENDICULAR SET SCREWS AS A MEANS RESTRAINT WILL NOT BE PERMITTED.

(C) POLYETHYLENE ENCASEMENT:

1. ALL BURIED MAINS, FITTINGS, AND APPURTENANCES SHALL BE ENCASED WITH POLYETHYLENE WRAPPING IN ACCORDANCE WITH THE MOST CURRENT REVISION OF ANSI/AWWA C-105/A21.5 INSTALLATION METHOD A. ALTERNATE INSTALLATION METHOD A FOR WET TRENCH CONDITIONS SHALL BE USED WHEN FORCE MAIN ARE INSTALLED IN UNPAVED LOCATIONS SUCH AS TREE LAWNS AND EASEMENTS TRAVERSING PRIVATE PROPERTY.

2. ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, RETAINED MECHANICAL JOINTS, FLANGES, VICTAULIC AND COMPRESSION TYPE BOLTED SLEEVED COUPLINGS, SHALL HAVE FIELD APPLIED THREE (3) COATS OF BITUMASTIC COATING PRIOR TO POLYETHYLENE ENCASEMENT.

(D) BOLTLESS RESTRAINED SLIP-ON JOINTS:

1) WHERE CALLED FOR ON THE CONTRACT DRAWINGS OR DIRECTLY SPECIFIED ALL JOINT RESTRAINT SHALL BE OF THE BOLTLESS RESTRAINED SLIP-ON JOINT DESIGN DESIGNATED AS EITHER “TYPE I” OR “TYPE II” AS SPECIFIED HEREIN. VALVES AND VALVE JOINT TYPE WITHIN THE LIMITS OF THE BOLTLESS RESTRAINED PIPE AND FITTINGS SHALL BE OF THE TYPE INDICATED ON THE CONTRACT DRAWINGS OR AS SPECIFIED.

2) TYPE I – BOLTLESS RESTRAINED PUSH-ON JOINT PIPE AND FITTINGS DESIGNATED AS “TYPE I” SHALL BE OF A DESIGN CONSISTING OF A SHOP WELDED RETAINER RING OR SEGMENT ON THE SPIGOT END OF THE PIPE THAT WHEN THE JOINT IS FULLY ASSEMBLED “LOCKS” INTO THE BELL OF THE ADJACENT PIPE OR FITTING PROVIDING A POSITIVE RESTRAINED JOINT. NO FIELD WELDED RESTRAINED JOINTS ARE PERMITTED EXCEPT ON LENGTHS OF PIPE LESS THAN NOMINAL LENGTH NEED TO CLOSE THE LINE. BOLTLESS RESTRAINED JOINTS SHALL BE OF A DESIGN THAT PROVIDES RESTRAINED ACTION BETWEEN THE SPIGOT AND BELL OF THE PIPE OR FITTING INDEPENDENT OF THE GASKET. “TYPE I” BOLTLESS RETRAINED PUSH-ON JOINTS SHALL BE EQUAL TO: “FLEX-RING” AS MANUFACTURED BY AMERICAN CAST IRON PIPE COMPANY; “SUPER-LOCK” AS MANUFACTURED BY CLOW CORPORATION (MCWANE, INC.); OR “TR-FLEX” AS MANUFACTURED BY U. S. PIPE AND FOUNDRY.

3) TYPE II – BOLTLESS RESTRAINED PUSH-ON JOINT PIPE AND FITTINGS DESIGNATED AS “TYPE II” SHALL BE OF A DESIGN IN WHICH A PUSH-ON BELL JOINT PIPE END OR PUSH-ON BELL FITTING JOINTS UTILIZE A WEDGING TYPE APPROVED GASKET TO PROVIDE RESTRAINT. THE “TYPE II” BOLTLESS RESTRAINED JOINT SHALL EQUAL TO THE “FIELD-LOK” GASKET AS MANUFACTURED BY U.S.PIPE AND FOUNDRY OR THE “FAST-GRIP” GASKET AS MANUFACTURED BY THE AMERICAN CAST IRON COMPANY. THE GASKET SHALL COMPLY WITH THE MATERIAL REQUIREMENTS OF ANSI/AWWA C111/A21.11, “RUBBER-GASKET JOINTS FOR DUCTILE-IRON PIPE AND GRAY-IRON PRESSURE PIPE AND FITTINGS“. THE PUSH-ON JOINT USED IN THE “TYPE II” BOLTLESS RESTRAINED JOINT PIPE AND FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH ANSI/AWWA C110/A21.10-87, “DUCTILE IRON AND GRAY-IRON FITTINGS, 3-INCH THROUGH 48-INCH, FOR WATER AND OTHER LIQUIDS,“ OR ANSI/AWWA C153/A21.53, “DUCTILE IRON COMPACT FITTINGS, 3” THROUGH 16” FOR WATER AND OTHER LIQUIDS“.

(E) COMPRESSION COUPLINGS:

1. ALL PIPE COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING WITH STOPS REMOVED; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND, BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276-89A, TYPE 304) TO PROPERLY COMPRESS THE GASKETS. THE MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536). THE COMPRESSION COUPLING SHALL HAVE A MINIMUM WORKING PRESSURE RATING OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE NOS: 38, 138, OR 162 (TRANSITION TYPE), OR SMITH-BLAIR 441 STRAIGHT AND TRANSITION COUPLINGS. ALL COMPRESSION COUPLINGS SHALL BE FURNISHED WITH ELECTROLIC INSULATION.

2. ALL COMPRESSION COUPLINGS SHALL BE COATED IN THE SHOP WITH A FACTORY COATING COMPATIBLE WITH FIELD APPLIED PRIMER AND ENAMEL COATINGS. COMPRESSION COUPLINGS SHALL BE CLEANED AND PAINTED WITH THREE (3) FIELD COATS OF KOPPERS BITUMASTIC SUPER TANK SOLUTION OR EQUIVALENT.

(F) FLANGED JOINTS:

1. FLANGED JOINTS SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS OR AS SPECIFIED. FLANGES SHALL BE EITHER CAST STEEL, FORGED OR ROLLED STEEL, OR PROPERLY WELDED AND MACHINED FABRICATED STEEL PLATES, WELDED TO PIPE WITH TWO CONTINUOUS WELDS. THEY SHALL HAVE PLAIN FACES AND SHALL BE FACED TRUE AND SMOOTH AT RIGHT ANGLES TO THE AXIS OF THE PIPE AND SHALL BE SPOT FACED ON THE BACK. DRILLING SHALL CONFORM TO ANSI B16.1, 125 LBS. EACH BLIND FLANGE SHALL BE CAST IRON AND HAVE BOSSES TAPPED AT TOP AND BOTTOM FOR TWO (2) INCH STANDARD PIPE AND FURNISHED WITH PLUGS.

2. ALL MACHINED STEEL SURFACES AT THE ENDS OF PIPE AND/OR FITTINGS TO RECEIVE VICTAULIC TYPE COUPLINGS OR PIPE ENDS HAVING FLANGES (FACE OF FLANGE) SHALL BE COATED WITH ONE (1) SHOP COAT OF AN APPROVED ZINC RICH PAINT.

3. ALL BOLTS AND NUTS USED IN THE FINISHED WORK FOR FLANGES SHALL BE MADE OF SILICON BRONZE (ASTM B 98-84, ALLOY A, “SPECIFICATION FOR COPPER-SILICON ALLOY ROD, BARS, AND SHAPES”) OR STAINLESS STEEL (ASTM A 276-89A, TYPE 304, “SPECIFICATION FOR STAINLESS AND HEAT-RESISTING STEEL BARS AND SHAPES”). THE ENDS OF ALL BOLTS MUST BE FINISHED TO STANDARD RADIUS IN ACCEPTABLE MANNER. ALL SCREW THREADS SHALL BE AMERICAN STANDARD COARSE THREAD (N.C.). STUD BOLTS DOUBLE END (ROD) SHALL BE USED TO MAKE THE FLANGED JOINTS ON PIPE. ALL DIMENSIONS TO BE ACCORDING TO AMERICAN STANDARD HEAVY. BOLTS AND NUTS SHALL BE DELIVERED TO THE FIELD FREE FROM GREASE, RUST AND DIRT AND SHALL BE PROPERLY PROTECTED FROM MOISTURE AND DIRT IN THE FIELD. GASKETS FOR FLANGED PIPE SHALL BE 5X MANILA ROPE PATTERN OR OTHER APPROVED TYPE.

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ITEM SPECIAL - DUCTILE IRON PIPE AND FITTINGS - 20" AND SMALLER (CONT.)

JOINTS (CONT.)

(G) TRANSITION COUPLINGS:

THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO THE CITY THROUGH THE ENGINEER FOR APPROVAL OF THE TRANSITION COUPLING ASSEMBLY. THE TRANSITION COUPLING SHALL BE "DRESSER STYLE 63/39, TYPE 1" SLIP TYPE WITH ELECTROLIC INSULATION, OR APPROVED EQUAL, WITH MINIMUM 1/2" THICK BODY AND SLIP, WITH AN 8-IN, TRAVERSE. THE TRANSITION COUPLING SHALL INCLUDE ALL MATERIALS, BOLTS, NUTS AND WASHERS, WELDED NECK FLANGES A.S.A. 150# AND GASKETS. ALL BOLTS AND NUTS SHALL BE MADE OF STAINLESS STEEL: ASTM A 276--89A, TYPE 304, "SPECIFICATION FOR STAINLESS AND HEAT--RESISTING SHEET BARS AND SHAPES." NO FIELD WELDING OF GALVANIZED STEEL PIPE WILL BE PERMITTED. THE TRANSITION COUPLING SHALL BE GALVANIZED EXCEPT SLIP PIPE. THE TRANSITION COUPLING SHALL HAVE FIELD APPLIED INSULATION AS PER DETAILS ON THE CONTRACT DRAWINGS.

PAINTING

AFTER INSTALLATION AND BEFORE POLYETHYLENE ENCASEMENT, ALL EXPOSED OR DAMAGED COATING AND ALL BOLTS FOR MECHANICAL JOINTS, RETAINED MECHANICAL JOINTS, FLANGES AND VICTAULIC OR COMPRESSION TYPE BOLTED SLEEVED COUPLINGS SHALL BE CLEANED AND PAINTED WITH THREE (3) FIELD COATS OF KOPPERS BITUMASTIC SUPER TANK SOLUTION OR EQUIVALENT.

DRAWINGS

(A) THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR APPROVAL SIX (6) SETS OF PRINTS OF ALL SHOP DRAWINGS FOR PIPE AND FITTINGS AND MISCELLANEOUS OR SPECIAL DETAILS OF PIPE AND FITTING JOINTS WHICH ARE NOT STANDARD CONSTRUCTION OR FULLY DETAILED IN THE REGULAR CATALOGUE OF THE COMPANY FURNISHING THE PIPE, FITTINGS AND SPECIALS. NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN APPROVED.

(B) THE APPROVAL OF THE DRAWINGS BY THE CITY SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH THIS CONTRACT.

MEASUREMENT

THE NUMBER OF FEET OF DUCTILE IRON PIPE AND FITTINGS TO BE PAID FOR SHALL BE THE ACTUAL NUMBER OF FEET FURNISHED AND PLACED IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND THESE SPECIFICATIONS AS MEASURED ALONG THE AXIS OF THE PIPING, INCLUDING FITTINGS AND VALVES CONNECTED UP IN PLACE. FOR CONNECTIONS BETWEEN NEW AND/OR EXISTING MAINS THE NUMBER OF FEET OF DUCTILE IRON PIPE AND FITTINGS, INCLUDING CONNECTIONS THERETO, TO BE PAID FOR SHALL BE ACTUAL NUMBER OF FEET FURNISHED AND PLACED IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND THESE SPECIFICATIONS AS MEASURED ALONG THE AXIS OF THE PIPING FROM CENTER TO CENTER OF EXISTING MAINS.

PAYMENT

THE FOOTAGE MEASURED AS PROVIDED ABOVE SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE BID PER FOOT FOR:

"ITEM SPECIAL - SLUDGE FORCE MAIN, DUCTILE IRON PIPE WITH PUSH-ON JOINTS AND RETAINED MECHANICAL JOINT FITTINGS, CLASSIFIED AS TO SIZE AND CLASS...(FT.)"

HANDLING PIPE AND ACCESSORIES

(A) UNLOADING PIPE, FITTINGS, AND OTHER ACCESSORIES SHALL, UNLESS OTHERWISE DIRECTED, BE UNLOADED AT THE POINT OF DELIVERY, HAULED TO AND DISTRIBUTED AT THE SITE OF THE PROJECT BY THE CONTRACTOR. THEY SHALL AT ALL TIMES BE HANDLED WITH CARE TO AVOID DAMAGE. IN LOADING AND UNLOADING, THEY SHALL BE LIFTED BY HOISTS OR SLID, OR ROLLED ON SKIDWAYS IN SUCH MANNER AS TO AVOID SHOCK. UNDER NO CIRCUMSTANCES SHALL THEY BE DROPPED. PIPE HANDLED ON SKIDWAYS MUST NOT BE SKIDDED OR ROLLED AGAINST PIPE ALREADY ON THE GROUND.

(B) AT SITE OF WORK: IN DISTRIBUTING THE MATERIAL AT THE SITE OF THE WORK, EACH PIECE SHALL BE UNLOADED OPPOSITE OR NEAR THE PLACE WHERE IT IS TO BE LAID IN THE TRENCH.

(C) PROTECTION OF PIPE COATING: PIPE SHALL BE HANDLED IN SUCH MANNER THAT A MINIMUM AMOUNT OF DAMAGE TO THE COATING WILL RESULT. ANY PIPE OR FITTING, THE COATING OF WHICH HAS BEEN DAMAGED IN SHIPPING OR HANDLING, SHALL HAVE THE DAMAGED PORTION WELL CLEANED AND COATED IN THE SHOP WITH A MATERIAL EQUAL TO THAT APPLIED TO THE PIPE AND FITTINGS AND APPROVED BY THE CITY BEFORE BEING PLACED IN THE WORK. THE CONTRACTOR SHALL THOROUGHLY COAT ALL EXPOSED PARTS OF BOLTS AND NUTS WITH AN APPROVED ASPHALT PAINT, AFTER ALL PIPE HAS BEEN LAID AND BEFORE BACKFILLING HAS BEEN PLACED. ALL FIELD COATINGS SHALL BE FURNISHED AND APPLIED BY THE CONTRACTOR.

(D) PROTECTION OF CONCRETE PIPE: IF, IN THE PROCESS OF MANUFACTURE, TRANSPORTATION, OR HANDLING, ANY CONCRETE PIPE, FITTING OR SPECIAL RECEIVES ANY INDENTATION OR DEFORMATION TO THE CONCRETE, STEEL ENDS OR CONNECTIONS, THE REMOVAL OF WHICH WILL IN ANY DEGREE INJURE IT, SUCH PIPE, FITTING OR SPECIAL SHALL BE REJECTED AND REPLACED WITH NEW MATERIAL TO THE SATISFACTION OF THE CITY AT THE CONTRACTOR'S EXPENSE.

(E) PIPE KEPT CLEAN: THE INTERIOR OF THE PIPE, FITTINGS, AND OTHER ACCESSORIES SHALL BE KEPT FREE FROM DIRT AND FOREIGN MATTER AT ALL TIMES.

EXCAVATION

(A) THE CONTRACTOR SHALL REMOVE ALL EXISTING STRUCTURES, ROADWAYS, DRIVEWAYS AND OTHER SIMILAR MATERIALS AND MAKE ALL EXCAVATION NECESSARY FOR THE PROPER CONSTRUCTION OF THE FORCE MAIN, PIPE CONNECTIONS AND APPURTENANT STRUCTURES, INCLUDING TUNNEL AND SHAFT EXCAVATION. THE EXCAVATION SHALL INCLUDE THE REMOVAL, HANDLING, REHANDLING AND DISPOSAL OF MATERIALS ENCOUNTERED IN THE WORK AND SHALL INCLUDE ALL PUMPING, BAILING, DRAINAGE, SHEETING AND BRACING. MOREOVER, THE CONTRACTOR MUST ASSUME ALL RESPONSIBILITY FOR ANY ADDED EXPENSE OR OTHER LIABILITY WHICH MAY ARISE BY MEANS OF QUICKSAND, OBSTACLES OR CONDITIONS FORESEEN AND UNFORESEEN OR ENCOUNTERED IN THE WORK OF THIS CONTRACT.

(B) TRENCHES SHALL IN EVERY CASE BE OF SUFFICIENT WIDTH TO PERMIT SOLID PACKING OF BACKFILL UNDER AND AROUND PIPES, AND SATISFACTORY CONSTRUCTION OF ALL APPURTENANCES AND FOR SUCH SHEETING AND SHORING, PUMPING AND DRAINING AS MAY BE NECESSARY.

(C) THE TRENCH SHALL BE DUG TO THE ALIGNMENT AND DEPTH REQUIRED AND ONLY SO FAR IN ADVANCE OF PIPE LAYING AS THE ENGINEER SHALL PERMIT. THE TRENCH SHALL BE SO BRACED AND DRAINED THAT WORKMEN MAY WORK THEREIN SAFELY AND EFFICIENTLY. IT IS ESSENTIAL THAT THE DISCHARGE FROM PUMPS BE LED TO NATURAL DRAINAGE CHANNELS, TO DRAINS, OR TO SEWERS.

(D) THE TRENCH WIDTH MAY VARY WITH AND DEPEND UPON THE DEPTH OF TRENCH AND THE NATURE OF THE EXCAVATED MATERIAL ENCOUNTERED, BUT IN ANY CASE SHALL BE OF AMPLE WIDTH TO PERMIT THE PIPE TO BE LAID AND JOINTED PROPERLY AND OF THE BACKFILL TO BE PLACED AND COMPACTED PROPERLY. THE MINIMUM WIDTH OF UNSHEETED TRENCH SHALL BE EIGHTEEN (18) INCHES LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE EXCEPT BY CONSENT OF THE CITY; THE MAXIMUM CLEAR WIDTH OF TRENCH SHALL BE NOT MORE THAN TWO (2) FEET GREATER THAN THE OUTSIDE PIPE DIAMETER. WHEN SHEETING AND BRACING IS USED, THE TRENCH WIDTH SHALL BE INCREASED ACCORDINGLY.

(E) THE TRENCH, UNLESS OTHERWISE SPECIFIED, SHALL HAVE A FLAT BOTTOM CONFORMING TO THE GRADE TO WHICH THE PIPE IS TO BE LAID. THE PIPE SHALL BE LAID UPON SOUND SOIL CUT TRUE AND EVEN, SO THAT THE BARREL OF THE PIPE WILL HAVE A BEARING FOR ITS FULL LENGTH.

(F) ANY PART OF THE TRENCH EXCAVATED BELOW GRADE SHALL BE CORRECTED WITH APPROVED MATERIAL, THOROUGHLY COMPACTED.

(G) WHEN THE UNCOVERED TRENCH BOTTOM AT SUBGRADE IS SOFT AND IN THE OPINION OF THE ENGINEER CANNOT SUPPORT THE PIPE, A FURTHER DEPTH AND OR WIDTH SHALL BE EXCAVATED AND BACKFILLED TO PIPE FOUNDATION GRADE AS REQUIRED UNDER (F), OR OTHER APPROVED MEANS SHALL BE ADOPTED TO ASSURE A FIRM FOUNDATION FOR THE PIPE.

(H) LEDGE ROCK, BOULDERS, LARGE STONES, AND SHALE SHALL BE REMOVED TO PROVIDE A CLEARANCE OF AT LEAST SIX (6) INCHES BELOW ALL PARTS OF THE PIPE, VALVES, OR FITTINGS AND A CLEAR WIDTH OF NINE (9) INCHES ON EACH SIDE OF ALL IRON PIPE, CONCRETE PIPE, AND STEEL PIPE SHALL BE PROVIDED.

(I) EXCAVATION BELOW SUBGRADE IN ROCK, SHALE OR IN BOULDERS SHALL BE BACKFILLED TO SUBGRADE WITH APPROVED MATERIAL, THOROUGHLY COMPACTED.

(J) BELL HOLES OF AMPLE DIMENSIONS SHALL BE DUG IN EARTH TRENCHES AT EACH JOINT TO PERMIT THE JOINTING TO BE MADE PROPERLY. ADEQUATE CLEARANCE FOR PROPER JOINTING OF PIPE LAID IN ROCK SHALL BE PROVIDED AT BELL HOLES.

(K) THE USE OF EXCAVATING MACHINERY WILL BE PERMITTED EXCEPT IN PLACES WHERE ITS OPERATION WILL CAUSE DAMAGE TO TREES, BUILDINGS, OR EXISTING STRUCTURES ABOVE OR BELOW GROUND, IN WHICH CASE HAND METHODS SHALL BE EMPLOYED.

(L) TREES, FENCES, POLES AND ALL OTHER PROPERTY SHALL BE PROTECTED UNLESS THEIR REMOVAL IS AUTHORIZED. ANY PROPERTY DAMAGED SHALL BE SATISFACTORILY RESTORED BY THE CONTRACTOR.

(M) HYDRANTS UNDER PRESSURE, VALVE PIT COVERS, VALVE BOXES, CURB STOP BOXES FIRE OR POLICE CALL BOXES, OR OTHER UTILITY CONTROLS SHALL BE LEFT UNOBSTRUCTED AND ACCESSIBLE DURING THE CONSTRUCTION PERIOD.

(N) THE CONTRACTOR SHALL MAINTAIN ALL EXCAVATIONS IN GOOD ORDER DURING THE CONSTRUCTION, SO AS NOT TO HINDER OR INJURE THE PIPE LAYING, MASONRY OR OTHER WORK. HE SHALL TAKE ALL REASONABLE PRECAUTIONS TO PREVENT MOVEMENT OF THE SIDES OF SUCH EXCAVATION, AND SHALL REMOVE AT HIS OWN EXPENSE ANY MATERIAL SLIDING INTO THE EXCAVATION.

SHEETING AND BRACING

(A) THE CONTRACTOR SHALL FURNISH AND PUT IN PLACE SUCH SHEETING AND BRACING AS MAY BE REQUIRED TO SUPPORT THE SIDES OF TRENCHES OR OTHER EXCAVATION AND SHALL REMOVE SUCH SHEETING AND BRACING, AS THE TRENCH OR EXCAVATION IS FILLED UP, UNLESS THE ENGINEER SHALL ORDER IT LEFT IN PLACE, IN WHICH CASE THE CONTRACTOR SHALL CUT THE PLANK OFF AT A HEIGHT AS ORDERED BY THE ENGINEER, OR AS CALLED FOR ON THE CONTRACT DRAWINGS. THAT PORTION OF THE TIMBER ORDERED TO BE LEFT IN PLACE WILL BE PAID FOR AT THE CONTRACT UNIT PRICE BID PER THOUSAND BOARD FEET MEASURE. NO PAYMENT WILL BE MADE FOR WASTED ENDS.

(B) FOR ALL EXCAVATIONS FOR THE WORK DESCRIBED HEREIN, THE CONTRACTOR SHALL FURNISH AND PLACE SHEETING AND BRACING SO AS TO REDUCE TO A MINIMUM THE POSSIBILITY OF INJURY OR DAMAGE TO THE SAME.

(C) IF THE ENGINEER IS OF THE OPINION THAT AT ANY POINT SUFFICIENT OR PROPER SUPPORTS, SHEETING, OR BRACINGS HAVE NOT BEEN PROVIDED, HE MAY ORDER ADDITIONAL SUPPORTS, SHEETING OR BRACING, AT THE EXPENSE OF THE CONTRACTOR, AND THE COMPLIANCE WITH SUCH ORDERS BY THE CONTRACTOR SHALL NOT RELIEVE OR RELEASE HIM FROM HIS RESPONSIBILITY FOR SUFFICIENCY OF SUCH SUPPORTS.

(D) SHEETING AND BRACING SHALL BE PROVIDED IN ACCORDANCE WITH RULE 4121:1-3-13 OF "THE SPECIFIC SAFETY REQUIREMENTS OF THE INDUSTRIAL COMMISSION OF OHIO RELATING TO CONSTRUCTION."

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REMOVAL OF EXCAVATED MATERIAL

(A) ALL SURPLUS MATERIAL AND SUCH OTHER MATERIAL AS THE ENGINEER MAY DEEM UNFIT FOR USE AS BACKFILL SHALL BE DISPOSED OF BY THE CONTRACTOR SO AS TO GIVE A MINIMUM OF INCONVENIENCE TO THE PUBLIC. IN CASE OF SETTLEMENT AFTER BACKFILL, THE CONTRACTOR SHALL SUPPLY SUFFICIENT MATERIAL SATISFACTORY TO THE ENGINEER TO MAKE UP FOR THE DEFICIENCY.

(B) IN THE STORING OF EXCAVATED MATERIAL, WHICH IS TO BE USED AS A BACKFILL, THE CONTRACTOR SHALL EXERCISE CARE SO AS TO AVOID INCONVENIENCING THE PUBLIC. IF IN THE OPINION OF THE ENGINEER IT IS NECESSARY TO REMOVE THIS EXCAVATED MATERIAL FROM THE STREET OR LOTS, THE CONTRACTOR SHALL BE REQUIRED TO DO SO.

(C) ANY MATERIAL WHICH MAY SPILL OR DRIP FROM VEHICLES BY HAULING IN THE STREETS SHALL BE REMOVED AND THE STREETS CLEANED BY THE CONTRACTOR, TO THE SATISFACTION OF THE ENGINEER.

(D) WHEN SO DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL IMMEDIATELY REMOVE ALL EXCAVATED MATERIALS FROM THE SITE.

LAYING PIPE

(A) PROPER IMPLEMENTS, TOOLS, AND FACILITIES, SATISFACTORY TO THE ENGINEER, SHALL BE PROVIDED AND USED BY THE CONTRACTOR FOR THE SAFE AND CONVENIENT PROSECUTION OF THE WORK. ALL PIPE, FITTINGS, AND APPURTENANCES SHALL BE CAREFULLY LOWERED INTO THE TRENCH, PIECE BY PIECE, BY MEANS OF DERRICK, PROPER SLINGS, AND OTHER SUITABLE TOOLS OR EQUIPMENT, IN SUCH MANNER AS TO PREVENT DAMAGE TO PIPE OR COATING. UNDER NO CIRCUMSTANCES SHALL PIPE OR ACCESSORIES BE DROPPED OR DUMPED INTO THE TRENCH. IF ANY DEFECTIVE PIECE IS DISCOVERED WHILE PIPE IS SUSPENDED OR AFTER BEING LAID, A NEW PIECE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.

(B) ALL FOREIGN MATTER OR DIRT SHALL BE REMOVED FROM THE INSIDE OF THE PIPE BEFORE IT IS LOWERED INTO ITS POSITION IN THE TRENCH, AND IT SHALL BE KEPT CLEAN BY APPROVED MEANS DURING AND AFTER LAYING.

(C) AT TIMES WHEN PIPE LAYING IS NOT IN PROGRESS, THE OPEN ENDS OF PIPE SHALL BE CLOSED BY APPROVED MEANS, AND NO TRENCH WATER SHALL BE PERMITTED TO ENTER THE PIPE. NO PIPE SHALL BE LAID IN WATER, OR WHEN THE TRENCH CONDITIONS OR THE WEATHER IS UNSUITABLE FOR SUCH WORK, EXCEPT BY PERMISSION OF THE ENGINEER.

(D) WHEREVER NECESSARY TO DEFLECT PIPE FROM A STRAIGHT LINE, EITHER IN THE VERTICAL OR HORIZONTAL PLANE TO AVOID OBSTRUCTIONS, TO PLUMB STEMS, OR FOR OTHER REASONS, THE DEGREE OF DEFLECTION SHALL BE APPROVED BY THE ENGINEER. MAXIMUM JOINT DEFLECTIONS SHALL NOT EXCEED MANUFACTURER'S RECOMMENDATIONS.

(E) BEFORE LAYING DUCTILE IRON PIPE, ALL LUMPS, BLISTERS AND EXCESS COAL TAR COATING SHALL BE REMOVED FROM THE BELL AND SPIGOT ENDS OF EACH PIPE. THE PIPE ENDS SHALL THEN BE KEPT CLEAN UNTIL JOINTS ARE MADE.

(F) GRADE BREAKS SHALL BE ACCOMPLISHED BY JOINT DEFLECTIONS OF ONE OR MORE OF THE PIPE SEGMENTS UNLESS OTHERWISE NOTED. MAXIMUM JOINT DEFLECTIONS SHALL NOT EXCEED MANUFACTURER'S RECOMMENDATIONS.

(G) BEFORE LAYING CONCRETE PIPE, THE PIPE ENDS SHALL BE MADE SMOOTH WITH EMERY CLOTH, FILE OR OTHER APPROVED MEANS, WIRE BRUSHED AND WIPED UNTIL CLEAN AND DRY. PIPE ENDS SHALL BE KEPT CLEAN UNTIL JOINTS ARE MADE. AFTER CLEANING AND DRYING, ALL CONTACT SURFACES OF THE GASKETS AND STEEL JOINT RINGS SHALL BE COATED WITH AN APPROVED FLAX SOAP BEFORE ENTERING THE SPIGOT ENDS INTO THE SOCKET. IMMEDIATELY AFTER THE JOINT IS PULLED TOGETHER, THE PIPE SHALL BE BLOCKED WITH WOOD BLOCKING. A SURCINGLE SHALL BE INSTALLED AROUND THE JOINT AND THE PIPE SHALL BE SECURED WITH EARTH OR SAND AS REQUIRED, CAREFULLY TAMPED UNDER AND ON EACH SIDE UP TO THE SPRING-LINE OF THE PIPE, INCLUDING THE BELL HOLES. ALL BLOCKING SHALL BE REMOVED WHEN BACKFILL HAS REACHED THE SPRING LINE FOR THE PIPE.

(H) BEFORE LAYING STEEL PIPE, THE PREPARATION OF PIPE ENDS FOR THE STEEL PIPE AND FITTINGS SHALL MADE IN ACCORDANCE WITH THE AWWA SPECIFICATIONS, C 200-86, "STEEL PIPE 6" AND LARGER," OR LATEST REVISION THEREOF.

FLOATING

THE CONTRACTOR SHALL TAKE EVERY PRECAUTION AGAINST THE FLOATING OF THE PIPE DUE TO WATER COMING INTO THE TRENCH, OR THROUGH CAVING IN, FLUSHING OR PUDDLING. IN CASE OF SUCH FLOATING THE CONTRACTOR SHALL REPLACE THE PIPE AT HIS OWN EXPENSE AND MAKE WHOLLY GOOD ANY INJURY OR DAMAGE WHICH MAY HAVE RESULTED.

FLOODS AND FREEZING WEATHER

PROPER FACILITIES SHALL BE PROVIDED FOR PROTECTING THE WORK FROM DAMAGE BY FLOOD RAIN OR FROST, AND WORK DONE IN FREEZING WEATHER SHALL BE DONE IN SUCH MANNER AS THE ENGINEER MAY APPROVE. VALVES SHALL BE PROTECTED FROM FREEZING UNTIL BACKFILLED IN THE COMPLETED WORK.

PROTECTION OF EXISTING UTILITIES

(A) THE CONTRACTOR SHALL TAKE EVERY PRECAUTION TO SUPPORT AND PROTECT EXISTING UTILITIES.

(B) PRIOR TO PERFORMING WORK ON EXISTING SEWERS, THE CONTRACTOR SHALL PROVIDE ADEQUATE TEMPORARY FLOW CONTROL. SUCH CONTROL MEASURES SHALL BE APPROVED BY THE CITY PRIOR TO BEGINNING WORK.

(C) CONTRACTOR SHALL EXPOSE ALL AFFECTED UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL FIELD VERIFY LOCATION AND DEPTH.

(D) CONTRACTOR SHALL MAINTAIN MINIMUM SEPARATION BETWEEN ADJACENT UTILITIES PER DETAILS. WHERE MINIMUM SEPARATION CANNOT BE MAINTAINED, PROVIDE CONCRETE ENCASEMENT PER DETAILS.

BACKFILLING

A. BACKFILLING SHALL CONSIST OF A SAND BEDDING BACKFILL AND BACKFILL, UNLESS OTHERWISE SPECIFIED, OR WHERE PREMIUM BACKFILL IS REQUIRED, MADE WITH MATERIAL EXCAVATED FROM THE TRENCHES, PROVIDING THE SAME IS SATISFACTORY TO THE ENGINEER AND THE CITY. IF, IN THE OPINION OF THE ENGINEER AND THE CITY, THE MATERIAL EXCAVATED IS UNSATISFACTORY, THEN THE CONTRACTOR SHALL FURNISH AT HIS OWN EXPENSE OTHER SUITABLE MATERIAL FOR BACKFILL. ALL BACKFILL MATERIAL SHALL BE FREE FROM SLAG, CINDERS, RUBBISH, AND OTHER OBJECTIONABLE MATERIAL. BACKFILL SHALL BE PLACED INTO THE TRENCH AND NOT DOZED OR DUMPED FROM THE TOP OF THE TRENCH. THIS WORK INCLUDES ALL BACKFILLING, TOGETHER WITH RAMMING, PUDDLING, AND ROLLING, AS REQUIRED; THE FURNISHING OF SAND BEDDING BACKFILL, SUITABLE MATERIAL FOR BACKFILL, INCLUDING PREMIUM BACKFILL; AND ALL APPURTENANT WORK INCIDENTAL THERETO.

B. BEFORE LAYING THE PIPE, THE BOTTOM OF THE TRENCH SHALL BE BROUGHT TO THE GRADE OF THE BOTTOM OF THE PIPE, EXCEPT AT PIPE JOINTS. WHEREVER THE BOTTOM OF THE TRENCH HAS BEEN EXCAVATED BELOW THE BOTTOM OF THE PIPE, THE CONTRACTOR SHALL PLACE SAND BEDDING, OR OTHER APPROVED MATERIAL SATISFACTORY TO THE ENGINEER AND THE CITY, TO BRING THE BOTTOM OF THE TRENCH TO THE GRADE OF THE BOTTOM OF THE PIPE. THIS SAND BEDDING SHALL BE THOROUGHLY TAMPED BEFORE THE PIPE IS PLACED IN THE TRENCH.

C. THE BEDDING BACKFILL THREE (3) INCHES UNDER, AROUND AND TO A DEPTH OF ONE (1) FOOT ABOVE THE TOP OF ALL PIPE, SHALL BE MADE WITH SAND, WHICH MATERIAL SHALL BE FREE FROM STONE AND OTHER OBJECTIONABLE MATERIAL NOTED ABOVE IN PARAGRAPH (A) AND HEREIN. THE SAND USED FOR BEDDING BACKFILL SHALL BE A NATURAL BANK SAND, GRADED FROM FINE TO COARSE, NOT LUMPY OR FROZEN, AND FREE FROM SLAG, CINDERS, ASHES, RUBBISH, OR OTHER DELETERIOUS OR OBJECTIONABLE MATERIAL. THE SAND USED FOR BEDDING BACKFILL SHALL NOT CONTAIN A TOTAL OF MORE THAN 10% BY WEIGHT OF LOAM AND CLAY, AND ALL SUCH MATERIAL MUST BE CAPABLE OF BEING PASSED THROUGH A 3/4 INCH SIEVE. NOT MORE THAN 5% SHALL REMAIN ON A #4 SIEVE. THE CONTRACTOR MUST USE SPECIAL CARE IN PLACING THIS PORTION OF THE SAND BEDDING BACKFILL, SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, AND DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. THE SAND BEDDING BACKFILL SHALL BE TAMPED IN THIN LAYERS OF SIX (6) INCHES, SIMULTANEOUSLY ON EACH SIDE OF THE PIPE, AND THOROUGHLY COMPACTED SO AS TO PROVIDE A SOLID BACKING AGAINST THE EXTERNAL SURFACE OF THE PIPE.

D. BACKFILL ABOVE THE ONE (1) FOOT SAND BEDDING BACKFILL SHALL BE MADE WITH MATERIAL SPECIFIED HEREIN IN EITHER PARAGRAPH (A) OR AS SPECIFIED HEREIN FOR PREMIUM BACKFILL IN PARAGRAPH (G).

E. PREMIUM BACKFILL SHALL BE PLACED WHERE EXISTING AND FUTURE PERMANENT PAVEMENT, SIDEWALKS, DRIVEWAYS, SEWER PIPE CROSSINGS AND CURB CROSSINGS HAVE BEEN OPEN OR UNDERCUT. THE PLACEMENT OF PREMIUM BACKFILL ALSO APPLIES TO ALL EXCAVATION WITHIN THREE (3) FEET OF EXISTING OR FUTURE PERMANENT PAVEMENT, SIDEWALKS, DRIVEWAYS, SEWER PIPE CROSSINGS AND CURB CROSSINGS. IF PART OF THE TRENCH IS UNDER EXISTING OR FUTURE PAVEMENT, SIDEWALK, DRIVEWAY OR CURB THE ENTIRE TRENCH SHALL BE BACKFILLED WITH PREMIUM BACKFILL MATERIAL SPECIFIED HEREIN.

F. ONLY AFTER THE ONE (1) FOOT SAND BEDDING BACKFILL HAS BEEN SATISFACTORILY COMPACTED, MAY WORK PROCEED IN PLACING THE REMAINING BACKFILL WHICH MUST BE CAREFULLY PLACED AND COMPACTED BY TAMPING, PUDDLING, OR ROLLING. ALL PRECAUTIONS MUST BE TAKEN TO ELIMINATE FUTURE SETTLEMENT. THE NUMBER OF MEN TAMPING SHALL BE NOT LESS THAN THE NUMBER BACKFILLING, AND ADDITIONAL MEN SHALL BE KEPT IN THE TRENCH TO SPREAD THE MATERIAL.

G. PREMIUM BACKFILL CONSISTING OF CONTROLLED LOW STRENGTH MATERIAL CONTROLLED DENTISTY FILL (CLSM-CDF) "FLOWABLE FILL" IS REQUIRED:

A: UNDER ALL EXISTING OR FUTURE PAVEMENTS, SIDEWALKS, AND DRIVES WITHIN MEETING THE FOLLOWING REQUIREMENTS:

B: AS SPECIFIED IN THE SLUDGE FORCE MAIN TRENCH DETAIL FOUND ON SHEET 65

WHEN PREMIUM BACKFILL IS REQUIRED BY THE LOCAL MUNICIPALITY FOR CASES OTHER THAN THOSE LISTED ABOVE, IT SHALL BE LIMESTONE GRADED PER ODOT 304.02 OR ODOT 411. NO SLAG IS PERMITTED.

SIEVE % PASSING GRADING	
2-INCH	100
1-INCH	70-100
3/4-INCH	50-90
NO. 4	30-60
NO. 30	9-33
NO. 200	0-13

THE FRACTION OF THESE MATERIALS PASSING A #40 SIEVE SHALL HAVE A LIQUID LIMIT NOT GREATER THAN 30 (THIRTY) AND A PLASTICITY INDEX NOT GREATER THAN 6 (SIX).

SLAG; NATURAL OR SYNTHETIC CRUSHED AGGREGATE SUCH AS BROKEN OR CRUSHED ROCK; CRUSHED CONCRETE; OR OTHER TYPE OF MATERIAL IN LIEU OF THE SAND BEDDING BACKFILL AND THE LIMESTONE SCREENING BACKFILL MATERIAL WILL NOT BE PERMITTED.

THE MINIMUM COMPACTION FOR ALL SAND BEDDING BACKFILL, BACKFILL AND PREMIUM BACKFILL SHALL BE 95% STANDARD PROCTER.

H. BACKFILLING SHALL NOT BE DONE IN FREEZING WEATHER, EXCEPT BY PERMISSION OF THE ENGINEER AND THE CITY, AND IT SHALL NOT BE MADE WITH FROZEN MATERIAL, NOR SHALL ANY FILL BE MADE WHERE THE MATERIAL ALREADY IN THE DITCH IS FROZEN.

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BACKFILLING (CONT.)

I. SPECIAL TREATMENT OF THE TRENCH WILL BE REQUIRED WHERE CINDER EXCAVATION, EXCEEDING ONE (1) FOOT MEASURED FROM THE GROUND OR PAVEMENT SURFACE IS ENCOUNTERED. BEFORE LAYING THE PIPE, THE BOTTOM OF THE TRENCH SHALL BE DUG EIGHT (6) INCHES BELOW PIPE GRADE AND THEN BROUGHT TO THE GRADE OF THE PIPE IN THE FOLLOWING MANNER. A FOUR (4) INCH LAYER OF CRUSHED LIMESTONE SHALL BE PLACED ON THE ENTIRE WIDTH OF THE BOTTOM OF THE TRENCH, FOLLOWED BY A FILLER OF HYDRATED LIME AND A LAYER OF SAND BEDDING TO SIX (6) INCHES ABOVE THE TOP OF THE PIPE. THE FOUR (4) INCH CRUSHED LIMESTONE SHALL BE WELL GRADED FROM FINE TO COARSE, AND FREE FROM SLAG, CINDERS, ASHES, RUBBISH OR OTHER OBJECTIONABLE MATERIAL. ALL LIMESTONE MUST BE CAPABLE OF BEING PASSED THROUGH A 3/4 INCH SIEVE. ON TOP OF THIS LAYER OF CRUSHED LIMESTONE, HYDRATED LIME SHALL BE SUPPLIED IN THE AMOUNT OF 3/8 OF A POUND PER SQUARE FOOT OF TRENCH.

THIS BED OF CRUSHED LIMESTONE, WITH FILLER OF HYDRATED LIME IN PLACE, SHALL BE THOROUGHLY TAMPED BEFORE THE PIPE IS LAID IN THE TRENCH AND THE SAND BEDDING BACKFILL IS PLACED. THE SAND BEDDING BACKFILL SHALL BE FOR THREE (3) INCHES UNDER, AROUND AND TO A DEPTH OF SIX (6) INCHES ABOVE THE TOP OF THE PIPE. THE CONTRACTOR MUST USE SPECIAL CARE IN PLACING THIS PORTION OF THE BACKFILL SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, AND DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. ON TOP OF THE SAND BEDDING BACKFILL THE CONTRACTOR SHALL PLACE ANOTHER LAYER OF CRUSHED LIMESTONE SIX (6) INCHES THICK FOR THE ENTIRE WIDTH OF THE TRENCH. ON TOP OF THIS SIX (6) INCH LAYER OF COMPACTED LIMESTONE A SECOND FILLER OF HYDRATED LIME SHALL THEN BE APPLIED IN THE AMOUNT OF 3/4 OF A POUND PER SQUARE FOOT OF TRENCH. THE REMAINING BACKFILL SHALL BE MADE WITH LIMESTONE SCREENINGS AS ELSEWHERE SPECIFIED HEREIN, CAREFULLY PLACED AND COMPACTED BY TAMPING, OR ROLLING. ALL PRECAUTIONS SHALL BE TAKEN TO ELIMINATE FUTURE SETTLEMENT. THE TREATMENT OF THE TRENCH BOTTOM PREVIOUSLY DESCRIBED MAY BE OMITTED WHERE THE CINDER DEPTH, MEASURED FROM THE TOP SURFACE DOES NOT EXCEED 2'-6".

PROVISIONS FOR PROTECTING THE WORK

THE CONTRACTOR SHALL FURNISH ALL THE NECESSARY EQUIPMENT, SHALL TAKE ALL NECESSARY PRECAUTIONS AND SHALL ASSUME THE ENTIRE COST OF HANDLING ANY SEWAGE, SEEPAGE, STORM SURFACE AND FLOOD FLOWS OR ICE, WHICH MAY BE ENCOUNTERED AT ANY TIME DURING THE CONSTRUCTION OF THE WORK. THE MANNER OF PROVIDING FOR THESE OCCURRENCES SHALL MEET WITH THE APPROVAL OF THE ENGINEER. AFTER INSTALLATION, THE CONTRACTOR SHALL FURNISH AND MAINTAIN SATISFACTORY PROTECTION TO ALL EQUIPMENT WHETHER OF THIS OR OTHER CONTRACT AGAINST INJURY BY WEATHER, FLOODING OR BY DIRECT OR INCIDENTAL DAMAGE FROM HIS OWN OPERATIONS, LEAVING ALL WORK IN A PERFECT CONDITION AT THE COMPLETION OF THE CONTRACT. NO EXTRA PAYMENT WILL BE MADE FOR THIS WORK BUT THE ENTIRE COST OF THE SAME SHALL BE INCLUDED IN THE WORK TO BE DONE IN THIS CONTRACT.

DRAWINGS

(A) THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER FOR APPROVAL, SIX (6) SETS OF PRINTS OF ALL SHOP DRAWINGS. SHOP DRAWINGS SHALL BE FULLY DIMENSIONED LEGIBLE DRAWINGS AS DEVELOPED BY THE MATERIALS FABRICATOR. SHOP DRAWINGS SHALL BE SUBMITTED FOR ALL BOLTLESS RESTRAINED IRON PIPE AND FITTINGS, PRESTRESSED CONCRETE PIPE AND FITTINGS, STEEL PIPE AND FITTINGS, SPECIAL FITTINGS, COUPLINGS, SPECIALS, AND MISCELLANEOUS DETAILS, SUCH AS VALVES, DRAIN FORGINGS, PRECAST VAULTS, CASTINGS, ETC. DRAWINGS SHALL INCLUDE DETAILS, LAYOUTS AND LAYING SCHEDULE FOR ALL PIECES FURNISHED REQUIRING DRAWING SUBMITTAL.

(B) TWO (2) SETS OF PRINTS OF EACH OF THE DRAWINGS SUBMITTED WILL BE RETURNED TO THE CONTRACTOR THROUGH THE ENGINEER WITH THE CRITICISMS OR APPROVAL OF THE CITY NOTED THEREON. IN CASE THE DRAWINGS ARE NOT APPROVED, THE CONTRACTOR SHALL AGAIN SEND FOR APPROVAL SIX (6) SETS OF REVISED PRINTS OF EACH OF THE DRAWINGS TO TAKE CARE OF THE CRITICISMS NOTED. NO WORK SHALL BE DONE IN THE SHOP UNTIL AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED.

(C) AFTER THE DRAWINGS HAVE BEEN FINALLY APPROVED, THE CONTRACTOR SHALL FURNISH THE CITY THROUGH THE ENGINEER WITH ONE (1) COMPLETE SET OF REPRODUCIBLE TRACINGS ON MYLAR OF EACH OF THE FINAL SHOP DRAWINGS. MYLAR SHALL BE OF MINIMUM 4-MIL THICKNESS, SHALL BE OF A SINGLE BASE STOCK WITH AN ETCHED SURFACE TO PROVIDE A MATTE FINISH ON THE FRONT AND SHALL BE OF A PERMANENT NON-ERASABLE, "WASH-OFF" TYPE, OF WHICH THE IMAGE ON THE MYLAR MEDIUM CANNOT BE REMOVED BY ERASURE. ALL SHOP DRAWINGS SHALL BE REPRODUCED FROM THEIR FULL SIZED ORIGINAL TRACINGS AND NOT AS REDUCED SIZES AS MAY HAVE BEEN SUBMITTED DURING THE REVIEW PROCESS. SMALL SIZED DRAWINGS PERTAINING TO A GIVEN ITEM SHALL BE GROUPED FOR REPRODUCTION SO THAT ALL TRACINGS SHALL BE 22" X 34" OVERALL.

(D) THE APPROVAL OF THE DRAWINGS BY THE ENGINEER AND THE CITY SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS IN CONNECTION WITH THIS CONTRACT.

ERRORS AND DISCREPANCIES

IF THE CONTRACTOR, IN THE COURSE OF HIS WORK, FINDS ANY DISCREPANCY BETWEEN THE PLANS, DESCRIPTION AND LOCATION OF WORK, ESTIMATE OF QUANTITIES, THE PHYSICAL CONDITION OF THE LOCALITY, OR ANY ERRORS IN PLANS OR IN THE LAYOUT AS GIVEN BY THE DRAWINGS AND INSTRUCTIONS WHICH MAKE IT IMPOSSIBLE FOR HIM TO COMPLETE THE WORK REQUIRED UNDER THE PLANS AND SPECIFICATIONS, IT SHALL BE HIS DUTY TO IMMEDIATELY INFORM THE ENGINEER IN WRITING AND THE ENGINEER SHALL VERIFY THE SAME. ANY WORK DONE AFTER SUCH DISCOVERY, UNTIL AUTHORIZED, SHALL BE DONE AT THE CONTRACTOR'S RISK.

LISTS AND INVOICES

(A) THE CONTRACTOR SHALL FURNISH THE CITY WITH THE LIST IN DUPLICATE OF PIECES IN EACH SHIPMENT OF PIPE AND SPECIALS, GIVING THE SERIAL NUMBER AND DESIGNATION OF EACH PIPE AND SPECIAL SENT AT THAT TIME.

(B) THE MATERIAL SHALL BE SHIPPED IN SUCH SECTIONS AS THE STATE AND CITY MAY ORDER.

THRUST BLOCKING

THRUST BLOCKS SHALL BE USED AT ALL CHANGE OF DIRECTION FITTINGS IN ADDITION TO THE RESTRAINED JOINTS, AND SHALL BE 4,000 PSI CONCRETE. THRUST BLOCK SIZE AND LAYOUT SHALL BE PER DETAILS.

AIR RELEASE VALVE

ALL HIGH POINTS IN FORCE MAIN SHALL HAVE AN AIR RELEASE VALVE INSTALLED IN A STANDARD MANHOLE CONFORMING TO THE UNIFORM STANDARDS SEWER DETAILS.

DEPTH OF COVER

COMMERCIAL AND NON-RESIDENTIAL FORCE MAINS SHALL HAVE MINIMUM COVER OF FIVE (5) FEET.

PIPE SUPPORTS ON BRIDGES

FOR PIPE SUPPORT DETAILS, REFER TO THE DETAILS AND BRIDGE PLANS.

PROTECTION OF UTILITIES

CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO SUPPORT, MAINTAIN, OR OTHERWISE PROTECT EXISTING UTILITIES AND OTHER FACILITIES AT ALL TIMES DURING CONSTRUCTION.

ITEM SPECIAL - INSULATION AND OUTER PROTECTIVE JACKET

THE INSULATION SHALL BE FOAMGLAS AS MANUFACTURED BY PITTSBURGH CORNING CORPORATION OR APPROVED EQUAL THAT IS CERTIFIED TO MEET THE REQUIREMENTS OF ISO 9002. INSULATION SHALL BE MINIMUM TWO (2") CELLUALR GLASS MANUFACTURED IN ACCORDANCE WITH ASTM C552, "STANDARD SPECIFICATION FOR CELLULAR GLASS THERMAL INSULATION", FOR 12" O.D. PIPE AND LARGER AND HAVING A MINIMUM DENSITY OF 8 POUNDS PER CUBIC FOOT AND COMPRESSIVE STRENGTH OF 100 PSI. THE CELLULAR INSULATION SHALL BE FABRICATED IN MINIMUM CURVED 24" LONG SIDEWALL SEGMENTS EMPLOYING TAPERED GROOVES THAT CLOSE COMPLETELY FILLING THE SPACE BETWEEN THE PIPE AND THE OUTER WEATHERPROOF JACKET. SEGMENTS SHALL BE JOINED WITH LONGITUDINAL AND BUTT JOINTS THAT ARE TIGHTLY FITTED TO ELIMINATE VOIDS. BUTT JOINTS SHOULD BE STAGGERED. THE OUTER JACKET SHALL BE PITTWRAP CW PLUS OR APPROVED EQUAL FOR DIRECT-BURIAL. THE BURIED JACKETING SHALL BE 50 MIL THICK SELF-SEALING, MODIFIED BITUMINOUS MEMBRANE FOR PROTECTING UNDERGROUND INSULATION SYSTEMS. EXPOSED JACKETING SHALL BE ALUMINUM JACKETING, 0.016" THICKNESS, AND INSTALLED WITH ALL LAPS POSITIONED TO SHED WATER. ALL LAPS SHALL BE A MINIMUM OF 2". JACKETING SHALL BE SECURED USING BANDS AND SEALS FOR BURIED AND EXPOSED JACKETING. JOINT SEALANT SHALL BE PITTSEAL 727 (A STYRENE-BUTADIENE RUBBER SEALANT) AVAILABLE FROM PITTSBURGH CORNING CORPORATION OR EQUAL. BAND SPACING SHALL BE TWO BANDS EQUALLY SPACED PER SECTION OF INSULATION OR 12" ON CENTER AND 6" FROM EACH END. BANDING SHALL BE ALUMINUM OR STAINLESS STEEL BANDS, 1/2" WIDE X 0.010" THICK WITH MATCHING SEALS. JACKETING SHALL BE FACTORY-APPLIED ON THE INSULATION. ALL SURFACES TO BE INSULATED SHALL BE CLEANED OF ALL SCALE, RUST, OIL, AND FOREIGN MATTER AND SHOULD BE DRY AND FREE OF FROST BEFORE AND DURING THE APPLICATION OF THE INSULATION. CLEANING, SUCH AS SAND BLASTING AND PRIMING OF SURFACES TO BE INSULATED IS REQUIRED. WHEN PRIMED THE PRIMER MUST BE THOROUGHLY DRY BEFORE APPLICATION OF ANY INSULATION MATERIALS.

PIPE JOINTS, INCLUDING EXPANSION JOINTS AND SUPPORT AREAS, AND PIPE BETWEEN THE BACKWALLS OF THE BRIDGE ABUTMENTS SHALL BE FIELD INSULATED WITH PREFORMED POLYURETHANE FOAM (OR FRP IF APPLICABLE) OR CELLULAR GLASS AND JACKETING CUT IN SHAPES TO FIT, OR WITH A FIVE LAYER APPLICATION OF PITTCOTE 300 FINISH AND REINFORCING FABRIC. FOLLOW CELLULAR GLASS MANUFACTURES RECOMMENDATIONS FOR COVERING IRREGULAR SHAPES. ALL FIELD APPLIED INSULATION SHALL BE INSTALLED TO FULLY FILL ANY VOIDS.

FIELD PLACED INSULATION AND JACKET SHALL BE REMOVABLE IN ORDER TO PERFORM MAINTENANCE OR MAKE ADJUSTMENTS TO THE PACKING GLAND OF THE EXPANSION JOINT(S).

BURIED PIPE 15 FEET BEYOND THE BACKWALLS OF THE PROPOSED BRIDGE ABUTMENTS HAVING LESS THAN FOUR AND ONE-HALF (4-1/2') FEET OF COVER SHALL BE INSULATED WITH A MINIMUM OF A ONE (1) FOOT INSULATION ENVELOPE EQUAL TO "WITCOLITE" OR "GILSULATE 500XR", OR INSULATE WITH DIRECT-BURIAL CELLULAR GLASS INSULATION.

THE VOID BETWEEN THE SPLIT SLEEVE AND THE STEEL WATER MAIN THROUGH EACH BRIDGE ABUTMENT WALL SHALL BE FILLED WITH JUTE PACKING OR BACKER ROD AND SEALED AT BOTH ENDS WITH THREE (3") INCHES OF NON-SHRINKING GROUT.

PIPE SUPPORTS

STEEL WATER MAIN SHALL BE SUPPORTED ON THE INSULATION EXTERIOR USING A SYSTEM SHOWN ON THE PLANS. ROLLED STEEL PIPE CRADLES OF ONE-HALF (1/2) THE CIRCUMFERENCE OF THE INSULATED PIPING, INCLUDING THE INSULATION JACKETING OR FINISH. HIGH DENSITY MOLDED RIGID POLYURETHANE FOAM SADDLE SHALL BE MONOLITHICALLY MOLDED IN 180 DEGREE SEAMLESS SECTIONS AND FACTORY OR SHOP SECURED TO THE STEEL CRADLES PER THE SADDLE MANUNFACTURER'S RECOMMENDATIONS. THE DENSITY OF THE MOLDED RIGID POLYURETHANE FOAM SHALL BE 20 POUNDS PER CUBIC FOOT HAVING AN ULTIMATE COMPRESSIVE STRENGTH OF 1322 PSI WITH A DESIGN COMPRESSIVE STRENGTH OF 264.4 PSI. TYPICAL MANUFACTURES FOR FOAM PIPE SADDLES ARE POWER PIPING, BERGEN POWER, AND PIPE SHIELDS, INC.

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CATHODIC PROTECTION FOR SLUDGE FORCE MAIN

GENERAL

THE WORK UNDER CATHODIC PROTECTION FOR SAINTARY FORCE MAINS INCLUDES FURNISHING THE SERVICES OF A QUALIFIED CORROSION ENGINEERING FIRM CAPABLE OF PROVIDING ALL NECESSARY MATERIALS, EQUIPMENT, EXPERTISE AND KNOW-HOW AND ALL LABOR FOR CONSTRUCTION OF A CATHODIC PROTECTION SYSTEM AS INDICATED HEREIN AND NECESSARY FOR THE PROPER COMPLETION OF THE PROJECT INCLUDED UNDER THIS ITEM INCLUDING THE GEOTECHNICAL SURVEY; THE FURNISHING AND INSTALLATION OF A GALVANIC ANODE SYSTEM; AND A FOLLOWUP BASELINE SURVEY.

ADDITIONALLY, THE QUALIFIED CORROSION ENGINEERING FIRM SHALL BE RESPONSIBLE FOR THE INSTALLATION, TESTS, AND THE CATHODIC PROTECTION SYSTEM SPECIFIED AND PROVIDE NECESSARY REPORTS, DESIGN CALCULATION DRAWINGS AND SYSTEM OPERATION AND MAINTENANCE (O&M) MANUALS.

“QUALIFIED” IMPLIES THAT THE WORK IS PERFORMED BY EXPERIENCED FIELD ENGINEERING PERSONNEL UNDER SUPERVISION OF A NATIONAL ASSOCIATION OF CORROSION ENGINEERS (NACE) ACCREDITED CORROSION SPECIALIST OR REGISTERED PROFESSIONAL CORROSION ENGINEER. CERTIFICATION OF QUALIFICATIONS SHALL BE SUBMITTED WITH THE SUBMITTAL PACKAGE.

CATHODIC PROTECTION IS NOT REQUIRED FOR THE TEMPORARY SLUDGE FORCE MAIN.

GEOTECHNICAL SURVEY

IMMEDIATELY AFTER AWARD OF THIS CONTRACT AND BEFORE THE BEGINNING OF ANY WORK THE CONTRACTOR SHALL, UNDER ITEM SPECIAL - CATHODIC PROTECTION FOR SLUDGE FORCE MAINS, HAVE AN CORROSION ENGINEERING FIRM PERFORM THE GEOTECHNICAL SURVEY.

THE RESULTS OF THIS SURVEY SHALL DETERMINE THE EXTENT OF THE DESIGN REQUIRED FOR THE GALVANIC CELL (SACRIFICIAL ANODE) SYSTEM TO BE INSTALLED.

SOIL BORINGS SHALL BE PERFORMED EVERY 500 FEET DIRECTLY ALONG THE PROPOSED PIPELINE. THE SOIL SAMPLE SHALL BE TAKEN AT ONE (1) FOOT DEPTH BELOW THE GROUND SURFACE AND AT THE PROPOSED PIPE DEPTH AND ANALYZED FOR MOISTURE CONTENT, PH, CONDUCTIVITY, CHLORIDE ION CONCENTRATION, AND SULFIDE ION CONCENTRATION. THIS WORK SHALL BE PREFORMED BY THE CATHODIC PROTECTION ENGINEERING FIRM. ALL BORING SAMPLES SHALL BE OBTAINED UNDER THE DIRECT SUPERVISION OF THE CORROSION ENGINEER.

AFTER COMPLETION OF THE SOIL SAMPLE ANALYSIS THE CONTRACTOR SHALL SUBMIT TO THE CITY THROUGH THE ENGINEER SIX (6) BOUND COPIES OF THE RESULTS OF THE GEOTECHNICAL SURVEY THAT INCLUDES AT LEAST THE FOLLOWING INFORMATION: (1) SOIL BORING LOG INDICATING LOCATION, DEPTH; (2) ANALYSIS OF SAMPLE; (3) PRESENCE OF ANY OTHER CATHODIC PROTECTION SYSTEM THAT MAY AFFECT THE WORK UNDER THIS CONTRACT; AND (3) RECOMMENDATIONS FOR CORRECTIVE ACTIONS TO TAKEN WHERE ADVERSE CONDITIONS EXISTS.

STATUS OF CITY INSPECTORS

INSPECTORS AS DESIGNATED BY THE DIRECTOR OF PUBLIC UTILITIES ARE AUTHORIZED TO INSPECT ALL WORK DONE AND MATERIALS FURNISHED, SUCH INSPECTION MAY EXTEND TO ALL OR ANY PART OF THE SLUDGE FORCE MAIN WORK, AND TO THE PREPARATION OR MANUFACTURE OF THE MATERIALS TO BE USED IN THE FORCE MAIN WORK. THE CITY INSPECTOR AS DESIGNATED BY THE DIRECTOR OF PUBLIC UTILITIES WILL MAKE WORK INSTRUCTIONS THROUGH THE ENGINEER. ARRANGEMENTS FOR CITY INSPECTORS ARE TO BE MADE BY NOTIFYING INSPECTION AND ENFORCEMENT DIVISION WITHIN THE TIME SPECIFIED. NO WORK SHALL BE ACCEPTED UNLESS INSPECTED.

ACCESS TO WORK AND PLACE OF MANUFACTURE

THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND CITY, AT LEAST SEVEN (7) DAYS PREVIOUS TO THE COMMENCEMENT OF THE MANUFACTURE OF ANY MATERIALS, OF THE TIME AND PLACE WHERE THE MANUFACTURE IS TO COMMENCE, IN ORDER THAT A REPRESENTATIVE OF THE ENGINEER AND THE CITY, OR HIS DESIGNEE, MAY BE PRESENT TO INSPECT THE MANUFACTURE. THE CONTRACTOR SHALL PROVIDE, WITHOUT CHARGE OR EXPENSE TO THE STATE AND CITY, ALL NECESSARY ASSISTANCE TO THE ENGINEER AND THE CITY, OR HIS DESIGNEE, WHEN REQUIRED FOR INSPECTION OR VERIFICATION OF WORK DONE.

DIMENSIONS, DETAILED DRAWINGS AND ELEVATIONS

FIGURED DIMENSIONS ON DRAWINGS SHALL TAKE PRECEDENT OVER MEASUREMENTS BY SCALE, AND DETAILED DRAWINGS ARE TO TAKE PRECEDENCE OVER GENERAL DRAWINGS AND SHALL BE CONSIDERED AS EXPLANATORY OF THEM AND NOT AS INDICATING EXTRA WORK. IF, HOWEVER, ANY OF THE DETAILED DRAWINGS SHOW MORE ELABORATE OR EXPENSIVE WORK THAN IS NORMALLY SPECIFIED AND INDICATED BY THE CONTRACT DRAWINGS, NOTICE THEREOF MUST BE GIVEN TO THE ENGINEER BY THE CONTRACTOR WITHIN TEN (10) DAYS AFTER RECEIPT OF SUCH DETAILED DRAWINGS IN ORDER THAT THE DRAWINGS MAY BE AMENDED OR THE ADDITIONAL EXPENSE ON ACCOUNT OF SUCH WORK MAY BE ADJUSTED AND AUTHORIZED. IF THE ENGINEER DOES NOT RECEIVE SUCH NOTICE FROM THE CONTRACTOR WITHIN TEN (10) DAYS AFTER THE DETAILED DRAWINGS HAVE BEEN RECEIVED BY HIM, IT IS HEREBY AGREED THAT THE CONTRACTOR ACCEPTS THE DRAWINGS AND WILL EXECUTE THEM WITHOUT CLAIM FOR EXTRA COMPENSATION.

ELECTROLYSIS TEST STATIONS

ELECTROLYSIS TEST STATIONS SHALL BE INSTALLED WHERE SHOWN ON THE CONTRACT DRAWING AND SHALL BE OF THE FLUSH-TO-GRADE TYPE AS SHOWN ON THE CONTRACT DRAWINGS. ADDITIONAL ELECTROLYSIS TEST STATIONS SHALL BE INSTALLED AT STEEL PIPE CASINGS, SUPPLEMENTAL CONNECTIONS OR OTHER LOCATIONS AS REQUIRED BY EITHER THE GEOTECHNICAL SURVEY OR AS ORDERED BY THE CITY. PAYMENT FOR ADDITIONAL ELECTROLYSIS TEST STATIONS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE CATHODIC PROTECTION SYSTEM BEING INSTALLED. THE ELECTROLYSIS TEST STATION ASSEMBLY SHALL CONSIST OF:

(A) TERMINAL BOARD: TERMINAL BOARD SHALL BE MICARTA OR PHENOLIC, DIMENSIONED AS SHOWN 1/4-INCH THICK WITH BRASS MACHINE SCREWS, NUTS, AND WASHERS AND COPPER ALLOY TERMINALS SIZED TO ACCOMMODATE WIRE AS SHOWN.

(B) SHUNT: HAVING A 0.01 OHM, 6 AMPERE CAPACITY, WITH ACCURACY OF PLUS OR MINUS ONE (+/- 1%) PERCENT, OF THE MANGANIC WIRE TYPE.

(C) TEST LEAD WIRES: U.L. 93. ALL TEST LEAD WIRES SHALL BE AWG #12 TYPE TW STRANDED COPPER, COLOR CODED AS SHOWN ON THE CONTRACT DRAWINGS. NO SPLICES WILL BE PERMITTED. ALL TEST STATIONS SHALL HAVE 24" OF SLACK IN THE LEAD WIRES, COILED WITHIN THE TEST STATION BOX FOR CORE REMOVAL AND TESTING PURPOSES.

(D) DRAIN CABLES: ALL DRAIN CABLES FURNISHED AND INSTALLED SHALL COMPLY WITH ASTM STANDARD D1248 AND SHALL BE AWG #6 WHERE APPLICABLE WITH HMWPE INSULATION. NO SPLICES WILL BE PERMITTED.

(E) CONNECTION TO PIPE:

1. DUCTILE IRON PIPE AND FITTINGS: THE CONNECTIONS OF TEST LEADS, ANODE LEADS, AND DRAIN CABLES TO DUCTILE IRON PIPE AND FITTINGS SHALL BE BY THERMITE WELDING AS SPECIFIED HEREIN.

ELECTROLYSIS TEST STATIONS (CONT.)

2. PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS: FOR CONNECTIONS OF ANODE LEADS, TEST LEADS, AND DRAIN CABLES, THE PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS SHALL BE PROVIDED WITH MILD STEEL RODS FOR WELDING TO THE STEEL PIPE CYLINDER. THE ANODE LEAD CABLES SHALL BE PROVIDED 1/4" DIAMETER BY 6" LONG RODS. THE DRAIN CABLES AND TEST LEADS SHALL BE PROVIDED WITH 5/8" DIAMETER BY 6" LONG MILD STEEL RODS. EACH CABLE-TO-ROD CONNECTION SHALL BE SHOP ASSEMBLED USING APPROPRIATELY SIZED THERMITE WELDED CONNECTION AND EACH WELDED CONNECTION SHALL BE SHOP COVERED WITH ADHESIVE LINED HEAT SHRINKABLE POLYETHYLENE SLEEVE. CADWELDING, BONDING CABLES, TEST LEAD WIRES, AND ANODE LEAD WIRES TO STEEL ANGLE PLATES INCORPORATED INTO THE PIPE MANUFACTURE IS AN ACCEPTABLE ALTERNATE METHOD.

3. STEEL PIPE AND FITTINGS: THE CONNECTIONS OF TEST LEADS, ANODE LEADS, AND DRAIN CABLES TO STEEL PIPE AND FITTINGS SHALL BE BY THERMITE WELDING AS SPECIFIED HEREIN.

(F) COPPER-COPPER SULFATE REFERENCE ELECTRODES: REFERENCE ELECTRODES SHALL BE OF COPPER-COPPER SULFATE TYPE, ENCASED IN A 2-INCH DIAMETER BY 8-INCH LONG SCHEDULE 80 POLYVINYL CHLORIDE TUBE. THE COPPER ROD SHALL BE 99.9% PURITY 1/4-INCH DIAMETER BY 7-INCH LONG. THE ELECTRODE SHALL BE PACKAGED IN A 8-INCH DIAMETER BY 15-INCH LONG PERMEABLE CLOTH BAG CONTAINING A SPECIAL NON-POLARIZING BACKFILL MATERIAL. THE REFERENCE ELECTRODE SHALL BE EQUIPPED WITH 1/4-INCH DIAMETER BY 4-INCH LONG PVC REINFORCING RODS AT THE DISTAL END TO ENSURE INTIMATE CONTACT OF THE REFERENCE ELECTRODE WITH THE SPECIAL BACKFILL. TOTAL PACKAGE WEIGHT SHALL BE 15-POUNDS. REFERENCE ELECTRODE LEAD CABLES SHALL BE AWG NO. 14 HMWPE LENGTH AS NECESSARY. THE LEAD CABLES SHALL BE SILVER SOLDERED TO THE COPPER ROD AND COVERED WITH A HEAT SHRINKABLE SLEEVE AND AN EPOXY ENCAPSULATION 2-INCH DIAMETER BY 2-INCH LONG. REFERENCE ELECTRODE LEAD WIRES SHALL NOT BE SPLICED. THE CABLE INSULATION SHALL BE FREE OF NICKS, CUTS AND ABRASIONS OVER THE ENTIRE LENGTH. THE REFERENCE ELECTRODES SHALL HAVE A STABILITY OF +5 MILLIVOLTS WITH 3.0 MICROAMP LOAD. REFERENCE ELECTRODE SHALL BE DELIVERED IN PLASTIC OR PAPER SHIPPING BAGS TO PREVENT MOISTURE INTRUSION AND DAMAGE TO THE CLOTH BAG.

BONDING CABLES

CONTINUITY BOND CABLES: ALL PIPE AND FITTING JOINTS, EXCEPT DIELECTRIC INSULATED JOINTS AND WELDED JOINTS SHALL BE BONDED TO MAKE THE ENTIRE PIPELINE ELECTRICALLY CONTINUOUS.

(A) DUCTILE IRON PIPE: BOND CABLES SHALL BE 18-INCH LONG.

(B) PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS: ALL PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS AND SPECIAL FITTINGS SHALL BE FABRICATED IN SUCH A MANNER AS TO ESTABLISH ELECTRICAL CONTINUITY BETWEEN ALL APPLICABLE METALLIC COMPONENTS OF THE PIPING, INCLUDING CYLINDER, TENSILE WIRES, ANCHOR SOCKETS, ANCHOR SOCKET BRACKETS, JOINT RINGS, FLANGES, LUGS, DRAWBOLTS, AND SADDLE PLATES. BOND CABLES SHALL BE 18-INCH LONG.

(C) STEEL PIPE AND FITTINGS: ALL STEEL PIPE AND FITTINGS AND SPECIAL FITTINGS SHALL BE FABRICATED IN SUCH A MANNER AS TO ESTABLISH ELECTRICAL CONTINUITY BETWEEN ALL APPLICABLE METALLIC COMPONENTS OF THE PIPING, INCLUDING CYLINDER, ANCHOR SOCKETS, ANCHOR SOCKET BRACKETS, JOINT RINGS, FLANGES, LUGS, DRAWBOLTS, AND SADDLE PLATES. CONTINUITY SHALL BE ESTABLISHED THROUGH WELDING OR BONDING OF JOINTS. BOND CABLES SHALL BE 18-INCH LONG.

(D) BONDING AND DRAIN CABLES:

1. JOINT BONDING CABLES SHALL BE MINIMUM NO.4 AWG STRANDED COPPER CABLE WITH HMWPE INSULATION MINIMUM EIGHTEEN (18 INCHES IN LENGTH TWO (2) PER BOND PER JOINT.

2. DRAIN CABLES SHALL BE NO.6 AWG (MIN.) COPPER CABLE WITH HMWPE INSULATION AND SHALL BE OF SUFFICIENT LENGTH TO REACH THE ADJACENT ELECTROLYSIS TEST STATION.

THERMITE WELDING

(A) MATERIALS:

1. THERMITE WELD EQUIPMENT: ALL CATHODIC PROTECTION CABLE AND WIRE CONNECTIONS TO DUCTILE IRON PIPE AND FITTINGS, PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS, AND STEEL PIPE AND FITTINGS SHALL BE MADE BY THE THERMITE WELD METHOD. THERMITE WELD MATERIALS SHALL BE EQUAL TO THOSE MANUFACTURED BY: “CADWELD” OF ERICO PRODUCTS, INC.; “THERMOWELD” OF CONTINENTAL INDUSTRIES, INC.; OR APPROVED EQUAL.

2. PLASTIC BACKFILL SHIELD FOR THERMITE WELD CONNECTIONS SHALL BE A ONE (1) PIECE MOLDED PLASTIC CAP RECESSED TO COVER CABLE AND THERMITE WELD CONNECTIONS WITH DIELECTRIC SEALER AS DEVELOPED BY ROYSTON LABORATORIES FOR COVERING THERMITE WELDS, OR APPROVED EQUAL.

3. BITUMINOUS COATING COMPOUND FOR THERMITE WELDS: SHALL BE EQUAL TO THAT MANUFACTURED BY KOPPERS COMPANY, B-50, OR APPROVED EQUAL AND SHALL BE SHIPPED TO THE JOB SITE IN ONE (1) GALLON SEALED CONTAINERS. THE MATERIAL SHALL CONFORM TO SPECIFICATION MIL-C-18480A FOR BITUMASTIC COATINGS.

(B) THERMITE WELD EQUIPMENT:

THE CONNECTION OF JOINT BONDING WIRE, TEST LEADS, DRAIN CABLES AND OTHER WELDED CONNECTIONS TO DUCTILE IRON PIPE AND FITTINGS SHALL BE AS FOLLOWS:

APPLICATION MOLD SLEEVE CHARGE

30" & LARGER CAHBA-IG CAB-133-IH CA25XF-19  
DIA. DUCTILE  
IRON/STEEL PIPE

4" TO 24" CAHBA-IG-24 NONE CA25XF-19  
DIA. DUCTILE  
IRON/STEEL PIPE

30" & LARGER CAHBA-IV NONE CA45XF-19  
DIA. DUCTILE  
IRON/STEEL PIPE

4" TO 24" CAHBA-IV NONE CA45XF-19  
DIA. DUCTILE  
IRON/STEEL PIPE

(A) MATERIALS AND EQUIPMENT: MATERIALS AND EQUIPMENT FURNISHED AND INSTALLED TO PROVIDE A GALVANIC ANODE CATHODIC PROTECTION SYSTEM SHALL BE NEW AND STANDARD PRODUCTS OF MANUFACTURERS REGULARLY ENGAGED IN THE PRODUCTION OF SUCH MATERIAL OR EQUIPMENT. MATERIALS AND EQUIPMENT SHALL BE MANUFACTURER'S LATEST STANDARD DESIGN AND COMPLYING WITH THAT SPECIFIED HEREIN.

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CATHODIC PROTECTION FOR SLUDGE FORCE MAIN (CONT.)

1. GALVANIC ANODES: THERE SHALL BE ONE ANODE OF THE FOLLOWING SIZE AND WEIGHT PER AVERAGE LENGTH OF PIPE INSTALLED ALONG THIS NEW SLUDGE FORCE MAIN SECTION.

MAGNESIUM ANODES 32# PRE-PACKAGED, HIGH POTENTIAL WITH 40 FEET # 10 TW WIRE.

CHEMICAL COMPOSITION:  
(ELEMENT CONTENT %)  
AL 0.010  
MN 0.500 - 1.300  
CU 0.020 MAX.  
NI 0.001 MAX.  
FE 0.030 MAX.  
OTHER 0.050 EACH OR 0.300 MAX TOTAL  
MAGNESIUM REMAINDER

2. ANODE CONSTRUCTION: 32# PACKAGED HI-POT MAGNESIUM ANODE 40' #10THHN STRANDED - RED WIRE THE MAGNESIUM ANODE SHALL BE PACKAGED IN A PERMEABLE CLOTH BAG CONTAINING A BACKFILL MATERIAL WEIGHING 70 POUNDS HAVING THE FOLLOWING CHECMICAL COMPOSITION:

GROUND HYDRATED GYPSUM 75%  
POWDERED BENTONITE 20%  
ANHYDROUS (SODIUM SULFATE) 5%

BACKFILL SHALL HAVE A GRAIN SIZE SO THAT 100% IS CAPABLE OF PASSING THROUGH A 20 MESH SCREEN AND 50% WILL BE RETAINED BY A 100 MESH SCREEN. THE MIXTURE SHALL BE FIRMLY PACKAGED AROUND THE ZINC WITHIN THE CLOTH BAG WITH PACKAGED DIMENSIONS OF 5" DIA. X 21" LONG. THE PACKAGED ANODE SHALL WIEGH NO LESS THAN 70 POUNDS.

3. ANODE LEAD CABLES: LEAD CABLES SHALL BE SHOP CONNECTED TO THE STEEL STRAP CORE WITH SILVER SOLDER. THE CONNECTION SHALL BE INSULATED WITH AN ELECTRICAL POTTING COMPOUND. ANODE LEAD CABLES SHALL BE AWG NO. 10 WITH THERMOPLASTIC INSULATION LENGTH AS NECESSARY. NO SPLICES WILL BE PERMITTED BETWEEN THE ANODE CONNECTION AND THE PIPE OR TEST STATION. SPLICES AND ANODE LEAD WIRE TO MILD STEEL ROD FOR CONNECTION TO CONCRETE PIPE WILL BE PERMITTED.

(B) INSTALLATION:

1. ANODES:

A. AUGER OR DIG HOLES TO DEPTH INDICATED HEREIN. IF AUGER IS USED, HOLE SHALL BE 10-INCH MINIMUM DIAMETER. PLACE ANODE IN BOTTOM OF HOLE THREE (3) TO FIVE (5) FEET BELOW WATER MAIN OR THREE (3) TO FIVE (5) FEET Laterally FROM SIDE OF WATER MAIN. IF FOR ANY REASON THE LATERAL LOCATION OF THE ANODE CANNOT BE ACHIEVED, SUFFICIENT SOIL SHALL BE REMOVED (EITHER BY BACKHOE, BUCKET OR MANUALLY) ON THE BOTTOM OR IMMEDIATELY ADJACENT TO THE WATER MAIN TO ACHIEVE THE MINIMUM THREE (3) FOOT DISTANCE. DO NOT SUPPORT THE ANODE WITH LEAD WIRE.

BACKFILL THE ANODE IN 6-INCH LIFTS OF NATIVE SOIL. COMPACT THE SOIL AROUND THE ANODE. WHEN THE BACKFILL IS LEVEL WITH THE TOP OF THE ANODE, POUR MINIMUM TEN (10) GALLONS OF FRESH WATER INTO THE HOLE. WHEN THE ANODE HAS ABSORBED ALL THE WATER, COMPLETE THE BACKFILL OPERATION TO THE BOTTOM OF THE PIPE TRENCH.

B. BACKFILL THE ANODE LEAD WIRE IN STONE FREE EARTH OR SAND AT CONNECTION POINT ON PIPE.

C. CONNECT THE ANODE LEAD WIRE TO THE PIPE AFTER THE NECESSARY TESTING HAS BEEN PERFORMED.

2. TEST STATIONS: THERE SHALL BE A MINIMUM OF THREE TEST STATIONS INSTALLED. ADDITIONAL TEST STATIONS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR WHERE ORDERED OR DIRECTED OR AS DETERMINED FROM THE GEOTECHNICAL SURVEY USING APPLICABLE EQUIPMENT AS SHOWN ON THE CONTRACT DRAWINGS, OR AS SPECIFIED HEREIN. ALL TEST STATIONS SHALL HAVE 24" OF SLACK IN THE LEAD WIRES, IN COILED WITHIN THE TEST STATION BOX FOR CORE REMOVAL AND TESTING PURPOSES.

A. INSTALL ANODES AS SPECIFIED HEREIN;

B. INSTALL REFERENCE ELECTRODE AT LOCATIONS SHOWN ON THE CONTRACT DRAWINGS, SHOP DRAWINGS OR THE CORROSION FIRM'S RECOMMENDATIONS. THE REFERENCE ELECTRODE SHALL BE COMPLETELY SURROUNDED BY NATIVE SOIL, POSITIONED 4-INCHES BELOW THE BOTTOM OF THE TRENCH. SATURATE THE REFERENCE ELECTRODE WITH 5 GALLONS MINIMUM FRESH WATER (ONLY APPLICABLE WHERE PIPELINE IS UNDER PAVEMENT).

C. INSTALL DRAIN CABLE AND TEST LEAD CABLE ON PIPE AS SPECIFIED HEREIN;

D. RUN ALL TEST STATION CABLES IN 1-1/2 INCH DIAMETER PVC CONDUIT TO THE ELECTROLYSIS TEST STATION ASSEMBLY BOX LOCATIONS INDICATED ON THE CONTRACT DRAWINGS.

E. SET TEST BOX FLUSH TO GRADE AND LEVEL. INSTALL A CONCRETE COLLAR AROUND TEST STATION BOX IF IN UNPAVED AREA AS SHOWN ON THE CONTRACT DRAWINGS.

F. LEAVE THE TEST STATION LEAD WIRES COILED IN THE TEST BOX. EXCESS SLACK WIRE SHALL BE LEFT SUCH THAT ALL WIRES WILL EXTEND 24-INCHES ABOVE THE TOP OF THE TEST BOX. PLACE THE SPECIFIED TEST BOARD IN THE BOX FOR LATER CONNECTION BY THE CONTRACTOR'S CORROSION ENGINEER. PERFORM REQUIRED TESTING PRIOR TO BACKFILLING TO ENSURE PROPER OPERATION AND INSTALLATION OF ANODE AND REFERENCE ELECTRODE.

3. CASING TEST STATIONS: INSTALL ONE (1) CASING TEST STATION AT EACH END OF ALL CASING PIPE.

A. INSTALL ANODES AS SPECIFIED HEREIN;

B. INSTALL REFERENCE ELECTRODE AS HEREIN SPECIFIED (ONLY APPLICABLE AT PAVED LOCATIONS);

C. INSTALL DRAIN CABLES AND TEST LEADS AS SPECIFIED HEREIN;

D. INSTALL TEST BOX(ES) AS SPECIFIED HEREIN;

E. INSTALL TEST STATION LEAD WIRES AS SPECIFIED HEREIN;

4. LINE CROSSING (INTERFERENCE) TEST STATIONS: INTERFERENCE TEST STATIONS SHALL BE INSTALLED AT SELECTED FOREIGN CATHODICALLY PROTECTED LINE CROSSING LOCATIONS WHERE ORDERED.

A. INSTALL REFERENCE ELECTRODE MIDWAY BETWEEN CROSSING PIPES IN NATIVE BACKFILL SO THAT THE ELECTRODE IS UNIFORMLY SURROUNDED BY 4 INCHES NATIVE SOIL. SATURATE REFERENCE ELECTRODE WITH MINIMUM FIVE (5) GALLONS FRESH WATER DURING BACKFILLING.

B. INSTALL DRAIN CABLES AND TEST LEADS AS SPECIFIED HEREIN. DRAIN LEAD CABLE AND TEST LEAD CABLES TO FOREIGN PIPELINES SHALL BE INSTALLED BY THE FOREIGN PIPELINE OWNER. CONTACT THE FOREIGN PIPELINE OWNER TWO (2) WEEKS IN ADVANCE OF CONSTRUCTION TO COORDINATE INSTALLATION.

C. INSTALL TEST BOX(ES) AS SPECIFIED HEREIN;

D. INSTALL TEST STATION LEAD WIRES AS SPECIFIED HEREIN.

5. DIELECTRIC ISOLATION TEST STATIONS: INSTALL ELECTRIC ISOLATION TEST STATIONS AT ALL DIELECTRIC INSULATOR LOCATIONS. DIELECTRIC INSULATORS AND TEST STATIONS SHALL BE INSTALLED AT BOTH ENDS OF THE PROPOSED WATERLINE AT THE CONNECTION TO THE EXISTING WATERLINE.

A. INSTALL REFERENCE ELECTRODE AS SPECIFIED HEREIN;

B. INSTALL DRAIN CABLES AND TEST LEADS AS SPECIFIED HEREIN;

C. INSTALL TEST BOX(ES) AS SPECIFIED HEREIN;

D. INSTALL TEST STATION LEAD WIRES AS SPECIFIED HEREIN;

6. DIELECTRIC MATERIAL: DIELECTRIC FLANGE MATERIAL AND DIELECTRIC UNIONS SHALL BE OF PROPER SIZE AND BE EQUAL TO THAT MANUFACTURED BY F.H. MALONEY, PIPELINE SEAL & INSULATOR INC. OR APPROVED EQUAL.

7. CONNECTIONS TO PIPE - DUCTILE IRON PIPE AND STEEL PIPE CASINGS: THERMITE WELD TEST LEAD, DRAIN LEAD AND JOINT BOND CABLES TO PIPE PER THE THERMITE WELD EQUIPMENT MANUFACTURER'S INSTRUCTIONS. TEST EACH WELDED CONNECTION BY STRIKING WELD WITH A HAMMER SEVERAL TIMES. COVER THE TEST LEAD DRAIN CABLE AND ANODE CONNECTIONS WITH BITUMASTIC AND THERMITE WELD CAPS. LEAVE THE BONDING CABLE CONNECTIONS UNCOVERED UNTIL AFTER THE CONTINUITY TESTING HAS BEEN SATISFACTORILY PERFORMED BY THE CORROSION ENGINEER.

8. ELECTRICAL ISOLATION FROM FOREIGN PIPING: ELECTRICAL CONTACT OF SUBJECT PIPING TO OTHER BURIED METAL STRUCTURES SHALL BE PREVENTED AT THE TIME OF INSTALLATION. WHERE THE PROPOSED SUBJECT PIPING IS BURIED WITHIN FOUR (4) INCHES OF A FOREIGN METAL STRUCTURE OR REINFORCING STEEL, A 1/4-INCH THICK MICARTA OR PHENOLIC SHEET OF APPROPRIATE SIZE SHALL BE INSERTED TO PREVENT CONTACT BETWEEN THE STRUCTURES.

(C) ENERGIZING AND TESTING: TESTING BY THE CONTRACTOR'S INDEPENDENT CORROSION CONSULTING ENGINEER SHALL CONSIST OF BUT MAY NOT BE LIMITED TO THE FOLLOWING:

1. STRUCTURE-TO-SOIL POTENTIAL TESTS:

STRUCTURE TO SOIL POTENTIAL TESTS SHALL BE PERFORMED ON ANODES PRIOR TO THEIR CONNECTION TO THE PIPELINE TO ENSURE THAT THE PROPER ANODE MATERIAL IS PROVIDED. THE ANODE OPEN CIRCUIT POTENTIAL SHALL BE AT LEAST 1070 MV WITH RESPECT TO COPPER-COPPER SULFATE HALF CELL FOR ZINC ANODES. RANDOMLY TEST 10% OF THE ANODES. STRUCTURE TO SOIL POTENTIAL TESTS SHALL BE PERFORMED ON PERMANENT REFERNCE ELECTRODES TWENTY-FOUR (24) HOURS PRIOR TO COMPLETE BACKFILLING PIPE AND DOCUMENT THEIR OPERATING POTENTIAL.

2. ELECTRICAL CONTINUITY TESTING: AFTER COMPLETION OF THE PIPE CONSTRUCTION THE CORROSION ENGINEER SHALL PERFORM CONTINUITY TESTING TO DOCUMENT THAT THE WATER MAIN INSTALLED UNDER THIS CONTRACT IS CONTINUOUS BETWEEN TEST STATION ASSEMBLIES AND MEETS THE INTENT OF THE DESIGN TO THE SATISFACTION OF THE ENGINEER/DESIGN ENGINEER/FIELD ENGINEER. ANY AREAS WHERE DISCONTINUITIES ARE EVIDENT SHALL BE INVESTIGATED. EACH SECTION OF PIPE SHALL BE TESTED FOR ELECTRICAL CONTINUITY PRIOR TO FINAL PAVING. ANY DISCONTINUITY SHALL BE LOCATED, EXCAVATED AND REPAIRED AT THE EXPENSE OF THE CONTRACTOR, PRIOR TO FINAL PAVING.

3. DIELECTRIC ISOLATION TESTS: DIELECTRIC INSULATING FITTINGS SHALL BE TESTED PRIOR TO BACKFILLING TO ENSURE THEIR PROPER INSTALLATION. LEAD WIRES SHALL BE ATTACHED PRIOR TO BACKFILLING.

4. POST INSTALLATION SURVEY: THE POST INSTALLATION SURVEY SHALL BE PERFORMED BY THE CORROSION ENGINEER. HE SHALL COORDINATE WITH THE CWD'S CORROSION MITIGATION UNIT.

AS A MINIMUM, THE POST INSTALLATION SURVEY SHALL CONSIST OF TESTING THAT INCLUDES PIPE TO SOIL POTENTIALS, AS WELL AS COUPON "ON" AND "INSTANT-OFF" POTENTIAL BOTH WITH RESPECT TO THE BURIED REFERENCE ELECTRODE AND A PORTABLE CALIBRATED COPPER-COPPER SULFATE REFENCE ELECTRODE, ANODE CURRENT OUTPUTS, AND LEAD WIRE CONTINUITY TESTS. THIS SURVEY SHALL ALSO INCLUDE ELECTRICAL CONTINUITY TESTING OF THE NEW LINE UNDER PROTECTION.

AFTER COMPLETION OF THE PROJECT, THE CORROSION ENGINEER SHALL SUBMIT A BOUND CORROSION SURVEY REPORT IN THREE (3) HARD COPIES AND ONE ELECTRONIC COPY IN PDF FORMAT TO THE CLEVELAND WATER DEPARTMENT. THE REPORT SHALLL CONTAIN ALL FIELD DATA OBTAINED DURING THE PROJECT. TESTING BY THE CONTRACTOR'S INDEPENDENT CORROSION ENGINEER SHALL CONSIST OF BUT MAY NOT BE LIMITED TO THE TESTING LISTED ABOVE.

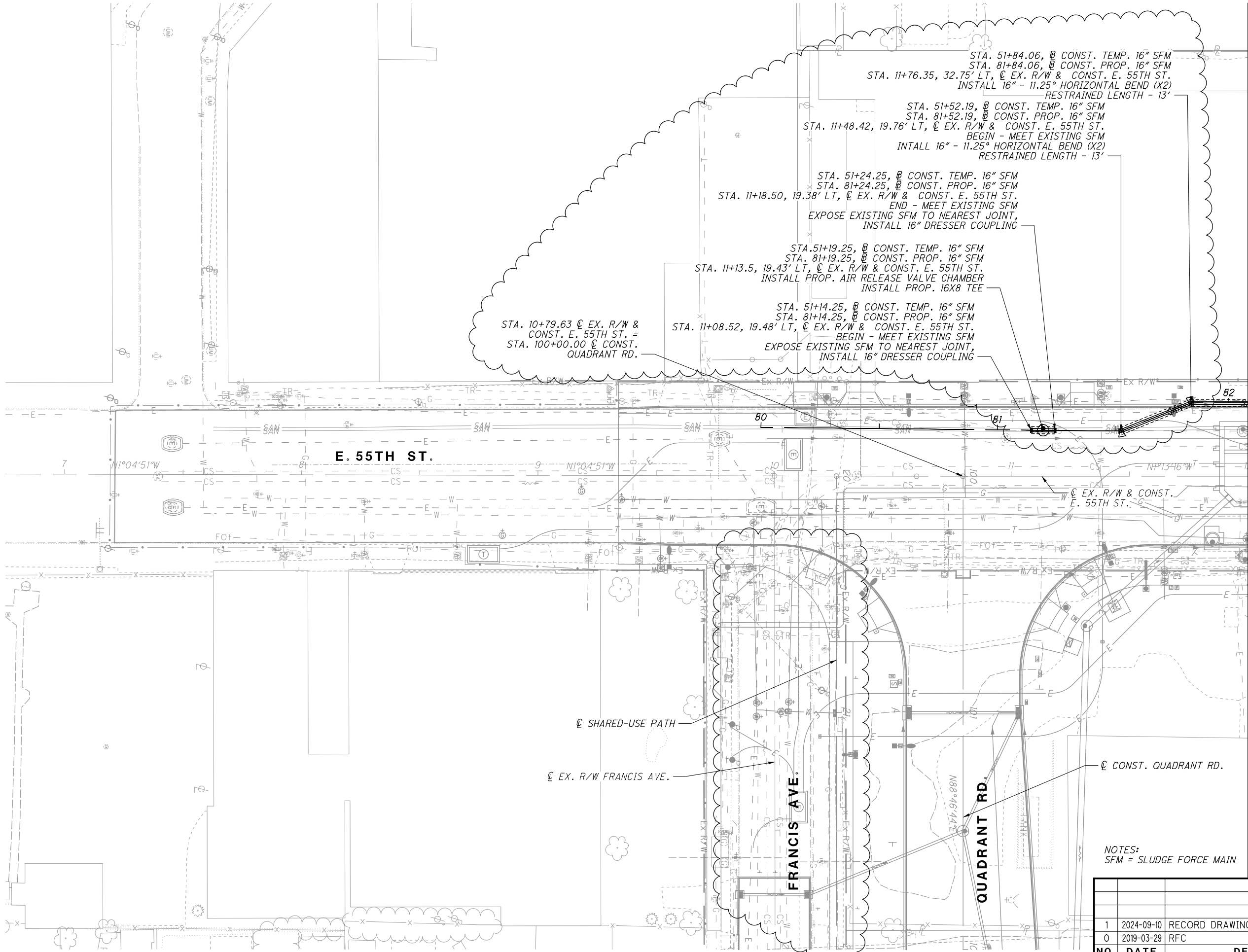
BASELINE SURVEY

SIX (6) TO TWELVE (12) MONTHS AFTER THE PIPELINE HAS BEEN INSTALLED THE CONTRACTOR SHALL, UNDER ITEM SPECIAL - CATHODIC PROTECTION FOR SAINTARY FORCE MAINS, PERFORM A BASELINE SURVEY. THE BASELINE SURVEY SHALL BE CONDUCTED BY THE CORROSION ENGINEERING FIRM. AFTER COMPLETION OF THE SURVEY, THE CONTRACTOR, CORROSION ENGINEER, SHALL SUBMIT SIX (6) BOUND COPIES OF THE SURVEY REPORT, SIGNED BY THE CORROSION ENGINEER, TO THE CITY. THIS REPORT SHALL CONTAIN: ALL FIELD DATA OBTAINED DURING THE SURVEY; ANALYSIS OF THE DATA OBTAINED; AND ANY RECOMMENDATIONS FOR MAINTENANCE OF THE CATHODIC PROTECTION SYSTEM INSTALLED AND OF THE PIPELINE.

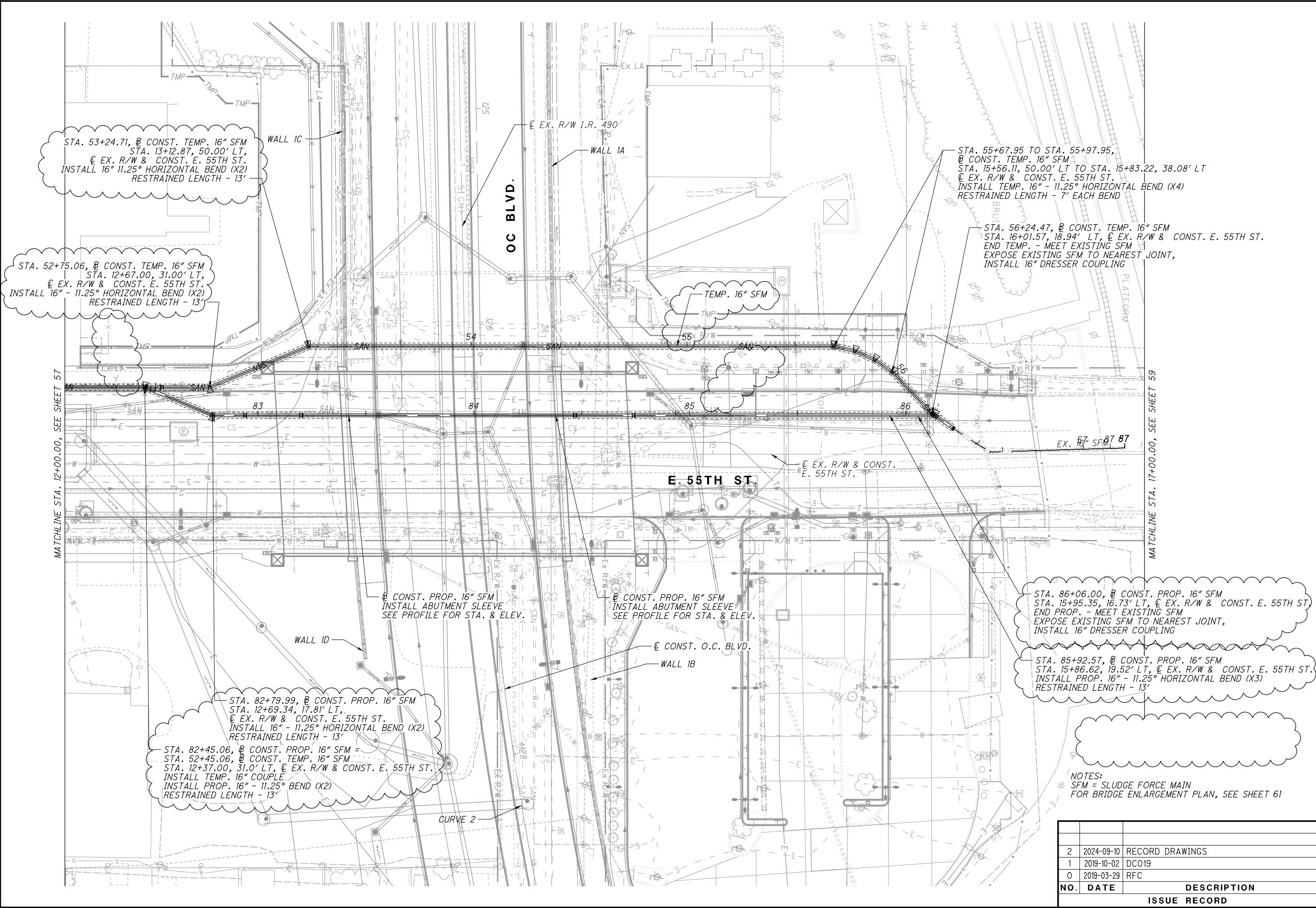
0	2019-03-29	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		

TOTALS FOR INFORMATION ONLY

56  
67



ISSUE RECORD		
NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-03-29	RFC



NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2019-10-02	DC019
0	2019-03-29	RFC

ISSUE RECORD

MATCHLINE STA. 17+00.00, SEE SHEET 58



NO.	DATE	DESCRIPTION
0	2019-03-29	RFC
ISSUE RECORD		

CUY-IR490/ SR010-2.09 / 19.28

RECORD PLANS

SLUDGE FORCE MAIN PLAN - E. 55TH ST.

STA. 17+00.00 TO END

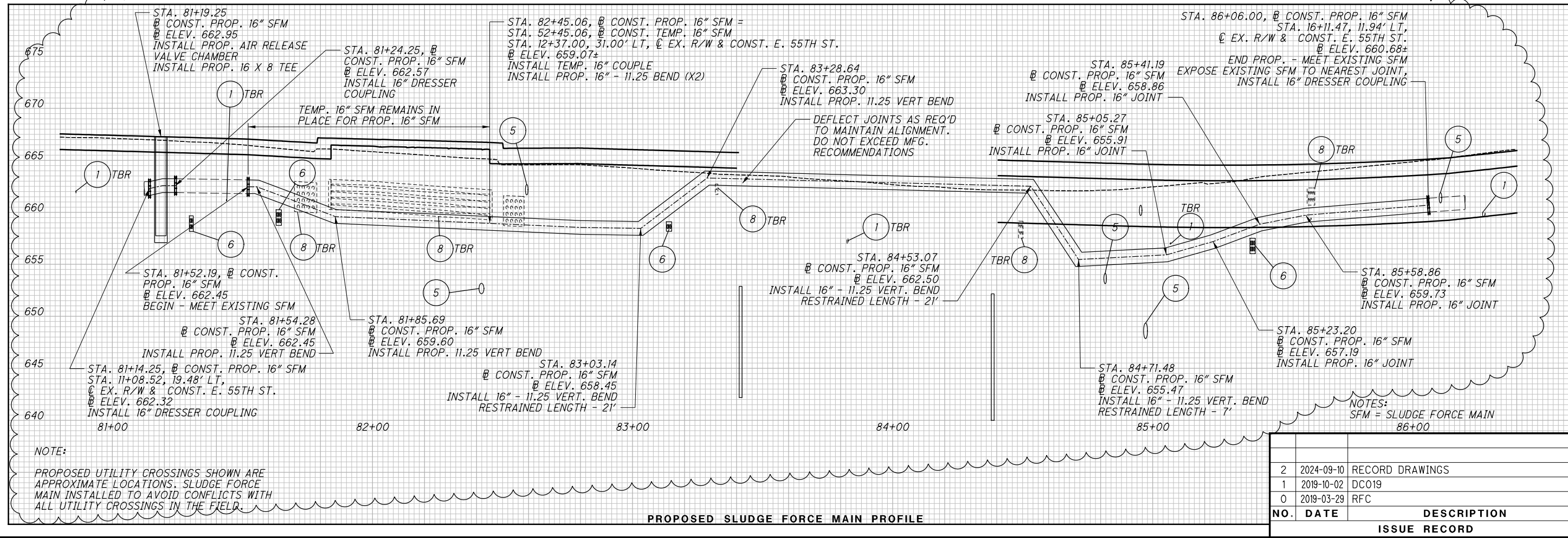
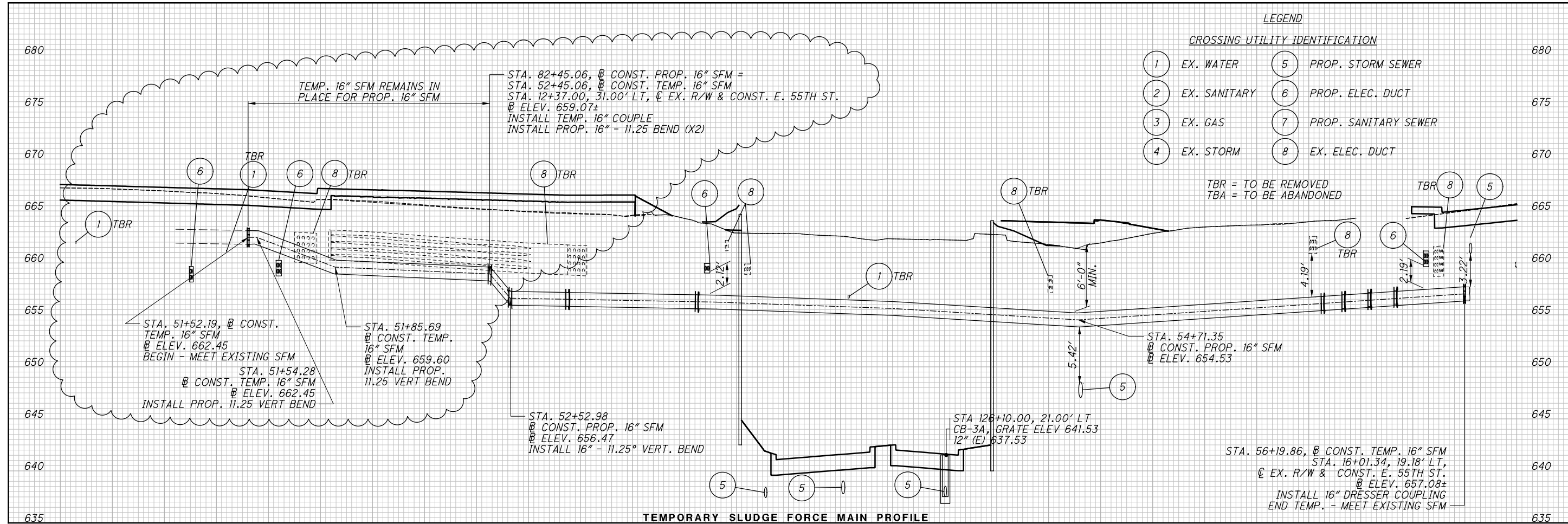
RECORD PLANS

CALCULATED A/E  
CHECKED MBM

0 20 40  
HORIZONTAL SCALE IN FEET

N

RECORD PLANS



LEGEND

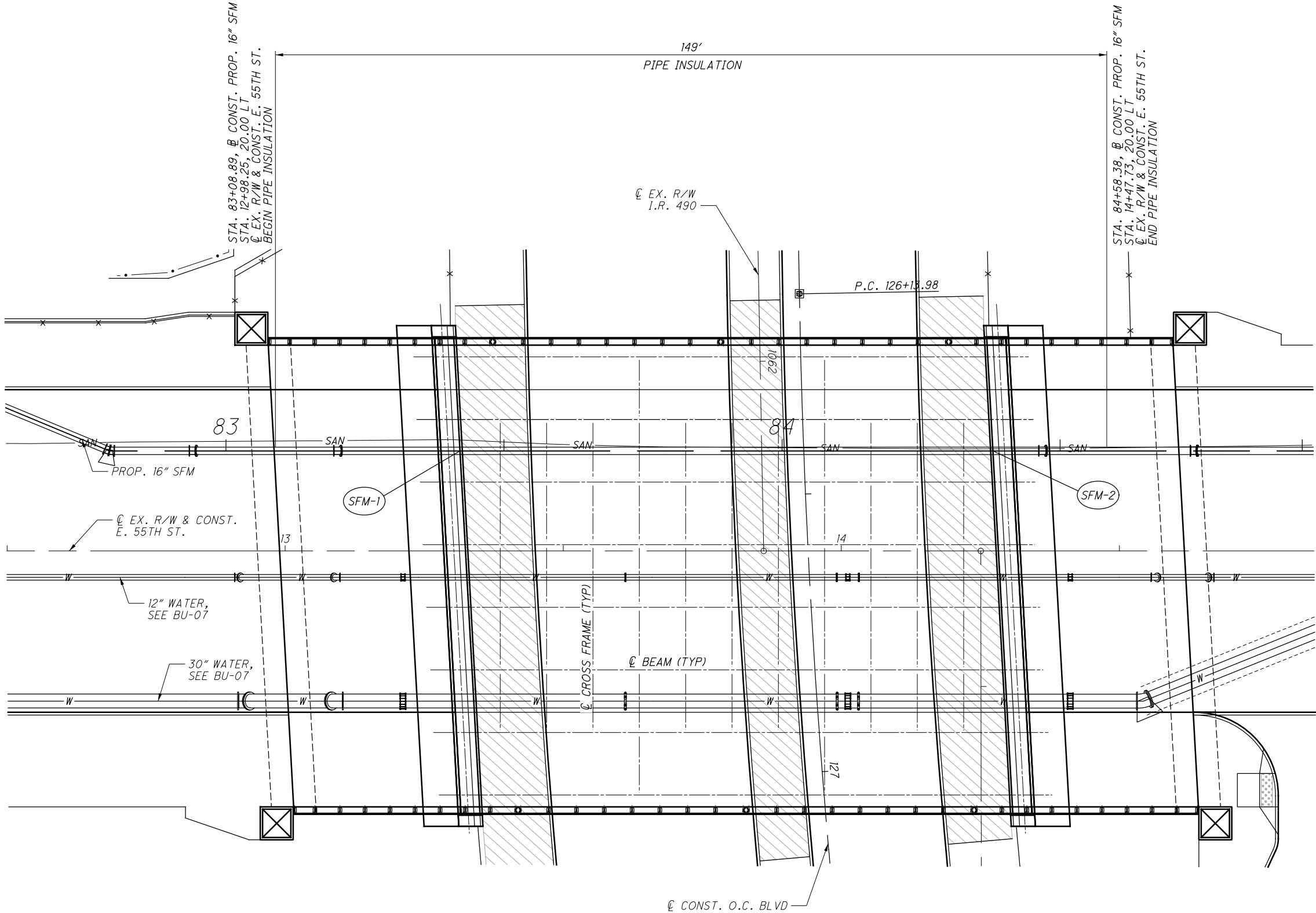
CROSSING UTILITY IDENTIFICATION			
1	EX. WATER	5	PROP. STORM SEWER
2	EX. SANITARY	6	PROP. ELEC. DUCT
3	EX. GAS	7	PROP. SANITARY SEWER
4	EX. STORM	8	EX. ELEC. DUCT

TBR = TO BE REMOVED  
TBA = TO BE ABANDONED

NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2019-10-02	DC019
0	2019-03-29	RFC
ISSUE RECORD		



NOTES:  
SFM = SLUDGE FORCE MAIN  
FOR BRIDGE CROSS FRAMES & PIPE SUPPORT DETAILS, SEE BU-03 (E 55TH STREET BRIDGE).  
FOR PIPE INSULATION DETAILS, SEE SHEET 67



NO.	DATE	DESCRIPTION
1	2019-10-02	DC019
0	2019-03-29	RFC
ISSUE RECORD		

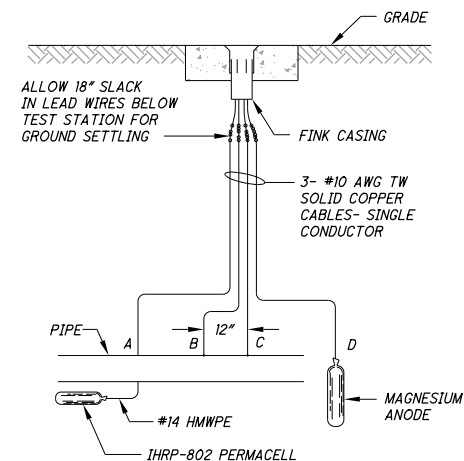
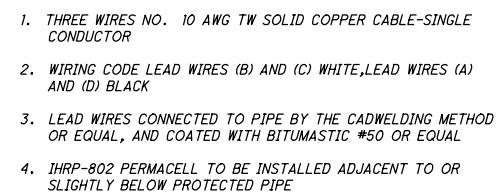
SFM-1

SFM-2

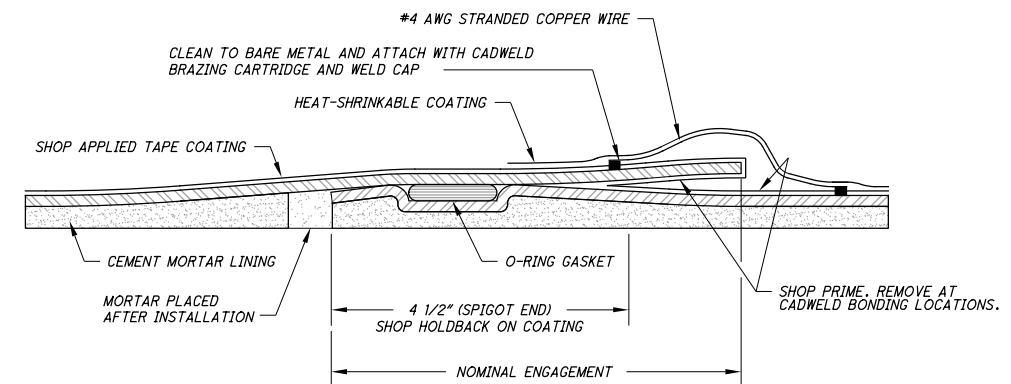
STA. 83+42.09, @ CONST. PROP. 16" SFM  
STA. 13+31.75, 18.00' LT,  
@ EX. R/W & CONST. E. 55TH ST.  
INSTALL ABUTMENT SLEEVE

STA. 84+37.91, @ CONST. PROP. 16" SFM  
STA. 14+26.74, 18.00' LT,  
@ EX. R/W & CONST. E. 55TH ST.  
INSTALL ABUTMENT SLEEVE





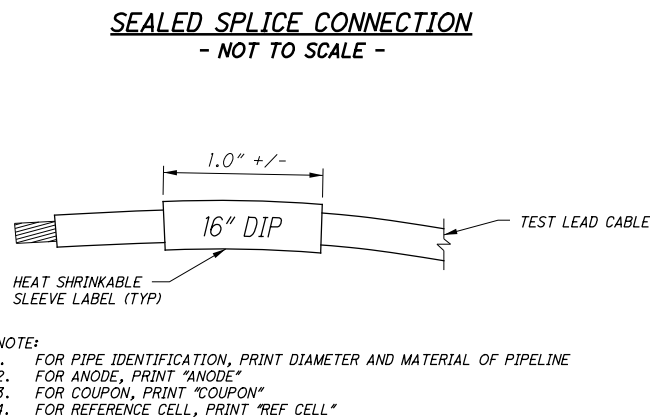
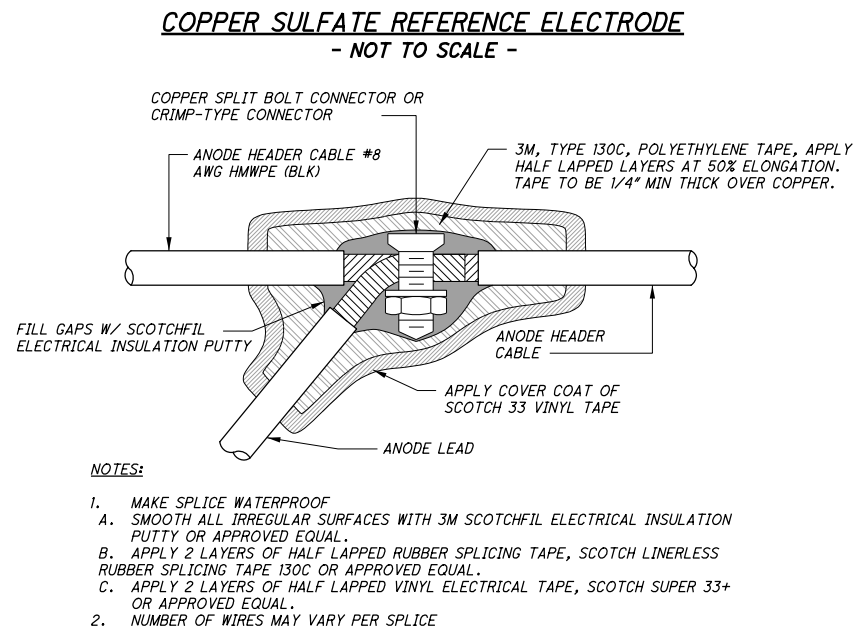
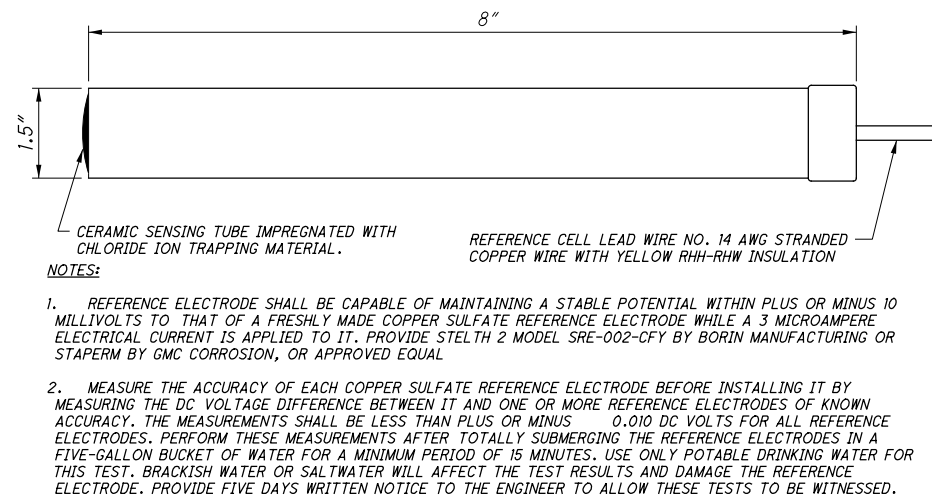
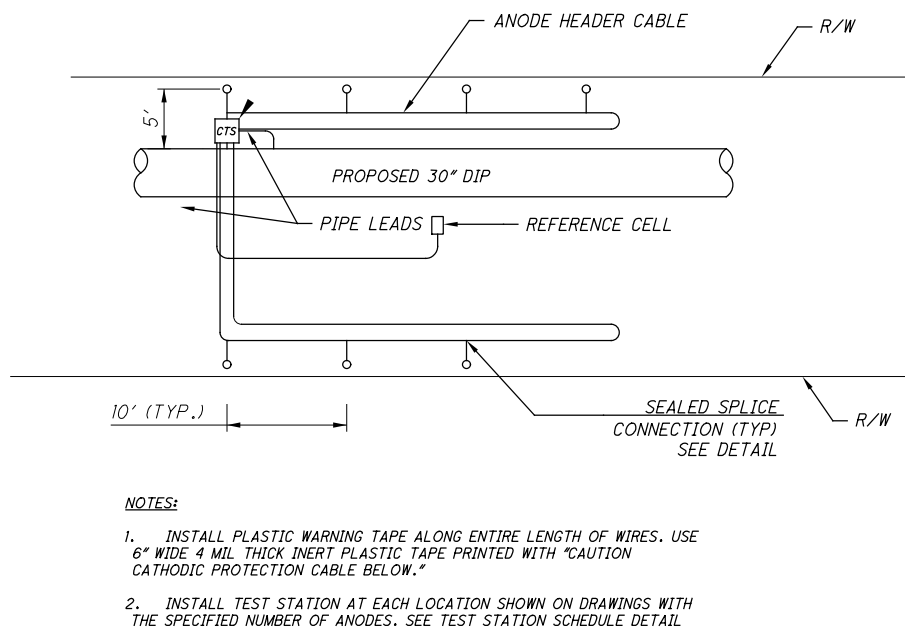
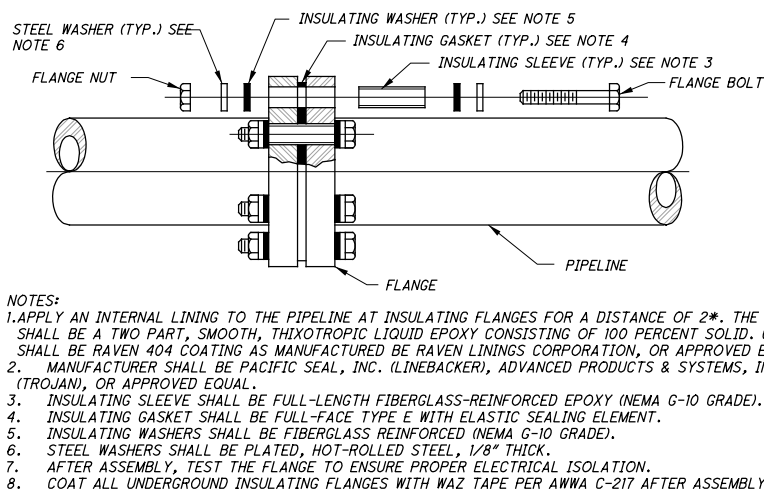
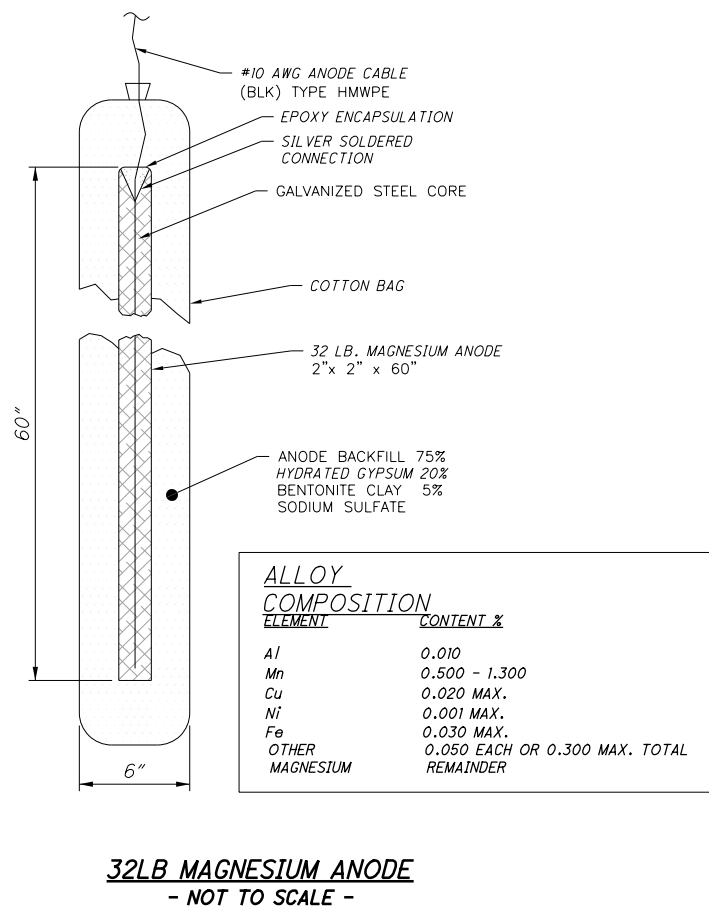
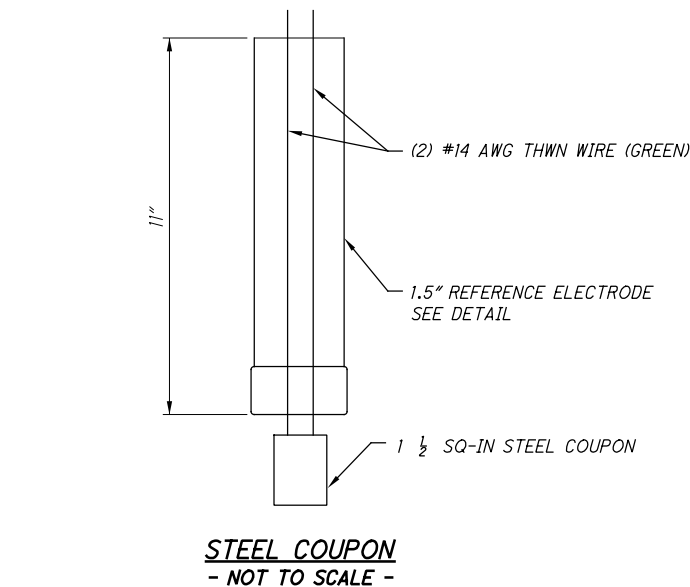
### ELECTROLYSIS TEST STATION DETAIL



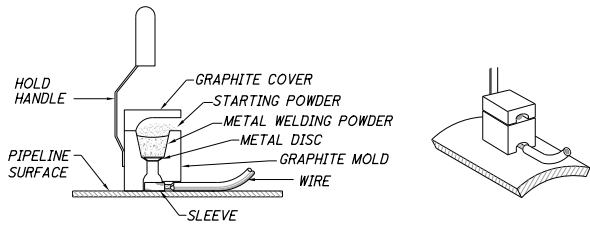
STEEL PIPE  
BELL AND SPIGOT TYPICAL BONDED JOINT DETAIL

- NOT TO SCALE -

0	2019-03-29	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



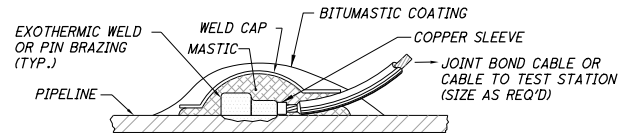
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<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



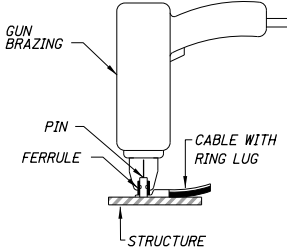
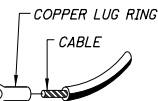
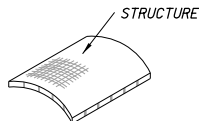
- STEP 1. GRIND STRUCTURE CONNECTION AREA (3"x3") TO BARE SHINY METAL AND CLEAN.
- STEP 2. STRIP INSULATION FROM WIRE. ATTACH SLEEVE
- STEP 3. HOLD MOLD FIRMLY WITH OPENING AWAY OPERATOR & IGNITE WITH FLINT GUN.
- STEP 4. REMOVE SLAG FROM CONNECTION & PEEN WELD FOR SOUNDNESS.
- STEP 5. COVER CONNECTION AND EXPOSED STRUCTURE SURFACE WITH A WELD CAP AND BITUMINOUS COATING COMPOUND.

NOTE:  
PROCEDURE SHOWN ABOVE IS TO BE USED AS A GENERAL GUIDE ONLY. CONSULT MANUFACTURER'S LITERATURE FOR SPECIFIC INSTALLATION INSTRUCTIONS. ALL WELD'S SHALL BE A MINIMUM OF 6" APART.

EXOTHERMIC WELD

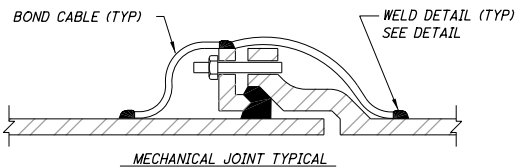
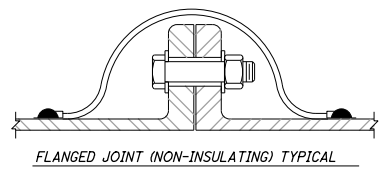
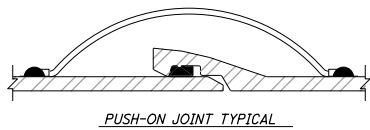


WIRING-TO-STRUCTURE WELD DETAIL  
- NOT TO SCALE -

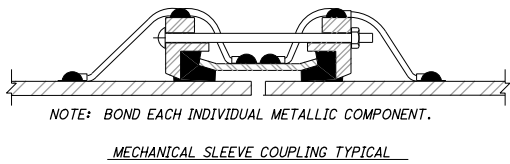


PIN BRAZING

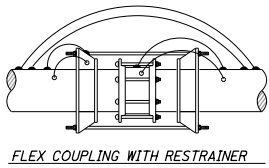
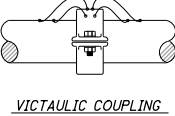
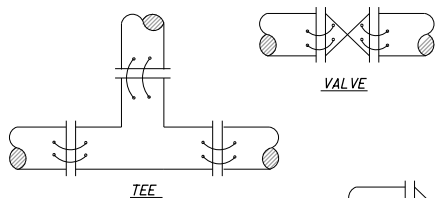
1. DEGREASE AND CLEAN STRUCTURE TO BARE, BRIGHT METAL WITH MECHANICAL DEVICES.
2. STRIP WIRE INSULATION AND ATTACH A BAC MI LUG OR APPROVED EQUAL TO WIRE.
3. LOAD THE BRAZING GUN WITH A DIRECT BRAZING PIN AND FERRULE. USE A THREADED TYPE CONNECTION FOR ABOVE-GROUND USE ONLY.
4. BRAZE THE CABLE TO THE PIPE. EXTRA MATERIAL REQUIRED FOR DI OR CI PIPE.
5. TEST BRAZE BY BREAKING OFF THE SHANK OF THE PLAIN PIN WITH A HAMMER.
6. COVER CONNECTION WITH MASTIC FILLED WELD CAP AND BITUMASTIC COATING 80% SOLIDS BY VOLUME OVER WELD CAP AND ALL EXPOSED METAL.
7. ALL WELDS SHALL BE A MINIMUM OF 6" APART.
8. ALLOW WELD COATING TO CURE PER MANUF. RECOM. BEFORE BURIAL.



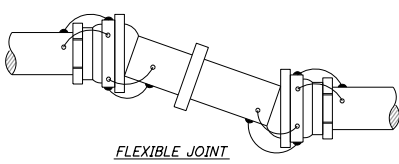
MECHANICAL JOINT TYPICAL



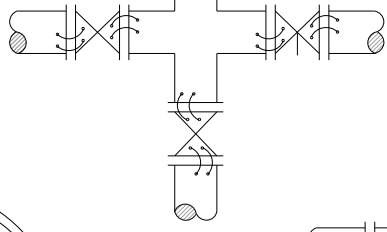
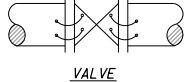
NOTE: BOND EACH INDIVIDUAL METALLIC COMPONENT.



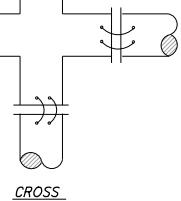
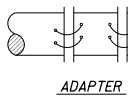
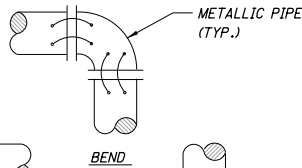
FLEX COUPLING WITH RESTRAINER



FLEXIBLE JOINT



VALVE CROSSING



METALLIC PIPE (TYP.)

NOTES:

1. ALL BOND WIRES SHALL BE STRD. COPPER WIRE W/HMWPE INSULATION, INSTALLED AT MIN. LENGTH.
2. TWO #8 BOND CABLES ARE REQUIRED PER JOINT FOR PIPE DIAMETERS 16" AND SMALLER. THREE #4 BOND CABLES ARE REQUIRED PER JOINT FOR PIPE DIAMETERS GREATER THAN 16".
3. BOND WIRES SHALL BE SPACED 6" APART MIN.
4. ALL WIRE CONNECTIONS SHALL BE MADE BY THE EXOTHERMIC WELD OR PIN BRAZING PROCESS, EXCEPT WIRE CONNECTIONS ON SOIL CAST IRON PIPE. WIRE CONNECTIONS ON SOIL CAST IRON PIPE SHALL BE MADE BY PIN BRAZING PROCESS ONLY. SEE DETAIL.
5. WAX TAPE ALL BURIED BOLTED FITTINGS PER AWWA C217.

PIPE JOINT AND MECHANICAL JOINT BONDING  
- NOT TO SCALE -

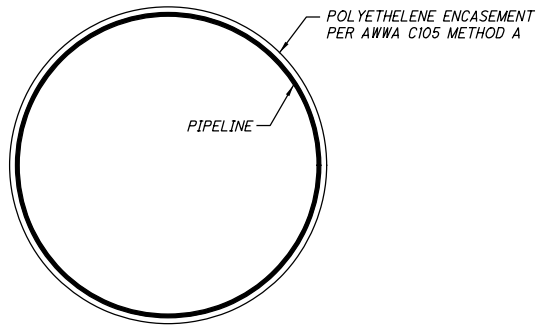
WIRE SCHEDULE

DESCRIPTION	WIRE SIZE (AWG)	WIRE INSULATION TYPE	WIRE COLOR
14-IN DIP	#8 STRANDED	THHN/THWN	BLACK
REFERENCE CELL	#14 STRANDED	RHH-RHW	YELLOW
STEEL COUPON	#14 STRANDED	THHN/THWN	GREEN
ZINC ANODE	#12 STRANDED	HMWPE	BLACK

TEST STATION SCHEDULE\*\*

CTS NO.	STATION	INSTALLATION TYPE	NO. OF ANODES
1	12+25.00	4-WIRE TEST STATION	0
2	11+00.00	ANODE BED	6
3	13+00.00	ANODE BED	6
4	16+50.00	ANODE BED	6
5	18+00.00	ANODE BED	6
6	15+00.00	4-WIRE TEST STATION	0

\*\* FIELD ADJUST PER CORROSION ENGINEERS RECOMMENDATIONS.

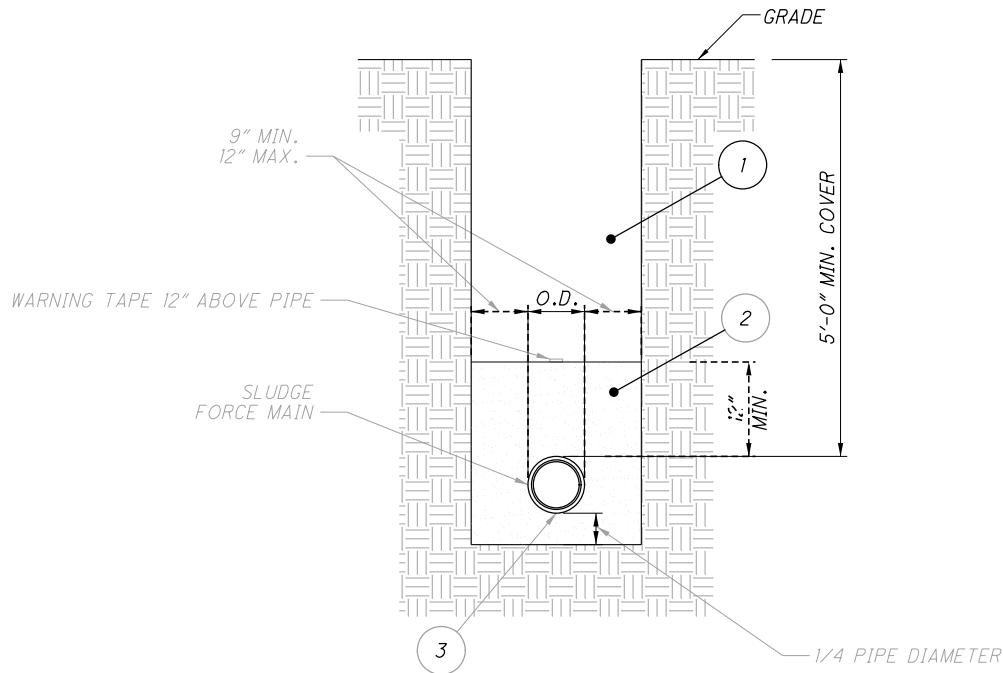
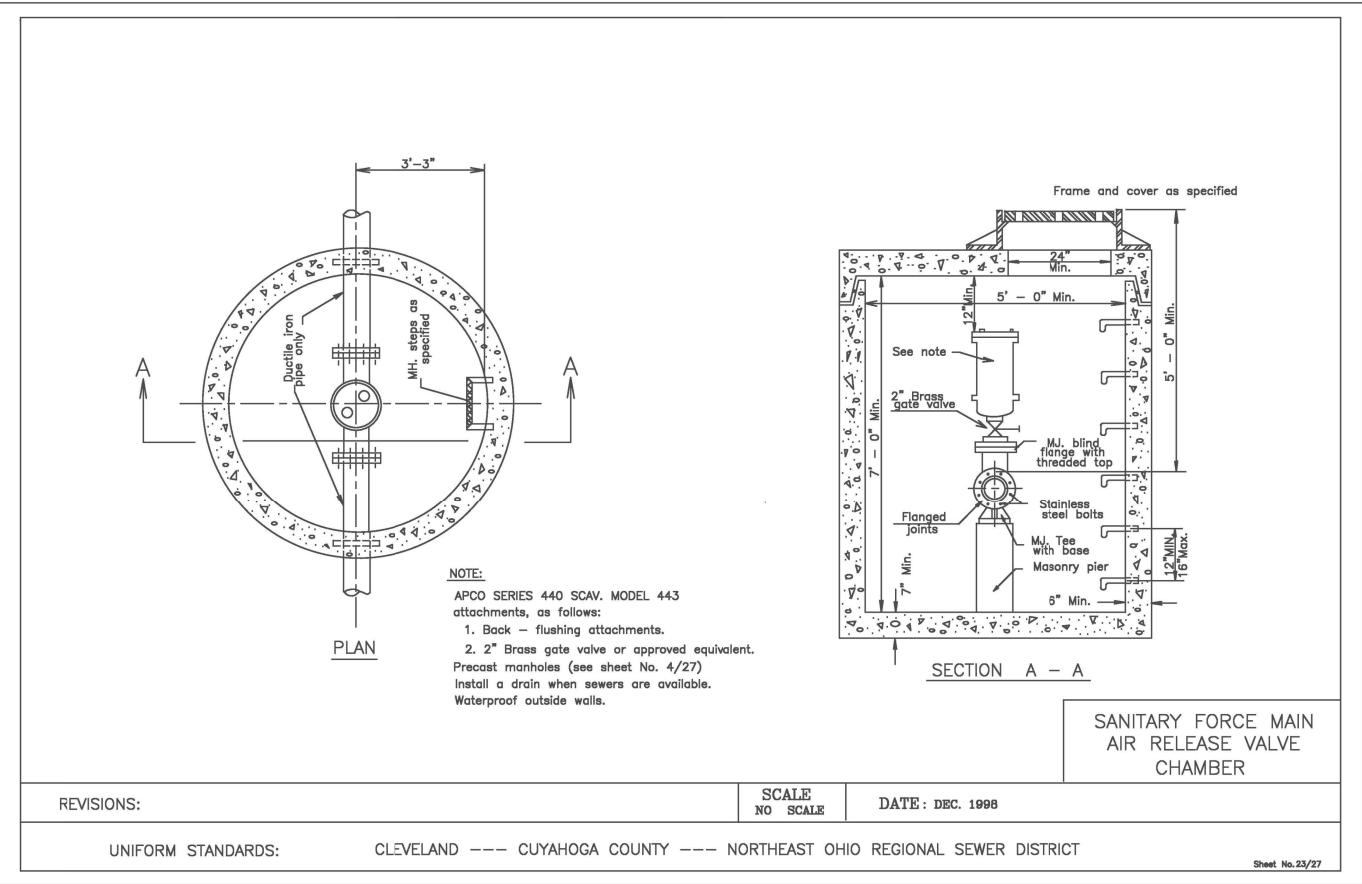
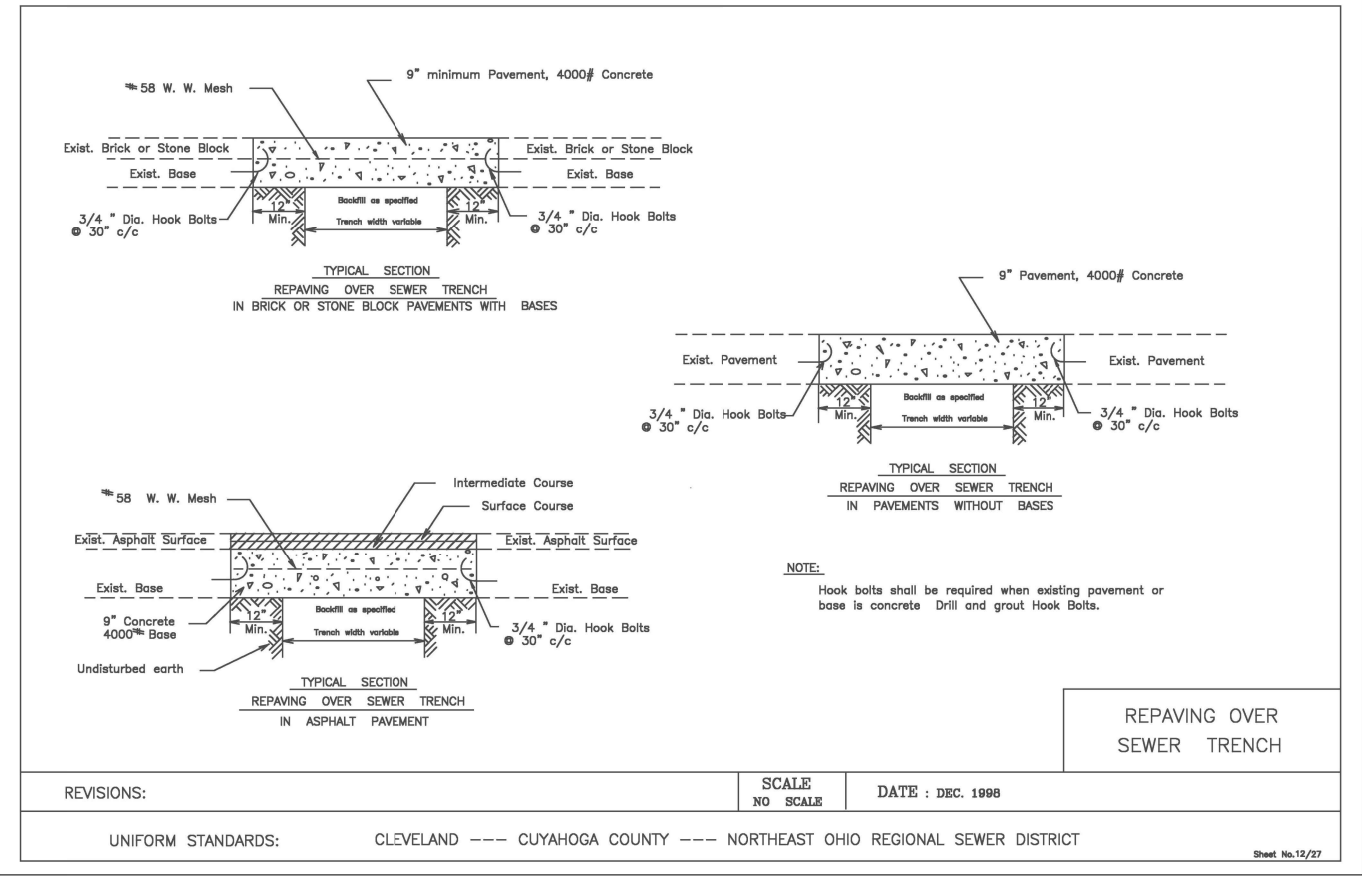


NOTES:

1. WRAP PIPE WITH POLYETHYLENE ENCASEMENT PER AWWA C105 METHOD A.
2. ROUTE TEST AND REFERENCE CELL WIRES THROUGH END OF ENCASEMENT AT JOINTS AND SEAL ENCASEMENT PER AWWA C105.

POLYETHYLENE ENCASEMENT  
- NOT TO SCALE -

NO.	DATE	DESCRIPTION
0	2019-03-29	RFC
ISSUE RECORD		



- 1 COMPACTED SUITABLE BACKFILL. SEE NOTES 1, 2, OR 3 THIS SHEET.
- 2 BEDDING SHALL CONSIST OF COARSE INTERLOCKING AGGREGATE No. 57, 6, 67, 68, 7, 78, OR 8.
- 3 AMPLE BELL HOLES SHALL BE FORMED TO PERMIT PROPER JOINTING

NOTES:

1. PREMIUM BACKFILL REQUIRED UNDER EXISTING OR FUTURE PAVEMENTS, SIDEWALKS, AND/OR DRIVES OR WHEN REQUIRED BY LOCAL MUNICIPALITY.
2. PREMIUM BACKFILL SHALL BE LIMESTONE GRADED PER ODOT 304.02 OR ODOT 411. NO SLAG IS PERMITTED.
3. UNLESS OTHERWISE SPECIFIED, ALL BACKFILLING OF TRENCHES WITHIN PAVEMENT LIMITS, WITH THE EXCEPTION OF UNDERDRAINS, SHALL BE BACKFILLED TO THE TOP OF THE TRENCH OR BOTTOM OF SUBGRADE, WHICHEVER IS LOWER, WITH LOW STRENGTH MORTAR (LSM) PER CITY OF CLEVELAND SPECIFICATIONS.

LSM SHALL CONSIST OF THE FOLLOWING PROPORTIONS PER CUBIC YARD:

CEMENT (ASTM C-150, TYPE 1): 50 LBS  
SAND (PER C&MS 703.03, SSD): 2475 LBS  
WATER: 25 GALLONS  
ADMIXTURE (AIR): 3 OZ.

APPROVED ADMIXTURES: MASTER BUILDERS-RHEOFILL, AXIM-FLOW AIR, W.R. GRACE-DARAFILL (AN EQUAL MAY BE USED ONLY WITH DEPARTMENT APPROVAL)

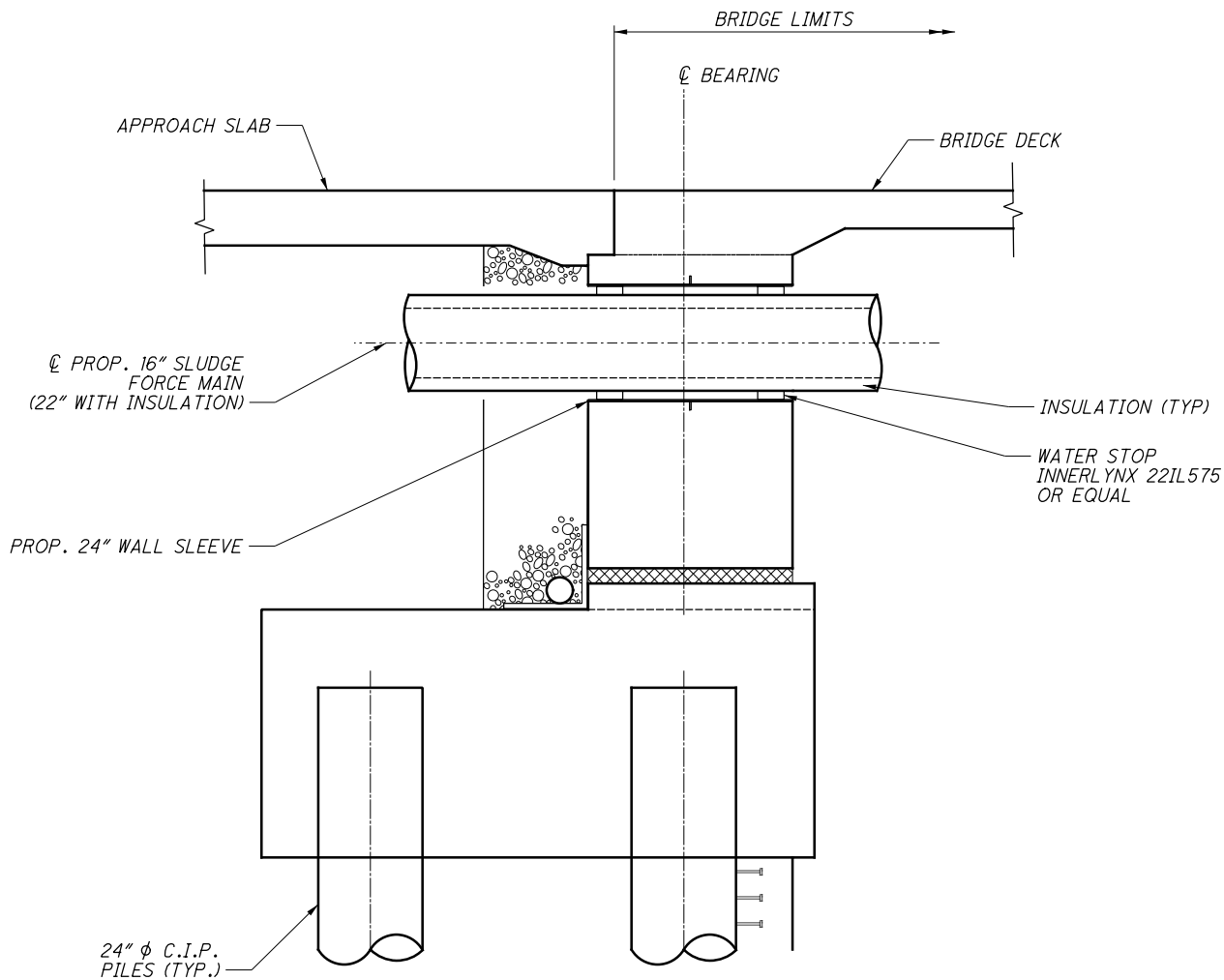
USE OF FLY ASH, SPENT FOUNDRY SAND, OR CORE SAND IS STRICTLY PROHIBITED.

4. CONTRACTOR SHALL USE SPECIAL CARE IN PLACING THE BEDDING BACKFILL, SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. THE BEDDING BACKFILL SHALL BE TAMPED IN SIX (6) INCH LAYERS, SIMULTANEOUSLY ON EACH SIDE OF THE PIPE, AND THOROUGHLY COMPACTED SO AS TO PROVIDE A SOLID BACKING AGAINST THE EXTERNAL SURFACE OF THE PIPE.
6. PAVEMENT, SIDEWALK OR DRIVES TO BE INSTALLED IN ACCORDANCE WITH LOCAL MUNICIPALITY'S SPECIFICATIONS.

SLUDGE FORCE MAIN TRENCH DETAILS

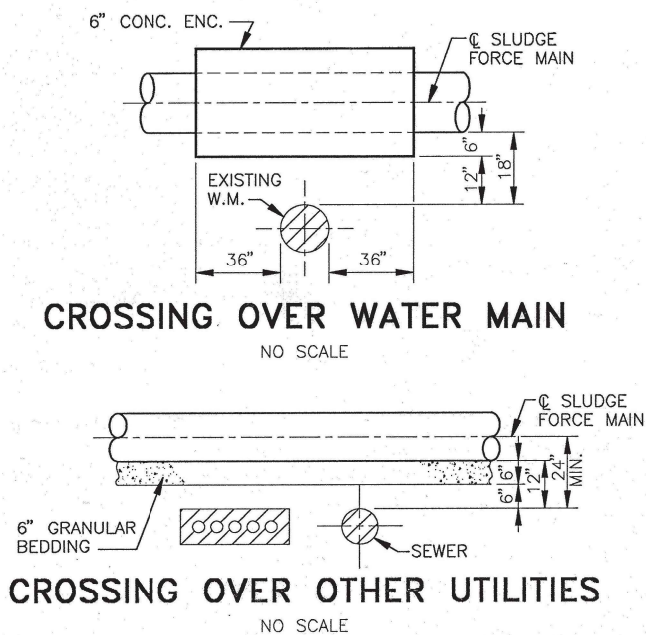
- NOT TO SCALE -

NO.	DATE	DESCRIPTION
0	2019-03-29	RFC
ISSUE RECORD		

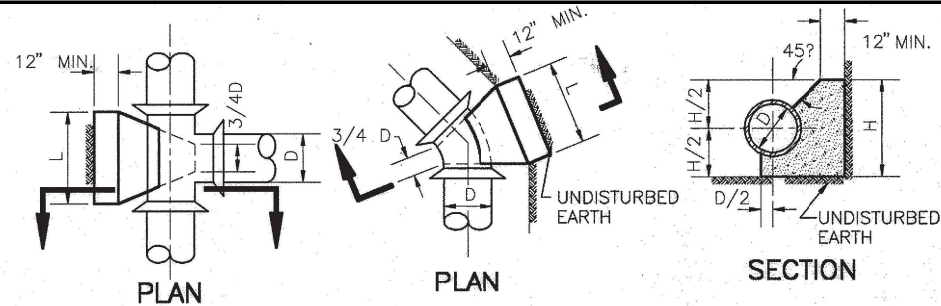


NOTE:  
REFER TO BU-03, E 55TH STREET BRIDGE, PLANS  
FOR MORE DETAILED INFORMATION ON ABUTMENT  
SLEEVE.

**ABUTMENT SLEEVE FOR FORCE MAINS DETAIL**  
- NOT TO SCALE -



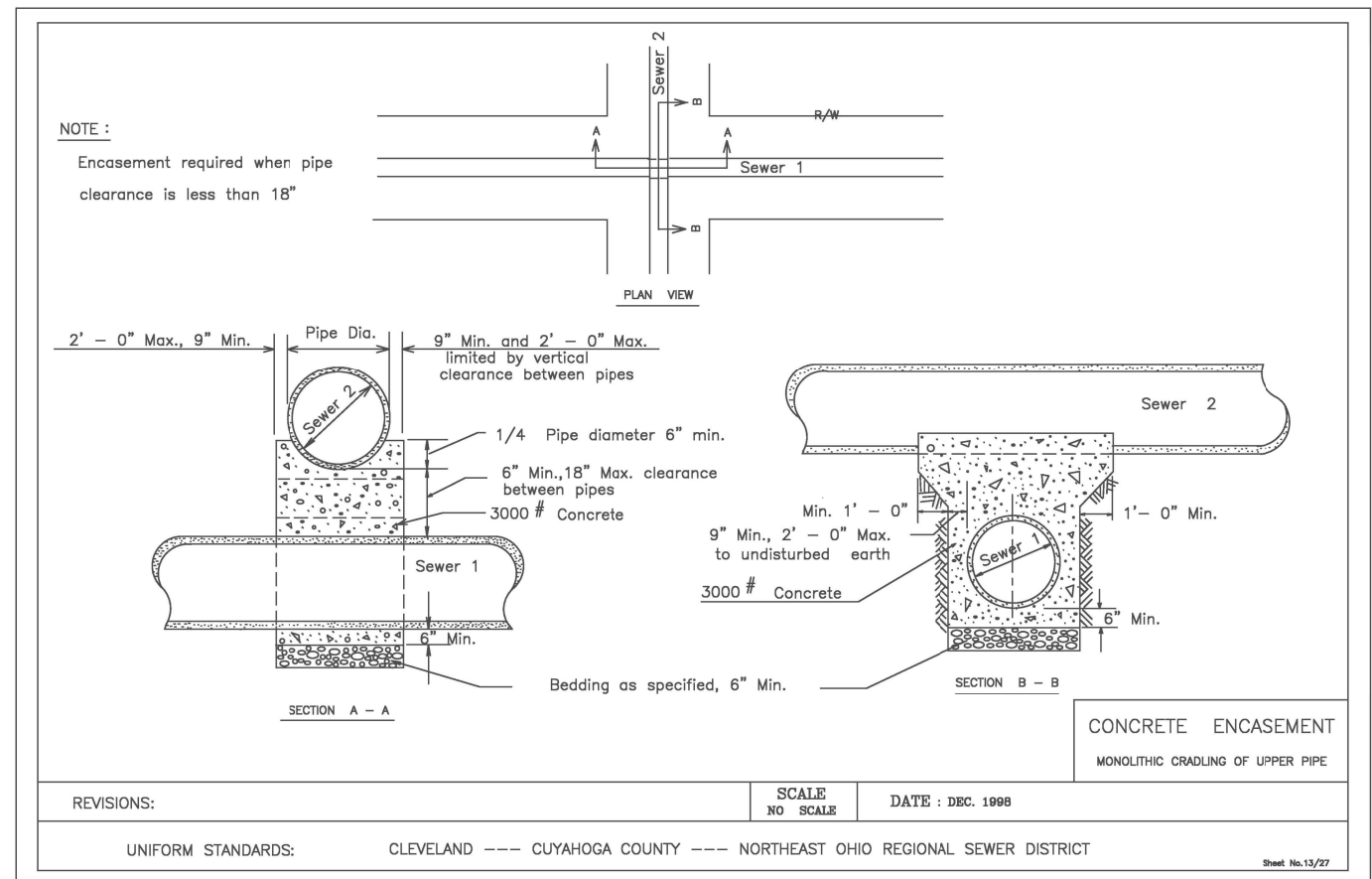
**VERTICAL CLEARANCE FOR UTILITIES**  
- NOT TO SCALE -



NOTE: THIS DETAIL TO BE APPLIED TO ALL HORIZONTAL BENDS OF MORE THAN 10° AND BEHIND ALL TEES OF PIPE LINES WHERE PIPE DIAMETER IS LARGER THAN 48" OR TEST PRESSURE IS HIGHER THAN 30 P.S.I. FOR SMALLER PIPE AND/OR LOWER PRESSURES. SEE STANDARD THRUST BLOCK DETAIL.

PIPE DESCRIPTION	LOCATION	DIA. (IN.)	TEST PRESS. (P.S.I.)	L (FT.-IN.)	H (FT.-IN.)
16" SL. F.M.	11-1/4" ELL	16"	350	1'-6"	2'-4"
16" SL. F.M.	22-1/2" ELL	16"	350	3'-0"	2'-6"
12" F.M. & BLOW-OFF	11-1/4" ELL	12"	350	1'-6"	2'-0"
12" F.M. & BLOW-OFF	22-1/2" ELL	12"	350	2'-0"	2'-0"
12" F.M. & BLOW-OFF	45° ELL	12"	350	4'-0"	2'-0"
12" F.M. & BLOW-OFF	90° ELL	12"	350	4'-9"	3'-0"

**DETAILED THRUST BLOCK**  
NO SCALE



REVISIONS:

SCALE  
NO SCALE

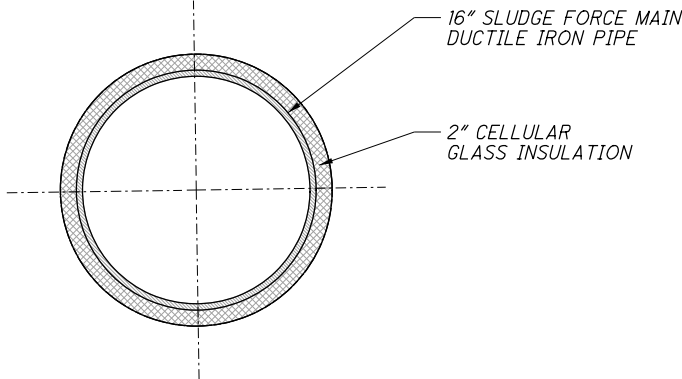
DATE : DEC. 1998

UNIFORM STANDARDS:

CLEVELAND --- CUYAHOGA COUNTY --- NORTHEAST OHIO REGIONAL SEWER DISTRICT

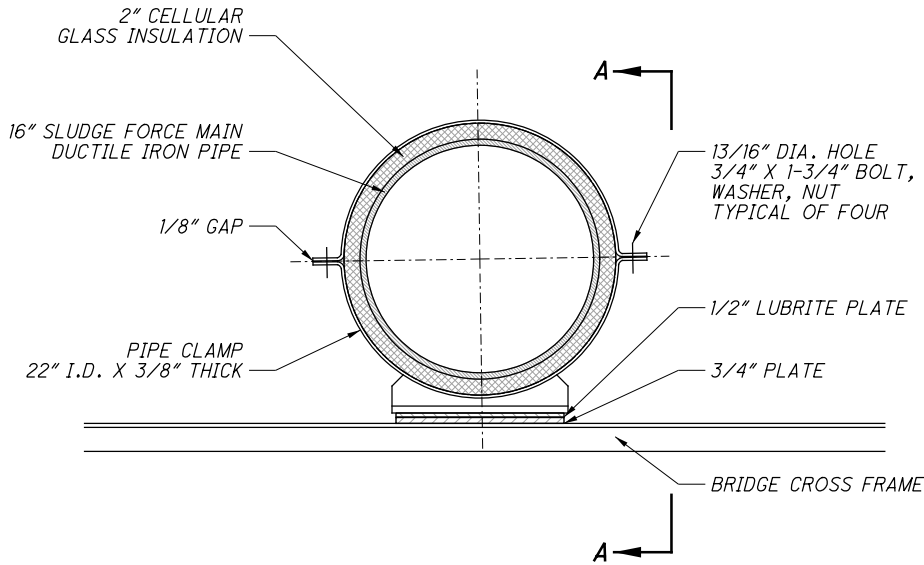
Sheet No.13/27

NO.	DATE	DESCRIPTION
0	2019-03-29	RFC
ISSUE RECORD		



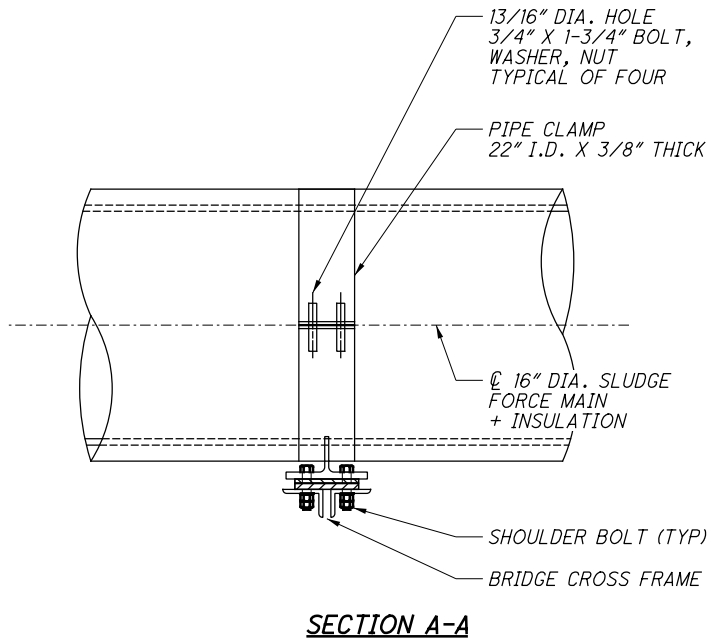
NOTE:  
FOR INSULATION NOTES AND SPECIFICATIONS, SEE  
ITEM SPECIAL - INSULATION AND OUTER PROTECTIVE  
JACKET NOTES ON SHEET 52

**TYPICAL PIPE INSULATION DETAIL**  
- NOT TO SCALE -



- NOTE:
1. PIPE SUPPORTS ARE TO BE FABRICATED AS DETAILED IN THE SHOP DRAWINGS.
  2. THERE SHALL BE A MINIMUM OF TWO (2) PIPE SUPPORTS FOR EACH PIPE LENGTH, NO MORE THAN 20' OF PIPE SHALL BE UNSUPPORTED.
  3. PIPE SUPPORTS ARE REQUIRED TO ALLOW MOVEMENT ONLY IN THE AXIAL DIRECTIONS. ALL OTHER MOVEMENT IS RESTRICTED.
  4. PIPE SUPPORTS SHALL NOT CRUSH PIPE INSULATION.
  5. REFER TO BU-03, E 55TH STREET BRIDGE, PLANS FOR MORE DETAILED INFORMATION ON PIPE SUPPORT DESIGN.

**TYPICAL PIPE SUPPORT DETAIL**  
- NOT TO SCALE -



NO.	DATE	DESCRIPTION
1	2019-10-02	DC019
0	2019-03-29	RFC

ISSUE RECORD



# Submittal: 27

## Revision:

Date Submitted: 7/25/2019

Response Due: 8/1/2019



**Project:** ODOT 3000(17) – Opportunity Corridor 3

**Subject:** S10A Structural Expansion & Construction Joints

**To:** Kevin Kuntz, P.E.  
Ohio Department of Transportation – District 12

**Email:** Kevin.Kuntz@dot.ohio.gov

**From:** Marty Fritz  
Kokosing Construction Company, Inc.

**Email:** mwf@kokosing.biz

We Are Sending:	Submitted For:
<input type="checkbox"/> As-Built Construction Drawings	<input checked="" type="checkbox"/> Approval
<input type="checkbox"/> Certifications / Test Results	<input type="checkbox"/> Acceptance
<input type="checkbox"/> Engineered / Working Drawings	<input type="checkbox"/> Record
<input type="checkbox"/> Product Data / Samples	
<input type="checkbox"/> Quality Control Procedures	<b>Sent Via:</b>
<input type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Attached (Electronic)
<input checked="" type="checkbox"/> Other: NEORS Material Submittal	<input type="checkbox"/> Attached (Hard Copy)

Submittal #	Spec	Revision	Description	Status
27	Appendix DR-08 Section 03 32 00		Material Submittal for S10A	For Approval

### Comments:

In accordance with Appendix DR-08 'NEORS Material Specifications for Regulator S-10', attached are material submittals for structural expansion and construction joints. Please note that this submittal was provided by Independence Excavating, and they will be responsible for the proper installation of this material.

Please feel free to contact me for any questions/concerns regarding this submittal.

Signed: 



# SUBMITTAL



Submittal number	12.0	Date	07/22/2019
Project	ODOT OC3 IR490-SR010	E 55th St Cleveland, OH 44104	
Project number	181135		
Spec section			
Subsection	S10A: Sup1	Status	Open
Current action	Not yet submitted	Ball in court	
Topic	BU-05 S10A: Supplemental 1: 03 32 00		

Submitter	Matthew L Gillilan
Reviewer	Michael Luyster
Cc	

Date submitted	07/22/2019	Submission due date	08/05/2019
Released for review		Review due date	
Date returned		Required on site date	08/09/2019
Date closed			

## Notes

Supplemental package for S10A. Reference 03 32 00, Structural Expansion and Construction Joints from BU-05 NEORSD Special Provisions.

## Greenstreak® PVC Waterstop

### Flexible PVC Waterstop

**Distributed By:**  
**The Chas. E. Phipps Company**  
Cleveland 1-800-362-9267  
Canton 1-877-258-7601  
Toledo 1-800-860-3352  
www.chasehipps.com

<b>Description</b>	Greenstreak® PVC Waterstop is a flexible PVC waterstop for joint waterproofing.
<b>Where To Use</b>	<ul style="list-style-type: none"> <li>■ Water/Waste Water Treatment Plants</li> <li>■ Lock and Dam Systems</li> <li>■ Reservoirs and Aqueducts</li> <li>■ Flood Walls</li> <li>■ Retaining Walls</li> <li>■ Foundations</li> <li>■ Tunnels and Culverts</li> <li>■ Bridge Abutments</li> <li>■ Containment Structures and Tanks</li> <li>■ Slabs-on-Ground</li> </ul>
<b>Advantages</b>	<p>Greenstreak® PVC Waterstop features:</p> <ul style="list-style-type: none"> <li>■ Embedded in concrete, across and/or along the joint, waterstops form a watertight diaphragm that prevents the passage of liquid through the joint.</li> <li>■ Suitable for potable water contact, meets NSF/ANSI Standard 61.</li> </ul>
<b>Typical Data</b>	
<b>Coverage</b>	Available in various lengths.
<b>Packaging</b>	Varies

Property	ASTM Test Method	Value
Water Absorption	ASTM D570	0.15% max.
Tear Resistance	ASTM D624	300 lb. / in. min.
Ultimate elongation	ASTM D638	350%
Tensile strength	ASTM D638	2000 psi min.
Low temperature brittleness	ASTM D746	Passes @ -35°F / -37°C
Stiffness in flexure	ASTM D747	700 psi min.
Specific gravity	ASTM D792	1.38 max.
Hardness Shore A15	ASTM D2240	79+/-3
Accelerated extraction - Tensile strength - Elongation	Corp. of Engineers CRD-C-572	1600 psi min. 300% min.
Effect of Alkali - Weight change - Hardness change	Corp. of Engineers CRD-C-572	+0.25% -0.10% +/- 5 points
*Results may differ based upon statistical variations depending upon equipment, temperature, application methods, test methods, and actual site condition.		



PRIOR TO EACH USE OF ANY SIKA PRODUCT, THE USER MUST ALWAYS READ AND FOLLOW THE WARNINGS AND INSTRUCTIONS ON THE PRODUCT'S MOST CURRENT PRODUCT DATA SHEET, PRODUCT LABEL AND SAFETY DATA SHEET WHICH ARE AVAILABLE ONLINE AT [HTTP://USA.SIKA.COM/](http://usa.sika.com/) OR BY CALLING SIKA'S TECHNICAL SERVICE DEPARTMENT AT 800-933-7452. NOTHING CONTAINED IN ANY SIKA MATERIALS RELIEVES THE USER OF THE OBLIGATION TO READ AND FOLLOW THE WARNINGS AND INSTRUCTION FOR EACH SIKA PRODUCT AS SET FORTH IN THE CURRENT PRODUCT DATA SHEET, PRODUCT LABEL AND SAFETY DATA SHEET PRIOR TO PRODUCT USE.

# Waterproofing

## How to Use

### Chemical Resistance

Not intended for chemical containment applications, please refer to Westec® waterstop literature at [usa.sika.com](http://usa.sika.com) for more information on Sika's chemically resistant waterstop product line.

### Application

Greenstreak® PVC Waterstop must be installed prior to concrete placement to ensure proper positioning and concrete consolidation around the waterstop. All transitions, intersections, and splices should be heat welded to maintain continuity. Factory Made Fabrications are recommended for all intersections and changes of direction. Specific installation requirements will vary depending on the style of profile, please refer to Sika's PVC Waterstop Installation Guide and Splicing PVC Waterstop Installation Guide available at [usa.sika.com](http://usa.sika.com).

### Tooling & Finishing

All transitions, intersections, and splices must be heat welded using a Sika Greenstreak Splicing Iron in compliance with the instructions shown in Sika's Splicing PVC Waterstop Installation Guidelines found at [usa.sika.com](http://usa.sika.com).

### Limitations

The size, shape, and style of waterstop should be based on specific application needs. Please consult a Sika Greenstreak Engineer at 800-325-9504 for assistance with profile selection.

#### Distributed By:



Cleveland 1-800-362-9267  
Canton 1-877-258-7601  
Toledo 1-800-860-3352  
[www.chasehipps.com](http://www.chasehipps.com)



**KEEP CONTAINER TIGHTLY CLOSED • KEEP OUT OF REACH OF CHILDREN • NOT FOR INTERNAL CONSUMPTION • FOR INDUSTRIAL USE ONLY • FOR PROFESSIONAL USE ONLY**

All information provided by Sika Corporation ("Sika") concerning Sika products, including but not limited to, any recommendations and advice relating to the application and use of Sika products, is given in good faith based on Sika's current experience and knowledge of its products when properly stored, handled and applied under normal conditions in accordance with Sika's instructions. In practice, the differences in materials, substrates, storage and handling conditions, actual site conditions and other factors outside of Sika's control are such that Sika assumes no liability for the provision of such information, advice, recommendations or instructions related to its products, nor shall any legal relationship be created by or arise from the provision of such information, advice, recommendations or instructions related to its products. The user of the Sika product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with the full application of the product(s). Sika reserves the right to change the properties of its products without notice. All sales of Sika product(s) are subject to its current terms and conditions of sale which are available at <http://usa.sika.com/> or by calling 800-933-7452.

Sika warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor.

**NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKI SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKI SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

**Sika Greenstreak Sales Office**  
3400 Tree Court Industrial Blvd.  
St. Louis, MO 63122  
Tel: (636) 225-9400  
Fax: (636) 225-2049  
[usa.sika.com](http://usa.sika.com)

**Sika Corporation**  
201 Polito Avenue  
Lyndhurst, NJ 07071  
Phone: (201) 933-8800  
Fax: (201) 933-6225  
[usa.sika.com](http://usa.sika.com)

**Sika Canada Inc.**  
601, Delmar Avenue  
Pointe-Claire, QC H9R 4A9  
Phone: (514) 697-2610  
Fax: (514) 697-3087  
[can.sika.com](http://can.sika.com)


**PRIOR TO EACH USE OF ANY SIKI PRODUCT, THE USER MUST ALWAYS READ AND FOLLOW THE WARNINGS AND INSTRUCTIONS ON THE PRODUCT'S MOST CURRENT PRODUCT DATA SHEET, PRODUCT LABEL AND SAFETY DATA SHEET WHICH ARE AVAILABLE ONLINE AT [HTTP://USA.SIKA.COM/](http://USA.SIKA.COM/) OR BY CALLING SIKI'S TECHNICAL SERVICE DEPARTMENT AT 800-933-7452. NOTHING CONTAINED IN ANY SIKI MATERIALS RELIEVES THE USER OF THE OBLIGATION TO READ AND FOLLOW THE WARNINGS AND INSTRUCTION FOR EACH SIKI PRODUCT AS SET FORTH IN THE CURRENT PRODUCT DATA SHEET, PRODUCT LABEL AND SAFETY DATA SHEET PRIOR TO PRODUCT USE.**

SYMMETRICAL ABOUT MAJOR AND MINOR AXIS OF CROSS SECTION

## 679 PROFILE

SCALE: 1" = 1"



REV. MARK	REVISION	BY	CHK	APP	DATE	DESIGNED:		DATE:		
						DRAWN:	B. ZHU	10/14/14	PART NUMBER:	0679001
						CHECKED:			QUANTITY REQUIRED:	
						APPROVED:			SCALE:	AS SHOWN
						FAB. REP.:			DWG. REF. NO.:	
						SHEET NUMBER:				
<div><div>3400 TREE CRT. IND. BLVD., ST. LOUIS, MO 63122-6689 PH: 800-325-9504 (636-225-9400) FX: 800-551-5154 (636-225-2049) WEBSITE: <a href="http://www.greenstreak.com">www.greenstreak.com</a> EMAIL: <a href="mailto:info@greenstreak.com">info@greenstreak.com</a></div></div> <div>#679 - RIBBED FLAT WATERSTOP</div> <div>REV</div>										

# Sikaflex® Sealant/Adhesive Primers

## Sikaflex Primers 260, 429, and 449

**Distributed By:**  
**The Chas. E. Phipps Company**  
Cleveland 1-800-362-9267  
Canton 1-877-258-7601  
Toledo 1-800-860-3352  
www.chasephipps.com

<b>Description</b>	Sikaflex primers are special materials formulated to improve the bond of Sikaflex urethane sealants when applied to specific substrates.						
<b>Sikaflex Primer 260</b>	Sikaflex Primer 260 promotes adhesion of urethane sealants to various metallic, non-metallic, and plastic substrates.						
<b>Sikaflex Primer 429</b>	Sikaflex Primer 429 promotes adhesion to clean, sound, and dry concrete, masonry, Exterior Insulation Finish Systems (EIFS), and wood — including teak and mahogany.						
<b>Sikaflex Primer 449</b>	Sikaflex Primer 449 is used to promote adhesion to pvc, solvent-based enamel, PPG's fluorocarbon Duranar-finish, and certain plastics such as ABS and Plexiglass.						
<b>Where to Use</b>	Most substrates require a primer only if testing shows need for it or where the sealant will be underwater after cure. Certain substrates do require a primer under all conditions.						
<b>Advantages</b>	<ul style="list-style-type: none"> <li>Single-component, ready to use.</li> <li>Easily applied by brush, dauber, or spray.</li> </ul>						
<b>Coverage</b>	<p>Following are average coverages, depending on porosity of substrate:</p> <p><b>Sikaflex Primer Coverage per pint (Liner ft. 1/2" x 1/2" joint)</b></p> <table> <tr> <td><b>260</b></td><td>300-500</td></tr> <tr> <td><b>429</b></td><td>300</td></tr> <tr> <td><b>449</b></td><td>300-500</td></tr> </table>	<b>260</b>	300-500	<b>429</b>	300	<b>449</b>	300-500
<b>260</b>	300-500						
<b>429</b>	300						
<b>449</b>	300-500						
<b>Packaging</b>	<p><b>Sikaflex 260 and 449</b> primers are available in pints, 6/carton.</p> <p><b>Sikaflex 429</b> primer is available in pints, 6/carton; and gallons, 2/carton.</p>						

Substrate	Primer Required	Recommended primer if necessary
<b>Concrete and Masonry</b>		
Concrete Block	No	Sikaflex 429 primer
Placed Concrete	No	Sikaflex 429 primer
Precast Concrete	No	Sikaflex 429 primer
Mortar	No	Sikaflex 429 primer
Grout	No	Sikaflex 429 primer
Brick	No	Sikaflex 429 primer
SikaTops	No	Sikaflex 429 primer
<b>Stone</b>		
Granite	No	Sikaflex 429 primer
Marble	No	Sikaflex 260 primer
<b>Paints</b>		
Acrylic Latex	No Bond Achieved	
Emercoat 33	No Bond Achieved	
DeSoto Fluoropon	No Bond Achieved	
PPG Duracon S600	No Bond Achieved	
Solvent-based Enamel	Yes	Sikaflex 449 primer
PPG Fluorocarbon	Yes	Sikaflex 449 primer
Duranar	Yes	Sikaflex 449 primer
PPG Polycron	Yes	Sikaflex 449 primer
Kynar	Yes	Sikaflex 449 primer
Siliconized Polyester	Yes	Sikaflex 260 primer
Alucobond	Yes	Sikaflex 260 primer
<b>Plastics</b>		
PVC	Yes	Sikaflex 449 primer
ABS	Yes	Sikaflex 449 primer
Plexiglass	Yes	Sikaflex 449 primer
Plexiglass DR	Yes	Sikaflex 449 primer
Lucite	Yes	Sikaflex 449 primer
Rovel Plastic	Yes	Sikaflex 449 primer

Substrate	Primer Required	Recommended primer if necessary
<b>Plastics cont'd</b>		
Lexan	Yes	Sikaflex 260 primer
Teflon	No Bond Achieved	
Polyethylene	No Bond Achieved	
Polypropylene	No Bond Achieved	
Tuffak	Yes	Sikaflex 449 primer
Polyester/Fiberglass	No	Sikaflex 449 primer
<b>Glass</b>		
Glass - Sheet, float or plate	No	Sikaflex 260 primer
Porcelain	No	Sikaflex 260 primer
Ceramic tile	No	Sikaflex 260 primer
<b>Metals</b>		
Aluminum - Anodized	No	Sikaflex 260 primer
Aluminum - Mill Finish	Yes	Sikaflex 260 primer
Lead	No	Sikaflex 260 primer
Copper (bright/clean)	No	Sikaflex 260 primer
Brass	No	Sikaflex 260 primer
Zinc	No	Sikaflex 260 primer
Tinplate	No	Sikaflex 260 primer
Steel (Bright/Clean)	No	Sikaflex 260 primer
Steel - Stainless	Yes	Sikaflex 260 primer
Steel - Galvanized	Yes	Sikaflex 260 primer
<b>Rubber</b>		
Urethane	No	Sikaflex 449 primer
<b>Woods</b>		
Unfinished Woods	No	Sikaflex 429 primer
<b>EIFS**</b>		
Dryvit	Yes	Sikaflex 429 primer
Sto	Yes	Sikaflex 429 primer
Synergy	Yes	Sikaflex 429 primer

\*\* Product will bond without primer however primer is recommended by EIFS manufacturers to properly seal substrate. Follow EIFS manufacturer's primer recommendations.

### Typical Data (Material and curing conditions 73°F and 50% R.H.)

RESULTS MAY DIFFER BASED UPON STATISTICAL VARIATIONS DEPENDING UPON MIXING METHODS AND EQUIPMENT, TEMPERATURE, APPLICATION METHODS, TEST METHODS, ACTUAL SITE CONDITIONS AND CURING CONDITIONS.

**Color** Clear  
**Shelf life** 6 months in original, unopened containers.

**Sika®**

## How to Use Surface Preparation

The key to good bonding with Sikaflex sealants/primers is surface preparation. Specifically, all surfaces must be dry and free of dirt, grease, mold release agents, loose mortar, laitance, and any foreign matter. If the joint contains old sealant, it and all extraneous material must be removed and the substrate cleaned by mechanical means. Apply primers at substrate temperatures of 40°F and rising. Surface must be frost free.

### Application

Shake or stir primer well before using. Apply to dry, clean, oil free surface with a brush, dauber or spray.

Sikaflex Primer	Dry time before installing sealant	
260	>1 hr.	<8 hrs.*
429	>1 hr.	<8 hrs.*
449	>30 min.	<8 hrs.*

\* If sealant cannot be installed within 8 hours of priming, reprime.

### Limitations

- Primer should not be used if it starts to gel in container.
- Protect Sikaflex primers from moisture. Once container has been opened, use contents immediately.
- Do not attempt to use partial containers.
- Do not reseal or reuse. Resealing may cause moisture contamination and gelling.

### Caution

#### Sikaflex Primer 260

**Flammable; Irritant; Poison** - Contains methanol. May cause skin/eye/respiratory irritation. Avoid contact. Methanol is a poison and may cause blindness if ingested. Use only with adequate ventilation. Use of safety goggles and chemical resistant gloves is recommended. In case of exceedance of PELs, use an appropriate, properly fitted NIOSH approved respirator. Remove contaminated clothing. Keep away from heat, sparks, and open flames.

#### Sikaflex Primer 429

**Flammable; Irritant; Sensitizer** - Contains aromatic polyisocyanate, xylene, PGMEA, TDI. May cause skin/eye/respiratory irritation. May cause skin and/or respiratory sensitization after prolonged or repeated contact. Avoid contact. May cause headaches, dizziness or other CNS effects. TDI is a suspect carcinogen (IARC, NTP). Use only with adequate ventilation. Use of safety goggles and chemical resistant gloves is recommended. In case of exceedance of PELs, use an appropriate, properly fitted NIOSH approved respirator. Remove contaminated clothing. Keep away from heat, sparks, and open flames.

#### Sikaflex Primer 449

**Flammable; Irritant; Sensitizer** - Contains xylene, butyl acetate, methylethyl ketone, toluene. May cause skin/eye/respiratory irritation. May cause skin and/or respiratory sensitization after prolonged or repeated contact. Avoid contact. May cause headaches, dizziness or other CNS effects. Use only with adequate ventilation. Use of safety goggles and chemical resistant gloves is recommended. In case of exceedance of PELs, use an appropriate, properly fitted NIOSH approved respirator. Remove contaminated clothing. Keep away from heat, sparks, and open flames.

### First Aid

In case of skin contact, wash immediately and thoroughly with soap and water. If symptoms persist, consult physician. For eye contact, flush immediately with plenty of water for at least 15 minutes; contact a physician. For respiratory problems, remove person to fresh air; if symptoms persist, consult physician. In case of ingestion, consult a physician immediately - methanol is a poison. Remove contaminated clothing.

### Clean Up

In case of spill or leaks, wear suitable protective equipment, contain spill, collect with absorbent material, and transfer to suitable container. Ventilate area. Avoid contact. Dispose of in accordance with current, applicable, local, state and federal regulations.

#### Distributed By:



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Canton 1-877-258-7601  
Toledo 1-800-860-3352  
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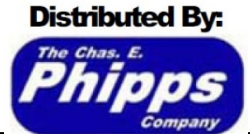


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# PRODUCT DATA SHEET

## Sikaflex®-2c NS EZ Mix



Cleveland 1-800-362-9267  
Canton 1-877-258-7601  
Toledo 1-800-860-3352  
www.chasehipps.com

TWO-COMPONENT, NON-SAG, POLYURETHANE ELASTOMERIC SEALANT

### PRODUCT DESCRIPTION

Sikaflex®-2c NS EZ Mix is a 2-component, premium-grade, polyurethane-based, elastomeric sealant. It is principally a chemical cure in a non-sag consistency. Meets ASTM C 920, Type S, Grade NS, Class 25, use T, NT, M, G, A, O, I and Federal specification TT-S-00230 C Type II, Class A. Meets Canada Standard CAN/CGSB 19.24 - M90.

### USES

- Intended for use in all properly designed working joints with a minimum depth of ¼ inch.
- Ideal for vertical and horizontal applications.
- Placeable at temperatures as low as 40 °F.
- Adheres to most substrates commonly found in construction.
- An effective sealant for use in Exterior Insulation Finish Systems (EIFS).
- Submerged environments, such as canal and reservoir joints.

### CHARACTERISTICS / ADVANTAGES

- Capable of +50 % joint movement.
- Chemical cure allows the sealant to be placed in joints exceeding ½ in. in depth.
- High elasticity with a tough, durable, flexible consistency.
- Exceptional cut and tear resistance.
- Exceptional adhesion to most substrates without priming.
- Available in 35 architectural colors.
- Color uniformity assured via Color-pak system.
- Available in pre-pigmented Limestone (no Color-pak needed).
- Non-sag even in wide joints.
- Certified to the NSF/ANSI Standard 61 for potable water.
- Easy to mix.
- Paintable with water-, oil-, and rubber-base paints.
- Jet fuel resistant.
- Cold weather booster for initial tack (see reverse side for data).
- Shore A hardness can be increased by using "TG" additive. See Sikaflex-2c NS TG data sheet for specific details.

### ENVIRONMENTAL INFORMATION

- LEED® EQc 4.1
- SCAQMD, Rule 1168
- BAAQMD, Reg. 8, Rule 51

### APPROVALS / STANDARDS

- Certified to NSF/ANSI standard 61 for portable water
- 2-hour UL Fire Rated Joint System Nos. FF-S-1034, FW-S-1020, HW-S-1018, WW-S-1037.



## PRODUCT INFORMATION

<b>Packaging</b>	1.5 gal. unit, 3 gal unit.
<b>Color</b>	A wide range of architectural colors are available. Special colors available on request.
<b>Shelf Life</b>	One year in original, unopened containers.
<b>Storage Conditions</b>	Store dry at 40–95 °F (4–35 °C). Condition material to 65–75 °F before using.

## TECHNICAL INFORMATION

<b>Shore A Hardness</b>	25 ± 5	(73 °F (23 °C) and 50 % R.H.) (ASTM D-2240)
<b>Tensile Strength</b>	95 psi	(73 °F (23 °C) and 50 % R.H.) (ASTM D-412)
<b>Tensile Stress at Specified Elongation</b>	70 psi at 100 %	(73 °F (23 °C) and 50 % R.H.) (ASTM D-412)
<b>Elongation at Break</b>	300 %	(73 °F (23 °C) and 50 % R.H.) (ASTM D-412)
<b>Adhesion in Peel</b>	<b>Substrate</b> Concrete	<b>Peel Strength</b> >15 lb. <b>Adhesion loss</b> 0% (73 °F (23 °C) and 50 % R.H.) (Fed Spec.TT-S-00227E)
<b>Tear Strength</b>	45 lbs./in.	(73 °F (23 °C) and 50 % R.H.) (ASTM D-624)
<b>Chemical Resistance</b>	Good resistance to water, diluted acids, diluted alkalines, and residential sewage. Consult Technical Service at 1-800-933-SIKA for specific data.	
<b>Resistance to Weathering</b>	Excellent	
<b>Service Temperature</b>	-40 °F to 170 °F (-40°C to 75 °C).	

## APPLICATION INFORMATION

<b>Coverage</b>	<b>1 gallon: Yield in Linear feet</b>			
	<b>Width/Depth</b>	<b>1/4"</b>	<b>3/8"</b>	<b>1/2"</b>
	1/4"	307.9		
	3/8"	205.3	136.8	
	1/2"	153.9	102.6	77.0
	3/4"	102.6	38.4	51.3
	1"			38.5
	1.25"			30.8
	1.5"			25.7
<b>Ambient Air Temperature</b>	40 °F to 100 °F Sealant should be installed when joint is at mid-range of its anticipated movement.			
<b>Substrate Temperature</b>	40 °F to 100 °F Sealant should be installed when joint is at mid-range of its anticipated movement.			
<b>Pot Life</b>	<b>Sikaflex®-2c NS EZ Mix Working Time (hours)</b>			
		73 °F	100 °F	40 °F
	Sikaflex-2c NS	4–6	3	6
	w/ 1 booster	2	1	2–3
	w/ 2 boosters	1	<1	1.5



## APPLICATION INSTRUCTIONS

### SUBSTRATE PREPARATION

Priming is typically not necessary. Most substrates only require priming if sealant will be subjected to water immersion after cure. Testing should be done, however, on questionable substrates, to determine if priming is needed. Consult Technical Service or Sikaflex Primer Technical Data Sheet for additional information on priming. Note: Most Exterior Insulation Finish Systems (EIFS) manufacturers recommend the use of a primer. When EIFS manufacturer specifies a primer or if on-site bond testing indicates a primer is necessary, Sikaflex 429 primer is recommended. On-site adhesion testing is recommended with final system prior to the start of a job.

### MIXING

Pour entire contents of Component 'B' into pail of Component 'A'. Add entire contents of Color-pak into pail and mix with a low-speed drill (400–600 rpm) and Sikaflex paddle.\* Mix for 3–5 minutes to achieve a uniform color and consistency. Scrape down sides of pail periodically. Avoid entrapment of air during mixing. When mixing in cold weather (<50 °F), do not force the mixing paddle to the bottom of the pail. After adding Component 'B' and Color-pak into Component 'A', mix the top 1/2 to 3/4 of the pail during the first minute of mixing. After scraping down the sides of the pail, mix again for another minute. The paddle should reach the bottom of the pail between the first and second minute of mixing. Scrape down the sides of the pail a second time and then mix for an additional 2–3 minutes until the sealant is well blended. Color-pak must be used with tint base. For pre-pigmented Limestone base, just mix with low speed drill and Sikaflex paddle (no Color-pak needed).

### APPLICATION METHOD / TOOLS

Recommended application temperatures 40–100 °F. Pre-conditioning units to 65–75 °F is necessary when working at extremes. Move pre-conditioned units to work areas just prior to application. Apply sealant only to clean, sound, dry, and frost-free substrates. Sikaflex-2c should be applied into joints when joint slot is at mid-point of its designed expansion and contraction. To place, load directly into bulk gun or use a follower plate loading system. Place nozzle of gun into bottom of joint and fill entire joint. Keeping the nozzle deep in the sealant, continue with a steady flow of sealant preceding nozzle to avoid air entrapment. Also, avoid overlapping of sealant since this also entraps air.

### Tooling and Finishing

Tool sealant to ensure full contact with joint walls and remove air entrapment. Joint dimension should allow for 1/4 inch minimum and 1/2 inch maximum thickness for sealant. Proper design is 2:1 width to depth ratio. To accelerate the cure of Sikaflex®-2c NS EZ Mix in cold weather temperatures, add Sikaflex-2c booster.

### Removal

Uncured material can be removed with xylene. Strictly follow solvent manufacturer's warnings and instructions for use. Cured material can only be removed mechanically. For spillage, collect, absorb, and dispose of in accordance with current, applicable local, state, and federal regulations.

## LIMITATIONS

- The ultimate performance of Sikaflex®-2c NS EZ Mix, depends on good joint design and proper application.
- Minimum depth in working joint is 1/4 in.
- Maximum expansion and contraction should not exceed 50 % of average joint width.
- When used in areas with heavy traffic either recess joint or use Sikaflex 2c NS TG (Traffic Grade) Additive to increase durability.
- Do not cure in the presence of curing silicones.
- Avoid contact with alcohol and other solvent cleaners during cure.
- Allow 3 day cure before subjecting sealant to total water immersion. Primer is required if sealant will be subjected to total water immersion.
- Avoid exposure to high levels of chlorine. (Maximum level is 5 ppm).
- Do not apply when moisture vapor transmission exists since this can cause bubbling within the sealant.
- Avoid over-mixing sealant.
- White color tends to yellow slightly when exposed to ultraviolet rays.
- Light colors can yellow if exposed to direct gas fired heating elements.
- When overcoating, an on-site test is recommended to determine actual compatibility.
- Rigid paints, coatings or primers will crack when placed over elastomeric sealants experiencing expansion or contraction
- Do not use in contact with bituminous/asphaltic materials.

## BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

## LOCAL RESTRICTIONS

See Legal Disclaimer.

## ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

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SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.** Sale of SIKA products are subject to the Terms and Conditions of Sale which are available at <https://usa.sika.com/en/group/SikaCorp/termsandconditions.html> or by calling 201-933-8300.

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Fax: 201-933-6225



Product Data Sheet  
Sikaflex®-2c NS EZ Mix  
October 2018, Version 01.01  
020511050000000002

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Sikaflex-2cNSEZMix-en-US-(10-2018)-1-1.pdf



# SikaFlex®-2c Color Guide

Two-component polyurethane elastomeric sealant



WHITE



ALUMINUM GRAY



GRAY



DESERT TAUPE



BLUSH BEIGE



SIERRA BEIGE



BRITE WHITE



ARMARILLO WHITE



MEDIUM BROWN



BAPTIST RED



SANDALWOOD



BUFF



VAN DYKE



BRICK



DARK BRONZE



LIMESTONE



PARCHMENT



PRECAST



EVERGREEN



SAHARA



COLONIAL WHITE



MINNESOTA GRAY



TAN



ADOBE ACCENT



GREEN GRAY



SANDALWOOD BEIGE



EGGSHELL CREAM



CAPITOL



REDWOOD



GEOGRAPHIC BEIGE



PEARL ASH



DOVER SKY



RUSTIC RED



BRONZE



BLACK

Colors show approximate tone without any texture, and color of actual product may vary slightly. Custom colors available with adequate lead time and minimum batch quantities. Please consult your Sika representative for further information and pricing. Color representation will vary between screens. For more accurate colors, consult a cured sample or physical color card.

## Sika Corporation

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**BUILDING TRUST**



# WATERSTOP-RX®

## EXPANDING CONCRETE JOINT WATERSTOP

### DESCRIPTION

WATERSTOP-RX is a hydrophilic strip waterstop designed to stop water infiltration through cast-in-place concrete construction joints by expanding upon contact with water to form a positive seal against the concrete. The key to WATERSTOP-RX's effectiveness is its superior expansion to seal and fill voids and cracks in the concrete. WATERSTOP-RX is an active bentonite/butyl-rubber based waterstop that is designed to replace passive PVC/Rubber dumbbell waterstops, thereby eliminating the requirement of special pieces, split-forming and seam welding. WATERSTOP-RX has been successfully tested by independent testing firms to over 60 meters (200 feet) of hydrostatic water pressure, under both continuous immersion and wet/dry cycling.

WATERSTOP-RX is available in three sizes and shapes (see Product Table). WATERSTOP-RX 101 is produced in a rectangular shape measuring 25 x 19 mm (1" x 3/4"). WATERSTOP-RX 101T is produced in a trapezoidal shape measuring 31 x 12 mm (1-1/4" x 1/2") with a reinforcing plastic scrim embedded in the top surface for high tensile strength. The patented trapezoidal shape distributes the expansive force over a greater area and allows the concrete to flow more readily over the product during placement. WATERSTOP-RX 102 is produced in a half-circle (Crescent) shape measuring 19 x 9 mm (3/4" x 3/8").

Though WATERSTOP-RX possesses good resistance to many chemicals, the waterstop is not intended to be used as the primary joint sealant for chemical containment vessels. Consult manufacturer for guidance regarding chemical compatibility for secondary chemical containment applications. Additionally, WATERSTOP-RX is not an expansion joint sealant; contact CETCO for expansion joint applications.

### APPLICATIONS

Applications include both vertical and horizontal non-moving concrete construction joints, new to existing concrete construction, irregular surfaces, and around through-wall

penetrations, such as plumbing and utility pipes. Additionally WATERSTOP-RX can seal around concrete pilings and steel H-piles passing through the slab. WATERSTOP-RX works in both continuous hydrostatic and intermittent hydrostatic conditions.

WATERSTOP-RX products are designed for reinforced structural concrete with a minimum of 20N/mm<sup>2</sup> (3,000 psi) compressive strength. RX-101 and RX-101T are designed for concrete 200 mm (8") thick or greater with two rows of reinforcing steel. RX-102 is designed for vertical concrete 150 mm (6") thick or greater; and horizontal concrete no less than 100 mm (4") thick. RX-102 should be used in concrete with one row of steel reinforcement, concrete curbs, planter walls, fountains, and lightweight structural concrete.

***WATERSTOP-RX is a reliable, cost-effective means to stop water infiltration through concrete cold joints. It can also be used around pipe and structural penetrations***

### INSTALLATION

**Surface preparation:** Surfaces should be clean and dry. Remove all dirt, rocks, rust or other construction debris. Do not install WATERSTOP-RX in standing water or on an iced substrate.

**Adhesive:** Apply a continuous bead of CETSEAL along the substrate where WATERSTOP-RX will be installed. Assure proper 75 mm (3") concrete coverage will be maintained. Keep the nozzle tip pressed against the concrete at a 45° angle during application.

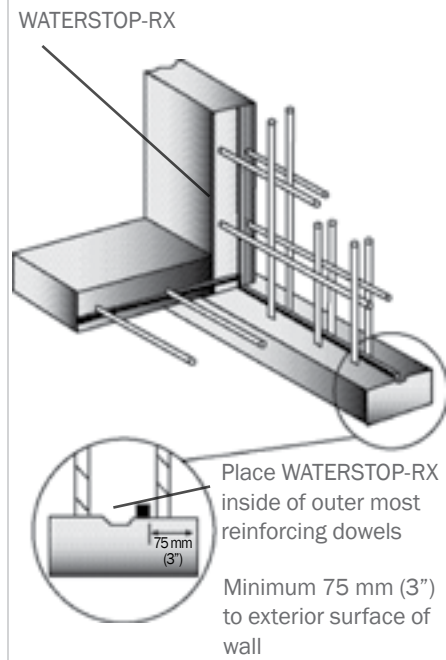
**Installation:** After applying a continuous bead of CETSEAL, remove release paper, then firmly press the entire length of WATERSTOP-RX onto the adhesive. For vertical and overhead applications, firmly press a minimum of 15 seconds to assure adhesion. For best results apply WATERSTOP-RX within 15 minutes of adhesive installation. WATERSTOP-RX must be placed into adhesive prior to CETSEAL skinning over and curing. CETSEAL may be applied to damp surfaces, but not in standing water.

Tightly butt coil ends together to form a continuous waterstop - do not overlap coil ends. Place in maximum practical lengths to minimize coil end joints. Where required, cut coils with a sharp knife or utility blade to fit coil ends together. Make horizontal to vertical transitions by abutting product coil sections together, no special accessory pieces are required.

At structural and pipe penetrations, cut into strips to fit around the penetration. Apply to adhesive and abut coil ends together.

On irregular surfaces such as stone or rough concrete, make sure WATERSTOP-RX remains in direct contact with the substrate along the entire installation. There should not be any air gap between the WATERSTOP-RX and the substrate.

#### Footing/Wall Joint



General Application Detail

Distributed By:



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## WATERSTOP-RX®

### EXPANDING CONCRETE JOINT WATERSTOP

**Installation with REVO-FIX:** REVO-FIX is a steel mesh used to mechanically secure WATERSTOP-RX 101 into position using the accompanying supplied fasteners. Remove release paper and place the WATERSTOP-RX on the concrete substrate. Then place REVO-FIX strips over the WATERSTOP-RX, lapping the strip ends by 25 mm (1") maximum. Nail through LAP with fastener supplied, and install one fastener 300 mm (12") on center along the REVO-FIX.

End-to-end or end-to-side REVO-FIX junctions are created by simple butt joints pressed firmly together. Start at junctions; do not stretch WATERSTOP-RX to fit. Do not overlap waterstop.

#### LIMITATIONS

WATERSTOP-RX is not a self-adhering product. CETSEAL or REVO-FIX is required to secure WATERSTOP-RX to concrete, metal, or PVC (Pipe) surfaces. Mechanical fasteners should be used with REVO-FIX to secure WATERSTOP-RX 101; and fasteners can be used in conjunction with CETSEAL. Mechanical fasteners should not be used to

secure WATERSTOP-RX alone. Do not use any other adhesive or construction sealant, except CETSEAL, to secure WATERSTOP-RX.

WATERSTOP-RX is not designed, nor intended to function as an expansion joint sealant. For precast concrete applications, contact manufacturer for product suitability and for any special installation requirements.

WATERSTOP-RX products are designed for structural concrete with a minimum of 20N/mm<sup>2</sup> 3,000 psi compressive strength. WATERSTOP-RX 101 and RX-101T require a minimum of 3" (75 mm) of concrete coverage. WATERSTOP-RX 102 requires a minimum concrete coverage of 2" (50 mm). WATERSTOP-RX should only be used in applications where the product is completely encapsulated within the concrete.

WATERSTOP-RX should not be prehydrated by being subjected to submersion or remain in extended contact with water prior to encapsulation in concrete. If the product exhibits considerable swell prior to encapsulation in the concrete, it must be replaced with new material.

In conditions where severe ground water chemical contamination exists, or is expected, consult manufacturer for product chemical compatibility information.

#### PACKAGING

RX-101: 30 m (100 ft./box)

RX-101T: 36 m (120 ft./box)

RX-102: 60 m (200 ft./box)

CETSEAL and REVO-FIX are packaged separately.

#### ACCESSORY PRODUCTS

CETSEAL is a multi-purpose, single component polyether moisture cure adhesive used to secure WATERSTOP-RX into position. Apply a continuous bead of CETSEAL to substrate then install WATERSTOP-RX before CETSEAL skins over and cures. Adhesive yield will vary with use, substrate and application.

#### WATERSTOP-RX PRODUCT TABLE

PRODUCT	SIZE	ROLL LENGTH	CROSS-SECTION SHAPE	UNIT QTY/CARTON	MIN CONCRETE COVERAGE
RX-101	25 x 19 mm (1" X 3/4")	5 m (16' 8")	Rectangle	30 m (100 LF)	75 mm (3")
RX-101T	31 x 12 mm (1-1/4" X 1/2")	6 m (20')	Trapezoid with Poly Scrim Reinforcement	36 m (120 LF)	75 mm (3")
RX-102	19 x 9 mm (3/4" x 3/8")	10 m (33' 4")	Half-Circle	60 m (200 LF)	50 mm (2")



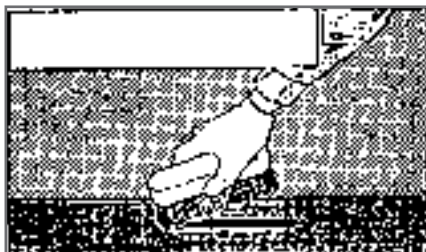
## WATERSTOP-RX®

### EXPANDING CONCRETE JOINT WATERSTOP

#### 5 FAST & EASY INSTALLATION STEPS

##### STEP 1

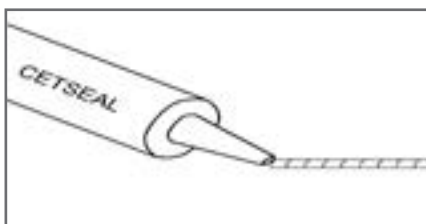
##### CLEAN SURFACE



REMOVE ALL DIRT AND DEBRIS

##### STEP 2

##### APPLY ADHESIVE



APPLY CETSEAL

##### STEP 3

##### PLACE WATERSTOP



REMOVE RELEASE PAPER THEN PRESS FIRMLY AGAINST CETSEAL. MAINTAIN MIN. CONCRETE COVERAGE DEPTH

##### STEP 4

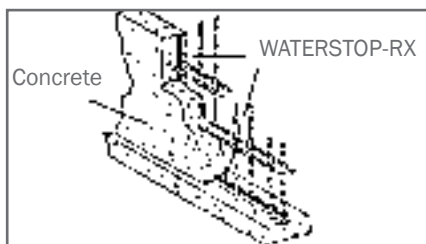
##### BUTT COIL ENDS



TIGHTLY BUTT COIL ENDS TO FORM A CONTINUOUS WATERSTOP. DO NOT OVERLAP COIL ENDS

##### STEP 5

##### POUR CONCRETE



#### LIMITED WARRANTY

Specifications and other information contained herein supersedes all previously printed matter and are subject to change without notice.

All goods sold by seller are warranted to be free from defects in material and workmanship. The foregoing warranty is in lieu of and excludes all other warranties not expressly set forth herein, whether expressed or implied by operation of law or otherwise, including but not limited to any implied warranties of merchantability or fitness.

Seller shall not be liable for incidental or consequential losses, damages or expenses, directly or indirectly arising for the sale, handling or use of goods, or from any other case relating thereto, and seller's liability hereunder in any case is expressly limited to the replacement (in the form originally shipped) of goods not complying with the agreement or at seller's election, to the repayment of, or crediting buyer with, an amount equal to the purchase price of such goods, whether such claims are for breach of warranty or negligence.

Any claim by buyer with reference to the goods sold hereunder for any cause shall be deemed waived by buyer unless submitted to seller in writing within thirty (30) days from the date buyer discovered or should of discovered, any claimed breach.

Materials should be inspected and tested by purchaser prior to their use if product quality is subject to verification after shipment. Performance guarantees are normally supplied by the applicator.

#### TYPICAL PROPERTIES

PROPERTY	TEST METHOD	VALUE
Hydrostatic Head Resistance	Independent Test	70 m (231 Ft.)
Wet / Dry Cycling (25 Cycles @ 231 ft)	Independent Test	No Effect
Adhesion to Concrete Using CETSEAL	Independent Test	Excellent



## WATERSTOP-RX® EXPANDING CONCRETE JOINT WATERSTOP

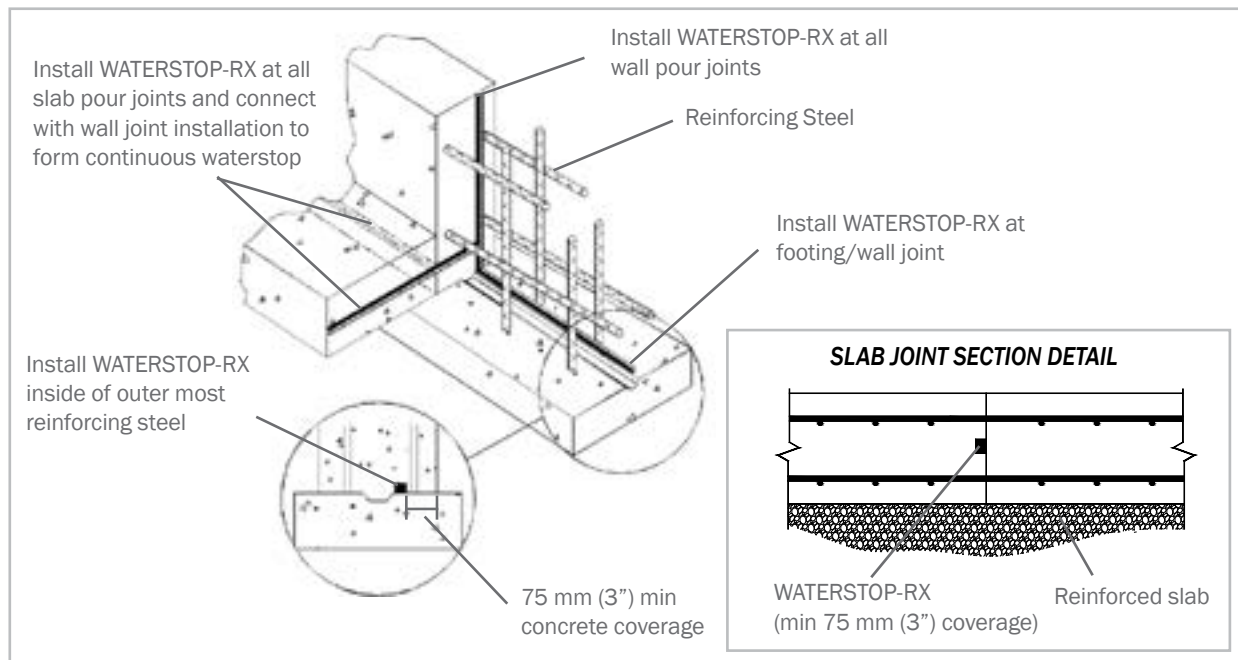
### TYPICAL PRODUCT APPLICATIONS

#### WATERSTOP-RX 101 and RX 101T

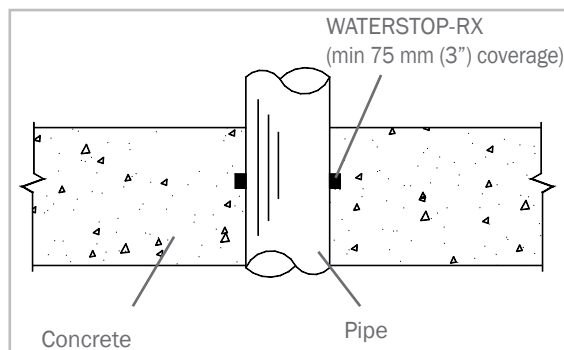
- Vertical and horizontal concrete 200 mm (8") thick or greater
- Concrete with two rows of steel reinforcement
- Shotcrete Foundation Walls
- High hydrostatic pressures
- Tie-back plates and penetrations

#### WATERSTOP-RX 102

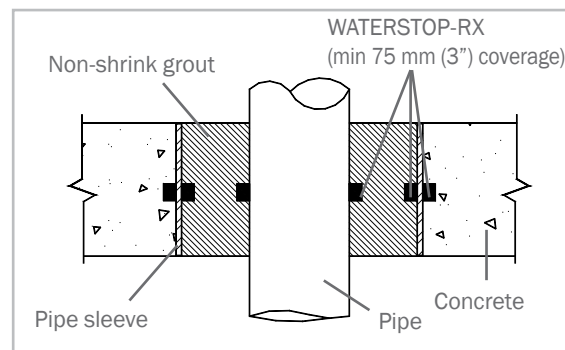
- Vertical concrete 150 mm (6") thick or greater.
- Horizontal concrete 100 mm (4") thick or greater
- Concrete with one row of steel reinforcement
- Slabs containing only wire mesh
- Fountains / Planter Boxes / Curbs
- Penetrations



Typical WATERSTOP-RX Foundation Detailing



Cast-in-Place Penetration



Sleeved Penetration Detail

Distributed By:



Cleveland 1-800-362-9267  
Canton 1-877-258-7601  
Toledo 1-800-860-3352  
www.chasephipps.com

North America: 847.851.1800 | 800.527.9948

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APRIL 2014

TDS\_WATERSTOP-RX\_AM\_EN\_201404\_v1



[www.CETCO.com](http://www.CETCO.com)

# CETSEAL

## SEALANT / ADHESIVE

### DESCRIPTION

CETSEAL is a multi-purpose, single component polyether moisture cure sealant/adhesive. CETSEAL is a low VOC, 100% solids, non-shrinking product with excellent UV resistance.

### APPLICATIONS

The primary applications are:

- Grade termination sealant
- Membrane lap sealant
- Waterstop adhesive

### INSTALLATION

**Grade Termination Sealant:** At grade termination of waterproofing membrane, apply continuous tooled bead of CETSEAL along the

top edge of the termination bar that covers and seals the top edge of the waterproofing membrane to the substrate.

**Membrane Lap Sealant:** Apply a bead of CETSEAL in accordance with waterproofing membrane installation guidelines.

**Waterstop Adhesive:** Apply a continuous bead of CETSEAL to substrate and/or waterstop then install waterstop before CETSEAL skins over. Yield will vary with use, substrate and application. Typical yield at 6 mm (1/4") diameter bead:

300 ml (10 oz) cartridge - 6 m (20 linear feet)

600 ml (20 oz) foil pack - 12 m (40 linear feet)

### PRECAUTIONS

Remove all dirt and debris, surface coatings and sealers before application. Prepare metal by removing rust, scale and oil residue. Allow treated lumber to cure for six months prior to application. Do not apply in standing water conditions or at temperature below -4°C (25°F).

### PACKAGING

300 ml (10 oz) cartridges - 12 cartridges per case. Typical weight per case: 5.4 kg (12 lbs)

600 ml (20 oz) foil packs - 12 foil packs per case. Typical weight per case: 9 kg (20 lbs)

### TYPICAL UNCURED PROPERTIES

PROPERTY	TYPICAL VALUE
Gun Grade	Zero Slump ASTM C 697
Viscosity	750,000+ cps Brookfield RVF, TF spindle, 4 RPM, 23°C (73°F)
Initial Skin Formation	10-15 minutes
Odor	Almost odorless

### TYPICAL CURED PROPERTIES

PROPERTY	TEST METHOD	TYPICAL VALUE
Elongation at Break	ASTM D412	600%
Hardness Shore A	ASTM C661	20 +/- 3
Low Temperature Flex	ASTM D816	-10°C (-23°F)
Shrinkage		No measurable shrinkage after 14 days
Service Temperature		-40°C to 90°C (-40°F to 194°F)
Shelf Life		1 year

North America: 847.851.1800 | 800.527.9948 | [www.CETCO.com](http://www.CETCO.com)

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UPDATED: JANUARY 2014

TDS\_CETSEAL\_AM\_EN\_201401\_v1

# Submittal: 28

## Revision:

Date Submitted: 7/26/2019

Response Due: 8/2/2019



**Project:** ODOT 3000(17) – Opportunity Corridor 3

**Subject:** S10A NEORSD Special Provisions

**To:** Kevin Kuntz, P.E.  
Ohio Department of Transportation – District 12

**Email:** Kevin.Kuntz@dot.ohio.gov

**From:** Marty Fritz  
Kokosing Construction Company, Inc.

**Email:** mwf@kokosing.biz

We Are Sending:	Submitted For:
<input type="checkbox"/> As-Built Construction Drawings	<input checked="" type="checkbox"/> Approval
<input type="checkbox"/> Certifications / Test Results	<input type="checkbox"/> Acceptance
<input type="checkbox"/> Engineered / Working Drawings	<input type="checkbox"/> Record
<input type="checkbox"/> Product Data / Samples	
<input type="checkbox"/> Quality Control Procedures	<b>Sent Via:</b>
<input type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Attached (Electronic)
<input checked="" type="checkbox"/> Other: NEORSD Material Submittal	<input type="checkbox"/> Attached (Hard Copy)

Submittal #	Spec	Revision	Description	Status
28	Special Provision 05 50 00		Material Submittal for S10A	For Approval

### Comments:

In accordance with Appendix DR-08 'NEORSD Material Specifications for Regulator S-10', attached are material submittals for manhole rungs/steps, precast risers (for record) and bolted castings. Please note that this submittal was provided by Independence Excavating, and they will be responsible for the proper installation of this material.

Please feel free to contact me for any questions/concerns regarding this submittal.

Signed: 

# SUBMITTAL



Submittal number	14.0	Date	07/25/2019
Project	ODOT OC3 IR490-SR010	E 55th St Cleveland, OH 44104	
Project number	181135		
Spec section			
Subsection	S10A: Sup2	Status	Open
Current action	Submitted	Ball in court	Matthew L Gillilan
Topic	BU-05: S-10A Supplemental 2: 05 50 00		

Submitter	Matthew L Gillilan
Reviewer	Michael Luyster
Cc	

Date submitted	07/25/2019	Submission due date	08/08/2019
Released for review		Review due date	
Date returned		Required on site date	08/15/2019
Date closed			

## Notes

From BU-05 Special Provisions: 05 50 00 Misc. Metal:  
Section 2.8: Manhole Rungs/Steps for Cast-in-place work  
Section 2.7: Manhole Covers and Frames

### Notes:

1. Also included, precast manhole riser sections. Structures have flat tops instead of cones to account for NEORS D manhole rung/step requirements.
2. Assemblies are submitted as bolted, per the special provision specs. Manholes will state "Sewer" per Cleveland requirements. Please confirm.



## **Submittal Package #173408**

**Independence Excavating**

**ODOT 173000  
Opportunity Corridor, Ph 3**

**Cleveland, Ohio**

**July 2019**

**SUBMITTAL FOR:  
BU-05  
S-10A Riser 1 and S-10A Riser 2**

**RALPH HASTINGS  
LINDSAY PRECAST  
PO BOX 578  
6845 ERIE AVE. N.W.  
CANAL FULTON, OHIO 44614  
1-800-837-7788**

Ph: 440 543-5468  
Fax: 440 543-1152  
Mobile: 440 336-4162  
Email: [rhastings@lindsayprecast.com](mailto:rhastings@lindsayprecast.com)  
Web : [www.lindsayconcrete.com](http://www.lindsayconcrete.com)

This is to certify that the quality control procedures of

**Lindsay Precast Inc.**

6845 Erie Ave. N.W.  
Canal Fulton, OH 44614-8509

were audited during an on-site plant inspection on April 29, 2019 and have met the

**Precast Concrete Requirements**

stated in the (14th Edition 2-7-19 of the NPCA Quality Control Manual for Precast Concrete Plants

Participation in the NPCA Plant Certification program affirms an ongoing commitment to producing quality precast concrete products to recognized standards of the *American Association of State Highway and Transportation Officials (AASHTO)*, the American Concrete Institute (ACI), the ASTM International (ASTM), the American Welding Society (AWS), the Precast Prestressed Concrete Institute (PCI), and the Concrete Reinforcing Steel Institute (CRSI).

This certificate is valid through December 31, 2019.



A handwritten signature in black ink, appearing to read "Michael J. Hoffman".

Michael J. Hoffman, Chairman of the Board

A handwritten signature in black ink, appearing to read "Ty E. Gable".

Ty E. Gable, NPCA President

A handwritten signature in black ink, appearing to read "Phillip B. Cutler".

Phillip B. Cutler, P.E., Director of Quality Assurance Programs

NPCA | 1320 City Center Drive, Suite 200 | Carmel, IN 46032  
This document shall be reproduced in its entirety



6845 ERIE AVE. N.W. BOX 578 • CANAL FULTON, OHIO 44614 • (330) 854-4511  
WWW.LINDSAYPRECAST.COM

## MIX DESIGN 1 CUBIC YARD

Type I/II cement	600 lbs
#8 Gravel	650 lbs
#57 Gravel	850 lbs
Sand	1350 lbs
Air	7 oz
Viscocrete	54 oz

Compressive strength at 28 days: 5,000 psi

+Sand amounts added to mix vary to compensate for water in aggregate.


\*Water based on aggregate moisture. Water to cement ratio not to exceed .45

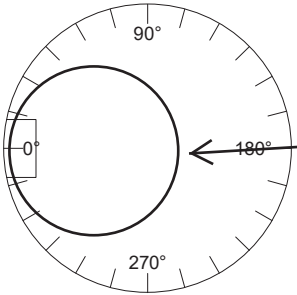
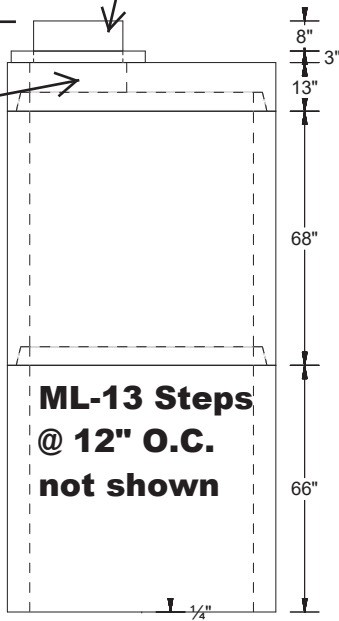
\*Up to 20% flyash may be substituted providing all physical characteristics remain unchanged


\*Actual sand amounts added to mix will vary to compensate for water in aggregate





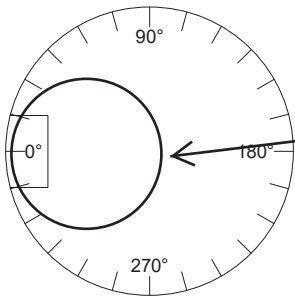
Customer:	INDEPENDENCE EXCAVATING, INC.	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
Job Name:	ODOT 173000 - Opp Corridor Ph 3	60"Ø x 13" Flat Top w/ 42"Ø Offset Opening	EA	1	2575	
Job #:	173408	60"Ø Manhole Riser X 68" Tall	EA	1	7343	
Structure ID:	S-10A R1	60"Ø Manhole Riser X 66" Tall	EA	1	7127	
Station:			EA	1	0	
Type:	60"Ø Doghouse Mh w no bottom pallet					
SalesPerson:	Ralph Hastings					
Rim:	667.17'					
Invert:	654.00'					
Rim to Invert:	13.17'					
Sump:						

Step Degree: 0		<b>ML-13 Steps @ 12" O.C.</b>		<b>EJ 1120A/1986Z Assembly by Ind Exc</b>	
		<b>667.17</b>			
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	654	0	0	no hole	No Hole
		<b>654.00</b>		<b>Plus 16 each ML-13 steps for cast-in-place below</b>	
> With ML-13 steps at 12" on center <				07/25/2019	

Customer:	INDEPENDENCE EXCAVATING, INC.	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
Job Name:	ODOT 173000 - Opp Corridor Ph 3	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185	
Job #:	173408	48"Ø Manhole Riser X 56" Tall	EA	1	4047	
Structure ID:	S-10A R2	48"Ø Manhole Riser X 74" Tall	EA	1	5348	
Station:			EA	1	0	
Type:	48"Ø doghouse Mh w no bottom pallet					
SalesPerson:	Ralph Hastings					
Rim:	667.17'					
Invert:	654.00'					
Rim to Invert:	13.17'					
Sump:						

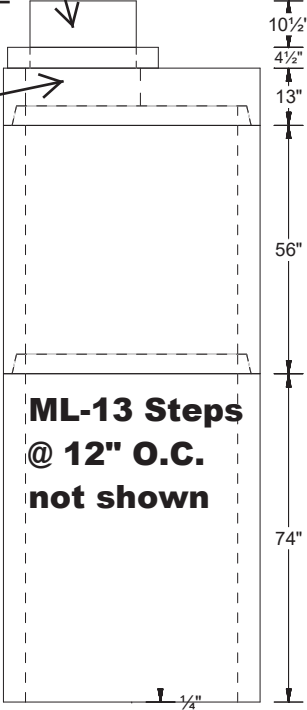
Step Degree: 0 **ML-13 Steps @ 12" O.C.**

**EJ 1700 by Ind Exc**



**667.17**

**26"Ø offset access opening**



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	654	0	0	no hole	No Hole

**654.00**

**Plus 30 each ML-13 steps  
for cast-in-place below**

# LINDSAY PRECAST, INC.

## TECHNICAL DATA FOR MANHOLE CONSTRUCTION

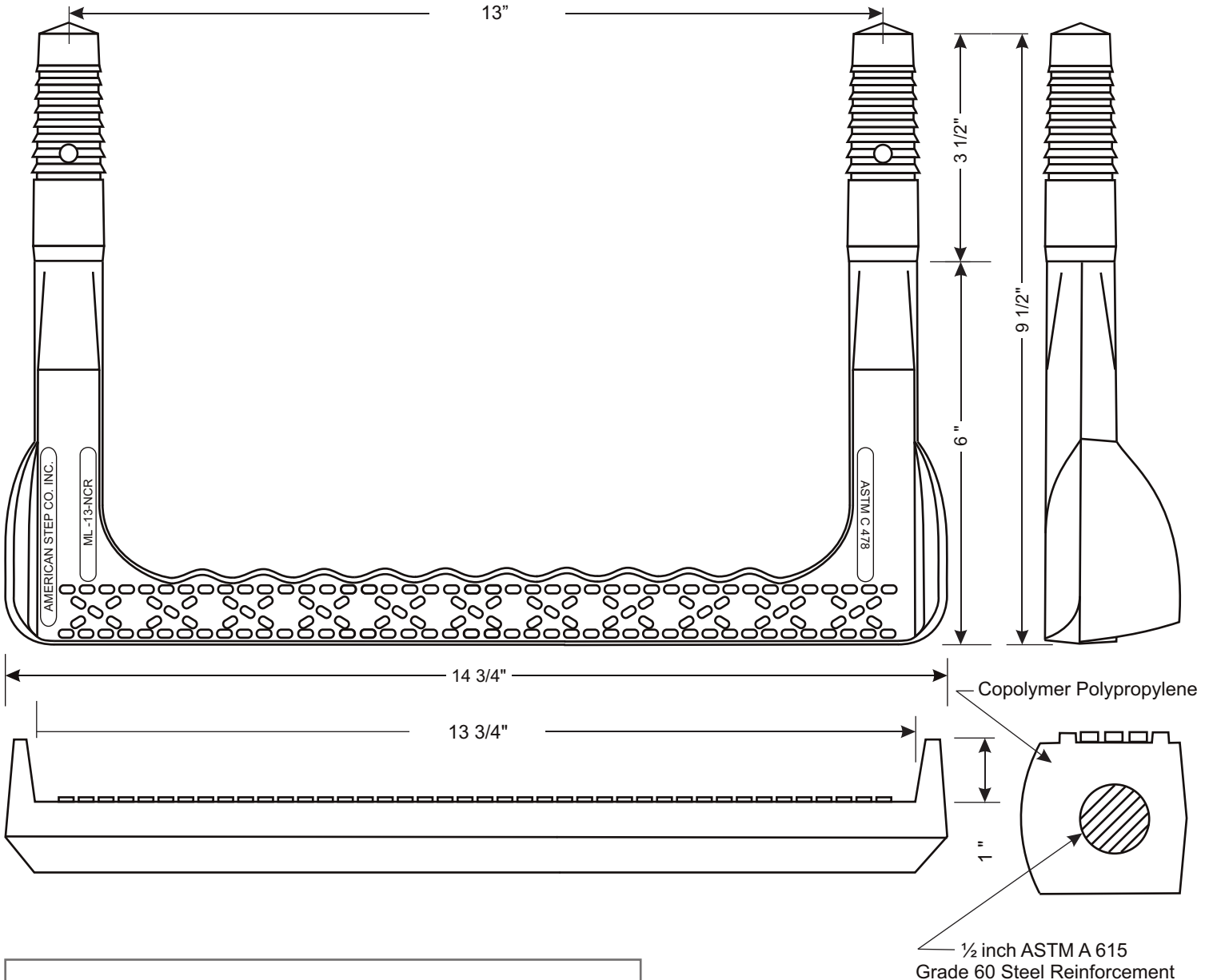
MANHOLE DIAMETER (Ft.)	28 DAY COMPRESSIVE STRENGTH (PSI)	CONCRETE WEIGHT PER CUBIC FOOT (LBS.)	WALL THICKNESS (INCHES)	REINFORCING STEEL YIELD STRENGTH (PSI) (A182)	CIRCUMFERENTIAL REINFORCING MESH	TOTAL AREA OF STEEL PER VERTICAL FOOT in <sup>2</sup> /Ft.	WEIGHT PER VERTICAL FOOT (LBS.)
4	5,000	150	5	65,000	3 x 8; W3 x W3	.12	900
5	5,000	150	6	65,000	2 x 8; W3 x W2.9	.18	1279
6	5,000	150	7	65,000	2 x 8; W3 x W2.9	.18	1786
7	5,000	150	8	65,000	2 x 8; W5 x W3	.30	2300
8	5,000	150	8	65,000	2 x 8; W5 x W3	.30	2710
10	5,000	150	11	65,000	2 x 8; W5 x W3	.30	4710
12	5,000	150	12	65,000	2 x 8; W5 x W3 6 x 6 10 Gauge	.36	6126

★ All manhole sections shall conform to the provisions of ASTM C-478.

★ Rubber gasketed joints shall conform to the provisions of ASTM C-443.

★ It is **REQUIRED** that all joints are sealed with a flexible butyl resin sealant manufactured by Concrete Sealents. The CS-102 - 7/8" diameter preformed gasket material shall conform to the provisions of Federal Specification SS-S-210A. This material can be supplied by Lindsay Concrete Products for an additional charge.

# ML-13-NCR



## ML-13-NCR

Mechanical Lock Installation Methods  
Minimum Concrete Strength Must Be 3000 psi.

### Preformed Holes

Two preformed holes on 13" centers  
Holes must be parallel  
Diameter of holes are 1.1" tapering to 7/8" in 3 1/2" of depth

### Drilled Holes

Drill two 1" holes on 13" centers with a minimum depth of 3 3/4"  
Use 1" masonry bit for drilling.  
Holes must be parallel.

Drive step with sledge hammer until both legs are completely seated

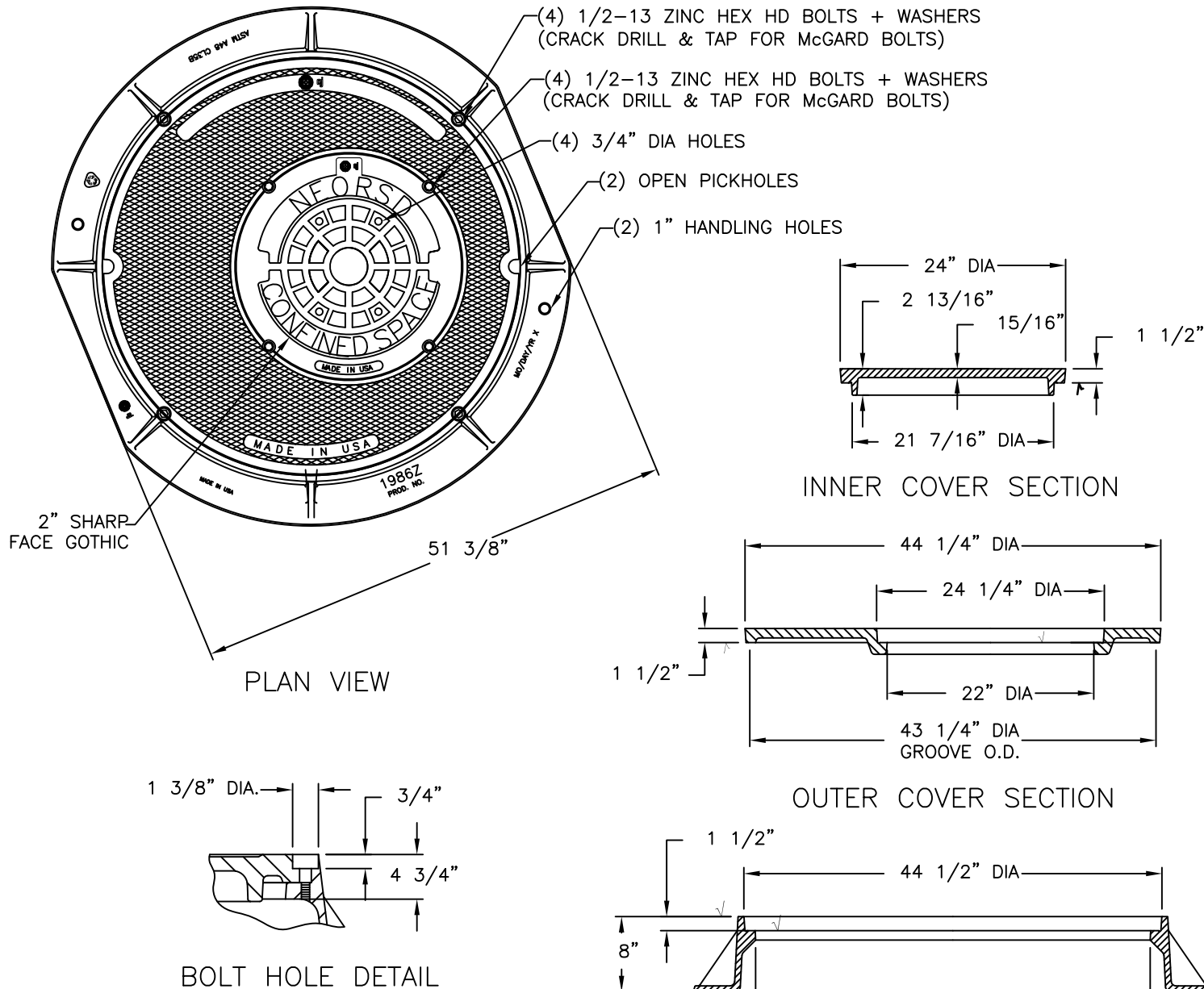
*This step meets or exceeds ASTM C 478 and OSHA Standards when properly installed.*



American Step Company, Inc.  
P.O. Box 137  
830 East Broadway  
Griffin, GA 30224-0137

800-988-STEP  
770-467-9844 (OFFICE)  
770-467-8011 (FAX)

# 1120C 1986E 1986Z Assembly



## Product Number

00112205B01

## Design Features

### -Materials

Cover  
Gray Iron (CL35B)

Cover  
Gray Iron (CL35B)

Frame  
Gray Iron (CL35B)

### -Design Load

Heavy Duty

### -Open Area

n/a

### -Coating

Dipped

-√ Designates Machined Surface

## Certification

- ASTM A48

-

-

-Country of Origin: USA

## Major Components

00112205

00198660

00198610

## Drawing Revision

05/29/2012 Designer: KK

07/11/2016 Revised By: DVD

## Disclaimer

Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

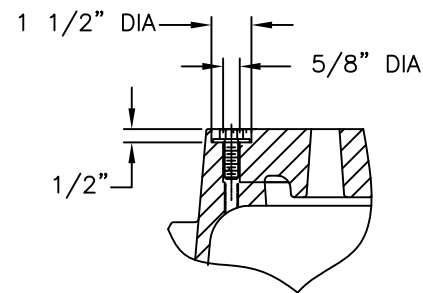
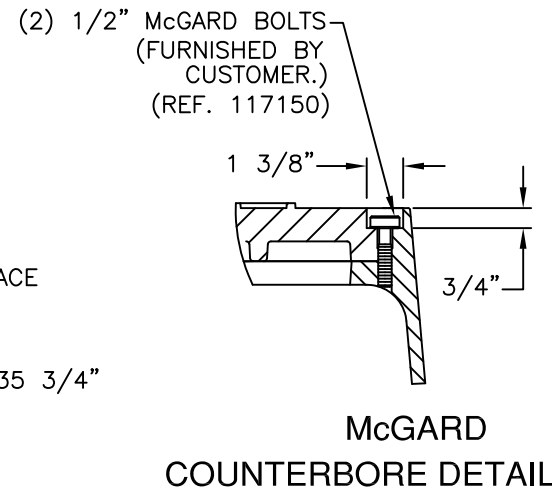
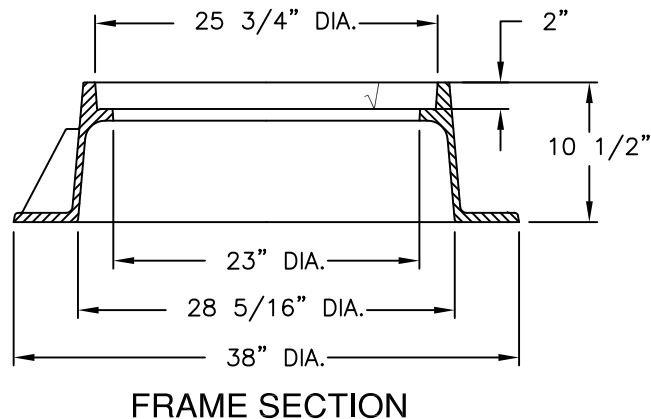
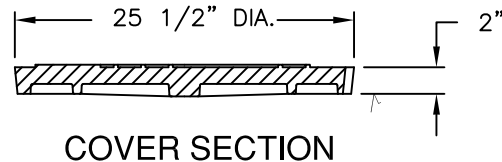
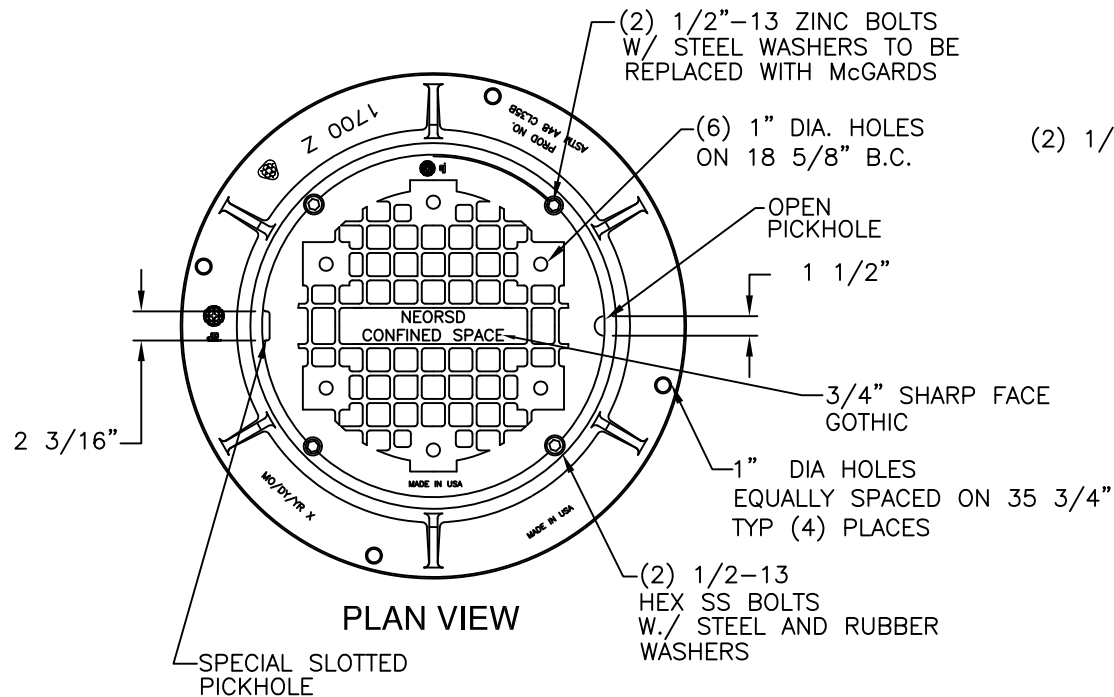
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## Contact

800 626 4653

ejco.com

# 1700Z 1700B Assembly



## Product Number

00170054B01

## Design Features

- Materials
  - Frame
    - Gray Iron (CL35B)
  - Cover
    - Gray Iron (CL35B)

- Design Load
  - Heavy Duty
- Open Area
  - n/a
- Coating
  - Dipped
- √ Designates Machined Surface

## Certification

- ASTM A48
- 
- 
- Country of Origin: USA

## Major Components

00170010  
00170054

## Drawing Revision

12/02/2013 Designer: MAH  
08/25/2016 Revised By: DVD

## Disclaimer

Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

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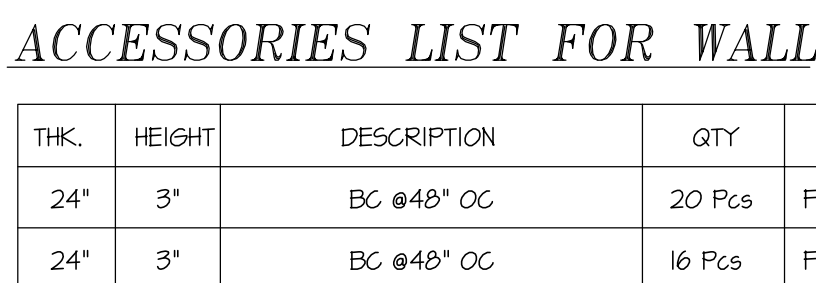
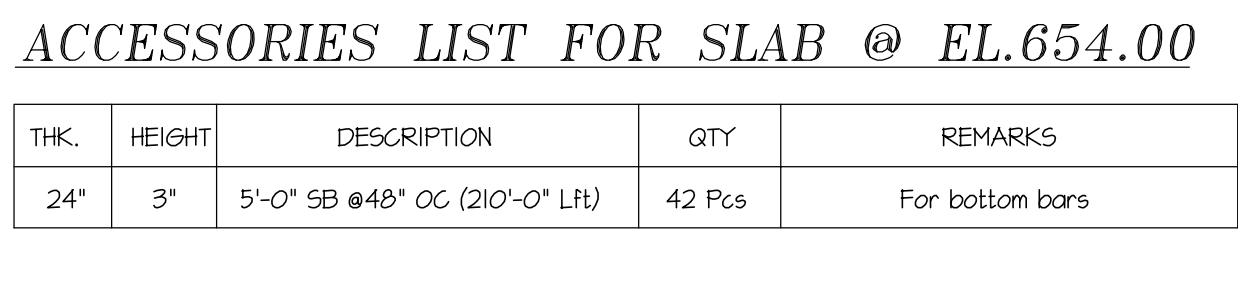
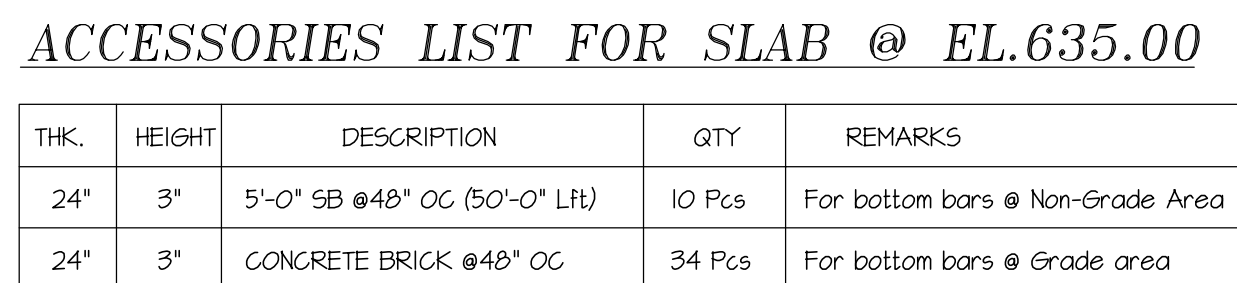
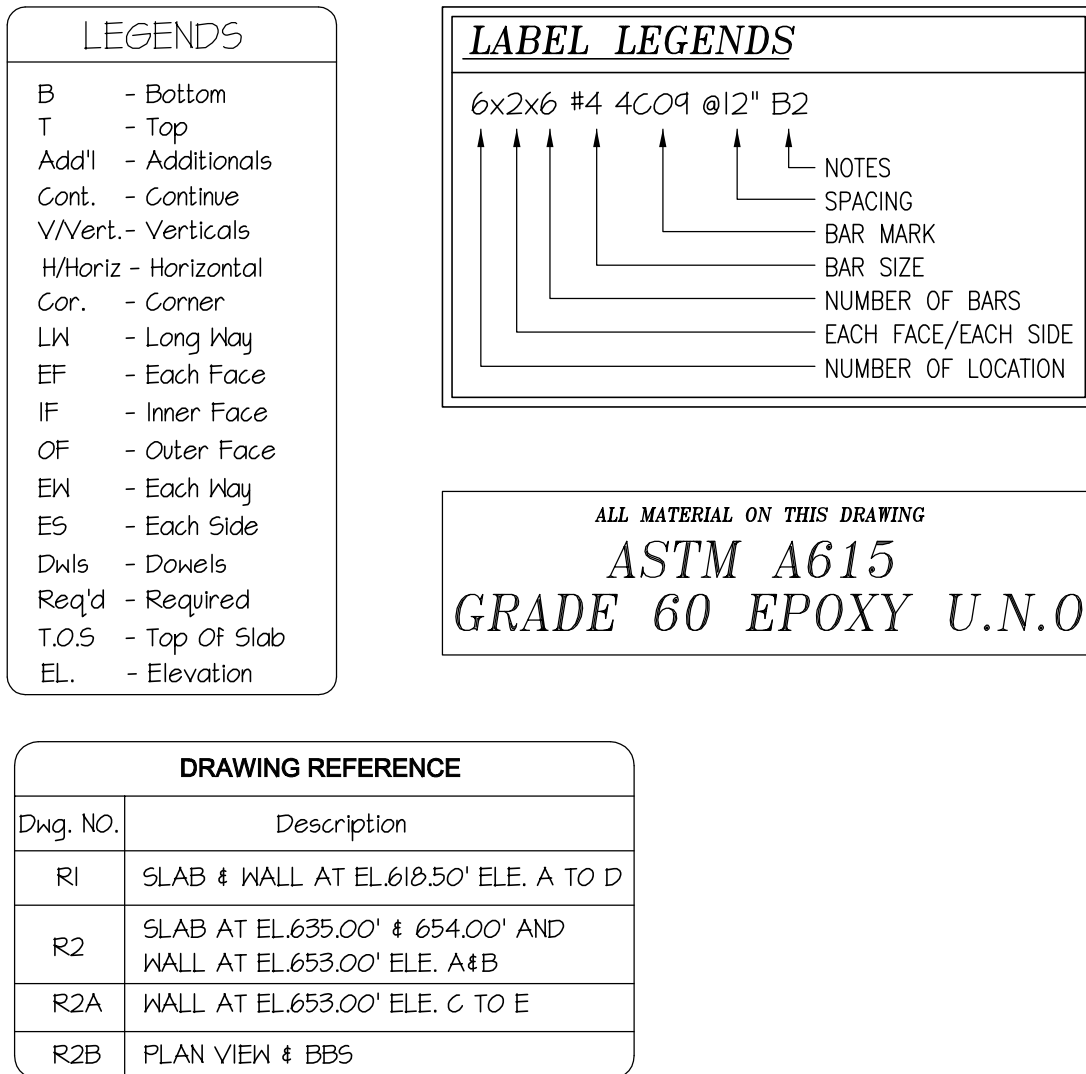
## Contact

800 626 4653  
ejco.com

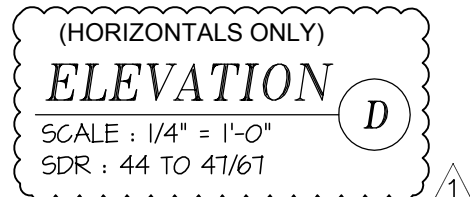
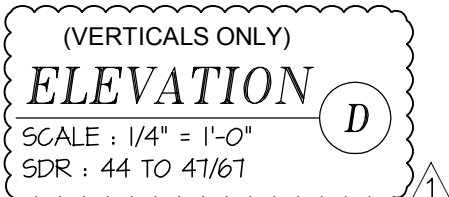
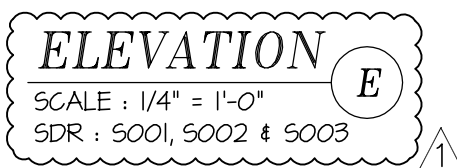
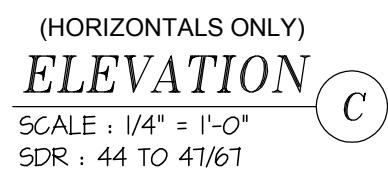
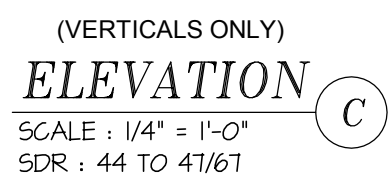








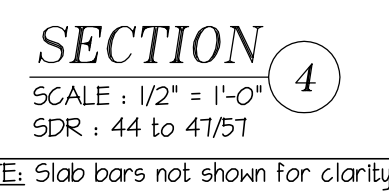
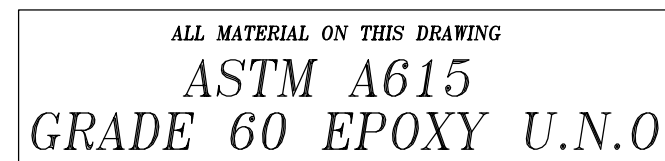
GRADE 60 EPOXY					JOB	LOCATION	CONTRACTOR	DWG. TITLE	DRAWN BY:
ACI 318 CLASS-B									
28 DAYS COMP.STRENGTH									
4000 PSI CONCRETE									
SIZE TOP BAR OTHER EMBED.									
#3	-	-	-	-	JOB NUMBER FE13637				
#4	-	-	-	-					
#6	-	-	56"	-					
#7	96"	-	74"	-					
#8	-	-	-	-					
#9	-	-	-	-	DWG.NO. R2				
#10	-	-	-	-					
#11	-	-	-	-					



LIST-D (INNER FACE)	LIST-D (OUTER FACE)
I #B 8B42 0B* H IF (a)	I #B 8B41 0B* H OF (a)
I #B 8B40 0B* H IF	I #B 8B41 0B* H OF
I #B 8B38 0B* H IF	I #B 8B41 0B* H OF
I #B 8B06 0B* H IF	I #B 8B87 0B* H OF
I #B 8B38 0B* H IF	I #B 8B41 0B* H OF
I #B 8B40 0B* H IF	I #B 8B41 0B* H OF
I #B 8B42 0B* H IF (b)	I #B 8B41 0B* H OF (b)

THK.	HEIGHT	DESCRIPTION	QTY	REMARKS
24"	3"	BC @48" OC	20 Pcs	For Outer face bars @ Elevation C
24"	3"	BC @48" OC	18 Pcs	For Outer face bars @ Elevation D
18"	3"	BC @48" OC	4 Pcs	For Outer face bars @ Elevation E

LEGENDS	
B	- Bottom
T	- Top
Add'l	- Additional
Cont.	- Continue
V/Vert.	- Verticals
H/Horiz	- Horizontal
Cor.	- Corner
LW	- Long Way
EF	- Each Face
IF	- Inner Face
OF	- Outer Face
EW	- Each Way
ES	- Each Side
Dwls	- Dowels
Req'd	- Required
T.O.S	- Top Of Slab
EL.	- Elevation



LIST-A (INNER FACE)	LIST-A (OUTER FACE)
1 #2 B8B4 00° H IF (a)	1 #2 B8A1 00° H OF (a)
1 #2 B8C4 00° H IF	1 #2 B8D5 00° H OF
1 #2 B8B4 04° H IF	1 #2 B8C1 04° H OF
1 #2 B8C4 04° H IF	1 #2 B8D5 04° H OF
1 #2 B8B4 08° H IF (b)	1 #2 B8A4 08° H OF (b)

LIST-B (INNER FACE)	LIST-B (OUTER FACE)
1 #2 B8I61 00° H IF (a)	1 #2 B8I60 00° H OF (a)
1 #2 B8I65 00° H IF	1 #2 B8I66 00° H OF
1 #2 B8I63 04° H IF	1 #2 B8I64 04° H OF
1 #2 B8I61 08° H IF	1 #2 B8I62 08° H OF
1 #2 B8I60 08° H IF (b)	1 #2 B8I43 08° H OF (b)

SIZE	TOP BAR	OTHER	EMBED.
#3	—	—	—
#4	—	—	—
#5	—	—	—
#6	—	56"	—
#7	—	—	—
#8	96"	74"	—
#9	—	—	—
#10	—	—	—
#11	—	—	—

## NOTICE

REVISION &amp; RESUBMIT



# ASTM C700 Extra-Strength Clay Pipe Specification Data

## Specify Logan Clay Pipe

Over the Long-Term, VCP is the Best Value.

- **Longevity & Sustainability** – A demonstrated service life of over 200-years in the U.S. is the longest proven service life in the industry.
- **Operations & Maintenance** – Aggressive cleaning options reduce annual maintenance costs by reducing SSOs and dig-ups over the service life of the installation.
- **Accept No Substitute** – Specify Vitrified Clay Pipe according to ASTM C700.



*120-year-old pipe recently replaced to upsize the service line.*

## Dimensions of Extra-Strength Logan Clay Pipe (ASTM C700)

Pipe Size (I.D.)		Available Lengths							Average O.D.*		Crushing Strength**		Nominal Length of Ys & Ts
Inches	MM	1'	2'	3'	4'	5'	6'	7'	Bell	Spigot	Lbs. per Linear Ft	KN per Linear M	
4"	100	✓	✓		✓				7.05	4.81	2000	29.2	2'
6"	150	✓	✓	✓	✓				10.51	7.48	2000	29.2	2'
8"	200	✓	✓	✓		✓			12.60	9.69	2200	32.1	2'
10"	250	✓	✓	✓		✓			15.46	12.12	2400	35.0	2'
12"	300	✓	✓	✓			✓		18.15	14.54	2600	37.9	2'
15"	375	✓	✓	✓				✓	22.28	18.14	2900	42.3	3'
18"	450	✓	✓	✓				✓	26.91	21.59	3300	48.2	3'
21"	525	✓	✓	✓				✓	31.20	25.48	3850	56.2	3'
24"	600	✓	✓	✓				✓	35.45	29.05	4400	64.2	3'

✓ = Standard length for each dimension

✓ = Also available in these lengths

\* All measurements are +/- 2%

\*\* Minimum crushing strength per ASTM C700

## Product Variance Data

Pipe Size	Limit of Minus Variation (per foot)	Max. Difference in Length of Opposite Sides	I.D. Limit of Minus Variation from Nominal Size
4"	1/4"	5/16"	3/16"
6"	1/4"	3/8"	1/4"
8"	1/4"	7/16"	5/16"
10"	1/4"	7/16"	3/8"
12"	1/4"	7/16"	7/16"
15"	1/4"	1/2"	9/16"
18"	1/4"	1/2"	11/16"
21"	1/4"	9/16"	13/16"
24"	3/8"	9/16"	15/16"



## Logan Clay Products LLC

loganclay.com • loganclaypipe.com • loganclaymasonry.com • no-digpipe.com

info@loganclay.com • 800-848-2141 • 740-385-2184 • Fax: 740-385-9336



**LOGAN**

Today's Clay Pipe

1219REV



# Logan's ASTM C425 O-Ring Joint

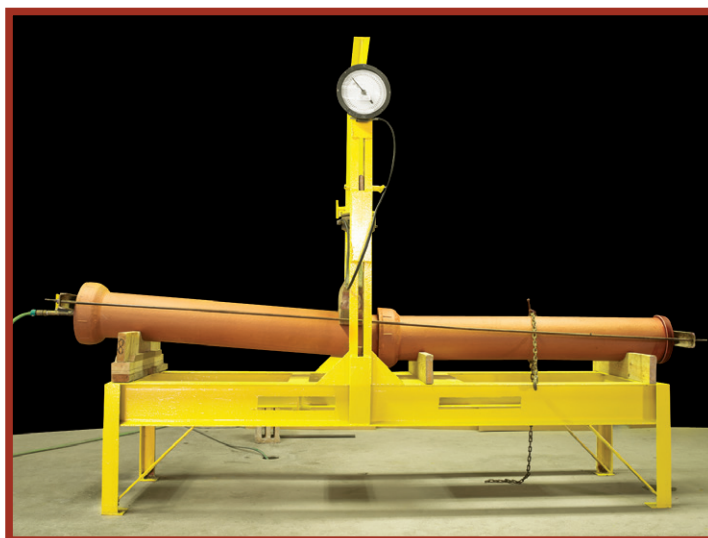
## Field Tested – Field Proven

The clay pipe sewers installed early in our nation's history were not supplied with a joint. The installers joined pipe by applying tar or mortar in the trench. These joints allowed significant infiltration which was beneficial as it diluted the effluent and cleaned the lines. These sewers generally discharged into waterways without treatment.

As cities began treating sewage, infiltration became an expense. Logan Clay responded by introducing factory applied joints. Each generation of factory applied joints improved upon the last until the O-Ring joint was developed, achieving the leak-free performance that communities require.

The O-Ring joints on Logan Clay Pipe Products meet or exceed the standards established in ASTM C425 *Standard Specification for Compression Joints Vitrified Clay Pipe and Fittings*. This standard requires that the joint be "leak-free."

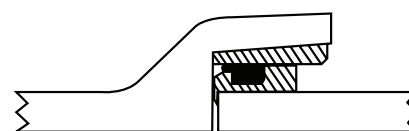
The Logan O-Ring joint has proven to be a reliable, watertight joint for more than 50 years. When installed in accordance with ASTM C12 specifications, our pipe and O-Ring joints eliminate the infiltration that was prevalent in early clay pipe lines.



*For this test of 8-inch pipe, the pipe on the right provides the basis of a straight pipeline. The pipe on the left is intentionally misaligned to simulate a deflected joint. The bell end is 2 1/2 inches higher than the spigot end (1/2-inch deflection per foot length). The spigot end is unsupported while a shear load of 1,200 lbs. (150 lbs. per inch diameter or 150 x 8 = 1,200 lbs.) is then applied from above. This combination simulates a field condition of both misalignment of the joint and improper support of the barrel. In this condition, the joint must withstand the 1,200 lbs. shear load while maintaining 4.3 psi of water pressure (10 ft. head) without leaking.*

## Deflection Allowed by ASTM Specification

Normal Diameter	Deflection of Pipe
4-12" (101-305 mm), inclusive	1/2" (42 mm)
15-24" (381-610 mm), inclusive	3/8" (31 mm)



Vitrified  
Clay



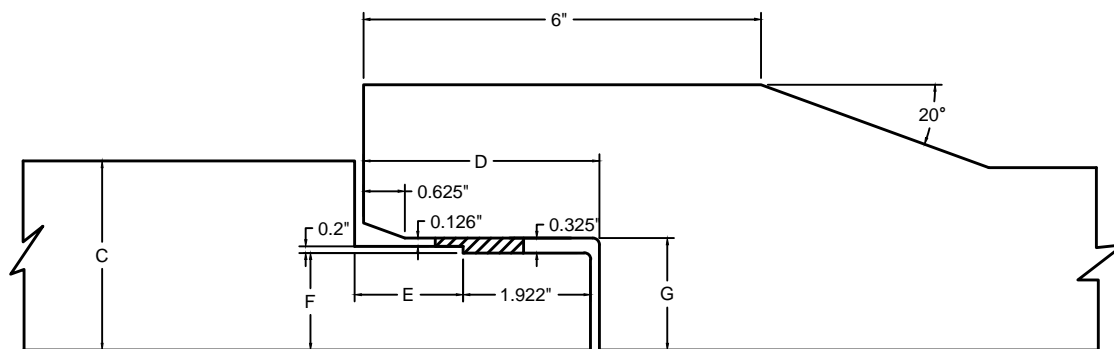
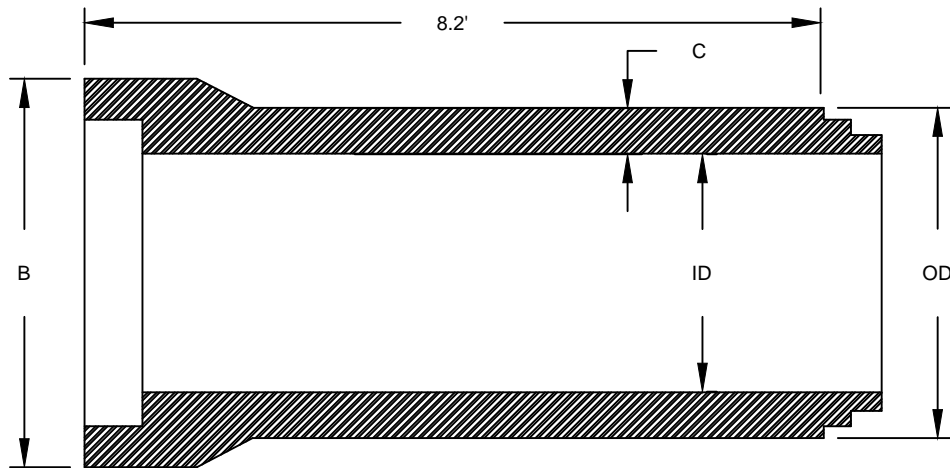
Factory-  
Applied  
Polyester  
Joint



Rubber  
Compression  
Gasket

## Logan Clay Products LLC

loganclay.com • loganclaypipe.com • loganclaymasonry.com • no-digpipe.com  
info@loganclay.com • 800-848-2141 • 740-385-2184 • Fax: 740-385-9336



PIPE SIZE		DELL OD	WALL THICKNESS	SPIGOT LENGTH		GASKET SURFACE DIA.	BELL ID
ID	OD	B	C	D	E	F	G
<del>12</del>	<del>17.5</del>	<del>20</del>	<del>2.75</del>	<del>3.562</del>	<del>1.641</del>	<del>14.722</del>	<del>15.251</del>
<del>15</del>	<del>21.0</del>	<del>23.875</del>	<del>3.00</del>	<del>3.562</del>	<del>1.641</del>	<del>18.222</del>	<del>18.751</del>
<del>18</del>	<del>24.5</del>	<del>27.625</del>	<del>3.25</del>	<del>3.750</del>	<del>1.828</del>	<del>21.847</del>	<del>22.375</del>
21	28	31.625	3.50	3.750	1.828	25.347	25.876
24	31.5	35.625	3.75	3.875	1.953	28.854	29.383
27	35	39.625	4.00	3.875	1.953	32.319	32.848
30	38.5	40.875	4.25	3.875	1.953	34.339	34.868
36	45.5	48.375	4.75	3.875	1.953	40.839	41.368

#### NOTES:

1. Manufactured in accordance with ASTM C76 and CSA A257.2
2. All dimensions are in inches, unless otherwise shown
3. Super seal gaskets manufactured in accordance with ASTM C443 and CSA A257.3

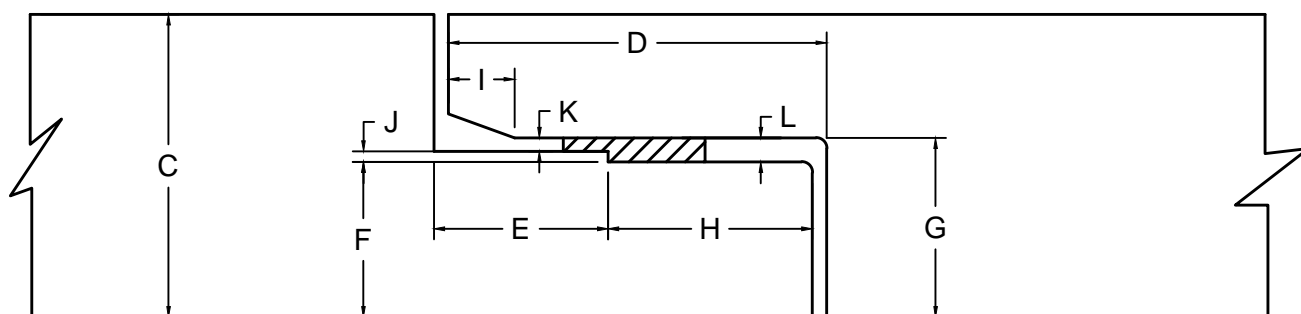
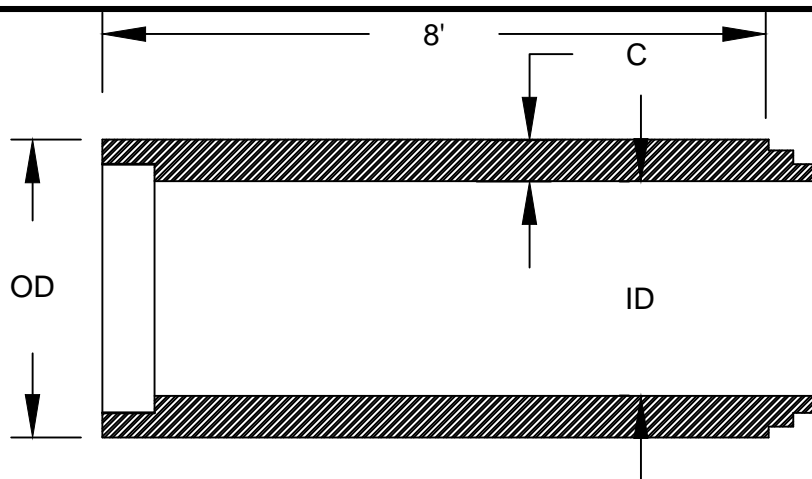


**Co-Pipe Products, Inc.**

20501 Goddard Rd, Taylor, MI 48180  
TEL: 734-287-1000

**JOINT DETAILS (12" to 36")  
DIAMETER RCP**

REVISED  
JAN.01.2014



IMPERIAL											
PIPE SIZE		WALL THICK.	SPIGOT LENGTH							GASKET SURFACE DIA.	BELL ID
ID	OD	C	D	E	H	I	J	K	L	F	G
42	52.5	5.25	4.25	1.75	2.50	0.75	0.30	0.15	0.44	46.170	46.887
48	59.5	5.75	4.25	1.75	2.50	0.75	0.30	0.15	0.44	52.170	53.887
54	66.5	6.25	4.25	1.75	2.50	0.75	0.30	0.15	0.44	57.879	58.596
60	72	6.00	4.75	2.25	2.50	0.88	0.30	0.15	0.44	64.379	65.096
66	78.5	6.50	5.00	2.50	2.50	0.88	0.30	0.15	0.44	70.879	71.596
<del>72</del>	<del>86</del>	<del>7.00</del>	<del>5.00</del>	<del>2.50</del>	<del>2.50</del>	<del>1.25</del>	<del>0.30</del>	<del>0.15</del>	<del>0.44</del>	<del>77.158</del>	<del>77.875</del>
<del>78</del>	<del>93</del>	<del>7.50</del>	<del>5.00</del>	<del>2.50</del>	<del>2.50</del>	<del>1.25</del>	<del>0.35</del>	<del>0.15</del>	<del>0.50</del>	<del>83.420</del>	<del>84.470</del>
<del>84</del>	<del>100</del>	<del>8.00</del>	<del>5.00</del>	<del>2.50</del>	<del>2.50</del>	<del>1.25</del>	<del>0.35</del>	<del>0.15</del>	<del>0.50</del>	<del>89.920</del>	<del>90.970</del>
<del>90</del>	<del>107</del>	<del>8.50</del>	<del>5.00</del>	<del>2.50</del>	<del>2.50</del>	<del>1.25</del>	<del>0.35</del>	<del>0.15</del>	<del>0.50</del>	<del>96.420</del>	<del>97.470</del>
<del>96</del>	<del>114</del>	<del>9.00</del>	<del>5.00</del>	<del>2.50</del>	<del>2.50</del>	<del>1.25</del>	<del>0.35</del>	<del>0.15</del>	<del>0.50</del>	<del>102.920</del>	<del>103.970</del>
<del>102</del>	<del>121</del>	<del>9.50</del>	<del>5.00</del>	<del>2.50</del>	<del>2.50</del>	<del>1.25</del>	<del>0.35</del>	<del>0.15</del>	<del>0.50</del>	<del>109.420</del>	<del>110.470</del>
<del>108</del>	<del>128</del>	<del>10.00</del>	<del>5.00</del>	<del>2.50</del>	<del>2.50</del>	<del>1.25</del>	<del>0.35</del>	<del>0.15</del>	<del>0.50</del>	<del>115.920</del>	<del>116.970</del>
<del>114</del>	<del>135</del>	<del>10.50</del>	<del>6.00</del>	<del>3.25</del>	<del>2.75</del>	<del>1.25</del>	<del>0.35</del>	<del>0.18</del>	<del>0.53</del>	<del>121.793</del>	<del>122.843</del>
<del>120</del>	<del>142</del>	<del>11.00</del>	<del>6.00</del>	<del>3.25</del>	<del>2.75</del>	<del>1.25</del>	<del>0.35</del>	<del>0.18</del>	<del>0.53</del>	<del>127.671</del>	<del>128.721</del>

**NOTES:**

1. Manufactured in accordance with ASTM C76 and CSA A257.2
2. All dimensions are in inches, unless otherwise shown
3. Super seal gaskets manufactured in accordance with ASTM C443 and CSA A257.3



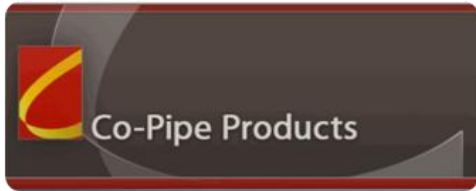
**Co-Pipe Products, Inc.**

20501 Goddard Rd, Taylor, MI 48180  
TEL: 734-287-1000

**JOINT DETAILS**  
**(42" to 120") DIA. RCP**

REVISED  
JAN.20.2017





20501 Goddard Rd, Taylor, MI 48180

Tel: 1.800.521.3514

734-287-1000

Fax: 734-287-8132

## RCP / APPROXIMATE MASS & DIMENSION CHART

INSIDE DIA. (in.)	INSIDE DIA. (mm)	WALL THICKNESS (in.)	OUTSIDE DIA. (in.)	BELL DIA. (in.)	LAY LENGTH (ft)	MASS/PIECE (lbs)
12"	300	2.75	17.5	20	8.2'	1230
15"	375	3	21	23.875	8.2'	1631
18"	450	3.25	24.5	27.625	8.2'	2079
21"	525	3.50	28	31.625	8.2'	2520
24"	600	3.75	31.5	35.625	8.2'	3126
27"	675	4	35	39.625	8.2'	3666
30"	750	4.25	38.5	40.875	8.2'	4162
36"	900	4.75	45.5	48.375	8.2'	5478
42"	1050	5.25	52.5	52.5	8'	6698
48"	1200	5.75	59.5	59.5	8'	8285
54"	1350	6.25	66.5	66.5	8'	10113
60"	1500	6	72	72	8'	11834
66"	1650	6.50	79.0	79.0	8'	14390
72"	1800	7	86	86	8'	15077
78"	1950	7.50	93	93	8'	17569
84"	2100	8	100	100	8'	20095
90"	2250	8.50	107	107	8'	23215
96"	2400	9	114	114	8'	25283
102"	2550	9.5	121	121	8'	27866
108"	2700	10	128	128	8'	30953
114"	2850	10.5	135	135	8'	34512
120"	3000	11	142	142	8'	37873



## **Submittal Package # 173408**

**Independence Excavating**

**ODOT 173000-OC3**

**Cleveland, Ohio**

**REVISED November 5, 2020**

**> Based on markups to the below plan sheets with review by M. Baker Intl <  
Plan Page 293, Issue Record #0, dated 7/29/18, RFC, Date Stamped 7/26/19,  
Plan Page 14, Issue Record #1, dated 9/11/19, DRFI015, Date Stamped 10/8/19  
& Plan Page 31, Issue Record #2, 9/11/19, DRFI015, Date Stamped 10/8/19**

**SUBMITTAL FOR BU-05**

**D-96**

**Weir Mh, Return Mh & Type 4 Water Quality Structure**

**RALPH HASTINGS  
LINDSAY PRECAST  
PO BOX 578  
6845 ERIE AVE. N.W.  
CANAL FULTON, OHIO 44614  
1-800-837-7788**

Ph: 440 543-5468

Fax: 440 543-1152

Mobile: 440 336-4162

Email: [rhastings@lindsayprecast.com](mailto:rhastings@lindsayprecast.com)

Web : [www.lindsayconcrete.com](http://www.lindsayconcrete.com)

Revised D-96 geometry suggested by Lindsay Precast, October 8, 2020

Rim Elev. = 642.67'  
Sta. 127+85.00, 66.00' RT

Rim Elev. = 643.45'  
Sta. 127+71.80, 75.85' RT

17' - 30" @ 1.76%

10' - 24" Type B @ 1.5%

Sta. 127+64.11, 81.70' RT

Sta. 127+92.85, 60.27' RT

10' - 24" Type B @ 1.5%

Rim Elev. = 643.62'  
Sta. 127+92.41, 78.86' RT

Sta. 128+06.36, 80.86' RT

Rim Elev. = 643.73'  
Sta. 127+86.59, 83.16' RT

Rim Elev. = 643.90'  
Sta. 127+80.80, 87.48' RT

Sta. 127+77.81, 102.00' RT

\* D-96 Bypass Mh is in the same location as the original plan D-96 Weir Mh  
\*\*The WQS Boxout Area has been relocated

Bypass Invert = 632.60  
Bypass WQS Invert = 632.45  
Return WQS Invert = 632.45  
Return Invert = 632.30

D-96  
STA 127+85.00, 66.00' RT  
ODOT  
WATER QUALITY STRUCTURE  
MH-3, APP, RIM ELEV 642.67  
30" (SW) 632.60  
30" (SW) 632.60

D-100  
STA 128+00.00, 31.00' RT  
MH-3, APP, RIM ELEV 641.46  
12" (SW) 636.49  
15" (SE) 636.76  
21" (W) 634.17  
24" (E) 636.79  
30" (S) 633.42

PR. ELECTRIC (CPP)

E C @ 3.46%

EX. GROUND

38'-30" TYPE B @ 2.16%

80.35' RT

QUADRANT RD.

SHARED USE PATH

NO.	DATE	DESCRIPTION
0	2019-01-29	RFC David X. Roubert
ISSUE RECORD		

CUY-IR490/S  
2.09 / 19.1

293  
303

Customer:	INDEPENDENCE EXCAVATING, INC.
Job Name:	ODOT 173000 - Opp Corridor Ph 3
Job #:	173408
Structure ID:	D-96 Weir Mh - BU-05
Station:	Revd Oct 27,,20 per Baker
Type:	ODOT #3 Storm Manhole with 12"
SalesPerson:	Weir Ralph Hastings

Rim:	642.67'
Invert:	632.60'
Rim to Invert:	10.07'
Sump:	0.58'

Description	UOM	Quantity	Weight
Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
48"Ø Stock Manhole Riser X 32" Tall	EA	1	2311
Stock 72"Ø Flat Transition to 48"Ø	EA	1	5904
72"Ø Non Extended 9" Manhole Base X 56" Tall	EA	1	10666
8" wide Weir in Mh	EA	1	750
Hole in Structure for Pipe	EA	3	0

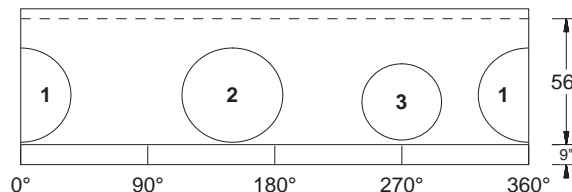
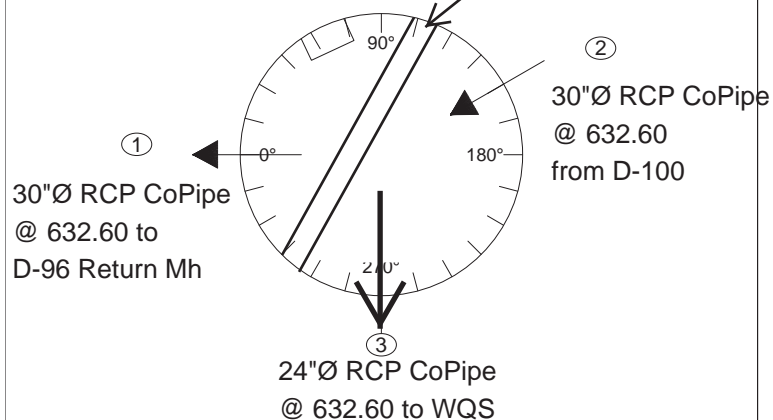
ODOT MH-3  
WQS Bypass Mh per Baker review



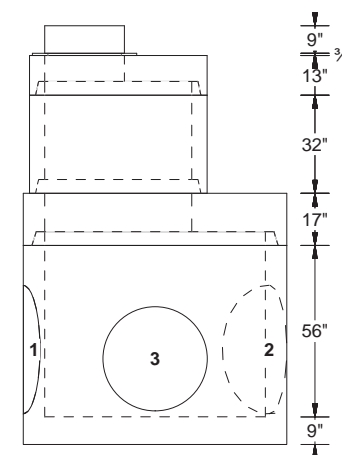
1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614

Step Degree: 65

Weir from 100° to 310°  
> Top of weir @ 633.60



EJIW 1450 - by Ind Exc




PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	632.6	0	0	30" - RCP Co-Pipe	42"Ø
(2)	632.6	0	150	30" - RCP Co-Pipe	42"Ø
(3)	632.6	0	270	24" - RCP Co-Pipe	34"Ø

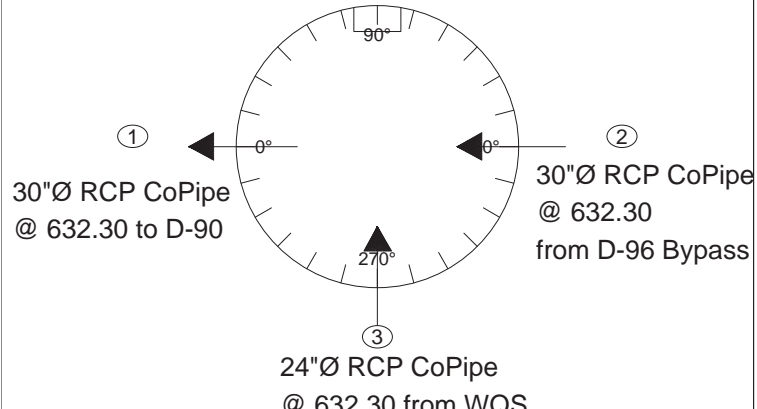
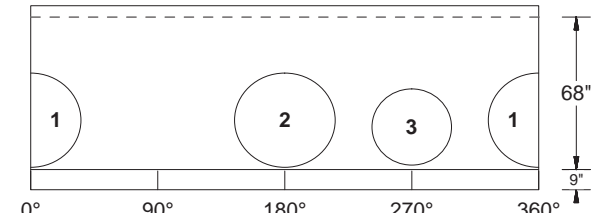
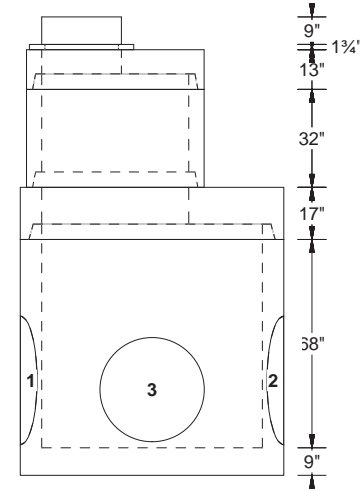
> 8" wide weir - top elevation of 633.60 - 19" above floor <

Hole in Structure for Pipe
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10/28/2020
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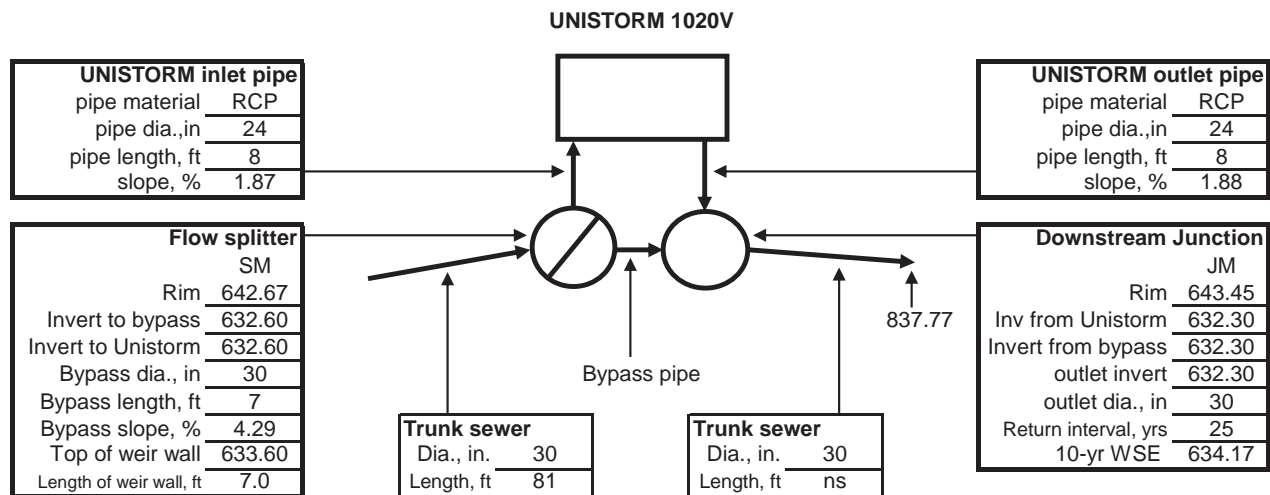


Customer: INDEPENDENCE EXCAVATING, INC.	<table><tr><th>Description</th><th>UOM</th><th>Quantity</th><th>Weight</th></tr><tr><td>Stock 48"Ø Flat Top W/ 26"Ø Hole</td><td>EA</td><td>1</td><td>1185</td></tr><tr><td>48"Ø Stock Manhole Riser X 32" Tall</td><td>EA</td><td>1</td><td>2311</td></tr><tr><td>Stock 72"Ø Flat Transition to 48"Ø</td><td>EA</td><td>1</td><td>5904</td></tr><tr><td>72"Ø Non Extended 9" Manhole Base X 68" Tall</td><td>EA</td><td>1</td><td>12476</td></tr><tr><td>Hole in Structure for Pipe</td><td>EA</td><td>3</td><td>0</td></tr></table>	Description	UOM	Quantity	Weight	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185	48"Ø Stock Manhole Riser X 32" Tall	EA	1	2311	Stock 72"Ø Flat Transition to 48"Ø	EA	1	5904	72"Ø Non Extended 9" Manhole Base X 68" Tall	EA	1	12476	Hole in Structure for Pipe	EA	3	0
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Structure ID: D-96 Return Mh - BU-05																									
Station: Revd Oct 27,,20 per Baker																									
Type: ODOT #3 Storm Manhole																									
SalesPerson: Ralph Hastings																									
Rim: 643.45'	ODOT MH-3 WQS Return Mh per Baker review	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614																							
Invert: 632.30'																									
Rim to Invert: 11.15'																									
Sump: 0.58'																									

Step Degree: 90			EJIW 1450 - by Ind Exc																								
<table><thead><tr><th>PipeNum</th><th>Elevation</th><th>%Grade</th><th>Angle</th><th>Pipe</th><th>Hole or Pipe Seal Type</th></tr></thead><tbody><tr><td>(1)</td><td>632.3</td><td>0</td><td>0</td><td>30" - RCP Co-Pipe</td><td>42"Ø</td></tr><tr><td>(2)</td><td>632.3</td><td>0</td><td>180</td><td>30" - RCP Co-Pipe</td><td>42"Ø</td></tr><tr><td>(3)</td><td>632.3</td><td>0</td><td>270</td><td>24" - RCP Co-Pipe</td><td>34"Ø</td></tr></tbody></table>	PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type	(1)	632.3	0	0	30" - RCP Co-Pipe	42"Ø	(2)	632.3	0	180	30" - RCP Co-Pipe	42"Ø	(3)	632.3	0	270	24" - RCP Co-Pipe	34"Ø			
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Hole in Structure for Pipe																											
10/28/2020																											



Data entry date 11/04/2020		<b>ENVIRONMENT 21 SKETCH PLAN, HYDROLOGY ANALYSIS, AND HYDRAULIC ANALYSIS</b>	
<b>Site/Project</b> ODOT 173000 OPPORTUNITY CORRIDOR PH 3 <b>Municipality</b> CLEVELAND, OH <b>Engineer</b> NS <b>Owner</b> OHDOT <b>Contractor</b> INDEPENDENCE EXCAVATING <b>ENV 21 Affiliate</b> LINDSAY CONCRETE		<b>Trunk sewer travel time</b> Longest travel distance, ft 300 Average pipe flow velocity, fps 4.0 Travel time, minutes 1.3 IDF duration at last inlet, minutes 5.0 IDF duration at first inlet, minutes 5.0	
<b>UNISTORM Inspection and Pumpout Interval</b> Annual unit pavement pollutant washoff 1000 #/ac/yr Annual unit roof pollutant washoff 100 #/ac/yr Pavement pollutant washoff 4200 #/yr Roof pollutant washoff 0 #/yr Site pollutant washoff load 4200 #/yr Washoff trapped at curbs and inlets 1050 #/yr Washoff trapped in UNISTORM 2595 #/yr Design sediment storage capacity 10500 # Maximum pumpout interval 4.0 yrs+/- Recommended inspection interval 0.5 yrs+/- Design sediment storage capacity 100.0 ft <sup>3</sup> Design sediment storage depth 0.5 ft Estimated per cent washoff trapped 86.8 % UNISTORM sump depth 4.0 ft		<b>UNISTORM Dimensioning</b> Structure # D-96 ODOT Type 4 Width, ft 10 Length, ft 20 Inlet stage      Outlet stage rim 643.62      rim 643.90 inlet inv 632.45      632.45 approx. floor 628.45	
<b>Site Drainage Hydrology for Specified IDF Duration</b> Rainfall rate 22.3 cfs Ponding/bypassing at inlets 2.2 cfs Flow entering inlets 20.0 cfs Inflow from offsite 0 cfs Total flow entering inlets 20.0 cfs Total flow entering Unistorm 7.1 cfs C = runoff coefficient = ability of rainfall to enter inlets		<b>Drainage Area Hydrology / Design Storm IDF Values</b> Specified return interval 25 yrs Specified duration 10 min Average intensity 5.30 in/hr Rainfall depth 0.88 inches Area, acres 4.20 C % paved 100 0.90 %roof 0 0.90 % vegetation 0 0.30 CA 3.78	
		<b>WATER QUALITY VOLUME (WQV)</b> Drainage area 4.20 ac Impervious area 4.20 ac Impervious area 100 % Water Quality Rv 0.95 Rainfall 1.00 inches Runoff 0.95 inches WQV 0.33 ac-ft WQV 14484 cf	
		<b>WATER QUALITY FLOW RATE (WQFR)</b> Average intensity 1.00 in/hr Event duration NS minutes Annual frequency NS events/yr Runoff coefficient 0.90 Impervious area 4.2 ac Spec. WQFR 3.60 cfs	







Environment 21, LLC  
8713 Read Road - P.O. Box 55  
East Pembroke, New York 14056  
ph# 585-762-8314  
fax# 585-762-8315  
email: envengr@env21.com

### Technical Report

Project: ODOT 173000 OPPORTUNITY CORRIDOR PH 3  
Municipality: CLEVELAND, OH  
Engineer: NS  
Owner: OHDOT  
Contractor: INDEPENDENCE EXCAVATING  
Environment 21 Affiliate: LINDSAY CONCRETE

Date: 11/04/2020

STS# D-96

ENV 21 Product UNISTORM  
ODOT Type 4

Width 10 ft  
Length 20 ft  
Surface area 200 sf

#### Drainage Area

Drainage area 4.20 acres  
Paved area 100 %  
Roof area 0 %  
Vegetated area 0 %

#### Water Quality Volume

Rainfall 1.00 in.  
Water Quality Rv 0.95  
Runoff depth 0.95 inches  
Drainage area 4.2 acres  
Water quality volume 0.33 ac-ft

#### Design Storm Rainfall IDF Values

Specified return interval 25 yrs  
Specified duration 10 min  
Average intensity 5.3 in/hr  
Rainfall depth 0.9 inches

#### Water Quality Flow Rate

Runoff coefficient 0.90  
Average Intensity 1.00 in/hr  
Impervious area 4.20 acres  
Water Quality Flow Rate 3.6 cfs

#### Site Drainage Hydrology for Specified IDF Duration

Rainfall rate 22.3 cfs  
Ponding/bypassing at inlets 2.2 cfs  
Flow entering inlets 20.0 cfs  
Inflow from offsite 0 cfs  
Total flow entering inlets 20.0 cfs  
UNISTORM inlet velocity 2.3 fps



## Sediment Pumpout Interval

Hydraulic model: Treatment with external bypassing

### Estimated Composition for Pollutant Washoff Entering UNISTORM

Annual unit pavement pollutant washoff	1000	#/ac/yr
Annual unit roof pollutant washoff	100	#/ac/yr
TSS as silt + bouyant organics	30	wt%
TSS as fine sand	40	wt%
TSS as medium sand	30	wt%
Pavement pollutant washoff	4200	#/yr
Roof pollutant washoff	0	#/yr
Site pollutant washoff load	4200	#/yr

### Storage Capacity for Washoff of Oil-Floatables

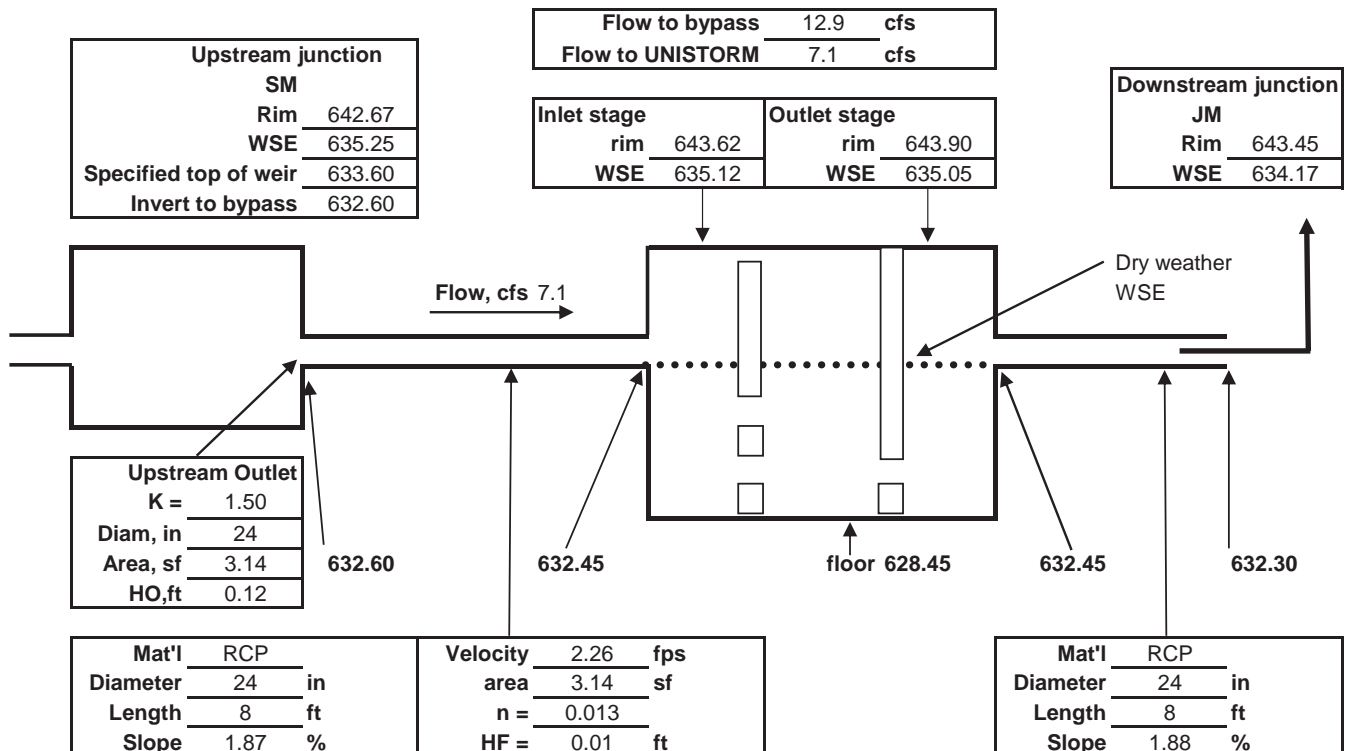
Water surface area	200	sf
Floatables depth	0.50	ft
Floatables stored	748.0	gal
Floatables retained	100	%

### Estimated UNISTORM Pumpout Interval

Washoff trapped at curbs and inlets	1050	#/yr	UNISTORM sump depth	4.0	ft
Washoff trapped in UNISTORM	2595	#/yr	Design sediment storage capacity	10500	#
Estimated per cent washoff trapped	87	%	Design sediment storage capacity	100	cf
			Design sediment storage depth	0.5	ft
			Maximum pumpout interval	4.0	yrs+/-
			Recommended inspection interval	0.5	yrs+/-

## Design Storm Backwater Analysis

- (1) Downstream Water Elevation Estimated by ENV 21 or Provided by Site Engineer
- (2) Outlet pipe hydraulics based on culvert hydraulics



**Environment 21, LLC**

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 Web: www.env21.com

**Phone: (800) 809-2801****Site/Project:** ODOT 173000 OPPORTUNITY CORRIDOR**Location:** CLEVELAND, OH**Owner:** OHDOT**Engineer:** NS**Contractor:** INDEPENDENCE EXCAVATING**ENV 21 Affiliate:** LINDSAY CONCRETE**Data Entry Date:** 11/04/2020**DWG No.:** 1 of 2
**environment**  
 Global Stormwater Solutions
**Product Name:** UNISTORM**STRUCTURE #** D-96**ODOT Type** 4

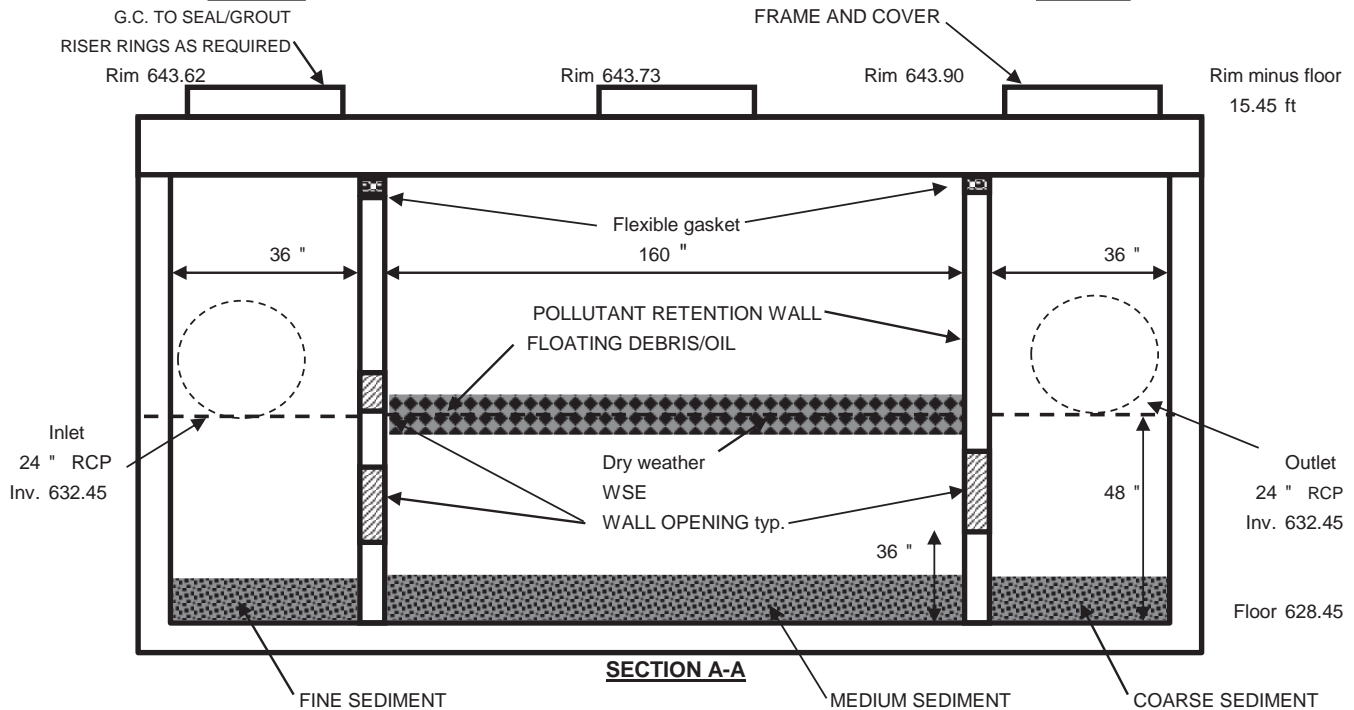
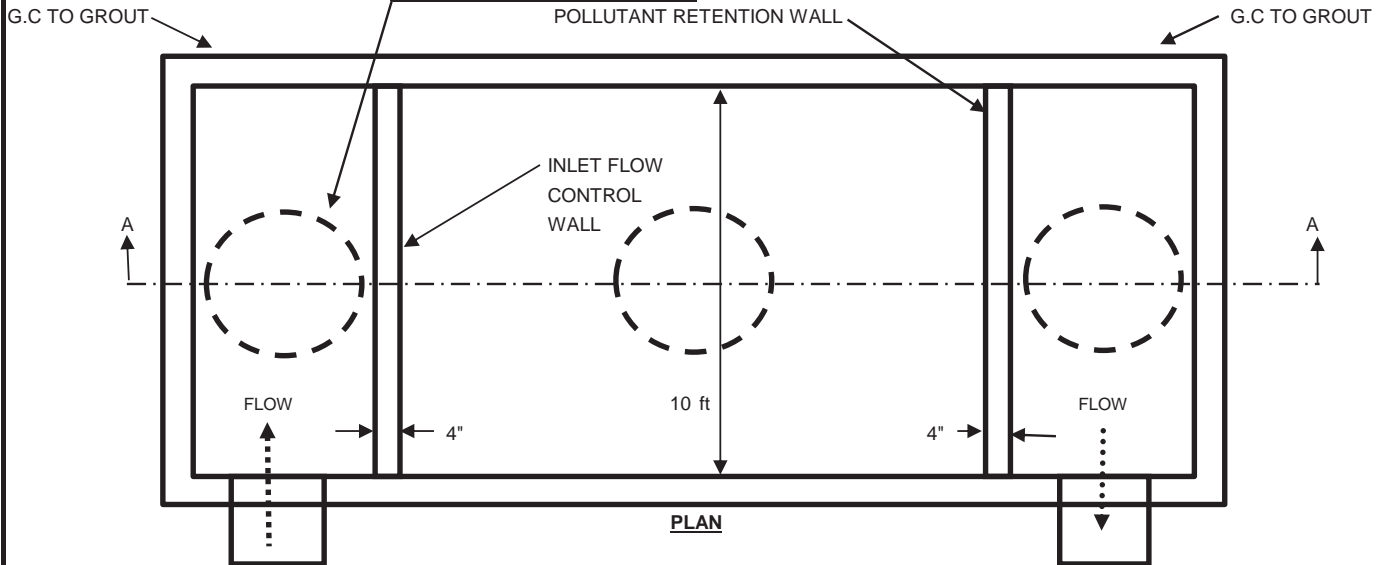
WIDTH, FT. 10

LENGTH, FT. 20

**DESIGN STORM HYDROLOGY**

Return Interval, yrs	25	Area, acres	4.20
Average Intensity, in/hr	5.3	% paved	100
Average Runoff, cfs	0.88	% roof	0
Flow to UNISTORM, cfs	7.1	% vegetation	0

**ACCESS OPENINGS**  
 Diameter, inches 30  
 Total openings 3

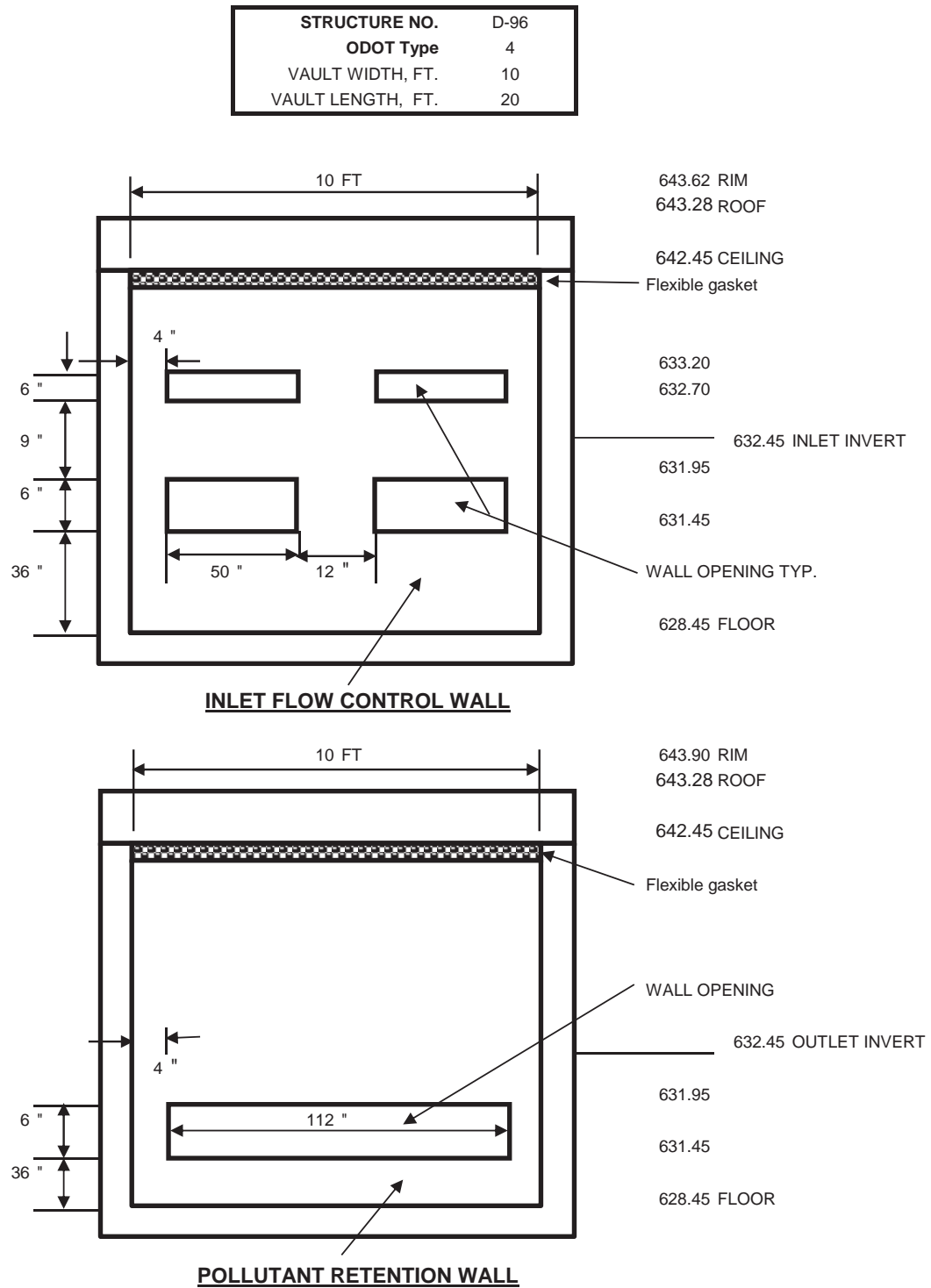


**NOTE:** THE INFORMATION IN THIS DRAWING IS PROPRIETARY. CONTRACTOR SUBMITTAL MUST INCLUDE  
 ENVIRONMENT 21 TECHNICAL ANALYSIS OF SITE HYDROLOGY AND STORM SEWER SYSTEM HYDRAULICS

PROPRIETARY INFORMATION:  
 - ALL RIGHTS TO ENVIRONMENT 21, LLC.

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**Phone: (800) 809-2801****Site/Project:** ODOT 173000 OPPORTUNITY CORRIDOR PI**Location:** CLEVELAND, OH**Owner:** OHDOT**Engineer:** NS**Contractor:** INDEPENDENCE EXCAVATING**ENV 21 Affiliate:** LINDSAY CONCRETE**Data Entry Date:** 11/04/2020**DWG No.:** 2 of 2**environment**  
Global Stormwater Solutions**Product Name:** UNISTORM

**NOTE:** THE INFORMATION IN THIS DRAWING IS PROPRIETARY. CONTRACTOR SUBMITTAL MUST INCLUDE  
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**Phone: (800) 809-2801**

**Site/Project:** ODOT 173000 OPPORTUNITY CORRIDOR PH 3

**Location:** CLEVELAND, OH

**Owner:** OHDOT

**Engineer:** NS

**Contractor:** INDEPENDENCE EXCAVATING

**ENV 21 Affiliate:** LINDSAY CONCRETE

**Data Entry Date:** 11/04/2020



**Product Name:** UNISTORM

## CALCULATED REMOVAL EFFICIENCIES BASED ON ANNUAL RAINFALL DATA

### UNISTORM CHAMBER DIMENSIONING

Structure # D-96

Model # 4

Width, ft 10

Length, ft 20

Inlet stage

rim 643.62

inlet inv 632.45

approx. floor

Outlet stage

rim 643.90

outlet inv 632.45

628.45

### Area treated by UNISTORM

Area, acres 4.20 C

% paved 100 0.90

% roof 0 0.90

% vegetation 0 0.30

CA 3.78

WQFR = 3.6 cfs

30 Min. Rainfall Depth (in.)	Rainfall intensity (in/hr)	Water flow rate (cfs)	Percentage of Annual Volume (%)	Percentage of Total Events (%)	Calculated removal efficiency at given flow rate of the 70 micron particle	Calculated critical settling velocity (ft/sec)	SOR (gpm/ft²)
0.25	0.50	1.89	30.5	81.5	93.33 %	0.02	4
0.50	1.00	3.78	23.1	10.3	66.00 %	0.03	8
0.75	1.50	5.67	15.5	4.1	53.89 %	0.05	13
1.00	2.00	7.56	9.5	1.8	46.67 %	0.06	17
1.25	2.50	9.45	7.4	1.1	41.74 %	0.08	21
1.50	3.00	11.34	5.4	0.6	38.10 %	0.09	25
1.75	3.50	13.23	2.6	0.3	35.28 %	0.11	30
2.00	4.00	15.12	1.6	0.1	33.00 %	0.13	34
2.25	4.50	17.01	1.4	0.1	31.11 %	0.14	38
2.50	5.00	18.90	1.3	0.1	29.51 %	0.16	42
2.75	5.50	20.79	0.2	0.0	28.14 %	0.17	47
3.00	6.00	22.68	0.5	0.0	26.94 %	0.19	51
3.25	6.50	24.57	0.3	0.0	25.89 %	0.20	55
3.50	7.00	26.46	0.0	0.0	24.94 %	0.22	59
3.75	7.50	28.35	0.2	0.0	24.10 %	0.24	64
4.00	8.00	30.24	0.0	0.0	23.33 %	0.25	68
4.25	8.50	32.13	0.2	0.0	22.64 %	0.27	72
4.50	9.00	34.02	0.2	0.0	22.00 %	0.28	76
4.75	9.50	35.91	0.0	0.0	21.41 %	0.30	81
5.00	10.00	37.80	0.0	0.0	20.87 %	0.32	85
5.25	10.50	39.69	0.0	0.0	20.37 %	0.33	89
5.50	11.00	41.58	0.0	0.0	19.90 %	0.35	93
5.75	11.50	43.47	0.0	0.0	19.46 %	0.36	98
6.00	12.00	45.36	0.0	0.0	19.05 %	0.38	102
6.25	12.50	47.25	0.0	0.0	18.67 %	0.39	106
6.50	13.00	49.14	0.0	0.0	18.30 %	0.41	110
6.75	13.50	51.03	0.0	0.0	17.96 %	0.43	115
7.00	14.00	52.92	0.0	0.0	17.64 %	0.44	119
7.25	14.50	54.81	0.0	0.0	17.33 %	0.46	123
7.50	15.00	56.70	0.0	0.0	17.04 %	0.47	127.3
7.75	15.50	58.59	0.0	0.0	16.76 %	0.49	132
8.00	16.00	60.48	0.0	0.0	16.50 %	0.50	136
8.25	16.50	62.37	0.0	0.0	16.25 %	0.52	140
8.35	16.70	63.13	0.0	0.0	16.15 %	0.53	142

Based on a particle size of 70 microns, and  
the percentage of total storm events, the average  
annual estimated removal efficiency =

**87%**

### Notes:

1. Based on DETPOND Detention Pond Treatment Model by Robert Pitt.
2. Critical settling velocity calculation based on the application of Stokes Law using the water flow rate, a partial specific gravity of 2.6 and a chamber surface area of 200 square feet.
3. Rainfall Depth, Percentage of Total Events, and Percentage of Annual Volume data was obtained at the Youngstown, OH Airport from 1948 to 2005.



## **Lindsay Project 173408**

**Independence Excavating**

**ODOT 173000-OC3**

**Cleveland, Ohio**

**February 15, 2021**

**ODOT Type 4 Water Quality Structures  
Installation Plan  
for  
D-96**

**RALPH HASTINGS  
LINDSAY PRECAST  
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1-800-837-7788**

Ph: 440 543-5468  
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Mobile: 440 336-4162  
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# **LINDSAY PRECAST**

6845 ERIE AVE. N.W., P.O. BOX 578  
CANAL FULTON, OHIO 44614  
PH (330) 854-4511 / FAX (330) 854-6664  
*Ralph Hastings' office #'s:*  
*ph (440) 543-5468 / fax (440) 543-1152*  
*email: rhastings@lindsayprecast.com*

Date: February 15, 2021  
To: Matt Gillilan  
Independence Excavating  
From: Ralph Hastings  
Project: ODOT 173000-OC3  
Cleveland, Ohio

## ODOT Type 4 Water Quality Structures Installation Plan Statement

The WQS's are designed by Environment 21 and are precast by Lindsay Precast. Both companies are listed on the ODOT QPL. This Installation Plan covers both D-203B & D-96

## Table of Contents for D-96

Part	Description	Pages
A	Material Specifications > ODOT & ASTM	1
B	WQS Installation Plan > Environment 21 - Installation	2 - 3
C	Plan View > Baker	4
D & E	Elevation View > Lindsay Precast	5 – 8
F	Volume > Environment 21 - Maintenance	9 – 19
G & H	Structural > Environment 21 – Hydrology & Hydraulic Analysis > Munkelt & Assoc – P.E. Stamped Structural Calc's	20 – 41



A. Material Specifications

The two 10'x20' WQS's, D-203B & D-96, conform to the various aspects of:

- ODOT SS895
- ODOT SS995
- ODOT C&MS Item 611
- ASTM C890-19
- ASTM C913-18
- Concrete per ACI 318
- Epoxy Coated Rebar per ASTM A615

## **ODOT Type 4 Water Quality Structures Installation Plan**

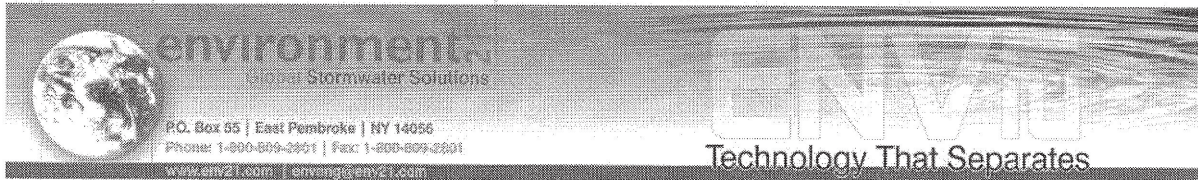
**Page 2 of 41**

### **B. Manufacturers Installation Procedures**

#### **8.0 INSTALLATION**

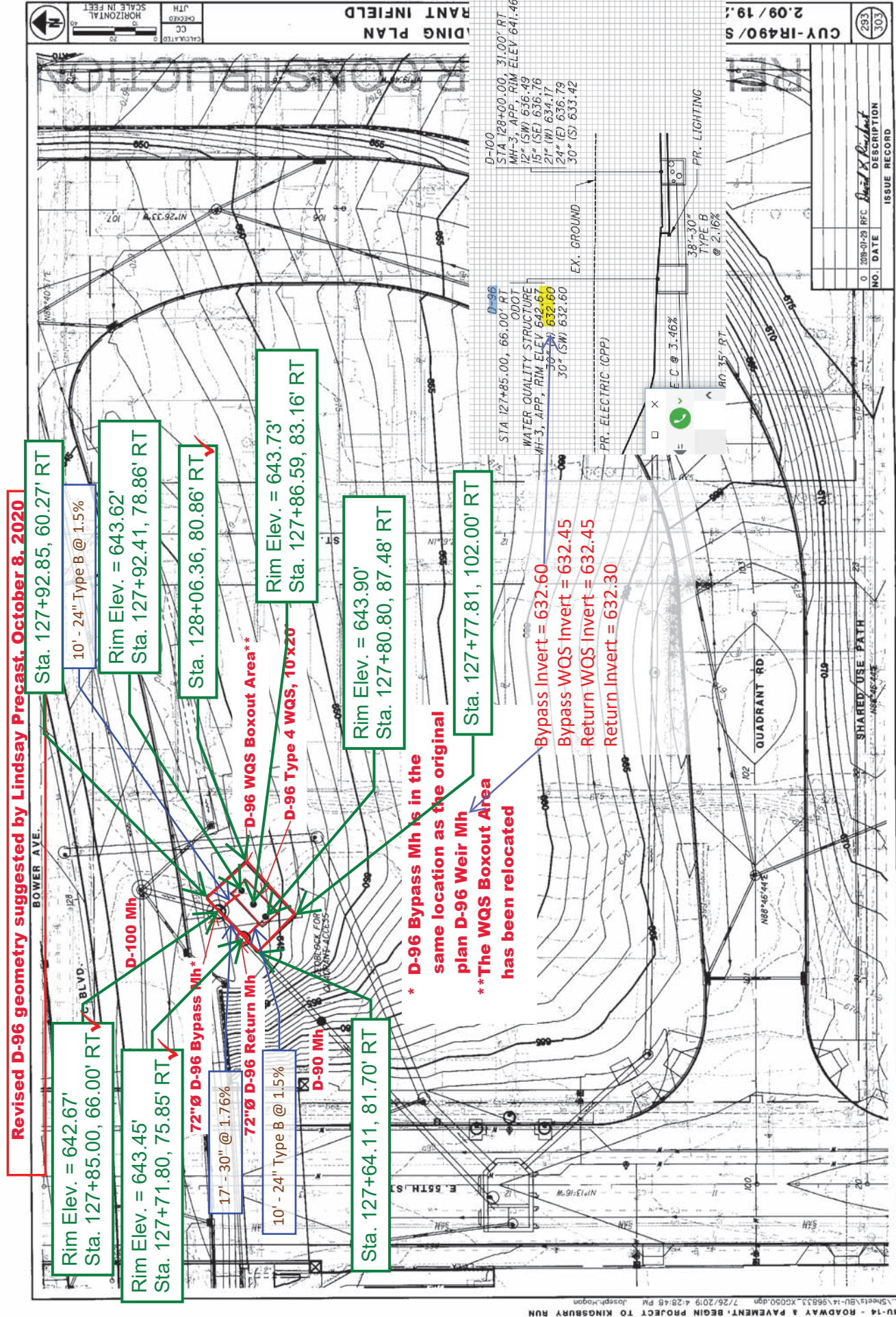
**NOTE:** The installation location shall be determined by the Project Engineer and verified by the Contractor. Environment 21 and its Affiliates are not responsible for determining this location. Additionally, unless it is caused by a design or manufacturing defect, Environment 21 and its Affiliates are not responsible for damage incurred during installation. All requirements (e.g., excavation size, materials, etc.) shall be per the site design and drawings. Installation of the Unistorm Vault shall be in compliance with ASTM C 891 for Standard Practice for Installation of Underground Precast Utility Structures.

- 8.1 The install location of the Unistorm Vault shall be excavated to the proper depth and width using proper, approved safety guidelines.
- 8.2 A bed depth of proper size, material, compaction, and level grading shall be added to the excavation. Minimum 6" of bedding material.
- 8.3 Add any boots, sealants, or internal components, as required prior to installation, to the Unistorm Vault.
- 8.4 Using proper, approved safety guidelines lift and set the Unistorm Vault components in place one component at a time. Check for proper placement and pipe alignment.
- 8.5 Complete the pipe connections and then grout and seal as required to guarantee watertight fit of any potential leakage areas (e.g., joints, etc) of the Unistorm Vault.
- 8.6 Set any risers, as required, to bring the access openings to grade and then backfill to the required elevation.



- 8.7 Add water and verify that there are no leaks or plugged lines. If any are found they should be repaired as directed by the Project Engineer. Install access covers (e.g., cast iron covers).





Customer: INDEPENDENCE EXCAVATING, INC.

Job Name: ODOT 173000 - Opp Corridor Ph 3

Job #: 173408

Structure ID: D-96 Weir Mh - BU-05

Station: Revd Oct 27,20 per Baker

Type: ODOT #3 Storm Manhole with 12" Weir

SalesPerson: Ralph Hastings

Rim: 642.67'

Invert: 632.60'

Rim to Invert: 10.07'

Sump: 0.58'

UOM

Description

Quantity

Weight

EA

Stock 48"Ø Flat Top W/ 26"Ø Hole

1

1185

EA

48"Ø Stock Manhole Riser X 32" Tall

1

2311

EA

Stock 72"Ø Flat Transition to 48"Ø

1

5904

EA

72"Ø Non Extended 9" Manhole Base X 56" Tall

1

10666

EA

8" wide Weir in Mh

1

750

EA

Hole in Structure for Pipe

3

0

ODOT MH-3

WQS Bypass Mh per Baker review

LP

Lindsay

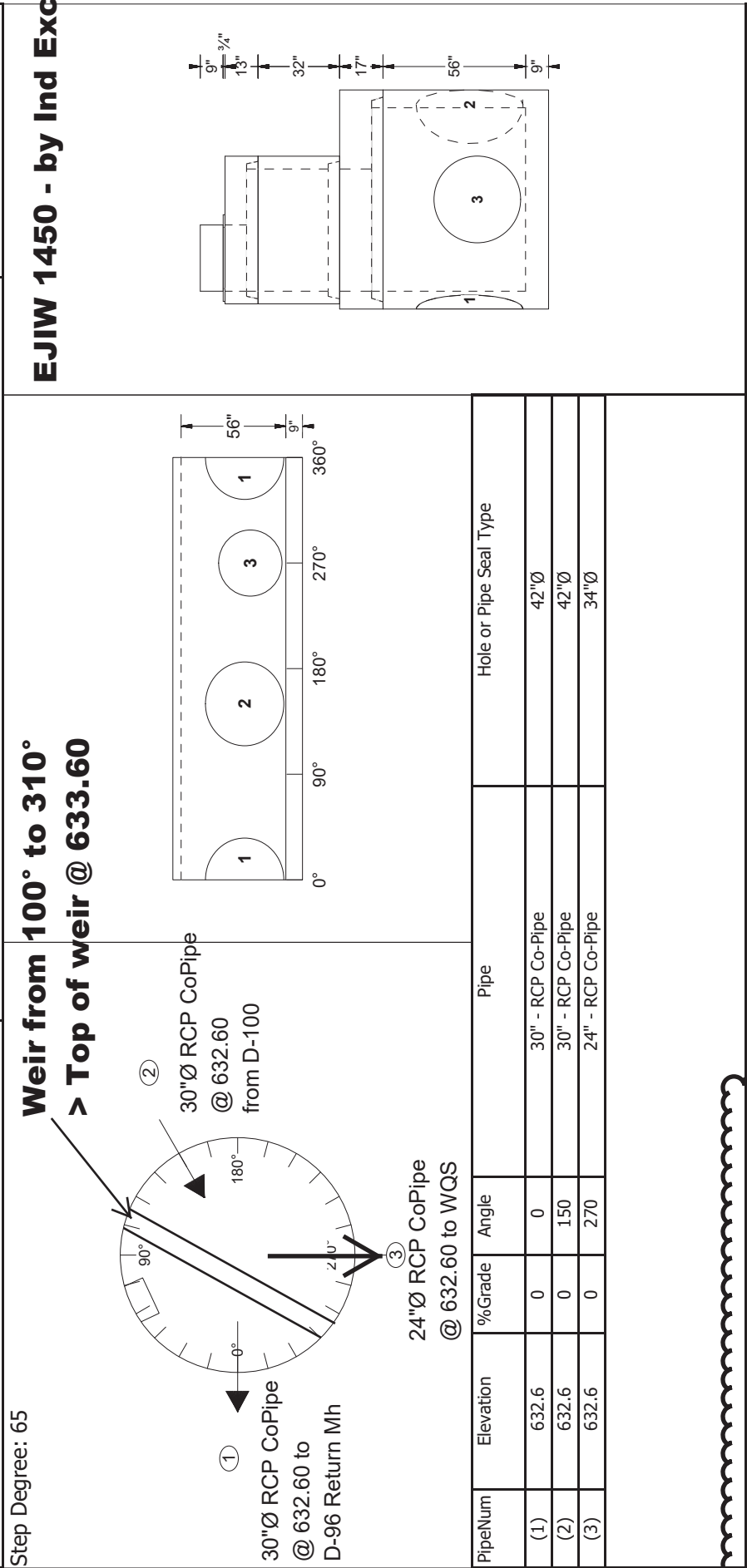
P R E C A S I

1-800-837-7788

6845 Erie Ave. N.W.

PO Box 578

Canal Fulton, Ohio 44614



Customer:  
Job Name:  
Job #:  
Structure ID:  
Station:  
Type:  
SalesPerson:

INDEPENDENCE EXCAVATING, INC.  
ODOT 173000 - Opp Corridor Ph 3  
173408  
D-96 Return Mh - BU-05  
Revd Oct 27,.20 per Baker  
ODOT #3 Storm Manhole  
Ralph Hastings

Rim:  
Invert:  
Rim to Invert:  
Sump:

643.45'  
632.30'  
11.15'  
0.58'

Quantity

Weight

Description

UOM

Quantity

Weight

Stock 48"Ø Flat Top W/ 26"Ø Hole

EA

1

1185

48"Ø Stock Manhole Riser X 32" Tall

EA

1

2311

Stock 72"Ø Flat Transition to 48"Ø

EA

1

5904

72"Ø Non Extended 9" Manhole Base X 68" Tall

EA

1

12476

Hole in Structure for Pipe

EA

3

0

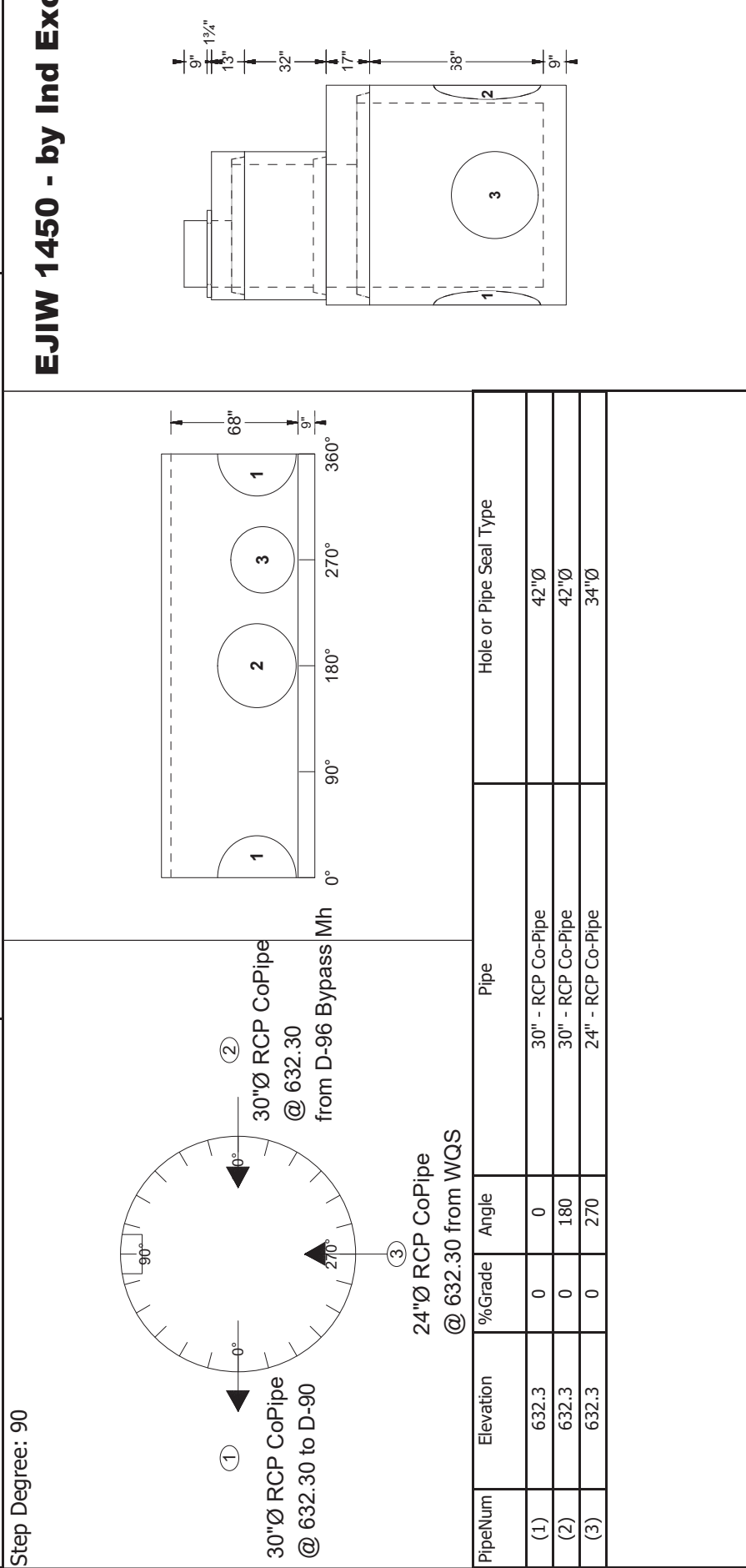
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6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614

PRECAST

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6845 Erie Ave. N.W.  
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Canal Fulton, Ohio 44614

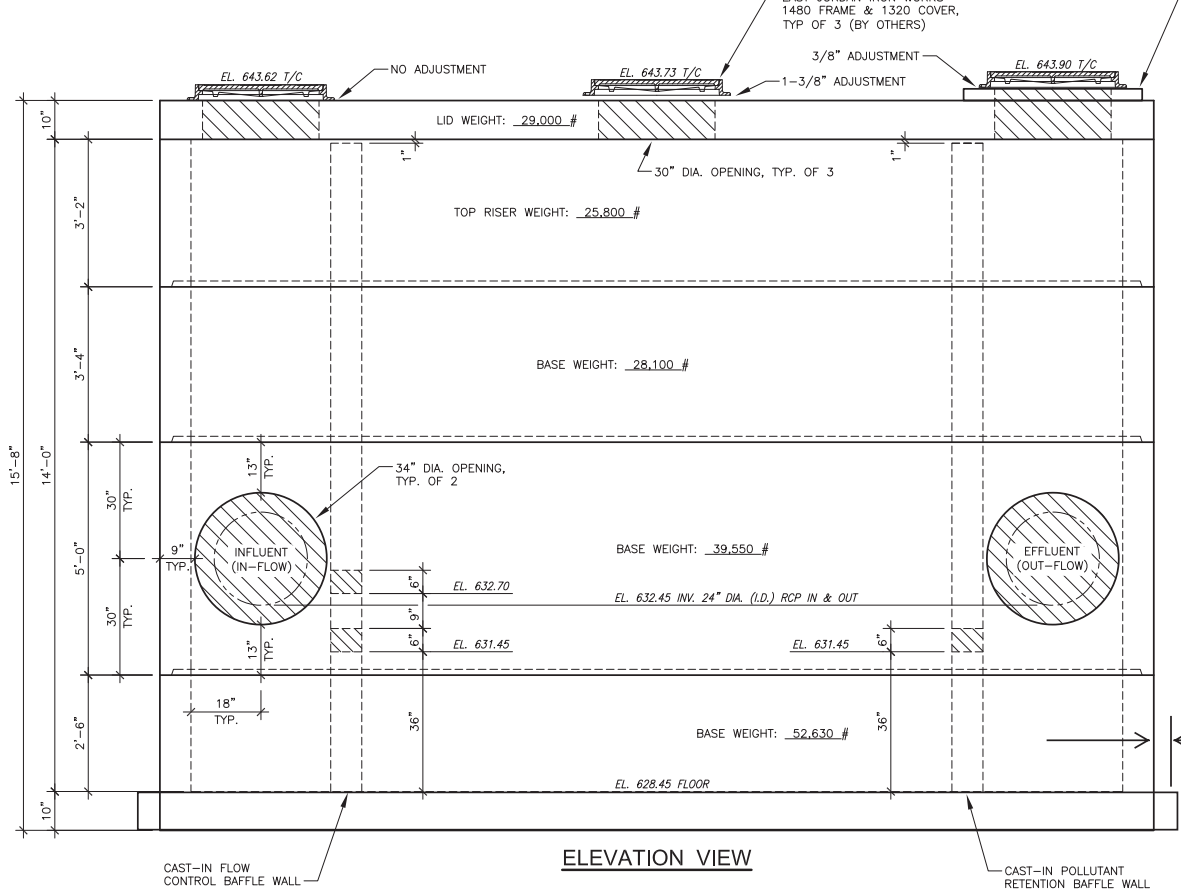
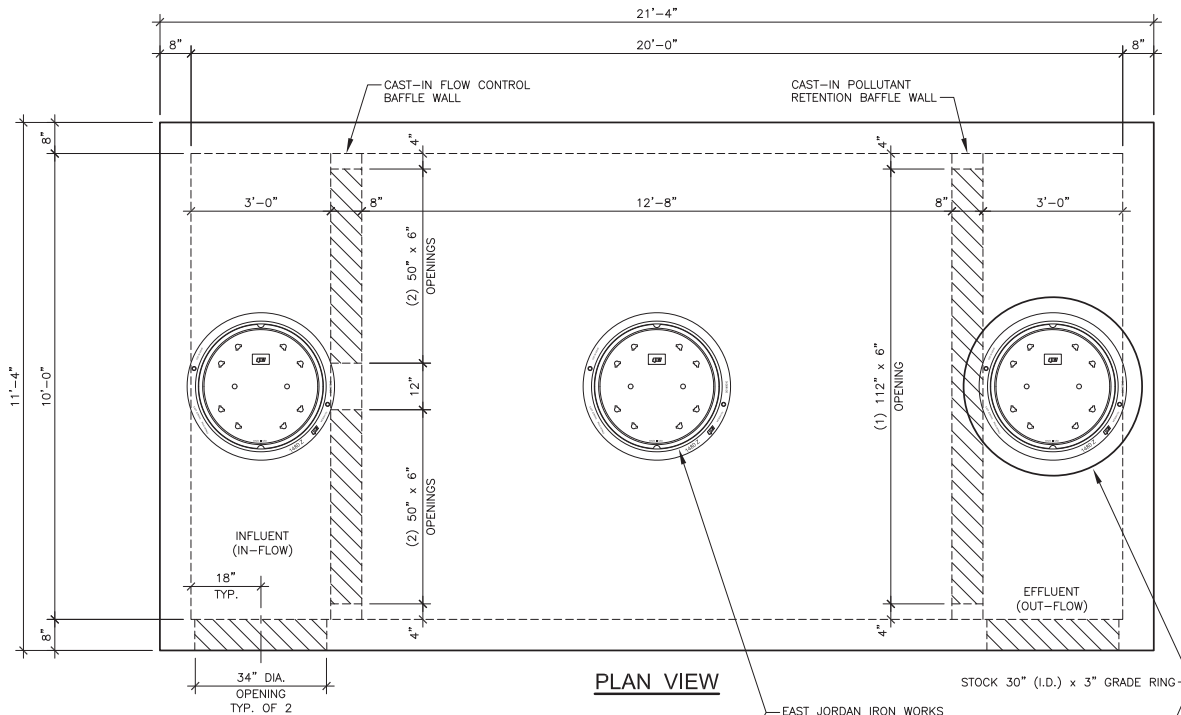
ODOT MH-3

WQS Return Mh per Baker review



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	632.3	0	0	30" - RCP Co-Pipe	42"Ø
(2)	632.3	0	180	30" - RCP Co-Pipe	42"Ø
(3)	632.3	0	270	24" - RCP Co-Pipe	34"Ø





**WATER QUALITY STRUCTURE - D-96**  
**TYPE 4 WQS**

**NOTES:**

- 1.) CONCRETE MIN. 5,000 PSI @ 28 DAYS
- 2.) REINFORCING GRADE 60 ASTM A615-A617  
60,000 PSI YIELD STRENGTH
- 3.) HS-20 LOADING
- 4.) REINFORCING FOR CAST-IN BAFFLE WALLS SHALL BE #4 DEFORMED BARS SPACED AT 12" O.C.E.W., CENTERED IN BAFFLE WALLS. ALL BAFFLE WALL REBAR SEGMENTS SHALL BE GROUTED INTO 3" DEEP DRILLED HOLES IN WALLS AND FLOOR OF VAULT SEGMENTS.

SEE FOLLOWING PAGE FOR DETAILS  
OF CAST-IN BAFFLE WALLS

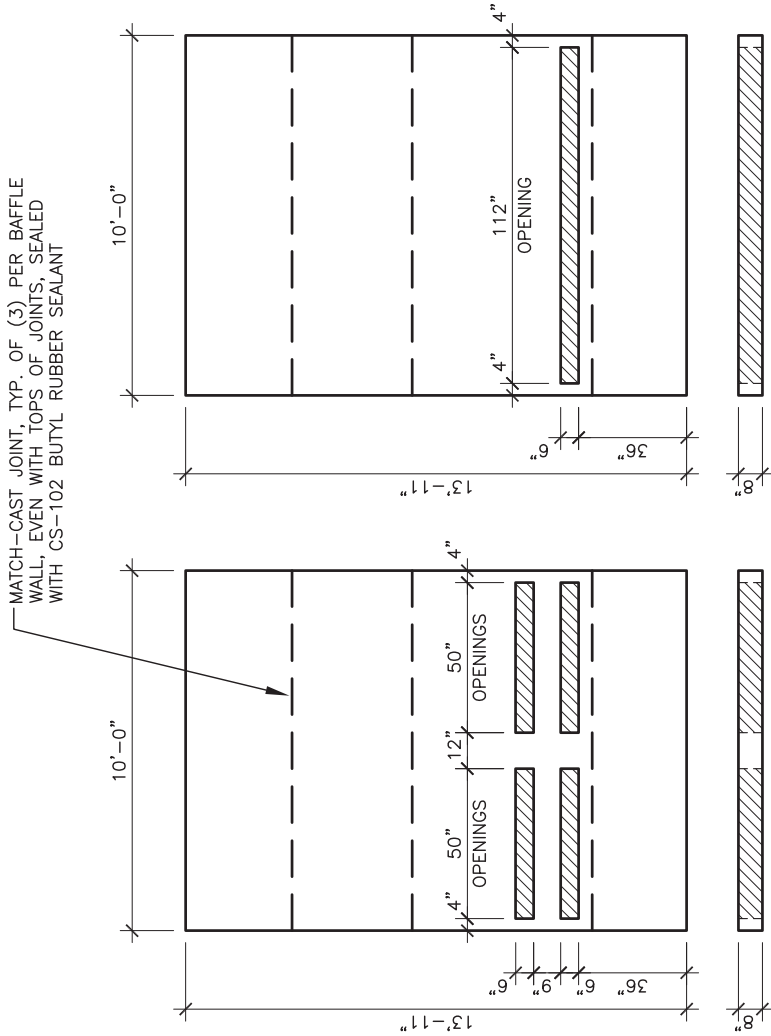
REVISIONS			
NO.	DESCRIPTION	DATE	BY
1.	WEIGHTS CORRECTED	12/14/20	DJF
2.	BAFFLE WALLS CAST-IN	1/20/21	DJF
3.	WEIGHTS CORRECTED	1/20/21	DJF
4.			
5.			
6.			
7.			

**INDEPENDENCE EXCAVATING, INC.**  
JOB: ODOT 173000 - OPPORTUNITY CORRIDOR - PHASE 3  
DRAWN BY: DJF  
CHECKED BY: RH  
DATE: 1/20/2021  
SCALE: 3/8"=1'-0"

**Lindsay**  
PRECAST

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173408 D-96-1



CAST-IN FLOW CONTROL  
BAFFLE WALL DETAIL  
(CAST IN (4) SECTIONS)  
3/16" = 1'-0"

CAST-IN POLLUTANT RETENTION  
BAFFLE WALL DETAIL  
(CAST IN (4) SECTIONS)  
3/16" = 1'-0"

CAST - IN BAFFLE WALL DETAILS

NOTES:

- 1.) CONCRETE MIN. 5,000 PSI @ 28 DAYS
- 2.) REINFORCING GRADE 60 ASTM A615-A617  
60,000 PSI YIELD STRENGTH
- 3.) HS-20 LOADING
- 4.) UNIT WEIGHTS INCLUDED IN BASE AND RISER WEIGHTS

REVISED

NO.	DESCRIPTION	DATE	BY
1.	CAST-IN WALLS	1/20/21	DJF
2.	COLD JOINTS ADDED	1/20/21	DJF
3.			
4.			
5.			
6.			
7.			

UP

Lindsay

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CUSTOMER:  
INDEPENDENCE EXCAVATING, INC.

JOB:  
ODOT 173000 - OPPORTUNITY CORRIDOR - PHASE 3

DRAWN BY: PICKED BY: SCALE: DATE: JOB NO: DWG NO:

DJF RH 3/16" = 1'-0" 1/20/21 173408 D-96-2



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E-mail: [envengr@env21.com](mailto:envengr@env21.com)

## UNISTORM-V MAINTENANCE

**D-96 Volumes:                      Sediment w/ Avg Depth of 12" = 200 cu ft.**  
**Stormwater = 600 cu ft/4,490 gal**

### UNISTORM -V DESCRIPTION

The UNISTORM-V is a 3-compartment Precast concrete vault. Vault width ranges from 6-12 feet depending on the diameter of the storm sewer pipe. Vault length increases with the size of the impervious area being treated. UNISTORM-V vaults are manufactured from standard precast concrete modules. Use of modules reduces the weight of the structures that need to be handled during shipment and installation.

Normal water depth in the UNISTORM sump will be 3.5-4.0 ft. This shallow sump reduces excavation costs and the depth to be accessed from a pumper truck.

UNISTORM-V inlet and outlet compartments are typically 36 inches long, and act as flow distributors for the quiescent middle compartment. The middle compartment length will be longer and vary depending on the size of the impervious area being treated. Each compartment is equipped with 24"-30" access openings.

### POLLUTANT STORAGE CAPACITY AND CLEANOUT FREQUENCY

Recommended practice for the UNISTORM-V is to plan on semi-annual inspections and annual pumpout based on the following general design guidelines:

- (1) Sediment Sump -- the rate at which sediment is accumulated will depend on land use and Highway Department activities (e.g., heavy winter sanding will create extra pavement sediment, while regular pavement sweeping will reduce sediment accumulation). Environment 21 recommends sediment pumpout when the average depth of the sediment pile is 0.50 ft. The UNISTORM sump is designed to store an average sediment pile depth of 1.5 ft.
- (2) Floatables Chambers -- oil sheen and floating debris will be retained in the inlet and middle sections of the UNISTORM-V. Annual accumulation of floatables is estimated at less than 0.50 inches but can vary depending on land use.

During the first year of operation, Environment 21 recommends visual inspections in February, May, and October. This inspection schedule can be modified in subsequent years according to experience and/or to meet specific stormwater permit requirements.



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## **SEDIMENT PILE DEPTH MEASUREMENT**

Cast iron manhole frames with vented covers are provided in the UNISTORM-V roof to make the sediment pile readily accessible for measurement and cleaning. Sediment should be removed when the pile depth is 6"-12". Normal water depth in the UNISTORM sump will be 3.5-4.0 ft.

During routine inspections, the distance from the rim of the UNISTORM access opening to the top of the sediment pile can be determined by slowly lowering a measuring rod with 3-6-inch diameter end plate. The end plate improves the ability to sense when the top of the sediment pipe has been contacted.

To determine sediment pile depth, twist the measuring rod into the sediment pile until the end plate contacts the floor of the UNISTORM-V.

Organic debris that has become waterlogged and settled to the floor is expected to be present in relatively small quantities that will be removed during pumpout of the mineral sediment.

## **FLOATABLES OBSERVATION AND MEASUREMENT**

Oil sheen and floating debris can be observed using a flood light to illuminate the water surface in the inlet and middle sections of the UNISTORM. Gently stir the floatables to estimate depth. This depth will typically be less than one inch and floatables can be skimmed from the surface prior to pumpout of the sediment.

## **PUMPOUT**

Pumpout of the UNISTORM is achieved using standard truck-mounted sewer and catch basin cleaners with positive displacement rotary lobe vacuum pumps. Manhole openings provide access to all sections of the UNISTORM. Site Plans for the project should include a driveway area for truck access to the UNISTORM.

## **DISPOSAL OF WASTEWATER, SEDIMENT, AND FLOATABLES**

Commercial and retail sites are usually adjacent and tributary to public stormwater systems, and accordingly pumper truck contents should be delivered to an approved waste disposal facility. Facilities used by the local Highway Department may be acceptable. For industrial sites, pumper truck contents should be delivered to a disposal site approved by the owner of the industrial site.



## UNISTORM SYSTEM MAINTENANCE

### 1.0 UNISTORM DESCRIPTION

- 1.1 The Unistorm is a precast concrete structure. It is available in different configurations (e.g., with an at grade inlet grate, flow control, etc.) and with different attachments (e.g., flow control vanes, flow diffusers, etc.).
- 1.2 The Unistorm System consists of stages of treatment separated by a precast concrete baffle walls. The baffle walls are designed to meet site-specific flow requirements and provide four functions:
  - (a) Removes floatables and sediment in the inlet stage
  - (b) Provides a low head loss flow path between the first and second stages
  - (c) Provides for additional sediment removal in the second stage.
  - (d) Provides flow control either with vanes mounted on the upstream side of the baffle wall or through diversion baffles.
- 1.3 The Unistorm Systems are manufactured from standard precast concrete components. These components are designed to reduce the weight that needs to be handled during shipment and installation.
- 1.4 Normal water depth in the Unistorm System structure sump will be 3-6 ft dependent on the project requirements. This shallow sump reduces excavation costs and the depth to be accessed from a standard vacuum truck (13' lift).
- 1.5 Cast iron access frames with vented covers are provided in the Unistorm System roof to make the sediment pile readily accessible for measurement and cleaning in each stage of the structure.

### 2.0 POLLUTANT STORAGE CAPACITY AND CLEANOUT FREQUENCY

- 2.1 The recommended maintenance practice for the Unistorm System is to plan on quarterly inspections and an annual pump-out based on the following general design guidelines:



- 2.1.1 Sediment Sump -- the rate at which sediment is accumulated will depend on land use and other pavement activities (e.g., heavy winter sanding will create extra sediment, while regular sweeping will reduce accumulation). The Unistorm System structure sump is designed to store an average sediment pile depth of up to 1.0 ft. Environment 21 recommends that the sediment should be removed when the first-stage sediment pile depth is 6"-12"
- 2.1.2 Floatables Chambers -- oil sheen and floating debris will be retained in the inlet stage of the Unistorm System. Annual accumulation of floatables is estimated at less than 0.50 inches but can vary depending on land use.
- 2.1.3 During the first year of operation, Environment 21 recommends visual inspections in January, April, July, and October. This inspection schedule may be modified in subsequent years according to experience or to meet specific stormwater permit requirements.
- 2.1.4 Refer to the Environment 21 system specific design package for the estimated maintenance interval or call 1-800-809-2801.

### 3.0 SAFETY

- 3.1 Safety is a priority and the following are recommended guidelines while performing maintenance on Unistorm Systems. These guidelines are not all-inclusive and by no means are they meant to usurp any safety program already in place for the individuals performing the maintenance on the Unistorm System.
  - 3.1.1 The Unistorm System is a confined space structure but entry into it is not required and is not recommended by Environment 21. The design of the Unistorm System is such that all of the maintenance may be completed without entry. In the remote chance that entry into the Unistorm System structure is required only trained, qualified workers with the proper Personal Protective Equipment (PPE) should perform the entry.





3.1.1.1 If a personnel entry is required it should be made per OSHA guidelines and any regulations concerning confined space entry, ladder safety, electrical safety (especially around water), environment safety (hazardous atmosphere, weather, etc.), and any other regulations deemed appropriate by local authorities. These regulations are generally minimum requirements so the most stringent of these should be followed. Physical access equipment should be determined by the prevalent conditions. An example would be to use a properly secured approved ladder (e.g., extension ladder) that is in a low traffic volume (both pedestrian and vehicle) area with an oblique terrain (e.g., flat).

3.1.2 The Unistorm System has cast iron access frames with vented covers which provide access to all stages of the Unistorm system. The openings are normally at ground level so the work area should be staged properly with safeguards to prevent anyone or anything from inadvertently falling through an opening in the Unistorm System structure. The access openings provided are usually sized at 24" or 30", dependent on the diameter of the structure, and conform to ASTM C478 specifications.

3.1.3 After maintenance has been completed on the Unistorm System, the area should be cleared of slip and trip hazards and the cast iron vented covers set securely in place.

## 4.0 FLOATABLES OBSERVATION AND MEASUREMENT

- 4.1 Maintain an inventory all tools and equipment used for completion of this procedure.
- 4.2 Obtain a flood light and a rod (measuring rod from step 5.2)
- 4.3 Set up the work area using proper safety procedures, equipment (e.g., barricades) and PPE as required.



- 4.4 Carefully remove the cast iron vented covers using proper lifting and rigging equipment; set the covers off to the side in a safe area and safe configuration (e.g., not suspended).
- 4.5 Illuminate the water surface in the inlet stage of the Unistorm System with the flood light.
- 4.6 Gently stir the floatables to estimate the depth. Obtain a sample of the floatables, water, or sediment, if required, for waste disposal. The depth of the oil sheen and floating debris will typically be less than one inch and can be skimmed from the surface prior to the pump-out of the sediment. Organic debris that has become waterlogged and settled to the floor is expected to be present in relatively small quantities that will be removed during the pump out of the mineral sediment.
- 4.7 Inspect all surfaces, which can be seen, of the Unistorm System structure for wear (e.g., cracking, spalling, etc.). Report signs of degradation to the proper authorities (i.e., owner, municipality, etc.).
- 4.8 Repeat steps 4.6 and 4.7 for other stages of the Unistorm System.

## 5.0 SEDIMENT PILE DEPTH MEASUREMENT

- 5.1 Complete section 4.0 of this procedure prior this section.
- 5.2 Obtain a measuring rod (increments in inches marked on the rod) that will reach the floor of the Unistorm System structure and still extend a minimum of 2' above the cast iron access frame. The rod should not bend.
- 5.3 Lower the measuring rod into the inlet stage of the Unistorm System structure until a slight resistance to movement occurs; the rod is now at the top of the sediment pile. Obtain a sight measurement by sighting the rod measuring increments to a point on the cover frame.
- 5.4 Twist the measuring rod into the sediment pile until the measuring rod is on the floor (verify the expected level using project submittal drawings). Obtain a sight measurement by sighting the rod increments to the same point on the access frame as was used in step 5.3. Subtract the smaller number from the larger number as obtained in this step and step 5.3. For example, if the measurement in step 5.3 is 8' 0" and the measurement in



step 5.4 is 8' 3" subtract the 8' 0" from the 8' 3". This is the sediment depth of the Unistorm Manhole.

- 5.5 Repeat steps 5.3 and 5.4 for all other stages of the Unistorm System.
- 5.5 If pump-out of the Unistorm System is required and will occur immediately go to Section 6.0 of this procedure; if not go to Section 7.0 of this procedure.

## 6.0 PUMP-OUT OF THE UNISTORM SYSTEM

- 6.1 Contact the following for approval and notification of the intent to pump out the Unistorm System:
  - 6.1.1 Owner
    - 6.1.1.1 Obtain permission from the Owner to pump out the contents of the Unistorm System.
  - 6.1.2 Waste Disposal Facility
    - 6.1.2.1 Facilities used by the local Highway Department may be acceptable, while, for industrial sites, the pumper truck contents should be delivered to a disposal site approved by the owner of the industrial site and disposed of in accordance with local requirements for disposal of pollutants.
    - 6.1.2.2 Obtain permission to deliver the waste to the facility.
  - 6.1.3 Government Agencies
    - 6.1.3.1 Obtain permission, as required, from local, State and Federal Agencies.
- 6.2 Obtain a standard truck-mounted sewer and catch basin cleaner with positive displacement rotary lobe vacuum pumps or other acceptable pump-out equipment.
- 6.3 If the area was secured after the inspection and Section 7.0 was performed complete steps 4.2 and 4.3 of this procedure.



- 6.4 Using the truck-mounted sewer and catch basin cleaner, suction the floatables and hydrocarbons from the inlet stage. Segregate this waste from the sediment and water as required by the local regulations and the waste facility.
- 6.5 Using the truck-mounted sewer and catch basin cleaner, suction the standing water and sediment from the inlet stage. Segregate this waste from the hydrocarbons and floatables as required by the local regulations and the waste facility.
- 6.6 Using the water supply from the vacuum truck wash down the interior surface of the Unistorm system and suction the waste from the bottom of the structure.
- 6.7 Repeat steps 6.4 through 6.6 for all other stages of the Unistorm System.
- 6.8 Using a flood light inspect all surfaces, which can be seen, of the Unistorm System structure for wear (e.g., cracking, spalling, etc.). Report signs of degradation to the proper authorities (i.e., owner, municipality, etc.).
- 6.9 Refill the Unistorm System, with clean water, to the inlet/outlet pipe invert elevation.
- 6.10 Properly dispose of the waste removed from Unistorm System as pre-arranged

## 7.0 SECURING THE AREA

- 7.1 Verify that no personnel, tools or equipment are in the Unistorm System structure.
- 7.2 Inspect the cast iron access frames and covers for damage (e.g., cracks, excessive wear, etc.).
- 7.3 Clear the cast iron access frames of any extraneous material and carefully replace the cast iron vented covers using proper lifting and rigging equipment. Verify that the covers are properly seated.
- 7.4 Remove the site set-up (tools, equipment, etc.) and verify the work area has been returned to its pre-work condition.



- 7.5 Complete an inventory of all tools and equipment used for this work, accounting for lost, damaged, or stolen tools or equipment.

## 8.0 RECORD KEEPING

- 8.1 Maintenance is a very important aspect in keeping the Unistorm System performance up to par. The attached "UNISTORM SYSTEM MAINTENANCE DATA SHEET" is provided and should be used to document the maintenance performed on the Unistorm System.
- 8.2 Provide a copy of the "UNISTORM SYSTEM MAINTENANCE DATA SHEET" to the owner, required government agencies, and Environment 21, LLC (P.O. Box 55, East Pembroke, NY 14056-1055).



environment21  
Global Stormwater Solutions

P.O. Box 55 | East Pembroke | NY 14056  
Phone: 1-800-809-2801 | Fax: 1-585-815-4701  
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# UNISTORM SYSTEM MAINTENANCE DATA SHEET

STRUCTURE NO.: \_\_\_\_\_

LOCATION: \_\_\_\_\_

OWNER: \_\_\_\_\_

UNISTORM MODEL \_\_\_\_\_

DATE INSTALLED: \_\_\_\_\_

MUNICIPALITY: \_\_\_\_\_

DATE	SEDIMENT PILE DEPTH	OIL SHEEN YES/NO	FLOATABLE DEPTH	PUMPOUT REQ. YES/NO	SAMPLED YES/NO	SAMPLE RESULTS

## PUMPOUT DATA (IF APPLICABLE)

DATE	SEDIMENT VOLUME REMOVED	FLOATABLES VOLUME REMOVED	SEDIMENT/FLOATABLE DISPOSAL INFORMATION:	
			WHERE DISPOSED	HOW DISPOSED





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**PRIOR TO START OF WORK**

- OWNER NOTIFIED AS REQUIRED. ☐
- GOVERNMENT AGENCIES NOTIFIED AS REQUIRED. ☐
- DISPOSAL SITE CONTACTED (IF PUMPOUT IS REQUIRED.) ☐
- ALL REQUIRED PPE, TOOLS, AND EQUIPMENT ARE AVAILABLE AND IN GOOD WORKING ORDER. ☐



**AFTER WORK COMPLETION**

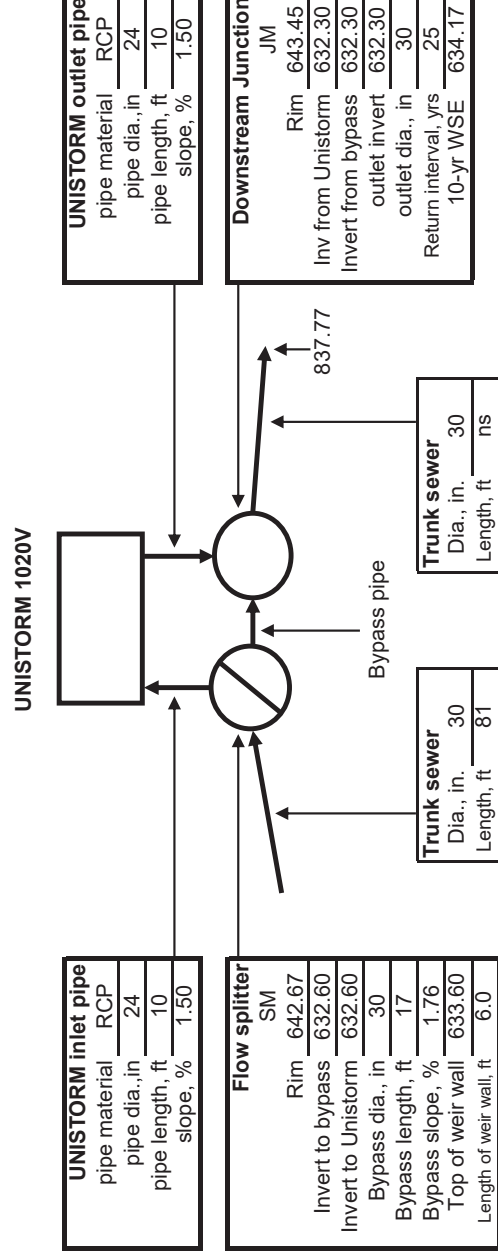
- ANY SIGNS OF WEAR NOTED AND REPORTED IF NECESSARY ☐
- UNISTORM SYSTEM HAS BEEN FILLED WITH CLEAN WATER ☐
- ALL CAST IRON COVERS HAVE BEEN PROPERLY REPLACED. ☐
- NO HAZARDOUS CONDITIONS EXIST AS A RESULT OF THE MAINTENANCE WORK. ☐
- ALL PPE, TOOLS, AND EQUIPMENT HAVE BEEN INVENTORIED AND REMOVED FROM THE SITE. ☐
- THE WORK AREA HAS BEEN RETURNED TO A SAFE PRE-WORK CONDITION. ☐
- ALL NOTIFICATIONS HAVE BEEN MADE, AS REQUIRED, THAT THE WORK IS COMPLETED. ☐

DATE: \_\_\_\_\_ SIGNATURE: \_\_\_\_\_

# ENVIRONMENT 21 SKETCH PLAN, HYDROLOGY ANALYSIS, AND HYDRAULIC ANALYSIS

Data entry date 01/19/2021		ENVIRONMENT 21 SKETCH PLAN, HYDROLOGY ANALYSIS, AND HYDRAULIC ANALYSIS									
Site/Project ODOT 173000 OPPORTUNITY CORRIDOR PH 3		Trunk sewer travel time				Drainage Area Hydrology / Design Storm IDF Values					
Municipality CLEVELAND, OH		Longest travel distance, ft 300				Specified return interval 25 yrs					
Engineer NS		Average pipe flow velocity, fps 4.0				Specified duration 10 min					
Owner OHDOT		Travel time, minutes 1.3				Average intensity 5.30 in/hr					
Contractor INDEPENDENCE EXCAVATING		IDF duration at last inlet, minutes 5.0				Rainfall depth 0.88 inches					
ENV 21 Affiliate LINDSAY CONCRETE		IDF duration at first inlet, minutes 5.0									
UNISTORM Inspection and Pumpout Interval											
Annual unit pavement pollutant washoff		1000		#/ac/yr		Rainfall rate		22.3 cfs		Area, acres 4.20 C	
Annual unit roof pollutant washoff		100		#/ac/yr		Ponding/bypassing at inlets		2.2 cfs		% paved 100 0.90	
Pavement pollutant washoff		4200		#/yr		Flow entering inlets		20.0 cfs		%roof 0 0.90	
Roof pollutant washoff		0		#/yr		Inflow from offsite		0 cfs		% vegetation 0 0.30	
Site pollutant washoff load		4200		#/yr		Total flow entering inlets		20.0 cfs		CA 3.78	
Washoff trapped at curbs and inlets		1050		#/yr		Total flow entering Unistorm		7.1 cfs			
Washoff trapped in UNISTORM		2595		#/yr		C = runoff coefficient = ability of rainfall to enter inlets					
Design sediment storage capacity		10500		#		WATER QUALITY VOLUME (WQV)					
Maximum pumpout interval		4.0		yrs+/-		Drainage area		4.20 ac		Rainfall 1.00 inches	
Recommended inspection interval		0.5		yrs+/-		Impervious area		4.20 ac		Runoff 0.95 inches	
Design sediment storage capacity		100.0		ft³		Impervious area		100 %		WQV 0.33 ac-ft	
Design sediment storage depth		0.5		ft		Water Quality Rv		0.95		WQV 14484 cf	
Estimated per cent washoff trapped		86.8		%		WATER QUALITY FLOW RATE (WQFR)					
UNISTORM sump depth		4.0		ft		Average intensity		1.00 in/hr		Runoff coefficient 0.90	
						Event duration		NS minutes		Impervious area 4.2 ac	
						Annual frequency		NS events/yr		Spec. WQFR 3.60 cfs	





## SKETCH PLAN



Environment 21, LLC  
8713 Read Road - P.O. Box 55  
East Pembroke, New York 14056  
ph# 585-762-8314  
fax# 585-762-8315  
email: envengr@env21.com

Technical Report

Project:	ODOT 173000 OPPORTUNITY CORRIDOR PH 3	Date:	01/19/2021
Municipality:	CLEVELAND, OH	STS#	D-96
Engineer:	NS		
Owner:	OHDOT		
Contractor:	INDEPENDENCE EXCAVATING		
Environment 21 Affiliate:	LINDSAY CONCRETE		
ENV 21 Product	UNISTORM	Width	10 ft
ODOT Type	4	Length	20 ft
		Surface area	200 sf
<u>Drainage Area</u>		<u>Water Quality Volume</u>	
Drainage area	4.20 acres	Rainfall	1.00 in.
Paved area	100 %	Water Quality Rv	0.95
Roof area	0 %	Runoff depth	0.95 inches
Vegetated area	0 %	Drainage area	4.2 acres
		Water quality volume	0.33 ac-ft
<u>Design Storm Rainfall IDF Values</u>		<u>Water Quality Flow Rate</u>	
Specified return interval	25 yrs	Runoff coefficient	0.90
Specified duration	10 min	Average Intensity	1.00 in/hr
Average intensity	5.3 in/hr	Impervious area	4.20 acres
Rainfall depth	0.9 inches	Water Quality Flow Rate	3.6 cfs
<u>Site Drainage Hydrology for Specified IDF Duration</u>			
Rainfall rate	22.3 cfs		
Ponding/bypassing at inlets	2.2 cfs		
Flow entering inlets	20.0 cfs		
Inflow from offsite	0 cfs		
Total flow entering inlets	20.0 cfs		
UNISTORM inlet velocity	2.3 fps		



## Sediment Pumpout Interval

Hydraulic model: Treatment with external bypassing

### Estimated Composition for Pollutant Washoff Entering UNISTORM

Annual unit pavement pollutant washoff	1000	#/ac/yr
Annual unit roof pollutant washoff	100	#/ac/yr
TSS as silt + bouyant organics	30	wt%
TSS as fine sand	40	wt%
TSS as medium sand	30	wt%
Pavement pollutant washoff	4200	#/yr
Roof pollutant washoff	0	#/yr
Site pollutant washoff load	4200	#/yr

### Storage Capacity for Washoff of Oil-Floatables

Water surface area	200	sf
Floatables depth	0.50	ft
Floatables stored	748.0	gal
Floatables retained	100	%

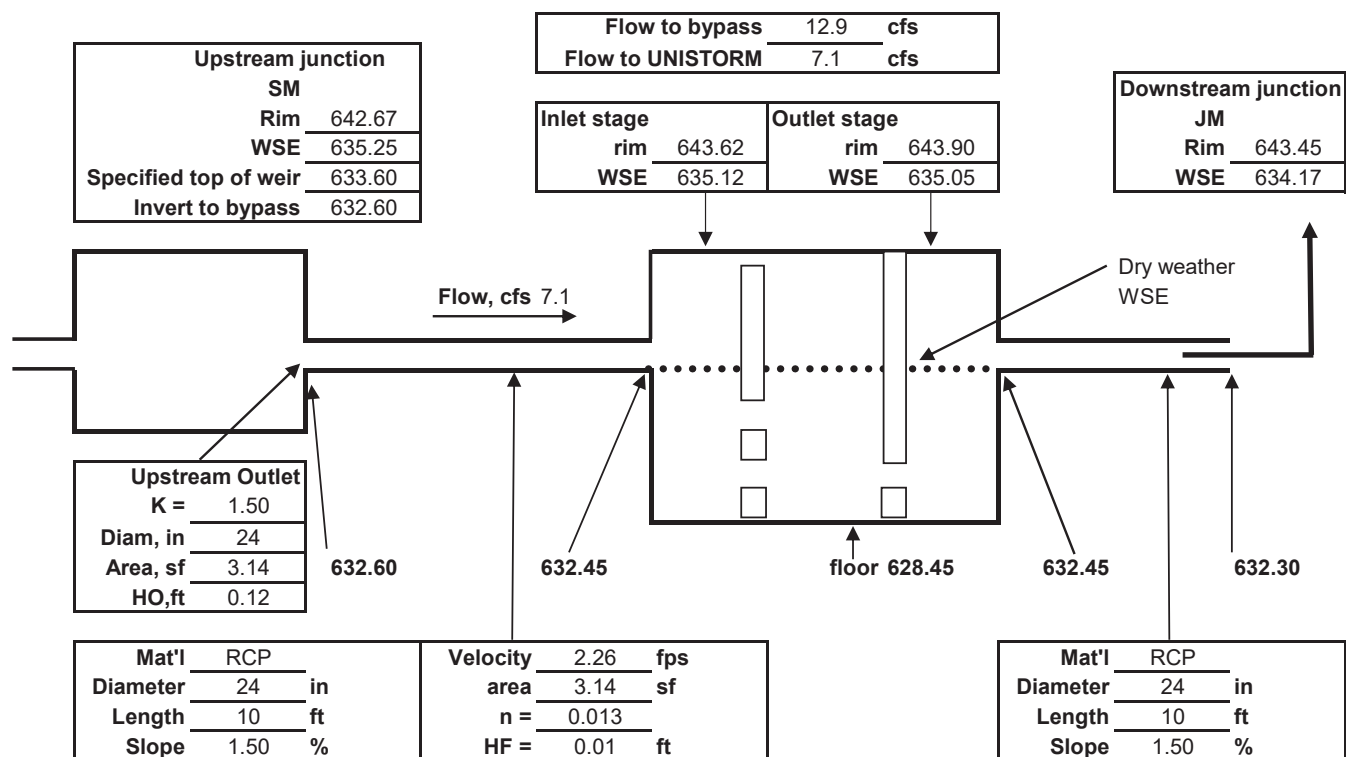
### Estimated UNISTORM Pumpout Interval


Washoff trapped at curbs and inlets	1050	#/yr
Washoff trapped in UNISTORM	2595	#/yr
Estimated per cent washoff trapped	87	%

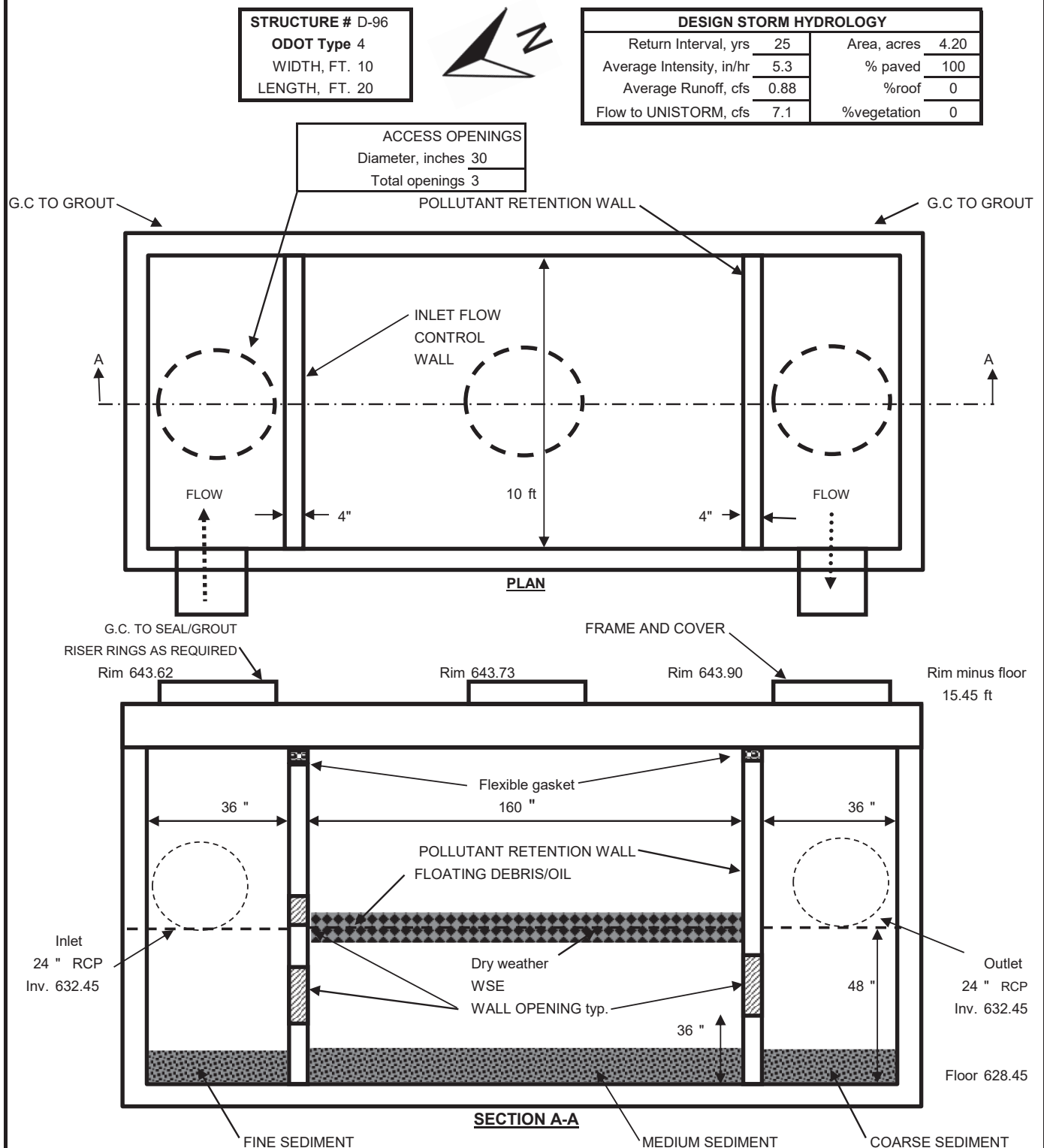
UNISTORM sump depth	4.0	ft
Design sediment storage capacity	10500	#
Design sediment storage capacity	100	cf
Design sediment storage depth	0.5	ft
Maximum pumpout interval	4.0	yrs+/-
Recommended inspection interval	0.5	yrs+/-

## Design Storm Backwater Analysis

- (1) Downstream Water Elevation Estimated by ENV 21 or Provided by Site Engineer
- (2) Outlet pipe hydraulics based on culvert hydraulics




<b>Environment 21, LLC</b> 8713 Read Road, P.O. Box 55 East Pembroke, NY 14056-0055 Fax: (585) 762-8315 Web: www.env21.com <b>Phone: (800) 809-2801</b>	<b>Site/Project:</b> ODOT 173000 OPPORTUNITY CORRIDOR		
	<b>Location:</b> CLEVELAND, OH		
	<b>Owner:</b> OHDOT		
	<b>Engineer:</b> NS		
	<b>Contractor:</b> INDEPENDENCE EXCAVATING		
	<b>ENV 21 Affiliate:</b> LINDSAY CONCRETE		
<b>Data Entry Date:</b> 01/19/2021		<b>DWG No.:</b> 1 of 2	<b>Product Name:</b> UNISTORM

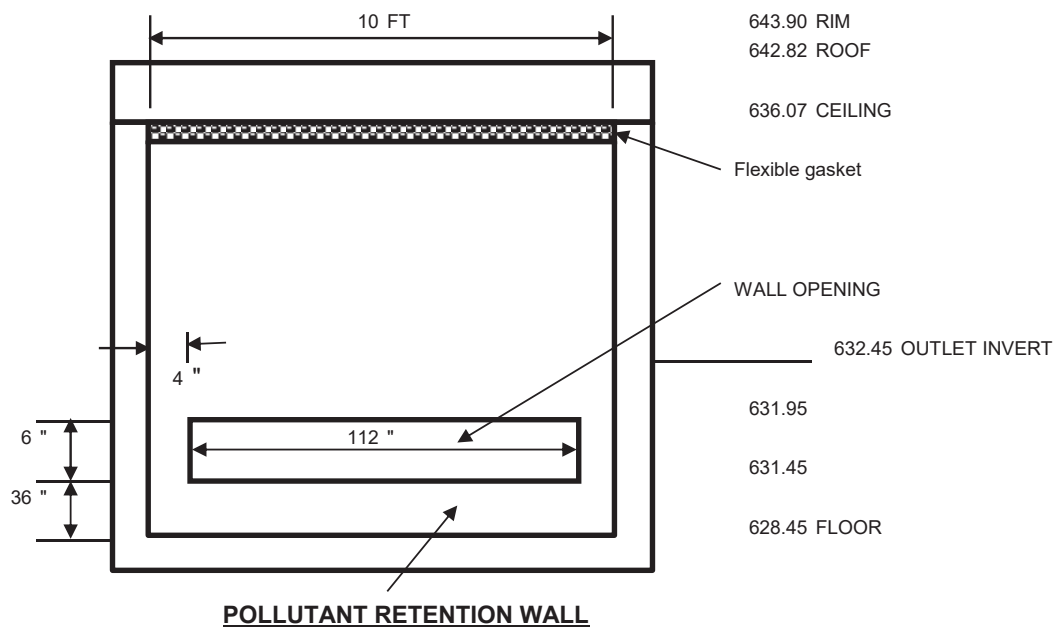
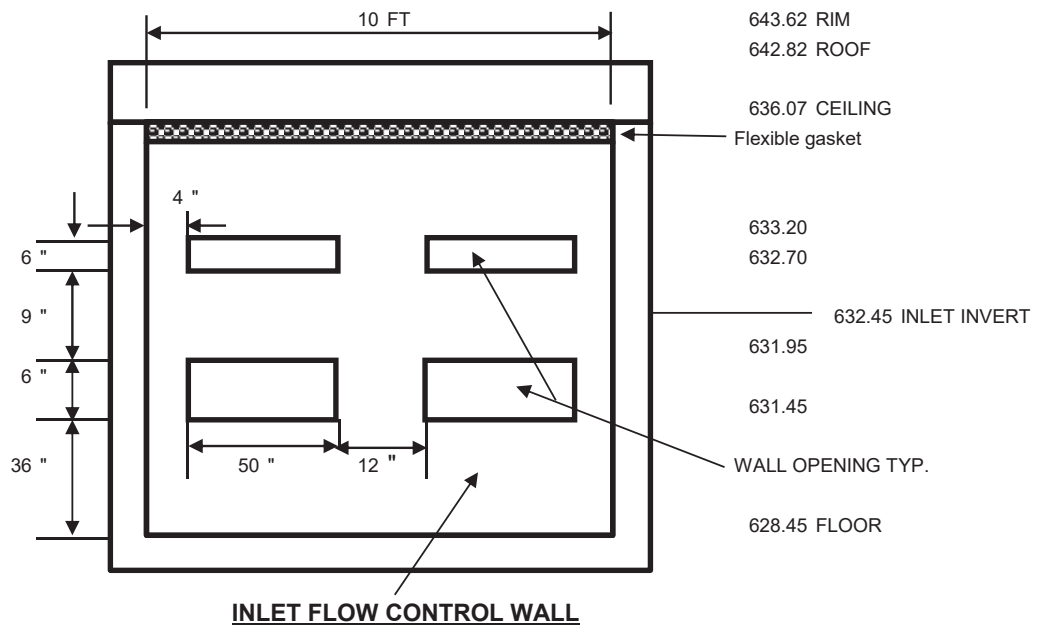


**NOTE:** THE INFORMATION IN THIS DRAWING IS PROPRIETARY. CONTRACTOR SUBMITTAL MUST INCLUDE ENVIRONMENT 21 TECHNICAL ANALYSIS OF SITE HYDROLOGY AND STORM SEWER SYSTEM HYDRAULICS

PROPRIETARY INFORMATION:  
 - ALL RIGHTS TO ENVIRONMENT 21, LLC.

<b>Environment 21, LLC</b> 8713 Read Road, P.O. Box 55 East Pembroke, NY 14056-0055 Fax: (585) 762-8315 Web: www.env21.com  <b>Phone: (800) 809-2801</b>	<b>Site/Project:</b> ODOT 173000 OPPORTUNITY CORRIDOR PI		
	<b>Location:</b> CLEVELAND, OH		
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	<b>Contractor:</b> INDEPENDENCE EXCAVATING		
	<b>ENV 21 Affiliate:</b> LINDSAY CONCRETE		
	<b>Data Entry Date:</b> 01/19/2021 <b>DWG No.:</b> 2 of 2		
<b>Product Name:</b> UNISTORM			

<b>STRUCTURE NO.</b>	D-96
<b>ODOT Type</b>	4
<b>VAULT WIDTH, FT.</b>	10
<b>VAULT LENGTH, FT.</b>	20



**NOTE:** THE INFORMATION IN THIS DRAWING IS PROPRIETARY. CONTRACTOR SUBMITTAL MUST INCLUDE ENVIRONMENT 21 TECHNICAL ANALYSIS OF SITE HYDROLOGY AND STORM SEWER SYSTEM HYDRAULICS

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<b>Environment 21, LLC</b> 8713 Read Road, P.O. Box 55 East Pembroke, NY 14056-0055 Fax: (585) 815-4701 Web: www.env21.com  <b>Phone: (800) 809-2801</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="padding: 2px;">Site/Project: ODOT 173000 OPPORTUNITY CORRIDOR PH 3</td></tr> <tr><td style="padding: 2px;">Location: CLEVELAND, OH</td></tr> <tr><td style="padding: 2px;">Owner: OHDOT</td></tr> <tr><td style="padding: 2px;">Engineer: NS</td></tr> <tr><td style="padding: 2px;">Contractor: INDEPENDENCE EXCAVATING</td></tr> <tr><td style="padding: 2px;">ENV 21 Affiliate: LINDSAY CONCRETE</td></tr> <tr><td style="padding: 2px;">Data Entry Date: 01/19/2021</td></tr> </table> <div style="text-align: right; padding-top: 10px;"> <b>Product Name: UNISTORM</b> </div>	Site/Project: ODOT 173000 OPPORTUNITY CORRIDOR PH 3	Location: CLEVELAND, OH	Owner: OHDOT	Engineer: NS	Contractor: INDEPENDENCE EXCAVATING	ENV 21 Affiliate: LINDSAY CONCRETE	Data Entry Date: 01/19/2021
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Location: CLEVELAND, OH								
Owner: OHDOT								
Engineer: NS								
Contractor: INDEPENDENCE EXCAVATING								
ENV 21 Affiliate: LINDSAY CONCRETE								
Data Entry Date: 01/19/2021								

### CALCULATED REMOVAL EFFICIENCIES BASED ON ANNUAL RAINFALL DATA

**UNISTORM CHAMBER DIMENSIONING**

Structure # D-96

Model # 4

Width, ft 10      Length, ft 20

Inlet stage
Outlet stage

rim 643.62
rim 643.90

inlet inv 632.45
outlet inv 632.45

approx. floor
628.45

Area treated by UNISTORM		
Area, acres	4.20	C
% paved	100	0.90
% roof	0	0.90
% vegetation	0	0.30
CA	3.78	

WQFR = 3.6 cfs

30 Min. Rainfall Depth (in.)	Rainfall intensity (in/hr)	Water flow rate (cfs)	Percentage of Annual Volume (%)	Percentage of Total Events (%)	Calculated removal efficiency at given flow rate of the 70 micron particle	Calculated critical settling velocity (ft/sec)	SOR (gpm/ft²)
0.25	0.50	1.89	30.5	81.5	93.33 %	0.02	4
0.50	1.00	3.78	23.1	10.3	66.00 %	0.03	8
0.75	1.50	5.67	15.5	4.1	53.89 %	0.05	13
1.00	2.00	7.56	9.5	1.8	46.67 %	0.06	17
1.25	2.50	9.45	7.4	1.1	41.74 %	0.08	21
1.50	3.00	11.34	5.4	0.6	38.10 %	0.09	25
1.75	3.50	13.23	2.6	0.3	35.28 %	0.11	30
2.00	4.00	15.12	1.6	0.1	33.00 %	0.13	34
2.25	4.50	17.01	1.4	0.1	31.11 %	0.14	38
2.50	5.00	18.90	1.3	0.1	29.51 %	0.16	42
2.75	5.50	20.79	0.2	0.0	28.14 %	0.17	47
3.00	6.00	22.68	0.5	0.0	26.94 %	0.19	51
3.25	6.50	24.57	0.3	0.0	25.89 %	0.20	55
3.50	7.00	26.46	0.0	0.0	24.94 %	0.22	59
3.75	7.50	28.35	0.2	0.0	24.10 %	0.24	64
4.00	8.00	30.24	0.0	0.0	23.33 %	0.25	68
4.25	8.50	32.13	0.2	0.0	22.64 %	0.27	72
4.50	9.00	34.02	0.2	0.0	22.00 %	0.28	76
4.75	9.50	35.91	0.0	0.0	21.41 %	0.30	81
5.00	10.00	37.80	0.0	0.0	20.87 %	0.32	85
5.25	10.50	39.69	0.0	0.0	20.37 %	0.33	89
5.50	11.00	41.58	0.0	0.0	19.90 %	0.35	93
5.75	11.50	43.47	0.0	0.0	19.46 %	0.36	98
6.00	12.00	45.36	0.0	0.0	19.05 %	0.38	102
6.25	12.50	47.25	0.0	0.0	18.67 %	0.39	106
6.50	13.00	49.14	0.0	0.0	18.30 %	0.41	110
6.75	13.50	51.03	0.0	0.0	17.96 %	0.43	115
7.00	14.00	52.92	0.0	0.0	17.64 %	0.44	119
7.25	14.50	54.81	0.0	0.0	17.33 %	0.46	123
7.50	15.00	56.70	0.0	0.0	17.04 %	0.47	127.3
7.75	15.50	58.59	0.0	0.0	16.76 %	0.49	132
8.00	16.00	60.48	0.0	0.0	16.50 %	0.50	136
8.25	16.50	62.37	0.0	0.0	16.25 %	0.52	140
8.35	16.70	63.13	0.0	0.0	16.15 %	0.53	142

Based on a particle size of 70 microns, and  
 the percentage of total storm events, the average  
 annual estimated removal efficiency =

87%

**Notes:**

1. Based on DETPOND Detention Pond Treatment Model by Robert Pitt.
2. Critical settling velocity calculation based on the application of Stokes Law using the water flow rate, a partial specific gravity of 2.6 and a chamber surface area of 200 square feet.
3. Rainfall Depth, Percentage of Total Events, and Percentage of Annual Volume data was obtained at the Youngstown, OH Airport from 1948 to 2005.

Telephone 215-855-8713

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# **GARY K. MUNKELT & ASSOCIATES, LLC**

Consulting Engineers  
Precast Concrete, Structural, Civil

1180 Welsh Rd. Suite 190 North Wales, PA 19454

**PROJECT:** DESIGN PRECAST CONCRETE WATER QUALITY STRUCTURE  
10'-0" x 20'-0" x 14'-0" I.D. (D-96)

**CLIENT:** LINDSAY PRECAST  
CANAL FULTON, OH

**JOB:** INDEPENDENCE EXCAVATING  
CLEVELAND, OH

*Gary K. Munkelt*  
2/9/2021  
STATE OF OHIO  
GARY K. MUNKELT  
49562  
REGISTERED PROFESSIONAL ENGINEER

## **TABLE OF CONTENTS**

<b><u>Title</u></b>	<b><u>Sheet</u></b>
General Specifications	2
Description of Product	3 - 4
Calculations	5 - 12
Reinforcing Summary Drawings	13 - 16

### GENERAL SPECIFICATIONS

1. Concrete shall be designed to obtain a strength of 5,000 psi in 28 days. Material shall meet requirements of ACI 318.
  - a. **Concrete for riser walls shall be designed to obtain a strength of 7,000 psi in 28 days. Material shall meet requirements of ACI 318. See calculations for details.**
2. Reinforcing steel for rebar shall be Grade 60 (obtain yield strength of 60,000 psi) and meet requirements of ASTM A615.
3. Weight of Concrete – 150 lb/ft<sup>3</sup>
4. Weight of Soil – 120 lb/ft<sup>3</sup>
5. HS-20 truck live load over top of structure at grade
6. Top of top slab is 0.34 ft min – 0.62 ft max below grade. (EL. 643.62' min, EL. 643.90' max)
7. Groundwater level at grade
8. Soil to have properties such that active earth pressure coefficient  $K_a = 0.33$

### REFERENCES

1. ASTM C890-19 titled "Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures"
2. ASTM C913-18 titled "Standard Specification for Precast Concrete Water and Wastewater Structures"



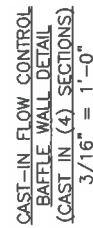
REVISIONS				Lindsay P R E C A B	
NO.	DESCRIPTION	DATE	BY		
1.	MEASUREMENTS CORRECTED	10/11/2021	EJF		
2.	SHUTTLE WHEELS CHANGED	11/17/2021	EJF		
3.	MEASUREMENTS CORRECTED	11/22/2021	EJF		

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DATE OF REVISION: 11/20/2021  
 DWF: 3/8" = 1'-0" 1/20/2021 173408 D-96-1

**INPC**



## CAST - IN BAFFLE WALL DETAILS

- 1.) CONCRETE MIN. 5,000 PSI @ 28 DAYS
- 2.) REINFORCING GRADE 60 ASTM A615-A617  
60,000 PSI YIELD STRENGTH
- 3.) HS-20 LOADING
- 4.) UNIT WEIGHTS INCLUDED IN BASE AND RISER

REVISIONS				
NO.	DESCRIPTION	DATE	BY	
1.	CASE-IN WALLS	1/20/21	DJF	
2.	COLD JOINTS ADDED	1/20/21	DJF	
3.				
4.				
5.				
6.				
7.				

**et** **RESPONSIVE**

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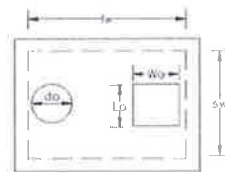
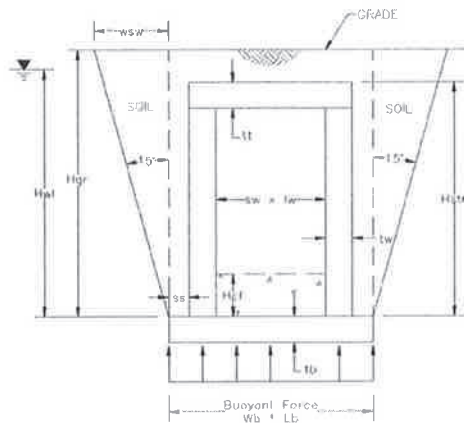
DRAWN BY: DJF CHECKED BY: RH DATE: 3/16 <sup>th</sup> = 1'-0"	JOB NO: 173408 DWG NO: D-96-2	
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CALC BY: TAC CHECK BY: \_\_\_\_\_ SHEET: 5 OF 16  
 DATE: 2/8/21 REVISED: \_\_\_\_\_ PROJECT: 2102025

**Determine Resistance to Flotation of Rectangular Structure**

**10.00 ft. x 20.00 ft.**



$s_w$ = short wall	=	10.00	ft.
$l_w$ = long wall	=	20.00	ft.
$A_o$ = Area, top slab openings	=	11.00	ft <sup>2</sup>
$t_t$ = top slab thickness	=	10	in.
$t_w$ = wall thickness	=	8	in.
$t_b$ = base slab thickness	=	10	in.
$s_s$ = shelf size	=	6	in.
$L_b$ = length of base	=	22.33	ft.
$W_b$ = width of base	=	12.33	ft.
$H_{str}$ = height of structure	=	14.83	ft.
Top of Slab to Grade (avg)	=	0.45	ft.
$H_{gr}$ = height to grade	=	15.28	ft.
Grade to Water Table	=	0.000	ft.
$H_{wl}$ = height to water level	=	15.28	ft.
$H_{cf}$ = height of concrete fill	=	0.00	ft.
Soil Wedge Angle	=	15	°
$w_{sw}$ = width of Soil Wedge	=	4.10	ft.

Weight of Concrete ( $W_{c1}$ ) =	150 pcf
Weight of Soil ( $W_{s1}$ ) =	120 pcf
Weight of Water ( $W_w$ ) =	62.4 pcf
Weight of Submerged Soil ( $W_{ss}$ ) =	57.6 pcf

Desired Factor of Safety = 1.25

**Buoyant Force ( $F_B$ ):** The buoyant force acts vertically upward on the bottom slab.

$$F_B = [(s_w + 2t_w)(l_w + 2t_w) \text{MIN}(H_{str}, H_{wl}) + (L_b)(W_b)(t_b)] \times W_w = 238,113 \text{ lb}$$

**Resisting Forces ( $F_R$ ):**

$W_1$ = Weight of Top Slab = $[(s_w + 2t_w)(l_w + 2t_w) - A_o](t_t) \times W_{c1}$ =	28,847	lb.
$W_2$ = Weight of Walls = $\{[(s_w + 2t_w)(l_w + 2t_w) - (s_w l_w)] \times (H_{str} - t_t)\} \times W_{c1}$ =	87,733	lb.
$W_3$ = Weight of Bottom Slab = $(L_b)(W_b)(t_b) \times W_{c1}$ =	34,431	lb.
$W_4$ = Weight of Soil over shelf = $\{[2 \times s_s H_{gr} (L_b + W_b - 2s_s)] + [w_{sw} H_{gr} (L_b + W_b + \pi/3 \times w_{sw})]\} \times W_{ss}$ =	170,072	lb.
$W_5$ = Weight of Saturated Soil over Top Slab = $[(s_w + 2t_w)(l_w + 2t_w)] (H_{wl} - H_{str}) \times W_{ss}$ =	6,267	lb.
$W_6$ = Weight of Concrete Fill = $(s_w l_w H_{cf}) \times W_{c1}$ =	0	lb.
$W_7$ = Weight of Baffle Walls = $[(2 \text{ walls} \times 13.92' \text{ tall} \times 10' \text{ wide}) - 8.83 \text{ ft}^2 \text{ openings total}] (8" \text{ thick}/12) (150 \text{ pcf})$	26,957	lb.
<b><math>F_R</math> =</b>	<b>354,307</b>	<b>lb.</b>

$$\text{Factor of Safety Against Flotation} = F_R / F_B = 1.49 \quad \text{OK}$$



## TOP SLAB DESIGN

### INPUT:

LL = 16 k / wheel	AASHTO HL-93 Wheel Live Load
$\gamma_{conc} = 150$ pcf	Concrete Unit Weight
$\gamma_{soil} = 120$ pcf	Soil Unit Weight
$h_{slab} = 10$ in	Thickness of Structural Concrete
$h_{soil} = 0.62$ ft	Height of Soil on Top of Slab (max)
b = 48 in	Width of Slab Section
$b_o = 26$ in	Width of Adjacent Openings
I = 1.3	Impact Factor
$L_u = 10.00$ ft	Span, Clear (for Shear)
L = 10.67 ft	Span, $\Phi$ Supports (for Moment)
$c_c = 1.00$ in	Cover for Rebar
$f_c = 5,000$ psi	Concrete Compressive Strength
$f_y = 60,000$ psi	Steel Yield Strength
Rebar = #5	Size of Rebar
Spacing = 6 in	Spacing of Typical Rebar
Trim Bars = 2 bars	Number of Bars Added to Section
$A_s = 3.10$ in <sup>2</sup>	Total Area of Rebar in Beam Section
d = 8.69 in	Depth of Cracked Section

### Main Bars:

Use #5 bars @ 6" o.c.

\* Use ACI Load Factors 1.2D + 1.6L

### APPLIED LOADS

$$\begin{aligned}
 w_{u,DL} &= \text{Self-Weight: } 1.2 \times (48" + 0.5 \times 26") (10") (150 \text{ pcf}) / 144,000 &= 0.76 \text{ klf} \\
 &\text{Soil: } 1.2 \times (48" + 0.5 \times 26") (0.62') (120 \text{ pcf}) / 12,000 &= 0.45 \text{ klf} \\
 w_{u,DL} &= 1.22 \text{ klf}
 \end{aligned}$$

$$\begin{aligned}
 &\text{Distributed Point Live Load area: } (1.75 \times 0.62') = 1.08 \text{ ft square} \\
 w_{u,LL} &= 1.6 \times 1.3 \text{ Impact Factor} \times 16 \text{ k} / (1.08' \times 1.08') \times 1.08 \text{ ft width} &= 30.63 \text{ klf}
 \end{aligned}$$

### APPLIED MOMENT AND SHEAR

$$\begin{aligned}
 M_u &= \frac{1}{8} (1.22 \text{ klf}) (10.67 \text{ ft})^2 + \frac{1}{8} (30.63 \text{ klf}) (1.08 \text{ ft}) (2 \times 10.67 \text{ ft} - 1.08 \text{ ft}) &= 101.3 \text{ k-ft} \\
 V_u &= 1.22 \text{ klf} (10.00 \text{ ft} / 2 - 8.69" / 12) + \frac{1}{2} (30.63 \text{ klf}) (1.08 \text{ ft}) &= 21.8 \text{ k}
 \end{aligned}$$

### ALLOWABLE MOMENT AND SHEAR

$$\begin{aligned}
 a &= (3.10 \text{ in}^2 \times 60,000 \text{ psi}) / (0.85 \times 48" \times 5,000 \text{ psi}) &= 0.91 \text{ in} \\
 \phi M_n &= 0.90 \times [3.10 \text{ in}^2 \times 60,000 \text{ psi} \times (8.69" - 0.91" / 2)] / 12,000 &= 114.8 \text{ k-ft} &\text{OK} \\
 \phi V_c &= 0.75 \times [2 \sqrt{(5,000 \text{ psi}) (48") (8.69")}] / 1,000 &= 44.2 \text{ k} &\text{OK}
 \end{aligned}$$

$$A_{s,min} \text{ for T\&S} = 0.0018 \times 12" \times 10" = 0.22 \text{ in}^2/\text{ft}$$

### T&S Bars:

$$\begin{aligned}
 &\text{Use } \#5 @ 6 \text{ in} \\
 A_s &= 0.62 \text{ in}^2/\text{ft} &\text{OK}
 \end{aligned}$$

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DATE: 2/8/21 REVISED: \_\_\_\_\_ PROJECT: 2102025

## WALL DESIGN – RISER WALLS (20' long span)

### INPUT & LOADING

- Top of Wall: 7.95' below grade (avg., lowest riser wall)
- Wall Height: 5'-0"
  - Mid-Height of Wall: 10.28' below grade
- Active earth pressure coefficient  $K_a = 0.33$ 
  - Lateral load, saturated soil =  $(0.33)(120 \text{ pcf soil} - 62.4 \text{ pcf water}) + 62.4 = 81.4 \text{ psf/ft of depth}$
- HS-20 Surcharge Live Load: No surcharge live load > 8 ft below grade
  - Lateral Soil Load =  $(10.28 \text{ ft})(81.4 \text{ psf}) = 0.837 \text{ klf}$ 
    - Total Factored Load =  $1.6 \times (0.837 \text{ klf}) = 1.34 \text{ klf}$
- Horizontal Rebar: #5 bars @ 5" o.c.  $\rightarrow A_s = 0.74 \text{ in}^2$  (both faces)
- Wall Thickness: 8"
- Concrete cover: 1" (both faces)
  - $d^- = 8" - 1" - \frac{1}{2}(0.625") = 6.69"$
  - $d^+ = d^- = 6.69"$
- $f'_c = 7,000 \text{ psi}$  (risers only)

See next pages for loading diagram and EnerCalc printout with design summary

### CHECK SHEAR

- $V_{u,\max} = 9.678 \text{ k}$
- $\phi V_c = 0.75 \times 2\sqrt{7,000 \text{ psi}} (12")(6.69")/1,000 = 10.1 \text{ k}$   $\phi V_c \geq V_u \therefore \text{OK}$

### CHECK BENDING MOMENT

- $a = \frac{(0.74 \text{ in}^2)(60,000 \text{ psi})}{0.85 (7,000 \text{ psi})(12")} = 0.62"$
- $M_u^- \text{ @ support} = 17.784 \text{ k-ft}$
- $\phi M_n^- = 0.9 \times (0.74 \text{ in}^2)(60 \text{ ksi}) \left(6.69" - \frac{0.62"}{2}\right) / 12 = 21.2 \text{ k-ft}$   $\phi M_n^- > M_u^- \therefore \text{OK}$
- $M_u^+ \text{ @ center} = 11.989 \text{ k-ft}$
- $\phi M_n^+ = 0.9 \times (0.74 \text{ in}^2)(60 \text{ ksi}) \left(6.69" - \frac{0.62"}{2}\right) / 12 = 21.2 \text{ k-ft}$   $\phi M_n^+ > M_u^+ \therefore \text{OK}$

### SUMMARY

- #5 horizontal bars @ 5" with 1" cover, both faces
- #5 vertical bars @ 12" placed inside horizontal bars

Riser Walls - 20' Long Span

### General Beam

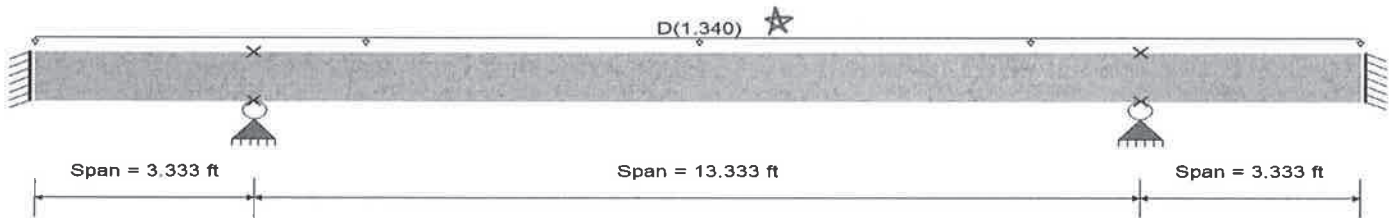
File: 2102025 - 08 Riser.ec6  
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24  
 Gary K. Munkelt & Associates

Lic. #: KW-06010475

DESCRIPTION: 1 ft strip, 1.42 klf

### General Beam Properties

Elastic Modulus	4,031.0 ksi				
Span #1	Span Length =	3.333 ft	Area =	108.0 in <sup>2</sup>	Moment of Inertia = 729.0 in <sup>4</sup>
Span #2	Span Length =	13.333 ft	Area =	108.0 in <sup>2</sup>	Moment of Inertia = 729.0 in <sup>4</sup>
Span #3	Span Length =	3.333 ft	Area =	108.0 in <sup>2</sup>	Moment of Inertia = 729.0 in <sup>4</sup>



### Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 1.340 k/ft, Tributary Width = 1.0 ft

### DESIGN SUMMARY

Maximum Bending =	<b>17.784 k-ft</b> <sup>M<sub>u</sub> max</sup>	Maximum Shear =	<b>9.678 k</b>
Load Combination	D Only	Load Combination	D Only
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 2
Location of maximum on span	3.333 ft	Location of maximum on span	13.333 ft
Maximum Deflection			
Max Downward Transient Deflection	0.000 in		0
Max Upward Transient Deflection	0.000 in		0
Max Downward Total Deflection	0.093 in		1728
Max Upward Total Deflection	-0.004 in		10051

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values (k-ft)							Shear Values (k)		
			M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Overall MAXimum Envelope														
Dsgn. L =	3.33 ft	1			7.03	-17.78	17.78					9.68		
Dsgn. L =	13.33 ft	2			11.99	-17.78	17.78					9.68		
Dsgn. L =	3.33 ft	3			7.03	-17.78	17.78					9.68		
D Only														
Dsgn. L =	3.33 ft	1			7.03	-17.78	17.78					9.68		
Dsgn. L =	13.33 ft	2			11.99	-17.78	17.78					9.68		
Dsgn. L =	3.33 ft	3			7.03	-17.78	17.78					9.68		

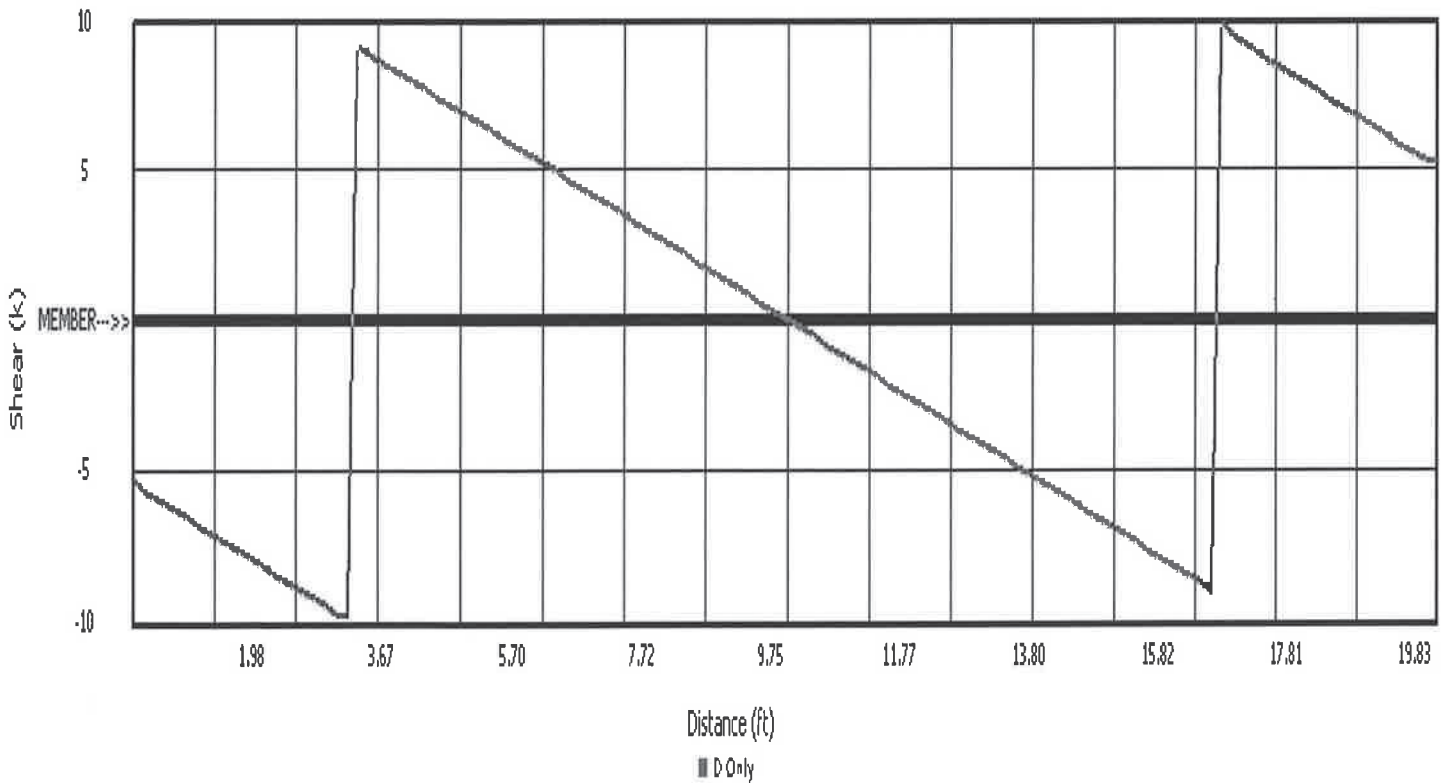
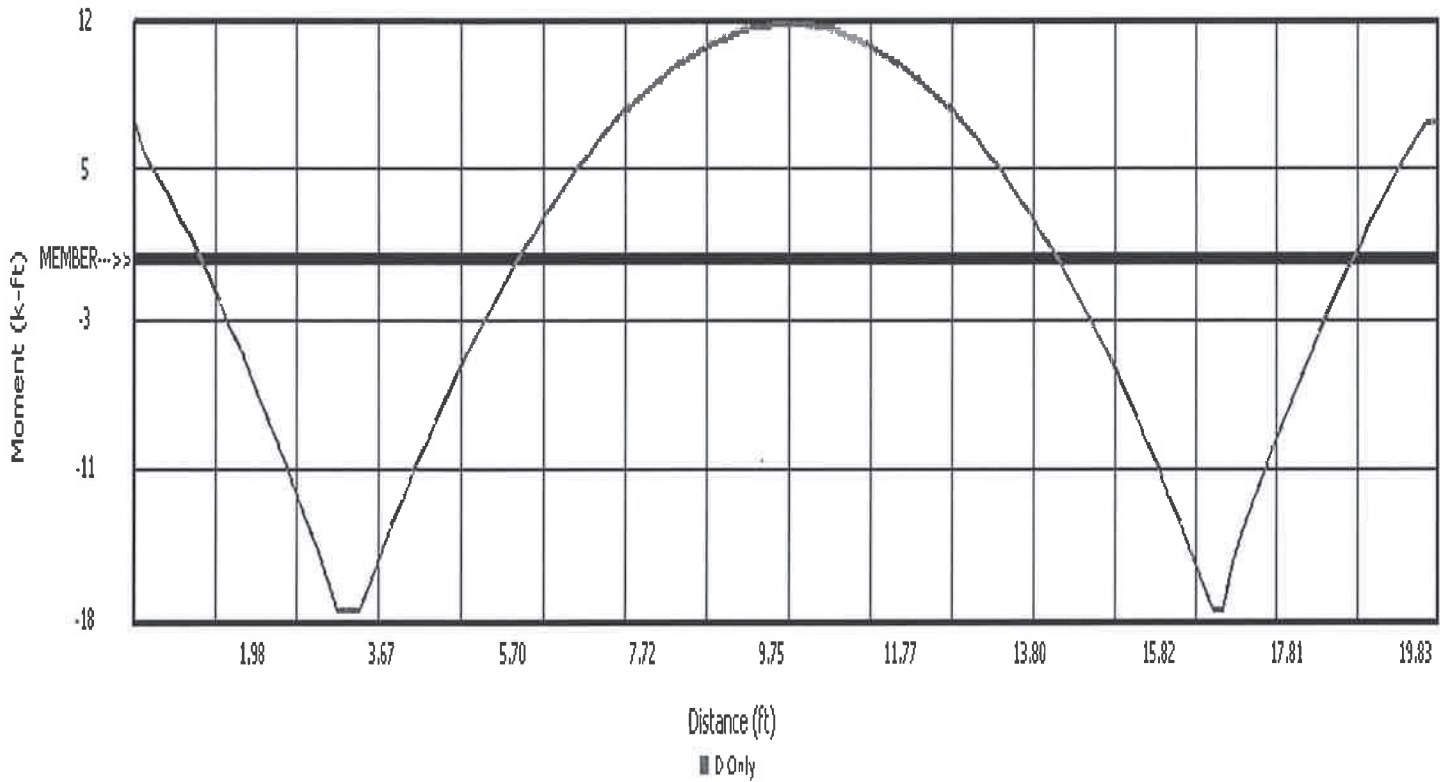
Riser Walls - 20' Long Span

General Beam

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DESCRIPTION: 1 ft strip, 1.42 klf



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 DATE: 2/8/21 REV: \_\_\_\_\_ PROJECT: 2102025

## **Wall Design** (Riser walls, 10' span @ ends)

### **INPUT & LOADING**

- Top of Wall: 7.95' below grade
- Wall Height: 5.00'
  - Mid-Height of Wall: 10.45' below grade (max)
- Lateral Soil Load (Saturated) =  $(120 \text{ pcf} - 62.4 \text{ pcf}) (K_a = 0.33) + 62.4 \text{ pcf} = 81.4 \text{ psf}$ 
  - Factored Soil Load =  $1.6 \times [(81.4 \text{ psf})(10.45')] / 1,000 = 1.36 \text{ klf}$
- Total Load = 1.36 klf
- Horizontal Rebar: #5 bars @ 5" o.c.  $\rightarrow A_s = 0.74 \text{ in}^2$  (both faces)
- Wall Thickness: 8"
- Concrete cover: 1.00" to outside face of wall
  - $d^- = 8" - 1" - \frac{1}{2}(0.625") = 6.69"$
  - $d^+ = d^- = 6.69"$  (same reinforcing on both faces)
- All spans analyzed as fixed at corners/adjoining walls; max span controls design
  - $L_{\text{clear}} = 10.00'$  (end walls)

### **CHECK SHEAR**

- $V_u \text{ @ 'd' from support} = 1.36 \text{ klf} \times (10.00' / 2 - 6.69" / 12) = 6.04 \text{ k}$
- $\phi V_c = 0.75 \times 2\sqrt{(7,000 \text{ psi}) (12") (6.69")} / 1,000 = 10.1 \text{ k}$   $\phi V_c > V_u \therefore \text{OK}$

### **CHECK BENDING MOMENT**

- $a = [(0.74 \text{ in}^2)(60,000 \text{ psi})] / [0.85 \times (7,000 \text{ psi})(12")] = 0.62$
- $M_u^- \text{ @ ends} = 1/12 \times (1.36 \text{ klf})(10.00 \text{ ft})^2 = 11.33 \text{ k-ft}$
- $\phi M_n^- = 0.9 \times (0.74 \text{ in}^2)(60 \text{ ksi})(6.69" - 0.62" / 2) / 12 = 21.25 \text{ k-ft}$   $\phi M_n^- > M_u^- \therefore \text{OK}$
- $M_u^+ \text{ @ center} = 1/24 \times (1.36 \text{ klf})(10.00 \text{ ft})^2 = 5.67 \text{ k-ft}$
- $\phi M_n^+ = 0.9 \times (0.74 \text{ in}^2)(60 \text{ ksi})(6.69" - 0.62" / 2) / 12 = 21.25 \text{ k-ft}$   $\phi M_n^+ > M_u^+ \therefore \text{OK}$

### **SUMMARY**

- #5 horizontal bars @ 5" o.c. with 1" cover to outside face of walls
- #5 vertical bars @ 12" placed inside horizontal bars

CALC BY: TA CHECK BY: \_\_\_\_\_ SHEET NO. 11 OF 16

DATE: 2/8/21 REV: \_\_\_\_\_ PROJECT: 2102025

## CANTILEVER WALLS UP FROM BOTTOM SLAB

### INPUTS

top of section	12.95 ft below grade	concrete $f_c$	5,000 psi
		steel $f_y$	60,000 psi
		wall thickness	8.0 in
		steel clear cover	1.0 in
equivalent soil pressure		b	12.0 in
	85 psf (lateral earth pressure)		
wall height	2.50 ft		
section width	10.00 ft		
section length	20.00 ft		

Vertical Steel	rebar used	# 4
	Spacing	8.0 in

Horizontal Steel	rebar used	# 4
	Spacing	8.0 in

### APPLIED LOADS

Let load factor = 1.6 for all lateral loads

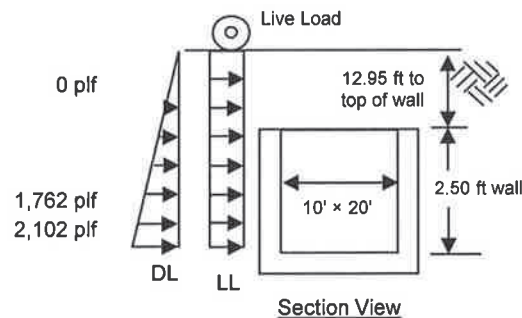
#### Live Load:

No HS-20 load > 8 ft below grade

#### Soil Load:

$$W_{12.95} = 1.6 \times (12.95 \text{ ft} \times 85 \text{ psf})$$

$$W_{15.45} = 1.6 \times (15.45 \text{ ft} \times 85 \text{ psf})$$



### APPLIED MOMENT AND SHEAR - Cantilever Design

#### Maximum negative moment

$$M_u^- = (W_{LL} + W_{12.95}) \times (\text{height})^2 / 2,000 + (W_{15.45} - W_{12.95}) \times \text{height}^2 / 6,000$$

$$(0 \text{ plf} + 1,762 \text{ plf}) \times (2.50 \text{ ft})^2 / 2,000 = -5.51 \text{ k-ft}$$

$$(2,102 \text{ plf} - 1,762 \text{ plf}) \times (2.50 \text{ ft})^2 / 6,000 = -0.35 \text{ k-ft}$$

$$\Sigma = -5.86 \text{ k-ft}$$

#### Maximum shear

$$V_u = (\text{height}) \times [W_{LL} + W_{12.95} + (W_{15.45} - W_{12.95})/2] / 1,000$$

$$(2.50 \text{ ft}) \times [0 \text{ plf} + 1,762 \text{ plf} + (2,102 \text{ plf} - 1,762 \text{ plf})/2] / 1,000 = 4.83 \text{ k}$$

### ALLOWABLE MOMENT AND SHEAR

d = thickness - cover - 1/2 bar		$A_s$	0.30 in <sup>2</sup> /ft	
= 8" - 1" - 1/2(4/8 in)	= 6.75 in	concrete $f'_c$	5,000 psi	
		steel $f_y$	60,000 psi	
q = $(A_s f_y) / (f'_c b d)$		wall thickness	8.0 in	
= $(60,000 \text{ psi} \times 0.30 \text{ in}^2) / (5,000 \text{ psi} \times 12" \times 6.75")$	= 0.04 in	steel clear cover	1.0 in	
		b	12.0 in	
		<table border="1"> <tr> <td>Vertical Steel #4 @ 8"</td> </tr> </table>		Vertical Steel #4 @ 8"
Vertical Steel #4 @ 8"				
$\phi M_n = \phi b d^2 f'_c q (1 - 0.59q) / 12,000$				
= $0.9 \times (12") (6.75")^2 (5,000 \text{ psi}) (0.044") [1 - (0.59 \times 0.044")] / 12,000$	= -8.87 k-ft		> $M_u$ OK	
$\phi V_c = \phi 2\sqrt{f'_c} b d$				
= $0.75 \times 2\sqrt{5,000 \text{ psi}} (12") (6.75") / 1,000$	= 8.59 k		> $V_u$ OK	

### MINIMUM STEEL REQUIREMENTS

$$A_{s,min} = 0.0018 \times b \times t$$

$$= 0.17 \text{ in}^2/\text{ft} < A_s \text{ provided OK}$$

Horizontal Steel #4 @ 8"
--------------------------

$$= 0.30 \text{ in}^2/\text{ft}$$



CALC BY: TAL CHECK BY: \_\_\_\_\_ SHEET NO. 12 OF 16  
 DATE: 2/8/21 REV: \_\_\_\_\_ PROJECT: 2102025

### BOTTOM SLAB

**Box Dimensions**

interior width	10.00 ft	unit weight of soil =	120 pcf
interior length	20.00 ft	weight of concrete =	150 pcf
bottom slab thickness	10.00 in	soil cover over top slab =	0.450 ft (avg)
shelf width	0.00 in	concrete f <sub>c</sub>	5,000 psi
box height (walls + top slab)	14.83 ft	steel f <sub>y</sub>	60,000 psi
typ. wall thickness	8.00 in	steel clear cover	1.00 in
top slab thickness	10.00 in	Rebar used	# 5
equivalent top opening area	11.00 ft <sup>2</sup>	Steel Spacing	@ 8.0 in
Add'l Weight	0 lb	As	0.47 in <sup>2</sup> /ft

**LOADS**

**DETERMINE LIVE LOAD**

**Load Area**

$$\begin{aligned}
 &= [\text{width} + 2 \times (\text{wall thickness})] \times [\text{length} + 2 \times (\text{wall thickness})] \\
 &= [10.00 \text{ ft} + 2 \times (8 \text{ in})/12] \times [20.00 \text{ ft} + 2 \times (8 \text{ in})/12] \\
 &= 241.8 \text{ ft}^2
 \end{aligned}$$

$$W_{LL} = 1.6 \times (16,000 \text{ lb live load}) / (2 \text{ wheels}) / 241.8 \text{ ft}^2 = 212 \text{ plf (per ft of width)}$$

**DETERMINE DEAD LOAD**

WEIGHT OF TOP SLAB = $(10''/12) \times 150 \text{ pcf} \times [(10.00 \text{ ft} + 2(8''/12)) \times (20.00 \text{ ft} + 2(8''/12)) - 11 \text{ ft}^2]$	28,847 lbs
WEIGHT OF WALLS = $150 \text{ pcf} \times (8''/12) \times 2(10.00 \text{ ft} + 20.00 \text{ ft} + 2(8''/12)) \times (14.83 \text{ ft} - 10''/12)$	87,733 lbs
WEIGHT, SOIL ON TOP SLAB = $0.45 \text{ ft} \times 120 \text{ pcf} \times [(10.00 \text{ ft} + 2(8''/12)) \times (20.00 \text{ ft} + 2(8''/12))]$	13,056 lbs
<b>TOTAL DEAD LOAD</b>	<b>129,637 lbs</b>

$$\begin{aligned}
 W_{DL} &= (1.2 \text{ load factor} \times \text{total dead load}) / \text{load area} \\
 &= 643 \text{ plf (per ft of width)}
 \end{aligned}$$

**FIND ACTUAL MOMENT & SHEAR – Two Way Design**

$$m = 10.00' / 20.00' = 0.50$$

$$\begin{aligned}
 M_u &= 0.095 \times [(WDL + WLL) \times (\text{Width} + \text{Wall Thickness})^2] \\
 &= 0.095 \times [(212 \text{ plf} + 643 \text{ plf}) \times (10.00 \text{ ft} + 0.67 \text{ ft})^2] / 1,000 \\
 &= 9.25 \text{ k-ft}
 \end{aligned}$$

$$\begin{aligned}
 V_u @ \text{d away from support} &= 0.94 \times (WDL + WLL) \times (\text{width}/2 - d/12) \\
 &= 0.94 \times (212 \text{ plf} + 643 \text{ plf}) (10.00 \text{ ft}/2 - 8.69''/12) \\
 &= 3,438 \text{ lbs}
 \end{aligned}$$

$$\begin{aligned}
 d &= \text{thickness} - \text{cover} - 1/2 \text{ bar} \\
 &= 10.00'' - 1.00'' - 1/2(5/8'') = 8.69 \text{ in}
 \end{aligned}$$

$$\begin{aligned}
 q &= (f_y/f_c) [A_s / (b d)] \\
 &= (60,000 \text{ psi} / 5,000 \text{ psi}) \times [0.47 \text{ in}^2 / (12'' \times 8.69'')] = 0.054
 \end{aligned}$$

concrete f <sub>c</sub>	5,000 psi
steel f <sub>y</sub>	60,000 psi
steel clear cover	1.00 in
b	12 in

**Use #5 @ 8" o.c. in main span**

  
 As 0.47 in<sup>2</sup>/ft

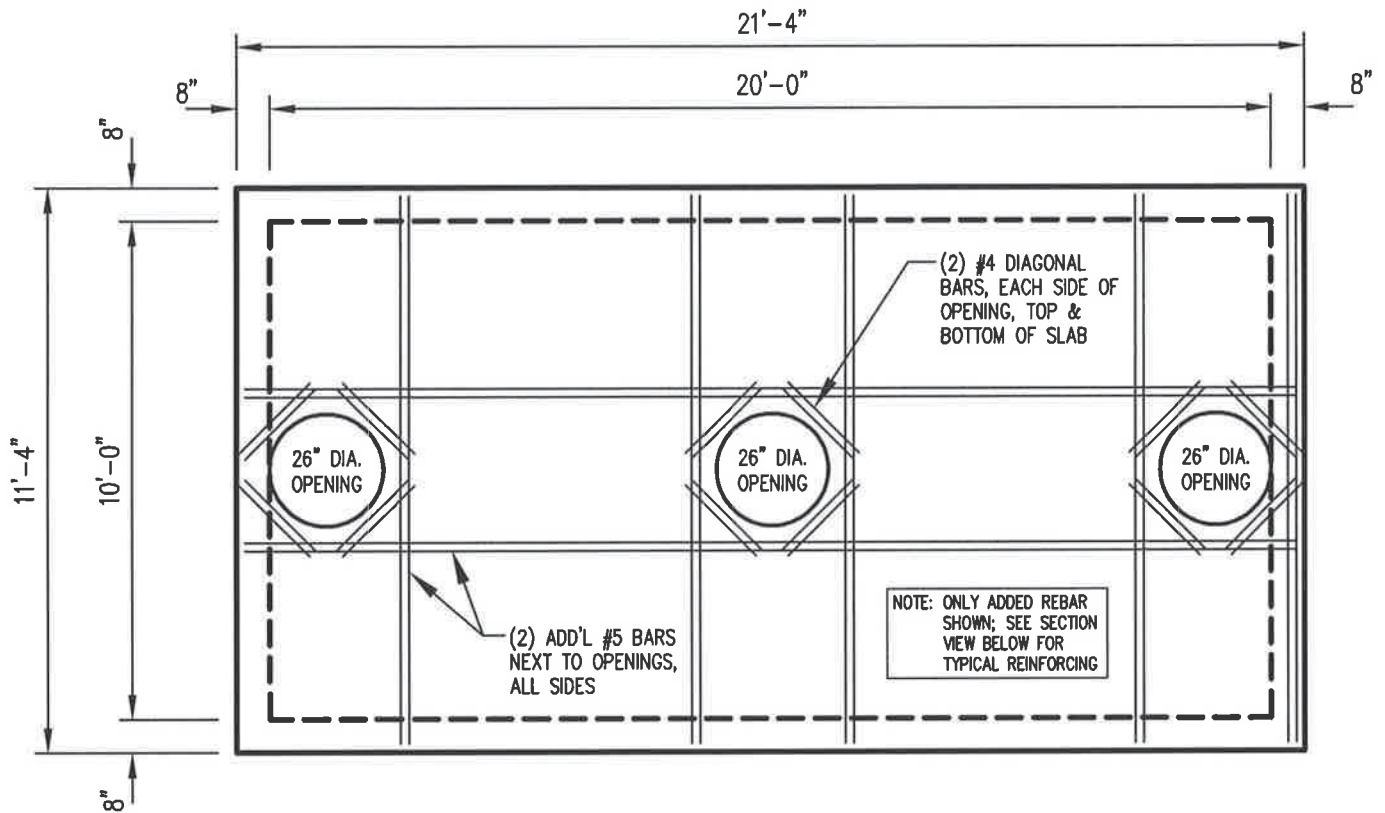
$$\begin{aligned}
 \phi M_n^+ &= \phi b d^2 (f_c) q (1 - 0.59q) / 12,000 \\
 &= 0.90 \times (12'') (8.688'')^2 (5,000 \text{ psi}) (0.054) [1 - (0.59 \times 0.054)] / 12,000 = 17.79 \text{ k-ft} > M_u \text{ OK}
 \end{aligned}$$

$$\begin{aligned}
 \phi V_n &= \phi 2 \sqrt{f_c} b d \\
 &= 0.75 \times 2 \sqrt{5,000 \text{ psi}} (12'') (8.69'') = 11,057 \text{ lbs} > V_u \text{ OK}
 \end{aligned}$$

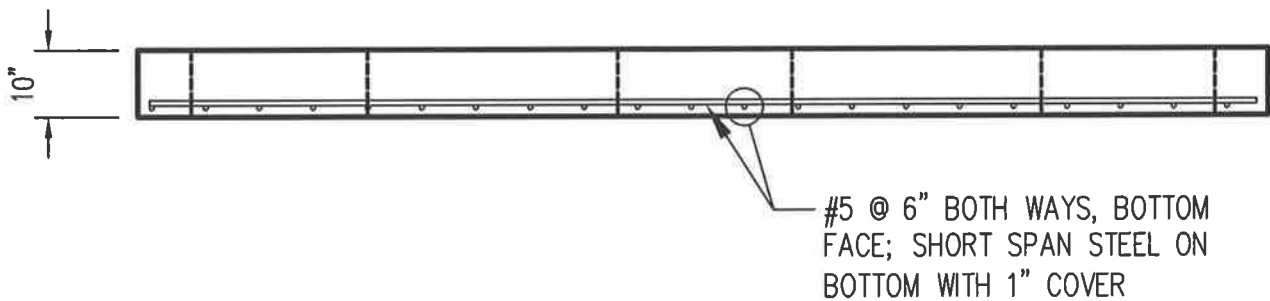
**Check Minimum Steel Requirement**

$$\begin{aligned}
 A_{s, \min} &= 0.0018 \times b \times d \\
 &= 0.0018 \times 12'' \times 10'' = 0.22 \text{ in}^2/\text{ft} < A_s \text{ OK}
 \end{aligned}$$

SHEET 13 of 16



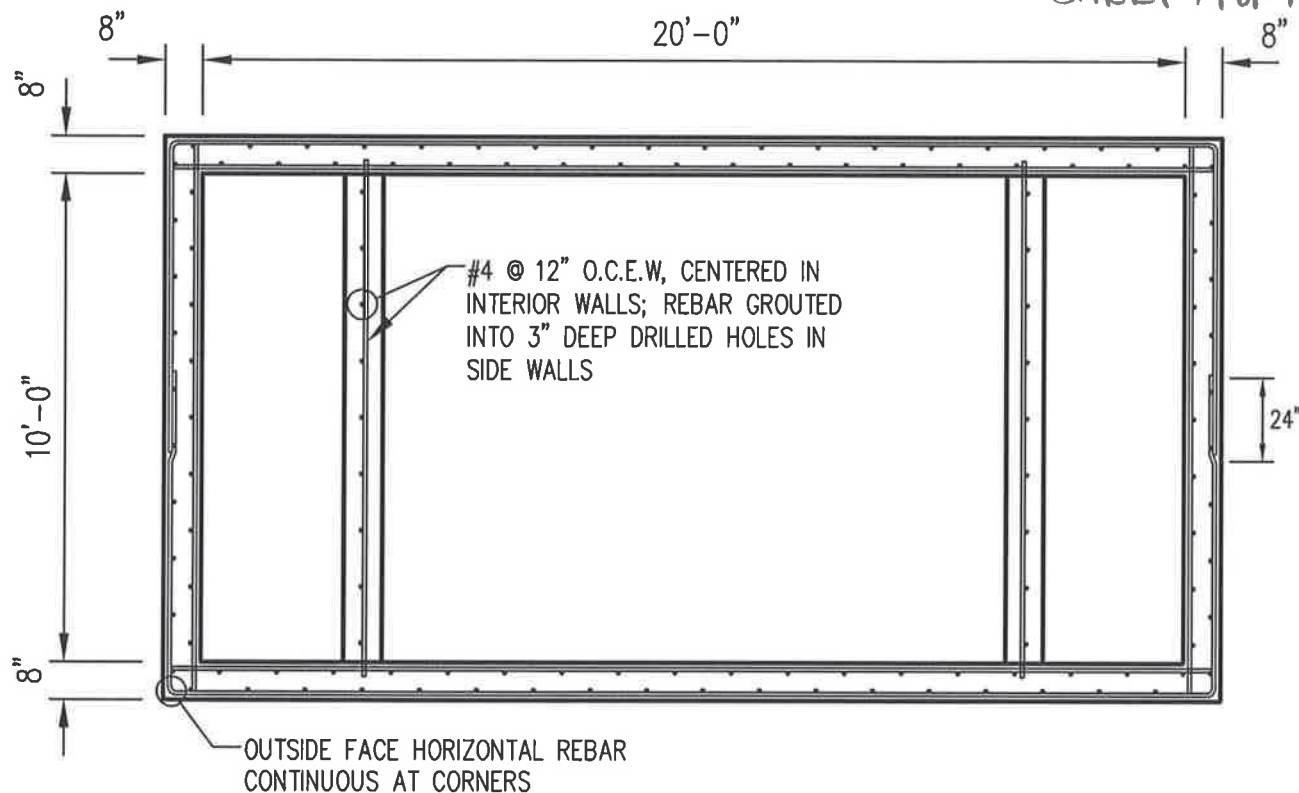
PLAN VIEW



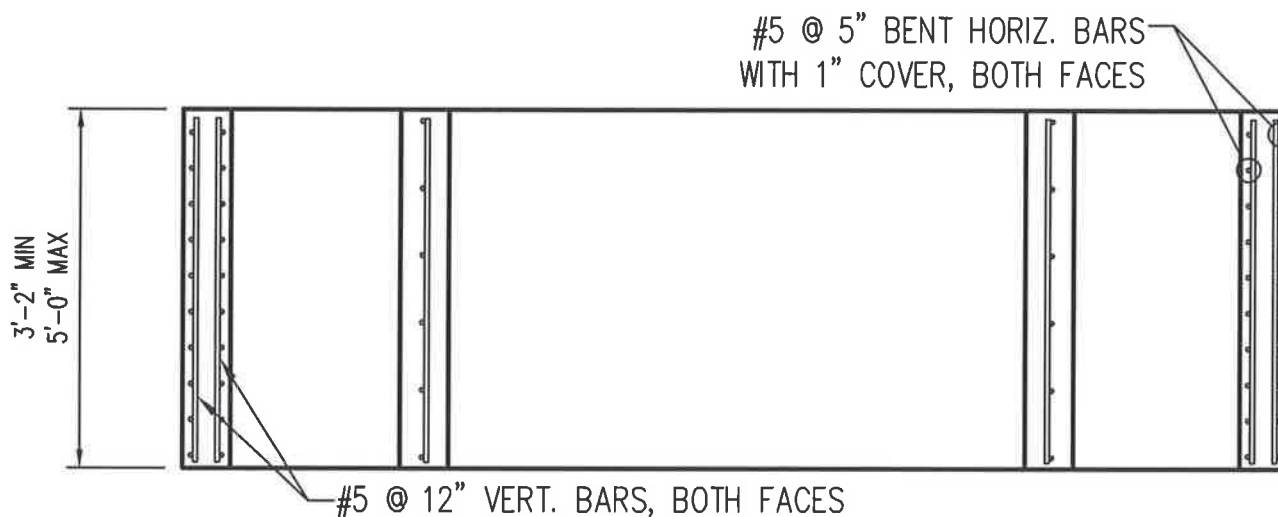
SECTION VIEW

MATERIALS:	REINFORCING STEEL DRAWING	DESIGNED FOR:
CONCRETE $f_c = 5,000$ PSI STEEL REBAR $f_y = 60,000$ PSI	TOP SLAB 10'-0" x 20'-0" x 14'-0" ID PRECAST CONCRETE WATER QUALITY STRUCTURE (D-96)	HS-20 LIVE LOAD OVER TOP OF TOP SLAB AT GRADE TOP OF TOP SLAB IS 0.34 ft MIN - 0.62 ft MAX BELOW GRADE

SHEET 14 of 16



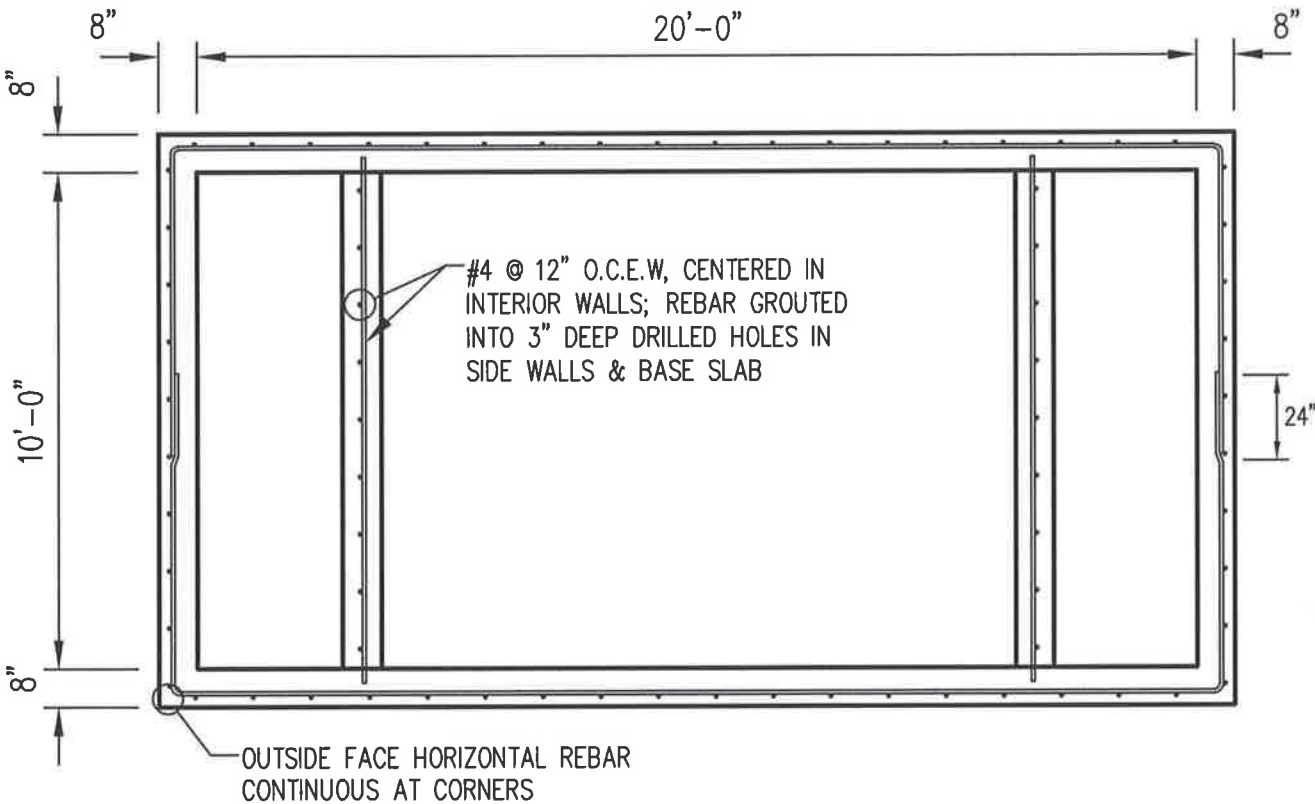
**PLAN VIEW**



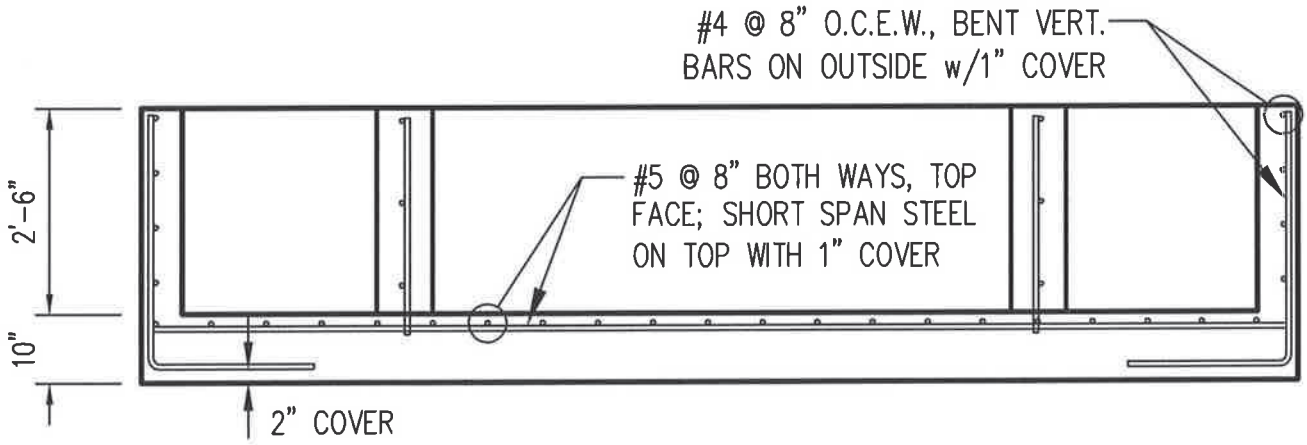
**SECTION VIEW**

MATERIALS:	REINFORCING STEEL DRAWING	DESIGNED FOR:
CONCRETE $f_c = 7,000$ PSI (RISER WALLS ONLY) STEEL REBAR $f_y = 60,000$ PSI	RISER WALLS 10'-0" x 20'-0" x 14'-0" ID PRECAST CONCRETE WATER QUALITY STRUCTURE (D-96)	HL-93 LIVE LOAD AT GRADE BOTTOM OF RISER WALLS IS 12.95 ft MAX BELOW GRADE

SHEET 15 OF 16



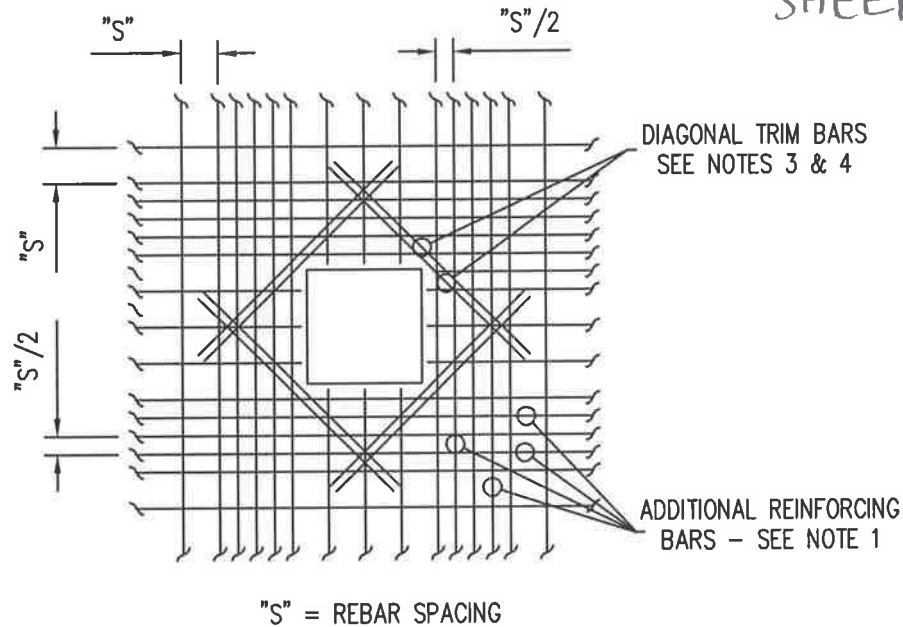
PLAN VIEW



SECTION VIEW

MATERIALS:	REINFORCING STEEL DRAWING	DESIGNED FOR:
CONCRETE $f_c = 5,000$ PSI STEEL REBAR $f_y = 60,000$ PSI	BASE SLAB & BOTTOM SLAB 10'-0" x 20'-0" x 14'-0" ID PRECAST CONCRETE WATER QUALITY STRUCTURE (D-96)	HL-93 LIVE LOAD OVER TOP OF STRUCTURE AT GRADE TOP OF BASE SLAB IS 15.45 ft MAX BELOW GRADE

SHEET 16 OF 16

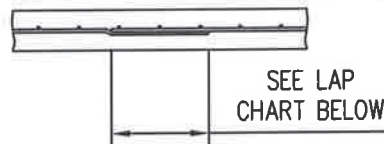


ADDITIONAL REINFORCING NOTES:

1. Provide additional reinforcing around openings equal to the bars interrupted. 1/2 each side, additional bars to be in the same plane.
2. Provide standard hook for bars if lap length extension cannot be obtained at joints or other obstructions. Place additional bars in the same planes as interrupted reinforcement.
3. Provide (2) #4 diagonal trim bars at corners of openings. Extend trim bars minimum 12" beyond openings. Provide standard hooks to bars as required to maintain bar cover.
4. Place diagonal bars in each layer of reinforcement inside normal reinforcement.
5. All reinforcement to clear openings by 2".
6. See Top Slab, Top Section, Riser Section, Base Section or Bottom Slab drawings for required rebar size and spacing.

## TYPICAL SLAB AND WALL OPENING REINFORCEMENT DETAILS

N.T.S.



BAR SIZE	MINIMUM LAP
#4	24"
#5	30"
#6	36"
#7	42"
#8	48"

LAP LENGTH NOTES:

1. See Top Slab, Top Section, Riser Section, Base Section or Bottom Slab drawings for required rebar size and spacing.

## LAP LENGTH DETAILS

N.T.S.





# UTILITY PIPE FITTINGS AND ACCESSORIES

UCAT.17.01



Star® Pipe Products  
4018 Westhollow Pkwy.  
Houston, TX 77082

Toll-Free: (800) 999-3009  
Tel: (281) 558-3000  
Fax: (281) 558-9000

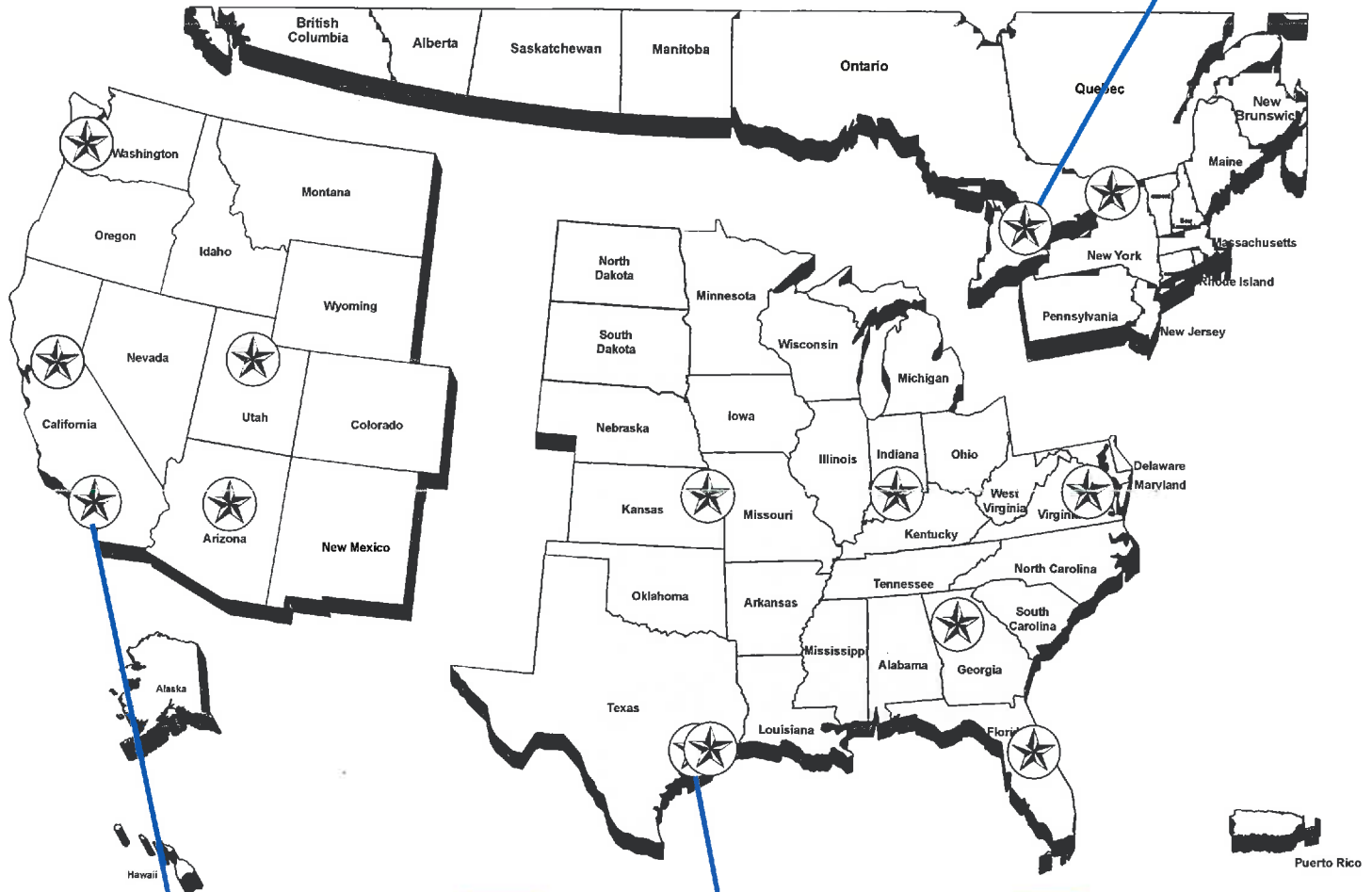
[www.starpipeproducts.com](http://www.starpipeproducts.com)



# Call Centers

## CAMBRIDGE CALL CENTER

1144 Industrial Road  
Cambridge, Ontario, N3H4W4  
Tel: (519) 650-1550  
Toll Free: (888) 893-7827  
Fax: (519) 650-1553



## CORONA CALL CENTER

1223 Sherborn Street, Ste 102  
Corona, CA 92879  
Tel: (951) 898-0770  
Toll Free: (877) 701-7827  
Fax: (951) 898-9561

## HOUSTON CALL CENTER

**Corporate Headquarters**  
4018 Westhollow Pkwy.  
Houston, TX 77082  
Tel: (281) 558-3000  
Toll Free: (800) 999-3009  
Fax: (281) 558-9000

# Distribution Centers

## Sacramento, CA

830 W. National Drive, Ste 150  
Sacramento, CA 95834

## Phoenix, AZ

1250 East Hadley Street, Ste 2  
Phoenix, AZ 85034

## Montreal, CAN

3067 Rue Joseph A. Bombardier  
Laval, QC H7P 6C5

## Kansas City, MO

1836 Levee Road  
North Kansas City, MO 64116

## Orlando, FL

601 Gills Drive, Ste 100  
Orlando, FL 32824

## Salt Lake City, UT

2801 West Parkway Blvd.  
Salt Lake City, UT 84119

## Atlanta, GA

5307 Peachtree Industrial Blvd.  
Chamblee, GA 30341

## Indianapolis, IN

6119 Guion Road  
Indianapolis, IN 46254

## Richmond, VA

2913 Transport Street, Ste 101  
Richmond, VA 23234

## Seattle, WA

13605 52nd Street East  
Sumner, WA 98390

## Houston, TX

4023 Westhollow Pkwy, Suite 108  
Houston, TX 77082



### GENERAL TERMS & CONDITIONS

pg. 2



### COMPACT MJ FITTINGS

ANSI/AWWA C153/A21.53

Sizes: 2" - 64"

pg. 3-13



### ACCESSORIES

ANSI/AWWA C111/A21.11

pg. 14-20



### FULL BODY MJ FITTINGS

ANSI/AWWA C110/A21.10

Sizes: 2" - 64"

pg. 21-30



### COMPACT PUSH-ON FITTINGS

ANSI/AWWA C153/A21.53

Sizes: 4" - 24"

pg. 31-38



### FLANGED FITTINGS & ACCESSORY PACKS

ANSI/AWWA C110/A21.10

Sizes: 1" - 64"

pg. 39-50



### FLANGES

ANSI/AWWA C115/A21.15

Sizes: 2" - 64"

pg. 51-54

### LININGS & COATINGS

- Ceramic Epoxy
- Cement Lined
- Double Cement Lined
- UL/ANSI/NSF Standards 61 and 372 Epoxy
- Coal Tar Epoxy
- Asphalt Coatings
- Fusion Bonded Epoxy
- Glass Lining
- Bare/Bare Available

{ Additional Linings & Coatings Available }

#### PLEASE CALL FOR

- Product Data/Specifications Sheets
- Material Safety Data Sheets
- Special Coating Options

800.999.3009



STAR<sup>®</sup> PIPE PRODUCTS

# General Terms and Conditions

## GENERAL

Star Pipe Products' ("Seller") terms and conditions of sale (the "Terms") shall control with respect to any sale of Seller's products (the "Goods") to any customer (each, a "Buyer") (each, an "Order"). No waiver, alteration or modification of these terms and conditions whether on Buyer's purchase order or otherwise shall be valid unless the waiver, alteration or modification is specifically accepted in writing and signed by an authorized representative of Seller. Buyer acknowledges that these Terms and Conditions are subject to change from time to time and the parties agree that each sale of Goods will be independently governed by the version of the Terms available online at [www.starpipeproducts.com](http://www.starpipeproducts.com) at the time of acceptance by Seller such order. All references by Seller to Buyer's specifications and similar requirements are only to describe Goods and work covered hereby and no warranties or other terms will have any force or effect. Buyer may not rely on any representation, promise or term not set forth herein and Seller expressly objects to and rejects all terms not contained in these Terms. Seller's acceptance of an Order, whether oral or written, and/or its delivery of Goods to Buyer is based on the express condition that Buyer agrees to all of these Terms.

## GOVERNING LAW; VENUE

These Terms (and every Order) shall be deemed made under and governed by the laws of the State of Texas and shall be construed and enforced in accordance therewith (without regard to its rules respecting conflicts of Law). Buyer irrevocably submits to the jurisdiction and venue of the state and federal courts located in Harris County, State of Texas, hereby waives any objections or defenses to such forum jurisdiction and venue selection, and agrees and consents that service of process may be made upon it in any legal proceeding relating to these Terms by any means allowed under Texas or federal law. **No party shall have the right to litigate, include in any lawsuit, or otherwise present claims for any other person or entity or for any class of persons or entities, and each party waives any such rights or claims it might have.**

## QUOTATIONS

Where Seller issues a quotation to place a bid, Seller's quotation is for prompt acceptance (not later than 30 days) and Seller reserves the right to modify and/or withdraw such quotation without notice. Buyer's prompt acceptance of the quotation and these Terms are material terms of the quotation and any resulting Order. In cases where freight allowance is included in the quotation, Buyer shall be liable for any rate increase and/or additional expense over the calculated allowance resulting from compliance with Buyer's shipping instructions.

## DELIVERY

Seller will make every effort to complete delivery of Goods as indicated on an Order, but Seller shall have no responsibility or liability, and will accept no back charge, for losses or damages arising from delivery delays or failure to give notice of expected delay. Seller may terminate any Order without liability of any nature, by written notice to Buyer, in the event that the delay in delivery or performance resulting from any of the aforesaid causes shall continue for a period of longer than sixty (60) days.

## WARRANTY

Seller warrants Goods of its own manufacture for one (1) calendar year from the date of shipment shall conform to the material and technical specifications set forth in the Order. Goods manufactured by others are sold "as is" except to the extent the manufacturer honors any applicable warranty made by the manufacturer. Secondhand goods are sold "as is". If the new Goods fail to conform with such specifications upon inspection by Seller, Seller will, at its option and as Buyer's sole remedy, either repair or replace such Goods having defects in material or workmanship with the type originally furnished. Seller shall not be liable or responsible and Seller's warranty obligations shall not apply if (A) upon inspection any defects are attributed to normal wear and tear, erosion or corrosion, improper storage, use or maintenance or use of Goods with incompatible products, (B) the defect is in any portion or part of Goods not manufactured by Seller, (C) Goods have been repaired or altered outside of Seller's factory, in any manner; (D) Goods have been subjected to misuse, negligence or accidents; or (E) Goods have been used in a manner contrary to Seller's instructions or recommendations. If (B) above is applicable, Seller will, as an accommodation to Buyer, assign to Buyer any warranties given to it by any such other manufacturers; provided, however, that the foregoing will not extend Seller's warranty to any accessory products unless otherwise agreed to in writing by Seller. If Seller's examination shall disclose to its satisfaction that the Good is defective, cannot be replaced and an adjustment is required, the amount of such adjustment shall not exceed the net line item sales price of the defective Good only and no allowance will be made for labor or expense of repairing or replacing defective Good or workmanship or damage resulting from the same. No adjustment shall be implemented unless the Good in question is returned to Seller in its originally installed condition, still connected to other components of the joint. Buyer must contact Seller as quickly as possible so Seller can assess the Good in its installed condition. No claims will be honored unless claim is made within forty-five (45) days of the defect being discovered. Where engineering design or fabrication work is supplied, Buyer's acceptance of Seller's design or of delivery of work shall relieve Seller of all further obligation for such services. **THIS CLAUSE CONTAINS SELLER'S SOLE WARRANTY. SELLER MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED SELLER'S AFORESTATED OBLIGATION ARE HEREBY DISCLAIMED BY SELLER AND EXCLUDED FROM THIS WARRANTY.** Seller neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of its engineering designs or Goods. Seller shall not be responsible for design errors due to inaccurate or incomplete information supplied by Buyer or its representatives. This warranty is non-transferable.

## LIABILITY

Seller shall not be liable for any loss, damage, cost of repairs, labor costs, special, incidental or consequential damages of any kind, whether based upon warranty (except for the obligation accepted by Seller under "Warranty" above), contract or negligence, arising in connection with the design, manufacture, sale, use or repair of the Goods or of the engineering designs supplied to Buyer. **IN NO EVENT SHALL SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO ANY ORDER ISSUED PURSUANT TO ANY ORDER, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE OF ANY KIND) OR OTHERWISE, EXCEED THE LINE ITEM PRICE OF THE GOOD(S) GIVING RISE TO THE CLAIM OR \$10,000 USD, WHICHEVER IS LESS.**

(Continued)



# General Terms and Conditions

- DISCLAIMER** (1) PER AWWA/ANSI C110 A21.10, THE FLANGED JOINT IS GENERALLY SPECIFIED FOR ABOVE GROUND SERVICE. UNDER-GROUND USE OF THE FLANGED JOINT IS GENERALLY NOT DESIRABLE DUE TO THE RIGIDITY OF THE JOINT. (2) SELLER WILL NOT PROVIDE WARRANTY FOR OR BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF GOOD DAMAGED BY PRESSURE JETTING OF ANY KIND, REGARDLESS OF AGE OR CAUSE.
- RETURNS** Seller will not accept return of any Good(s) unless Seller's written permission has been first obtained, in which case the Goods will be credited subject to the following: (a) All material returned must, on its arrival at Seller's plant, be found to be in first-class condition; if not, cost of putting in saleable condition will be deducted from credit memoranda; (b) A handling charge deduction of twenty-five percent (25%) will be made from all credit memoranda issued for material returned; (c) Transportation charges, if not prepaid will be deducted from credit memoranda.
- SHIPMENTS** All Goods sent out will be carefully examined, counted and packed. The cost of any special packing or special handling caused by Buyer's requirements or requests shall be added to the amount of the Order. No claim for shortages will be allowed unless made in writing within ten (10) days of receipt of a shipment. Claims for Goods damaged or lost in transit should be made on the carrier, as Seller's responsibility ceases, and title passes, on delivery to the carrier.
- GOODS** Orders covering special, made-to-order, rush or non-standard Goods are not subject to cancellation except on such terms as Seller may specify on application.
- PRICES** All prices and designs are subject to change without notice. All prices are F.O.B. Point of Shipment, unless otherwise stated.
- FORCE MAJEURE** Seller shall not be responsible or liable in any way for any failure to perform due to acts of God, fire, flood, serious accidents, foreign or United States embargo, war or riot, serious shortages, unavailability or significant price increases in commodities, materials or components, labor disputes, interruption of transportation, loss of essential production services, laws, rules, regulations, instructions or acts of any U.S. or foreign governmental authority, or by any other event beyond the reasonable control of Seller or its subcontractors.
- TAXES** The amount of any sales, excise or other taxes, if any, applicable to the Goods covered by this order, shall be added to the purchase price and shall be paid by Buyer unless Buyer provides Seller with an exemption certificate acceptable to the taxing authorities.
- MISCELLANEOUS** Seller produces both domestic and import Goods and each are cast with country of origin. The responsibility lies with the ordering and receiving parties to determine the suitability and origin of all Goods being requested. All Goods should be installed per Seller's installation instructions. Seller's Terms always apply. Please contact Seller if either are not readily available. All Domestic fittings are compliant with the Consolidated Appropriations Act of 2014 (AIS), the Recovery and Reinvestment Act of 2009 (ARRA) and the Buy America Acts of 1983 and 1933. We offer two (2) types of Domestic restraint Goods: (1) AIS Compliant and (2) Buy American Compliant.
- (1) All Goods described as AIS Compliant meet all requirements of the American Iron and Steel provision of the Consolidated Appropriations Act of 2014 (AIS), the Buy America Act of 1983 and the Buy American Act of 1933.
- (2) Buy American Compliant Goods meet the original Federal Buy American Act of 1933. These Goods may include import components and this will be noted in the description of the Good.
- Pressure Cleaning Guidelines:** The Ductile Iron Pipe Research Association publishes the Installation Guide for Ductile Iron Pipe. The following language comes from Chapter 7 of the February 2012 edition of this document: "The use of pressure washing to clean the inside diameter of cement-mortar-lined iron pipe is not recommended due to the possibility of damage to the seal coat and/or cement-mortar lining. The aggressiveness of the pressure washing is dependent on water pressure, travel speed, water jets, water jet angle to the lining, distance of the water jets from the lining, diameter of pipe, type of lining application, etc. Any attempt to do so is at the sole risk of the equipment operator." Seller concurs with this position. Seller will not provide warranty for or be responsible for the repair or replacement of Good damaged by pressure jetting of any kind.
- Non-Pressure Sewer Applications:** If a mandrel test is required, or if a particular inside diameter is needed in order to accommodate CCTV equipment or some other tool, it is recommended that the installer check inside diameter compatibility by passing an object of the same size through the fitting prior to installation in order to ensure that the fitting's inside diameter is compatible with the test or inspection desired. Mandrels, CCTV equipment, testing balls, and any other object passed through the fitting shall be constructed such that it does not damage the fitting's lining when transported through it. Seller will not be responsible for buried sewer fittings that are incompatible with the aforementioned objects if that inside diameter that has not been assessed prior to installation.



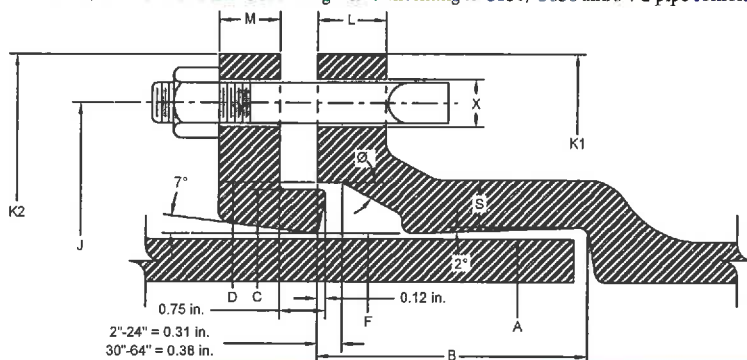
## Compact MJ Fittings

ANSI/AWWA C153/A21.53

## 2" - 64" DUCTILE IRON MECHANICAL JOINT COMPACT FITTINGS

## GENERAL SPECIFICATIONS

- MATERIAL:** Ductile Iron per ASTM A536
- PRESSURE:** 350 PSI rating for 2" - 24" sizes, 250 PSI rating for 30" - 48" sizes and 150 PSI rating for 54" - 64" sizes
- TESTING:** In accordance with ANSI/AWWA C153/A21.53, ANSI/AWWA C111/A21.11, UL and FM requirements
- LAYING LENGTH:** In accordance with ANSI/AWWA C153/A21.53 (fittings not listed in ANSI/AWWA have dimensions per Star design as noted in the catalog)
- DEFLECTION:** 2"-4"=8° | 6"=7° | 8"-12"=5° | 14"-16"=3 1/2° | 18"-24"=3° | 30"-64"=2°
- WEIGHTS:** Are in pounds, unless noted otherwise and do not include accessories, cement lining and coating
- FLANGES:** Flanged ends on fittings match ANSI/AWWA C115/A21.15 and ANSI B16.1 class 125 flanges
- CEMENT LINING:** In accordance with ANSI/AWWA C104/A21.4 -- size 2" - 3" single thickness and sizes 4" - 64" double thickness. [Click here for a pressure jetting discussion](#) or visit [http://www.starpipeproducts.com/pressure\\_cleaning\\_guidelines.asp](http://www.starpipeproducts.com/pressure_cleaning_guidelines.asp)
- COATING:** Asphaltic seal coat inside and out in accordance with ANSI/AWWA C104/A21.4 and referenced in ANSI/AWWA C153/A21.53
- GASKETS:** SBR in accordance with ANSI/AWWA C111/A21.11 (see pg. 16)
- T-BOLTS/NUTS:** Low alloy steel in accordance with ANSI/AWWA C111/A21.11 (see pg. 18)
- APPROVALS:** 3" - 12" UL/ULC Listed | 2" and greater are UL/ANSI/NSF Standards 61 and 372 | 3" - 16" FM APPROVED. Please consult factory for detail listing and approvals.
- DIMENSIONS:** All dimensions are in inches unless noted otherwise. ([Click here for a short commentary on non-pressure sewer applications](#) or visit [http://www.starpipeproducts.com/non-pressure\\_sewer\\_applications.asp](http://www.starpipeproducts.com/non-pressure_sewer_applications.asp). Review commentary before ordering or installing fittings for this application.)
- INSTALLATION:** Per ANSI/AWWA C600 and C111 using DIP conforming to C150/C151 and PVC pipe conforming to C900/C905



## MECHANICAL JOINT DIMENSIONS

NOM. SIZE	A DIA.	B	C DIA.	D DIA.	F DIA.	J DIA.	K1 DIA.	K2 DIA.	L	M	S	Ø	X DIA.	BOLTS	
														SIZE	NO.
2	2.50	2.50	3.39	3.50	2.61	4.75	6.19	6.25	0.58	0.62	0.36	28°	3/4	3/4 x 3	2
3	3.96	2.50	4.84	4.94	4.06	6.19	7.62	7.69	0.58	0.62	0.39	28°	3/4	3/4 x 3	4
4	4.80	2.50	5.92	6.02	4.90	7.50	9.06	9.12	0.60	0.75	0.39	28°	7/8	3/4 x 3 1/2	4
6	6.90	2.50	8.02	8.12	7.00	9.50	11.06	11.12	0.63	0.88	0.43	28°	7/8	3/4 x 3 1/2	6
8	9.05	2.50	10.17	10.27	9.15	11.75	13.31	13.37	0.66	1.00	0.45	28°	7/8	3/4 x 3 1/2	6
10	11.10	2.50	12.22	12.34	11.20	14.00	15.62	15.62	0.70	1.00	0.47	28°	7/8	3/4 x 3 1/2	8
12	13.20	2.50	14.32	14.44	13.30	16.25	17.88	17.88	0.73	1.00	0.49	28°	7/8	3/4 x 3 1/2	8
14	15.30	3.50	16.40	16.54	15.44	18.75	20.25	20.25	0.79	1.25	0.55	28°	7/8	3/4 x 4	10
16	17.40	3.50	18.50	18.64	17.54	21.00	22.50	22.50	0.85	1.31	0.58	28°	7/8	3/4 x 4	12
18	19.50	3.50	20.60	20.74	19.64	23.25	24.83	24.75	1.00	1.38	0.68	28°	7/8	3/4 x 4	12
20	21.60	3.50	22.70	22.84	21.74	25.50	27.08	27.00	1.02	1.44	0.69	28°	7/8	3/4 x 4	14
24	25.80	3.50	26.90	27.04	25.94	30.00	31.58	31.50	1.02	1.56	0.75	28°	7/8	3/4 x 4 1/2	16
30	32.00	4.00	33.29	33.46	32.17	36.88	39.12	39.12	1.31	2.00	0.82	20°	1 1/4	1 x 5 1/2	20
36	38.30	4.00	39.59	39.76	38.47	43.75	46.00	46.00	1.45	2.00	1.00	20°	1 1/4	1 x 5 1/2	24
42	44.50	4.00	45.79	45.96	44.67	50.62	53.12	53.12	1.45	2.00	1.25	20°	1 1/4	1 1/4 x 6	28
48	50.80	4.00	52.09	52.26	50.97	57.50	60.00	60.00	1.45	2.00	1.35	20°	1 1/4	1 1/4 x 6	32
54	57.56	4.00	58.82	59.02	57.73	63.20	65.70	65.70	1.88	2.00	1.50	20°	1 1/4	1 1/4 x 6 1/2	36
60	61.61	4.00	62.87	63.07	61.78	67.72	70.22	70.22	1.88	2.00	1.55	20°	1 1/4	1 1/4 x 6 1/2	36
64	65.67	4.00	66.96	67.13	65.84	71.86	74.36	74.36	1.88	2.00	1.62	20°	1 1/4	1 1/4 x 6 1/2	38

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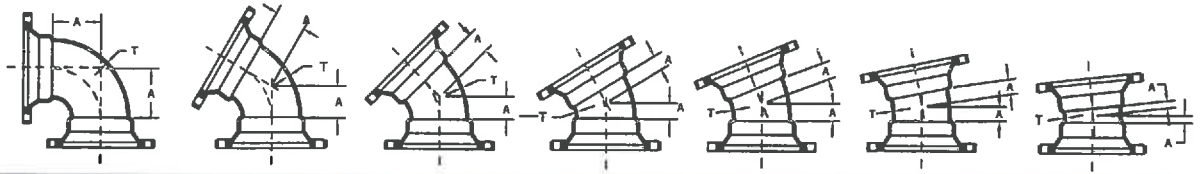
\* REGISTERED TRADEMARK OF STAR PIPE PRODUCTS



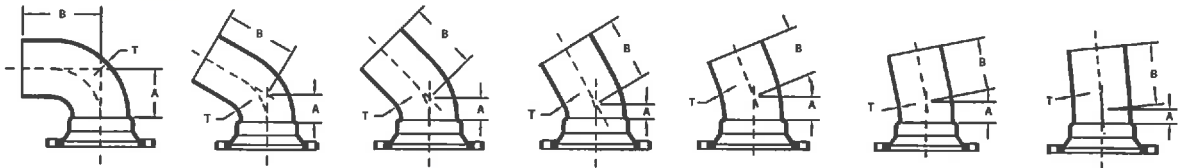


# Compact MJ Fittings

ANSI/AWWA C153/A21.53



MJ x MJ BENDS		90° MJ x MJ BENDS (¼)		60° MJ x MJ BENDS (⅙)		45° MJ x MJ BENDS (⅙)		30° MJ x MJ BENDS (½)		22 ½° MJ x MJ BENDS (⅙)		11 ¼° MJ x MJ BENDS (½)		5 ⅜° MJ x MJ BENDS (⅙)	
NOM. SIZE	T	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)	A	WT (LBS.)
2	0.30	3.25	14	-	-	1.80	13	-	-	1.00	9	1.00	8	-	-
3	0.33	3.50	23	-	-	1.50	21	-	-	1.00	16	1.00	14	-	-
4	0.34	4.00	27	3.00	21	2.00	23	-	-	1.50	18	1.25	16	1.25	16
6	0.36	5.00	39	4.00	35	3.00	32	-	-	2.00	32	1.50	30	1.50	27
8	0.38	6.50	57	4.50	50	3.50	46	3.00	44	2.50	46	1.75	42	1.75	38
10	0.40	7.50	89	-	-	4.50	70	-	-	3.00	64	2.00	58	2.00	56
12	0.42	9.00	108	6.50	104	5.50	98	4.00	87	3.50	84	2.25	74	2.25	73
14	0.47	11.50	180	-	-	5.00	145	-	-	3.75	140	2.50	128	-	-
16	0.50	12.50	264	7.50	210	5.50	202	4.50	177	3.75	178	2.50	148	2.50	150
18	0.54	14.00	335	-	-	6.00	250	-	-	4.50	255	3.00	205	-	-
20	0.57	15.00	400	-	-	7.00	305	-	-	4.50	262	3.00	245	3.00	239
24	0.61	17.00	565	10.50	479	7.50	405	6.00	385	4.50	412	3.00	315	3.00	317
30	0.66	21.50	1005	13.50	843	11.50	798	9.75	692	6.75	665	4.75	568	4.75	568
36	0.74	24.50	1562	17.00	1350	11.50	1164	11.00	1080	7.75	960	5.00	840	5.00	825
42	0.82	29.25	2506	19.00	2150	14.00	1792	12.00	1465	9.00	1350	6.00	1319	6.00	1125
48	0.90	33.25	3045	21.00	2650	15.00	2390	13.25	2075	10.00	1886	6.50	1700	6.50	1600
54	1.05	37.00	4023	-	-	20.25	3062	-	-	10.25	2198	5.00	1711	-	-
60	1.10	39.50	4714	-	-	21.25	3487	-	-	10.75	2434	7.00	2033	-	-
64	1.16	42.00	5508	-	-	22.25	4000	-	-	11.00	2727	7.00	2245	-	-



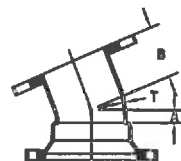
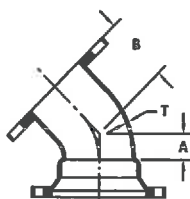
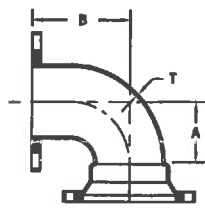
MJ x PE BENDS		90° MJ x PE BENDS (1/4)			60° MJ x PE BENDS (1/6)			45° MJ x PE BENDS (1/8)			30° MJ x PE BENDS (1/12)			22 1/2° MJ x PE BENDS (1/16)			11 1/4° MJ x PE BENDS (1/32)			5 5/8° MJ x PE BENDS (1/64)		
NOM. SIZE	T	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)
3	0.33	3.50	8.50	16	-	-	-	1.50	7.00	13	-	-	-	1.00	6.50	12	1.00	6.50	12	-	-	-
4	0.34	4.00	9.50	22	-	-	-	2.00	7.50	19	-	-	-	1.50	7.00	18	1.25	6.25	17	-	-	-
6	0.36	5.00	12.00	40	-	-	-	3.00	8.50	31	-	-	-	2.00	7.50	29	1.50	7.00	27	-	-	-
8	0.38	6.50	12.50	61	-	-	-	3.50	9.00	46	-	-	-	2.50	8.00	43	1.75	7.25	39	-	-	-
10	0.40	7.50	13.00	83	-	-	-	4.50	10.00	68	-	-	-	3.00	8.50	61	2.00	7.50	52	-	-	-
12	0.42	9.00	14.50	114	-	-	-	5.50	11.00	95	-	-	-	3.50	9.00	81	2.25	7.75	70	-	-	-
14	0.47	11.50	19.50	197	-	-	-	5.00	13.00	148	-	-	-	3.75	11.25	133	2.50	10.50	122	-	-	-
16	0.50	12.50	20.50	248	-	-	-	5.50	13.50	184	-	-	-	3.75	11.75	166	2.50	10.50	148	-	-	-
18	0.54	14.00	21.00	325	-	-	-	6.00	13.00	235	-	-	-	6.00	13.00	235	6.00	13.00	235	-	-	-
20	0.57	15.00	22.50	390	-	-	-	7.00	14.00	300	-	-	-	7.00	14.00	300	7.00	14.00	300	-	-	-
24	0.61	17.00	25.00	575	-	-	-	7.50	14.50	390	-	-	-	7.50	14.50	395	7.50	14.50	400	-	-	-
30	0.66	22.75	31.75	865	13.50	22.50	846	10.50	19.50	715	9.75	18.75	762	6.75	15.75	600	4.75	13.75	535	4.75	13.75	505
36	0.74	24.50	33.50	1355	-	-	-	12.00	21.00	1040	-	-	-	7.75	16.75	865	5.00	14.00	725	-	-	-
42	0.82	29.25	38.25	2055	-	-	-	14.00	23.00	1460	-	-	-	9.00	18.00	1200	6.00	15.00	1030	-	-	-
48	0.90	33.25	42.25	2805	-	-	-	15.00	24.00	1905	-	-	-	10.00	19.00	1575	6.50	15.50	1290	-	-	-



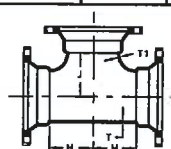
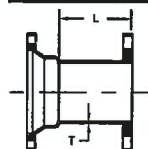


# Compact MJ Fittings

ANSI/AWWA C153/A21.53



MJ x FE BENDS		90° MJ x FE BENDS (1/4)			45° MJ x FE BENDS (1/4)			22 1/2° MJ x FE BENDS (1/16)			11 1/4° MJ x FE BENDS (1/32)		
NOM. SIZE	T	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)	A	B	WT (LBS.)
3	0.33	3.50	5.50	20	1.50	3.00	17	1.00	3.00	17	1.00	3.00	15
4	0.34	4.00	6.50	26	2.00	4.00	24	1.50	4.00	26	1.25	4.00	19
6	0.36	5.00	8.00	47	3.50	5.00	40	2.00	5.00	36	1.50	5.00	30
8	0.38	6.50	9.00	68	3.50	5.50	57	2.50	5.50	53	1.75	5.50	50
10	0.40	7.50	11.00	102	4.50	6.50	83	3.00	6.50	102	2.00	6.50	75
12	0.42	9.00	12.00	134	5.50	7.50	110	3.50	7.50	134	2.25	7.50	88
14	0.47	11.50	14.00	227	5.00	7.50	207	3.75	7.50	166	---	---	---
16	0.50	12.50	15.00	306	5.50	8.00	239	3.75	8.00	228	---	---	---
18	0.54	14.00	16.50	357	6.00	8.50	268	4.50	8.50	259	3.00	8.50	247
20	0.57	15.00	18.00	445	7.00	9.50	339	4.50	9.50	321	3.00	9.50	307
24	0.61	17.00	22.00	650	7.50	11.00	474	4.50	11.00	444	3.00	11.00	427
30	0.66	21.50	25.00	1070	10.50	15.00	858	---	---	---	---	---	---
36	0.74	24.50	28.00	1554	11.50	18.00	1240	7.75	18.00	1176	5.00	18.00	1118
42	0.82	29.25	31.00	2190	14.00	21.00	1820	---	---	---	6.00	21.00	1627
48	0.90	33.25	34.00	3015	15.00	24.00	2421	---	---	---	---	---	---



MJ x FLANGE ADAPTER			
NOM. SIZE	T	L	WT (LBS.)
3	0.33	3.50	13
4	0.34	3.50	22
6	0.36	3.50	32
8	0.38	3.50	47
10	0.40	4.00	66
12	0.42	4.00	91
14	0.47	5.00	141
16	0.50	5.00	170
18	0.54	5.00	176
20	0.57	5.00	252
24	0.61	5.00	320
30	0.66	7.00	558
36	0.74	8.50	796
42	0.82	12.00	1180
48	0.90	12.00	1499
54	1.05	13.00	1900
60	1.10	13.00	2163

MJ x MJ TEES					
NOM. SIZE	T	T1	H	J	WT (LBS.)
2 x 2	0.39	0.39	3.25	3.25	20
3 x 2	0.48	0.39	3.50	3.50	43
3 x 3	0.33	0.33	3.00	3.00	28
4 x 2	0.34	0.30	3.00	4.00	29
4 x 3	0.34	0.33	3.50	4.00	30
4 x 4	0.34	0.34	4.00	4.00	32
6 x 3	0.36	0.33	3.50	5.00	42
6 x 4	0.36	0.34	4.00	5.00	46
6 x 4 x 6	0.36	0.36	5.00	5.00	50
6 x 6	0.36	0.36	5.00	5.00	56
6 x 6 x 8	0.36	0.38	6.50	6.50	62
8 x 3	0.38	0.33	4.00	6.50	52
8 x 4	0.38	0.34	4.00	6.50	60
8 x 6	0.38	0.36	5.00	6.50	72
8 x 6 x 6	0.38	0.38	5.00	6.50	62
8 x 6 x 8	0.38	0.38	6.00	6.50	85
8 x 8	0.38	0.38	6.50	6.50	86
10 x 3	0.40	0.33	4.00	7.50	75
10 x 4	0.40	0.34	4.00	7.50	78
10 x 6	0.40	0.36	5.00	7.50	90
10 x 8	0.40	0.38	6.50	7.50	105
10 x 10	0.40	0.40	7.50	7.50	120
12 x 3	0.42	0.33	4.00	8.75	90
12 x 4	0.42	0.34	4.00	8.75	94

(Cont)

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\*REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

STAR<sup>®</sup> PIPE PRODUCTS

HOUSTON CORPORATE/TOLL FREE 1-800-999-3009/FAX 281-558-9000

www.starpipeproducts.com

Date: 5/2/19

### Domestic Fitting Product Certificate of Compliance

Star Distributor: SIMPLIFIED ALTERNATIVES, INC  
 Contractor: INDEPENDENCE EXCAVATING  
 Project Name: OPPORTUNITY CORRIDOR (CDDOT 173000)  
 Project Location: CLEVELAND, Ohio

Re: Buy America / Buy American Certification for Star Pipe Products Made in the USA fittings

We certify country of origin compliance per below:

**100% Domestic Fittings:** This option consists of 100% domestic fittings that are melted, poured, machined, and coated 100% in the United States. SPP performs the machining, packaging and Quality Control checks in its Houston, Texas facility. This product is compliant with the Consolidated Appropriations Act of 2014 (AIS), with the American Recovery and Reinvestment Act of 2009 (ARRA), the Buy America Act of 1983 and the Buy American Act of 1933. Domestic Fittings can be identified by item codes ending with the suffix "D".

Star Pipe Products certifies that all fitting products are made of ductile iron per ASTM A536, Grade 65-45-12 and conform to the following standards:

- AWWA C104(ANSI A21.4) for cement-mortar lining of ductile iron pipe and fittings for water
- AWWA C110(ANSI A21.10) for cast iron/ductile iron mechanical joint and flanged fittings
- AWWA C111(ANSI A21.11) for ductile iron mechanical joint glands and gaskets
- AWWA C153(ANSI A21.53) for compact mechanical joint and push-on ductile iron fittings

Star Pipe Products offers a variety of coatings and linings for the fittings it supplies. When a cement-lined and asphaltic-coated fitting is ordered, the asphaltic coating is applied inside and out in accordance with AWWA C104 (ANSI A21.4). The cement lining is applied in accordance with AWWA C104 (ANSI 21.4). These standards are met with both domestic and imported fittings, and they are met regardless of outlet style: standard mechanical joint, flange, or push-on.

Vivek Sharma  
 Director (Product Management Group)  
 Star Pipe Products

This document is void if modified in any manner other than the addition of distributor, contractor, or project details.

**STAR PIPE PRODUCTS**

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 F: 281.558.8000





**McWANE  
DUCTILE**

**IRON STRONG**



**SIZES - 4" to 36"**

**TR FLEX**

**® RESTRAINED JOINT DUCTILE IRON PIPE  
AND FITTINGS**



IRON STRONG

## 4" - 36" DUCTILE IRON TR FLEX<sup>®</sup> PIPE

MATERIAL	Ductile Iron per AWWA C150/ANSI A21.50, AWWA C151/ANSI A21.51, ASTM A536
PRESSURE	350 PSI Water Working Pressure 4" - 24" & 250PSI FOR 30 & 36"
TESTING	ANSI / AWWA C151 / ANSI 21.51 & UL - FM requirements
LAYING LENGTH	18 foot Nominal Length
CEMENT LINING	ANSI / AWWA C104 / ANSI 21.4
COATING	ANSI / AWWA C104 / ANSI 21.4
GASKETS	ANSI / AWWA C111/ ANSI A21.11
STANDARDS	AWWA C150/ANSI A21.50, AWWA C151/ANSI A21.51, AWWA C104 / ANSI 21.4, AWWA C111/ ANSI A21.11



❖ visit [pe.mcwane.com](http://pe.mcwane.com) for more information

❖ All Dimensions are in Inches

# TR FLEX

<sup>®</sup> RESTRAINED JOINT DUCTILE IRON PIPE  
AND FITTINGS





IRON STRONG

## DUCTILE IRON TR FLEX® Pulling Force at Equivalent Pressure for HDD Applications

Nominal Pipe Size	Pipe O.D. (in)	350 psi Equivalent Force	500 psi Equivalent Force	Recommended Maximum Pulling Force	Absolute Maximum Pulling Force
4	4.80	6,333	9,048	6,000	9,000
6	6.90	13,087	18,696	13,000	18,000
8	9.05	22,514	32,163	22,000	32,000
10	11.10	33,869	48,384	33,000	48,000
12	13.20	47,897	68,424	47,000	68,000
14	15.30	64,349	91,927	64,000	91,000
16	17.40	83,226	118,894	83,000	118,000
18	19.50	104,527	149,324	104,000	149,000
20	21.60	128,252	183,218	128,000	183,000
24	25.80	182,977	261,396	182,000	261,000
30	32.00	201,062	281,487	201,000	281,000
36	38.30	288,023	403,232	288,000	403,000

Notes:

- 350 psi is the rated pressure of the joint.
- 500 psi equivalent is the absolute maximum pulling force that should be used.
- 30" and 36" Equivalent Forces are 250 psi equivalent

## Actual Laying Length

Nominal Size	Feet	Inch
4	18	1
6	18	1
8	18	1
10	17	11
12	17	11
14	17	10
16	17	10
18	17	10
20	17	9
24	17	9
30	17	9
36	17	7

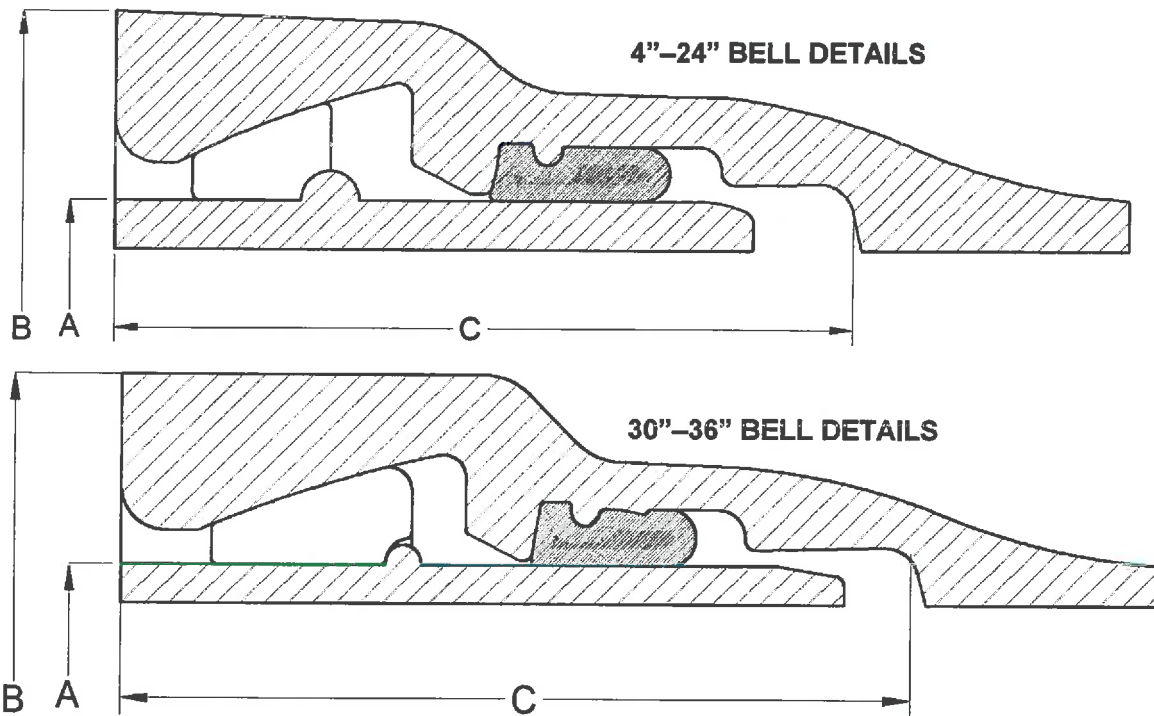
❖ visit [pe.mcwane.com](http://pe.mcwane.com) for more information

❖ All Dimensions are in Inches

**TR FLEX**

® RESTRAINED JOINT DUCTILE IRON PIPE  
AND FITTINGS

## DUCTILE IRON TR FLEX® PIPE 4" - 36" Bell Details



Pipe Size In.	*Pressure Rating psi	A	B	C	# of D.I Locking Segments	# of Rubber Segments Retainers	Max Deflection Degrees	Pullout
		In.	In.	In.				
4	350	4.80	7.25	4.84	2	1	5	0.03
6	350	6.90	9.52	5.27	2	1	5	0.04
8	350	9.05	11.93	5.82	2	1	5	0.04
10	350	11.10	14.37	6.03	2	1	5	0.05
12	350	13.20	16.68	6.30	4	2	5	0.06
14	350	15.30	19.16	7.75	4	2	3-1/4	0.05
16	350	17.40	21.46	7.95	4	2	3-1/4	0.05
18	350	19.50	23.76	8.19	4	2	3	0.05
20	350	21.60	26.04	8.40	4	2	2-1/2	0.05
24	350	25.80	30.61	8.86	8	4	2-1/4	0.05
30	250	32.00	36.88	10.28	8	4	1-3/4	0.05
36	250	38.30	43.85	10.87	8	4	1-1/2	0.05

\*The TR FLEX® Restrained Joint has a working pressure rating equivalent to the working pressure rating of the parent pipe with a maximum working pressure rating of 350 psi for 4 in. through 24 in. and 250 psi for 30 in. through 36 in.

NOTE: These deflections are based on joints with nominal dimensions.

❖ visit [pe.mcwane.com](http://pe.mcwane.com) for more information

❖ All Dimensions are in Inches



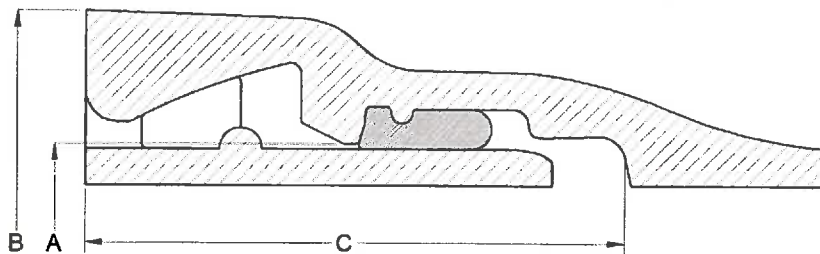


IRON STRONG

## DUCTILE IRON TR FLEX® FITTINGS

MATERIAL	Ductile Iron Grade 70-50-05 in accordance with AWWA C153 / ANSI A21.53
PRESSURE	350 PSI Water Working Pressure for 4" - 24" & 250PSI for 30 & 36"
TESTING	AWWA C153 / ANSI A21.53 & UL - FM requirements
LAYING LENGTH	AWWA C153 / ANSI A21.53
CEMENT LINING	AWWA C104 / ANSI A21.4
COATING	AWWA C104 / ANSI A21.4
GASKETS	AWWA C111 / ANSI A21.11
STANDARDS	AWWA C153 / ANSI A21.53, AWWA C104 / ANSI A21.4, AWWA C111 / ANSI A21.11

### BASIC SPECIFICATIONS



SIZE	A in	B in	C in
4	4.80	7.11	4.84
6	6.90	9.39	5.27
8	9.05	11.85	5.82
10	11.10	14.12	6.03
12	13.20	16.46	6.30
14	15.30	19.13	7.75
16	17.40	21.33	7.95
18	19.50	23.53	8.19
20	21.60	25.75	8.40
24	25.80	30.15	8.86
30	32.00	37.19	10.28
36	38.30	43.85	10.87

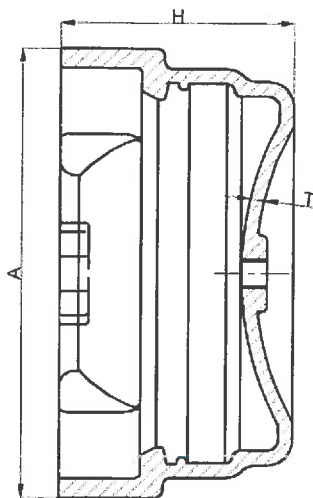
❖ visit [pe.mcwane.com](http://pe.mcwane.com) for more information

❖ All Dimensions are in Inches

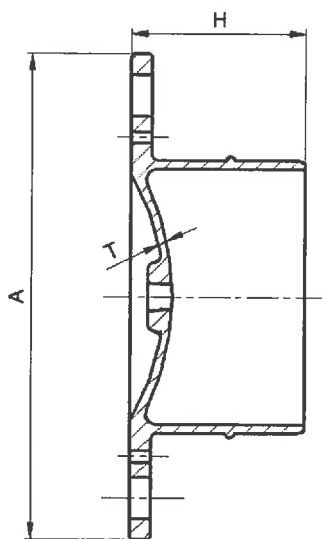
# TR FLEX

® RESTRAINED JOINT DUCTILE IRON PIPE  
AND FITTINGS

## TR FLEX<sup>®</sup> FITTING THICKNESS & DIMENSIONS CAPS & PLUGS



SIZE	A in	T in	H in
4	7.11	0.34	5.18
6	9.39	0.36	5.63
8	11.85	0.38	6.20
10	14.12	0.40	6.43
12	16.46	0.42	6.72
14	19.13	0.47	8.22
16	21.33	0.50	8.45
18	23.53	0.54	8.73
20	25.75	0.57	8.97
24	30.15	0.61	9.47
30	37.19	0.66	10.94
36	43.85	0.74	11.61



SIZE	A in	T in	H in
4	12.00	0.34	6.50
6	14.50	0.36	7.00
8	17.00	0.38	7.50
10	20.00	0.80	8.00
12	23.50	0.80	11.00
14	21.75	0.47	10.25
16	24.00	0.50	10.25
18	26.25	0.54	10.50
20	28.50	0.57	10.75
24	32.50	0.61	11.25
30	40.25	0.66	13.50
36	46.50	0.74	14.25

❖ visit [pe.mcwane.com](http://pe.mcwane.com) for more information

❖ All Dimensions are in Inches

**TR FLEX<sup>®</sup> RESTRAINED JOINT DUCTILE IRON PIPE AND FITTINGS**



IRON STRONG

## 4" - 36" DUCTILE IRON TR FLEX<sup>®</sup> PIPE ASSEMBLY INSTRUCTIONS

### TR Flex<sup>®</sup> pipes and fittings assembly instructions:

- When laying a pipe or fitting in a trench, orient the locking segment insertion bell slots so that:
  - The 2 slots on 4" - 20" pipe are at the horizontal or 3 and 9 o'clock positions
  - The 4 slots on 24" - 36" pipe are at the 2, 4, 8 and 10 o'clock positions or forming an 'X' when looking at the bell face



4"-20"



24"-36"

- Thoroughly clean the bell cavity area including the gasket seat and the locking segment groove to remove all dirt, debris and any foreign material(s) that could inhibit proper gasket sealing or locking segment placement. Ensure the gasket seat area is dry
- Insert a standard Tyton gasket in the bell socket, make sure the retainer bead on the heel of the gasket is fully inserted into the corresponding socket groove
- Apply a thin but continuous layer of lubricant on the installed gasket and the pipe spigot up to the weld bead
- Keeping the mating pipe aligned, insert the pipe spigot into the corresponding pipe bell and push home
- There are two locking segments for 4" - 10" joints, four locking segments for 12" - 20" joints and eight locking segments for 24" - 36" joints
- Insert the locking segments one at a time into the bell slots and rotate / slide each locking segment into the bell cavity. Red segments rotate to the right and black segments rotate to the left
- Insert the rubber retainer into the bell slot between two installed locking segments to retain the locking segments in their correct position
- Once all locking segments and rubber retainers are properly installed, pull back on the installed joint to fully extend the joint and set any desired deflection

❖ visit [pe.mcwane.com](http://pe.mcwane.com) for more information

\* TR FLEX<sup>®</sup> is a registered trademark of U.S. Pipe

**TR FLEX**

<sup>®</sup>

**RESTRAINED JOINT DUCTILE IRON PIPE  
AND FITTINGS**

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-101  
Station: Aug 14,'19  
Type: Cleve WPC Mh  
SalesPerson: Ralph Hastings

Rim: 666.91'  
Invert: 634.33'  
Rim to Invert: 32.58'  
Sump: 0.67'

Description	UOM	Quantity	Weight
Stock 48"Ø X 37" Eccentric Cone	EA	1	2755
48"Ø Stock Manhole Riser X 24" Tall	EA	1	1734
48"Ø Manhole Riser X 80" Tall	EA	1	5642
48"Ø Stock Manhole Riser X 48" Tall	EA	1	3467
48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778
84"Ø Flat Transition to 48"Ø	EA	1	8955
84"Ø Non Extended 12" Manhole Base X 97" Tall	EA	1	23256
A-Lok XC-1910	EA	2	0
A-Lok X-480	EA	1	0
Delivery unloaded	EA	1	0

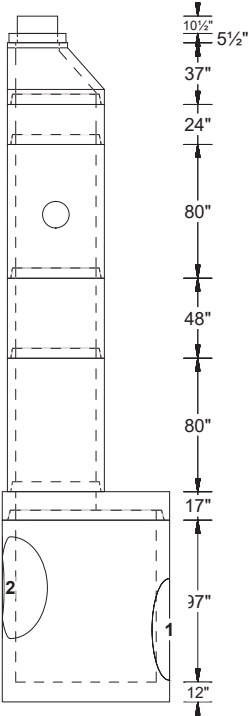
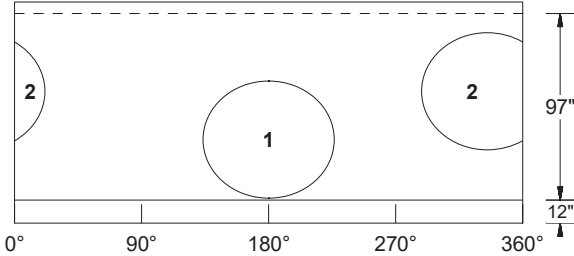
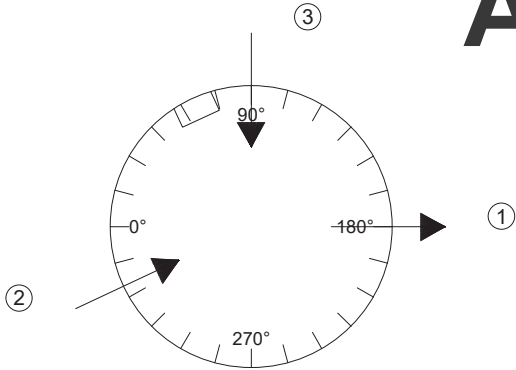


1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614

9/23/19: Revised to release transition, risers and cone as designed. Complete structure now approved.

Step Degree: 65 ML-10 steps at 16" O.C

APPROVED



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	634.33	-1.42	180	48" - RCP Co-Pipe	1910 A-LOK
(2)	636.33	1.43	335	48" - RCP Co-Pipe	1910 A-LOK
(3)	656	14.19	90	12" - VCP LOGAN	480 A-LOK

A-Lok XC-1910  
A-Lok X-480

08/14/2019

**From:** Ramy, Elie <eramy@ClevelandWPC.com>  
**Sent:** Tuesday, October 8, 2019 9:32 AM  
**To:** Gillilan, Matt  
**Cc:** Mark Gabele (mark.gabele@dot.ohio.gov); Brad Mast (bwm@kokosing.biz); Mike Luyster (mrl@kokosing.biz); Hampton, Andy; Morrow, Chris; Meyer, Brandon; Schiely, Alan; Kevin.Kuntz@dot.ohio.gov  
**Subject:** RE: OC3 - WPC Meeting

**CAUTION:** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Matt,

Coring into a VCP pipe is not a preferred method for WPC. VCP Tee is required.

Thanks,

Elie Ramy  
City of Cleveland  
Water Pollution Control (WPC)  
(216) 664-2756

---

**From:** Gillilan, Matt <[mgillilan@indexc.com](mailto:mgillilan@indexc.com)>  
**Sent:** Monday, October 07, 2019 6:50 AM  
**To:** Schiely, Alan <[aschiely@ClevelandWPC.com](mailto:aschiely@ClevelandWPC.com)>; Ramy, Elie <[eramy@ClevelandWPC.com](mailto:eramy@ClevelandWPC.com)>; Kevin.Kuntz@dot.ohio.gov  
**Cc:** Mark Gabele ([mark.gabele@dot.ohio.gov](mailto:mark.gabele@dot.ohio.gov)) <[mark.gabele@dot.ohio.gov](mailto:mark.gabele@dot.ohio.gov)>; Brad Mast ([bwm@kokosing.biz](mailto:bwm@kokosing.biz)) <[bwm@kokosing.biz](mailto:bwm@kokosing.biz)>; Mike Luyster ([mrl@kokosing.biz](mailto:mrl@kokosing.biz)) <[mrl@kokosing.biz](mailto:mrl@kokosing.biz)>; Hampton, Andy <[ahampton@indexc.com](mailto:ahampton@indexc.com)>; Morrow, Chris <[cmorrow@indexc.com](mailto:cmorrow@indexc.com)>; Meyer, Brandon <[BMeyer@indexc.com](mailto:BMeyer@indexc.com)>  
**Subject:** RE: OC3 - WPC Meeting

**\*\* BE ADVISED:** This email came from outside of the Department of Public Utilities organization! **USE CAUTION BEFORE** you reply, click on any links, or open any attachments! **DPU IT HelpDesk x74800 \*\***

Elie:

One follow-up question: Would it be acceptable if we were to core and boot the 15" VCP to make the 8" SDR26 transition/vertical drop? This would be in-place of the 15"x8" VCP Tee we discussed.

Thanks,  
Matt

---

**From:** Gillilan, Matt  
**Sent:** Friday, October 4, 2019 1:55 PM  
**To:** Schiely, Alan <[aschiely@ClevelandWPC.com](mailto:aschiely@ClevelandWPC.com)>; Ramy, Elie <[eramy@ClevelandWPC.com](mailto:eramy@ClevelandWPC.com)>; Kevin.Kuntz@dot.ohio.gov  
**Cc:** Mark Gabele ([mark.gabele@dot.ohio.gov](mailto:mark.gabele@dot.ohio.gov)) <[mark.gabele@dot.ohio.gov](mailto:mark.gabele@dot.ohio.gov)>; Brad Mast ([bwm@kokosing.biz](mailto:bwm@kokosing.biz)) <[bwm@kokosing.biz](mailto:bwm@kokosing.biz)>; Mike Luyster ([mrl@kokosing.biz](mailto:mrl@kokosing.biz)) <[mrl@kokosing.biz](mailto:mrl@kokosing.biz)>; Hampton, Andy <[ahampton@indexc.com](mailto:ahampton@indexc.com)>; Morrow, Chris <[cmorrow@indexc.com](mailto:cmorrow@indexc.com)>; Meyer, Brandon

([BMeyer@indexc.com](mailto:BMeyer@indexc.com)) <[BMeyer@indexc.com](mailto:BMeyer@indexc.com)>

**Subject:** OC3 - WPC Meeting

Alan/Elie:

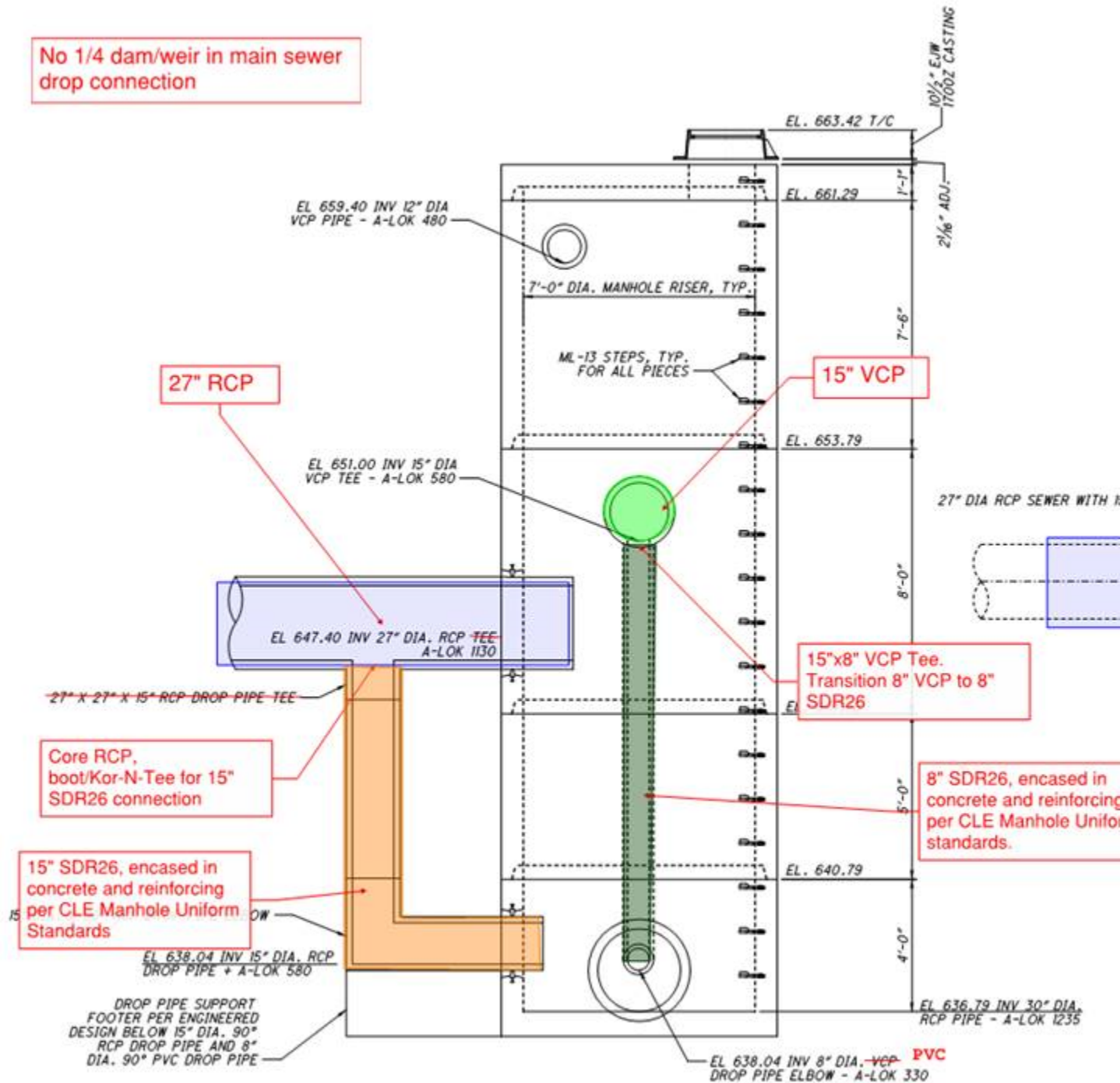
Thanks for your time this morning. To provide a brief recap of our discussion:

1. Sanitary structure S-103 has two external drop connections from existing sewers that will be tied into the manhole. The following is how IX is to proceed in order to make the connections:
  - 27" RCP: 27" RCP at invert elevation. Drop: Core and boot with 15" SDR26 vertical drop pipe and 90° into manhole base. Drop to be supported, encased in concrete and reinforced per City/County uniform standards
  - 15" VCP: 15" VCP at invert elevation. Drop: 15"x8" VCP tee, 8" VCP to transition to 8" SDR26 with 90° into manhole base. Drop to follow uniform standards
  - No dam/weir will be built in either the 15" or 27"
  - See sketch below
2. Regarding S-105, IX is to organize a field meeting with this group once the top of the existing structure is demolished to determine what is required for the final condition of the center brick wall. See sketch below.

S-103 Sketch:




No 1/4 dam/weir in main sewer drop connection



S-105 Sketch:

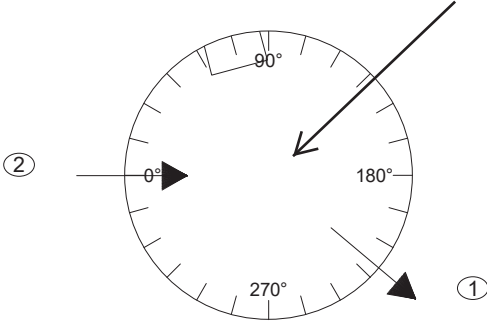


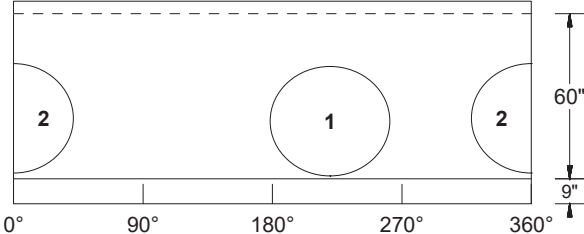
Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: S-104 REMAKE w/o 18 Station: Nov 27,'19 Type: Cleve WPC Mh SalesPerson: Ralph Hastings	Description		UOM	Quantity	Weight
	60"Ø Non Extended 9" Manhole Base X 60" Tall		EA	1	8278
	A-Lok XC-1235 Premium		EA	2	0
Rim: 642.12' Invert: 633.12' Rim to Invert: 9.00' Sump: 0.53'	<div>  <p>1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614</p> </div>				

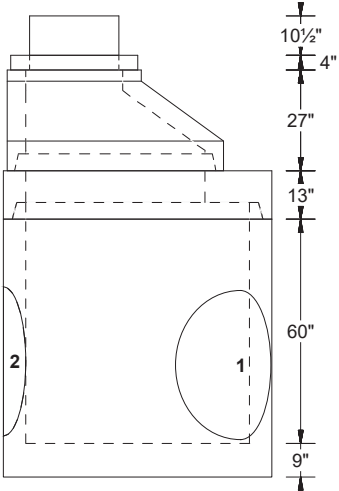
Step Degree: 75

**Core at 136° for 18"Ø DIP\***

**> 18"Ø invert elevation of 634.12**







PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	633.12	-1.7	220	30" - RCP Co-Pipe	1235 A-LOK
(2)	633.12	1.58	0	30" - RCP Co-Pipe	1235 A-LOK

**\*Either Kor-n-Seal boot will work**


**> S206-24A - uses a 24"Ø cored hole - This boot is in stock in New Hampshire**

**- OR -**

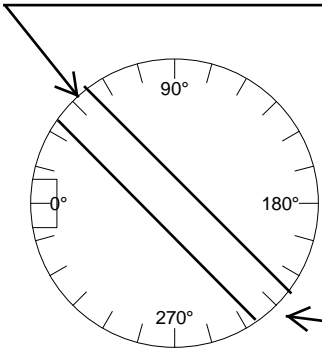
**> S206-22L - uses a 22"Ø cored hole - This boot will take 2 days to make before it can be shipped.**

A-Lok XC-1235 Premium

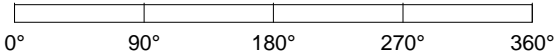
12/02/2019

Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: S-105 Station: Type: 84"Ø DH Cuy County SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	Stock 48"Ø X 27" Eccentric Cone	EA	1	1860	
	Stock 72"Ø Flat Transition to 48"Ø	EA	1	5904	
	72"Ø Manhole Riser X 72" Tall	EA	1	10858	
	84"Ø NB Flat Transition to 72"	EA	1	3945	
	Baffle in 72"Ø Manhole	EA	1	2925	
		EA	1	0	
Rim: 10.67' Invert: 0.00' Rim to Invert: 10.67' Sump: 0.00' <b>ML-10 steps at 16" O.C.</b>					

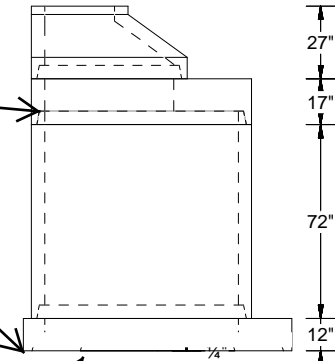
Step Degree: 0



6" thick solid slide in baffle x 84" tall,  
no holes, from 45° to 225°. Grooves in  
72"Ø riser, and in 84"x72" transition



Steps and baffle grooves from top  
of 72"Ø riser to the bottom of the  
84"Øx72"Ø transition must match



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	0	0	0	no hole	No Hole

Offset 84"Ø (100" O.D.)  
x 72"Ø transition  
x 12" thick, no pallet  
(no bottom joint)

11/08/2019

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-106 REVD  
Station: Apr 4,'19  
Type: Cleve WPC 84"Ø Stm  
SalesPerson: Ralph Hastings

Rim: 647.37'  
Invert: 630.38'  
Rim to Invert: 16.99'  
Sump Height: .00'

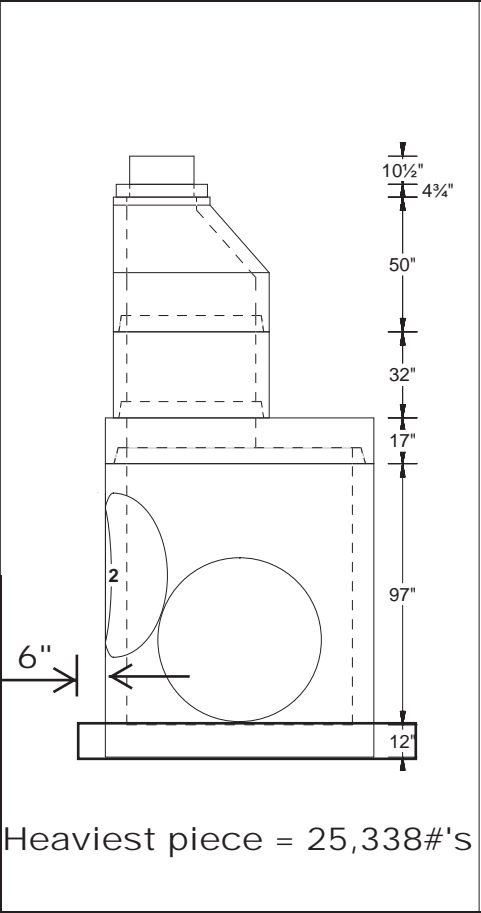
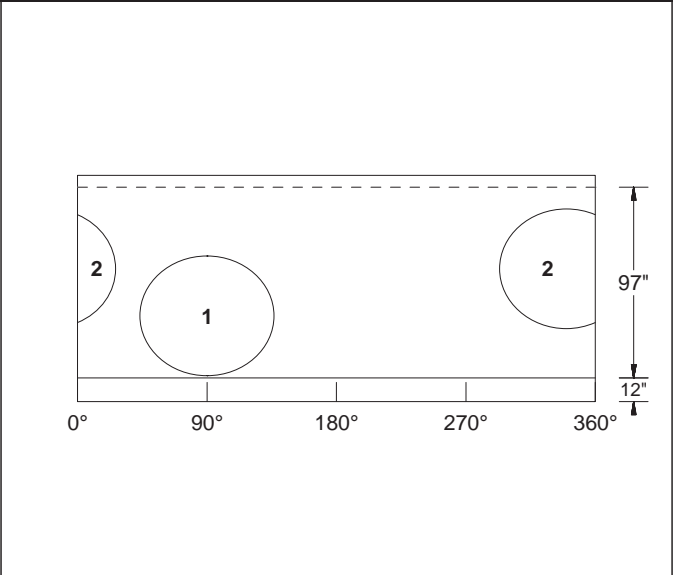
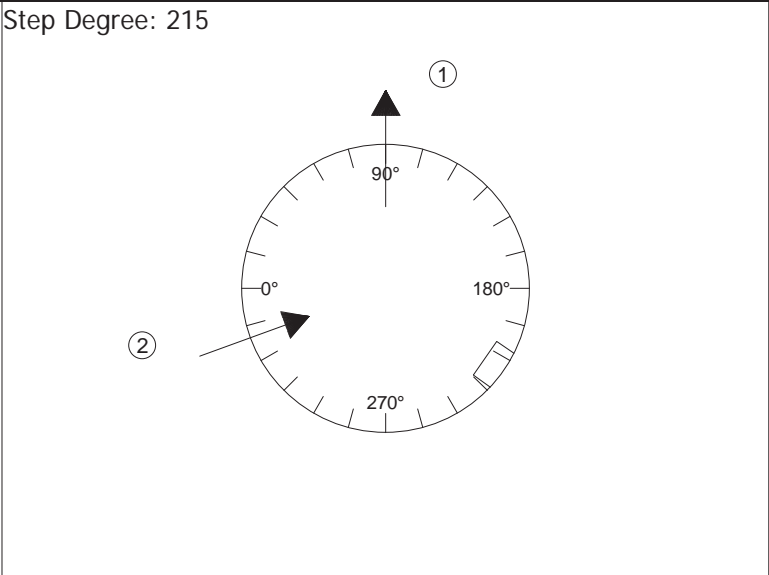
Description	UOM	Quantity	Weight
Stock 48"Ø X 50" Eccentric Cone	EA	1	3740
48"Ø Stock Manhole Riser X 32" Tall	EA	1	2311
84"Ø Flat Transition to 48"Ø	EA	1	8955
84"Ø Extended 12" Manhole Base X 97" Tall	EA	1	25338
A-Lok XC-1910	EA	2	0
Delivery unloaded	EA	1	0

Structure installed during Summer 2019 pre-phase work.



**Lindsay**  
P R E C A S T

1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	630.38	0	90	48" - RCP Co-Pipe	1910 A-LOK
(2)	632.38	0	340	48" - RCP Co-Pipe	1910 A-LOK

Customer: INDEPENDENCE EXCAVATING, INC.

Job Name: ODOT 173000 - Opp Corridor Ph 3

Job #: 173408

Structure ID: S-102

Station: Aug 14,'19

Type: Cleve WPC Mh

SalesPerson: Ralph Hastings

Rim: 647.24'

Invert: 636.54'

Rim to Invert: 10.70'

Sump: 0.54'

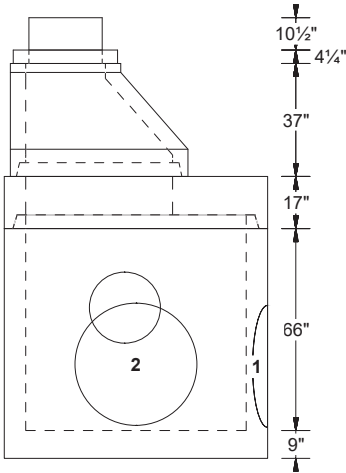
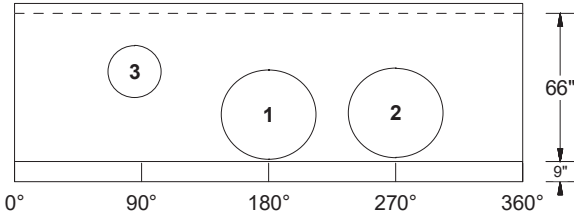
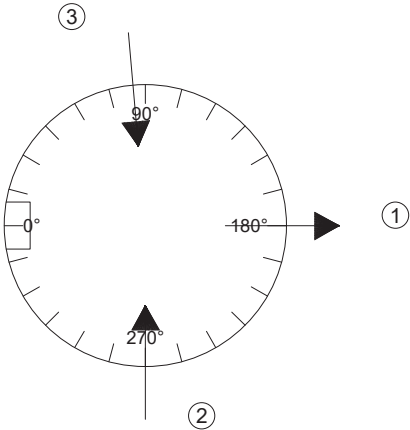
Description	UOM	Quantity	Weight
Stock 48"Ø X 37" Eccentric Cone	EA	1	2755
Stock 72"Ø Flat Transition to 48"Ø	EA	1	5904
72"Ø Non Extended 9" Manhole Base X 66" Tall	EA	1	12661
A-Lok XC-1235	EA	2	0
A-Lok XC-710	EA	1	0



1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614

APPROVED

Step Degree: 0 **ML-10 steps at 16" O.C.**



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636.54	-1.58	180	30" - RCP Co-Pipe	1235 A-LOK
(2)	636.54	0.5	270	30" - RCP Co-Pipe	1235 A-LOK
(3)	638.54	2.05	85	18" - VCP LOGAN	710 A-LOK



Customer:	INDEPENDENCE EXCAVATING, INC.
Job Name:	ODOT 173000 - Opp Corridor Ph 3
Job #:	173408
Structure ID:	S-103
Station:	Aug 14,'19
Type:	Cleve WPC Mh
SalesPerson:	Ralph Hastings
Rim:	663.42'
Invert:	636.79'
Rim to Invert:	26.63'
Sump:	0.51'

Description	UOM	Quantity	Weight
84"Ø Flat Top W/ 26"Ø Hole	EA	1	5974
84"Ø Manhole Riser X 88" Tall	EA	1	17524
84"Ø Manhole Riser X 96" Tall	EA	1	18329
84"Ø Manhole Riser X 48" Tall	EA	1	9634
84"Ø Non Extended 9" Manhole Base X 67" Tall	EA	1	18312
Z-Lok C107-16	EA	1	0
Z-Lok C107-8	EA	1	0
A-Lok XC-1130	EA	1	0
A-Lok XC-1235	EA	1	0
A-Lok XC-480	EA	1	0
A-Lok XC-580	EA	1	0
CL-188	EA	2	0
CL-EV15-18L	EA	2	0

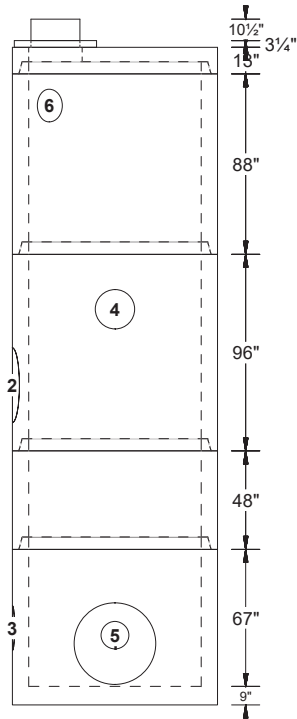
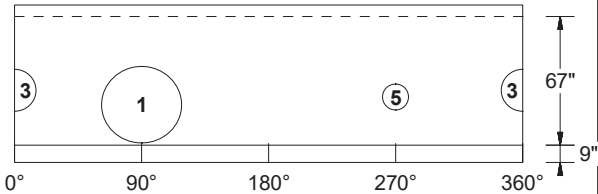
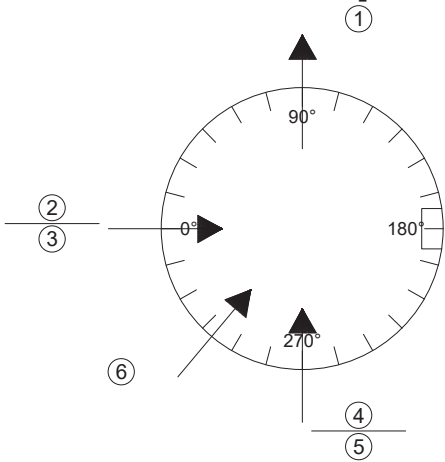


**Lindsay**  
 PRECAST

1-800-837-7788  
 6845 Erie Ave. N.W.  
 PO Box 578  
 Canal Fulton, Ohio 44614

Step Degree: 180
 **ML-10 steps at 16" O.C.**

APPROVED



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636.79	-0.5	90	30" - RCP Co-Pipe	1235 A-LOK
(2)	647.4	0	0	27" - RCP Co-Pipe	1130 A-LOK
(3)	638.04	0	0	15" - VCP SUPERIOR	16"/18" Z-LOK C107-16/18
(4)	651	0	270	15" - VCP SUPERIOR	580 A-LOK
(5)	638.04	0	270	8" - VCP LOGAN	8" Z-LOK C107-8 FW
(6)	659.4	0	310	12" - VCP LOGAN	480 A-LOK

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-104  
Station: Aug 14,'19  
Type: Cleve WPC Mh  
SalesPerson: Ralph Hastings

Rim: 642.12'  
Invert: 633.12'  
Rim to Invert: 9.00'  
Sump: 0.53'

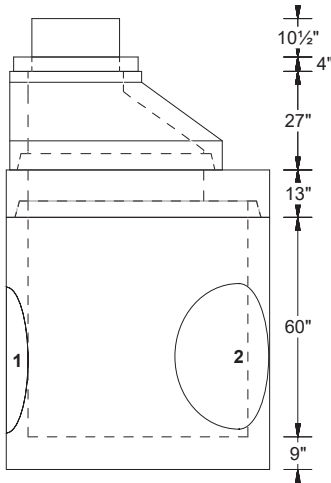
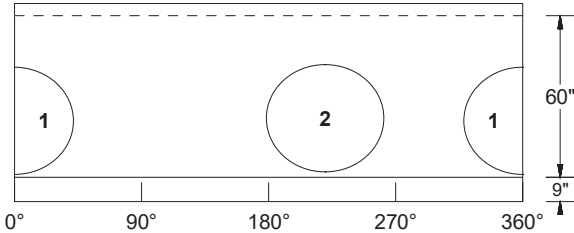
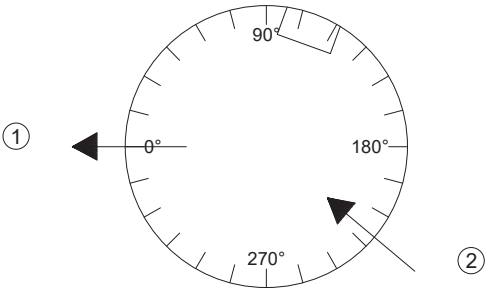
Description	UOM	Quantity	Weight
Stock 48"Ø X 27" Eccentric Cone	EA	1	1860
Stock 60"Ø Flat Transition to 48"Ø	EA	1	2355
60"Ø Non Extended 9" Manhole Base X 60" Tall	EA	1	8278
A-Lok XC-1235	EA	2	0



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Step Degree: 110

ML-10 steps at 16" O.C.



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	633.12	-1.7	0	30" - RCP Co-Pipe	1235 A-LOK
(2)	633.12	1.58	220	30" - RCP Co-Pipe	1235 A-LOK

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-109  
Station: Aug 14,'19  
Type: Cleve WPC Mh  
SalesPerson: Ralph Hastings

Rim: 667.04'  
Invert: 643.10'  
Rim to Invert: 23.94'  
Sump: 0.53'

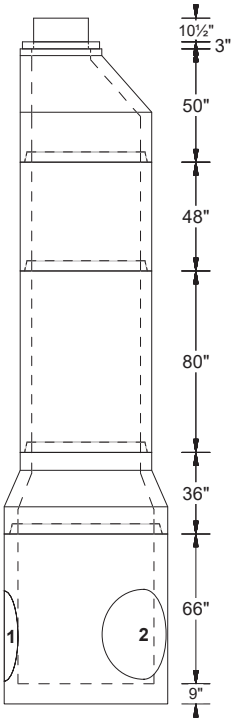
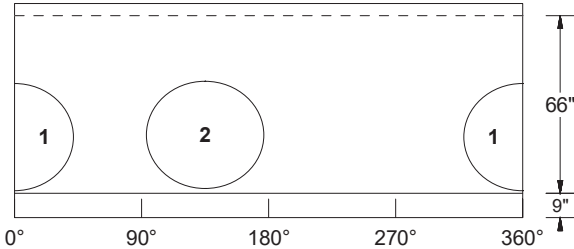
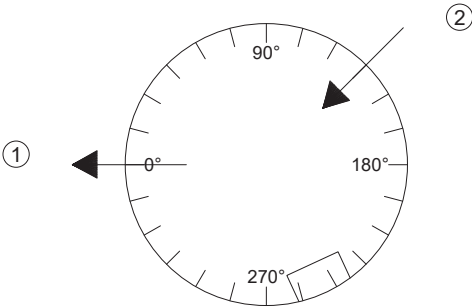
Description	UOM	Quantity	Weight
Stock 48"Ø X 50" Eccentric Cone	EA	1	3740
48"Ø Stock Manhole Riser X 48" Tall	EA	1	3467
48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778
Stock 60"Ø Dome Transition to 48"Ø	EA	1	3298
60"Ø Non Extended 9" Manhole Base X 66" Tall	EA	1	8926
A-Lok XC-1235	EA	2	0




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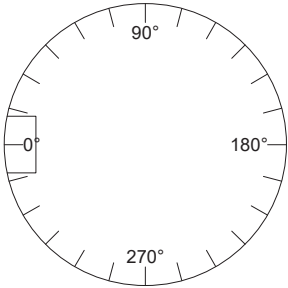
Step Degree: 245 **ML-10 steps at 16" O.C.**



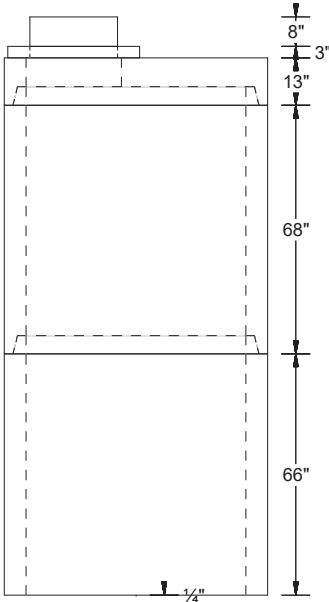
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	643.1	-1.35	0	30" - RCP Co-Pipe	1235 A-LOK
(2)	643.1	1.35	135	30" - RCP Co-Pipe	1235 A-LOK

Customer:	INDEPENDENCE EXCAVATING, INC.	Description	UOM	Quantity	Weight	
Job Name:	ODOT 173000 - Opp Corridor Ph 3	60"Ø x 13" Flat Top w/ 42"Ø Offset Opening	EA	1	2575	
Job #:	173408	60"Ø Manhole Riser X 68" Tall	EA	1	7343	
Structure ID:	S-10A R1	60"Ø Manhole Riser X 66" Tall	EA	1	7127	
Station:			EA	1	0	
Type:	Riser w/ no bottom pallet flat top					1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
SalesPerson:	Ralph Hastings					
Rim:	667.17'					
Invert:	654.00'					
Rim to Invert:	13.17'					
Sump:	0.01'					


Step Degree: 0      **ML-13 steps at 12" O.C.**



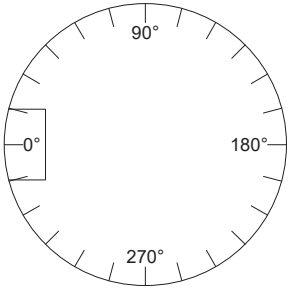
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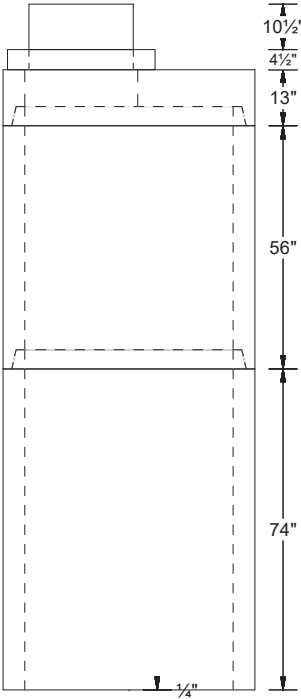
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	654	0	0	no hole	No Hole

Customer:	INDEPENDENCE EXCAVATING, INC.	Description	UOM	Quantity	Weight	
Job Name:	ODOT 173000 - Opp Corridor Ph 3	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185	
Job #:	173408	48"Ø Manhole Riser X 56" Tall	EA	1	4047	
Structure ID:	S-10A R2	48"Ø Manhole Riser X 74" Tall	EA	1	5348	
Station:			EA	1	0	
Type:	Riser w/ no bottom pallet flat top					1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
SalesPerson:	Ralph Hastings					
Rim:	667.17'					
Invert:	654.00'					
Rim to Invert:	13.17'					
Sump:	0.01'					

Step Degree: 0 **ML-13 steps at 12" O.C.**



**APPROVED**



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	654	0	0	no hole	No Hole

Customer: INDEPENDENCE EXCAVATING, INC.

Job Name: ODOT 173000 - Opp Corridor Ph 3

Job #: 173408

Structure ID: S-110A

Station: Aug 14,'19

Type: Cleve WPC Mh

SalesPerson: Ralph Hastings

Rim: 667.29'

Invert: 645.62'

Rim to Invert: 21.67'

Sump: 0.53'

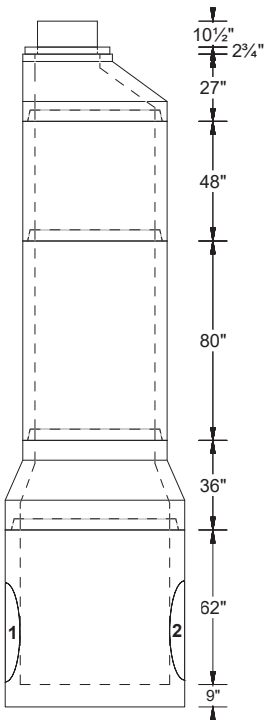
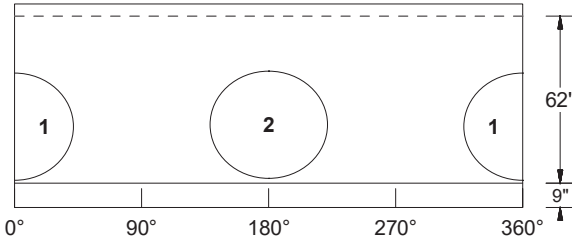
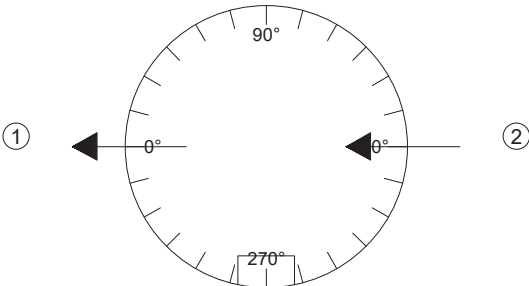
Description	UOM	Quantity	Weight
Stock 48"Ø X 27" Eccentric Cone	EA	1	1860
48"Ø Stock Manhole Riser X 48" Tall	EA	1	3467
48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778
Stock 60"Ø Dome Transition to 48"Ø	EA	1	3298
60"Ø Non Extended 9" Manhole Base X 62" Tall	EA	1	8494
A-Lok XC-1235	EA	2	0



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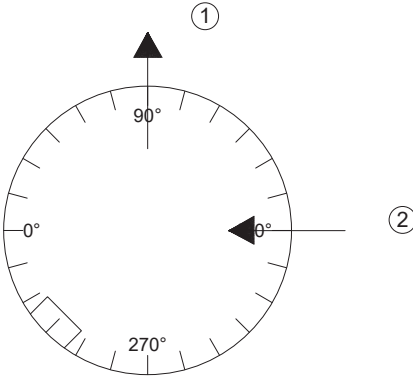
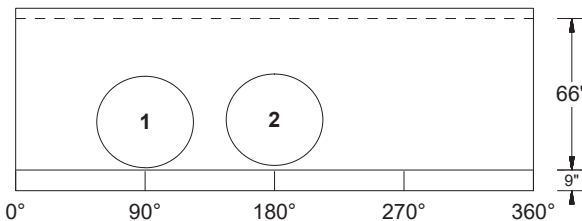
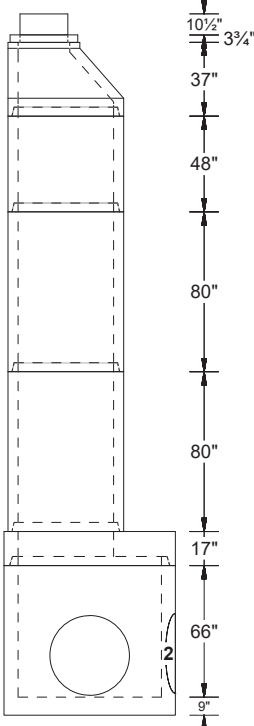
Step Degree: 270      **ML-10 steps at 16" O.C.**




PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	645.62	-1.35	0	30" - RCP Co-Pipe	1235 A-LOK
(2)	645.62	1.35	180	30" - RCP Co-Pipe	1235 A-LOK

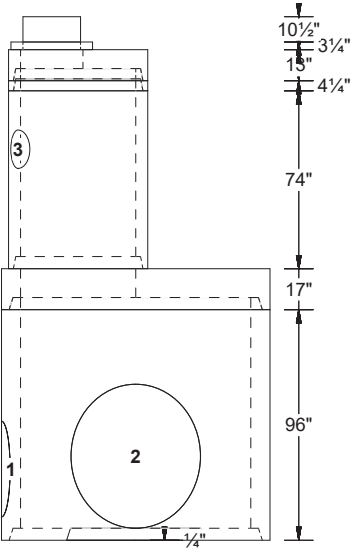
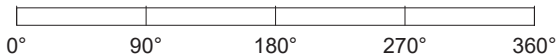
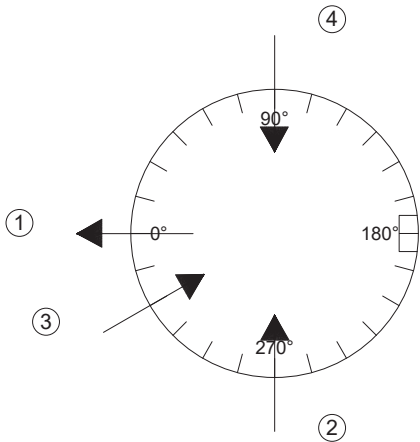


Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: S-110B Station: Aug 28,'19 Type: Cleve WPC Mh SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	Stock 48"Ø X 37" Eccentric Cone	EA	1	2755	
	48"Ø Stock Manhole Riser X 48" Tall	EA	1	3467	
	48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778	
	48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778	
	Stock 72"Ø Flat Transition to 48"Ø	EA	1	5904	
	72"Ø Non Extended 9" Manhole Base X 66" Tall	EA	1	12919	
	A-Lok XC-1235	EA	2	0	
Rim: 677.81' Invert: 649.82' Rim to Invert: 27.99' Sump: 0.54'	<div>REVISED Aug 18, 2019</div> <div>&gt; Rim &amp; Invert elevations &amp; outlet % of grade</div>				

Step Degree: 315 <b>ML-10 steps @ 16" O.C.</b> <div>    </div>					
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	649.82	-1.46	90	30" - RCP Co-Pipe	1235 A-LOK
(2)	649.82	1.26	180	30" - RCP Co-Pipe	1235 A-LOK
				A-Lok XC-1235	08/28/2019

Customer:	INDEPENDENCE EXCAVATING, INC.	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
Job Name:	ODOT 173000 - Opp Corridor Ph 3	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185	
Job #:	173408	48"Ø Manhole Riser x 4.2"	EA	1	315	
Structure ID:	S-111	48"Ø Manhole Riser X 74" Tall	EA	1	5210	
Station:	Aug 28,'19	96"Ø Transition to 48"Ø	EA	1	11912	
Type:	Cleve WPC D/H Mh	96"Ø Manhole Riser X 96" Tall	EA	1	17231	
SalesPerson:	Ralph Hastings	A-Lok XC-480	EA	1	0	
		A-Lok XC-1235	EA	1	0	
		Hole in Structure for Pipe	EA	2	0	
Rim:	670.33'	REVISED Aug 28, 2019 > Rim elevation & 12" invert elevation and angle > Existing pipe FROM #3 brick sewer TO #4 brick sewer > Increased manhole FROM 84"Ø TO 96"Ø due to the #4 sewer and the 30" sewer @ 90°				
Invert:	653.45'					
Rim to Invert:	16.88'					
Sump:	1.28'					

Step Degree: 180    **ML-10 steps @ 16" O.C.**



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	653.45	-1.21	360	30" - RCP Co-Pipe	1235 A-LOK
(2)	653.45	0	270	39" X 31" - #4 BRICK	STYROFOAM
(3)	665.2	1	330	12" - VCP LOGAN	480 A-LOK
(4)	653.45	0	90	39" X 31" - #4 BRICK	STYROFOAM

					A-Lok XC-480 A-Lok XC-1235 Hole in Structure for Pipe	08/28/2019
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Customer:	INDEPENDENCE EXCAVATING, INC.
Job Name:	ODOT 173000 - Opp Corridor Ph 3
Job #:	173408
Structure ID:	S-112
Station:	Aug 14,'19
Type:	Cleve WPC Mh
SalesPerson:	Ralph Hastings
Rim:	664.68'
Invert:	648.01'
Rim to Invert:	16.67'
Sump:	0.34'

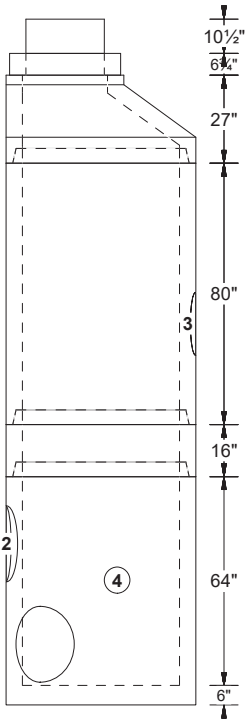
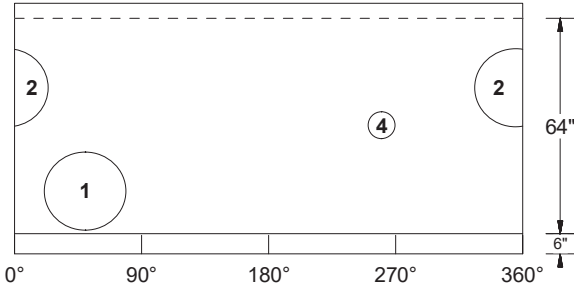
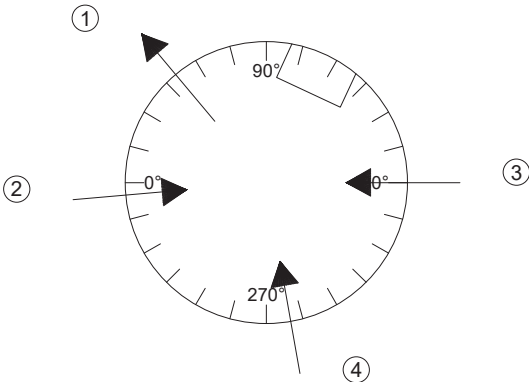
Description	UOM	Quantity	Weight
Stock 48"Ø X 27" Eccentric Cone	EA	1	1860
48"Ø Manhole Riser X 80" Tall	EA	1	5653
48"Ø Stock Manhole Riser X 16" Tall	EA	1	1156
48"Ø Non Extended 6" Manhole Base x 64"	EA	1	5603
Flow Channel to Spring Line	EA	1	2000
A-Lok XC-225/235	EA	1	0
A-Lok XC-580	EA	1	0
A-Lok XC-710	EA	2	0



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Step Degree: 115
**ML-10 steps at 16" O.C.**



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	648.01	-2.05	50	18" - VCP LOGAN	710 A-LOK
(2)	650.51	1	355	18" - VCP LOGAN	710 A-LOK
(3)	656.26	1.27	180	15" - VCP LOGAN	580 A-LOK
(4)	650.01	4.71	260	6" - VCP LOGAN	235 A-LOK

A-Lok XC-225/235 A-Lok XC-580 A-Lok XC-710	08/14/2019
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-115  
Station: Aug 14,'19  
Type: Cleve WPC Mh  
SalesPerson: Ralph Hastings

Rim: 664.00'  
Invert: 655.00'  
Rim to Invert: 9.00'  
Sump: 0.26'

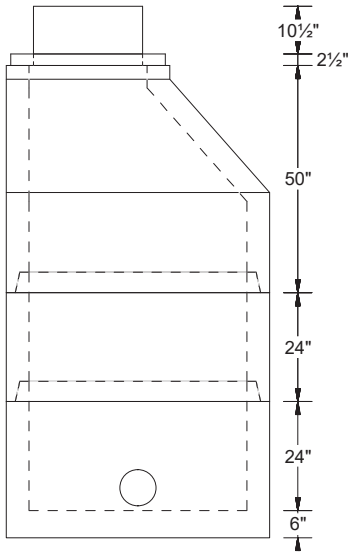
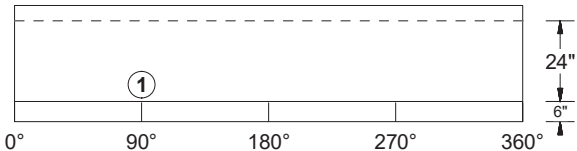
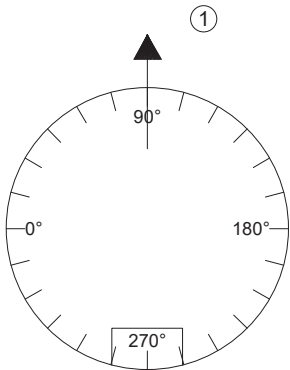
Description	UOM	Quantity	Weight
Stock 48"Ø X 50" Eccentric Cone	EA	1	3740
48"Ø Stock Manhole Riser X 24" Tall	EA	1	1734
48"Ø Non Extended 6" Manhole Base X 24" Tall	EA	1	3089
Flow Channel to Spring Line	EA	1	2000
A-Lok XC-225/235	EA	1	0

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Step Degree: 270 **ML-10 steps at 16" O.C.**



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	655	-4.71	90	6" - VCP LOGAN	235 A-LOK

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				A-Lok XC-225/235	08/14/2019
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-116  
Station: Aug 14,'19  
Type: Cleve WPC Mh  
SalesPerson: Ralph Hastings

Rim: 660.40'  
Invert: 646.23'  
Rim to Invert: 14.17'  
Sump: 0.34'

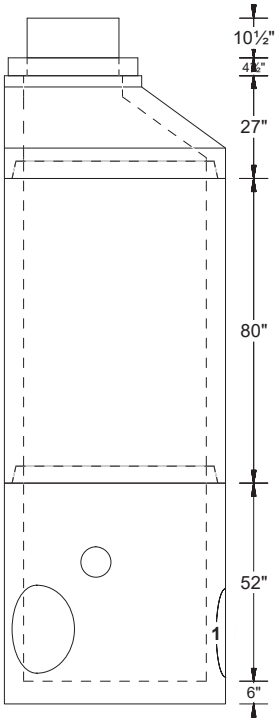
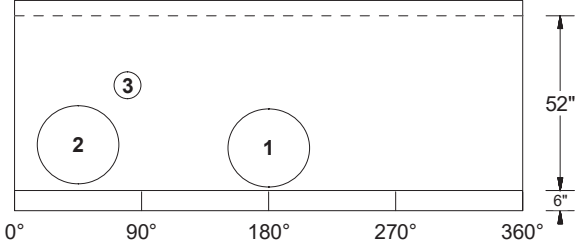
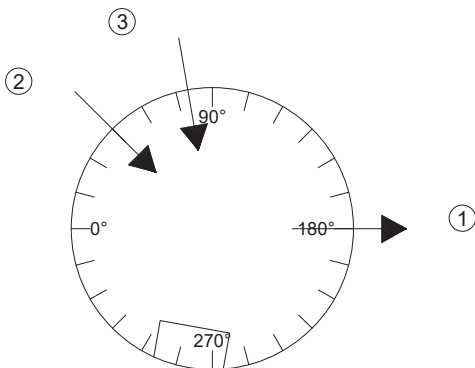
Description	UOM	Quantity	Weight
Stock 48"Ø X 27" Eccentric Cone	EA	1	1860
48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778
48"Ø Non Extended 6" Manhole Base x 52" Tall	EA	1	4736
Flow Channel to Spring Line	EA	1	2000
A-Lok XC-225/235	EA	1	0
A-Lok XC-710	EA	2	0



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Step Degree: 280 **ML-10 steps at 16" O.C.**



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	646.23	-2.05	180	18" - VCP LOGAN	710 A-LOK
(2)	646.23	2.05	45	18" - VCP LOGAN	710 A-LOK
(3)	648.23	1	80	6" - VCP LOGAN	235 A-LOK

A-Lok XC-225/235  
A-Lok XC-710  
08/14/2019

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-117  
Station: Aug 14,'19  
Type: Cleve WPC Mh  
SalesPerson: Ralph Hastings

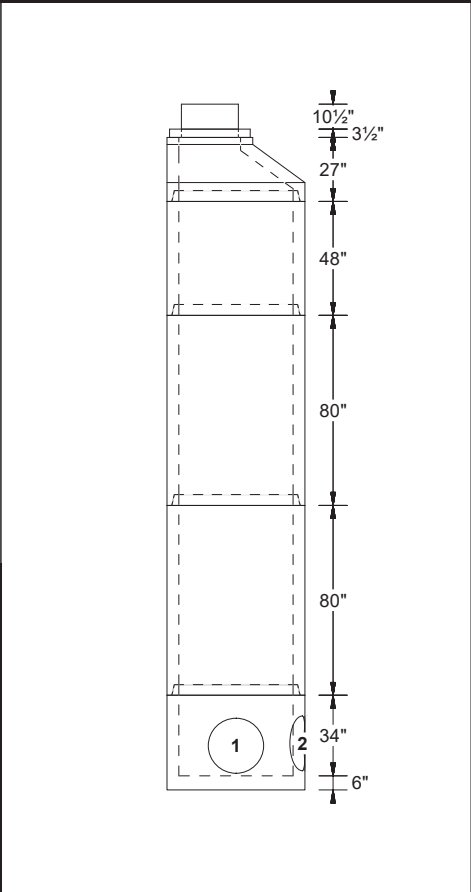
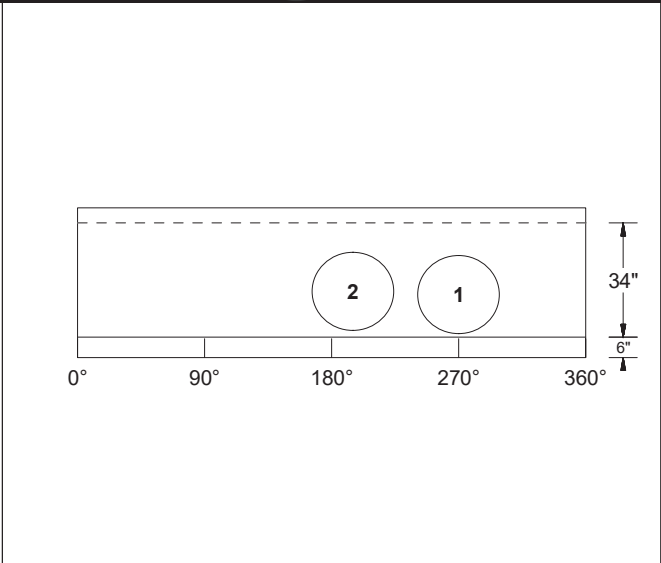
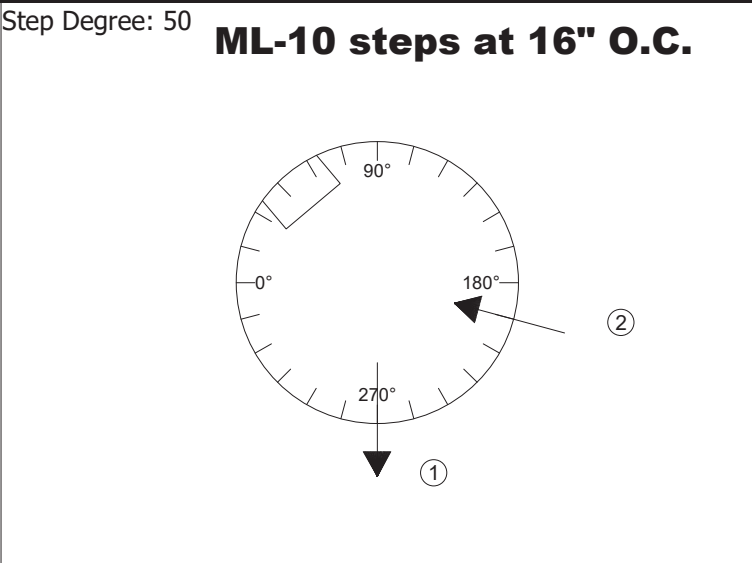
Rim: 664.09'  
Invert: 640.84'  
Rim to Invert: 23.25'  
Sump: 0.34'

Description	UOM	Quantity	Weight
Stock 48"Ø X 27" Eccentric Cone	EA	1	1860
48"Ø Stock Manhole Riser X 48" Tall	EA	1	3467
48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778
48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778
48"Ø Non Extended 6" Manhole Base X 34" Tall	EA	1	3457
Flow Channel to Spring Line	EA	1	2000
A-Lok XC-710	EA	2	0



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	640.84	-2.05	270	18" - VCP LOGAN	710 A-LOK
(2)	640.84	2.05	195	18" - VCP LOGAN	710 A-LOK

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	A-Lok XC-710	08/14/2019
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# LINDSAY PRECAST, INC.

## TECHNICAL DATA FOR MANHOLE CONSTRUCTION

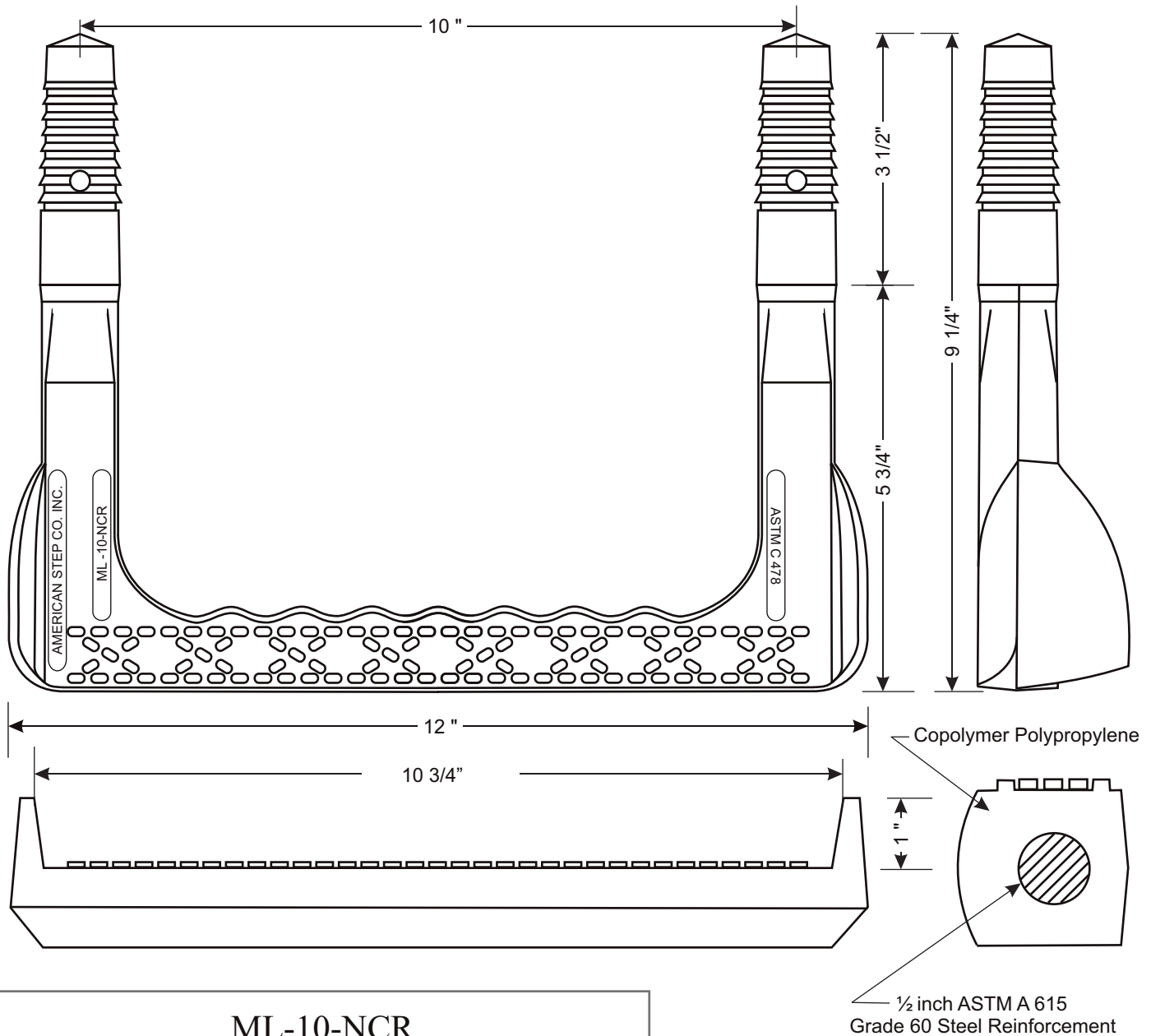
MANHOLE DIAMETER (Ft.)	28 DAY COMPRESSIVE STRENGTH (PSI)	CONCRETE WEIGHT PER CUBIC FOOT (LBS.)	WALL THICKNESS (INCHES)	REINFORCING STEEL YIELD STRENGTH (PSI) (A182)	CIRCUMFERENTIAL REINFORCING MESH	TOTAL AREA OF STEEL PER VERTICAL FOOT in <sup>2</sup> /Ft.	WEIGHT PER VERTICAL FOOT (LBS.)
4	5,000	150	5	65,000	3 x 8; W3 x W3	.12	900
5	5,000	150	6	65,000	2 x 8; W3 x W2.9	.18	1279
6	5,000	150	7	65,000	2 x 8; W3 x W2.9	.18	1786
7	5,000	150	8	65,000	2 x 8; W5 x W3	.30	2300
8	5,000	150	8	65,000	2 x 8; W5 x W3	.30	2710
10	5,000	150	11	65,000	2 x 8; W5 x W3	.30	4710
12	5,000	150	12	65,000	2 x 8; W5 x W3 6 x 6 10 Gauge	.36	6126

★ All manhole sections shall conform to the provisions of ASTM C-478.

★ Rubber gasketed joints shall conform to the provisions of ASTM C-443.

★ It is **REQUIRED** that all joints are sealed with a flexible butyl resin sealant manufactured by Concrete Sealents. The CS-102 - 7/8" diameter preformed gasket material shall conform to the provisions of Federal Specification SS-S-210A. This material can be supplied by Lindsay Concrete Products for an additional charge.

# ML-10-NCR



## ML-10-NCR

Mechanical Lock Installation Methods  
Minimum Concrete Strength Must Be 3000 psi.

### Preformed Holes

Two preformed holes on 10" centers  
Holes must be parallel  
Diameter of holes are 1.1" tapering to 7/8" in 3 1/2" of depth

### Drilled Holes

Drill two 1" holes on 10" centers with a minimum depth of 3 3/4"  
Use 1" masonry bit for drilling.  
Holes must be parallel.

Drive step with sledge hammer until both legs are completely seated

*This step meets or exceeds ASTM C 478 and OSHA Standards  
when properly installed.*



American Step Company, Inc.  
P.O. Box 137  
830 East Broadway  
Griffin, GA 30224-0137

800-988-STEP  
770-467-9844 (OFFICE)  
770-467-8011 (FAX)





The Company With Connections®

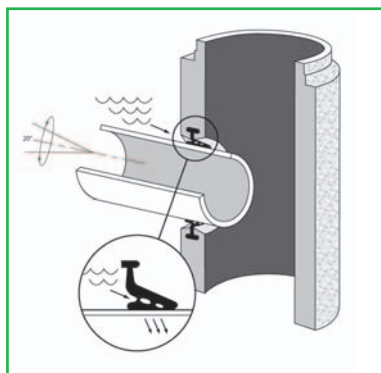


## INCOMPARABLE PIPE-TO-MANHOLE CONNECTORS FOR SANITARY SYSTEMS

# X-CEL

### ● A•LOK X-CEL

Designed to produce a guaranteed watertight seal between pipe and concrete, the **A•LOK X-CEL** flexible pipe-to-manhole connector provides maximum performance on the job site. Its unique design not only saves valuable project time, but also ensures longevity and offers unsurpassed environmental benefits.



A•LOK X-CEL connectors prevent infiltration and ex-filtration into wastewater or stormwater systems, and are installed in the precast structure in a way that does not require coring or placement after the base component is cast. This eliminates residual waste from coring, disposal of the slugs or wasted raw material utilization or energy. Once cast-in, the connector becomes an integral component of the structure wall.

Based on the traditional A•LOK connector, the X-CEL's enhanced features improve performance. Take the patented "water pocket" for example, which utilizes the untapped pressure of ground water to exert a clamping force around the connector and pipe, allowing the connector to perform in deeper installations.

Demonstrated in tests higher than 15 psi of hydrostatic water pressure, the X-CEL's unique design provides 45 percent more rubber contact with the pipe, allowing for greater pipe deflection.

### ● MATERIAL

Molded or extruded from compounds formulated for wastewater applications and engineered to conform to the requirements of section 4.1.1 of ASTM C-923, the standard rubber connector is available in alternative compounds upon request. Contact an A•LOK representative regarding special applications, such as the presence of hydrocarbons.

### ● KEY ADVANTAGES

The A•LOK X-CEL offers distinct advantages for engineers, specifiers, precasters and municipalities. An enhanced profile gives the connector 45% greater rubber contact with the pipe, thus allowing the pipe to be deflected in excess of 10 degrees of omnidirectional deflection, all the while maintaining a watertight seal. These enhancements allow for more flexibility to compensate for pipe shear due to settlement or ground movement.

### ● KEY ADVANTAGES (continued)

On larger-diameter pipe, where size prohibits a gasket from being installed in a flat plane, the X-CEL can be configured for casting in a curve with the connector staying perpendicular to the center line of the pipe. Discovered through years of extensive research and development, the configurations cause no loss of compression or deflection.

Functioning on pure compression, the X-CEL allows for fast and easy field installation. After the connector and pipe are cleaned and lubricated, the pipe is simply centered in the connector and inserted. Backfilling can be done immediately, thus enhancing project safety and overcoming the typical problems of water, running sand and other unstable trench conditions.

For Specifiers, the X-CEL connector offers a guaranteed solution to the age-old containment system problem of the best way to connect pipes and concrete structures. Precasters using X-CEL connectors experience increased satisfaction due to their ability to offer a complete watertight, guaranteed product, while municipalities that install X-CEL will ultimately spend less on road repair by avoiding the possibility of pot/sink holes that are often the result of leaking, non-connected, systems.

### ● PRODUCT REFERENCES

#### A.) ASTM C-923-00

Resilient Connector Between Reinforced Concrete Manholes Structures, Pipe and Laterals.

#### B.) ASTM C-1244-00

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

#### C.) ASTM C-478C

Standard Specification for Precast Reinforced Concrete Manhole Sections

### ● PERFORMANCE STANDARD

The A•LOK X-CEL guaranteed Connector meets or exceeds all material and test requirements outlined in ASTM C-923: *"Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals."*

Molded or extruded from compounds formulated for wastewater applications, the standard rubber connector is engineered to confirm with the requirements of section 4.1.1 of ASTM C-923. Alternative compounds are available upon special request.

## RESILIENT TEST REQUIREMENTS OF A.S.T.M. C-923-00

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	no weight loss no weight loss	at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temp brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in. or 34 kn/m	D 624, Method B

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# ● PART 6 • DIMENSIONAL DATA

## A•LOK X-CEL Cross Sections / Pipe Size OD's



92 Molded Series • 4.25" - 7.25"



93 Molded Series • 8.50" - 13.00"



93 Extruded Series • 13.25" - 29.00"

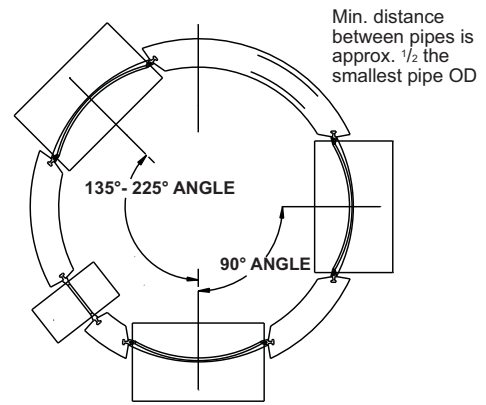


94 Extruded Series • 30.00" - 59.50"



95 Extruded Series • 60.00" - 87.50"

Larger Sizes Available Upon Special Request



## MAX. PIPE SIZE OD's

Manhole Diameter	135° - 225° Pipe Angle	90° Pipe Angle
42"	26.5"	22.0"
48"	31.5"	25.0"
60"	42.0"	32.0"
72"	52.5"	38.0"
84"	59.5"	44.0"
96"	73.5"	50.0"
108"	76.0"	56.0"
120"	85.0"	62.0"

# ● PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure. The connector shall be the A•LOK X-CEL CONNECTOR as manufactured by A•LOK PRODUCTS, INC., Tullytown, PA, or approved equal.

The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure. The connector shall assure that a seal is made between:

- (1) The connector and the structure wall by casting the connector integrally with the structure wall during the manufacturing process in a manner that it will not pull out during pipe coupling. The connector shall also be capable of being cast into a round structure by curving the connector in a manner that allows it to remain centrally located within the structure wall and perpendicular to the pipe. This configuration will result in no loss of seal or deflection of pipe entering a concrete structure.
- (2) The seal between the connector and the pipe shall be made by the compression of the connector between the outside circumference of the pipe and the interior hole opening of the structure. The connector shall be the only component to affect the seal between the pipe and structure.

The connector shall be made from materials that conform to the physical and chemical requirements outlined in Section 4, "Materials and Manufacture" of ASTM C-923 Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals, and the overall design will meet or exceed Section 7, "Test Methods and Requirements" of ASTM C-923.

The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

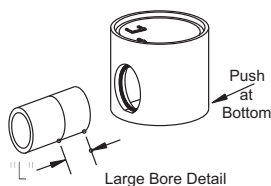
## ● PRODUCT SPECIFICATIONS (continued)

(2) The seal between the connector and the pipe shall be made by the compression of the connector between the outside circumference of the pipe and the interior hole opening of the structure. The connector shall be the only component to affect the seal between the pipe and structure.

The connector shall be made from materials that conform to the physical and chemical requirements outlined in Section 4, “*Materials and Manufacture*” of ASTM C-923 Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals, and the overall design will meet or exceed Section 7, “*Test Methods and Requirements*” of ASTM C-923.

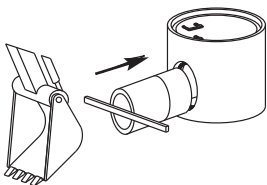
The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

## INSTALLATION INSTRUCTIONS



### STEP 1:

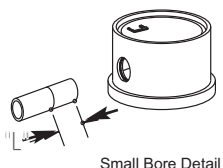
Confirm that the pipe surface is smooth, clean and free of foreign materials, chips, gouges and form seams due to manufacturing or handling. Slightly bevel any sharp or blunt edges caused by the cutting of the pipe.



### STEP 2:

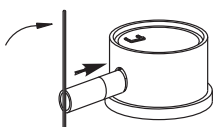
Lubricate the connector and the entire section of the pipe that will be inserted into the connector. The chart below lists A-LOK's minimum lubrication length “L”.

PIPE SIZE	MIN. LUBRICATION LENGTH “L”
4" - 15"	12"
16" - 18"	18"
21" & Larger	24"



### STEP 3:

Center the pipe and connector square to each other and insert the pipe into the connector using a bar or back hoe depending on the size. Once the pipe is coupled with the connector, deflect the structure or pipe to achieve the proper angle.



### WARNING

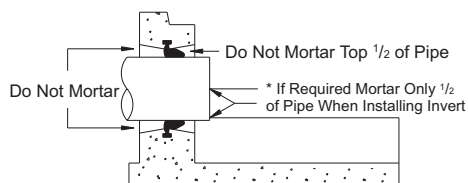
To ensure the A-LOK X-CEL Connector remains a flexible watertight connector, it is A-LOK Products, Inc. strong recommendation that no mortar be placed between the pipe and wall of the concrete structure. The use of mortar in this area would decrease the effectiveness of the connector to compensate for shear caused by settlement or ground movement.

### CAUTION:

When installing pipe stubs for future pipeline installation, all stubs must be properly restrained to prevent any movement by means other than the A-LOK X-CEL Connector.

### NOTE:

To find approximate subgrade, measure from the outside base of the structure to the junction of the connector and flat spot. Then add the wall thickness of the pipe plus 1/4 inch.







The Company With Connections®



## PIPE TO MANHOLE CONNECTOR FOR SANITARY SYSTEMS

# Z•LOK CAST IN BOOT CONNECTOR

### ● Z•LOK PIPE TO MANHOLE CONNECTOR

The **Z•LOK Pipe to Manhole Connector** is a flexible connector specifically engineered to produce a positive watertight seal for pipes entering precast concrete structures and the structure itself. Its heavier wall is designed to provide the highest performance. The **Z•LOK CONNECTOR** is manufactured to meet or exceed the requirements set forth in ASTM C-923-00 titled *"Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals"*.



### ● MATERIAL

The **Z•LOK CONNECTOR** is molded from an EPDM compound engineered to conform with the requirements of section 4.1.1 of ASTM C-923-00. Alternative compounds are available for unusual applications upon special order.

All stainless steel hardware is in compliance with section 4.2, *"Mechanical Devices"* of ASTM C-923-00.

### ● KEY ADVANTAGES

The **Z•LOK CONNECTOR** assures a positive watertight connection and provides up to 25° of omnidirectional deflection and 1.50" of vertical or horizontal movement without loss of seal, providing greater flexibility in the design and installation of pipelines and structures. These design features of the **Z•LOK CONNECTOR** prevent infiltration due to shear caused by settlement or ground movement.

The inner rubber O-ring design eliminates rubber wrinkling, compensates for pipe irregularity and wall thickness insuring a watertight seal.

The unique bi-directional design, permits the **Z•LOK CONNECTOR** take-down clamp to be fastened from either the inside or outside of the structure. Once fastened, immediate backfilling is possible enhancing project safety and overcomes the normal problems encountered with water, running sand and other unstable trench conditions.

When casting the **Z•LOK CONNECTOR** into the structure, making it an integral part of the wall, 50% of the opportunity for infiltration is eliminated.

### ● PRODUCT REFERENCES

#### A.) ASTM C-923-00

Resilient Connector Between Reinforced Concrete Manholes Structures, Pipe and Laterals.

#### B.) ASTM C-1244-00

Standard Test Method For Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

#### C.) ASTM C-478C

Standard Specification for Precast Reinforced Concrete Manhole Sections

### ● PERFORMANCE STANDARD

The **Z•LOK Connector** meets or exceeds all material and test requirements of ASTM C-923-00: *"Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals"*.

See following chart:

#### RESILIENT TEST REQUIREMENTS OF A.S.T.M. C-923-00

TEST	RESULTS	ASTM METHOD
Chemical resistance 1 N Sulfuric acid 1 N Hydrochloric Acid	no weight loss no weight loss	at 22°C for 48h
Tensile strength	1200 psi or 8.5 MPa, min	D 412
Elongation at break	350% min.	
Hardness	±5 from mfg's. specified hardness	D 2240 (Shore A durometer)
Accelerated oven-aging	decr. of 15%, max. of original tensile strength, decr. of 20% max. of elongation	D 573, 70±1°C for 7 days
Compression set	decr. of 25%, max. of original deflection	D 395, Method B, at 70°C for 22h
Water absorption	increase of 10%, max. of original by weight	D 471, immerse 0.75 by 2-in. or 19 by 25-mm Specimen in distilled water at 70°C for 48h
Ozone resistance	rating 0	D 1171
Low-temp brittle point	no fracture at -40°C	D 746
Tear resistance	200 lbf/in. or 34 kn/m	D 624, Method B

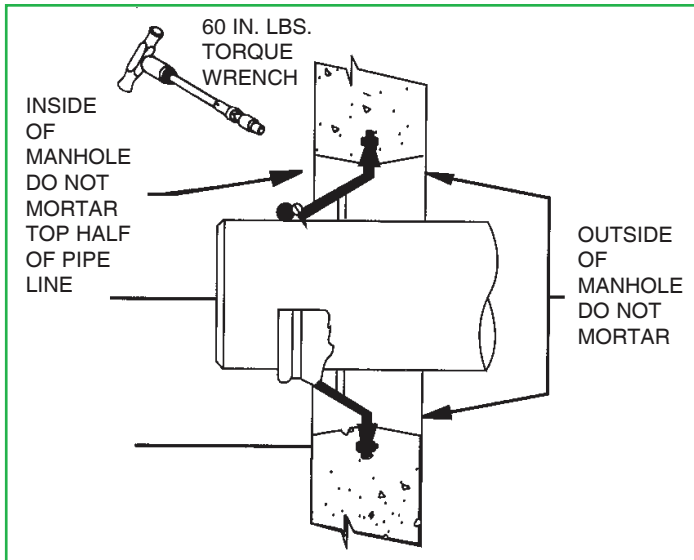
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## PART 6 • DIMENSIONAL DATA

Z-LOK RING NO.	PIPE O.D. MIN.	INCHES MAX.	CLAMP NUMBER
C107-1	1.25"	1.75"	CL-040
C107-2	2.00"	2.50"	CL-040
C107-3	2.75"	3.75"	CL-088
C107-4	4.25"	6.25"	CL-128
C107-6	6.25"	8.25"	CL-128
F208-8	8.25"	9.10"	CL-152
C107-8	8.25"	10.25"	CL-188
C107-10	10.25"	12.25"	CL-188
C107-12	12.25"	14.25"	CL-248
C107-15	14.25"	16.00"	CL-EV15-18-L
C107-16	16.25"	18.00"	CL-EV15-18-L
C107-18	18.25"	21.25"	CL-EV15-18-L

### NOTE:

- F208-8 GASKET CAN BE USED ON C107-6 MANDREL
- WHEN ORDERING CLAMPS, PIPE OD'S ARE REQUIRED
- C107-1 AND C107-2 USE THE SAME MANDREL
- C107-16 AND C107-18 USE THE SAME MANDREL
- REDI-LOK CLAMP IS REQUIRED FOR C107-15 THROUGH C107-18 GASKETS



**WARNING:** To ensure the **Z-LOK Connector** remains a flexible watertight connector, it is A•LOK Products, Inc. strong recommendation that **no mortar** be placed between the pipe and wall of the concrete structure. The use of mortar in this area would decrease the effectiveness of the connector to compensate for shear caused by settlement or ground movement.

**NOTE:** The 60 in.-lb. Torque Wrench is available through A•LOK Products, Inc.

**CAUTION:** When installing pipe stubs for future pipeline installation, all stubs must be properly restrained to prevent any movement by means other than the Z-LOK Connector.

**ANY QUESTIONS REGARDING Z-LOK CONNECTOR,  
PLEASE CALL 1-800-822-2565**

## PRODUCT SPECIFICATIONS

A flexible pipe to manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole or structure.

The connector shall be the **Z•LOK CONNECTOR** as manufactured by **A•LOK PRODUCTS, INC.**, Tullytown, PA, or approved equal.

The design of the connector shall provide a flexible, watertight seal between the pipe and concrete structure. The connector shall assure that a seal is made between:

(1) The connector and the structure wall by casting the connector integrally with the structure wall during the manufacturing process in a manner that it will not pull out during pipe coupling.

(2) The seal between the connector and the pipe shall be made by compressing the connector against the outside circumference of the pipe by means of a stainless steel take-down band.

The connector shall be made from materials that conform to the physical and chemical requirements outlined in Section 4, "Materials and Manufacture" of ASTM C-923-00 "Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals", and the overall design will meet or exceed Section 7, "Test Methods and Requirements" of ASTM C-923-00.

The connector shall be sized specifically for the type of pipe being used and shall be installed in accordance with the recommendations of the manufacturer.

## INSTALLATION INSTRUCTIONS

### Z-LOK CONNECTOR – INWARD POSITION



#### STEP 1:

Bevel pipe.  
Clean connector.  
Clean pipe of dirt & debris.

### INSIDE Z-LOK CONNECTOR INSTALLATION



#### STEP 2:

Center pipe in connector and push through.

#### STEP 3:

Attach proper size clamp beside o-ring then center pipe in connector and **VERY IMPORTANT** tighten clamp with torque wrench to 60 inch pounds.

### OUTSIDE INSTALLATION



#### STEP 4:

When installing a Z-LOK connector in the outside of the manhole position pull pipe back out after inserting so the connector flips outward, then **VERY IMPORTANT** - center pipe in connector and tighten the take down clamp to 60 inch pounds with a torque wrench.

DESIGN COMPUTATIONS FOR  
**ODOT 173408**  
**10' x 10' Doghouse Junction Chamber S-107**

PREPARED FOR:

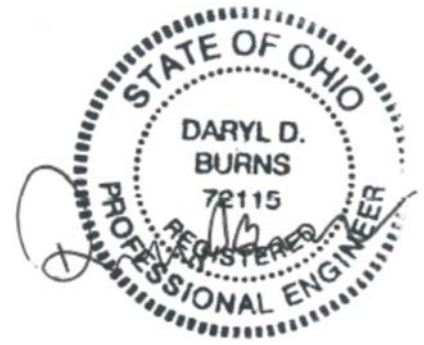
**Lindsay Precast Inc.**  
**6845 Erie Avenue NW**  
**Canal Fulton, Ohio 44614**

PREPARED BY:



State License # 05101

860 Hooper Road, Endwell, New York 13760  
TEL: 607-231-6600 FAX: 607-231-6650  
EMAIL: [precast@delta-eas.com](mailto:precast@delta-eas.com)  
[www.delta-eas.com](http://www.delta-eas.com)



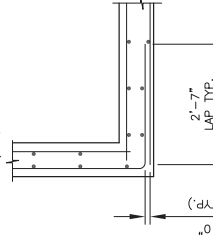
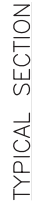
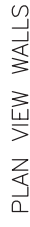
9/26/19

DESIGN PROVIDED  
AS PROVIDED BY EOR:  
1. DESIGN IN ACCORDANCE WITH AASHTO LRFD  
FOR HL-93 LOADING.

ASSUMPTIONS: (TO BE VERIFIED BY EOR)

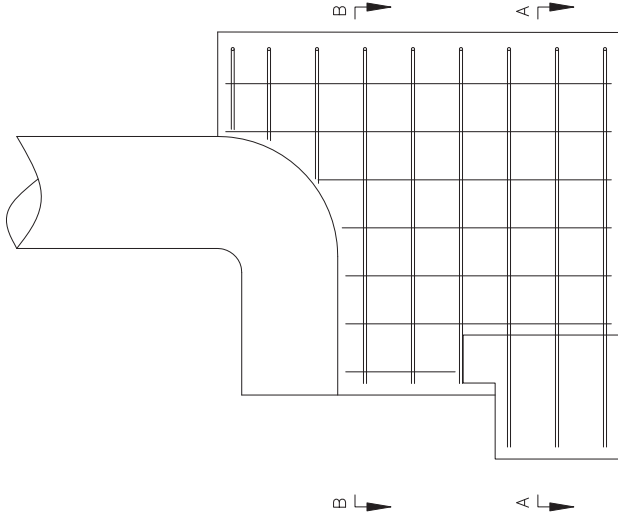
1. EARTH COVER = 20.86'
2. UNIT WEIGHT OF SOIL = 120 PCF
3. BAR COVER = 1 1/2" U.O.
4. WATER TABLE = 2' BELOW FINISHED GRADE
5. EQUIVALENT FLUID PRESSURE = 79 PCF
6. f'c @ 28 DAYS = 6,500 PSI
7. REINFORCEMENT = BAR PER ASTM A615, G

1. REINFORCE TOP SLAB AS SHOWN, PROVIDE ADDITIONAL REINFORCING AROUND WALL OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE, ADDITIONAL BARS TO BE IN THE SAME PLANE.
2. TRIM OPENINGS WITH DIAGONAL #4 BARS, EXTEND BARS MINIMUM 12" BEYOND OPENINGS, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
3. THIS IS A REINFORCING SUMMARY, REFERENCE LINDSAY PRECAST DRAWINGS FOR: OPENING SIZES, QUANTITY, LOCATION AND OTHER INFORMATION
4. LIFTING AND HANDLING BY OTHERS.



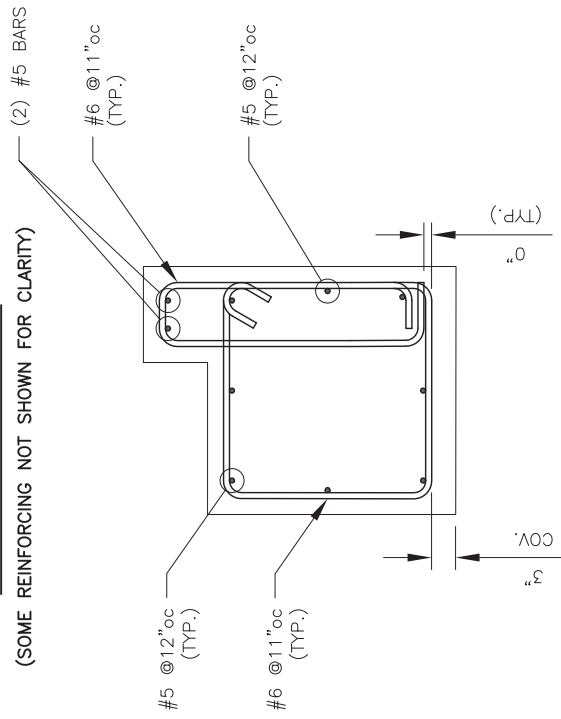
WALL CORNER DETAIL  
(PLAN VIEW)

[illegible]

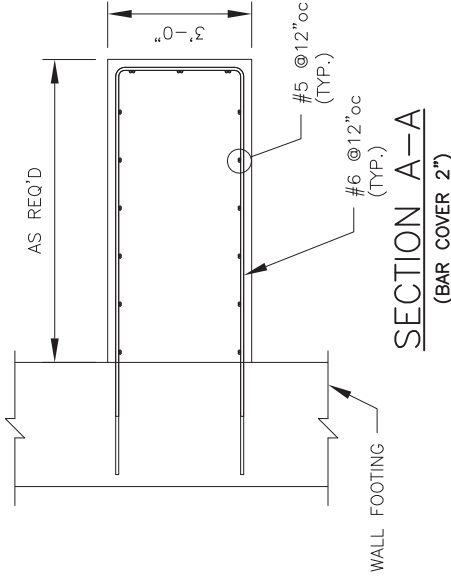
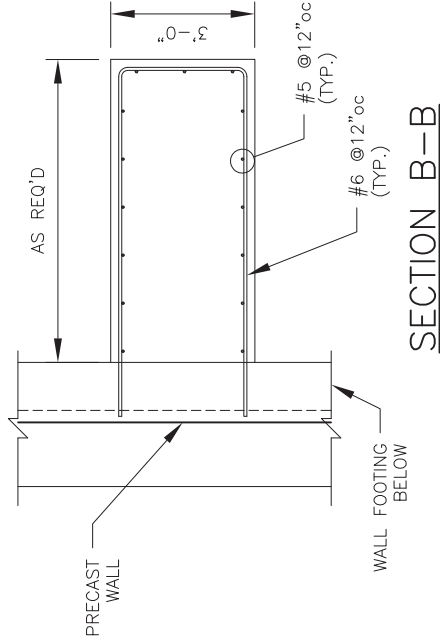


### PARTIAL ELEVATION CAST-IN-PLACE

(SOME REINFORCING NOT SHOWN FOR CLARITY)



### CAST-IN-PLACE FOOTING SECTION (BAR COVER 2" U.N.O.)



PREPARED FOR: <b>LINDSAY CONCRETE PRODUCTS, INC.</b> 6845 ERIE AVE. N.W. CANAL FULTON, OH 44614 PHONE: 330-854-4511 FAX: 330-854-6664		DATE: 9/24/19 SCALE: N.T.S. PROJECT:		SHEET TITLE: <b>REINFORCING SUMMARY</b> DRAWN BY: GJP CKB BY:	
REV. NO. DATE REVISION		MANHOLE S-107			
PREPARED BY:		CONTRACTOR:			
<b>DELTA</b> SPECIALTY PRECAST CONCRETE ENGINEERS 860 HOOPER ROAD, ENDWELL, NY 13760 TEL: (607) 231-6600 FAX: (607) 231-6650		DELTA PROJ. NO.: 2019.174.008 DWG. I.D. RS-01 SHT. NO. OF			

**PRECAST VAULT DESIGN**  
**DESCRIPTION**

Length (I.D.) =	10.00 ft
Width (I.D.) =	10.00 ft
Height (I.D.) =	9.00 ft
Wall Thickness =	12.00 in
Base Slab Thickness =	0.00 in
Cover Slab Thickness =	12.00 in
Earth Cover (Min.) =	20.86 ft
Earth Cover (Max) =	20.86 ft
Watertable Depth =	2.00 ft.
Wearing Surface Thk. (Present) =	0.00 in
Wearing Surface Thk. (Future) =	0.00 in

**TECHNICAL DATA**

Concrete Strength (f'c) =	6.5 ksi
Yield Strength (fy) =	60 ksi
Equivalent Lateral Fluid Pressure =	0.079 kcf
LL Surcharge =	0.08 ksf

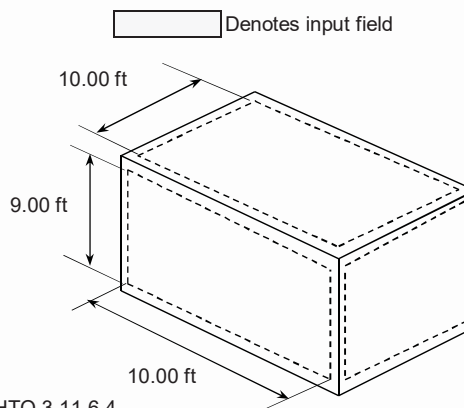
Unit Weight of Soil =	120 pcf
Unit Weight of Wearing Surface =	140 pcf
Unit Weight of Concrete =	152 pcf
$E_c = 120,000 K_1 w_c^{2.0} f_c^{0.33} =$	5.11E+06 psi
$E_s =$	2.90E+07 psi
$n = E_s / E_c =$	5.677
$\beta_1 = (.85 - .05(f_c - 4)) =$	0.725
$f_r = 7.5 \sqrt{f_c} =$	605 psi
Design Wheel Load (Pw) =	16 kips
Design Tandem (Axles 4' Apart) =	12.5 kips
Uniform Lane Load =	0 psf

Resistance Factors:	
$\phi$ - Shear =	0.90

Multiple Presence Factor - m	1.20
Live Load Dist. Factor	1.15

Load Factors:	
LL (live load)	1.75
LS (live load surcharge)	1.75
Max	

$\gamma_p$ DC (component)	1.25
$\gamma_p$ DW (wearing surface)	1.50
$\gamma_p$ EV (vert. earth pressure)	1.30
$\gamma_p$ EH (hor. active earth pressure)	1.50
$\gamma_p$ ES (earth surcharge)	1.50
$\gamma_e$ (exposure factor)	0.75



**Vault Isometric View**  
 (Joints not shown for clarity)  
 (All dimensions I.D.)

AASHTO 3.11.6.4

AASHTO 3.5.1

AASHTO 5.4.2.4-1

AASHTO 5.4.3.2

AASHTO 5.7.1

AASHTO HL-93

AASHTO 3.6.1.2.2

AASHTO 3.6.1.2.4

AASHTO 5.5.4.2.1

AASHTO Table 3.6.1.1.2-1

AASHTO Table 3.6.1.2.6a-1

AASHTO Table 3.4.1-1

AASHTO Table 3.4.1-2

AASHTO 5.7.3.4

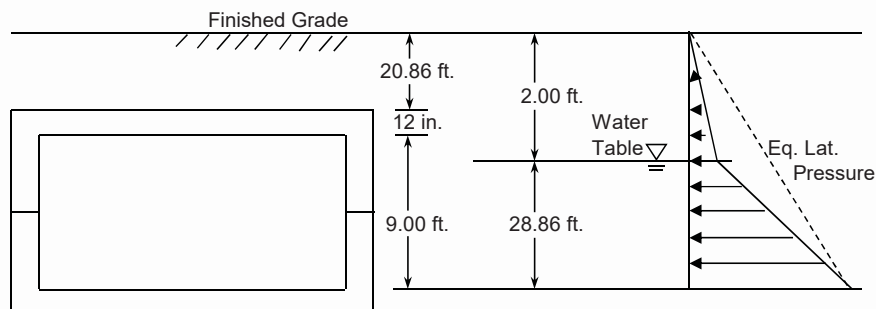
**References:**

1. "LRFD Bridge Design Specifications, 7th Ed." - AASHTO
2. "Building Code Requirements for Structural Concrete" - ACI 318
3. "Rectangular Concrete Tanks, 5th Ed." - PCA Publication.
4. "Theory of Plates and Shells" - Timoshenko, S. 1959.
5. "Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures" - ASTM C890



**EQUIVALENT LATERAL  
 FLUID PRESSURE:**

Ka =	0.33	
Unit Wt. of Soil =	120 pcf	
Max. Fill Above Structure =	20.86 ft.	(Worst Case)
Structure Inside Ht. =	9.00 ft.	
Top Slab Thickness =	12.00 in.	
Min. Watertable Depth =	2.00 ft.	(Given)
Lateral Pressure (Dry) =	39.6 pcf	
(Ka*Soil Wt.)		
Lateral Pressure (Sat.) =	81.4 pcf	
(Ka*(Soil Wt.-62.4pcf)+62.4pcf)		
Equivalent Lateral Pressure =	<b>78.7 pcf</b>	



## UNIFORM LIVE LOAD

### Design Truck

Distance Between CL of Wheel and CL of Truck: 3 ft  
 Wheel Load: 16 kips  
 Tire Contact Area: 200 in<sup>2</sup>

Distribution Length = 1.15 x Depth of Fill + Length of Dual Wheel Dimensions

Distribution Width = 1.15 x Depth of Fill + Width of Dual Wheel Dimensions

	Depth of Fill (ft)	Distrib. Length	Distrib. Width	Wheels Considered	DLA ft <sup>2</sup>	Uniform Load ksf
Min Fill	20.86	31.66	24.82	2	785.77	<b>0.041</b>
Max Fill	20.86	31.66	24.82	2	785.77	<b>0.041</b>

### Design Tandem

Distance Between CL of Wheel and CL of Truck: 3 ft  
 Distance Between Axles: 4 ft  
 Wheel Load: 12.5 kips  
 Tire Contact Area: 200 in<sup>2</sup>

Distribution Length = 1.15 x Depth of Fill + Length of Dual Wheel Dimensions

Distribution Width = 1.15 x Depth of Fill + Width of Dual Wheel Dimensions

	Depth of Fill (ft)	Distrib. Length	Distrib. Width	Wheels Considered	DLA ft <sup>2</sup>	Uniform Load ksf
Min Fill	20.86	31.66	28.82	4	912.39	<b>0.055</b>
Max Fill	20.86	31.66	28.82	4	912.39	<b>0.055</b>

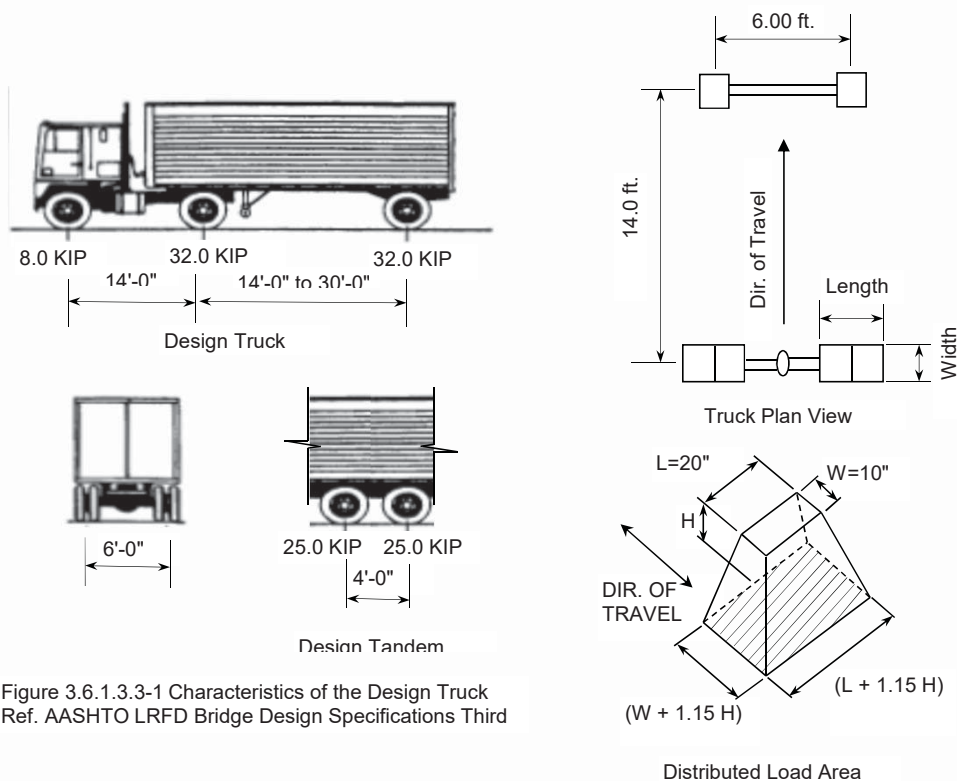


Figure 3.6.1.3.3-1 Characteristics of the Design Truck  
 Ref. AASHTO LRFD Bridge Design Specifications Third

**COVER SLAB DESIGN**  
**UNIFORM LIVE LOAD**  
**MAXIMUM FILL**

Length (I.D.) = 10.00 ft  
 Width (I.D.) = 10.00 ft  
 Wall Thickness = 12.00 in  
 Slab Thickness = 12.00 in

Earth Cover = 20.86 ft  
 Bar cover = 1.50 in  
 Impact = 1.00 AASHTO 3.6.2.2

**One Way Slab**

Span (s) = 11.00 ft  
 Dead Loads: Soil = 2.50 ksf  
 Concrete = 0.15 ksf  
 Wearing Surface (Present & Future) = 0.00 ksf  
 Additional Uniform Dead Load = 0.00 ksf  
 Total (wdl) = 2.65 ksf

2-Way slab fac. = 1.000

Mdl =  $wdl l^2 / 8$  \* (2-way slab factor):  
 Mdl (component) = 2.29 kip-ft  
 Mdl (wearingsurface) = 0.00 kip-ft  
 Mdl (vert. earth pressure) = 37.86 kip-ft  
 Mdl (additional) = 0.00 kip-ft

**Live Loads:**

Design Truck M =  $R1(a + (R1/2w))(Slab Fac) = 0.62$  kip-ft  
 Design Tandem M =  $R1(a + (R1/2w))(Slab Fac) = 0.83$  kip-ft <= Controls

Mll(lane) =  $wdl l^2 / 8$  \* (2-way slab factor) = 0.00 kip-ft

Mu = 53.82 kip-ft

de = 10.06 in

**Req. Bar Size and Spacing**

Short Span: As = 1.44 in. sq/ft.	Use	# 7	@	5.0 in
Long Span: As = 1.44 in. sq/ft.	Use	# 7	@	5.0 in

**Top Layer Reinforcing: Provide #4 @ 18"oc, ew (min.), Top Mat**

AASHTO 5.7.3.1.2-4  $c = As * Fy / .85 * f'c * \beta_1 * b = 1.80$  in AASHTO 5.7.3.1.2  
 AASHTO 5.7.2.2  $a = c * \beta_1 = 1.31$  in

**Check c/de Ratio: (AASHTO 5.7.2.1-1)**

$c/de \leq 0.003 / (0.003 + \epsilon_{cl})$ ; c/de = 0.179 **OK, Use Fy**

**Calculate  $\phi_M$ :** ( $\phi_M = 0.75 + 0.15[(\epsilon_{lr} - \epsilon_{cl}) / (\epsilon_{lr} - \epsilon_{cl})]$ , 0.75min, 0.9max, Fig. C5.5.4.2.1-1)

$\phi_M = 0.90$

AASHTO 5.7.3.2.2-1  $\phi Mn = \phi * As * Fy * (d - (a/2)) = 61.11$  kip-ft **OK**

**Check Min. Reinforcement: AASHTO 5.7.3.3**

$f_r = .24 * \lambda * \sqrt{f'c} = 0.61$  ksi AASHTO 5.4.2.6

$S_c = bt^2/6 = 288$  in<sup>3</sup>

Flexural cracking var. fac. (Other Con. Strs.) 1.60  $\gamma_1$

A615, Gr. 60 Reinforcement (Carbon steel) 0.67  $\gamma_3$

AASHTO 5.7.3.3.2-1  $Mcr = \gamma_3 * [(\gamma_1 * f_r) * S_c] = 15.74$  kip-ft

$Mr = \phi Mn > (\text{lesser of } Mcr \text{ or } 1.33 Mu)$

Mcr = 15.74 kip-ft <= Controls

1.33 \* Mu = 71.59 kip-ft

Mr =  $\phi Mn = 61.11$  kip-ft **OK**

**COVER SLAB DESIGN  
 UNIFORM LIVE LOAD  
 MAXIMUM FILL**

**Cracking Check: AASHTO 5.7.3.4**

$$\begin{aligned} d_c &= 1.94 \text{ in} \\ \beta_s &= 1 + [d_c / (0.7 * (h - d_c))] = 1.28 \\ \rho_{\text{Prov}} &= 0.01195 \\ k &= \sqrt{2\rho n + \rho n^2} - \rho n = 0.30672 \\ j &= 1 - (k/3) = 0.898 \\ f_s &= M_{\text{tot}} / A_s j d_e = 4.00 \text{ ksi} \\ \max \text{ spa} &\leq [(700 f_e) / (\beta_s f_s)] - 2d_c = 99.18 \text{ in} \quad \text{OK} \quad \text{AASHTO 5.7.3.4} \end{aligned}$$

**Shrinkage & Temperature Reinforcement (Ea. Bar, Ea. Direction) AASHTO 5.10.8**

$$\begin{aligned} b &= 120.00 \text{ in} \\ h &= 12.00 \text{ in} \\ A_s &= \frac{1.30 b h}{2(b + h) F_y} = 0.12 \text{ in. sq/ft.} \\ 0.11 &\leq A_s \leq 0.60 \quad 0.12 \text{ in. sq/ft.} \end{aligned}$$

**Shear**

(Uniform Loads Taken @ 'd' from Support)

$$l = (\text{Span} - (2 * d)) = 9.32 \text{ ft}$$

**Dead Load:**

$$\begin{aligned} \text{Factored D.L.} &= 3.44 \text{ klf/ft} \\ V_u \text{ DL} &= w_u * l / 2 * (\text{Slab Fac}) = 16.05 \text{ kips} \end{aligned}$$

**Live Load:**

$$\begin{aligned} \text{Factored L.L. (Lane)} &= 0.00 \text{ klf/ft} \\ V_{u \text{ Lane}} &= w_{u \text{ Lane}} * l / 2 * (\text{Slab Fac}) = 0.00 \text{ kips} \end{aligned}$$

$$\begin{aligned} \text{Design Truck } V_u &= LL(w_a/2S)(2S-a) * (\text{Slab Fac}) = 0.47 \text{ kips} \\ \text{Design Tandem } V_u &= LL(w_a/2S)(2S-a) * (\text{Slab Fac}) = 0.63 \text{ kips} \quad \leq \text{Controls} \end{aligned}$$

$$V_u \text{ (Total)} = 16.68 \text{ kips}$$

$$\text{AASHTO 5.8.2.9} \quad d_v = M_n / A_s F_y = 9.41 \text{ in} \quad \leq \text{Controls}$$

$$d_v = 0.9 d_e = 9.06 \text{ in}$$

$$d_v = 0.72(\text{thk.}) = 8.64 \text{ in}$$

$$\beta = 2.0 \quad \text{AASHTO 5.8.3.4.1}$$

$$\phi V_c = \phi 0.0316 \beta \sqrt{f_c} b_v d_v = 16.37 \text{ kips} \quad \text{NG} \quad \text{AASHTO 5.8.3.3}$$

*Say OK, less than 2%*

**WALL DESIGN  
UNIFORM LOAD  
MOMENT DISTRIBUTION**

Height = 9.00 ft  
Length b = 10.00 ft  
Width c = 10.00 ft  
Wall Thickness = 12.00 in

Distribution Factor (l) = 0.500  
Distribution Factor (s) = 0.500  
Fixed end moment (l) = 17.95 kip-ft 27.09  
Fixed end moment (s) = 17.95 kip-ft 27.09  
Simple span moment (l) = 26.92 kip-ft 40.63  
Simple span moment (s) = 26.92 kip-ft 40.63  
Balanced moment at corner (-) = 17.95 kip-ft 27.09  
Pos. moment @ midspan (+) = 8.97 kip-ft 13.54

**OUTSIDE FACE**

Bar cover = 1.50 in

	Mu	$\phi M_n$	Bar Sz	Sp	de	As	a
Negative - Horizontal	27.09 kip-ft	29.30 kip-ft	# 6	8.0 in	10.13 in	0.66 in. sq/ft.	0.60 in
Vertical	0.00 kip-ft	12.84 kip-ft	# 5	12.0 in	9.44 in	0.31 in. sq/ft.	0.28 in

$V_u = W_u \cdot b/2 = 16.25$  kips

Inflection pt. (from corner) 2.11 ft ldb = 18.0 in  
Extend bar from corner 3.61 ft Lap (1.7\*ldb) = 31.0 in  
 $\beta = 2.0$  AASHTO 5.8.3.4.1

$d_v = M_n / A_s F_y = 9.83$  in <= Controls AASHTO 5.8.2.9

$d_v = 0.9 d_e = 9.11$  in

$d_v = 0.72(\text{thk.}) = 8.64$  in

$\phi V_c = \phi 0.0316 \beta \sqrt{f_c} b_v d_v = 17.10$  kips  $\phi V_c > V_u$ : OK

AASHTO 5.7.3.1.2-4  $c = A_s F_y / (.85 f_c \beta_1 b) = 0.83$  in  
AASHTO 5.7.2.2  $a = c \beta_1 = 0.60$  in

Check c/de Ratio: (AASHTO 5.7.2.1-1)  
 $c/de \leq 0.003 / (0.003 + \epsilon_{ci})$ ; c/de = 0.082 OK, Use  $F_y$

Calculate  $\phi_M$ : ( $\phi M = 0.75 + 0.15 [(\epsilon_c - \epsilon_{ci}) / (\epsilon_{ti} - \epsilon_{ci})]$ ), 0.75 min,  
 $\phi_M = 0.90$  0.9 max, Fig. C5.5.4.2.1-1)

**Check Min. Reinforcement: AASHTO 5.7.3.3**

$f_r = .24 \lambda \sqrt{f_c} = 0.61$  ksi AASHTO 5.4.2.6

$S_c = b t^2 / 6 = 288$  in<sup>3</sup>

Flexural cracking var. fac. (Other Con. Strs.) 1.60  $\gamma_1$

A615, Gr. 60 Reinforcement (Carbon steel) 0.67  $\gamma_3$

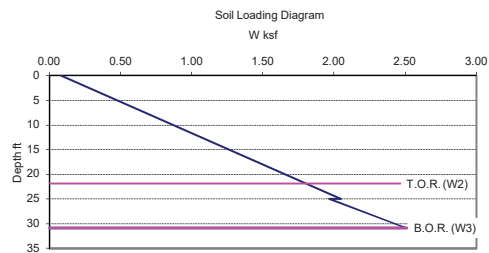
AASHTO 5.7.3.3.2-1  $M_{cr} = \gamma_3 [\gamma_1 f_r S_c] = 15.74$  kip-ft

$M_r = \phi M_n > (\text{lesser of } M_{cr} \text{ or } 1.33 M_u)$

$M_{cr} = 15.74$  kip-ft <= Controls

$1.33 M_u = 36.02$  kip-ft

$M_r = \phi M_n = 29.30$  kip-ft OK



Horizontal lines indicate top & bottom of riser wall

**Lateral Earth Pressure**

Eq. Lat. Press. = 0.079 kcf  
W2 = 1.80 ksf Top of Wall  
W3 = 2.51 ksf Bottom of Wall  
Wavg = 2.15 ksf  
Wu = 3.25 ksf

(Surcharge Applied Over Entire Height of Unit)

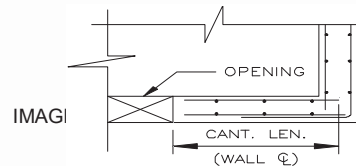
Check Cantilever Moment & Shear off the corner:

w for Design = 2.51 ksf

Cant. Len. = 1.50 ft

$M = w l^2 / 2 = 2.82$  kip-ft  
 $M_u = \gamma_p E S^* M = 4.23$  kip-ft  
OK

$V_u = w l = 5.64$  kips  
OK



**PLAN VIEW**

**WALL DESIGN  
UNIFORM LOAD  
MOMENT DISTRIBUTION  
(Cont.)**

**Cracking Check:** AASHTO 5.7.3.4

$$\begin{aligned} d_c &= 1.88 \text{ in} \\ \beta_s &= 1 + [d_c / (0.7 * (h - d_c))] = 1.26 \\ \rho_{\text{Prov}} &= 0.00545 \\ k &= \sqrt{2\rho n + \rho n^2} - \rho n = 0.21981 \\ j &= 1 - (k/3) = 0.927 \\ f_s &= M_{\text{tot}} / A_s j d_e = 34.64 \text{ ksi} \\ \max \text{ spa} &\leq [(700\gamma_e) / (\beta_s f_s)] - 2d_c = 8.24 \text{ in} \quad \text{OK} \end{aligned}$$

**Shrinkage & Temperature Reinforcement**  
(Ea. Bar, Ea. Direction) AASHTO 5.10.8

$$\begin{aligned} b &= 108.00 \text{ in} \\ h &= 12.00 \text{ in} \\ A_s &= \frac{1.30 b h}{2(b + h) F_y} = 0.12 \text{ in. sq/ft.} \\ 0.11 &\leq A_s \leq 0.60 \quad 0.12 \text{ in. sq/ft.} \end{aligned}$$

**INSIDE FACE**

Bar Cover = 1.50 in in

	Mu	φMn	Bar Sz	Sp	d	As	a
Positive	13.54 kip-ft	56.81 kip-ft	# 6	4.0 in	10.13 in	1.33 in. sq/ft.	1.20 in
Vertical	0.00 kip-ft	12.84 kip-ft	# 5	12.0 in	9.44 in	0.31 in. sq/ft.	0.28 in

AASHTO 5.7.3.1.2-4  $c = A_s F_y / .85 f_c \beta_1 b = 1.65 \text{ in}$   
AASHTO 5.7.2.2  $a = c \beta_1 = 1.20 \text{ in}$

**Check c/de Ratio:** (AASHTO 5.7.2.1-1)

$c/d_e \leq 0.003 / (0.003 + \epsilon_{ci}); c/d_e = 0.163 \quad \text{OK, Use } F_y$

**Calculate φ<sub>M</sub>:** (φM = 0.75 + 0.15[(ε<sub>t</sub> - ε<sub>ci</sub>)/(ε<sub>tr</sub> - ε<sub>ci</sub>)), 0.75min,

φ<sub>M</sub> = 0.90 0.9max, Fig. C5.5.4.2.1-1)

**Check Min. Reinforcement:** AASHTO 5.7.3.3

$$\begin{aligned} f_r &= .24 \lambda \sqrt{f_c} = 0.61 \text{ ksi} \quad \text{AASHTO 5.4.2.6} \\ S_c &= b t^2 / 6 = 288 \text{ in}^3 \\ \text{Flexural cracking var. fac. (Other Con. Strs.)} &= 1.60 \quad \gamma_1 \\ \text{A615, Gr. 60 Reinforcement (Carbon steel)} &= 0.67 \quad \gamma_3 \\ \text{AASHTO 5.7.3.3.2-1 } M_{cr} &= \gamma_3 * [( \gamma_1 * f_r ) * S_c] = 15.74 \text{ kip-ft} \end{aligned}$$

$M_r = \phi M_n > (\text{lesser of } M_{cr} \text{ or } 1.33 M_u)$

$M_{cr} = 15.74 \text{ kip-ft} \leq \text{Controls}$   
 $1.33 * M_u = 18.01 \text{ kip-ft}$   
 $M_r = \phi M_n = 56.81 \text{ kip-ft} \quad \text{OK}$

**Cracking Check:** AASHTO 5.7.3.4

$$\begin{aligned} d_c &= 1.88 \text{ in} \\ \beta_s &= 1 + [d_c / (0.7 * (h - d_c))] = 1.26 \\ \rho_{\text{Prov}} &= 0.01091 \\ k &= \sqrt{2\rho n + \rho n^2} - \rho n = 0.29541 \\ j &= 1 - (k/3) = 0.902 \\ f_s &= M_{\text{tot}} / A_s j d_e = 8.90 \text{ ksi} \\ \max \text{ spa} &\leq [(700\gamma_e) / (\beta_s f_s)] - 2d_c = 42.89 \text{ in} \quad \text{OK} \end{aligned}$$

**Shrinkage & Temperature Reinforcement**  
(Ea. Bar, Ea. Direction) AASHTO 5.10.8

$$\begin{aligned} b &= 108.00 \text{ in} \\ h &= 12.00 \text{ in} \\ A_s &= \frac{1.30 b h}{2(b + h) F_y} = 0.12 \text{ in. sq/ft.} \\ 0.11 &\leq A_s \leq 0.60 \quad 0.12 \text{ in. sq/ft.} \end{aligned}$$



Determine Stability Of Cast-In-Place Footer:

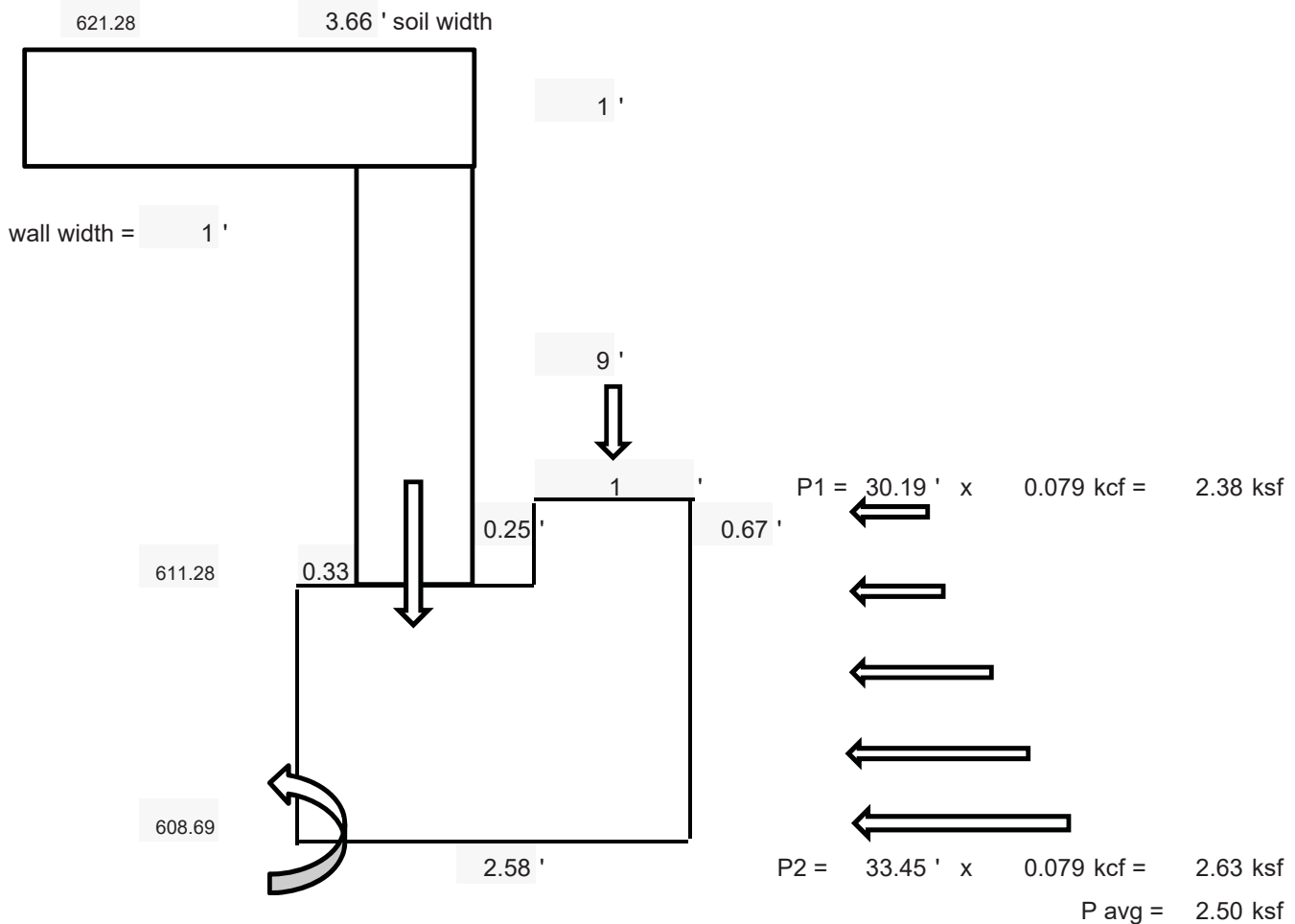
*Bouyant weights used*

unit weight soil = 0.058 kcf

unit weight concrete = 0.088 kcf

equivalent lateral pressure = 0.079 kcf

Finished Grade 642.14



Mr soil on top slab = 20.86' x 3.66' x 0.058 kcf = 4.398 k

Mr top slab = 3.66' x 1' x 0.088 kcf = 0.321 k

width thickness

Mr wall = 9' x 1' x 0.088 kcf = 0.788 k

Mr soil on top of footing = 30.19' x 1.25' x 0.058 kcf = 2.174 k

Mr footing large area = 2.59' x 2.58' x 0.088 kcf = 0.585 k

Mr footing small area = 0.67' x 1.25' x 0.088 kcf = 0.073 k

$$M_{OT} = 2.50 \text{ k/ft} \times 3.26 \text{ ft} \times 1.63' \times \frac{1.5 \text{ LF}}{1} = 19.96 \text{ k-ft}$$

Resisting Moments:

Soil on top slab:

$$M_{r1} = 4.398 \text{ k} \times (0.33' + 0.5') \times \frac{1 \text{ LF}}{1} = 3.65 \text{ k-ft}$$

Top Slab

$$M_{r2} = 0.321 \text{ k} \times (0.33' + 0.5') \times \frac{0.9}{1} = 0.24 \text{ k-ft}$$

Wall

$$M_{r3} = 0.788 \text{ k} \times (0.33' + 0.5') \times \frac{0.9}{1} = 0.59 \text{ k-ft}$$

Soil on footing

$$M_{r4} = 2.174 \text{ k} \times (0.33' + 1') + \left( \frac{0.25' + 1'}{2} \right) \times \frac{1}{1} = 4.25 \text{ k-ft}$$

Footing Large Area

$$M_{r5} = 0.585 \text{ k} \times 1.29' \times \frac{0.9}{1} = 0.68 \text{ k-ft}$$

Footing Small Area

$$M_{r6} = 0.073 \text{ k} \times (0.33' + 1') + \left( \frac{0.25' + 1'}{2} \right) \times \frac{1}{1} = 0.14 \text{ k-ft}$$

$$\text{Total Resisting Moment} = 9.55 \text{ k-ft}$$

$$\text{SF Overturning} = \frac{9.55 \text{ k-ft}}{19.96 \text{ k-ft}} = 0.478 \text{ NG}$$

$$\text{Req'd add'l} = \frac{19.96 \text{ k-ft} - 9.55 \text{ k-ft}}{\left( 2.59' + \frac{0.67'}{2} \right)} = 3.56 \text{ k/lf}$$

$$\text{Sliding Force} = 2.50 \text{ k/ft} \times 3.26 \text{ ft} + \left( 0.079 \text{ k/ft} \times \frac{3.26'^2}{2} \right) \times 1.5 = 12.87 \text{ k}$$

Sliding Resistance:

	LF	
soil on top slab = 4.40 k x	1	= 4.40 k
top slab = 0.321 k x	0.9	= 0.29 k
wall = 0.788 k x	0.9	= 0.71 k
soil on top of footing = 2.174 k x	1	= 2.17 k
footing large area = 0.585 k x	0.9	= 0.53 k
footing small area = 0.073 k x	0.9	= 0.07 k

$$\text{Total Sliding Resistance} = 8.16 \text{ k}$$

$$\text{Reduction Factor} = 0.9$$

$$\text{SF Sliding} = \frac{8.16 \text{ k} \times 0.5}{12.87 \text{ k} \times 0.5} = 0.317 \text{ NG} \quad 7.35 \text{ k}$$

Design vault wall to carry lateral soil load as well as sliding force from cast-in-place footing, see following sheets  
 Cast in place footing will transfer load to end walls of manhole.

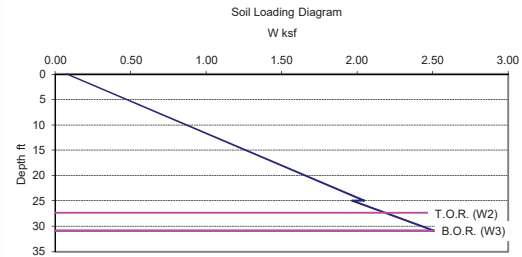
$$\text{Add'l sliding req'd} = 12.87 \text{ k} - 7.35 \text{ k} = 5.53 \text{ k}$$

$$5.53 \text{ k controls over } 3.56 \text{ k}$$

**WALL DESIGN  
 UNIFORM LOAD  
 MOMENT DISTRIBUTION**

*This sheet used to determine average pressure  
 for horizontal span design*

Height = 3.50 ft  
 Length b = 10.00 ft  
 Width c = 10.00 ft  
 Wall Thickness = 12.00 in



Horizontal lines indicate top & bottom of riser wall

**Lateral Earth Pressure**

Eq. Lat. Press. = 0.079 kcf  
 W2 = 2.15 ksf Top of Wall  
 W3 = 2.43 ksf Bottom of Wall  
 Wavg = 2.29 ksf  
 Wu = 3.44 ksf  
**No Surcharge**

Check bottom 3'-3" of side wall as simple span horizontal:

$$w \text{ avg.} = 2.29 \text{ ksf}$$

$$w_u = 3.44 \text{ ksf}$$

Span = 11' - ( 2 x  $\frac{10.13}{12}$  ") = 9.31'

Shear taken at 'd' from support

$$M = w l^2 / 8 : 2.29 \text{ k/ft} \times \frac{11^2}{8} = 34.64 \text{ k-ft}$$

$$M_u = 3.44 \text{ k/ft} \times \frac{11^2}{8} = 52.03 \text{ k-ft}$$

$$V_u = w l / 2 : 3.44 \text{ k/ft} \times \frac{9.31}{2} = 16.02 \text{ k}$$

$$V = w l / 2 : 2.29 \text{ k/ft} \times \frac{9.31}{2} = 10.66 \text{ k}$$

JOB

2019.174.008

DESCRIPTION

Manhole S-107

SHEET NO.

OF

SCALE

CALCULATED BY

GJP

DATE

9/4/2019

CHECKED BY

DATE

### Wall Horizontal Span

Limit State: Strength 1

### MATERIAL PROPERTIES:

1 Concrete Strength, $f'_c$	6.5	ksi
2 Reinforcing Steel Yield, $f_y$	60	ksi
3 Concrete Unit Weight	150	pcf

$$E_c = 120,000 K_1 w_c^{2.0} f'_c^{0.33} = 4.88E+03 \text{ ksi}$$

$$E_s = 29000 \text{ ksi}$$

$$n = E_s / E_c = 5.95$$

$$0.65 < \beta_1 < 0.85 = 0.73$$

$$\text{Unfactored Moment, } M_a = 34.64 \text{ kip-ft}$$

$$\text{Design Ultimate Moment, } M_u = 52.03 \text{ kip-ft}$$

$$\text{Ultimate Shear, } V_u = 16.02 \text{ kips}$$

$$d_v = \text{Greater of } .72h \text{ or } 0.9 d_e = 9.113 \text{ in}$$

$$V_c = \phi(0.0316)\beta\sqrt{f'_c}b*d_v = 15.86 \text{ kips/ft NG}$$

Say OK, less than 1%

$$\rho = \left[ 1 - \left( \sqrt{1 - \frac{2 \cdot M_u}{\phi b d^2 \cdot .85 f'_c}} \right) \right] \cdot \frac{.85 f'_c}{f_y} = 0.00999$$

$$\text{Steel Area Req'd; } A_s = \rho \cdot b \cdot d = 1.213 \text{ in}^2/\text{ft}$$

$$\#6 \text{ Bar @ } 4.00 \text{ in oc}$$

$$A_s \text{ Prov} = 1.33 \text{ in}^2/\text{ft}$$

$$\text{Use } \#6 \text{ Prov} = 0.01091 \text{ OK}$$

$$\phi M_n = \phi A_s f_y (d_e - a/2)/12 = 56.51 \text{ kip-ft OK}$$

AASHTO 5.7.3.2.2-1

### CHECK CRACKING AASHTO 5.7.3.4

$$k = \sqrt{2\rho n + (\rho n)^2} - \rho n = 0.301$$

$$j = 1 - (k/3) = 0.900$$

$$f_s = M_a / (A_s \cdot j \cdot d) = 34.43 \text{ ksi}$$

$$\max \text{ spa} \leq [(700\gamma_e) / (\beta_s f_s)] - 2d_c = 8 \text{ in OK}$$

$$d_c = 1.88 \text{ in}$$

$$B_s = 1 + d_c / (0.7 \cdot (h - d_c)) = 1.265$$

$$\gamma_e = 0.75$$

### AASHTO LRFD - 7th Edition

$$\text{Member Design Width } b = 12.00 \text{ in}$$

$$\text{Member Thickness } T_s = 12.00 \text{ in}$$

$$\text{Bar Cover} = 1.50 \text{ in}$$

$$\text{Bar Size} = 6$$

$$d_e = T_s - \text{Cov} - \text{Bar Size}/2 = 10.13 \text{ in}$$

$$\rho_b = \frac{0.85 \beta_1 \cdot f'_c}{f_y} \cdot \left[ \frac{87,000}{87,000 + f_y} \right] = 0.0395$$

$$f_r = .24 \cdot \lambda \cdot \sqrt{f'_c} = 0.59 \text{ ksi AASHTO 5.7.3.3}$$

### Capacity Reduction Factors

$$(\phi M = 0.75 + 0.15[(\epsilon_t - \epsilon_{cl})/(\epsilon_{tl} - \epsilon_{cl})], 0.75 \text{ min}, 0.9 \text{ max}, \text{ Fig. C5.5.4.2.1-1})$$

$$\text{Moment, } \Phi M = 0.9$$

$$\text{Shear, } \Phi V = 0.9$$

$$\beta = 2.0$$

### Check c/d Ratio: (Art. 5.7.2.1)

$$c = A_s \cdot f_y / (.85 \cdot f'_c \cdot \beta_1 \cdot b) = 1.792 \text{ in}$$

$$c/d_e \leq 0.003 / (0.003 + \epsilon_{cl}); c/d_e = 0.177 \text{ OK, Use } f_y$$

$$a = \beta_1 c = 1.299 \text{ in}$$

$$S_c = b t^2 / 6 = 288 \text{ in}^3$$

$$\text{Flexural cracking var. fac. (Other Con. Strs.) } 1.60 \gamma_1$$

$$A615, \text{ Gr. 60 Reinforcement (Carbon steel)} 0.67 \gamma_3$$

$$\text{AASHTO 5.7.3.3.2-1 } M_{cr} = \gamma_3 \cdot [(\gamma_1 \cdot f_r) \cdot S_c] = 15.12 \text{ kip-ft}$$

$$M_r = \phi M_n > (\text{lesser of } M_{cr} \text{ or } 1.33 M_u)$$

$$M_{cr} = 15.12 \text{ kip-ft} \leq \text{Controls}$$

$$1.33 \cdot M_u = 69.20 \text{ kip-ft}$$

$$M_r = \phi M_n = 56.51 \text{ kip-ft OK}$$



Design As Cantilever:

P = 5.53 k/ft from sliding force  
half of footing length

$$P = 5.53 \text{ k/ft} \times 6 \text{ ft} = 33.16 \text{ k}$$

$$M = P \times L = 33.16 \text{ k} \times 3.5 \text{ ft} + (10.66 \text{ k} \times \frac{3.5}{2}) = 134.7 \text{ k-ft}$$

$$M_u = 1.5 \times 134.7 \text{ k-ft} = 202.1 \text{ k-ft}$$

$$V_u = 1.5 \times 33.16 \text{ k} = 49.74 \text{ k}$$

Add reaction from horizontal span:

$$V_u = 16.02 \text{ k} \times 3.5 \text{ ft} = 56.06$$

$$\text{Total } V_u \text{ for cantilever design} = 56.06 \text{ k} + 49.74 \text{ k} = 105.8 \text{ k}$$

JOB	2019.174.008		
DESCRIPTION	Manhole S-107		
SHEET NO.	OF	SCALE	
CALCULATED BY	GJP	DATE	9/24/2019
CHECKED BY		DATE	

### Wall as deep beam

Limit State: Strength 1

### MATERIAL PROPERTIES:

1 Concrete Strength, F'c	6.5	ksi
2 Reinforcing Steel Yield, Fy	60	ksi
3 Concrete Unit Weight	150	pcf
4 Soil Unit Weight	120	pcf

$$E_c = 120,000 K_1 w_c^{2.0} f'_c^{0.33} = 5.01E+03 \text{ ksi}$$

$$E_s = 29000 \text{ ksi}$$

$$n = E_s / E_c = 5.79$$

$$0.65 < \beta_1 < 0.85 = 0.73$$

$$\text{Unfactored Moment, } M_a = 134.7 \text{ kip-ft}$$

$$\text{Design Ultimate Moment, } M_u = 202.1 \text{ kip-ft}$$

$$\text{Ultimate Shear, } V_u = 105.8 \text{ kips}$$

$$d_v = \text{Greater of } .72h \text{ or } 0.9 d_e = 20.98 \text{ in}$$

$$V_c = \phi(0.0316)\beta\sqrt{f'_c}b*d_v = 36.51 \text{ kips/ft } 1/2\phi V_c < V_u, \text{Stirrup Req'd}$$

$$\rho = \left[ 1 - \left( \sqrt{1 - \frac{2 \cdot M_u}{\phi b d^2 \cdot .85 f'_c}} \right) \right] \cdot \frac{.85 f'_c}{f_y} = 0.00716$$

$$\text{Steel Area Req'd; } A_s = \rho \cdot b \cdot d = 2.004 \text{ in}^2/\text{ft}$$

$$\text{Use } 4 \text{ \#7 Bars}$$

$$A_s \text{ Prov} = 2.41 \text{ in}^2/\text{ft}$$

$$\rho \text{ Prov} = 0.00860 \quad \text{OK}$$

$$\phi M_n = \phi A_s f_y (d_e - a/2)/12 = 240.5 \text{ kip-ft} \quad \text{OK}$$

AASHTO 5.7.3.2.2-1

### CHECK CRACKING

$$k = \sqrt{2\rho n + (\rho n)^2} - \rho n = 0.27$$

$$j = 1 - (k/3) = 0.910$$

$$f_s = M_a / (A_s \cdot j \cdot d) = 31.68 \text{ ksi}$$

$$\text{max spa} \leq [(700\gamma_e) / (\beta_s f_s)] - 2d_c = 10 \text{ in} \quad \text{OK}$$

$$d_c = 2.25 \text{ in}$$

$$B_s = 1 + d_c / (0.7 \cdot (h - d_c)) = 1.135$$

$$\gamma_e = 0.75$$

### AASHTO LRFD - 7th Edition

$$\text{Member Design Width } b = 12.00 \text{ in}$$

$$\text{Member Thickness } T_s = 26.00 \text{ in}$$

$$\text{Bar Cover} = 2.25 \text{ in } 1.5" \text{ cov.} + \#6 \text{ bar}$$

$$\text{Bar Size} = 7$$

$$d_e = T_s - \text{Cov} - \text{Bar Size}/2 = 23.31 \text{ in}$$

$$\rho_b = \frac{0.85\beta_1 \cdot f'_c}{f_y} \cdot \left[ \frac{87,000}{87,000 + f_y} \right] = 0.0395$$

$$f_r = .24 \cdot \lambda \cdot \sqrt{f'_c} = 0.61 \text{ ksi} \quad \text{AASHTO 5.7.3.3}$$

### Capacity Reduction Factors

$$(\phi M = 0.75 + 0.15[(\epsilon_t - \epsilon_{cl})/(\epsilon_{tl} - \epsilon_{cl})], 0.75 \text{ min}, 0.9 \text{ max}, \text{ Fig. C5.5.4.2.1-1})$$

$$\text{Moment, } \phi M = 0.9$$

$$\text{Shear, } \phi V = 0.9$$

$$\beta = 2.0$$

### Check c/d Ratio: (Art. 5.7.2.1)

$$c = A_s \cdot f_y / (.85 \cdot f'_c \cdot \beta_1 \cdot b) = 3.002 \text{ in}$$

$$c/d_e \leq 0.003 / (0.003 + \epsilon_{cl}); c/d_e = 0.129 \quad \text{OK, Use } F_y$$

$$a = \beta_1 c = 2.177 \text{ in}$$

$$S_c = b t^2 / 6 = 98 \text{ in}^3$$

$$\text{Flexural cracking var. fac. (Other Con. Strs.) } 1.60 \gamma_1$$

$$\text{A615, Gr. 60 Reinforcement (Carbon steel) } 0.67 \gamma_3$$

$$\text{AASHTO 5.7.3.3.2-1 } M_{cr} = \gamma_3 \cdot [(\gamma_1 \cdot f_r) \cdot S_c] = 5.36 \text{ kip-ft}$$

$$M_r = \phi M_n > (\text{lesser of } M_{cr} \text{ or } 1.33 M_u)$$

$$M_{cr} = 5.36 \text{ kip-ft} \leq \text{Controls}$$

$$1.33 \cdot M_u = 268.78 \text{ kip-ft}$$

$$M_r = \phi M_n = 240.55 \text{ kip-ft} \quad \text{OK}$$

**Design Shear Reinforcement:**

$V_u$  req'd = 105.8 kips

$d_e$  = 23.31 "  $f'_c$  = 6500 psi

$\phi V_c$  provided = 36.51 kips  $\phi(0.0316)\beta\sqrt{f'_c}b*dv$

$b$  = 12.00 "  $\beta$  = 2.0

$\phi V_s$  req'd = 69.29 kips

$f_y$  = 60000 psi  $0.72h$  = 18.72

$\phi$  = 0.9  $0.9d_e$  = 20.98

Maximum Spacing = 6 "

$h$  = 26.00 "  $dv$  = 20.98

$\phi V_s$  =  $A_v f_y dv / s$  AASHTO 5.8.3.3-4

$A_{v \min}$  = 0.27 sq. in

Use # 4 stirrup Area of # 4 = 0.40 sq. in

$\phi V_s$  = 75.53 kips

Total  $\phi V_n$  provided =  $\phi V_c + \phi V_s$  = 112.04 kips

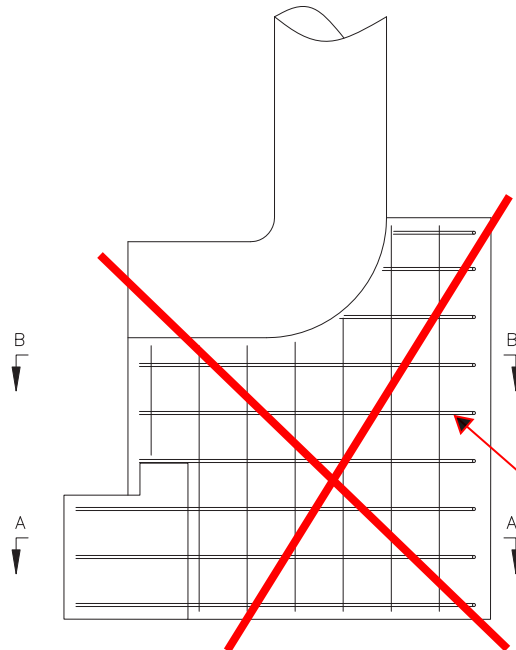
$\phi V_n$  112.04 kips >  $V_u$  105.80 kips OK

**5.8.2.7 Maximum Spacing**

If  $v_u < 0.125 f'_c$  then  $S_{max} = 0.8dv \leq 24"$  = 16.79 "

If  $v_u \geq 0.125 f'_c$  then  $S_{max} = 0.4dv \leq 12"$  = 8.39 "

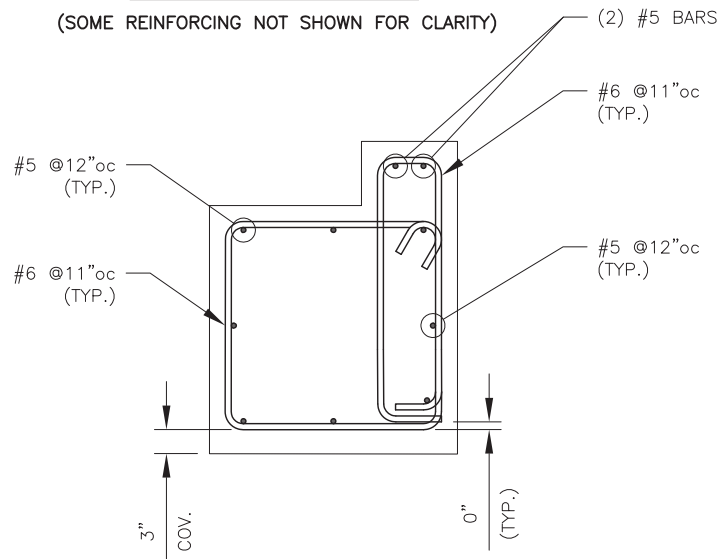
$v_u = V_u / \phi b dv$  0.467 ksi < 0.813 ksi  $0.125 f'_c = 0.813$  ksi



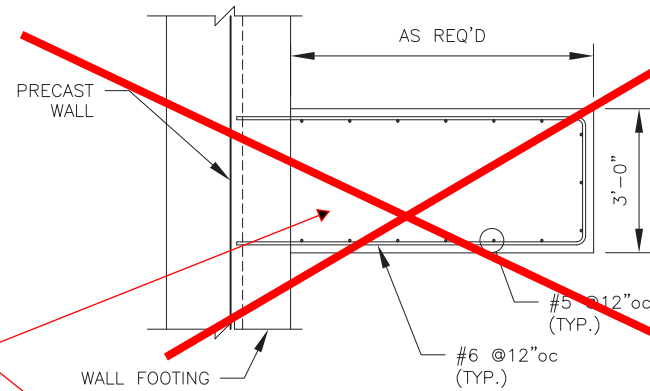
Drop Pipe Concrete encasement and reinforcing to follow City of Cleveland Uniform Standards

### PARTIAL ELEVATION CAST-IN-PLACE

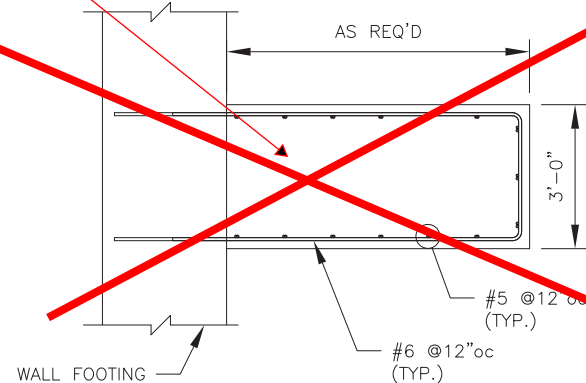
(SOME REINFORCING NOT SHOWN FOR CLARITY)



### CAST-IN-PLACE FOOTING SECTION (BAR COVER 2" U.N.O.)



### SECTION B-B

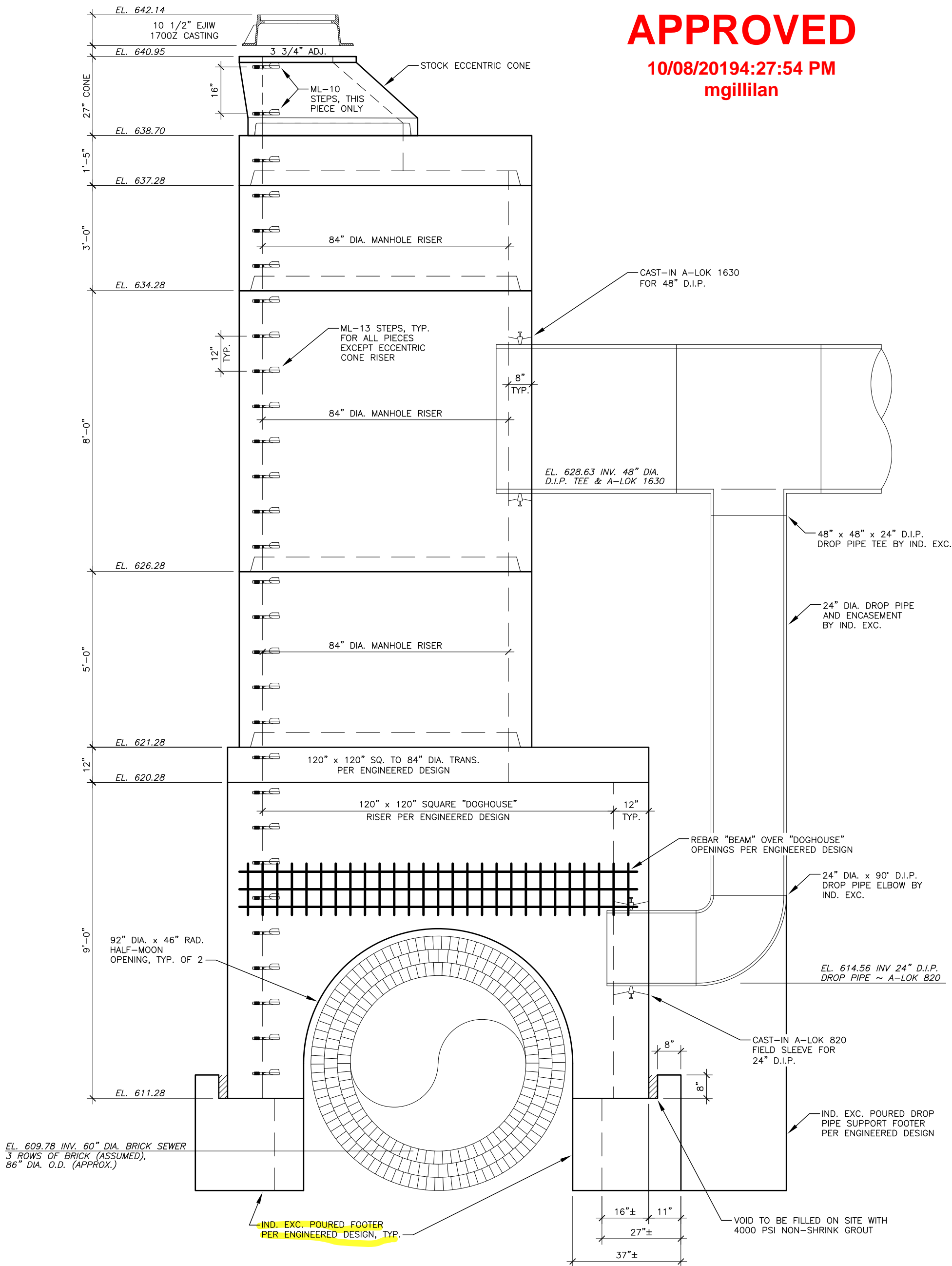


### SECTION A-A (BAR COVER 2")

REV. NO.    DATE    REVISION			PREPARED FOR: <b>LINDSAY CONCRETE PRODUCTS, INC.</b> 6845 ERIE AVE. N.W. CANAL FULTON, OH 44614 PHONE: 330-854-4511 FAX: 330-854-6664		
PREPARED BY: <b>DELTA</b> SPECIALTY PRECAST CONCRETE ENGINEERS 860 HOOPER ROAD, ENDWELL, NY 13760 TEL: (607) 231-6600    FAX: (607) 231-6650			DATE: 9/24/19    SHEET TITLE: <b>REINFORCING SUMMARY</b> DRWN BY: GJP SCALE: N.T.S.    CKD BY: PROJECT: <b>MANHOLE S-107</b>		
CONTRACTOR:			DWG. I.D. RS-01		
DELTA PROJ. NO.: 2019.174.008			SHT. NO. OF		

APPROVED

10/08/2019 4:27:54 PM  
mgillilan



MANHOLE S-107  
ELEVATION VIEW

NOTES:

- 1.) CONCRETE MIN. 5,000 PSI @ 28 DAYS
- 2.) REINFORCING GRADE 60 ASTM A615-A617 60,000 PSI YIELD STRENGTH
- 3.) HS-20 LOADING
- 4.) ALL MANHOLE SECTIONS SHALL CONFORM TO THE PROVISIONS OF ASTM C-478
- 5.) RUBBER GASKETED JOINTS SHALL CONFORM TO THE PROVISIONS OF ASTM C-443.
- 6.) EX. 78" DIA. SEWER SIZE, COMPOSITION AND WALL THICKNESS TO BE CONFIRMED BY OTHERS.

48" & 24" SKEWED 3° TO RIGHT 10/4/19 DJF  
48" MOVED DOWN 3"± 8/28/19 DJF

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1.	8" DROP	10/17/19	DJF
2.	A-LOKS SPEC'D	10/17/19	DJF
3.	NOTE 6	10/17/19	DJF
4.	120"x120" DOGHOUSE	5/30/19	DJF
5.	WALL THICKNESSES	6/19/19	DJF
6.	FOOTER/RISER	7/17/19	DJF
7.	3" VOID AT FOOTER	8/16/19	DJF

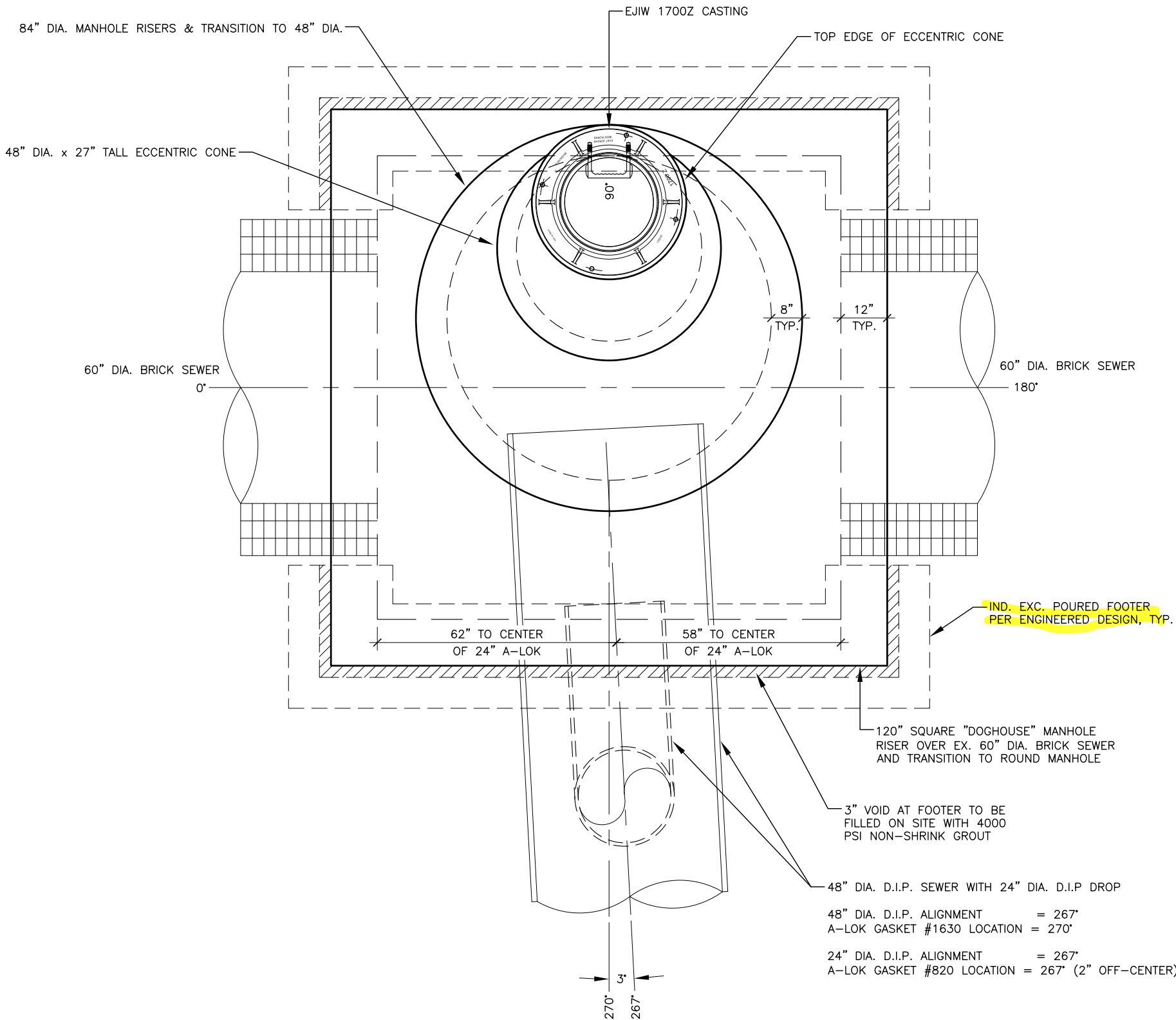
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CUSTOMER: **INDEPENDENCE EXCAVATING, INC.**  
JOB: **OPPORTUNITY CORRIDOR - PHASE 3**

DRAWN BY: DJF CHECKED BY: RH SCALE: 3/8"=1'-0" DATE: 10/4/19 JOB NO: 173408 DWG NO: LP-001

**Lindsay**  
PRECAST

**INPCB**  
INDEPENDENCE PRECAST




## MANHOLE S-107 PLAN VIEW

### NOTES:

- 1.) CONCRETE MIN. 5,000 PSI @ 28 DAYS
- 2.) REINFORCING GRADE 60 ASTM A615-A617 60,000 PSI YIELD STRENGTH
- 3.) HS-20 LOADING
- 4.) ALL MANHOLE SECTIONS SHALL CONFORM TO THE PROVISIONS OF ASTM C-478
- 5.) RUBBER GASKETED JOINTS SHALL CONFORM TO THE PROVISIONS OF ASTM C-443.
- 6.) EX. 78" DIA. SEWER SIZE, COMPOSITION AND WALL THICKNESS TO BE CONFIRMED BY OTHERS.

48" & 24" SKEWED 3' TO RIGHT 10/4/19 DJF  
48" MOVED DOWN 3"± 8/28/19 DJF

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1.	8" DROP	10/17/18	DJF
2.	48" & 24" REALIGN	10/17/18	DJF
3.	NOTE 6	10/17/18	DJF
4.	120"x120" DOGHOUSE	5/30/19	DJF
5.	WALL THICKNESSES	6/19/19	DJF
6.	FOOTER	7/17/19	DJF
7.	3" VOID AT FOOTER	8/16/19	DJF

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		CUSTOMER: INDEPENDENCE EXCAVATING, INC.	
JOB: OPPORTUNITY CORRIDOR - PHASE 3		DRAWN BY: DJF CHECKED BY: RH SCALE: 3/8"=1'-0" DATE: 10/4/19	
JOB NO: 173408		DWG NO: LP-002	





Customer:	INDEPENDENCE EXCAVATING, INC.
Job Name:	ODOT 173000 - Opp Corridor Ph 3
Job #:	173408
Structure ID:	S-111
Station:	Aug 28,'19
Type:	Cleve WPC D/H Mh
SalesPerson:	Ralph Hastings

**Lindsay**  
P R E C A S T

1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614

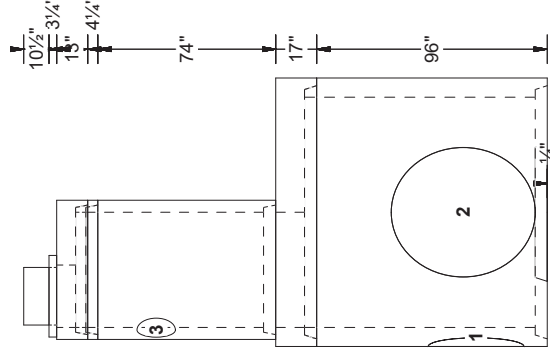
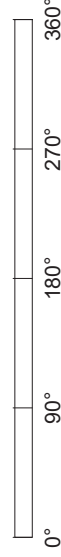
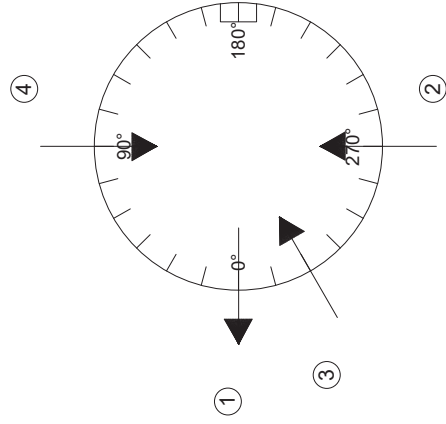
REVISED Aug 28, 2019	
> Rim elevation & 12" invert elevation and angle	
> Existing pipe FROM #3 brick sewer TO #4 brick sewer	
> Increased manhole FROM 84"Ø TO 96"Ø due to the #4 sewer and the 30" sewer @ 90°	

REVISED Aug 28, 2019

- > Rim elevation & 12" invert elevation and angle
- > Existing pipe FROM #3 brick sewer TO #4 brick sewer
- > Increased manhole FROM 84"Ø TO 96"Ø due to the #4 sewer and the 30"

Invert:	653.45'
Rim to Invert:	16.88'
Sump:	1.28'


Step Degree: 180 **ML-10 steps @ 16" O.C.**



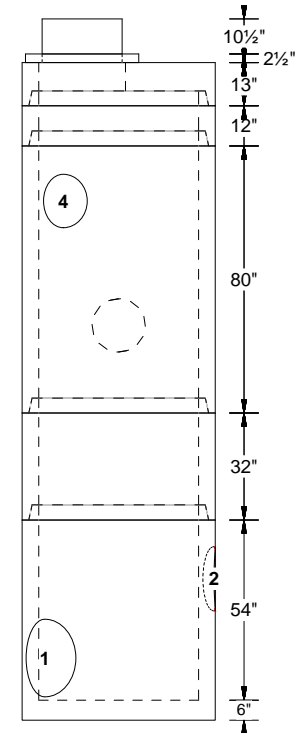
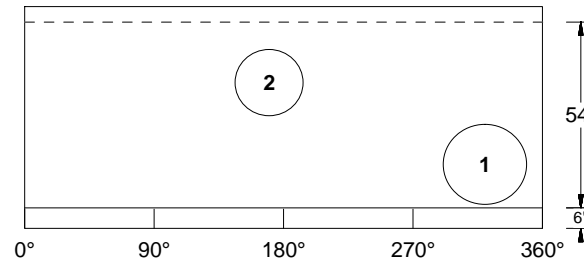
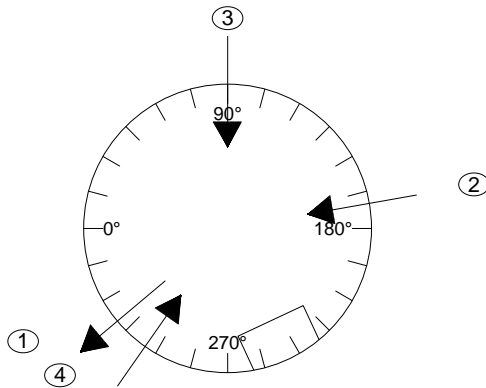
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	653.45	-1.21	360	30" - RCP Co-Pipe	1235 A-LOK
(2)	653.45	0	270	39" X 31" - #4 BRICK	STYROFOAM
(3)	665.2	1	330	12" - VCP LOGAN	480 A-LOK
(4)	653.45	0	90	39" X 31" - #4 BRICK	STYROFOAM

A-Lok XC-480  
A-Lok XC-1235  
Hole in Structure for Pipe

08/28/2019

Customer:	INDEPENDENCE EXCAVATING, INC.	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
Job Name:	ODOT 173000 - Opp Corridor Ph 3	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185	
Job #:	173408	48"Ø Stock Manhole Riser X 12" Tall	EA	1	867	
Structure ID:	S-112 REMAKE	48"Ø Manhole Riser X 80" Tall	EA	1	5607	
Station:	Dec 9,'19	48"Ø Stock Manhole Riser X 32" Tall	EA	1	2311	
Type:	Cleve WPC Mh	48"Ø Non Extended 6" Manhole Base x 54" Tall	EA	1	4963	
SalesPerson:	Ralph Hastings	Flow Channel to Spring Line	EA	1	2000	
		A-Lok XC-710	EA	1	0	
		A-Lok XC-480	EA	2	0	
		A-Lok XC-580	EA	1	0	
Rim:	664.68'					
Invert:	648.01'					
Rim to Invert:	16.67'					
Sump:	0.34'					

Step Degree: 245



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	648.01	-2.05	320	18" - VCP LOGAN	710 A-LOK
(2)	650.01	3.51	170	15" - VCP LOGAN	580 A-LOK
(3)	656.51	1.27	90	12" - VCP LOGAN	480 A-LOK
(4)	659.62	1	305	12" - VCP LOGAN	480 A-LOK

A-Lok XC-710  
A-Lok XC-480  
A-Lok XC-580

12/19/2019

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-116 REVD  
Station: Dec 5,'19  
Type: Cleve WPC 48"Ø San  
SalesPerson: Ralph Hastings

Rim: 660.40'  
Invert: 635.37'  
Rim to Invert: 25.03'  
Sump: 0.22'

Step Degree: 0

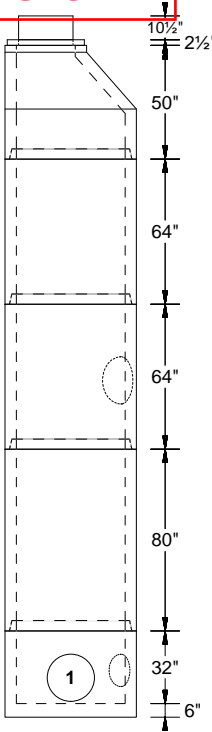
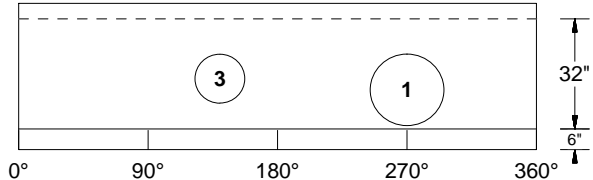
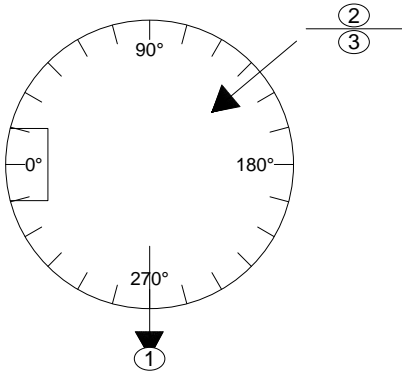
Description	UOM	Quantity	Weight
Stock 48"Ø X 50" Eccentric Cone	EA	1	3740
48"Ø Stock Manhole Riser X 64" Tall	EA	1	4623
48"Ø Manhole Riser X 64" Tall	EA	1	4476
48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778
48"Ø Non Extended 6" Manhole Base X 32" Tall	EA	1	3471
A-Lok XC-425	EA	1	0
A-Lok XC-630	EA	2	0



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PO Box 578  
Canal Fulton, Ohio 44614

**At 25.03' deep, this manhole does not require a landing platform. Only manholes that are over 28.00' deep require landing platforms.**

**> Can you get a clarification on this from Kokosing and Baker? See the landing Platform attachment.**



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	635.37	-1.52	270	18" - DIP	630 A-LOK
(2)	646.23	2.05	140	18" - DIP	630 A-LOK
(3)	635.87	0	140	12" - DIP	425 A-LOK

--

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-117 REVD  
Station: Dec 5,'19  
Type: Cleve WPC 48"Ø San  
SalesPerson: Ralph Hastings

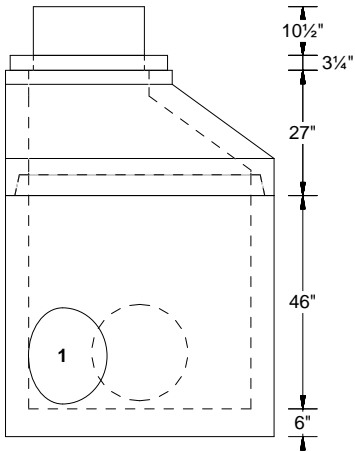
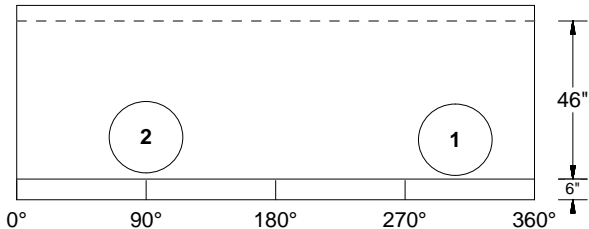
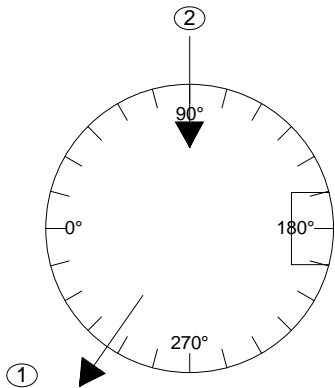
Rim: 641.95'  
Invert: 634.95'  
Rim to Invert: 7.00'  
Sump: 0.22'

Description	UOM	Quantity	Weight
Stock 48"Ø X 27" Eccentric Cone	EA	1	1860
48"Ø Non Extended 6" Manhole Base X 46" Tall	EA	1	4402
A-Lok XC-630	EA	2	0



1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614

Step Degree: 180



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	634.95	-1.52	305	18" - DIP	630 A-LOK
(2)	634.95	1.52	90	18" - DIP	630 A-LOK



Customer: INDEPENDENCE EXCAVATING, INC.  
 Job Name: ODOT 173000 - Opp Corridor Ph 3  
 Job #: 173408  
 Structure ID: D-88 BU-05  
 Station: August 20, 2020  
 Type: City of Cleveland Curb Inlet  
 SalesPerson: Ralph Hastings

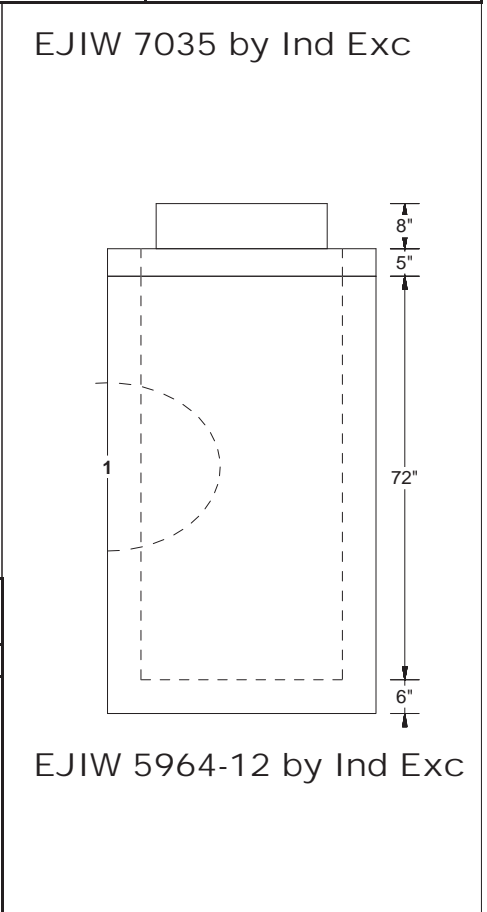
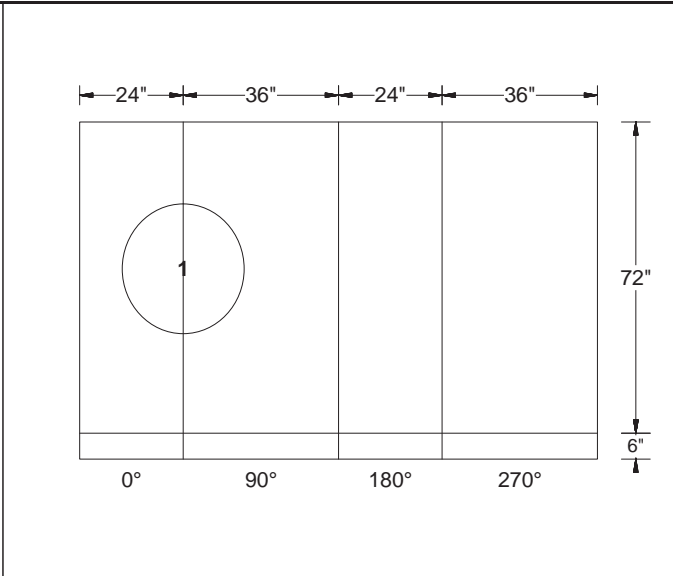
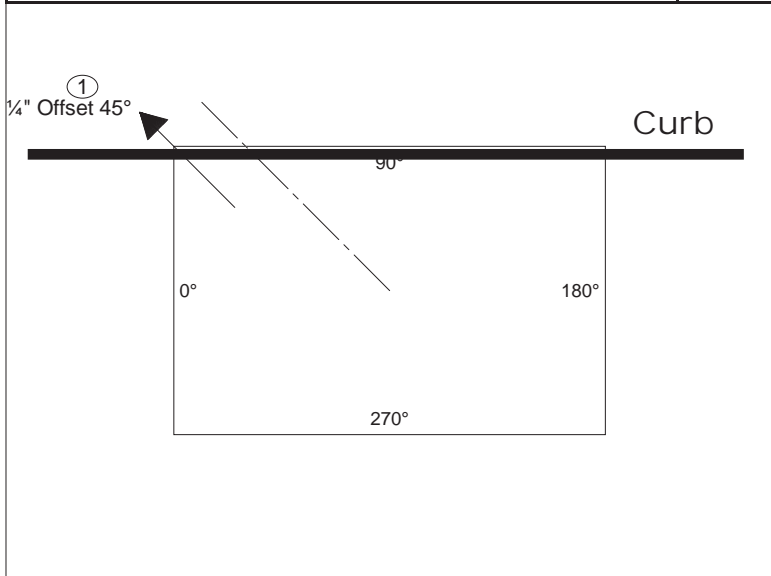
Rim: 664.53'  
 Invert: 660.53'  
 Rim to Invert: 4.00'  
 Sump: 3.08'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	6047
Corner Hole in Structure for Pipe	EA	1	0

IX Reviewed J.P. Sorma PE  
 8/21/20



1-800-837-7788  
 6845 Erie Ave. N.W.  
 PO Box 578  
 Canal Fulton, Ohio 44614



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.53	0	45	EJIW 5964-12	20"W X 30"T CORNER

> No Curb Drain <

Corner Hole in Structure for Pipe 08/20/2020



Customer: INDEPENDENCE EXCAVATING, INC.  
 Job Name: ODOT 173000 - Opp Corridor Ph 3  
 Job #: 173408  
 Structure ID: D-89 BU-05  
 Station: August 20, 2020  
 Type: City of Cleveland Curb Inlet  
 SalesPerson: Ralph Hastings

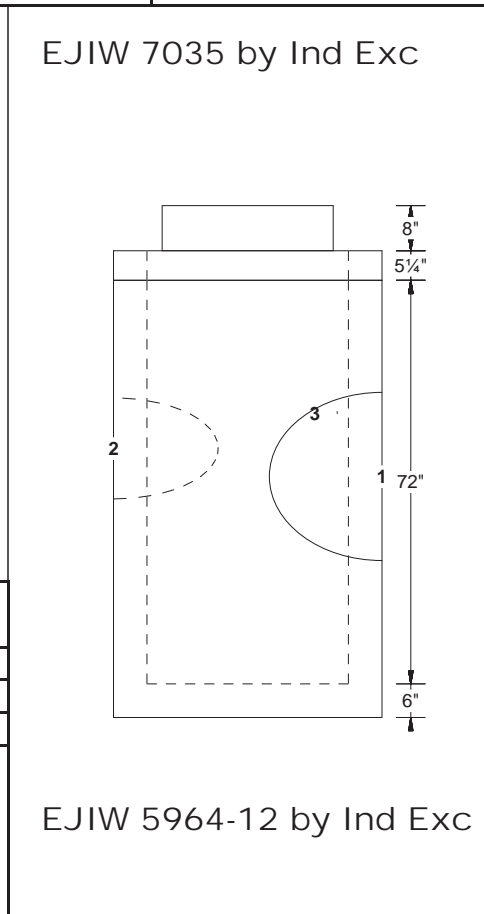
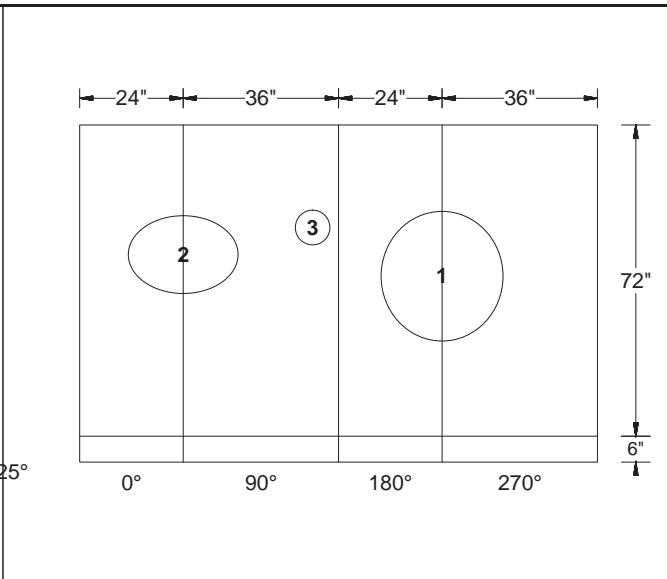
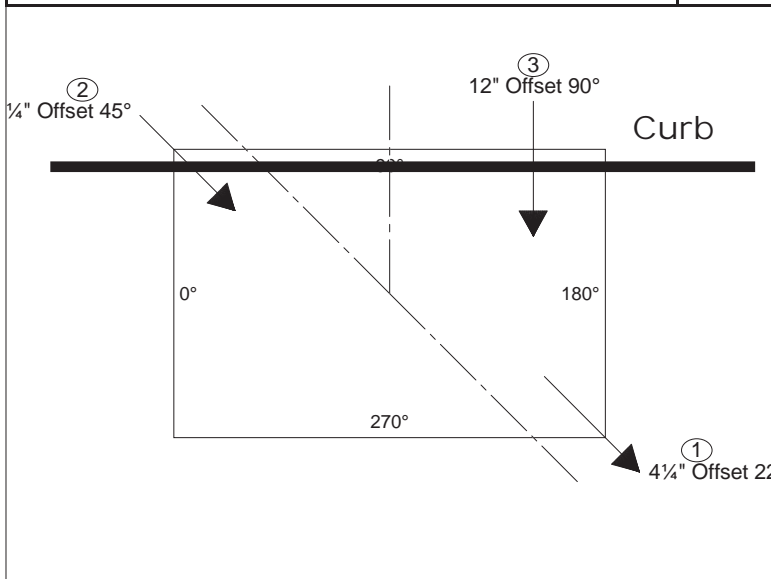
Rim: 664.56'  
 Invert: 660.45'  
 Rim to Invert: 4.11'  
 Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	5886
Corner Hole in Structure for Pipe	EA	2	0
Hole in Flat Wall Structure	EA	1	0

IX Reviewed J.P. Sorma PE  
 8/21/20



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 PO Box 578  
 Canal Fulton, Ohio 44614



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.45	0	225	EJIW 5964-12	20"W X 30"T CORNER
(2)	660.45	0	45	12" - VCP LOGAN	18" CORNER
(3)	661.23	0	90	6" - HDPE	8"Ø FW

EJIW 5964-12 by Ind Exc

> 6" Curb Drain must be on 90° wall <

Corner Hole in Structure for Pipe  
 Hole in Flat Wall Structure

08/20/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: S-115  
Station: Aug 14,'19  
Type: Cleve WPC Mn  
SalesPerson: Ralph Hastings

Rim: ~~664.00'~~ **664.77**  
Invert: 655.00'  
Rim to Invert: ~~9.00'~~ **9.77'**  
Sump: 0.26'

Description	UOM	Quantity	Weight
Stock 48"Ø X 50" Eccentric Cone	EA	1	3740
48"Ø Stock Manhole Riser X 24" Tall	EA	1	1734
48"Ø Non Extended 6" Manhole Base X 24" Tall	EA	1	3089
Flow Channel to Spring Line	EA	1	2000
A-Lok XC-225/235	EA	1	0

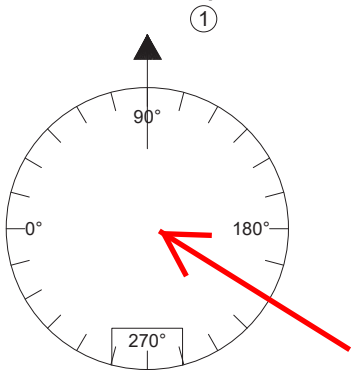


1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614

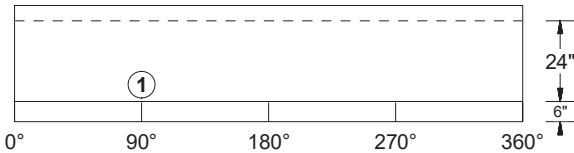
**APPROVED**

**OPTIONS: (NOTE: Base is worth \$522.00)**

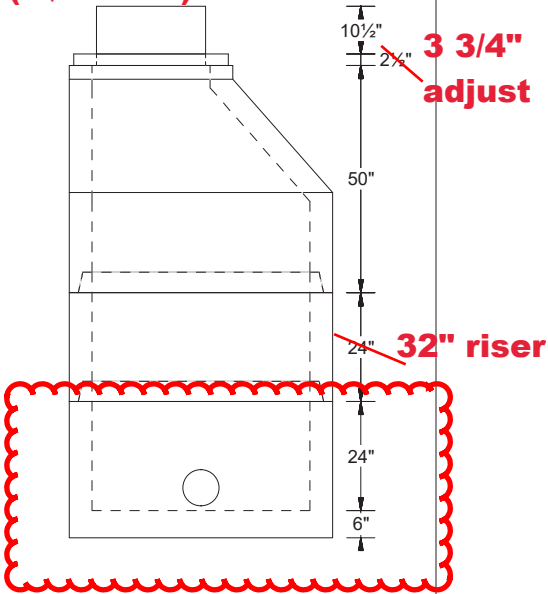
Step Degree: 270 ML-10 steps at 16" O.C.



- 1. Precision (?) to core thru wall and invert shelf and supply the boot.**  
**> Ind Exc to redo invert channel -**
- 2. Lindsay does all this - same price as a new base**
- 3. Make a new base and scrap this one (+\$100.00)**




The Kor-N-Seal boot needed is for a 12"Ø cored hole and a pipe O.D. range of 7.00 to 8.50, for 6"Ø VCP pipe.

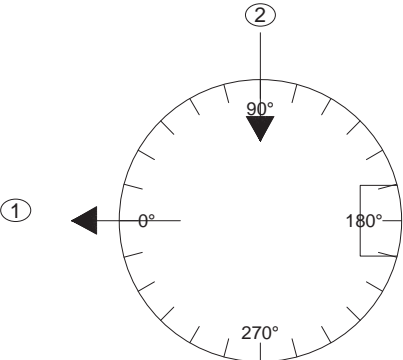
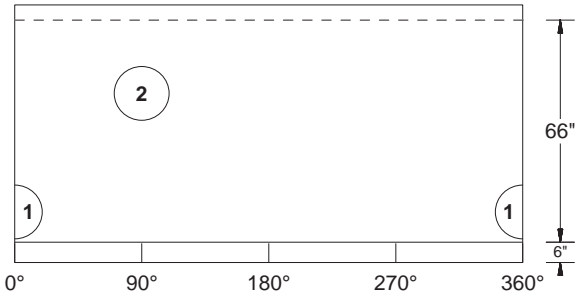
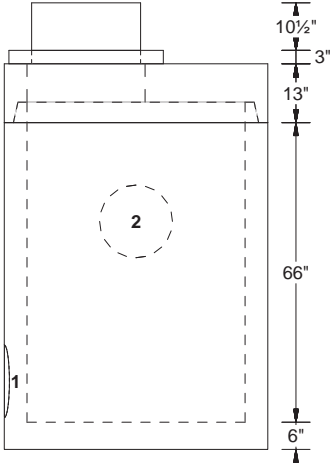



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	655	-4.71	90	6" - VCP LOGAN	235 A-LOK
<b>2</b>	<b>655.26</b>	<b>1.00</b>	<b>210</b>	<b>6" VCP Logan</b>	<b>6" Kor-N-Seal boot</b>

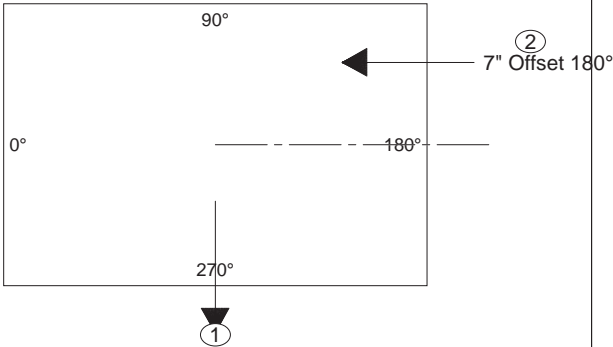
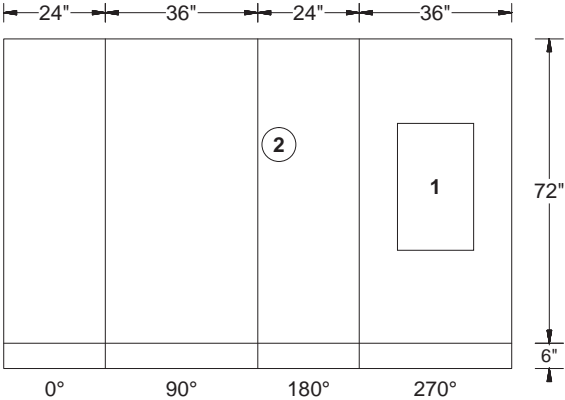
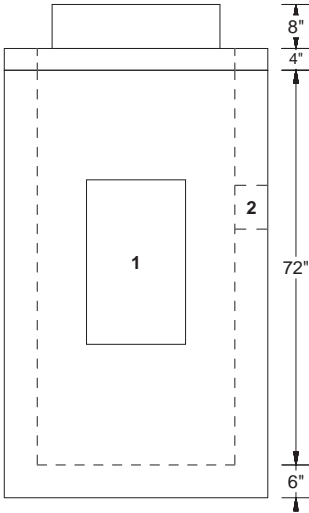
A-Lok XC-225/235

08/14/2019

Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-130 BU-05 Station: Type: Cleveland Division of Water Pollution SalesPerson: Control 48"Ø Ralph Hastings	Description	UOM	Quantity	Weight
	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
	48"Ø Non Extended 6" Manhole Base x 66" Tall	EA	1	5972
	A-Lok XC-480	EA	2	0
Rim: 665.34' Invert: 657.91' Rim to Invert: 7.43' Sump: 0.27'	Per Dec 13,'20 plan			
<div> 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614</div>				

Step Degree: 180		<div></div>		<div></div>		EJIW 1700 by Ind Exc																	
<table><thead><tr><th>PipeNum</th><th>Elevation</th><th>%Grade</th><th>Angle</th><th>Pipe</th><th>Hole or Pipe Seal Type</th></tr></thead><tbody><tr><td>(1)</td><td>657.91</td><td>-1.27</td><td>0</td><td>12" - VCP LOGAN</td><td>480 A-LOK</td></tr><tr><td>(2)</td><td>660.81</td><td>1</td><td>90</td><td>12" - VCP LOGAN</td><td>480 A-LOK</td></tr></tbody></table>		PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type	(1)	657.91	-1.27	0	12" - VCP LOGAN	480 A-LOK	(2)	660.81	1	90	12" - VCP LOGAN	480 A-LOK	<div></div>			
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type																		
(1)	657.91	-1.27	0	12" - VCP LOGAN	480 A-LOK																		
(2)	660.81	1	90	12" - VCP LOGAN	480 A-LOK																		
A-Lok XC-480					04/29/2020																		

Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-139 BU-05 Station: Type: City of Cleveland Curb Inlet SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	24" X 36" Catch Basin Base X 72" Tall	EA	1	6048	
	Hole in Flat Wall Structure	EA	1	0	
	Square hole	EA	1	0	
Rim: 664.98' Invert: 660.98' Rim to Invert: 4.00' Sump: 3.00'	Per Dec 13,'20 plan				

				EJIW 7035 by Ind Exc  	
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.98	0	270	EJIW 5964-12	30"T x 18"W KO
(2)	661.65	0	180	6" - HDPE	8"Ø FW
				Hole in Flat Wall Structure Square hole	04/29/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-114 BU-05  
Station:  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

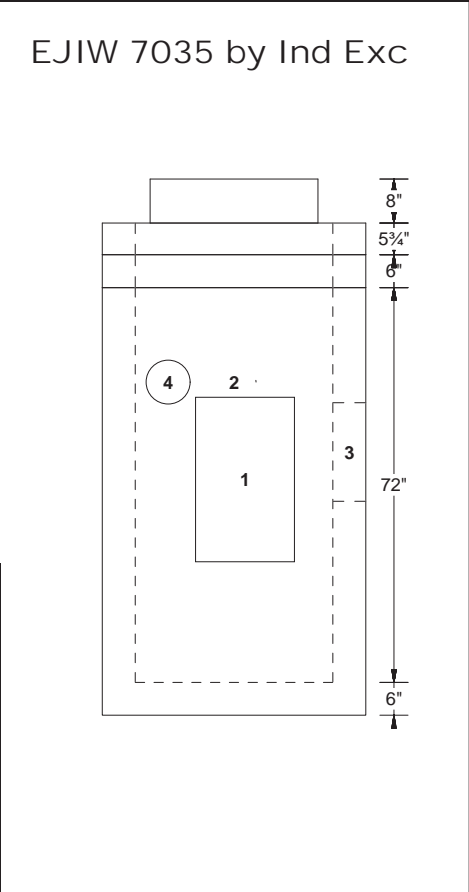
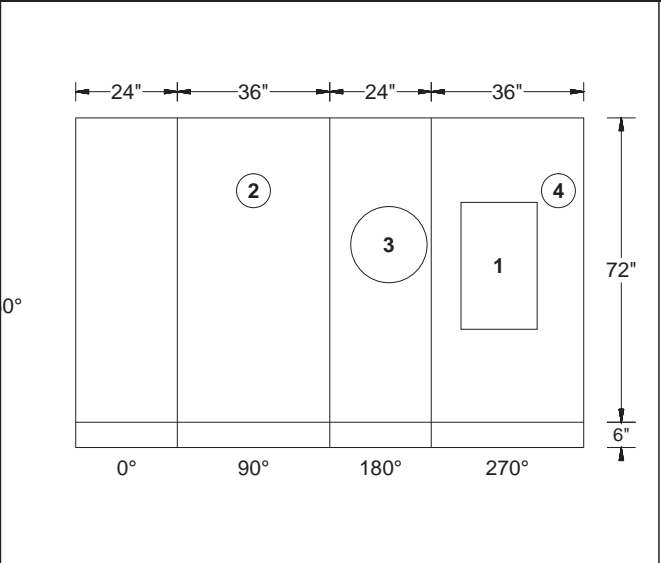
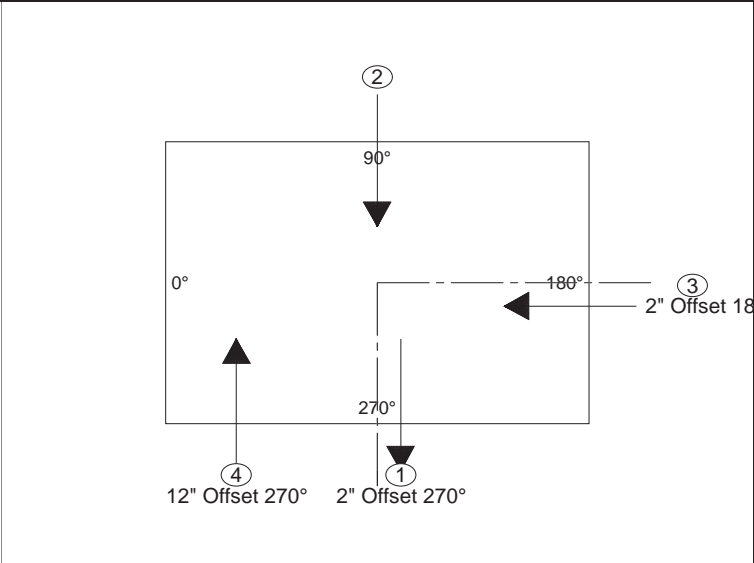
Rim: 664.51'  
Invert: 659.86'  
Rim to Invert: 4.65'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" x 36" x 6" Grade Ring	EA	1	450
24" X 36" Catch Basin Base X 72" Tall	EA	1	5887
Hole in Flat Wall Structure	EA	3	0

Per Dec 13,'20 plan



1-800-837-7788  
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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	659.86	0	270	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	661.18	0	90	6" - HDPE	8"Ø FW
(3)	659.86	0	180	12" - VCP LOGAN	18"Ø FW
(4)	661.18	0	270	6" - HDPE	8"Ø FW

Hole in Flat Wall Structure

04/29/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-143 BU-05 Pc A  
Station:  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

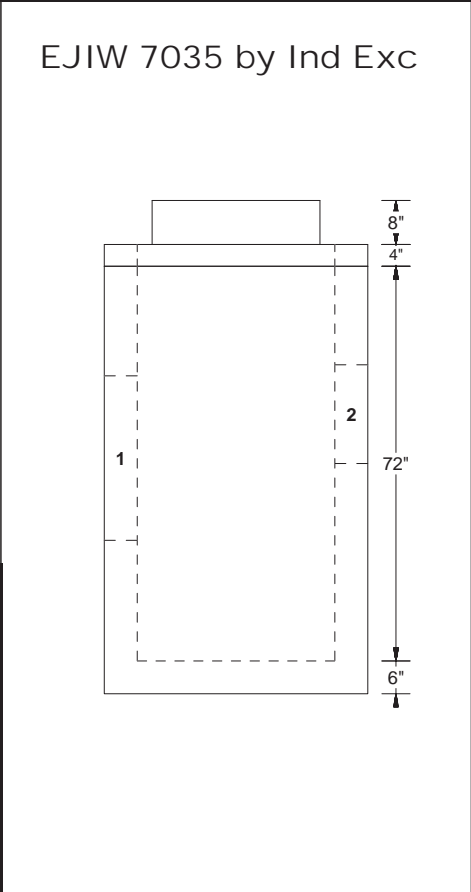
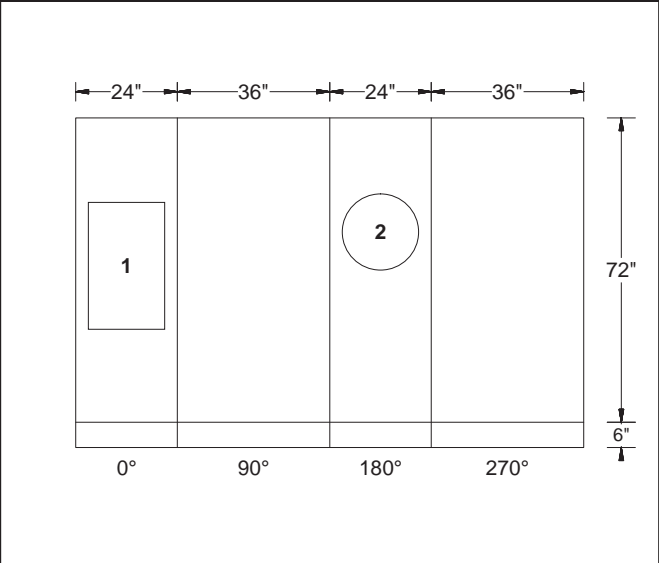
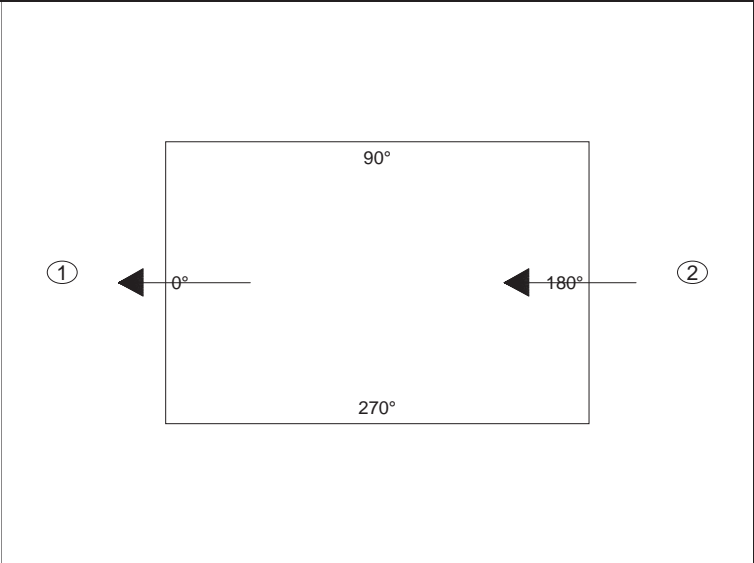
Rim: 664.32'  
Invert: 660.32'  
Rim to Invert: 4.00'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	5939
Square hole	EA	1	0
Hole in Flat Wall Structure	EA	1	0

Per Dec 13,'20 plan



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.32	0	0	EJIW 5964-12	30"T x 18"W KO
(2)	660.57	0	180	12" - VCP LOGAN	18"Ø FW

Square hole  
Hole in Flat Wall Structure

04/29/2020



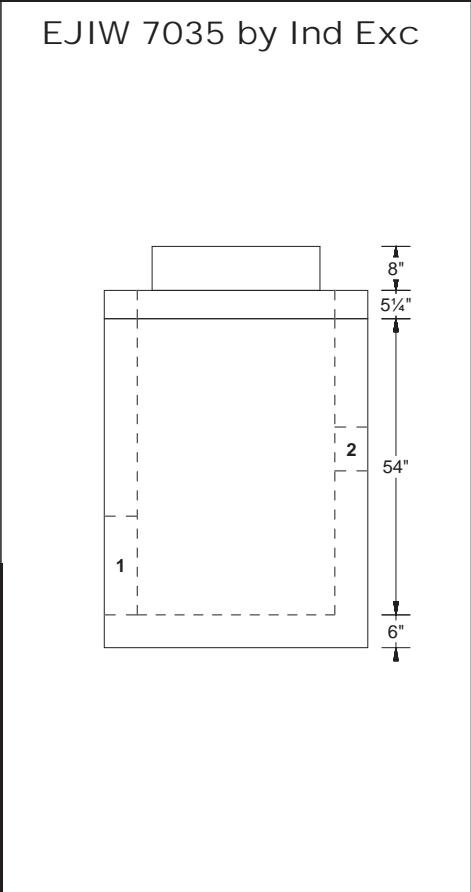
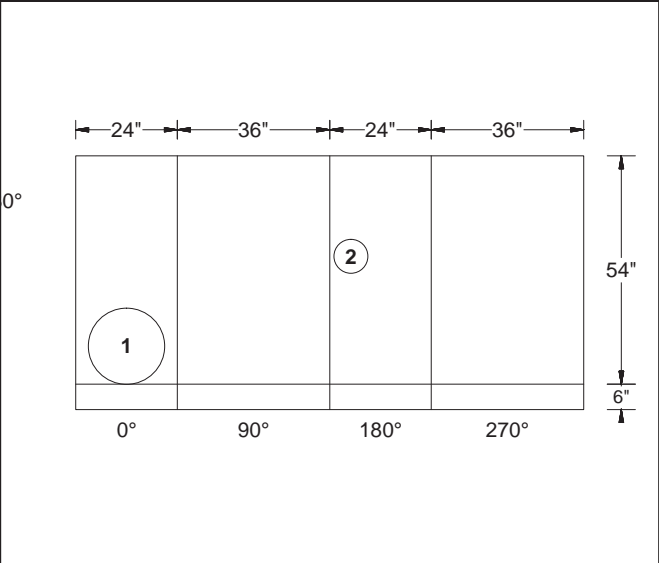
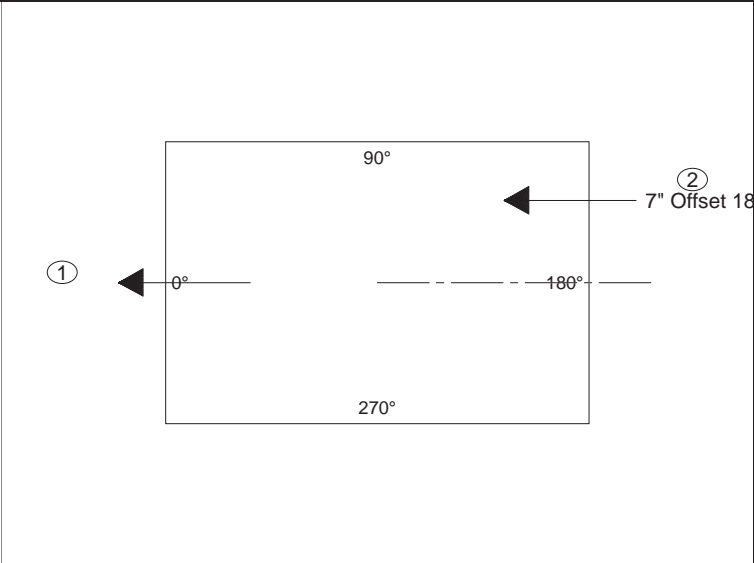
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-143 BU-05 Pc B  
Station:  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 665.92'  
Invert: 660.57'  
Rim to Invert: 5.35'  
Sump: 0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 54" Tall	EA	1	4789
Hole in Flat Wall Structure	EA	2	0
Per Dec 13,'20 plan			



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.57	0	0	12" - VCP LOGAN	18"Ø FW
(2)	662.59	0	180	6" - HDPE	8"Ø FW

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				Hole in Flat Wall Structure	04/29/2020
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-145 BU-05  
Station:  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

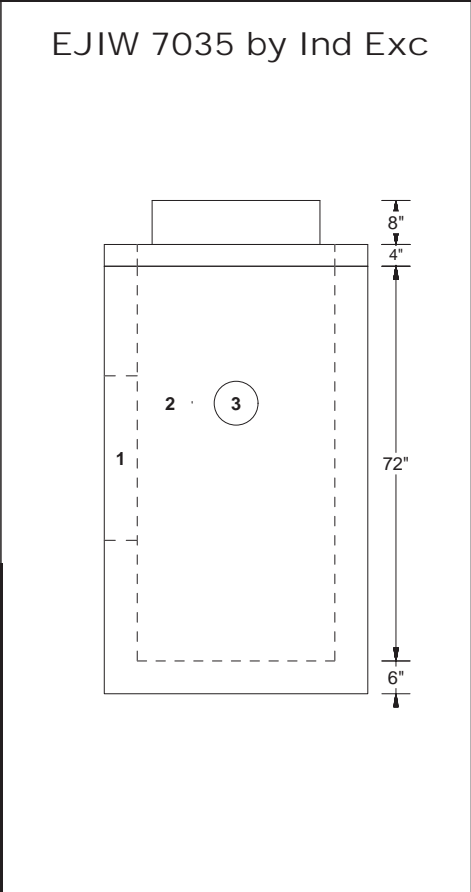
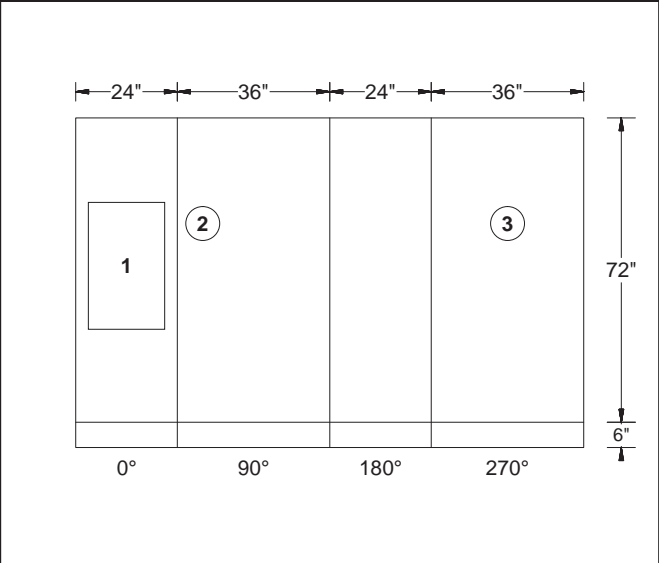
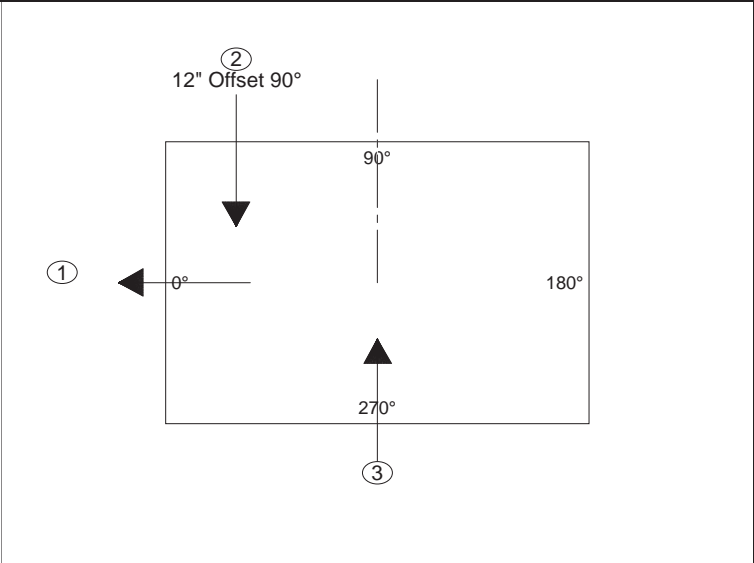
Rim: 665.92'  
Invert: 661.92'  
Rim to Invert: 4.00'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	6022
Square hole	EA	1	0
Hole in Flat Wall Structure	EA	2	0

Per Dec 13,'20 plan




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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	661.92	0	0	EJIW 5964-12	30"T x 18"W KO
(2)	662.59	0	90	6" - HDPE	8"Ø FW
(3)	662.59	0	270	6" - HDPE	8"Ø FW

	Square hole Hole in Flat Wall Structure	04/29/2020
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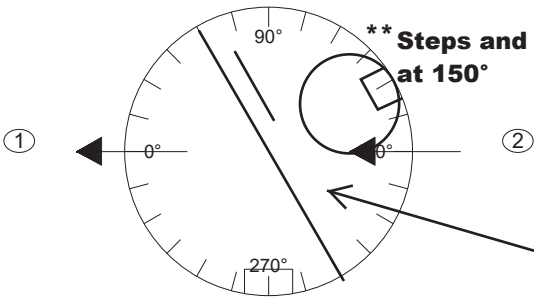
Customer:	INDEPENDENCE EXCAVATING, INC.	Description	UOM	Quantity	Weight	
Job Name:	ODOT 173000 - Opp Corridor Ph 3	Stock 48"Ø X 27" Eccentric Cone	EA	1	1860	
Job #:	173408	48"Ø Stock Manhole Riser X 48" Tall	EA	1	3467	
Structure ID:	D-90	48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778	
Station:	REVD Oct 4,'19	48"Ø Dia. Platform with 1/2 moon cutout	EA	1	9061	
Type:	Cleve WPC Stm 72"Ø	48"Ø Stock Manhole Riser X 80" Tall	EA	1	5778	
SalesPerson:	Ralph Hastings	Stock 72"Ø Flat Transition to 48"Ø	EA	1	5904	
		72"Ø Non Extended 9" Manhole Base X 76" Tall	EA	1	14532	
		48"Ø Dia. Platform Handrail x 42"	VF	1	8194	
		A-Lok XC-1160 Premium	EA	1	0	
Rim:	658.76'	A-Lok XC-1235	EA	1	0	<b>APPROVED</b>
Invert:	629.61'					
Rim to Invert:	29.15'					
Sump:	0.29'					

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Step Degree: 270

**Steps at 270° in A, B, C, D and up 48" in E\***

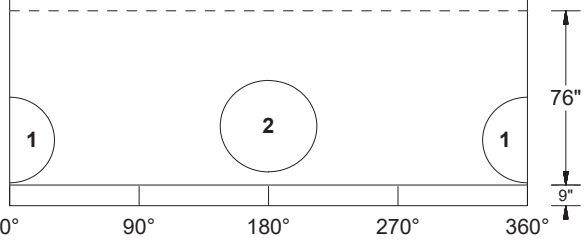
**Steps at 150° in E, F & G\*\***



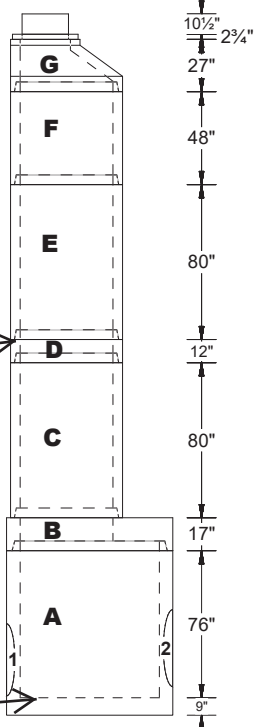
**\* Steps at 270°**

**\*\* Steps and top opening at 150°**

10/08/2019 4:20:05 PM  
mgillilan

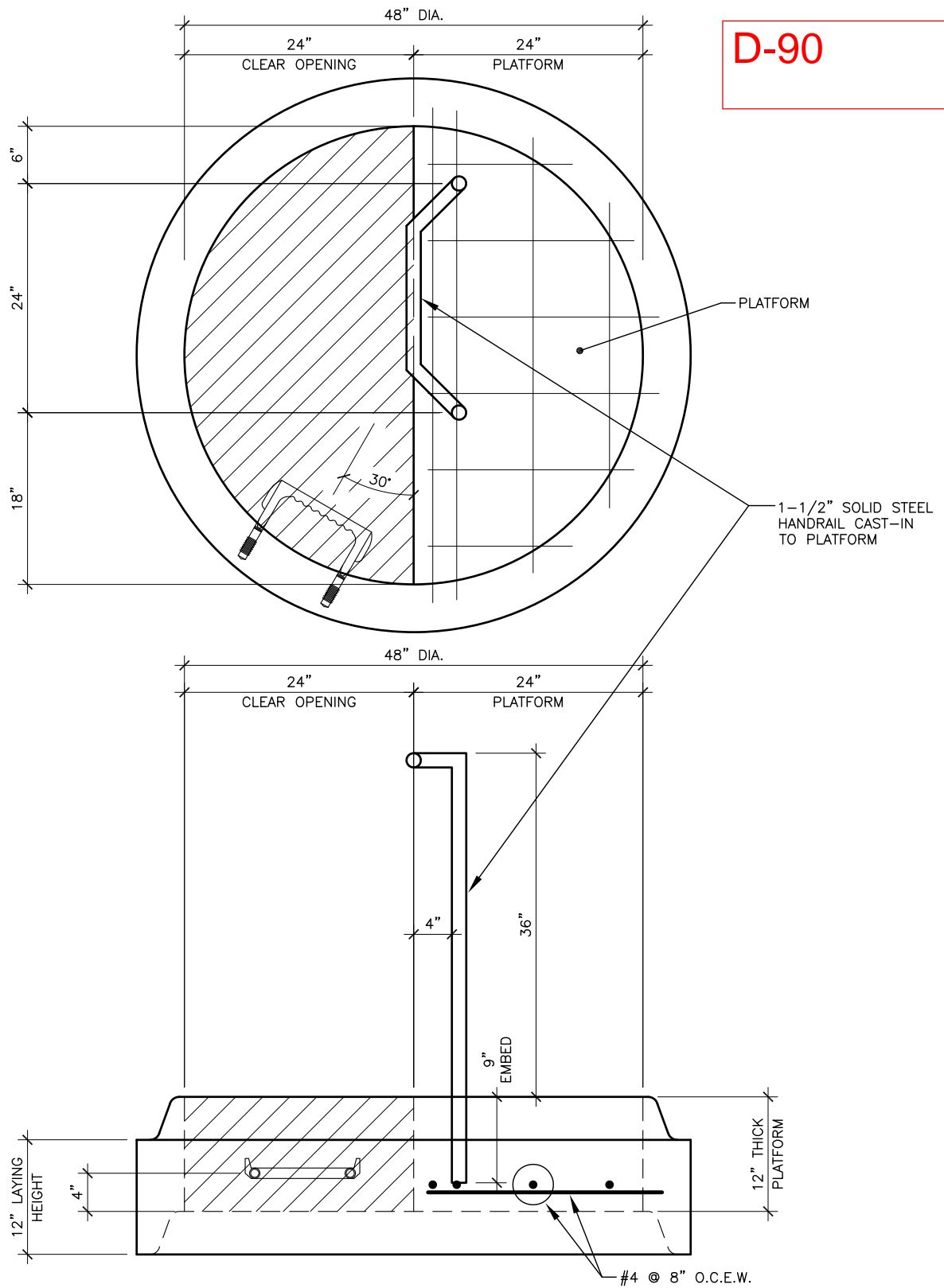


**Landing Platform top elev @ 644.74  
(see Landing Platform cut sheet)**



**Floor elevation at 629.32**

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	629.61	-3.74	0	36" - Steel	1160 A-LOK
(2)	630.11	3.46	180	30" - RCP Co-Pipe	1235 A-LOK



## 48" DIA. LANDING PLATFORM RISER

### NOTES:

- 1.) CONCRETE MIN. 5,000 PSI @ 28 DAYS
- 2.) REINFORCING GRADE 60 ASTM A615-A617  
60,000 PSI YIELD STRENGTH
- 3.) HS-20 LOADING
- 4.) 1 STEP AS DETAILED

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1.			
2.			
3.			
4.			
5.			
6.			
7.			



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CUSTOMER:  
**INDEPENDENCE EXCAVATING, INC.**  
JOB: **ODOT 173000 OPP CORRIDOR PH 3**

DRAWN BY: DJF    CHECKED BY: RH    SCALE: 3/4"=1'-0"    DATE: 10/8/19    JOB NO: 173408    DWG NO: LP-001





## **Submittal Package #173408**

**Independence Excavating**

**ODOT 173000-OC3**

**Cleveland, Ohio**

**June 4, 2020**

**SUBMITTAL FOR:**

**BU-05**

**Manholes & Catch Basins**

**D-113, D-118, D-136, D-137, D-152, D-153, D-152A,  
D-153A, D-154, D-155, D-156, D-156A, D-157, D-158**

**RALPH HASTINGS  
LINDSAY PRECAST  
PO BOX 578  
6845 ERIE AVE. N.W.  
CANAL FULTON, OHIO 44614  
1-800-837-7788**

Ph: 440 543-5468

Fax: 440 543-1152

Mobile: 440 336-4162

Email: [rhastings@lindsayprecast.com](mailto:rhastings@lindsayprecast.com)

Web : [www.lindsayconcrete.com](http://www.lindsayconcrete.com)

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-113 BU-05  
Station:  
Type: Cleveland Division of Water Pollution  
SalesPerson: Control 48"Ø  
Ralph Hastings

Rim: 667.01'  
Invert: 660.82'  
Rim to Invert: 6.19'  
Sump: 0.31'

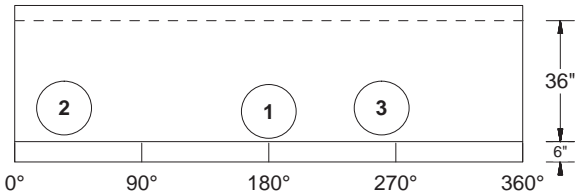
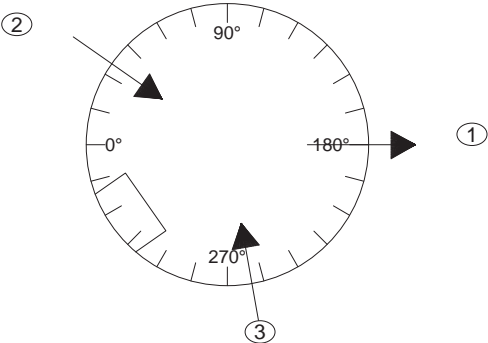
Description	UOM	Quantity	Weight
Stock 48"Ø X 27" Eccentric Cone	EA	1	1860
48"Ø Non Extended 6" Manhole Base X 36" Tall	EA	1	3717
Flow Channel to Spring Line	EA	1	2000
A-Lok XC-480	EA	3	0

Reviewed - IX  
6/09/20 PE JP Sorma

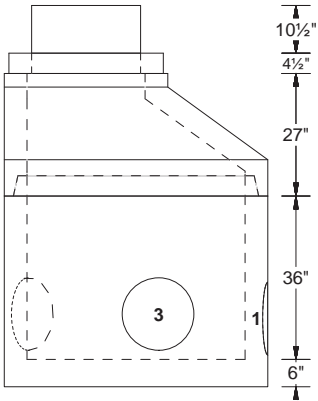


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Canal Fulton, Ohio 44614

Step Degree: 325



EJIW 1700 - By Ind Exc



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.82	-3.08	180	12" - VCP LOGAN	480 A-LOK
(2)	660.82	1.23	35	12" - VCP LOGAN	480 A-LOK
(3)	660.82	1	260	12" - VCP LOGAN	480 A-LOK

	A-Lok XC-480	06/05/2020
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-118 BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

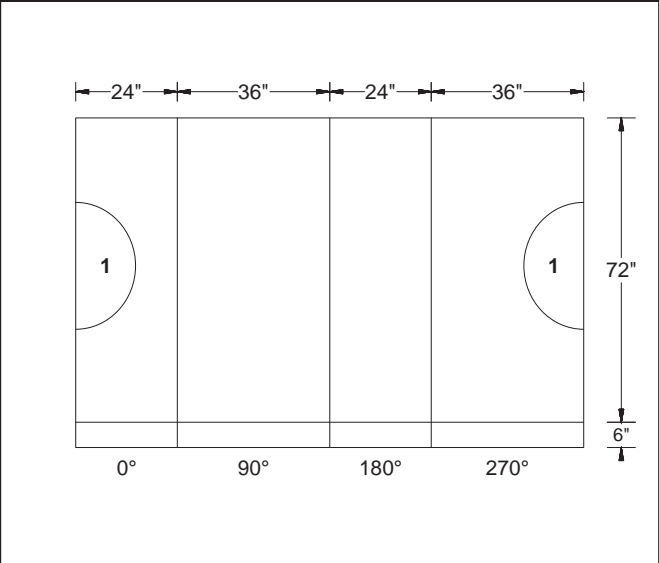
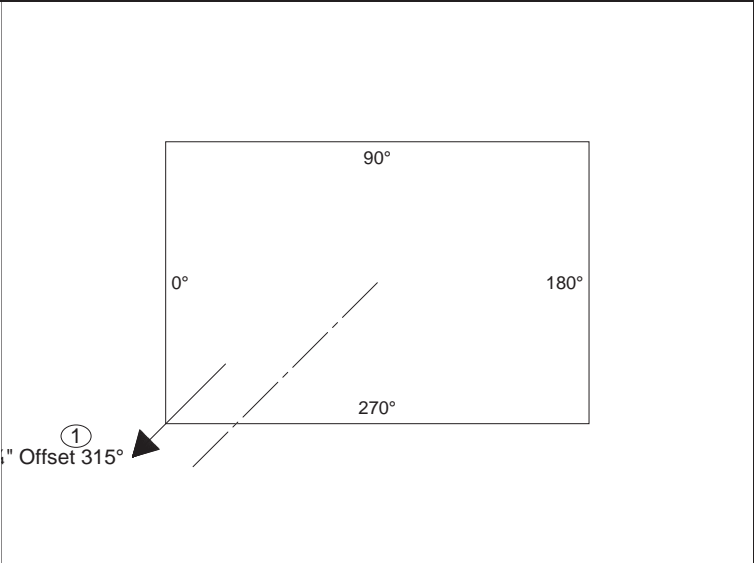
Rim: 679.14'  
Invert: 675.14'  
Rim to Invert: 4.00'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	6047
Corner Hole in Structure for Pipe	EA	1	0

Reviewed - IX  
6/09/20 PE JP Sorma



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EJIW 7035 - By Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	675.14	0	315	EJIW 5964-12	20"W X 30"T CORNER

> No Curb Drain <

Corner Hole in Structure for Pipe  
06/05/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
 Job Name: ODOT 173000 - Opp Corridor Ph 3  
 Job #: 173408  
 Structure ID: D-136, Pc A BU-05  
 Station: June 4, 2020  
 Type: City of Cleveland Curb Inlet  
 SalesPerson: Ralph Hastings

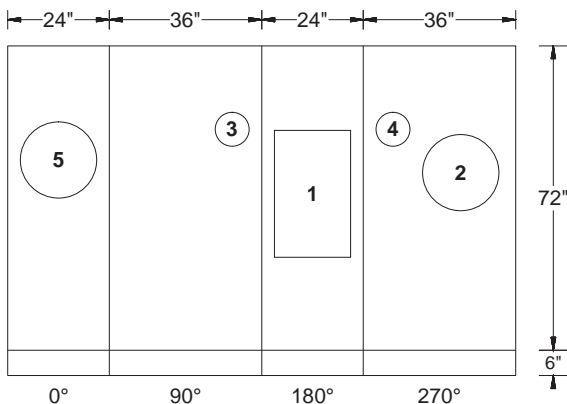
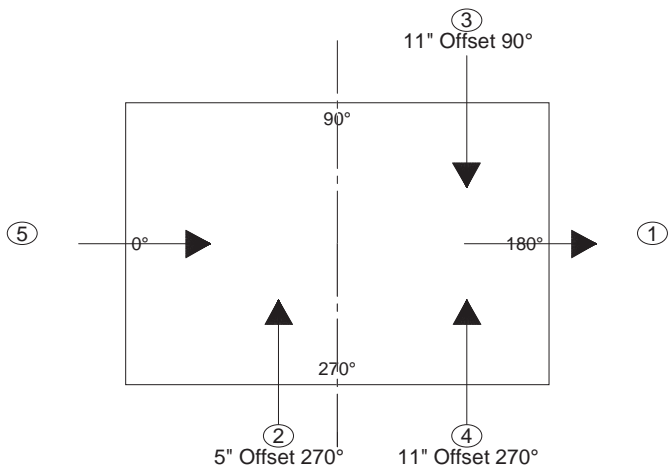
Rim: 665.94'  
 Invert: 661.50'  
 Rim to Invert: 4.44'  
 Sump: 3.00'

Description	UOM	Quantity	Weight
24" x 36" x 6" Grade Ring	EA	1	450
24" X 36" Catch Basin Base X 72" Tall	EA	1	5752
Hole in Flat Wall Structure	EA	4	0

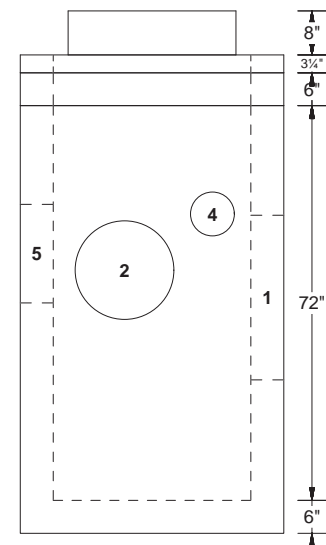
Reviewed - IX  
 6/09/20 PE JP Sorma



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EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
 - by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	661.5	0	180	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	661.5	0	270	12" - VCP LOGAN	18"Ø FW
(3)	662.61	0	90	6" - HDPE	8"Ø FW
(4)	662.61	0	270	6" - HDPE	8"Ø FW
(5)	661.75	0	0	12" - VCP LOGAN	18"Ø FW

> Curb Drain must be on 90° wall <

Hole in Flat Wall Structure

06/05/2020

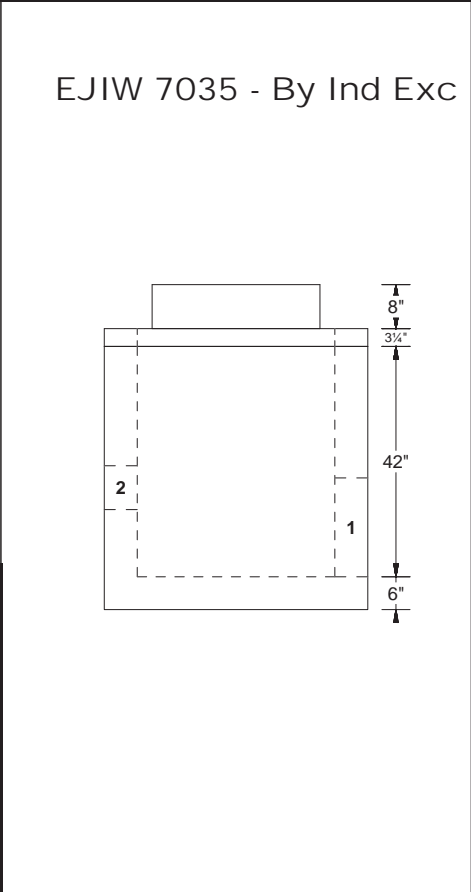
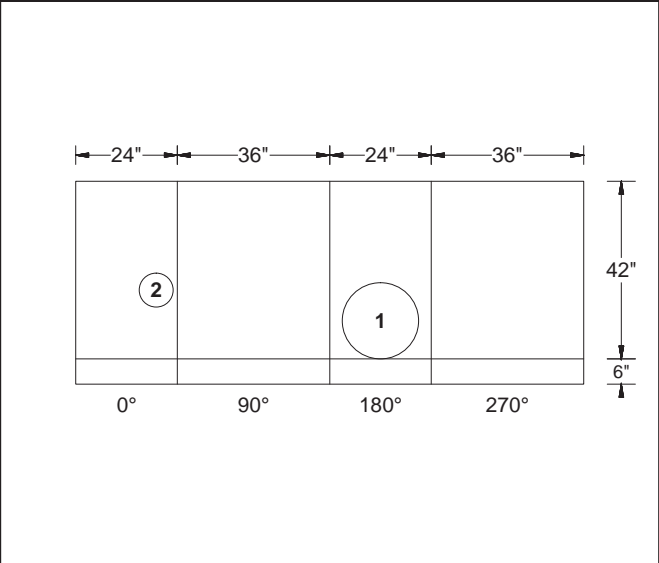
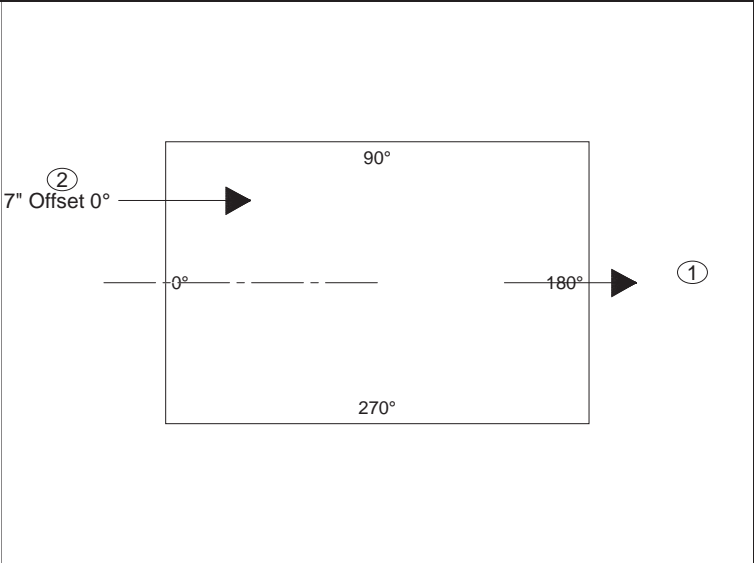
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-136, Pc B BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 665.94'  
Invert: 661.75'  
Rim to Invert: 4.19'  
Sump: 0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 42" Tall	EA	1	3889
Hole in Flat Wall Structure	EA	2	0
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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	661.75	0	180	12" - VCP LOGAN	18"Ø FW
(2)	662.61	0	0	6" - HDPE	8"Ø FW

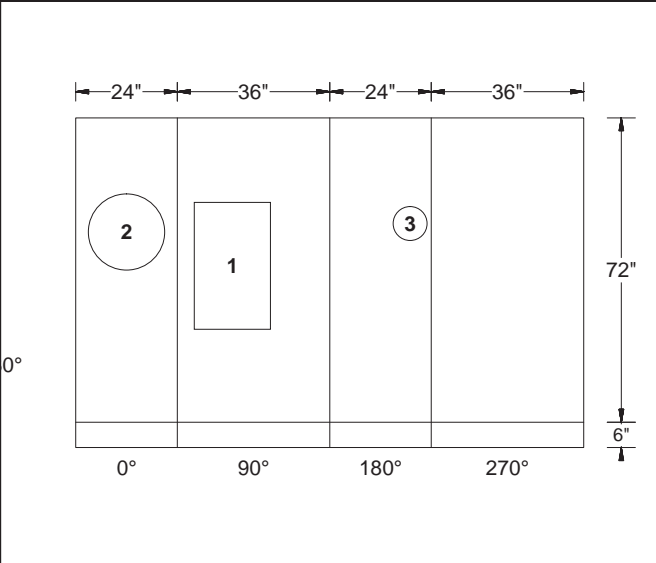
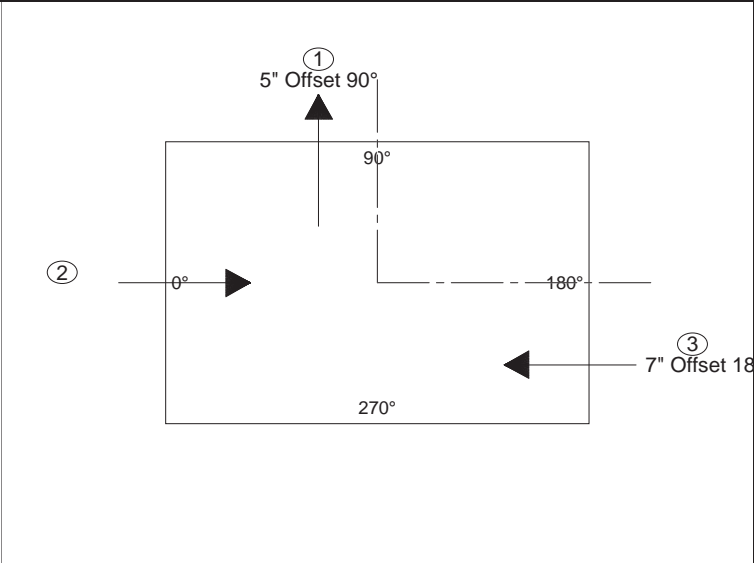
	Hole in Flat Wall Structure	06/05/2020
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Customer:	INDEPENDENCE EXCAVATING, INC.
Job Name:	ODOT 173000 - Opp Corridor Ph 3
Job #:	173408
Structure ID:	D-137, Pc A BU-05
Station:	June 4, 2020
Type:	City of Cleveland Curb Inlet
SalesPerson:	Ralph Hastings
Rim:	665.97'
Invert:	661.97'
Rim to Invert:	4.00'
Sump:	3.00'

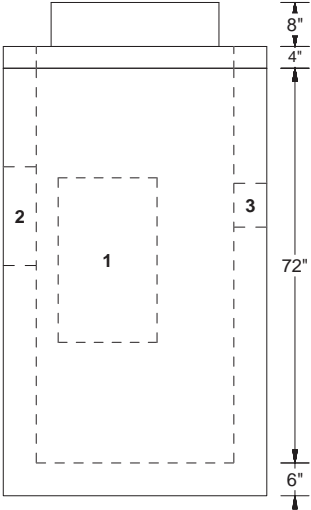
Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	5913
Hole in Flat Wall Structure	EA	2	0
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EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	661.97	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	662.22	0	0	12" - VCP LOGAN	18"Ø FW
(3)	662.64	0	180	6" - HDPE	8"Ø FW

	Hole in Flat Wall Structure	06/05/2020
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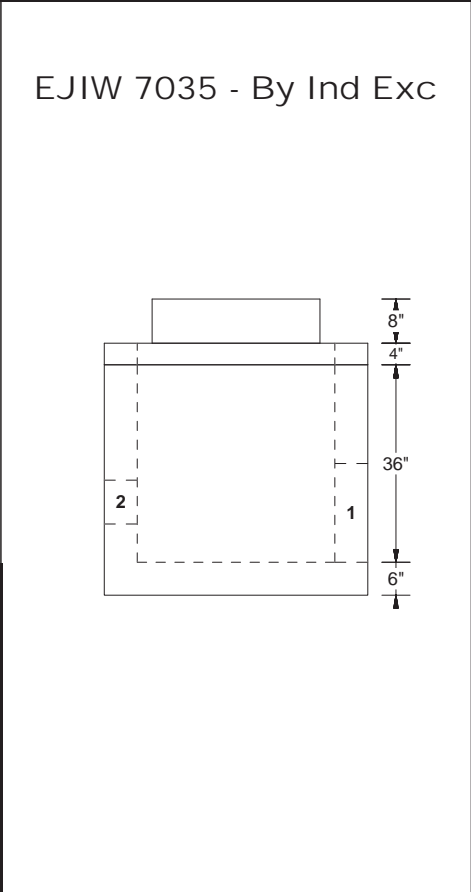
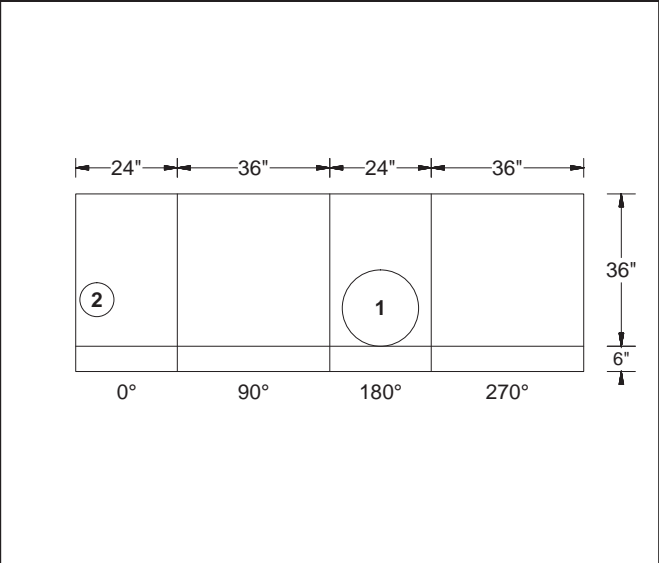
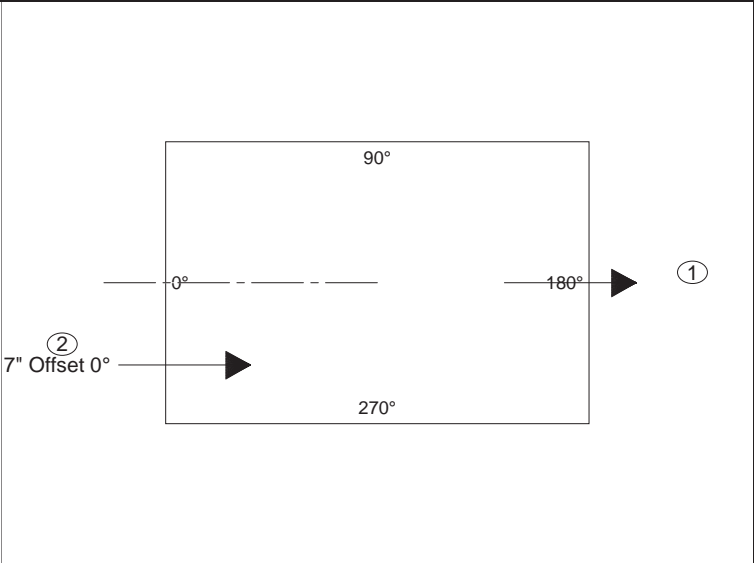
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-137, Pc B BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 665.97'  
Invert: 662.22'  
Rim to Invert: 3.75'  
Sump: 0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 36" Tall	EA	1	3439
Hole in Flat Wall Structure	EA	2	0
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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	662.22	0	180	12" - VCP LOGAN	18"Ø FW
(2)	662.64	0	0	6" - HDPE	8"Ø FW

	Hole in Flat Wall Structure	06/05/2020
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-152 BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

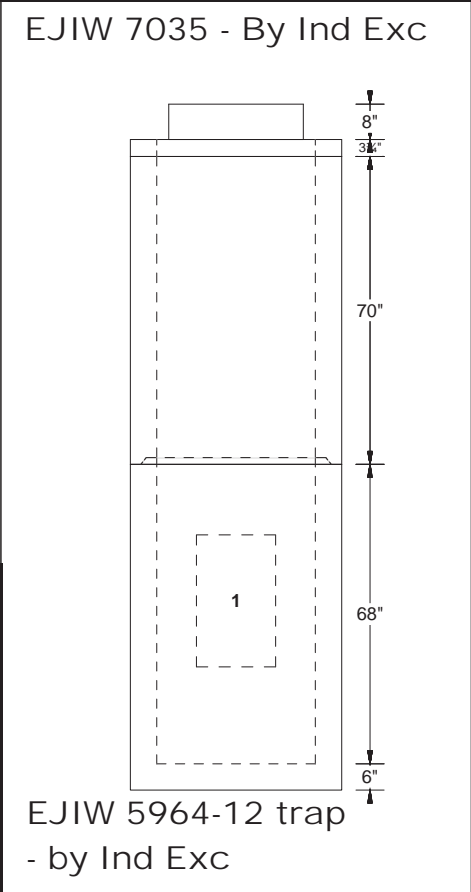
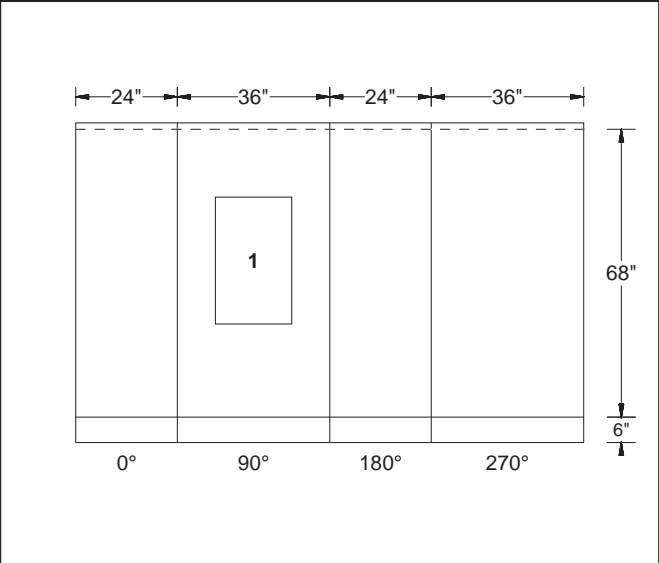
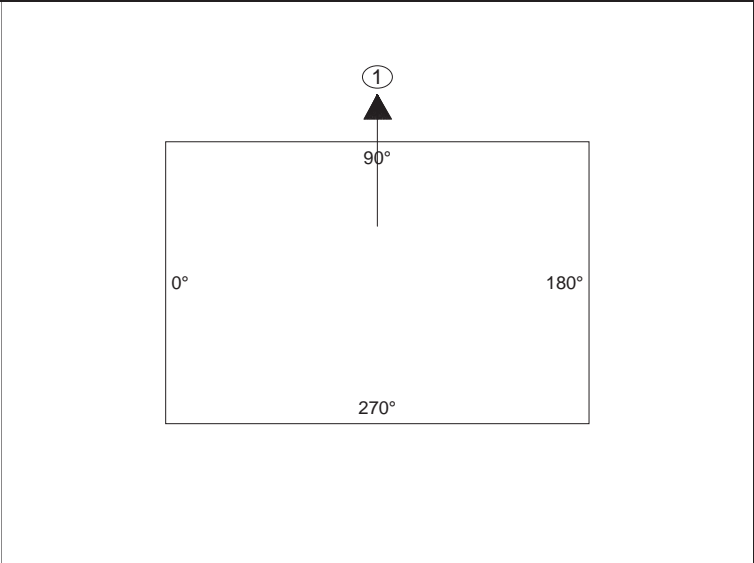
Rim: 671.02'  
Invert: 661.82'  
Rim to Invert: 9.20'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Riser X 70" Tall	EA	1	5250
24" X 36" Catch Basin Base X 68" Tall	EA	1	5774

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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	661.82	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W

> No Curb Drain <

06/05/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-153 BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

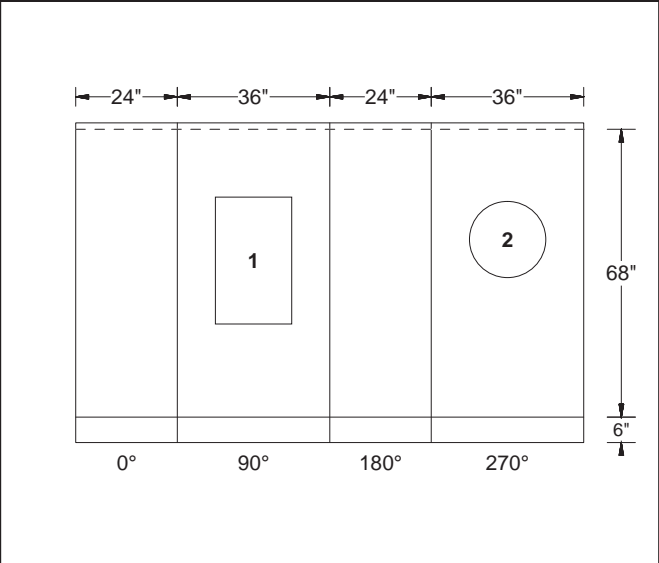
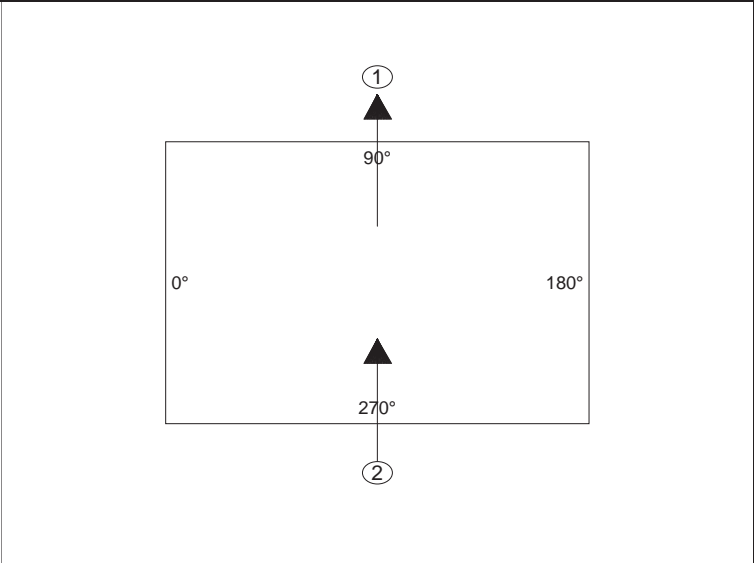
Rim: 670.84'  
Invert: 661.53'  
Rim to Invert: 9.31'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Riser X 68" Tall	EA	1	5100
24" X 36" Catch Basin Base X 68" Tall	EA	1	5639
Hole in Structure for Pipe	EA	1	0

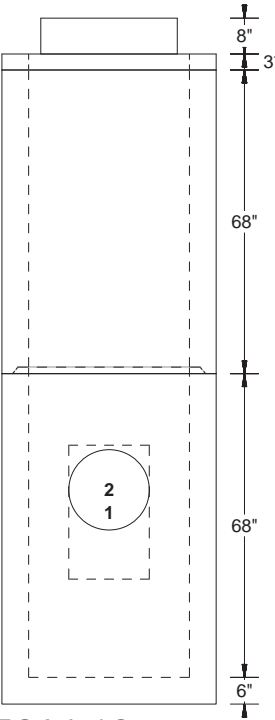
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EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	661.53	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	661.53	0	270	12" - VCP LOGAN	18"Ø

> No Curb Drain <

Hole in Structure for Pipe

06/05/2020



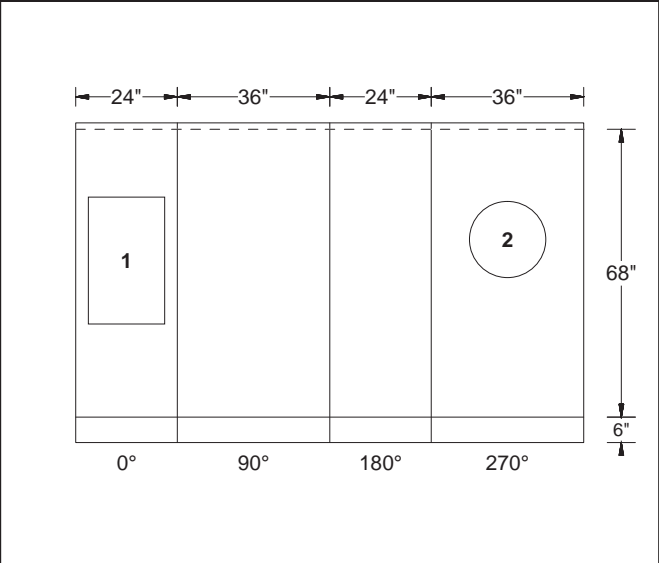
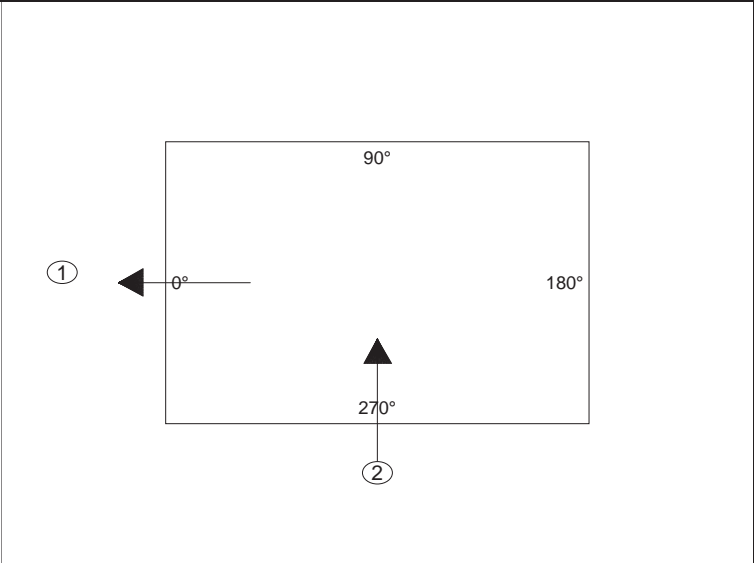
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-152A BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 676.81'  
Invert: 667.81'  
Rim to Invert: 9.00'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Riser X 64" Tall	EA	1	4800
24" X 36" Catch Basin Base X 68" Tall	EA	1	5639
Hole in Flat Wall Structure	EA	1	0
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EJIW 7035 - By Ind Exc

EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	667.81	0	0	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	667.81	0	270	12" - VCP LOGAN	18"Ø FW

> No Curb Drain <

Hole in Flat Wall Structure

06/05/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-153A BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

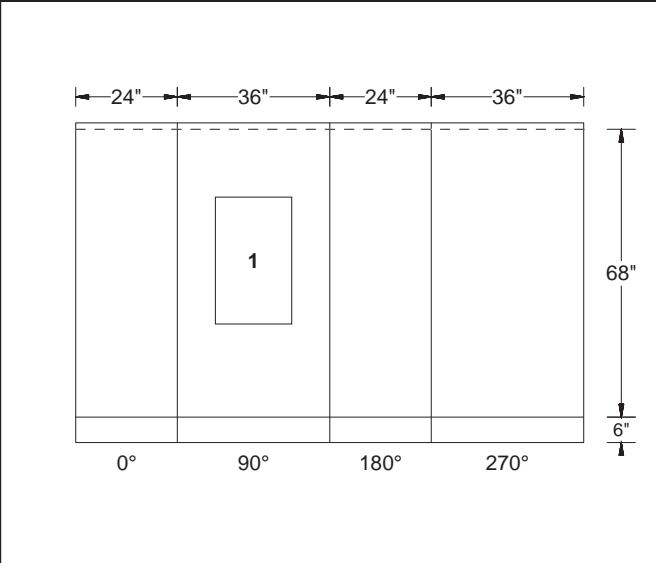
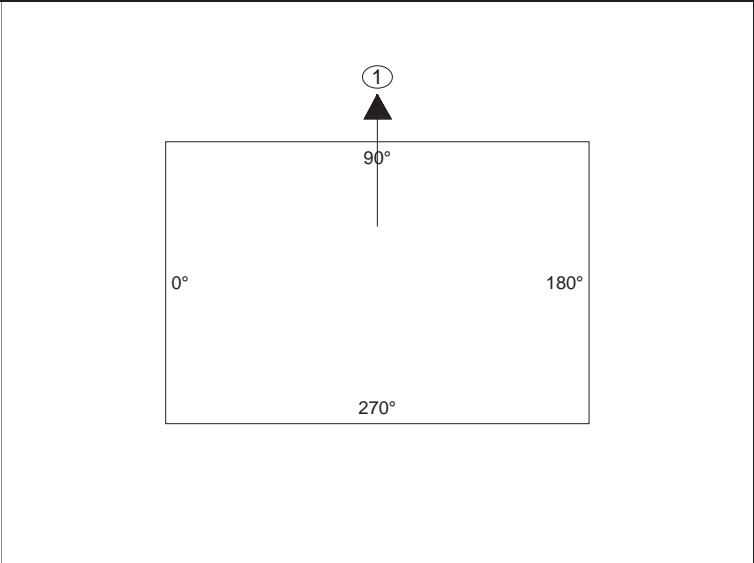
Rim: 676.81'  
Invert: 668.31'  
Rim to Invert: 8.50'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Riser X 58" Tall	EA	1	4350
24" X 36" Catch Basin Base X 68" Tall	EA	1	5774

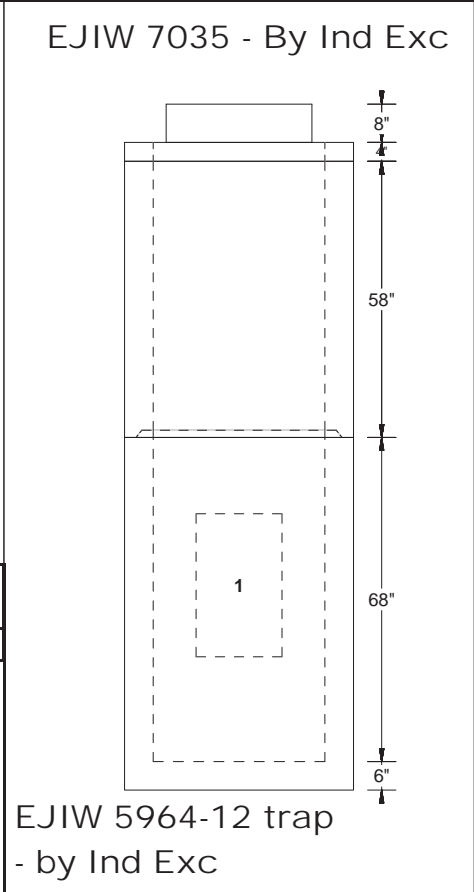
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EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	668.31	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W

> No Curb Drain <

06/05/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-154 BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

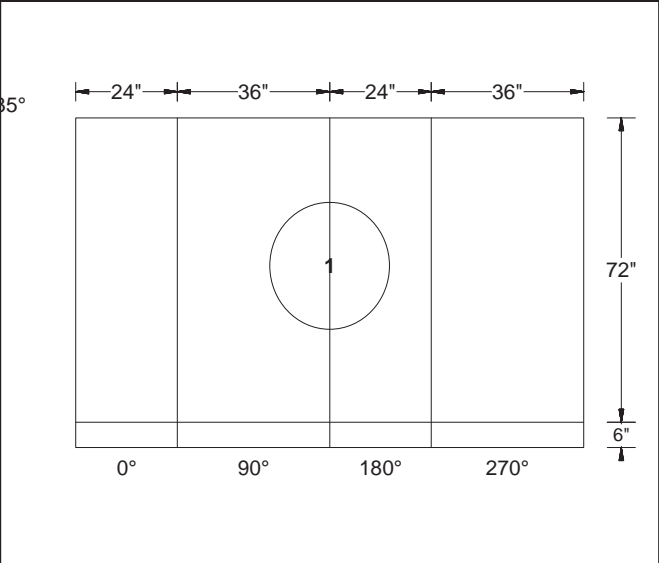
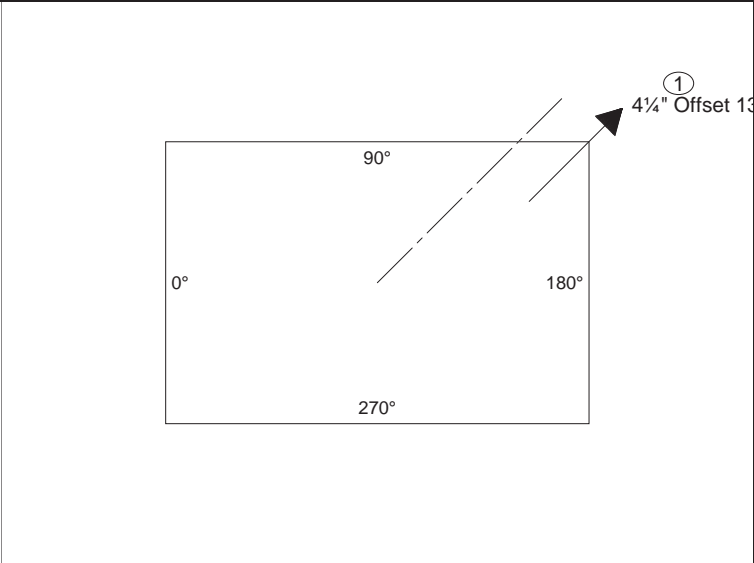
Rim: 669.60'  
Invert: 665.60'  
Rim to Invert: 4.00'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	6047
Corner Hole in Structure for Pipe	EA	1	0

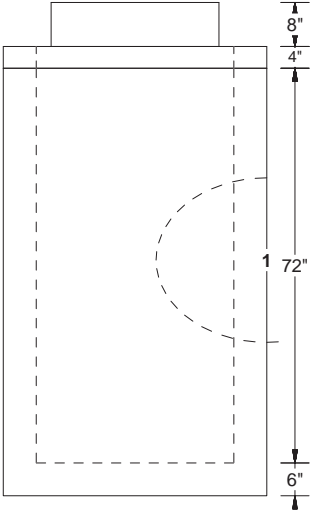
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EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	665.6	0	135	EJIW 5964-12	20"W X 30"T CORNER

> No Curb Drain <

Corner Hole in Structure for Pipe  
06/05/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-155 BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

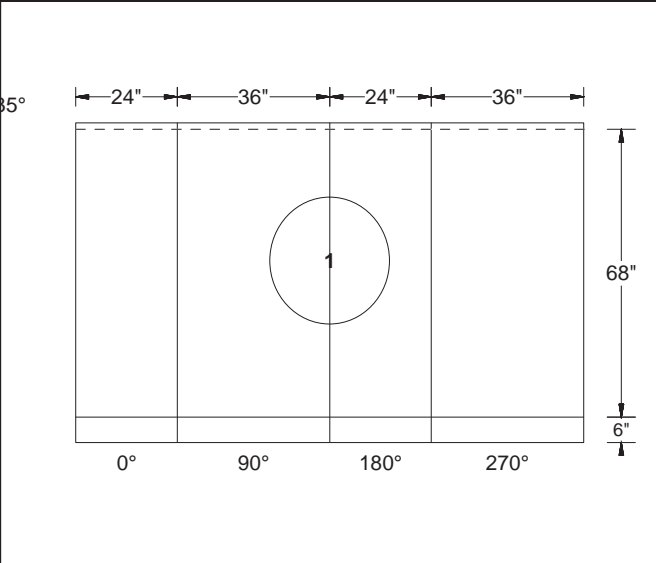
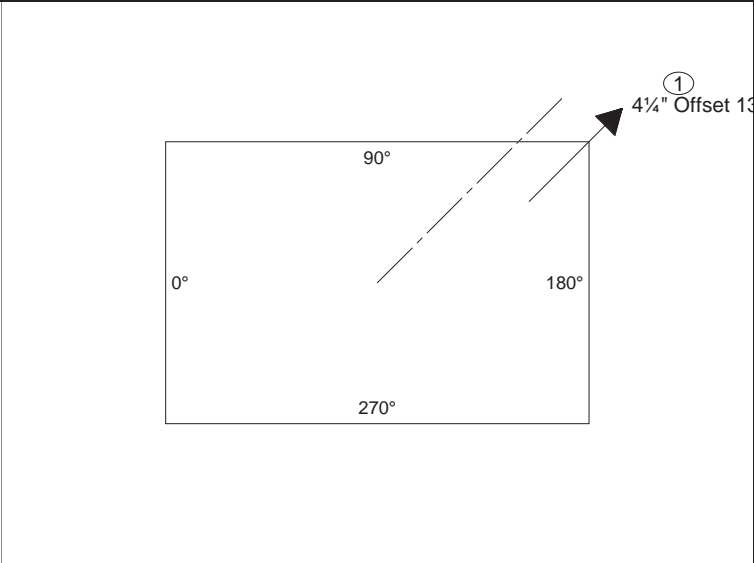
Rim: 669.08'  
Invert: 664.00'  
Rim to Invert: 5.08'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Riser X 16" Tall	EA	1	1200
24" X 36" Catch Basin Base X 68" Tall	EA	1	5747
Corner Hole in Structure for Pipe	EA	1	0

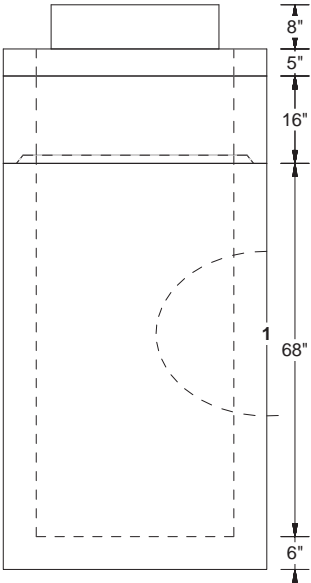
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EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	664	0	135	EJIW 5964-12	20"W X 30"T CORNER

> No Curb Drain <

Corner Hole in Structure for Pipe  
06/05/2020

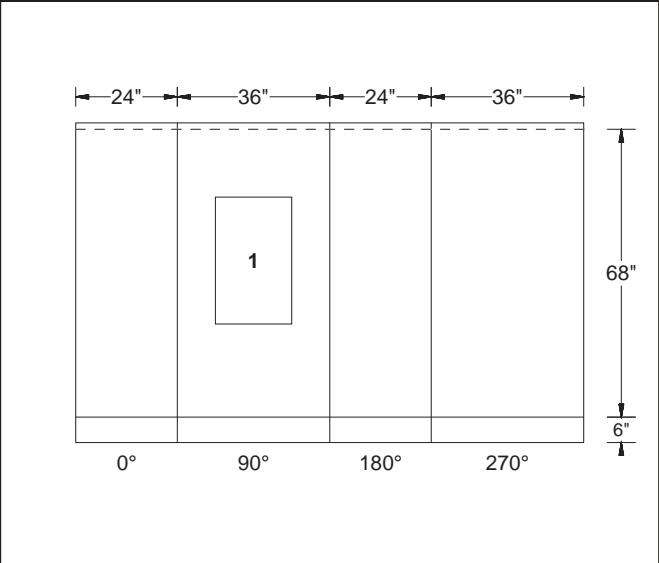
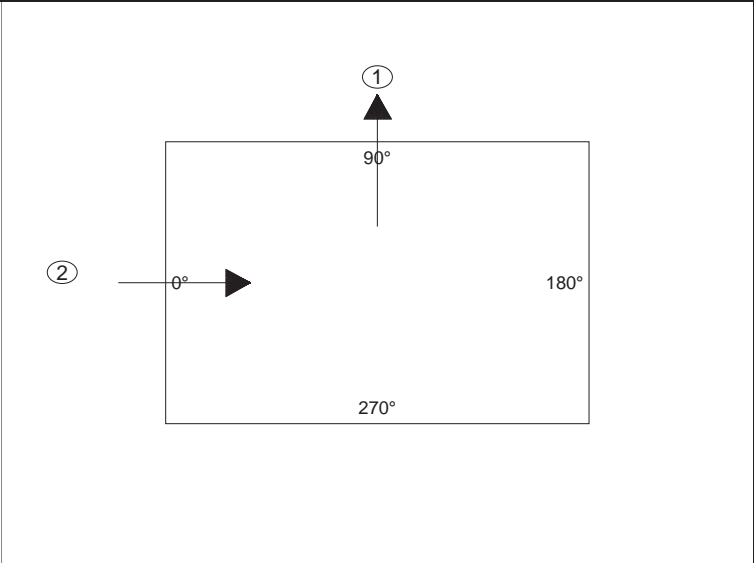
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-156, Pc A BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 669.16'  
Invert: 661.19'  
Rim to Invert: 7.97'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Riser X 52" Tall	EA	1	3765
24" X 36" Catch Basin Base X 68" Tall	EA	1	5774
Hole in Flat Wall Structure	EA	1	0
<div>Reviewed - IX</div> <div>6/09/20 PE JP Sorma</div>			



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EJIW 7035 - By Ind Exc

EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	661.19	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	664.86	0	0	12" - VCP LOGAN	18"Ø FW

> No Curb Drain <

Hole in Flat Wall Structure

06/05/2020

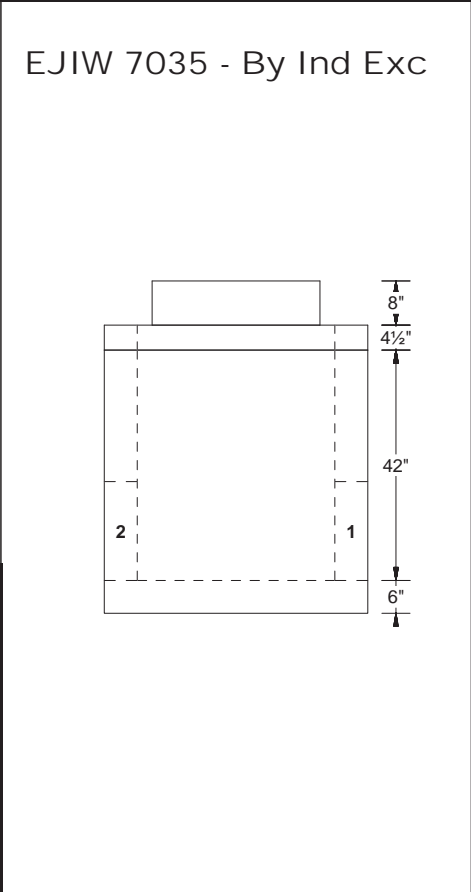
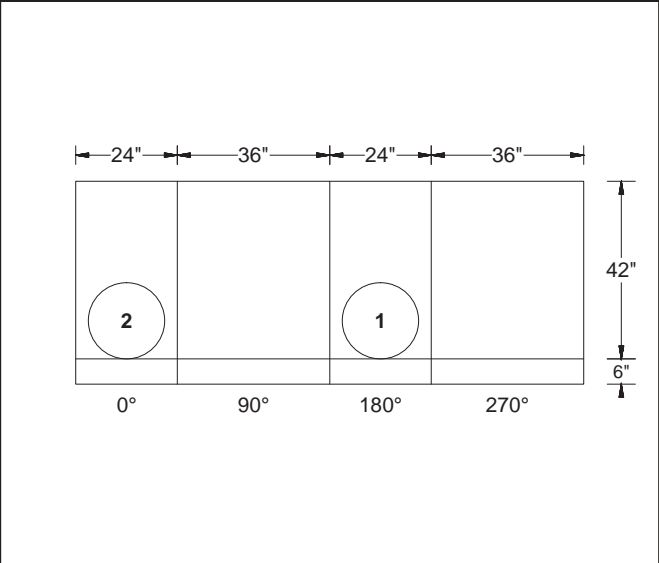
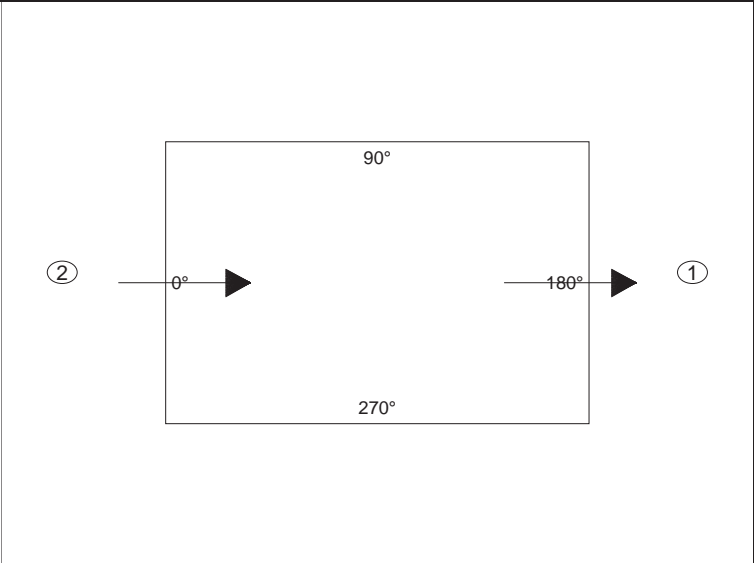
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-156, Pc B BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 669.16'  
Invert: 664.86'  
Rim to Invert: 4.30'  
Sump: 0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 42" Tall	EA	1	3780
Hole in Flat Wall Structure	EA	2	0
<div>Reviewed - IX</div> <div>6/09/20 PE JP Sorma</div>			



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	664.86	0	180	12" - VCP LOGAN	18"Ø FW
(2)	664.86	0	0	12" - VCP LOGAN	18"Ø FW

> No Curb Drain <

Hole in Flat Wall Structure

06/05/2020

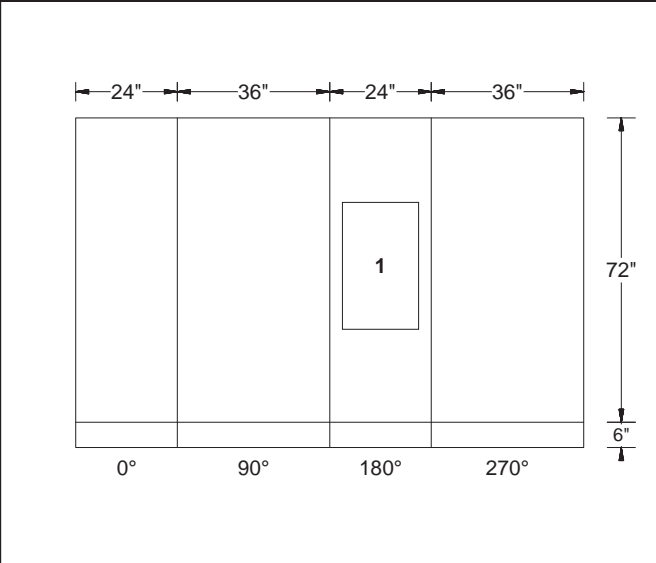
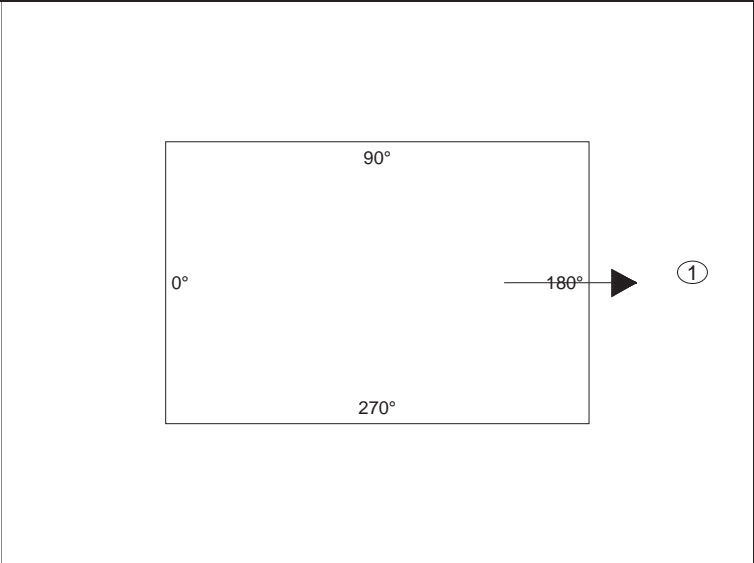
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-156A BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 669.14'  
Invert: 665.14'  
Rim to Invert: 4.00'  
Sump: 3.00'

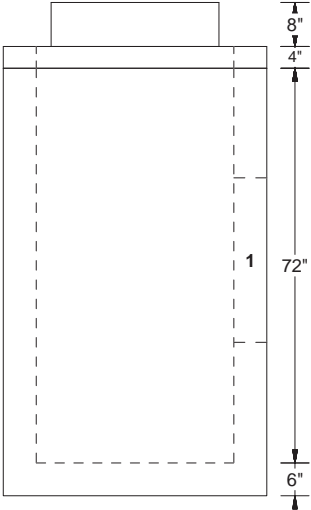
Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	6074
Reviewed - IX 6/09/20 PE JP Sorma			



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EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	665.14	0	180	EJIW 5964-12	Trap Ko 30"T x 18"W

> No Curb Drain <



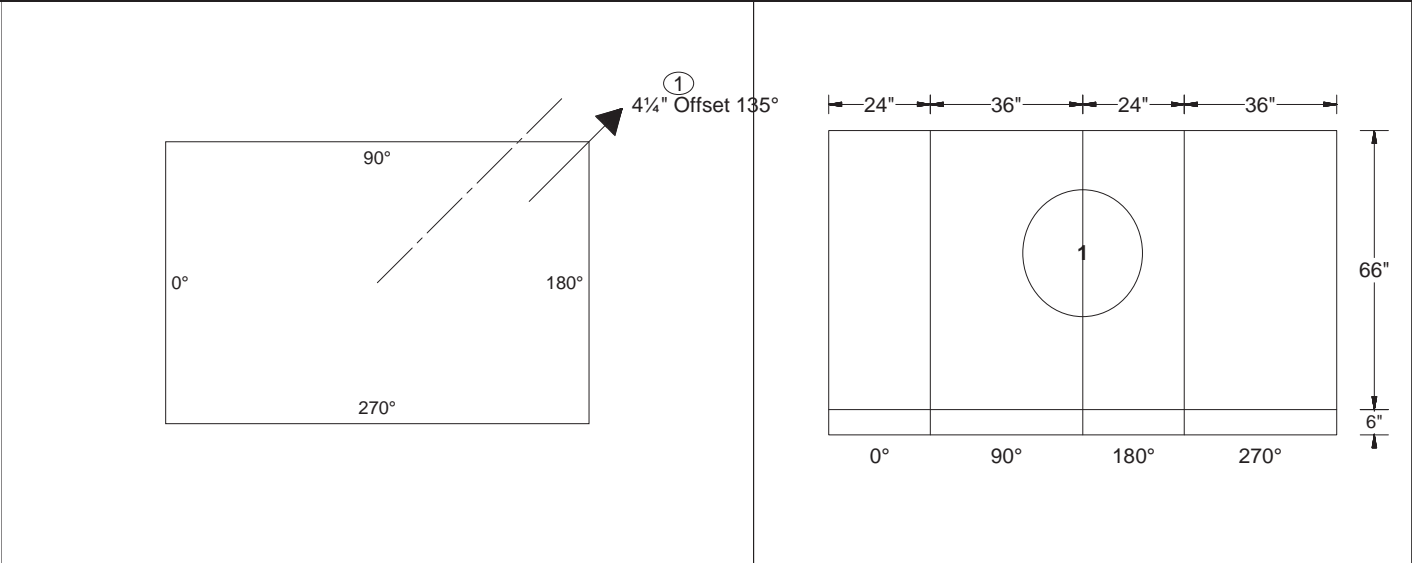
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-157 BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 677.47'  
Invert: 674.00'  
Rim to Invert: 3.47'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 66" Tall	EA	1	5597
Corner Hole in Structure for Pipe	EA	1	0
<div>Reviewed - IX</div> <div>6/09/20 PE JP Sorma</div>			

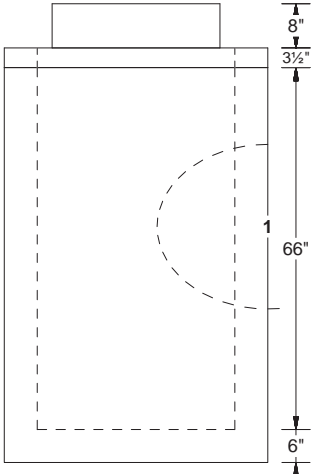


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Canal Fulton, Ohio 44614



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	674	0	135	EJIW 5964-12	20"W X 30"T CORNER

EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
- by Ind Exc

> No Curb Drain <

Corner Hole in Structure for Pipe

06/05/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-158 BU-05  
Station: June 4, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

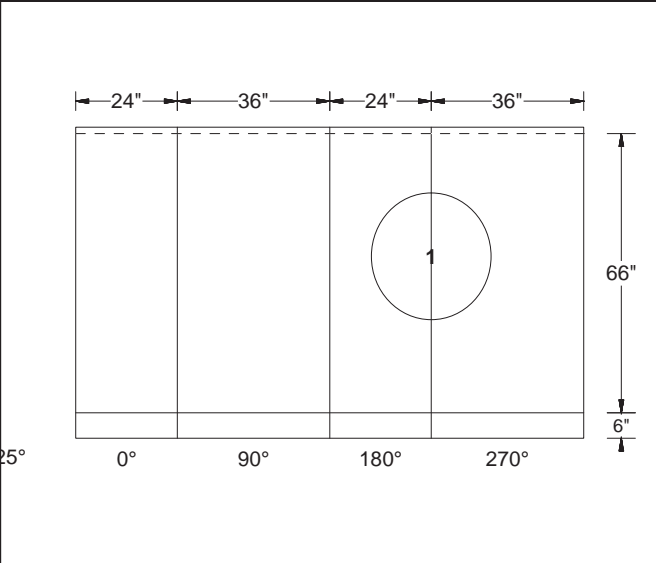
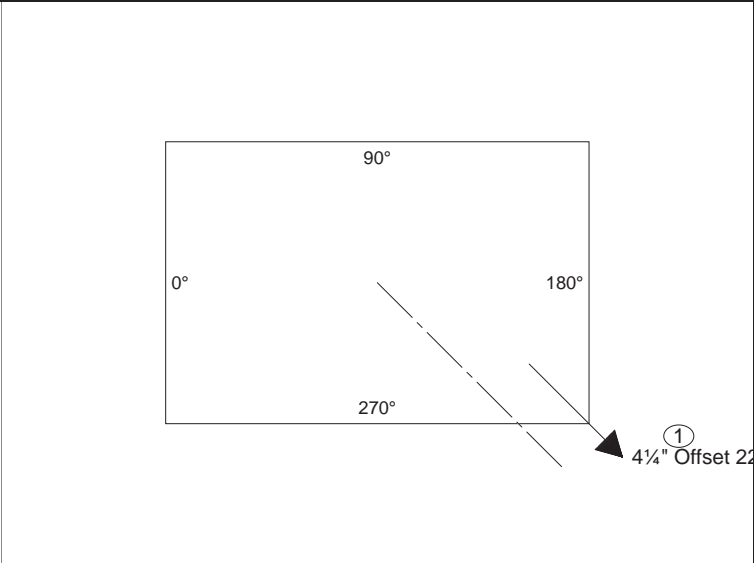
Rim: 677.75'  
Invert: 672.50'  
Rim to Invert: 5.25'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Riser X 20" Tall	EA	1	1500
24" X 36" Catch Basin Base X 66" Tall	EA	1	5597
Corner Hole in Structure for Pipe	EA	1	0

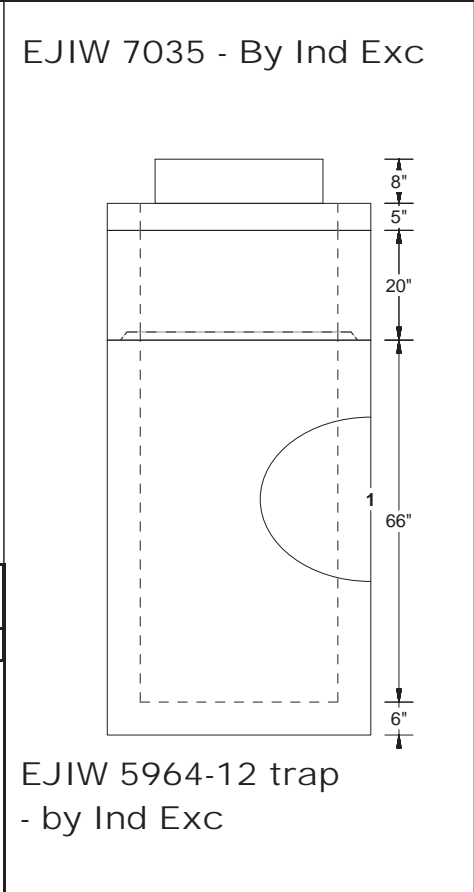
Reviewed - IX  
6/09/20 PE JP Sorma



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PO Box 578  
Canal Fulton, Ohio 44614



EJIW 7035 - By Ind Exc



EJIW 5964-12 trap  
- by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	672.5	0	225	EJIW 5964-12	20"W X 30"T CORNER

> No Curb Drain <

Corner Hole in Structure for Pipe

06/05/2020



## **Submittal Package #173408**

**Independence Excavating**

**ODOT 173000-OC3**

**Cleveland, Ohio**

**June 5, 2020**

**SUBMITTAL FOR:**

**BU-05**

**Manhole, Headwall & Catch Basins**

**D-91, D-95, D-101, D-110, D-111,**

**D-112, D-115, D-117, D-119**

**RALPH HASTINGS**

**LINDSAY PRECAST**

**PO BOX 578**

**6845 ERIE AVE. N.W.**

**CANAL FULTON, OHIO 44614**

**1-800-837-7788**

Ph: 440 543-5468

Fax: 440 543-1152

Mobile: 440 336-4162

Email: [rhastings@lindsayprecast.com](mailto:rhastings@lindsayprecast.com)

Web : [www.lindsayconcrete.com](http://www.lindsayconcrete.com)

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-111 BU-05  
Station: REVD June 9, 2020  
Type: ODOT #3A Catch basin  
SalesPerson: Ralph Hastings

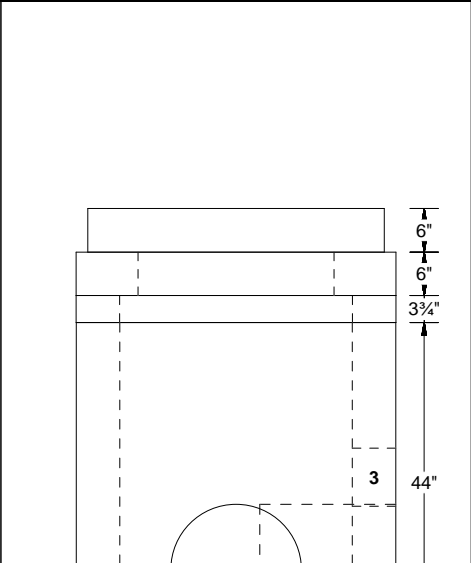
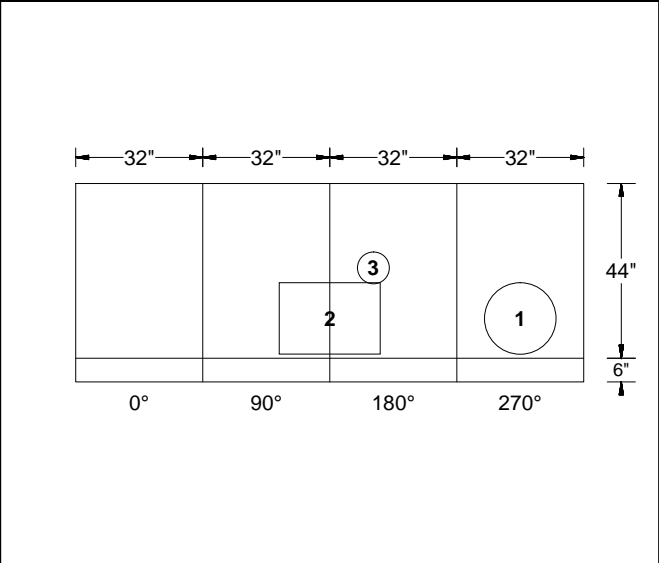
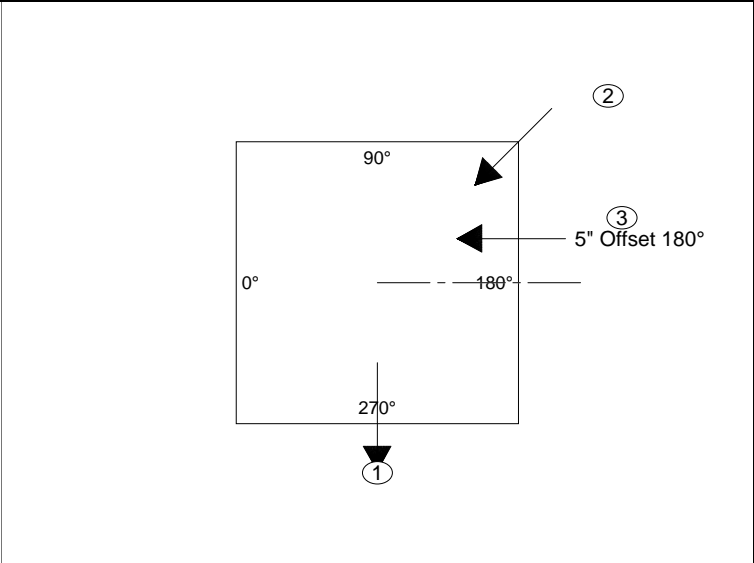
Rim: 649.82'  
Invert: 645.17'  
Rim to Invert: 4.65'  
Sump Height: .00'

Description	UOM	Quantity	Weight
ODOT 3A Lid Tall Back	EA	1	960
32" X 32" Catch Basin Base X 44" Tall	EA	1	4192
Hole in Flat Wall Structure	EA	2	0

Reviewed - IX  
6/09/20 PE JP Sorma



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PO Box 578  
Canal Fulton, Ohio 44614



PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description
(1)	645.17	0	270	12" - HDPE	18"Ø FW	L 7.00 / R 7.00
(2)	645.17	0	135	12" - HDPE	18" CORNER	RN: 12.73L X 12.73
(3)	646.49	0	180	6" - HDPE	8"Ø FW	L 17.00 / R 7.00

Hole in Flat Wall Structure

06/09/2020

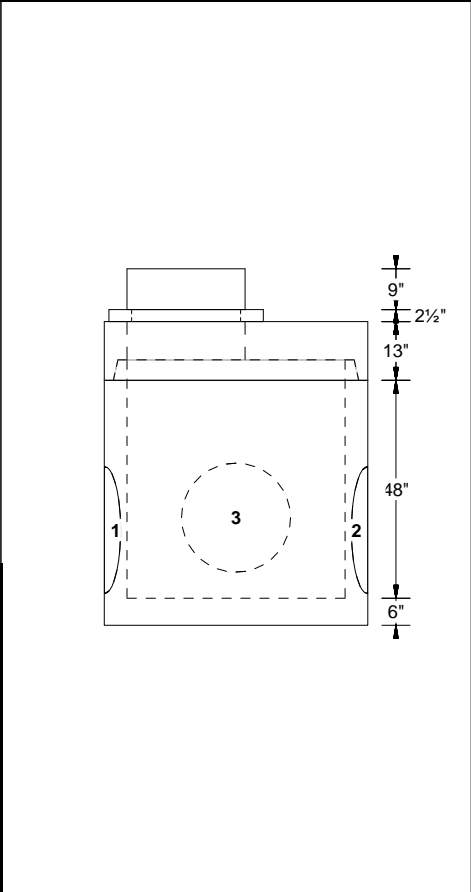
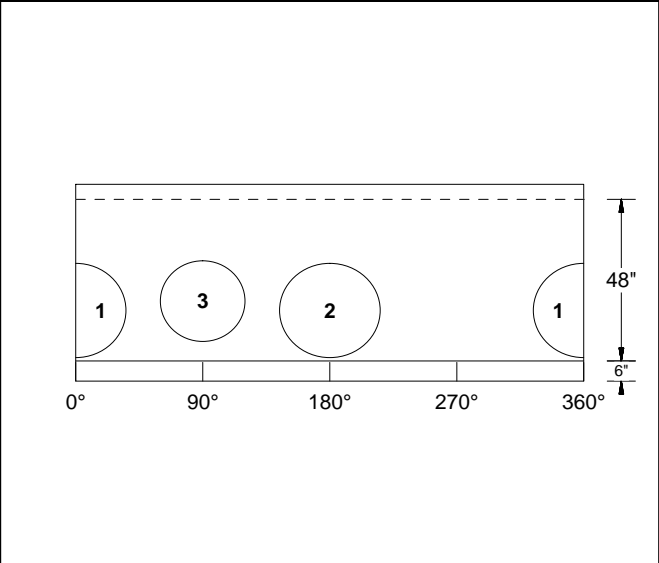
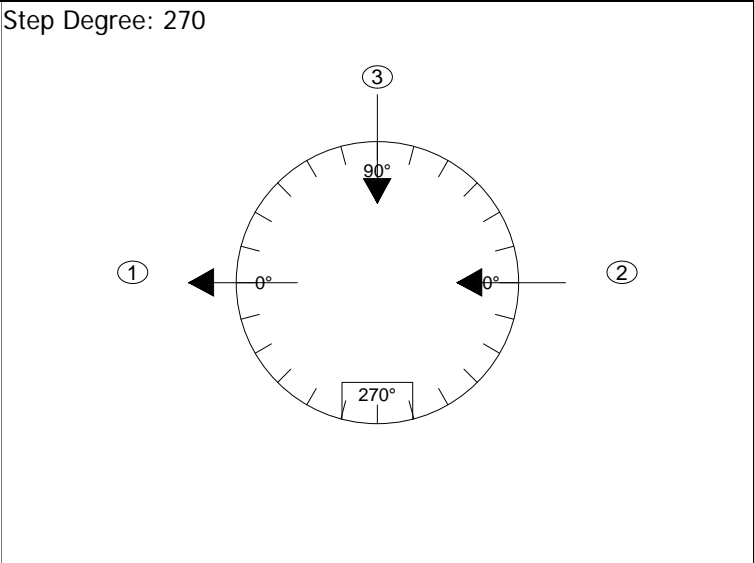
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-91 BU-05  
Station: June 5, 2020  
Type: ODOT #3 Storm Manhole  
SalesPerson: Ralph Hastings

Rim: 648.20'  
Invert: 642.65'  
Rim to Invert: 5.55'  
Sump: 0.50'

Description	UOM	Quantity	Weight
Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
48"Ø Non Extended 6" Manhole Base X 48" Tall	EA	1	4088
Hole in Structure for Pipe	EA	3	0




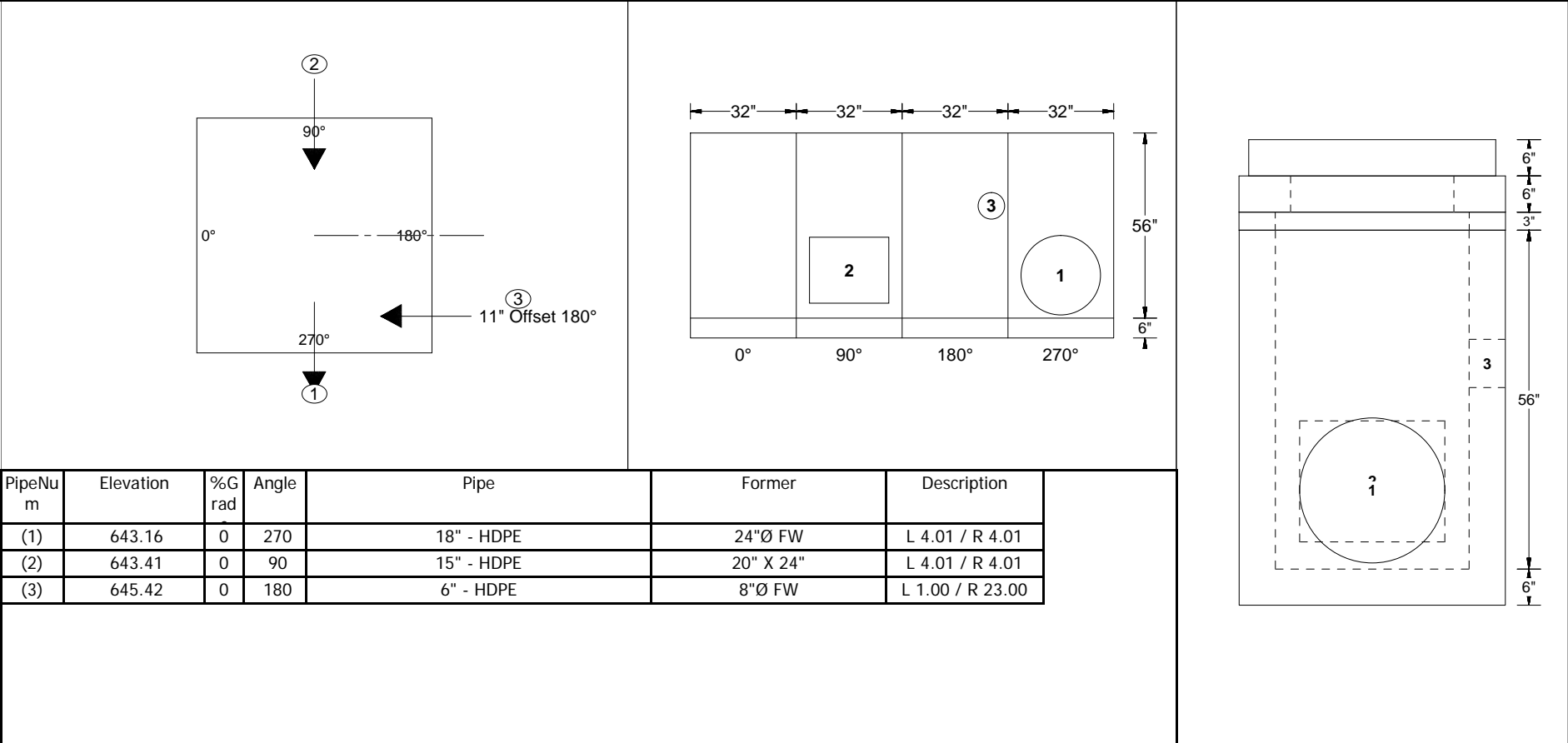
1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	642.65	0	0	18" - RCP B WALL	28"Ø
(2)	642.65	0	180	18" - RCP B WALL	28"Ø
(3)	642.88	0	90	18" - HDPE	24"Ø


	Hole in Structure for Pipe	06/05/2020
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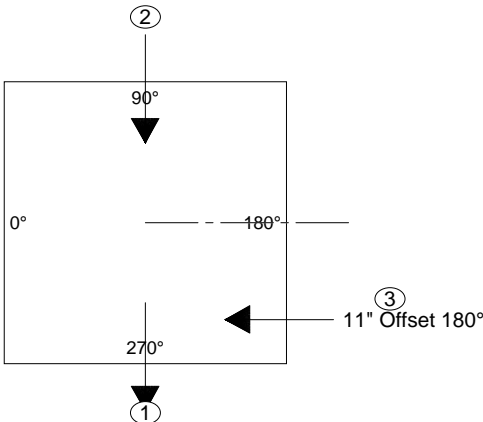
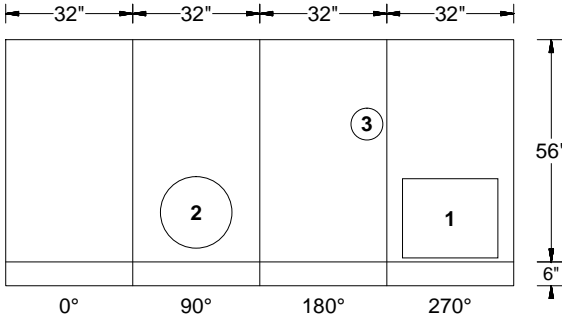
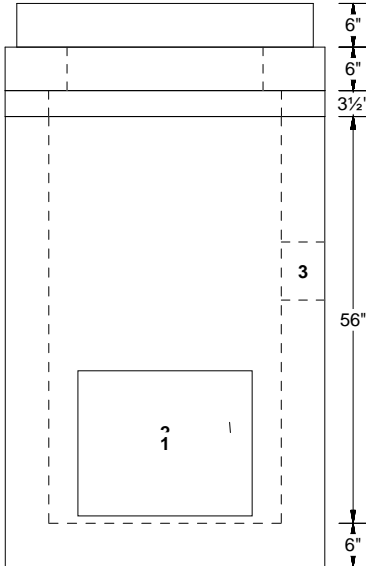
Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-95 BU-05 Station: June 5, 2020 Type: ODOT #3A Catch basin SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	ODOT 3A Lid Tall Back	EA	1	960	
	32" X 32" Catch Basin Base X 56" Tall	EA	1	4950	
	Hole in Flat Wall Structure	EA	2	0	
Rim: 648.75' Invert: 643.16' Rim to Invert: 5.59' Sump Height: .00'	Reviewed - IX 6/09/20 PE JP Sorma				




PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description
(1)	643.16	0	270	18" - HDPE	24"Ø FW	L 4.01 / R 4.01
(2)	643.41	0	90	15" - HDPE	20" X 24"	L 4.01 / R 4.01
(3)	645.42	0	180	6" - HDPE	8"Ø FW	L 1.00 / R 23.00

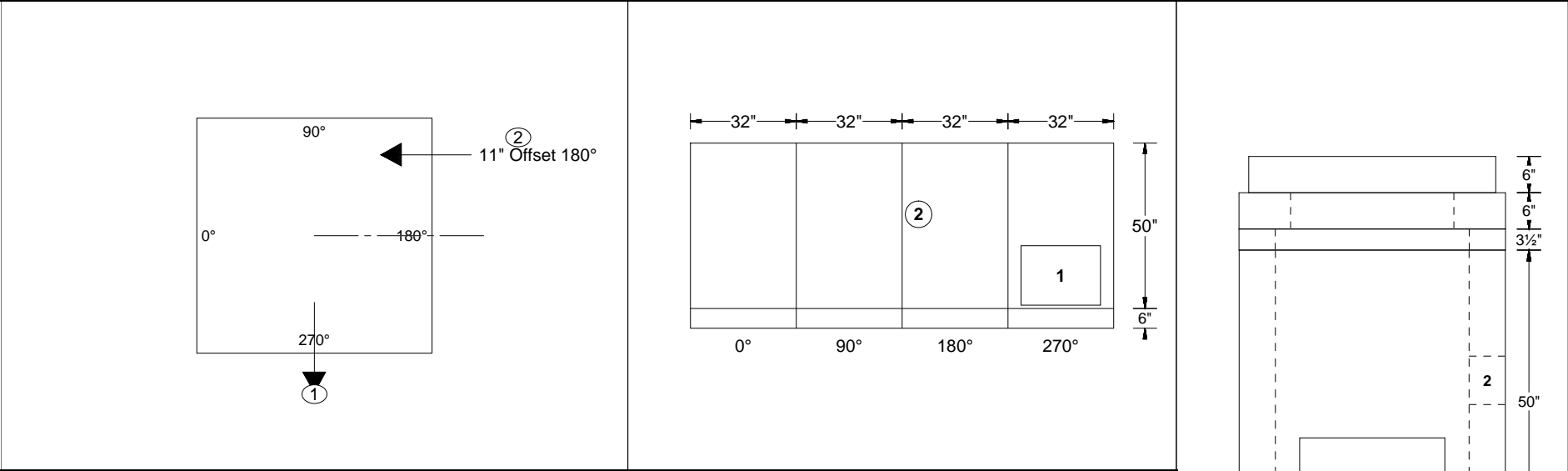
	Hole in Flat Wall Structure	06/05/2020
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Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-112 BU-05 Station: June 5, 2020 Type: ODOT #3A Catch basin SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	ODOT 3A Lid Tall Back	EA	1	960	
	32" X 32" Catch Basin Base X 56" Tall	EA	1	5067	
	Hole in Structure for Pipe	EA	1	0	
	Hole in Flat Wall Structure	EA	1	0	
Rim: 649.86' Invert: 644.18' Rim to Invert: 5.68' Sump Height: .00'	Reviewed - IX 6/09/20 PE JP Sorma				

																														
<table><tr><th>PipeNum</th><th>Elevation</th><th>%G rad</th><th>Angle</th><th>Pipe</th><th>Former</th><th>Description</th></tr><tr><td>(1)</td><td>644.18</td><td>0</td><td>270</td><td>15" - HDPE</td><td>20" X 24"</td><td>L 4.01 / R 4.01</td></tr><tr><td>(2)</td><td>644.43</td><td>0</td><td>90</td><td>12" - HDPE</td><td>18"Ø</td><td>L 7.00 / R 7.00</td></tr><tr><td>(3)</td><td>646.53</td><td>0</td><td>180</td><td>6" - HDPE</td><td>8"Ø FW</td><td>L 1.00 / R 23.00</td></tr></table>			PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description	(1)	644.18	0	270	15" - HDPE	20" X 24"	L 4.01 / R 4.01	(2)	644.43	0	90	12" - HDPE	18"Ø	L 7.00 / R 7.00	(3)	646.53	0	180	6" - HDPE	8"Ø FW	L 1.00 / R 23.00
PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description																								
(1)	644.18	0	270	15" - HDPE	20" X 24"	L 4.01 / R 4.01																								
(2)	644.43	0	90	12" - HDPE	18"Ø	L 7.00 / R 7.00																								
(3)	646.53	0	180	6" - HDPE	8"Ø FW	L 1.00 / R 23.00																								
<div>Hole in Structure for Pipe Hole in Flat Wall Structure</div>			06/05/2020																											




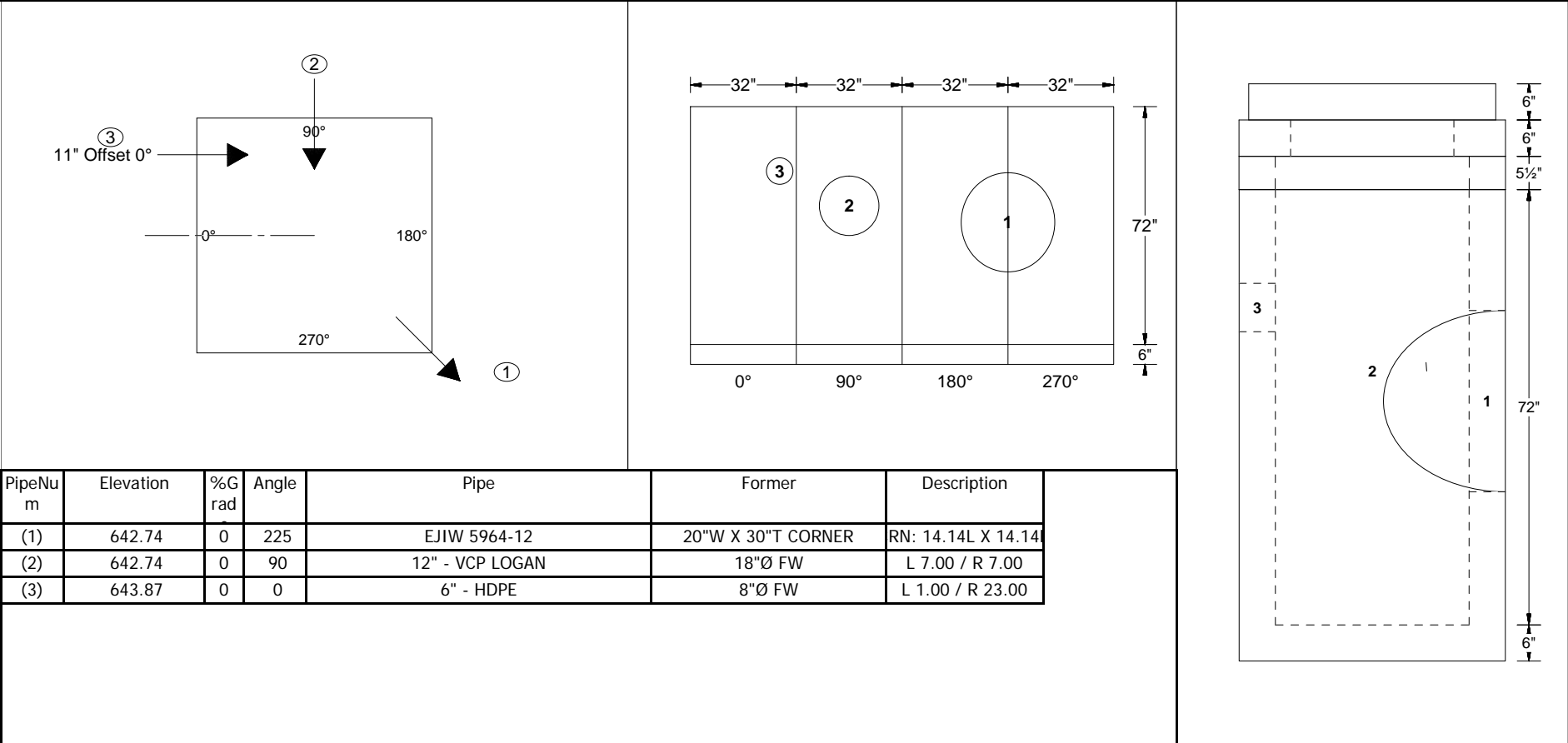
Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-110 BU-05 Station: June 5, 2020 Type: ODOT #3A Catch basin SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	ODOT 3A Lid Tall Back	EA	1	960	
	32" X 32" Catch Basin Base X 50" Tall	EA	1	4750	
	Hole in Flat Wall Structure	EA	1	0	
	Square hole	EA	1	0	
Rim: 650.82' Invert: 645.69' Rim to Invert: 5.13' Sump Height: .00'	Reviewed - IX 6/09/20 PE JP Sorma				



PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description
(1)	645.69	0	270	12" - HDPE	18"t X 24"w Ko	L 4.01 / R 4.01
(2)	647.49	0	180	6" - HDPE	8"Ø FW	L 23.00 / R 1.00


	Hole in Flat Wall Structure Square hole	06/05/2020
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Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-119 BU-05 Station: June 5, 2020 Type: ODOT #3A Catch basin SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	ODOT 3A Lid Tall Back	EA	1	960	
	32" X 32" Catch Basin Base X 72" Tall	EA	1	6291	
	Hole in Flat Wall Structure	EA	2	0	
	Corner Hole in Structure for Pipe	EA	1	0	
Rim: 647.2' Invert: 642.74' Rim to Invert: 4.46' Sump Height: 3.00'	Reviewed - IX 6/09/20 PE JP Sorma				


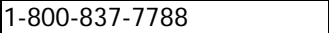


PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description
(1)	642.74	0	225	EJIW 5964-12	20"W X 30"T CORNER	RN: 14.14L X 14.14L
(2)	642.74	0	90	12" - VCP LOGAN	18"Ø FW	L 7.00 / R 7.00
(3)	643.87	0	0	6" - HDPE	8"Ø FW	L 1.00 / R 23.00

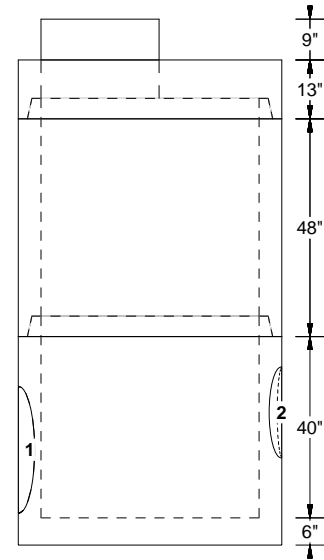
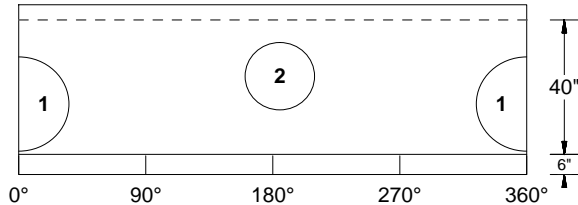
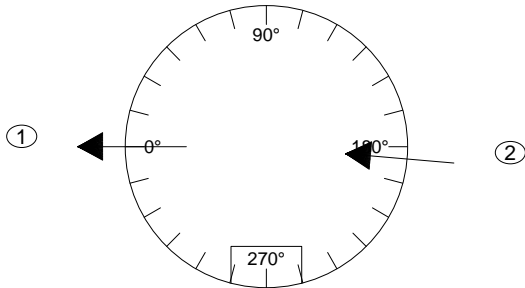
					Hole in Flat Wall Structure Corner Hole in Structure for Pipe	06/05/2020
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Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-115 BU-05 Station: June 5, 2020 Type: ODOT 2-2A Catch Basin SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	24" X 24" Catch Basin Riser X 38" Tall	EA	1	2299	
	24" X 24" Catch Basin X 64" Tall	EA	1	4438	
	EJIW 5110 Z Frame - 00511013	EA	1	0	
	Square hole	EA	1	0	
<div>Reviewed - IX</div> <div>6/09/20 PE JP Sorma</div>					
Rim: 648.33' Invert: 642.9' Rim to Invert: 5.43' Sump Height: 3.07'					

PipeNum	Elevation	%Grade	Angle	Pipe	Former	Description							
(1)	642.9	0	270	EJIW 5964-12	Trap Ko 30"T x 18"W	L 3.00 / R 3.00							
(2)	647.83	0	180	6" x 24" WINDOW	6"t X 24"w Ko	L .01 / R .01							
							Square hole				06/05/2020		

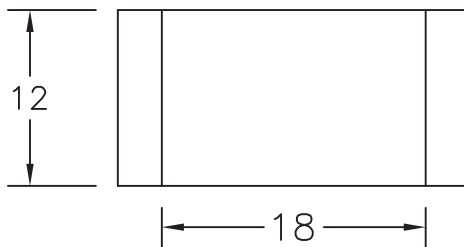
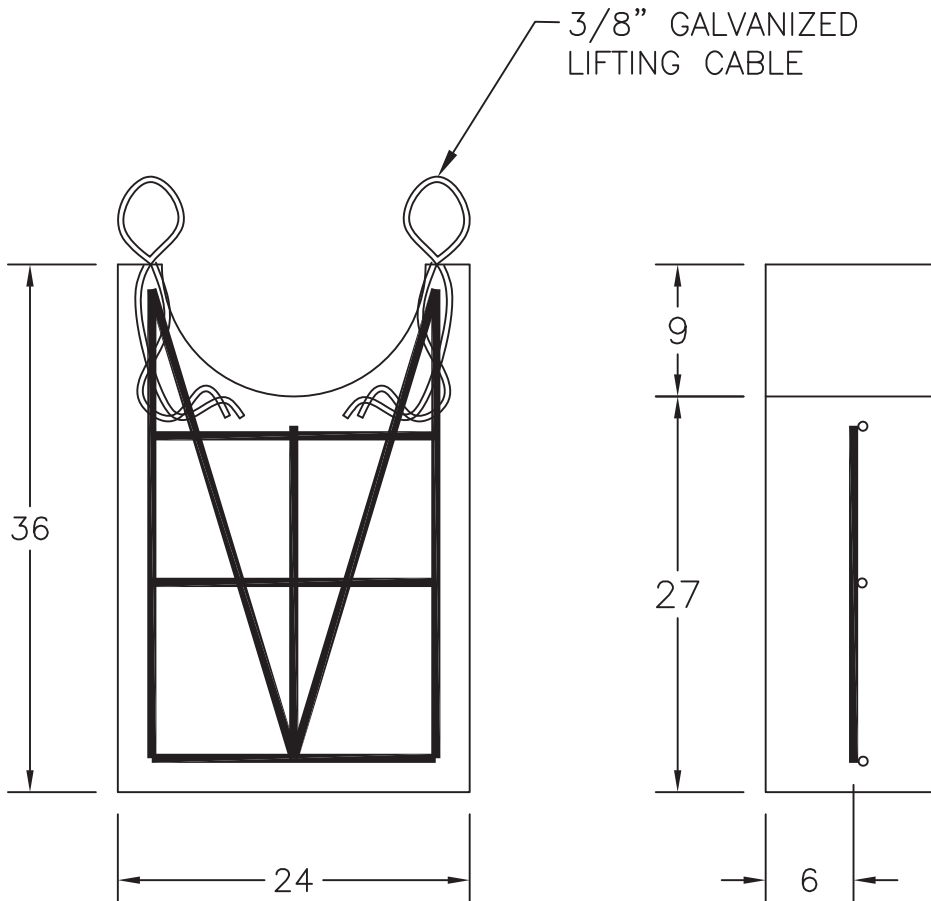
Customer:	INDEPENDENCE EXCAVATING, INC.	Description	UOM	Quantity	Weight	
Job Name:	ODOT 173000 - Opp Corridor Ph 3	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185	
Job #:	173408	48"Ø Stock Manhole Riser X 48" Tall	EA	1	3467	
Structure ID:	D-101 BU-05	48"Ø Non Extended 6" Manhole Base X 40" Tall	EA	1	3851	
Station:	June 5, 2020	Hole in Structure for Pipe	EA	1	0	
Type:	ODOT #3 Storm Manhole	<div>Reviewed - IX</div> <div>6/09/20 PE JP Sorma</div>				 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
SalesPerson:	Ralph Hastings					
Rim:	662.46'					
Invert:	653.80'					
Rim to Invert:	8.66'					
Sump:	0.50'					

Step Degree: 270



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	653.8	0	0	18" - RCP B WALL	28"Ø
(2)	654.74	0	185	12" - RCP Co-Pipe	20"Ø

	Hole in Structure for Pipe	06/05/2020
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173408

Independence Excavating  
 ODOT 173000, OC3  
 1/2 Headwall for 12" RCP  
 D-117 - 12"Ø IE @ 657.30

## CONSTRUCTION NOTES

CONCRETE TO BE 4,000 PSI

REINFORCING TO BE #5 EPOXY  
 COATED REBAR SPACED AT 12" C-C WITH 2"  
 MINIMUM COVER.

1 RODS - 22" LONG  
 3 RODS - 20" LONG  
 4 RODS - 32" LONG

IF CONCRETE RIP RAP IS REQUIRED THE 6"  
 EXTENSION WILL BE POURED MONOLITHIC WITH  
 THE HEAD WALL.

HEAD WALL WILL BE MARKED WITH PROJECT  
 NAME, STATION OR STRUCTURE #, PIPE SIZE,  
 AND PIPE TYPE.

AREA BETWEEN PIPE AND HEAD WALL TO BE  
 FILLED WITH NON SHRINK GROUT BY  
 CONTRACTOR.

CONTRACTOR TO CUT OFF 3/8" GALVANIZED  
 LIFERT AFTER SETTING HEAD WALL

### DIMENSIONAL TOLERANCES:

CONCRETE: \_\_\_\_\_ ±1/2"

ROD SPACING: \_\_\_\_\_ ±2"


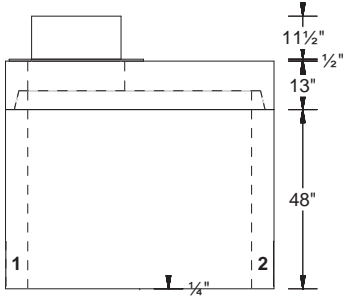
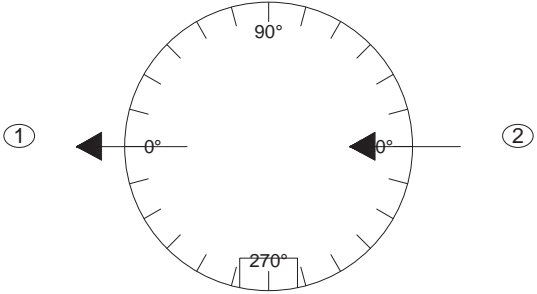
CONCRETE COVER OVER REINFORCING: -0", +1/2"

**LINDSAY CONCRETE**  
**PRODUCTS CO., INC.**




O.D.O.T. HW 2.2  
 12" RCP

DRAWN BY: JDG	REVISION:	DATE: 10/26/07	CAT. NO. HW-2.2-12
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<div>Customer: INDEPENDENCE EXCAVATING, INC.</div> <div>Job Name: ODOT 173000 - Opp Corridor Ph 3</div> <div>Job #: 173408</div> <div>Structure ID: WS-7 Meter Vault, CWD 1.5 NT</div> <div>Station:</div> <div>Type: CWD Meter Vault For 1-2" Pipe</div> <div>SalesPerson: Ralph Hastings</div>		Description		UOM	Quantity	Weight	
		Stock 60"Ø Flat Top w/ 26"Ø Hole		EA	1	2575	
		60"Ø Manhole Riser X 48" Tall		EA	1	5126	
		Square hole		EA	2	0	
<div>Rim: 5.58'</div> <div>Invert: 0.00'</div> <div>Rim to Invert: 5.58'</div> <div>Sump: 0.50'</div>		<div>CWD Non-traffic meter vault</div> <div>for 1 1/2" service</div> <div>IX Reviewed - J.P. Sorma PE</div> <div>8/13/20</div>				<div></div> <div>1-800-837-7788</div> <div>6845 Erie Ave. N.W.</div> <div>PO Box 578</div> <div>Canal Fulton, Ohio 44614</div>	
Step Degree: 270		<div>EJIW 1705 Traffic casting</div> <div>due to location in sidewalk</div> <div>- by Ind Exc</div> <div></div>					
<div></div>							
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type		
(1)	0	0	0	1 1/2" - K Coppper	6"w x 12"T Styro		
(2)	0	0	180	1 1/2" - K Coppper	6"w x 12"T Styro		
					Square hole		08/12/2020

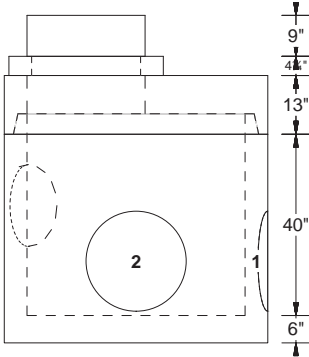
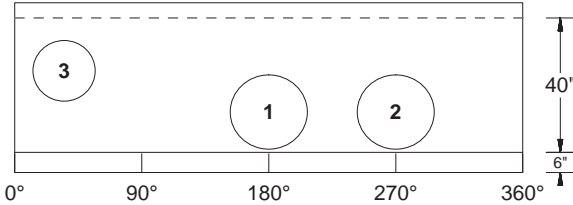
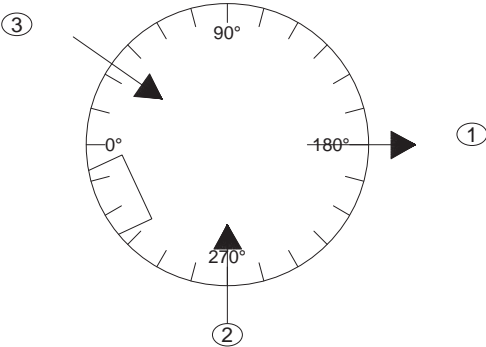
Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-97 BU-05 Station: July 2. 2020 Type: ODOT #3 Storm Manhole SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight
	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
	48"Ø Non Extended 6" Manhole Base X 40" Tall	EA	1	3820
	Hole in Structure for Pipe	EA	3	0
	ODOT MH 3 with pipe holes			

Reviewed IX - JP Sorma PE  
7/6/20



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PO Box 578  
Canal Fulton, Ohio 44614

Step Degree: 335




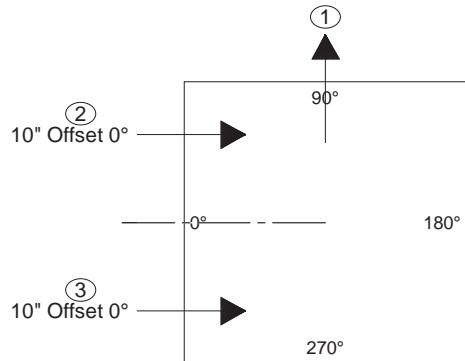
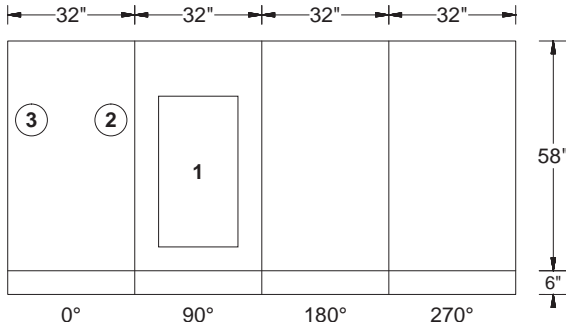
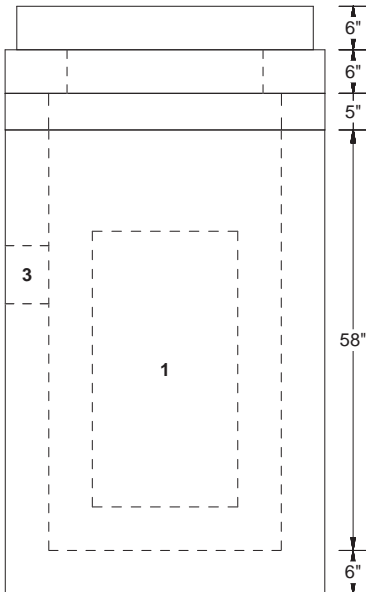
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	640.31	0	180	15" - VCP LOGAN	22"Ø
(2)	640.31	0	270	15" - VCP LOGAN	22"Ø
(3)	641.45	0	35	12" - VCP LOGAN	18"Ø

Hole in Structure for Pipe

07/02/2020



Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-120 BU-05 Station: July 2. 2020 Type: ODOT #3A Catch basin SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	
	ODOT 3A Lid Tall Back	EA	1	960	
	32" X 32" Catch Basin Base X 58" Tall	EA	1	5223	
	Hole in Flat Wall Structure	EA	2	0	
	Square hole	EA	1	0	
Rim: 644.86' Invert: 640.61' Rim to Invert: 4.25' Sump Height: 2.00'	ODOT CB 3A A.P.P. w/ sump & trap  Reviewed IX - JP Sorma PE 7/6/20				1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614

											
PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description					
(1)	640.61	0	90	EJIW 5964-15	Trap Ko 38"T x 20"W	L 6.00 / R 6.00					
(2)	641.53	0	0	6" - HDPE	8"Ø FW	L 2.00 / R 22.00					
(3)	641.53	0	0	6" - HDPE	8"Ø FW	L 22.00 / R 2.00					
Hole in Flat Wall Structure Square hole						07/02/2020					

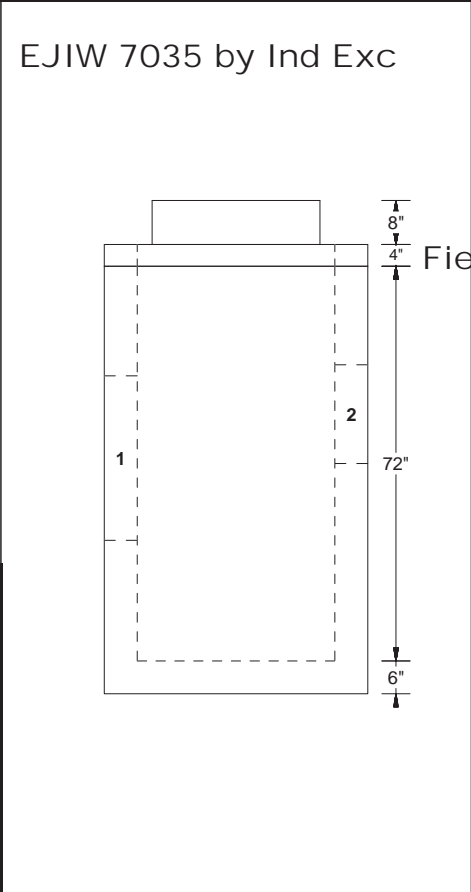
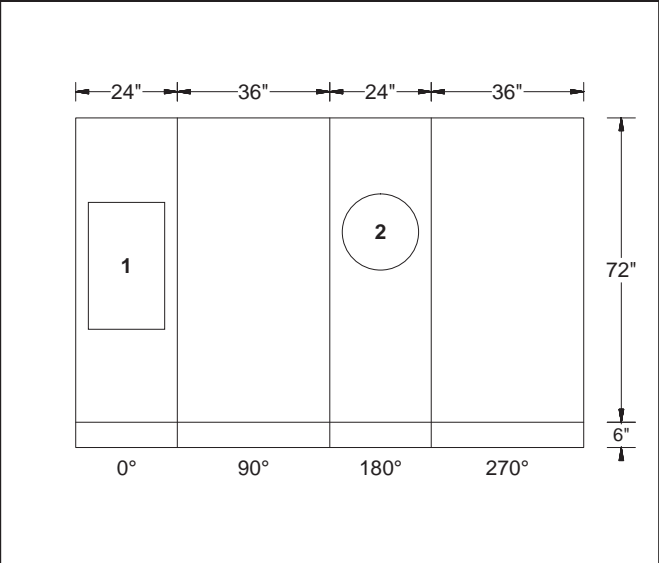
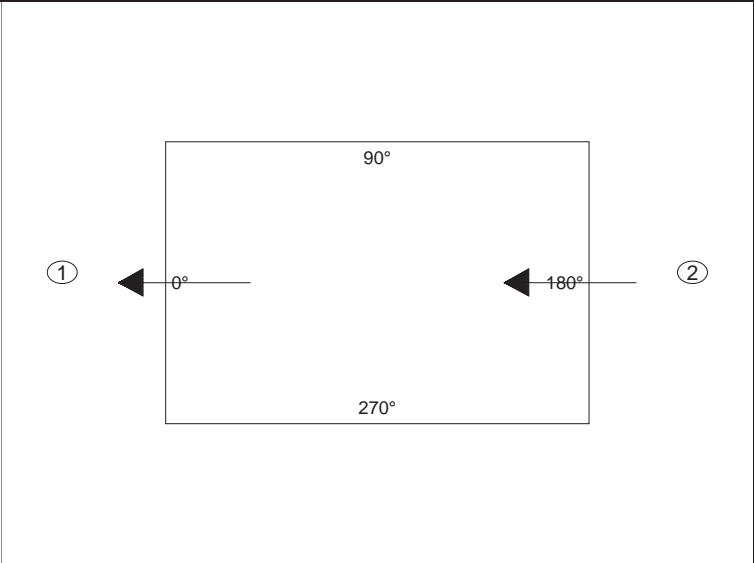
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-140, Pc A BU-05  
Station: June 25, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 664.55'  
Invert: 660.55'  
Rim to Invert: 4.00'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	5939
Hole in Flat Wall Structure	EA	1	0
Square hole	EA	1	0



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.55	0	0	EJIW 5964-12	30"T x 18"W KO
(2)	660.8	0	180	12" - VCP LOGAN	18"Ø FW

	Hole in Flat Wall Structure Square hole	06/25/2020
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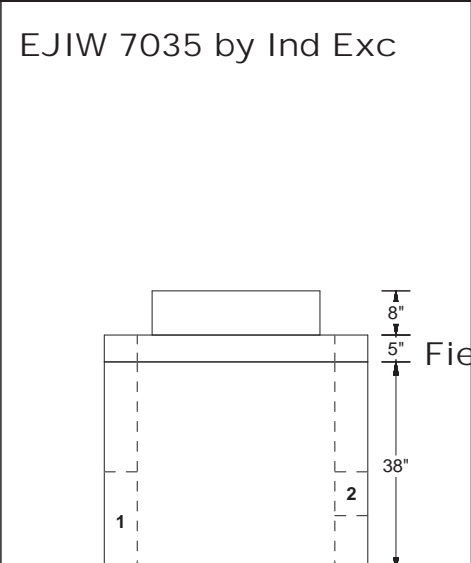
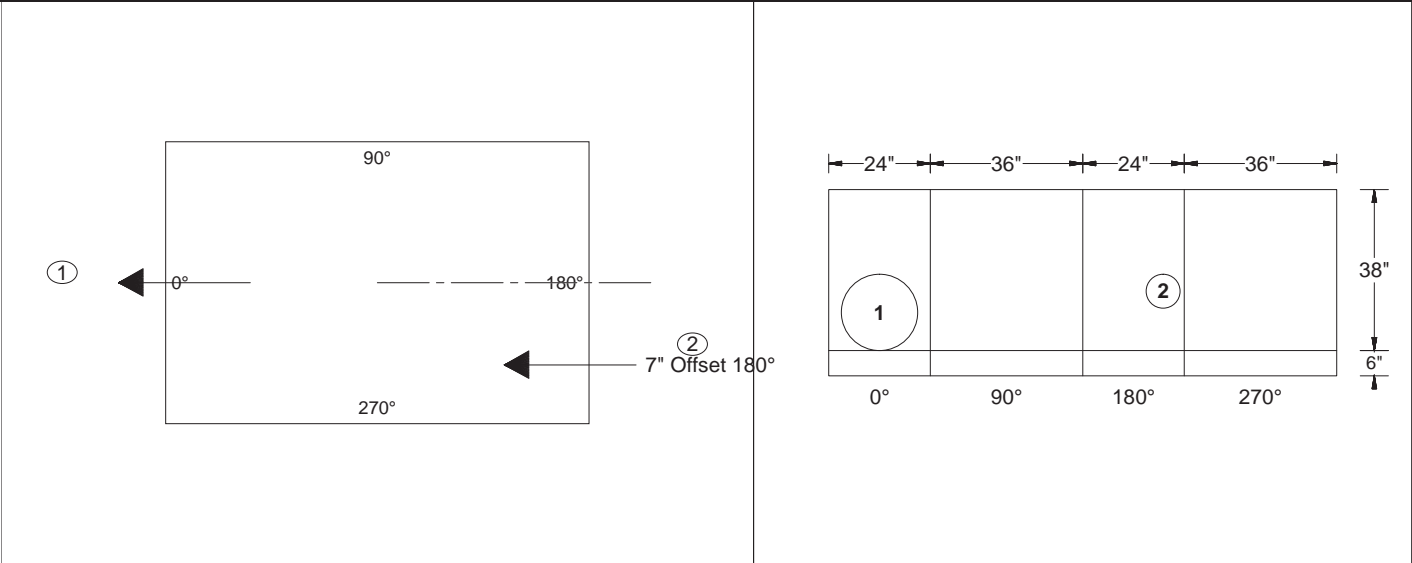
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-140, Pc B BU-05  
Station: June 25, 2020  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 664.55'  
Invert: 660.55'  
Rim to Invert: 4.00'  
Sump: 0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 38" Tall	EA	1	3589
Hole in Flat Wall Structure	EA	2	0




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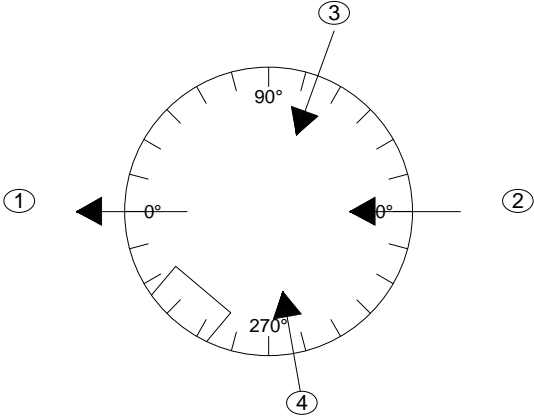
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.55	0	0	12" - VCP LOGAN	18"Ø FW
(2)	661.22	0	180	6" - HDPE	8"Ø FW

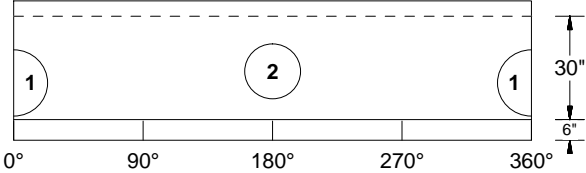
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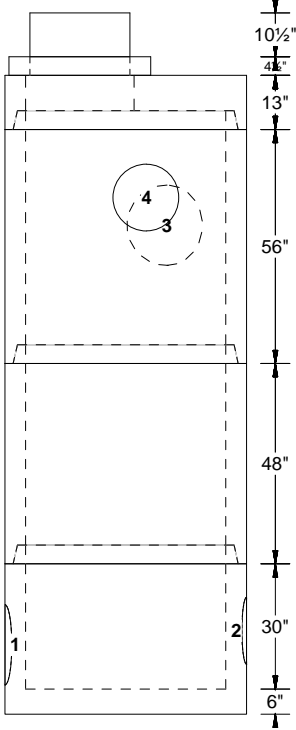
				Hole in Flat Wall Structure	06/25/2020
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Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-138 Station: Dec 9, 2019 Type: Cleveland Division of Water Pollution SalesPerson: Control 48"Ø Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185	
	48"Ø Manhole Riser X 56" Tall	EA	1	3832	
	48"Ø Stock Manhole Riser X 48" Tall	EA	1	3467	
	48"Ø Non Extended 6" Manhole Base X 30" Tall	EA	1	3329	
	Flow Channel to Spring Line	EA	1	2000	
	A-Lok XC-580	EA	2	0	
	A-Lok XC-480	EA	2	0	
Rim: 664.48' Invert: 651.31' Rim to Invert: 13.17' Sump: 0.33'					

Step Degree: 310







PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	651.31	-3.51	0	15" - VCP LOGAN	580 A-LOK
(2)	651.56	4.2	180	12" - VCP LOGAN	480 A-LOK
(3)	659.59	1	110	15" - VCP LOGAN	580 A-LOK
(4)	660.28	1	260	12" - VCP LOGAN	480 A-LOK

A-Lok XC-580  
A-Lok XC-480

12/19/2019

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-115 BU-05  
Station: August 27, 2020  
Type: ODOT 2-2A Catch Basin  
SalesPerson: Ralph Hastings

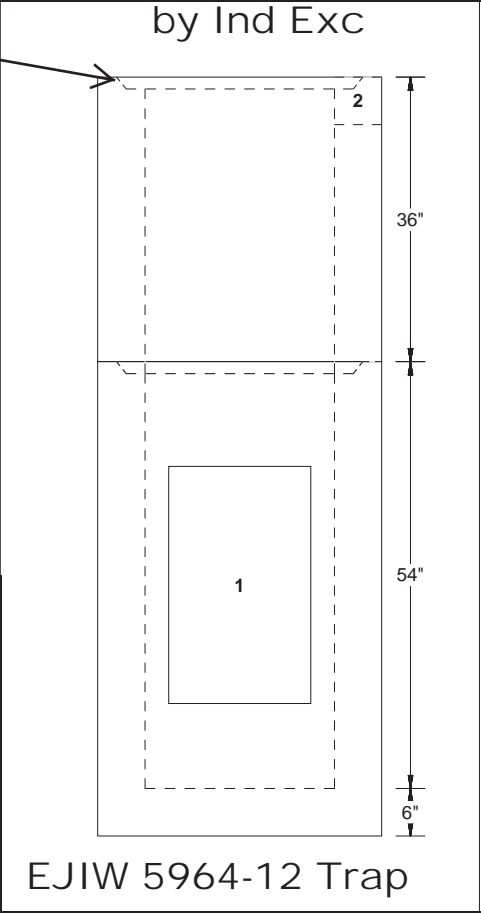
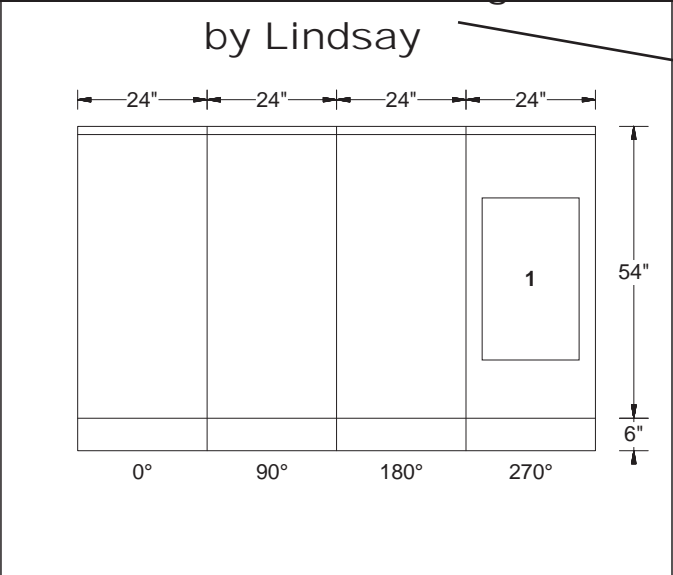
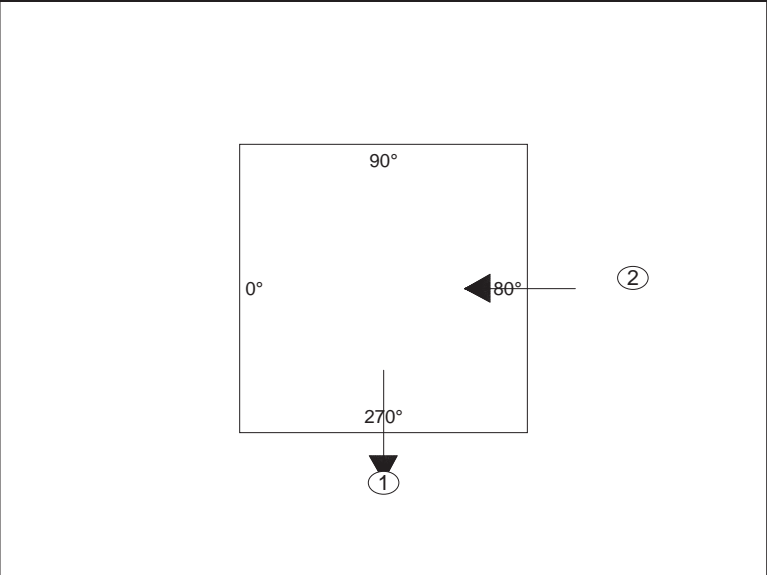
Rim: 648.33'  
Invert: 642.9'  
Rim to Invert: 5.43'  
Sump Height: 2.07'

Description	UOM	Quantity	Weight
24" X 24" Catch Basin Riser X 36" Tall	EA	1	2173
24" X 24" Catch Basin X 54" Tall	EA	1	3813
EJIW 5110 Z Frame - 00511013	EA	1	0
Square hole	EA	1	0



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EJIW 5110 grate



PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description
(1)	642.9	0	270	EJIW 5964-12	Trap Ko 30"T x 18"W	L 3.00 / R 3.00
(2)	647.83	0	180	6" x 24" WINDOW	6"t X 24"w Ko	L .01 / R .01

Square hole	by Ind Exc	08/27/2020
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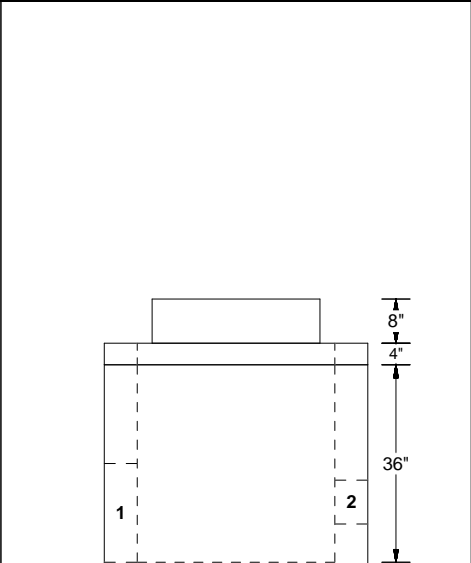
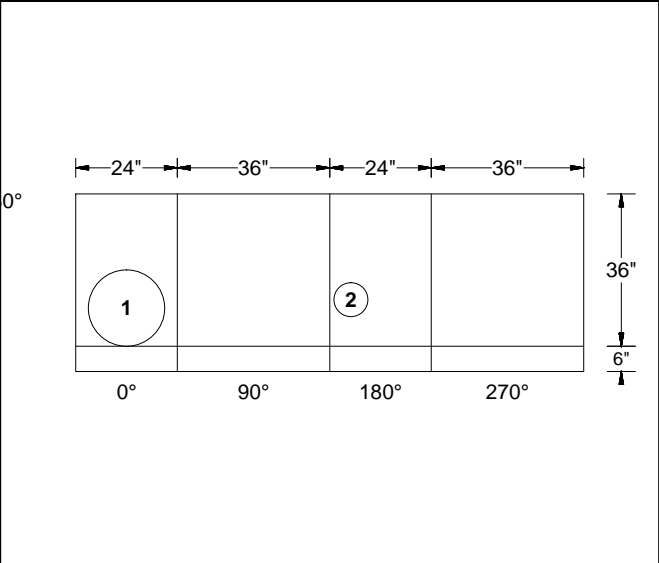
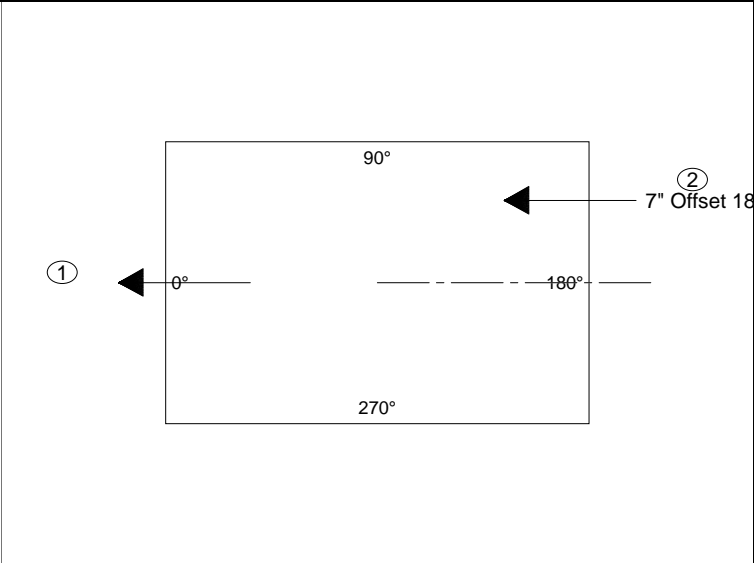
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-143 BU-05 Pc B- REVISED  
Station:  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 664.32'  
Invert: 660.57'  
Rim to Invert: 3.75'  
Sump: 0.25'


Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 36" Tall	EA	1	3439
Hole in Flat Wall Structure	EA	2	0
<div>Structure field modifications needed</div>			



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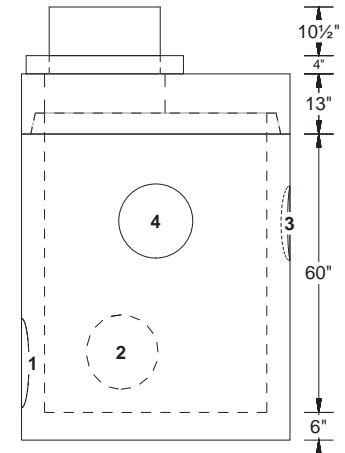
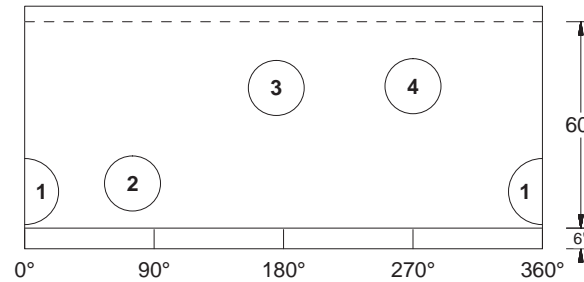
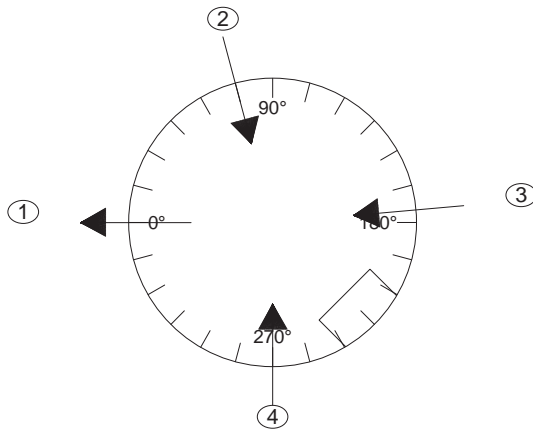


PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.57	0	0	12" - VCP LOGAN	18"Ø FW
(2)	660.98	0	180	6" - HDPE	8"Ø FW

Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-149 BU-05 Station: August 28, 2020 Type: Cleveland Division of Water Pollution SalesPerson: Control 48"Ø Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185	
	48"Ø Non Extended 6" Manhole Base x 60" Tall	EA	1	5323	
	A-Lok XC-480	EA	3	0	
	A-Lok XC-580	EA	1	0	
Rim: 650.30' Invert: 643.33' Rim to Invert: 6.97' Sump: 0.31'	IX Reviewed J.P. Sorma PE 8/31/20				

Step Degree: 225

EJIW 1700 - by Ind Exc



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	643.33	-2.74	0	15" - VCP LOGAN	580 A-LOK
(2)	643.58	1	75	12" - VCP LOGAN	480 A-LOK
(3)	645.85	2.7	175	12" - VCP LOGAN	480 A-LOK
(4)	645.94	1	270	12" - VCP LOGAN	480 A-LOK

A-Lok XC-480  
A-Lok XC-580

08/28/2020



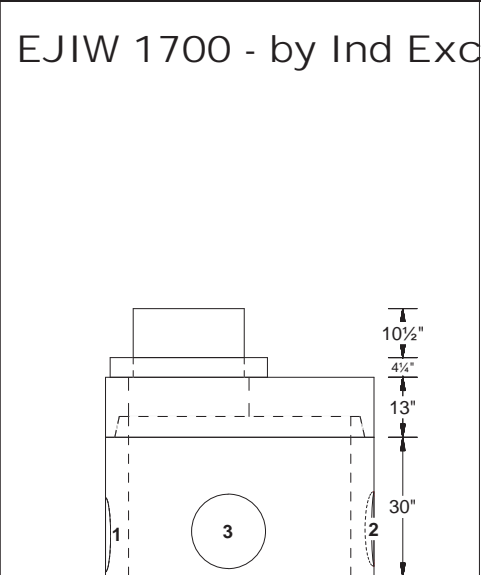
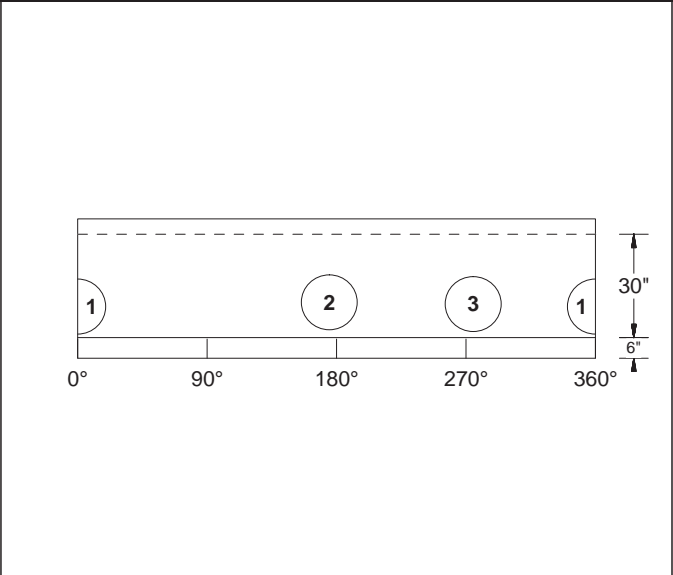
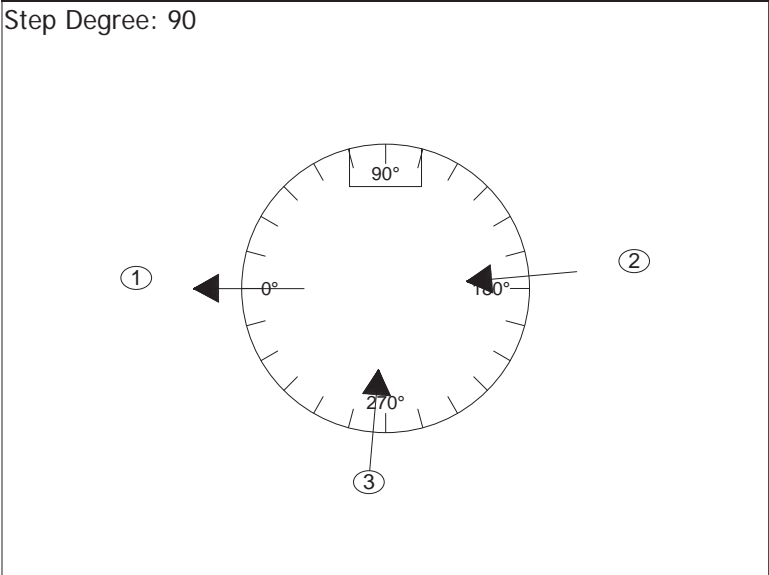
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-151 BU-05  
Station: August 28, 2020  
Type: Cleveland Division of Water Pollution  
SalesPerson: Control 48"Ø  
Ralph Hastings

Rim: 653.11'  
Invert: 648.59'  
Rim to Invert: 4.52'  
Sump: 0.29'

Description	UOM	Quantity	Weight
Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
48"Ø Non Extended 6" Manhole Base X 30" Tall	EA	1	3283
A-Lok XC-480	EA	3	0
IX Reviewed J.P. Sorma PE 8/31/20			




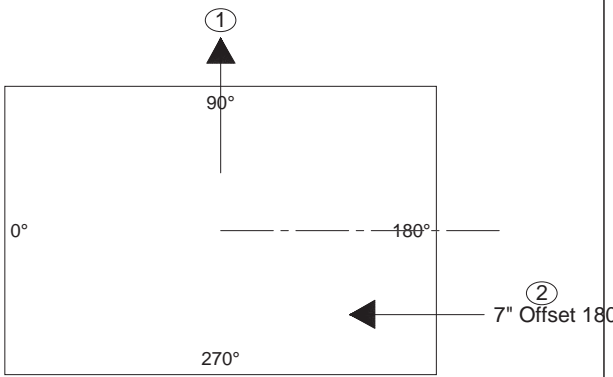
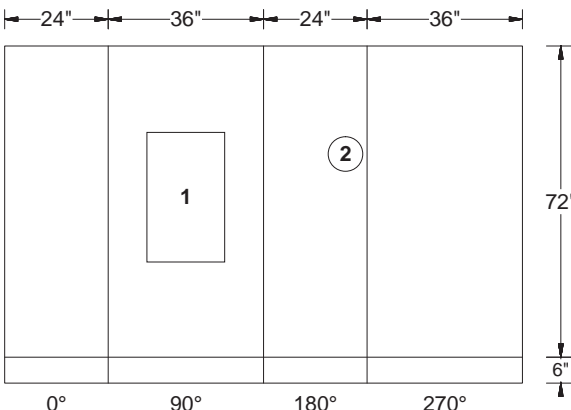
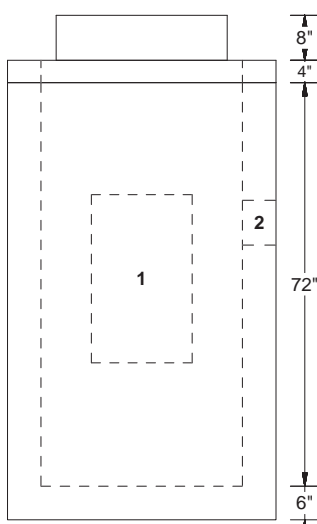
1-800-837-7788  
6845 Erie Ave. N.W.  
PO Box 578  
Canal Fulton, Ohio 44614



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	648.59	-2.17	0	12" - VCP LOGAN	480 A-LOK
(2)	648.59	3.4	175	12" - VCP LOGAN	480 A-LOK
(3)	648.59	1	275	12" - VCP LOGAN	480 A-LOK

					A-Lok XC-480		08/28/2020	
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Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-147 BU-05 Station: August 28, 2020 Type: City of Cleveland Curb Inlet SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	24" X 36" Catch Basin Base X 72" Tall	EA	1	6048	
	Hole in Flat Wall Structure	EA	1	0	
Rim: 650.06' Invert: 646.06' Rim to Invert: 4.00' Sump: 3.00'	IX Reviewed J.P. Sorma PE 8/31/20				

										EJIW 7035 - by Ind Exc 				
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type					EJIW 5964-12 Trap - by Ind Exc				
(1)	646.06	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W									
(2)	646.73	0	180	6" - HDPE	8"Ø FW									
					Hole in Flat Wall Structure					08/28/2020				

Customer: INDEPENDENCE EXCAVATING, INC.  
 Job Name: ODOT 173000 - Opp Corridor Ph 3  
 Job #: 173408  
 Structure ID: D-149A BU-05  
 Station: August 28, 2020  
 Type: City of Cleveland Curb Inlet  
 SalesPerson: Ralph Hastings

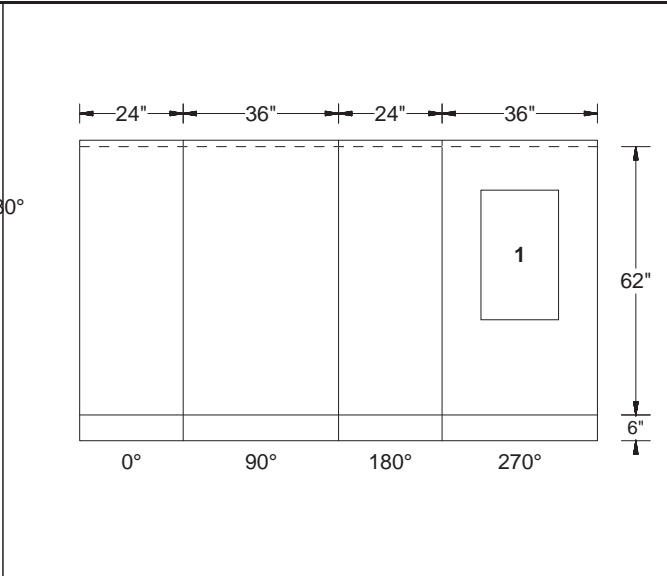
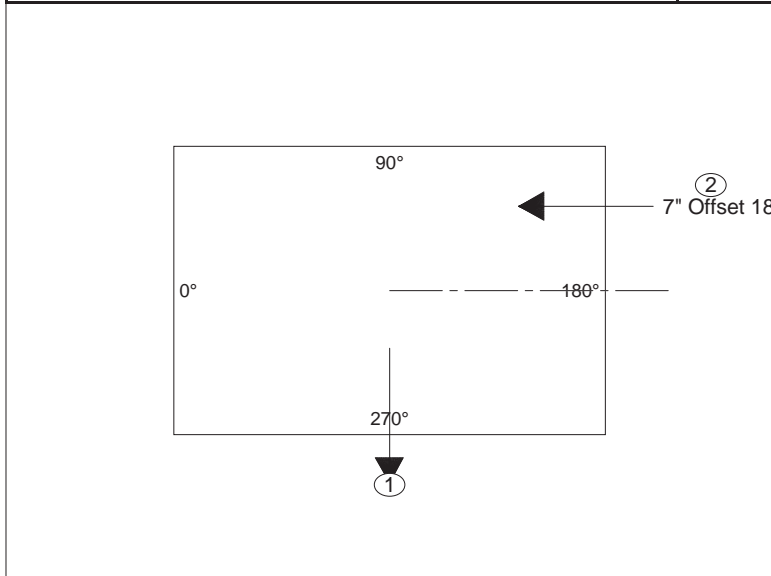
Rim: 650.15'  
 Invert: 644.17'  
 Rim to Invert: 5.98'  
 Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Riser X 34" Tall	EA	1	2524
24" X 36" Catch Basin Base X 62" Tall	EA	1	5274
Hole in Flat Wall Structure	EA	1	0

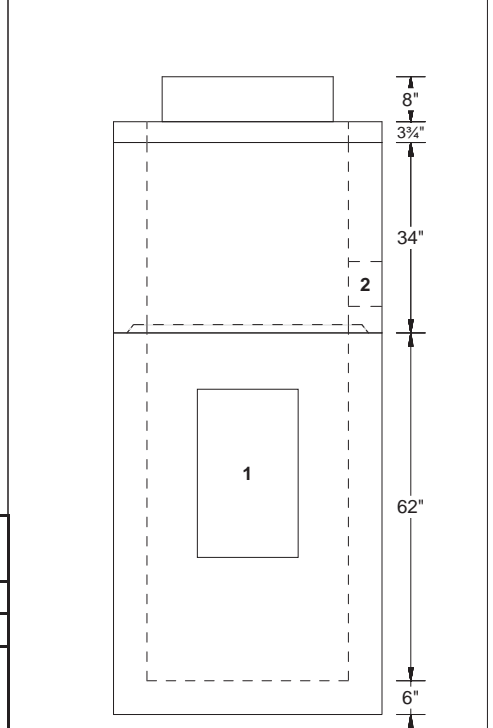
IX Reviewed J.P. Sorma PE  
 8/31/20



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EJIW 7035 - by Ind Exc

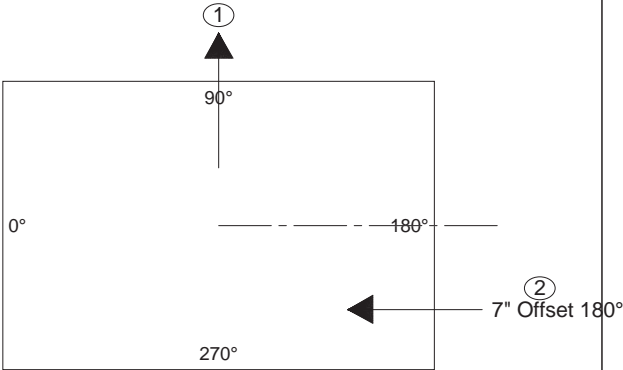
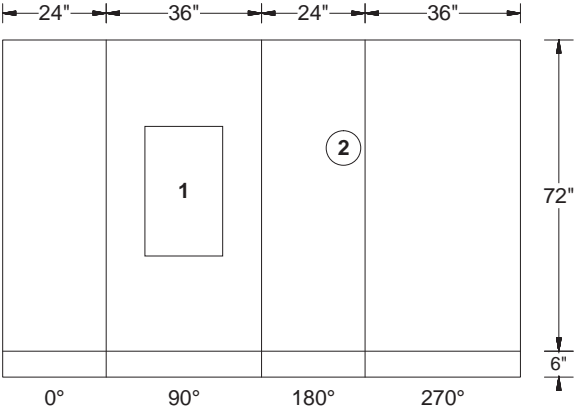
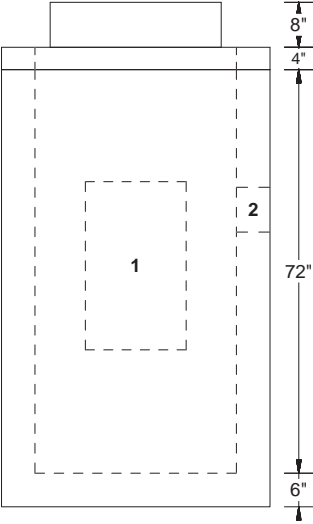



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	644.17	0	270	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	646.82	0	180	6" - HDPE	8"Ø FW

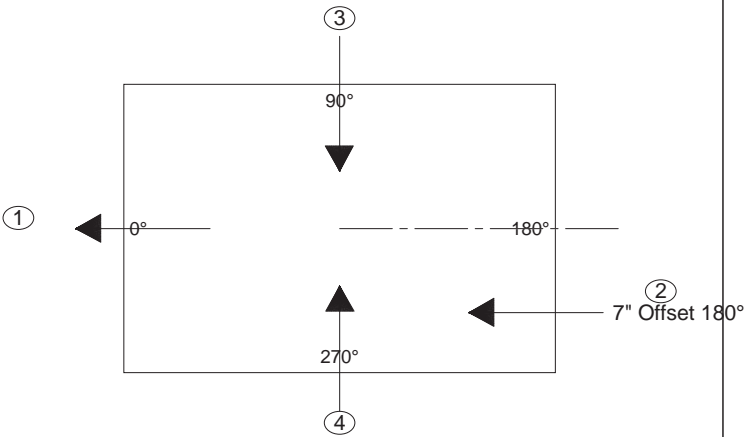
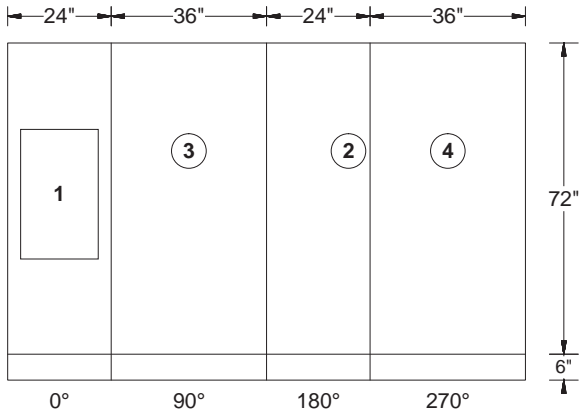
EJIW 5964-12 Trap  
 - by Ind Exc

	Hole in Flat Wall Structure	08/28/2020
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Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-150 BU-05 Station: August 28, 2020 Type: City of Cleveland Curb Inlet SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight
	24" X 36" Catch Basin Base X 72" Tall	EA	1	6048
	Hole in Flat Wall Structure	EA	1	0
IX Reviewed J.P. Sorma PE 8/31/20				
<div> <div> Rim: 652.76'  Invert: 648.76'  Rim to Invert: 4.00'  Sump: 3.00' </div> <div>  <p>1-800-837-7788  6845 Erie Ave. N.W.  PO Box 578  Canal Fulton, Ohio 44614</p> </div> </div>				

<div> <div>  </div> <div>  </div> </div>					EJIW 7035 - by Ind Exc				
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type				
(1)	648.76	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W				
(2)	649.43	0	180	6" - HDPE	8"Ø FW				
					EJIW 5964-12 Trap - by Ind Exc				
									
					Hole in Flat Wall Structure				
					08/28/2020				

Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-148 BU-05 Station: August 28, 2020 Type: City of Cleveland Curb Inlet SalesPerson: Ralph Hastings	Description		UOM	Quantity	Weight
	24" X 36" Catch Basin Base X 72" Tall		EA	1	5996
	Hole in Flat Wall Structure		EA	3	0
Rim: 656.84' Invert: 652.84' Rim to Invert: 4.00' Sump: 3.00'	IX Reviewed J.P. Sorma PE 8/31/20				 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614

				EJIW 7035 - by Ind Exc	
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	652.84	0	0	EJIW 5964-12	Trap Ko 30\"T x 18\"W
(2)	653.51	0	180	6\" - HDPE	8\"Ø FW
(3)	653.51	0	90	6\" - HDPE	8\"Ø FW
(4)	653.51	0	270	6\" - HDPE	8\"Ø FW
					EJIW 5964-12 Trap - by Ind Exc
				Hole in Flat Wall Structure	08/28/2020



## **Submittal Package #173408**

**Independence Excavating**

**ODOT 173000-OC3**

**Cleveland, Ohio**

**September 23, 2020**

**SUBMITTAL FOR:**

**BU-05 - Balance of Storm Manholes & Catch Basins**

**RALPH HASTINGS  
LINDSAY PRECAST  
PO BOX 578  
6845 ERIE AVE. N.W.  
CANAL FULTON, OHIO 44614  
1-800-837-7788**

Ph: 440 543-5468  
Fax: 440 543-1152  
Mobile: 440 336-4162  
Email: [rhastings@lindsayprecast.com](mailto:rhastings@lindsayprecast.com)  
Web : [www.lindsayconcrete.com](http://www.lindsayconcrete.com)

**Ind Exc / ODOT 173000-OC-3 / BU-05 Storm & Sanitary Status Report - September 23, 2020 - Page 1 of 2**

Structure	Size	Description	Status	
D-88 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-89 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-90	72"Ø	Cleve WPC Stm 72"Ø	Shipped	
D-91 BU-05	48"Ø	ODOT #3 Storm Manhole	Shipped	
D-95 BU-05	32"x32"	ODOT #3A Catch basin	Shipped	
D-96 Return Mh - BU-05	72"Ø	ODOT #3 Storm Manhole	Submitted	
D-96 Type 4 WQS	10'x20'	ENV 21 ODOT WQS type 4	Submitted	
D-96 Weir Mh - BU-05	72"Ø	ODOT #3 Storm Manhole with 12" Weir	Submitted	
D-97 BU-05	48"Ø	ODOT #3 Storm Manhole	Shipped	
D-98 BU-05	72"Ø	ODOT #3 Storm Manhole	Submittal - Sept 23,'20	
D-99 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Submittal - Sept 23,'20	
D-100 BU-05	96"Ø	ODOT #3 Storm Manhole	Submittal - Sept 23,'20	
D-101 BU-05	48"Ø	ODOT #3 Storm Manhole	Shipped	
D-102 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Submittal - Sept 23,'20	
D-103 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Submittal - Sept 23,'20	
D-104 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Submittal - Sept 23,'20	
D-105 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Submittal - Sept 23,'20	
D-107 BU-05	24"x24"	ODOT 2-2B Catch Basin	Submittal - Sept 23,'20	
D-109 BU-05	24"x24"	ODOT 2-2A Catch Basin	Submittal - Sept 23,'20	
D-110 BU-05	32"x32"	ODOT #3A Catch basin	Shipped	
D-111 BU-05	32"x32"	ODOT #3A Catch basin	Shipped	
D-112 BU-05	32"x32"	ODOT #3A Catch basin	Shipped	
D-113 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Shipped	
D-114 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-115 BU-05	24"x24"	ODOT 2-2A Catch Basin	Shipped	
D-116 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-117 BU-05	Headwall	ODOT HW2.2 for 12" Pipe	Shipped	
D-118 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-119 BU-05	32"x32"	ODOT #3A Catch basin	Shipped	
D-120 BU-05	32"x32"	ODOT #3A Catch basin	Shipped	
D-121 BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-122 BU-05	32"x32"	ODOT #3A Catch Basin APP	Submittal - Sept 23,'20	
D-123 BU-05	32"x32"	ODOT #3A Catch Basin APP	Submittal - Sept 23,'20	
D-124, Pc A BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-124, Pc B BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-125, Pc A BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-125, Pc B BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-126 BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-127 BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-128 BU-05	24"x24"	ODOT 2-2B Catch Basin	Submittal - Sept 23,'20	
D-129 BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-130 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Shipped	
D-131, Pc A	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-131, Pc B BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-133 BU-05	36"x36"	ODOT 2-3 Catch Basin	Submittal - Sept 23,'20	
D-134, Pc A BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-134, pc B BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-135 BU-05	24"x36"	Cleveland CB-1	Submittal - Sept 23,'20	
D-136, Pc A BU-05	24"x36"	Cleveland CB-1	Shipping 9/28/20	
D-136, Pc B BU-05	24"x36"	Cleveland CB-1	Shipping 9/28/20	



**Ind Exc / ODOT 173000-OC-3 / BU-05 Storm & Sanitary Status Report - September 23, 2020 - Page 2 of 2**

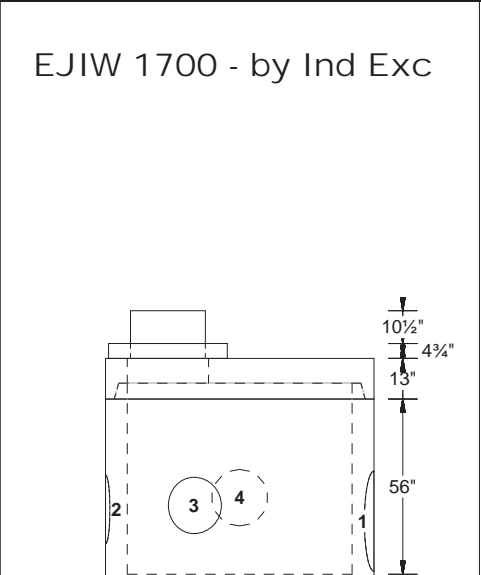
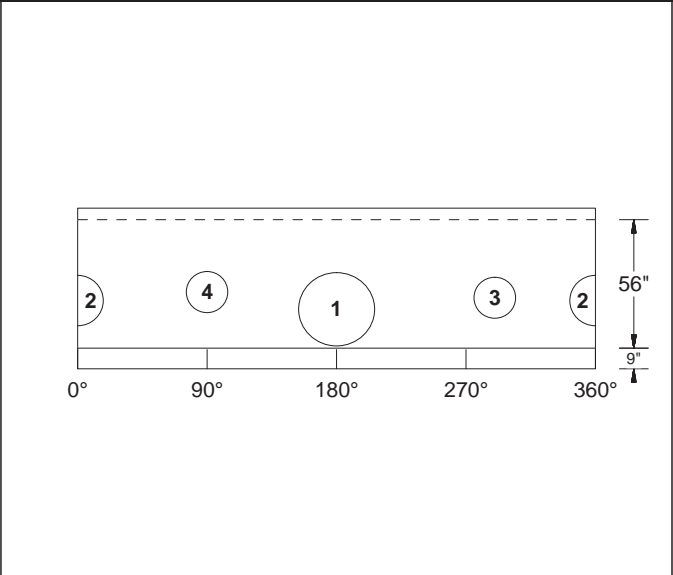
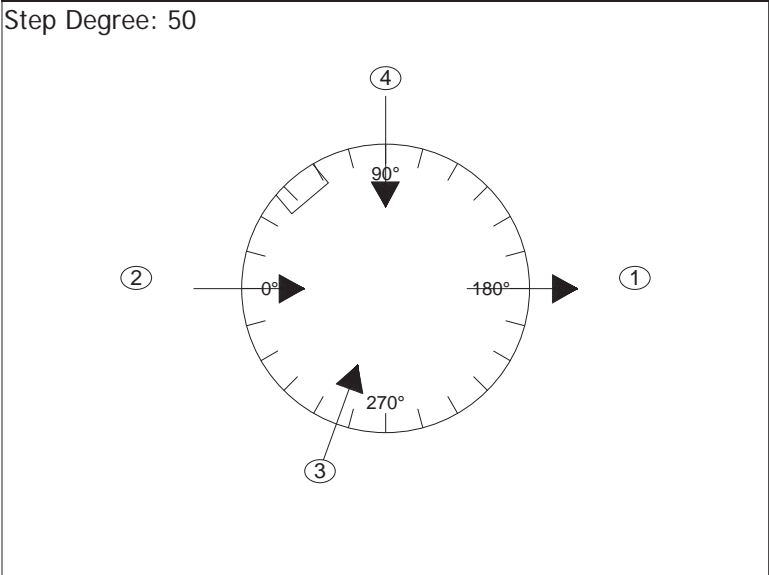
Structure	Size	Description	Status	
D-137, Pc A BU-05	24"x36"	Cleveland CB-1	Shipping 9/28/20	
D-137, Pc B BU-05	24"x36"	Cleveland CB-1	Shipping 9/28/20	
D-138	48"Ø	Cleve WPC Stm 48"Ø	Shipped	
D-139 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-140, Pc A BU-05	24"x36"	Cleveland CB-1	Shipped	
D-140, Pc B BU-05	24"x36"	Cleveland CB-1	Shipped	
D-142 Pc A, BU-05 REMAKE	24"x36"	Cleveland CB-1	Shipped	
D-142, Pc A BU-05	24"x36"	Cleveland CB-1	Shipped	
D-142, Pc B BU-05	24"x36"	Cleveland CB-1	Shipped	
D-143 BU-05 Pc A	24"x36"	Cleveland CB-1	Shipped	
D-143 BU-05 Pc B	24"x36"	Cleveland CB-1	Shipped	
D-144 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-145 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-147 BU-05	24"x36"	Cleveland CB-1	Ordered - Need Dates	
D-148 BU-05	24"x36"	Cleveland CB-1	Ordered - Need Dates	
D-149 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Ordered - Need Dates	
D-149A BU-05	24"x36"	Cleveland CB-1	Ordered - Need Dates	
D-150 BU-05	24"x36"	Cleveland CB-1	Ordered - Need Dates	
D-151 BU-05	48"Ø	Cleve WPC Stm 48"Ø	Ordered - Need Dates	
D-152 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-152A BU-05	24"x36"	Cleveland CB-1	Shipped	
D-153 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-153A BU-05	24"x36"	Cleveland CB-1	Shipped	
D-154 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-155 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-156, Pc A BU-05	24"x36"	Cleveland CB-1	Shipped	
D-156, Pc B BU-05	24"x36"	Cleveland CB-1	Shipped	
D-156A BU-05	24"x36"	Cleveland CB-1	Shipped	
D-157 BU-05	24"x36"	Cleveland CB-1	Shipped	
D-158 BU-05	24"x36"	Cleveland CB-1	Shipped	
S-10A Riser 1	60"Ø	Cleve WPC Stm 60"Ø	Shipped	
S-10A Riser 2	48"Ø	Cleve WPC Stm 48"Ø	Shipped	
S-101	84"Ø	Cleve WPC Stm 84"Ø	Shipped	
S-102	72"Ø	Cleve WPC Stm 72"Ø	Shipped	
S-103	84"Ø	Cleve WPC Stm 84"Ø	Shipped	
S-104	60"Ø	Cleve WPC Stm 60"Ø	Shipped	
S-105	84"Ø	Cleve WPC Stm 84"Ø	Shipped	
S-106	84"Ø	Cleve WPC Stm 84"Ø	Shipped	
S-107	10'x10'	Custom	Shipped	
S-109	60"Ø	Cleve WPC Stm 60"Ø	Shipped	
S-110A	60"Ø	Cleve WPC Stm 60"Ø	Shipped	
S-110B	72"Ø	Cleve WPC Stm 72"Ø	Shipped	
S-111	96"Ø	Cleve WPC Stm 96"Ø	Shipped	
S-112	48"Ø	Cleve WPC Stm 48"Ø	Shipped	
S-115	48"Ø	Cleve WPC Stm 48"Ø	Shipped	
S-115A	48"Ø	Cleve WPC Stm 48"Ø	Shipped	
S-116	48"Ø	Cleve WPC Stm 48"Ø	Shipped	
S-117	48"Ø	Cleve WPC Stm 48"Ø	Shipped	

Customer:	INDEPENDENCE EXCAVATING, INC.
Job Name:	ODOT 173000 - Opp Corridor Ph 3
Job #:	173408
Structure ID:	D-98 BU-05
Station:	Sept 23,'20
Type:	ODOT #3 Storm Manhole
SalesPerson:	Ralph Hastings
Rim:	641.41'
Invert:	634.94'
Rim to Invert:	6.47'
Sump:	0.55'

Description	UOM	Quantity	Weight
Stock 72"Ø Flat Top W/26"Ø Hole	EA	1	3880
72"Ø Non Extended 9" Manhole Base X 56" Tall	EA	1	11947
Hole in Structure for Pipe	EA	4	0
<div> <div>ODOT MH 3 APP</div> <div>W/ pipe holes</div> <div>IX Reviewed J.P. Sorma PE</div> <div>9/29/20</div> </div>			



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	634.94	-0.5	180	21" - RCP Co-Pipe	32"Ø
(2)	635.44	1.95	0	15" - VCP LOGAN	22"Ø
(3)	635.69	1	290	12" - VCP LOGAN	18"Ø
(4)	635.89	1	90	12" - VCP LOGAN	18"Ø

	Hole in Structure for Pipe	09/24/2020
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-99 BU-05  
Station: Sept 23,'20  
Type: Cleveland Division of Water Pollution  
SalesPerson: Control 48"Ø  
Ralph Hastings

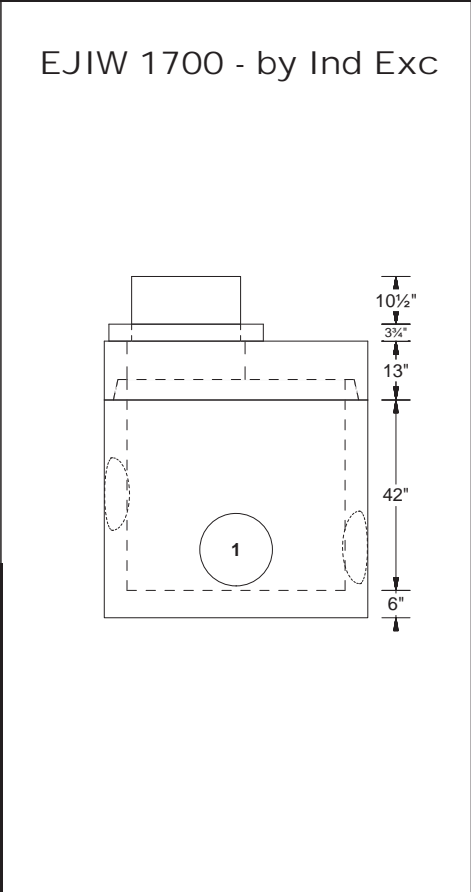
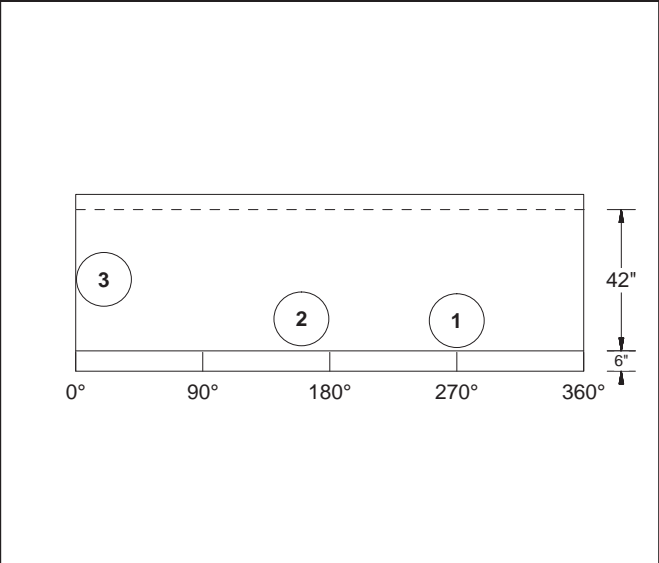
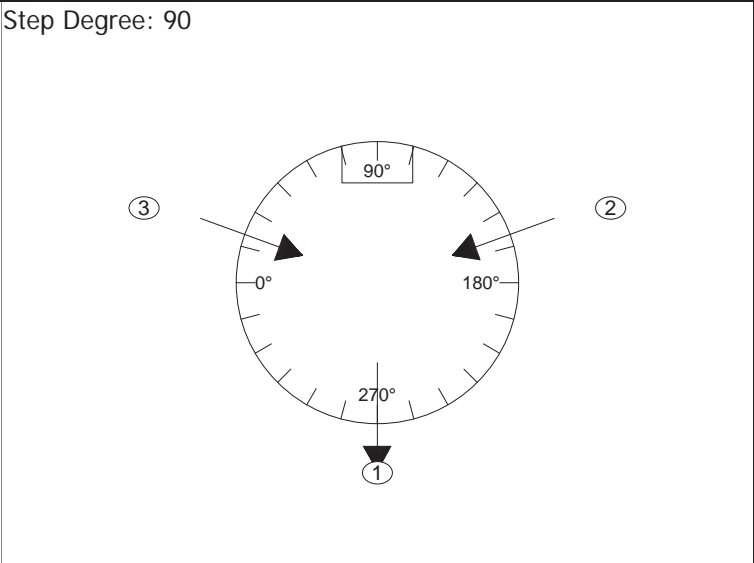
Rim: 641.61'  
Invert: 636.11'  
Rim to Invert: 5.50'  
Sump: 0.27'

Description	UOM	Quantity	Weight
Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
48"Ø Non Extended 6" Manhole Base X 42" Tall	EA	1	4150
A-Lok XC-480	EA	3	0

Cleveland WPC MH-1  
W/ A-Loks  
**IX Reviewed J.P. Sorma PE**  
**9/29/20**



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636.11	-1	270	12" - VCP LOGAN	480 A-LOK
(2)	636.11	1	160	12" - VCP LOGAN	480 A-LOK
(3)	637.1	1	20	12" - VCP LOGAN	480 A-LOK

	A-Lok XC-480	09/24/2020
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Customer: INDEPENDENCE EXCAVATING, INC.

Job Name: ODOT 173000 - Opp Corridor Ph 3

Job #: 173408

Structure ID: D-100 BU-05

Station: Sept 23,'20

Type: ODOT #3 Storm Manhole

SalesPerson: Ralph Hastings

Rim: 641.46'

Invert: 633.42'

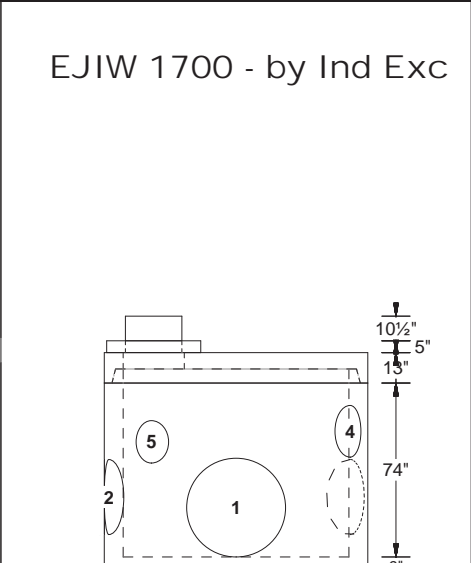
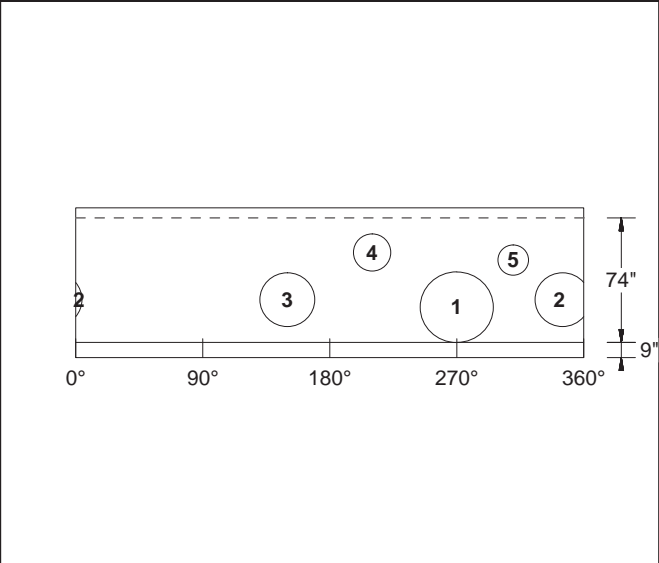
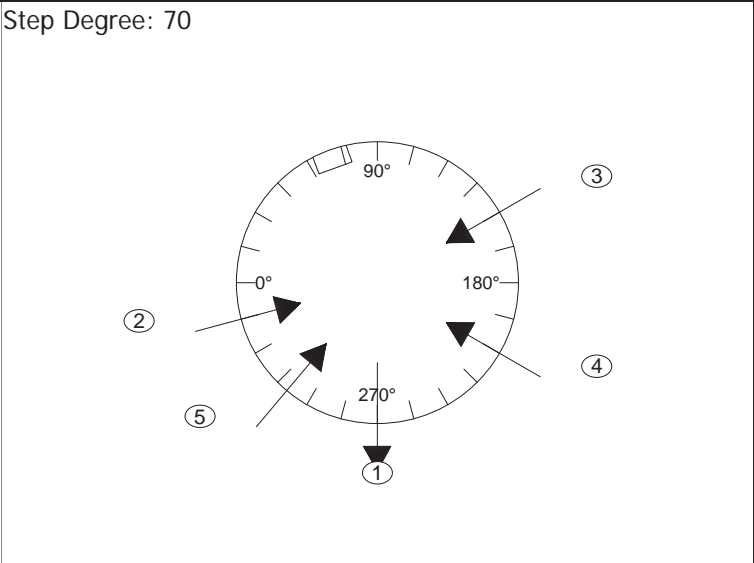
Rim to Invert: 8.04'

Sump: 0.50'

Description	UOM	Quantity	Weight
96"Ø Flat Top W/ 26"Ø Hole	EA	1	10448
96"Ø Non Extended 9" Manhole Base X 74" Tall	EA	1	21941
Hole in Structure for Pipe	EA	5	0
ODOT MH 3 APP W/ pipe holes  IX Reviewed J.P. Sorma PE 9/29/20			



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	633.42	0	270	30" - RCP Co-Pipe	42"Ø
(2)	634.17	0	345	21" - RCP Co-Pipe	32"Ø
(3)	634.17	0	150	21" - RCP Co-Pipe	32"Ø
(4)	636.76	0	210	15" - VCP LOGAN	22"Ø
(5)	636.49	0	310	12" - VCP LOGAN	18"Ø

	Hole in Structure for Pipe	09/24/2020
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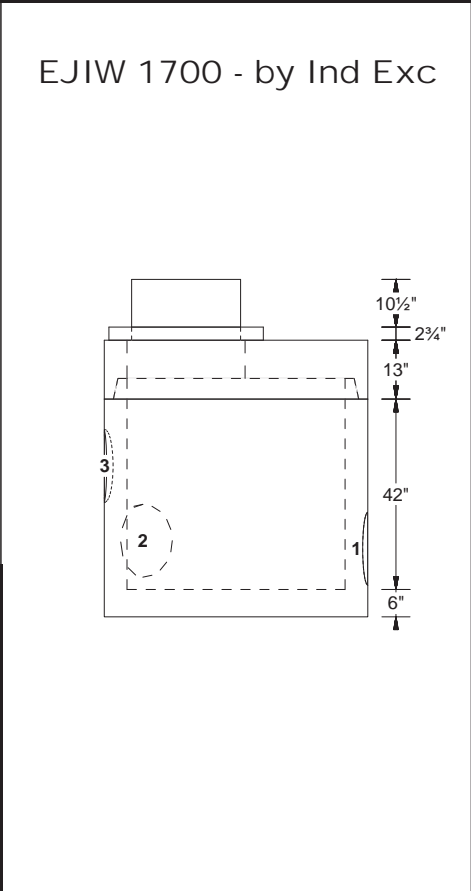
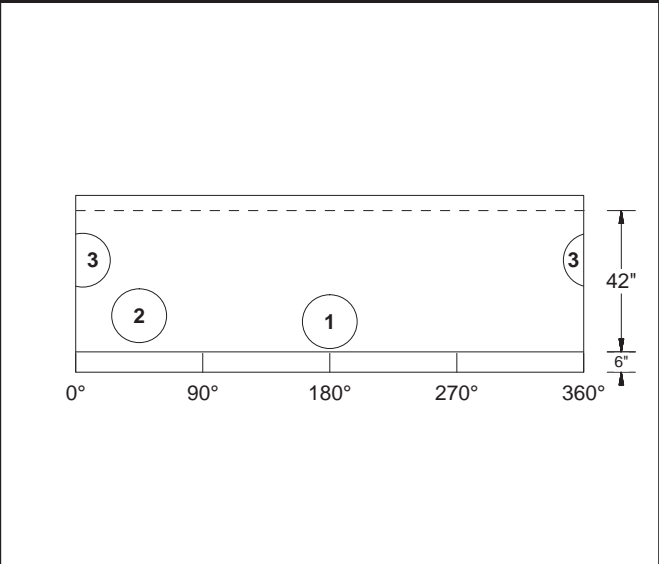
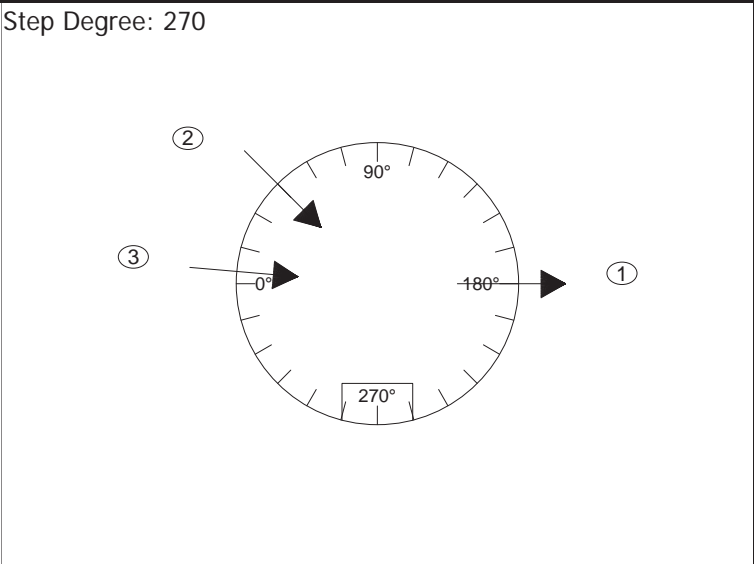
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-102 BU-05  
Station: Sept 23,'20  
Type: Cleveland Division of Water Pollution  
SalesPerson: Control 48"Ø  
Ralph Hastings

Rim: 649.62'  
Invert: 644.25'  
Rim to Invert: 5.37'  
Sump: 0.32'

Description	UOM	Quantity	Weight
Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
48"Ø Non Extended 6" Manhole Base X 42" Tall	EA	1	4150
A-Lok XC-480	EA	3	0
<div> <div>Cleveland WPC MH-1</div> <div>W/ A-Loks</div> <div>IX Reviewed J.P. Sorma PE</div> <div>9/29/20</div> </div>			



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	644.25	-3.87	180	12" - VCP LOGAN	480 A-LOK
(2)	644.25	3.17	45	12" - VCP LOGAN	480 A-LOK
(3)	645.62	3.82	5	12" - VCP LOGAN	480 A-LOK

	A-Lok XC-480	09/24/2020
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-103 BU-05  
Station: Sept 23,'20  
Type: Cleveland Division of Water Pollution  
SalesPerson: Control 48"Ø  
Ralph Hastings

Rim: 643.80'  
Invert: 637.80'  
Rim to Invert: 6.00'  
Sump: 0.47'

Description	UOM	Quantity	Weight
Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
48"Ø Non Extended 6" Manhole Base X 50" Tall	EA	1	4205
A-Lok XC-480	EA	2	0
A-Lok XC-890 Premium	EA	2	0

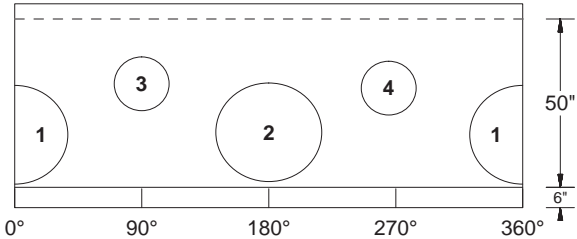
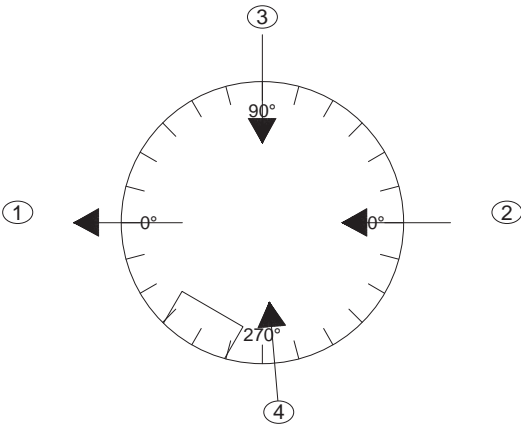
Cleveland WPC MH-1  
W/ A-Loks

IX Reviewed J.P. Sorma PE  
9/29/20

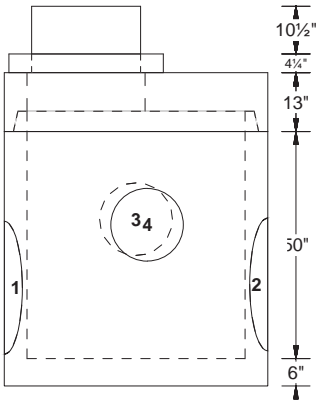


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Step Degree: 300



EJIW 1700 - by Ind Exc



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	637.8	-2.37	0	21" - RCP Co-Pipe	890 A-LOK
(2)	637.8	1.16	180	21" - RCP Co-Pipe	890 A-LOK
(3)	639.36	1	90	12" - VCP LOGAN	480 A-LOK
(4)	639.27	1	265	12" - VCP LOGAN	480 A-LOK

A-Lok XC-480  
A-Lok XC-890 Premium

09/24/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-104 BU-05  
Station: Sept 23,'20  
Type: Cleveland Division of Water Pollution  
SalesPerson: Control 48"Ø  
Ralph Hastings

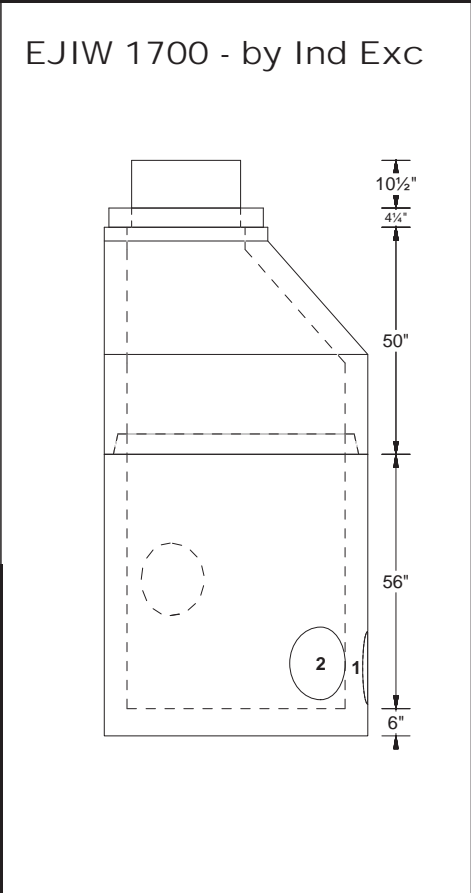
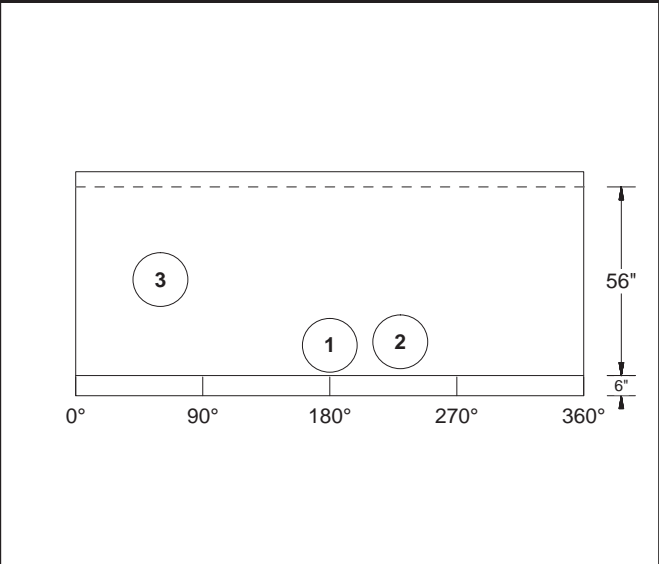
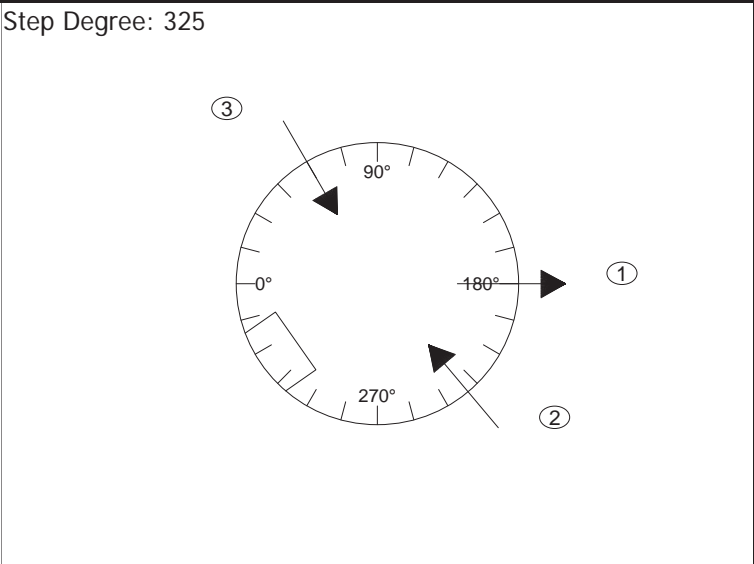
Rim: 660.87'  
Invert: 651.11'  
Rim to Invert: 9.76'  
Sump: 0.31'

Description	UOM	Quantity	Weight
Stock 48"Ø X 50" Eccentric Cone	EA	1	3740
48"Ø Non Extended 6" Manhole Base x 56" Tall	EA	1	5162
A-Lok XC-480	EA	3	0

Cleveland WPC MH-1  
W/ A-Loks  
IX Reviewed J.P. Sorma PE  
9/29/20



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	651.11	-3.17	180	12" - VCP LOGAN	480 A-LOK
(2)	651.11	1	230	12" - VCP LOGAN	480 A-LOK
(3)	652.61	3.08	60	12" - VCP LOGAN	480 A-LOK

	A-Lok XC-480	09/24/2020
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-105 BU-05  
Station: Sept 23,'20  
Type: Cleveland Division of Water Pollution  
SalesPerson: Control 48"Ø  
Ralph Hastings

Rim: 646.82'  
Invert: 639.30'  
Rim to Invert: 7.52'  
Sump: 0.45'

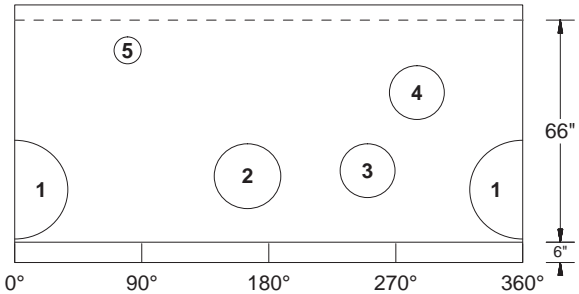
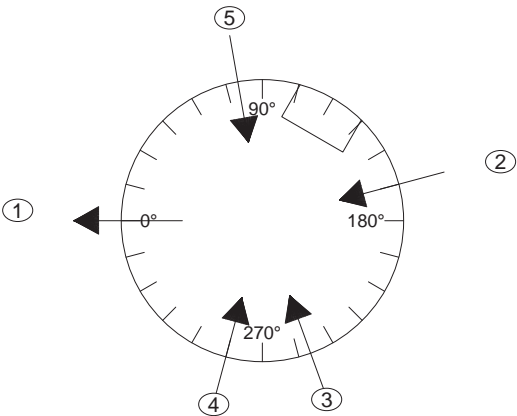
Description	UOM	Quantity	Weight
Stock 48"Ø Flat Top W/ 26"Ø Hole	EA	1	1185
48"Ø Non Extended 6" Manhole Base x 66" Tall	EA	1	5517
A-Lok XC-480	EA	2	0
A-Lok XC-580	EA	1	0
A-Lok XC-890 Premium	EA	1	0
Hole in Structure for Pipe	EA	1	0

Cleveland WPC MH-1  
W/ A-Loks  
IX Reviewed J.P. Sorma PE  
9/29/20

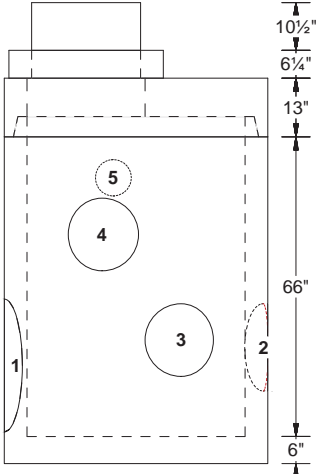


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Canal Fulton, Ohio 44614

Step Degree: 120



EJIW 1700 - by Ind Exc



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	639.3	-1.16	0	21" - RCP Co-Pipe	890 A-LOK
(2)	639.8	2.74	165	15" - VCP LOGAN	580 A-LOK
(3)	640.05	3.87	250	12" - VCP LOGAN	480 A-LOK
(4)	642.05	1	285	12" - VCP LOGAN	480 A-LOK
(5)	643.35	0	80	6" - HDPE	8"Ø

A-Lok XC-480  
A-Lok XC-580  
A-Lok XC-890 Premium  
Hole in Structure for Pipe

09/24/2020

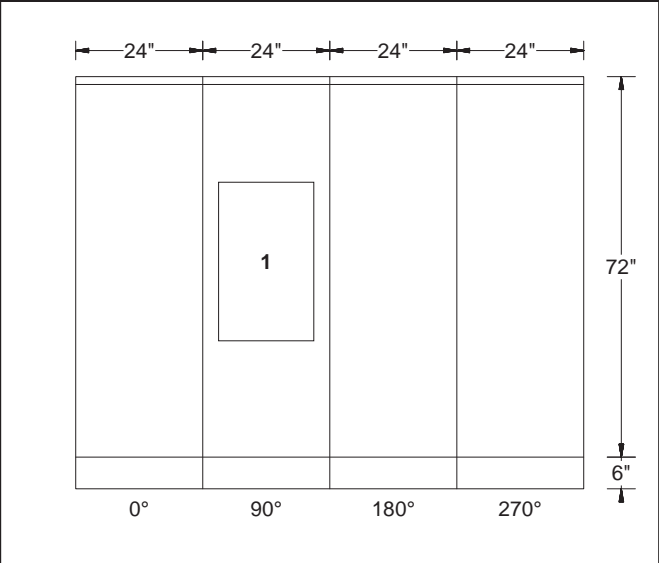
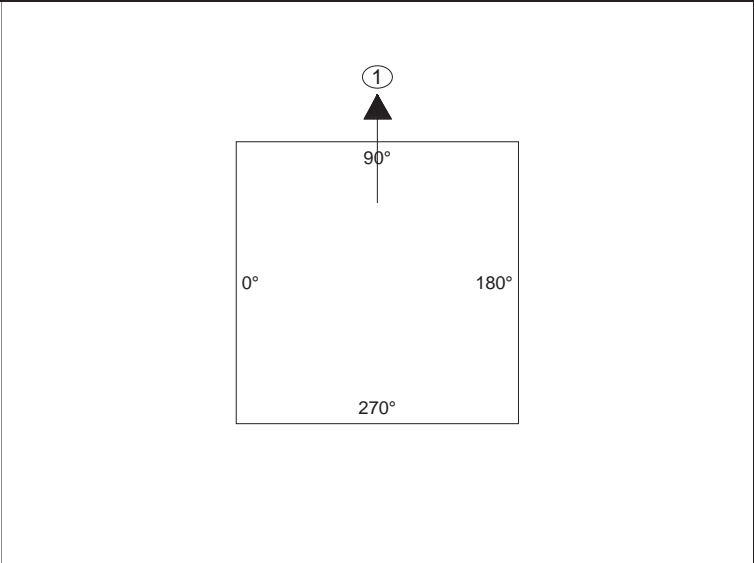
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-107 BU-05  
Station: Sept 23,'20  
Type: ODOT 2-2B Catch Basin  
SalesPerson: Ralph Hastings

Rim: 664.76'  
Invert: 660.26'  
Rim to Invert: 4.50'  
Sump: 3.00'

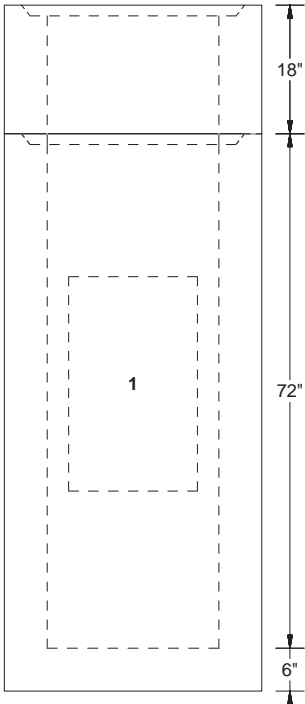
Description	UOM	Quantity	Weight
24" X 24" Catch Basin Riser X 18" Tall	EA	1	1125
24" X 24" Catch Basin X 72" Tall	EA	1	4938
Square hole	EA	1	0
ODOT CB 2-2B APP  IX Reviewed J.P. Sorma PE 9/29/20			



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EJIW 5110 by Ind Exc



EJIW 5964-12 trap  
by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	660.26	0	90	EJIW 5964-12	30"T x 18"W KO
					Square hole

09/24/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-109 BU-05  
Station: Sept 23,'20  
Type: ODOT 2-2A Catch Basin  
SalesPerson: Ralph Hastings

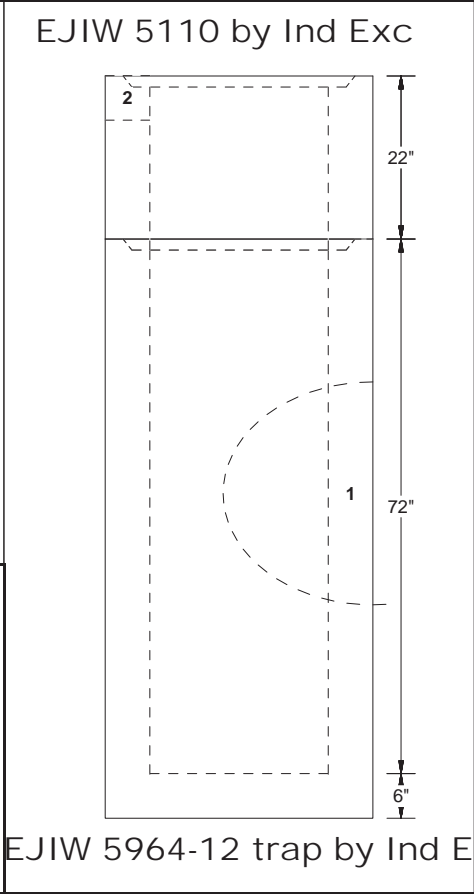
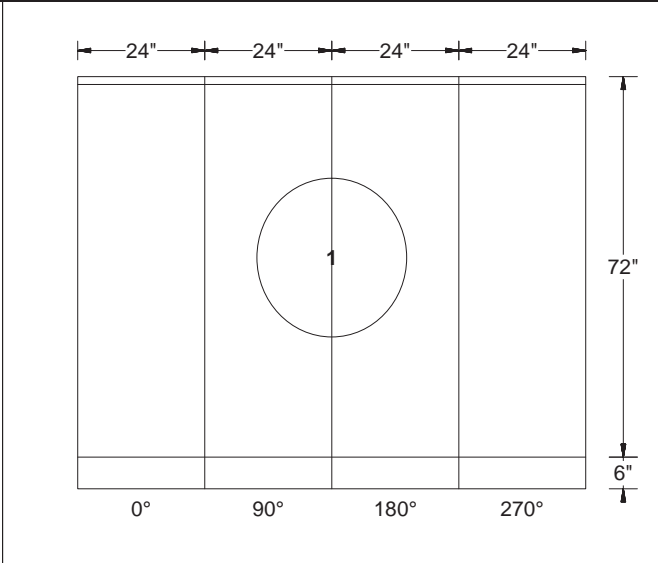
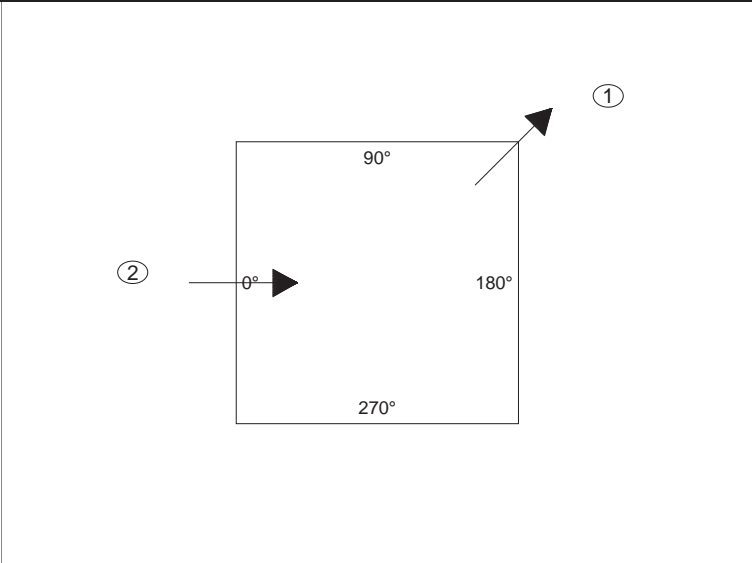
Rim: 642.76'  
Invert: 638'  
Rim to Invert: 4.76'  
Sump Height: 3.07'

Description	UOM	Quantity	Weight
24" X 24" Catch Basin Riser X 22" Tall	EA	1	1298
24" X 24" Catch Basin X 72" Tall	EA	1	4903
EJIW 5110 Z Frame - 00511013	EA	1	0
Square hole	EA	1	0
Corner Hole in Structure for Pipe	EA	1	0

ODOT CB 2-2A APP  
IX Reviewed J.P. Sorma PE  
9/29/20



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PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description
(1)	638	0	135	EJIW 5964-12	20"W X 30"T CORNER	RN: 14.14L X 14.14L
(2)	642.26	0	0	6" x 24" WINDOW	6"t X 24"w Ko	L .01 / R .01

> Please confirm window placement at 0° (west) <

Square hole  
Corner Hole in Structure for Pipe

09/24/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-121 BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

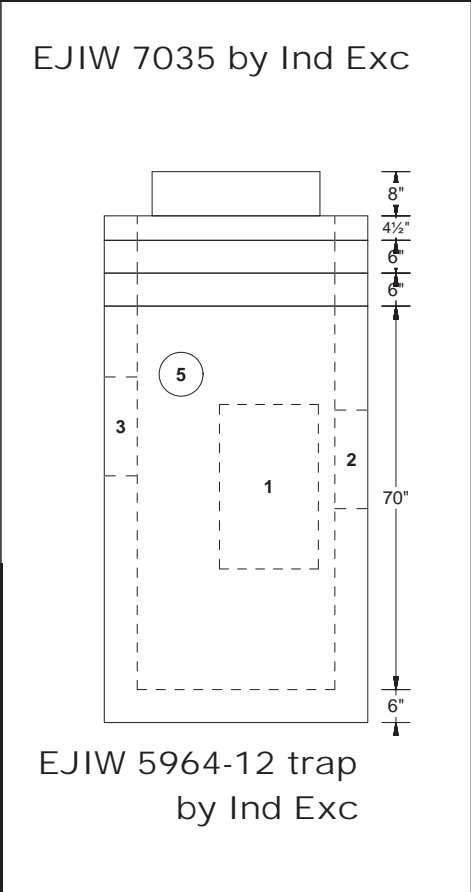
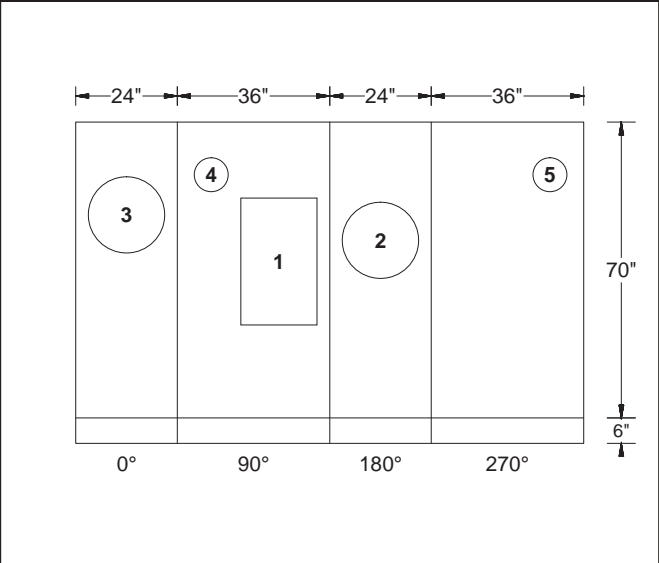
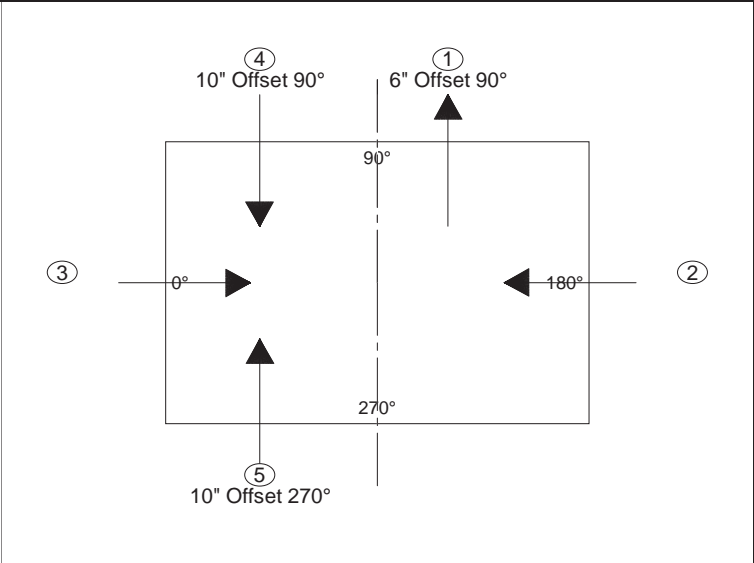
Rim: 640.87'  
Invert: 636.00'  
Rim to Invert: 4.87'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" x 36" x 6" Grade Ring	EA	1	450
24" x 36" x 6" Grade Ring	EA	1	450
24" X 36" Catch Basin Base X 70" Tall	EA	1	5152
Hole in Flat Wall Structure	EA	4	0

Cleveland WPC CB-1  
IX Reviewed J.P. Sorma PE  
9/29/20




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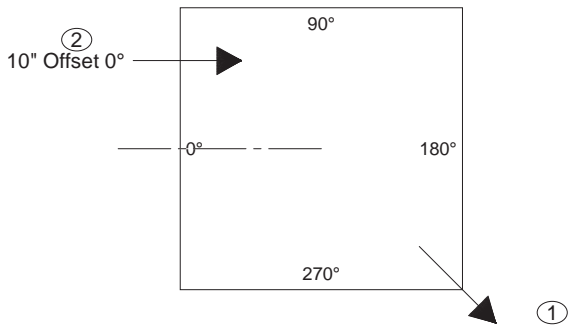
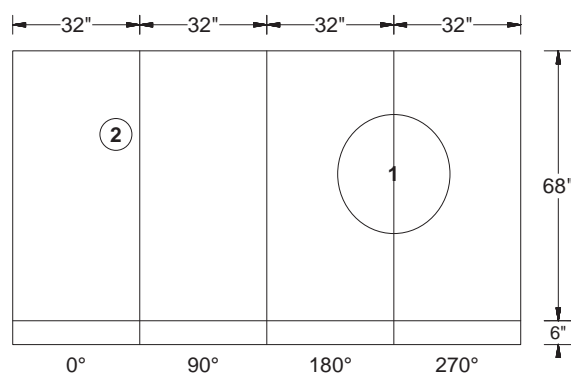
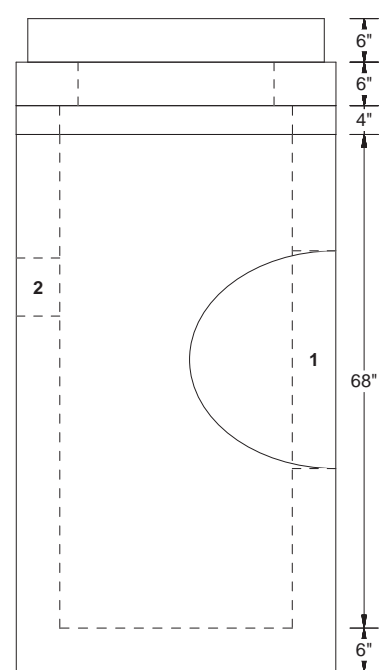


PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	636	0	180	12" - VCP LOGAN	18"Ø FW
(3)	636.5	0	0	12" - VCP LOGAN	18"Ø FW
(4)	637.54	0	90	6" - HDPE	8"Ø FW
(5)	637.54	0	270	6" - HDPE	8"Ø FW

NOTE  
> 6" U/D from the west must be on the 270° wall <

Hole in Flat Wall Structure  
09/24/2020

Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-122 BU-05 Station: Sept 23,'20 Type: ODOT #3A Catch Basin APP SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	
	ODOT 3A Lid Tall Back	EA	1	960	
	32" X 32" Catch Basin Base X 68" Tall	EA	1	6108	
	Corner Hole in Structure for Pipe	EA	1	0	
	Hole in Flat Wall Structure	EA	1	0	
Rim: 641.53' Invert: 637.53' Rim to Invert: 4.00' Sump Height: 3.00'	ODOT CB 3A APP  IX Reviewed J.P. Sorma PE 9/29/20				1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614

								<p>EJIW 7350 by Ind Exc</p>  <p>EJIW 5964-12 trap by Ind Exc</p>			
PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description					
(1)	637.53	0	225	EJIW 5964-12	20"W X 30"T CORNER	RN: 14.14L X 14.14L					
(2)	638.2	0	0	6" - HDPE	8"Ø FW	L 2.00 / R 22.00					
						Corner Hole in Structure for Pipe Hole in Flat Wall Structure		09/24/2020			

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-123 BU-05  
Station: Sept 23,'20  
Type: ODOT #3A Catch Basin APP  
SalesPerson: Ralph Hastings

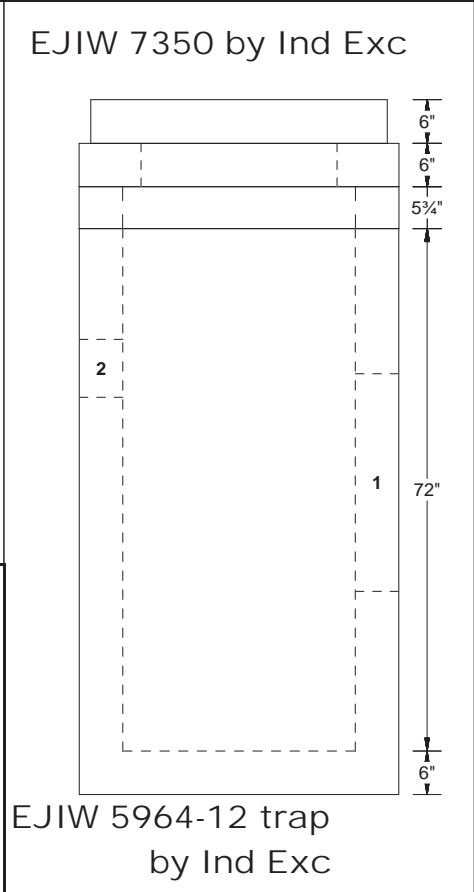
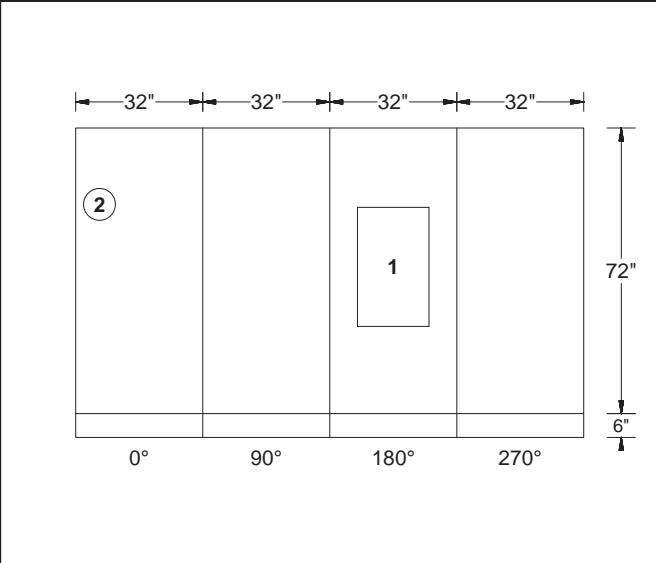
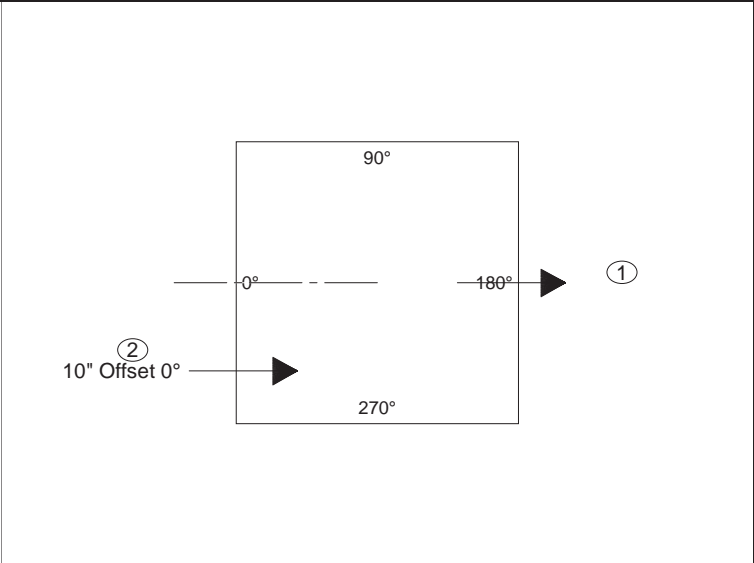
Rim: 642.14'  
Invert: 637.66'  
Rim to Invert: 4.48'  
Sump Height: 3.00'

Description	UOM	Quantity	Weight
ODOT 3A Lid Tall Back	EA	1	960
32" X 32" Catch Basin Base X 72" Tall	EA	1	6456
Hole in Flat Wall Structure	EA	1	0

ODOT CB 3A APP  
IX Reviewed J.P. Sorma PE  
9/29/20



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PipeNum	Elevation	%Grade	Angle	Pipe	Former	Description
(1)	637.66	0	180	EJIW 5964-12	Trap Ko 30"T x 18"W	L 7.00 / R 7.00
(2)	638.81	0	0	6" - HDPE	8"Ø FW	L 22.00 / R 2.00

> Submitted as an ODOT CB 3A APP per Plan Page 14. Plan Page 30 lists this CB as a Cleveland Hole in Flat Wall Structure CB-1. Please confirm or revise. <

09/24/2020

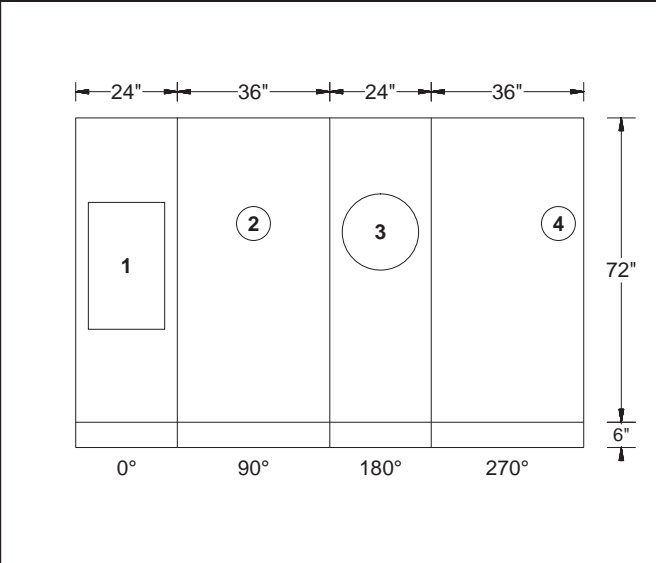
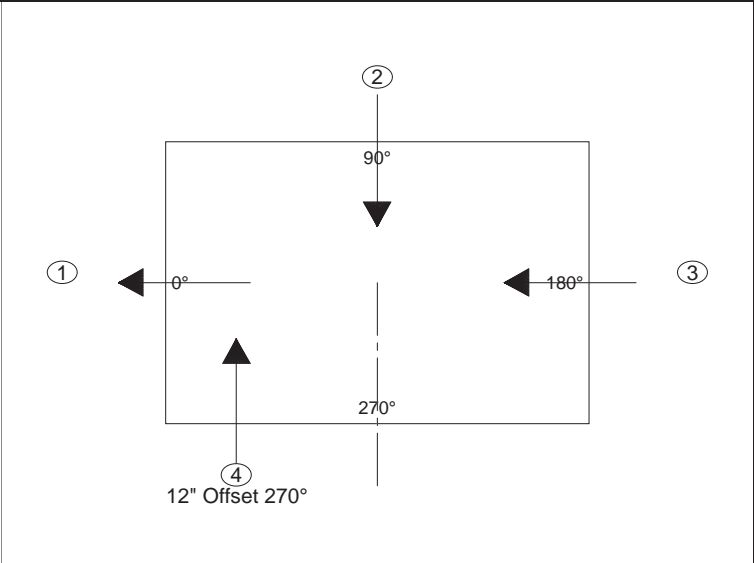
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-124, Pc A BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 640.68'  
Invert: 636.68'  
Rim to Invert: 4.00'  
Sump: 3.00'

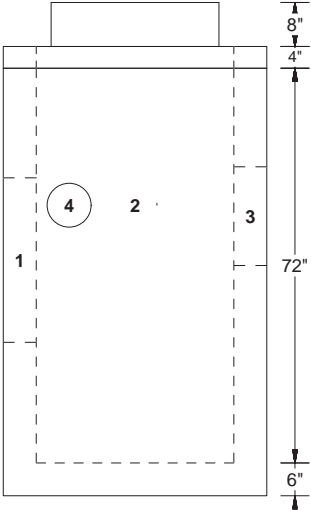
Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	5887
Hole in Flat Wall Structure	EA	3	0
Cleveland WPC CB-3, Pc A			
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EJIW 7035 by Ind Exc



EJIW 5964-12 trap  
by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636.68	0	0	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	637.35	0	90	6" - HDPE	8"Ø FW
(3)	636.93	0	180	12" - VCP LOGAN	18"Ø FW
(4)	637.35	0	270	6" - HDPE	8"Ø FW

NOTE  
> 6" U/D from the west must be on the 270° wall <

Hole in Flat Wall Structure	09/24/2020
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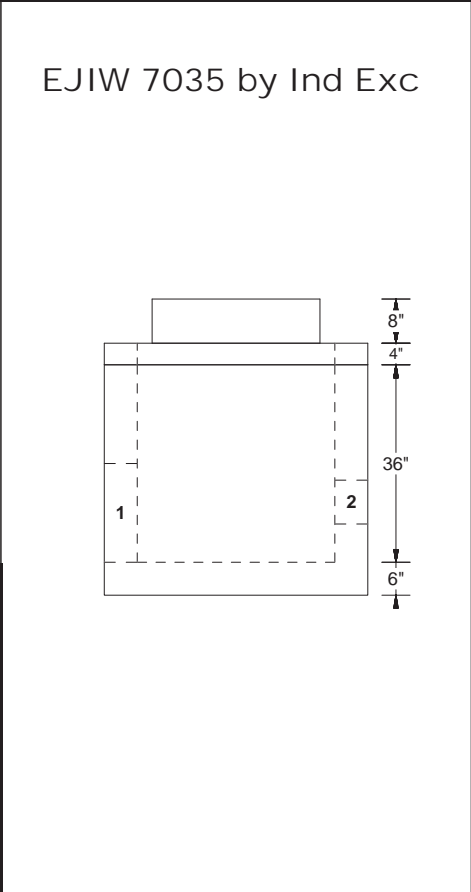
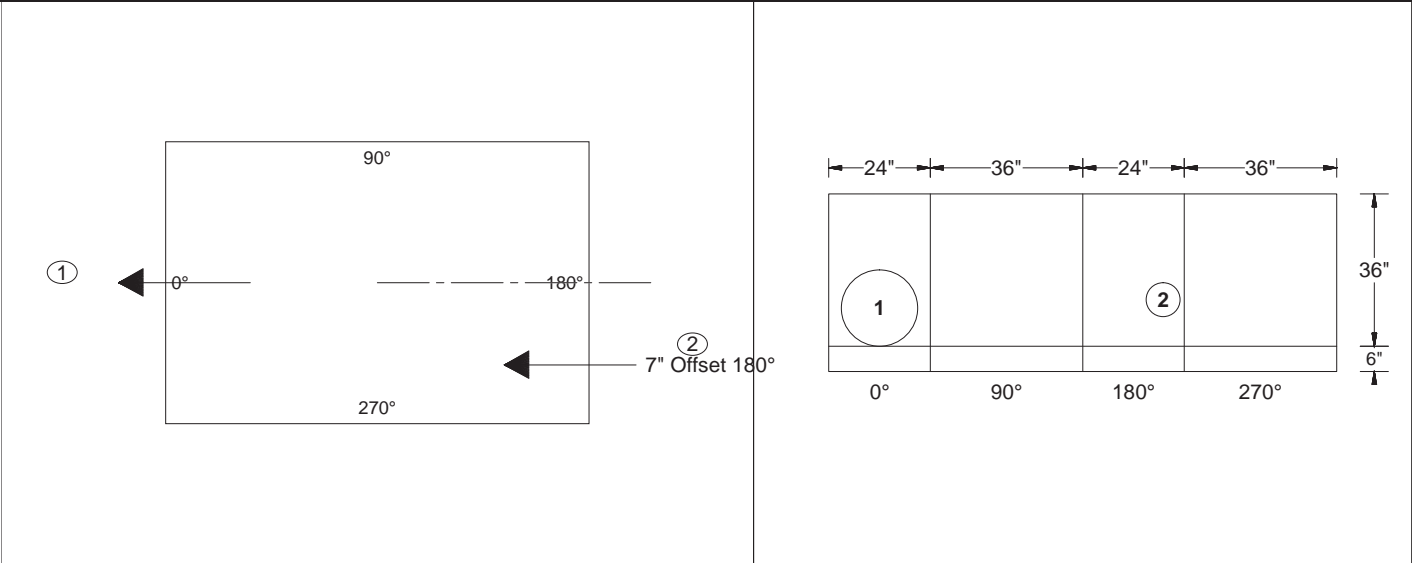
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-124, Pc B BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 640.68'  
Invert: 636.93'  
Rim to Invert: 3.75'  
Sump: 0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 36" Tall	EA	1	3439
Hole in Flat Wall Structure	EA	2	0
<div> <div>Cleveland WPC CB-3, Pc B</div> <div>IX Reviewed J.P. Sorma PE</div> <div>9/29/20</div> </div>			



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636.93	0	0	12" - VCP LOGAN	18"Ø FW
(2)	637.35	0	180	6" - HDPE	8"Ø FW

	Hole in Flat Wall Structure	09/24/2020
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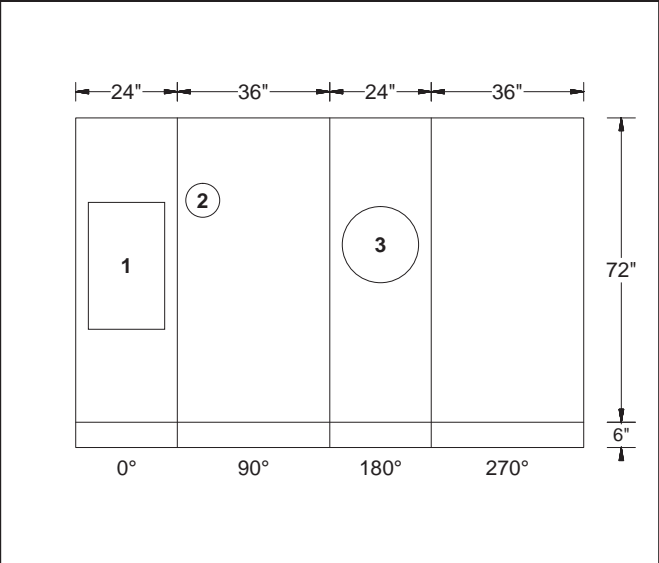
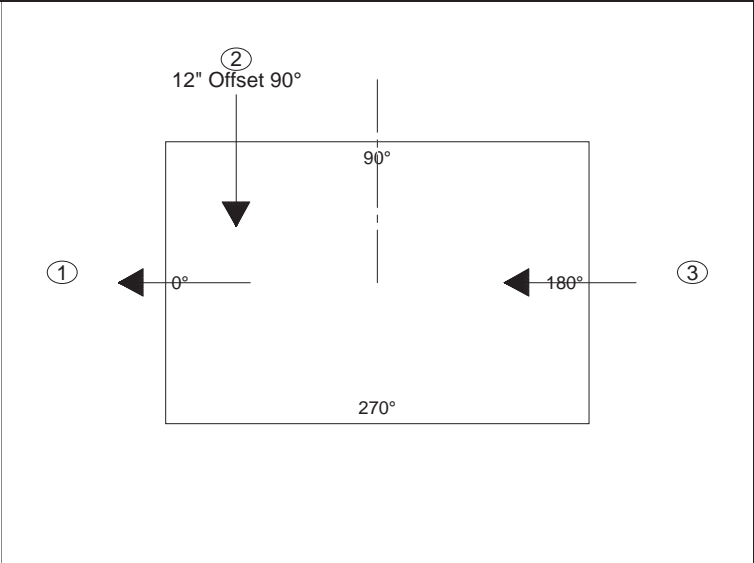
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-125, Pc A BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 641.12'  
Invert: 636.67'  
Rim to Invert: 4.45'  
Sump: 3.00'

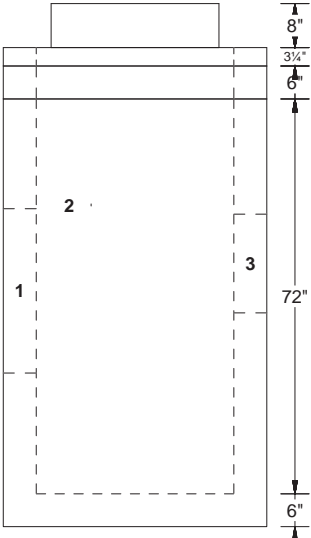
Description	UOM	Quantity	Weight
24" x 36" x 6" Grade Ring	EA	1	450
24" X 36" Catch Basin Base X 72" Tall	EA	1	5913
Hole in Flat Wall Structure	EA	2	0
Cleveland WPC CB-3, Pc A  IX Reviewed J.P. Sorma PE 9/29/20			



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EJIW 7035 by Ind Exc



EJIW 5964-12 trap  
by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636.67	0	0	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	637.79	0	90	6" - HDPE	8"Ø FW
(3)	636.67	0	180	12" - VCP LOGAN	18"Ø FW

NOTE

> 6" U/D from the west must be on the 90° wall <

Hole in Flat Wall Structure	09/24/2020
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Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-125, Pc B BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

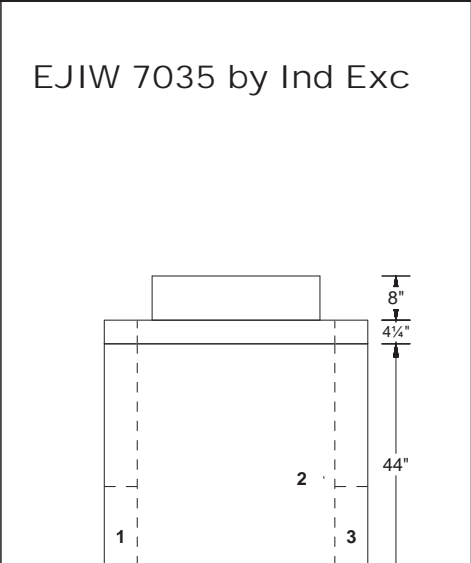
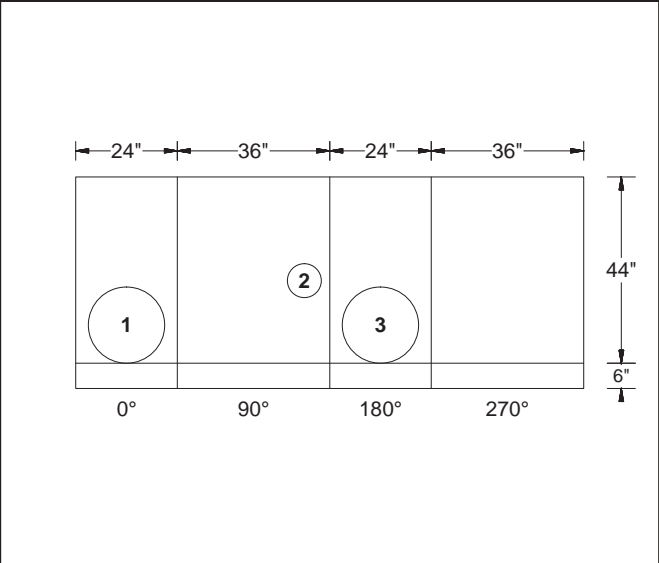
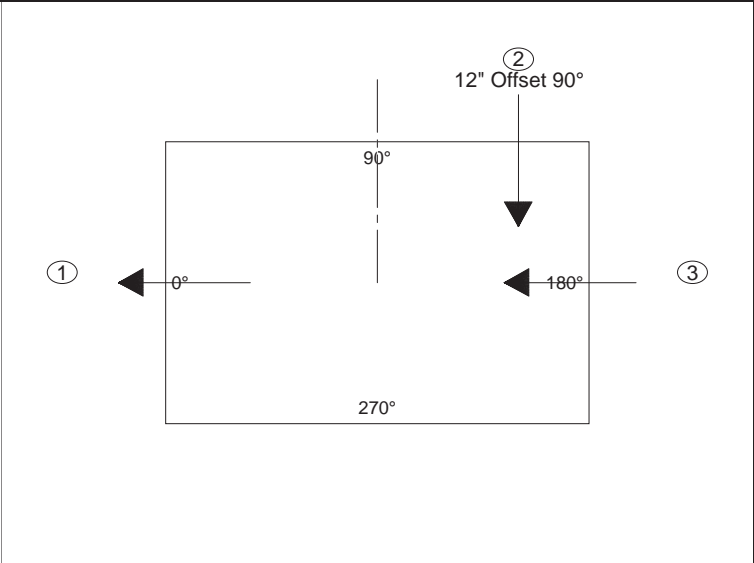
Rim: 641.12'  
Invert: 636.67'  
Rim to Invert: 4.45'  
Sump: 0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 44" Tall	EA	1	3904
Hole in Flat Wall Structure	EA	3	0

Cleveland WPC CB-3, Pc B  
  
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9/29/20



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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636.67	0	0	12" - VCP LOGAN	18"Ø FW
(2)	637.79	0	90	6" - HDPE	8"Ø FW
(3)	636.67	0	180	12" - VCP LOGAN	18"Ø FW

NOTE

> 6" U/D from the east must be on the 90° wall <

Hole in Flat Wall Structure

09/24/2020

Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-126 BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 640.87'  
Invert: 636.87'  
Rim to Invert: 4.00'  
Sump: 3.00'

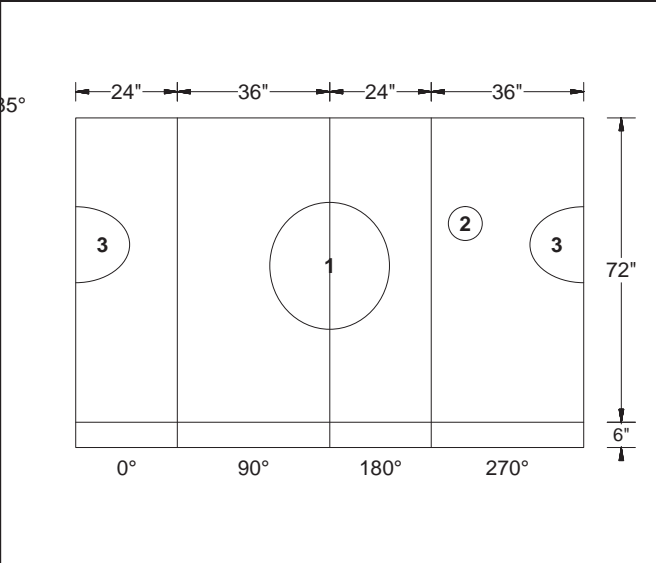
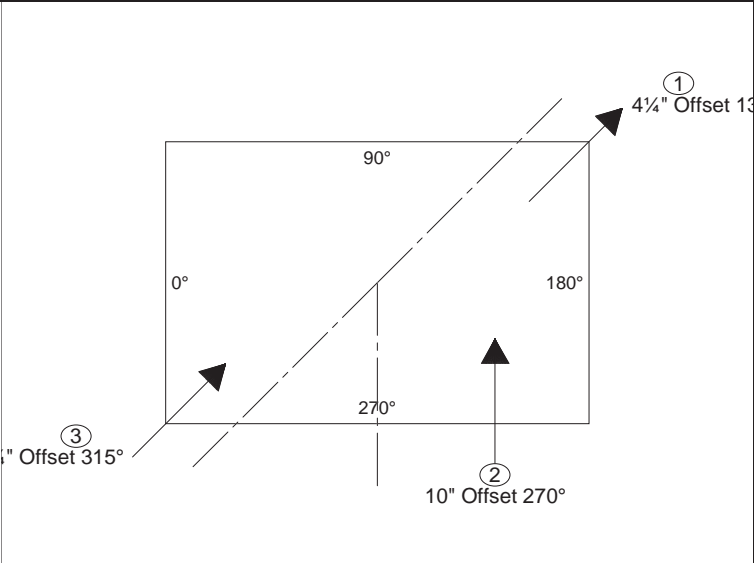
Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	5886
Corner Hole in Structure for Pipe	EA	2	0
Hole in Flat Wall Structure	EA	1	0

Cleveland WPC CB-1

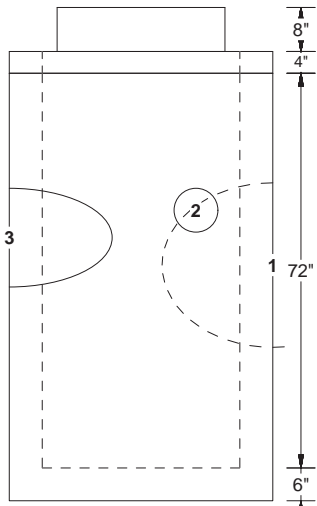
IX Reviewed J.P. Sorma PE  
9/29/20



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EJIW 7035 by Ind Exc



EJIW 5964-12 trap  
by Ind Exc


PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	636.87	0	135	EJIW 5964-12	20"W X 30"T CORNER
(2)	637.54	0	270	6" - HDPE	8"Ø FW
(3)	636.87	0	315	12" - VCP LOGAN	18" CORNER

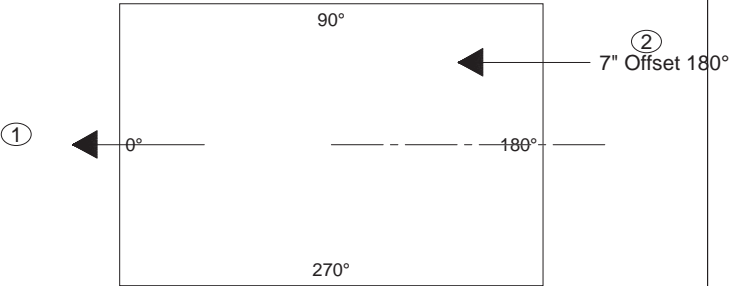
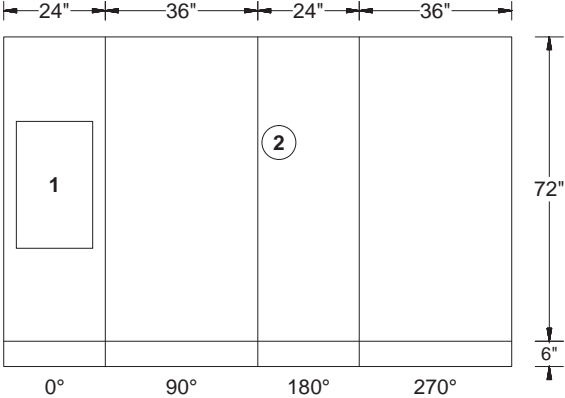
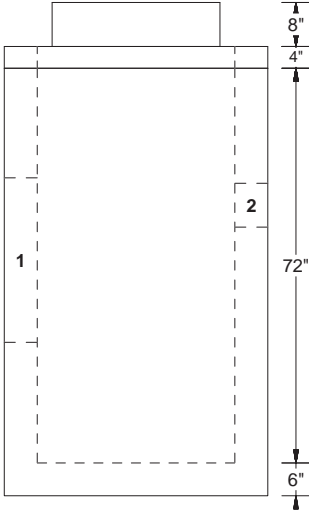
NOTE

> 6" U/D from the east must be on the 270° wall <

Corner Hole in Structure for Pipe  
Hole in Flat Wall Structure

09/24/2020

Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-127 BU-05 Station: Sept 23,'20 Type: City of Cleveland Curb Inlet SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	24" X 36" Catch Basin Base X 72" Tall	EA	1	6048	
	Hole in Flat Wall Structure	EA	1	0	
Rim: 641.33' Invert: 637.33' Rim to Invert: 4.00' Sump: 3.00'	Cleveland WPC CB-1  IX Reviewed J.P. Sorma PE 9/29/20				

				EJIW 7035 by Ind Exc  	
PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	637.33	0	0	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	638	0	180	6" - HDPE	8"Ø FW
EJIW 5964-12 trap by Ind Exc					
				Hole in Flat Wall Structure	09/24/2020

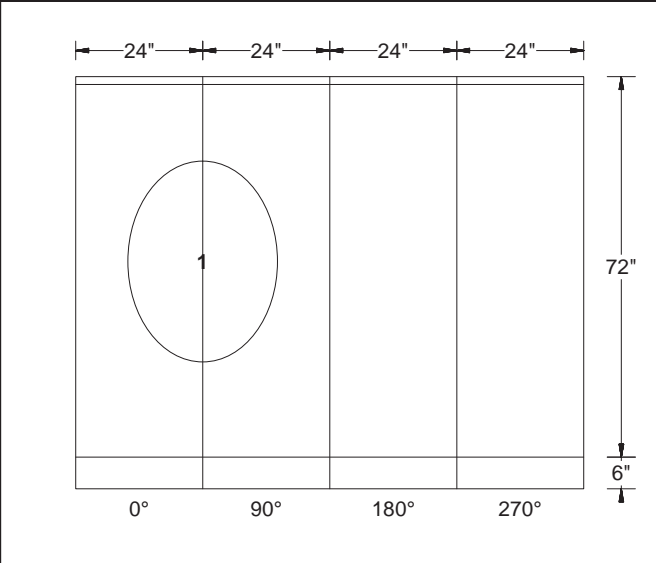
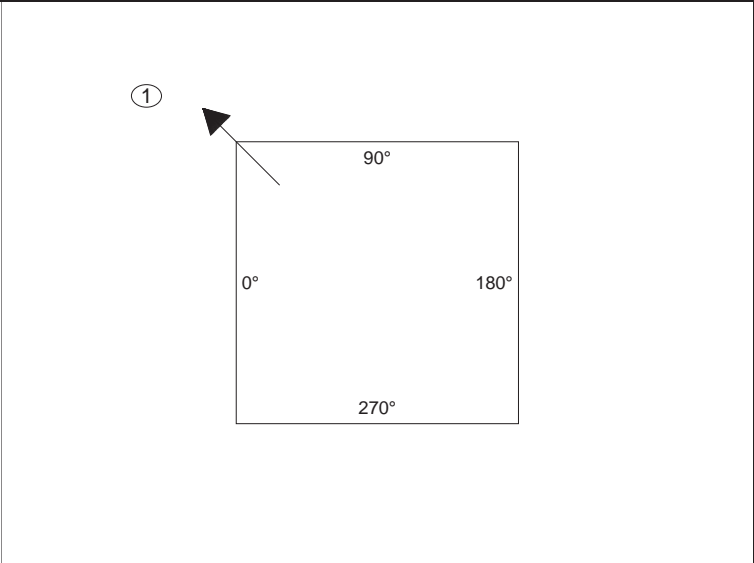
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-128 BU-05  
Station: Sept 23,'20  
Type: ODOT 2-2B Catch Basin  
SalesPerson: Ralph Hastings

Rim: 641.75'  
Invert: 637.23'  
Rim to Invert: 4.52'  
Sump: 3.00'

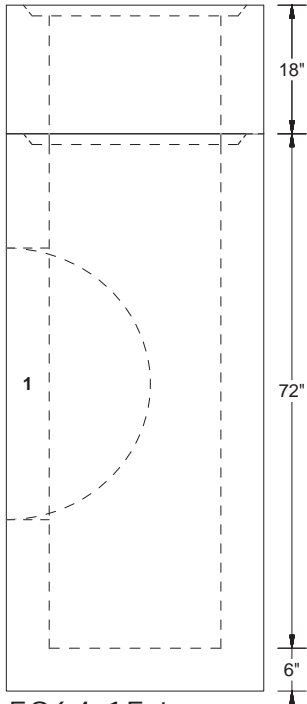
Description	UOM	Quantity	Weight
24" X 24" Catch Basin Riser X 18" Tall	EA	1	1125
24" X 24" Catch Basin X 72" Tall	EA	1	4831
Corner Hole in Structure for Pipe	EA	1	0
ODOT CB 2-2B APP			
IX Reviewed J.P. Sorma PE 9/29/20			



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EJIW 5110 by Ind Exc



EJIW 5964-15 trap  
by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	637.23	0	45	EJIW 5964-15	38"T x 20" W Corner
Corner Hole in Structure for Pipe					09/24/2020

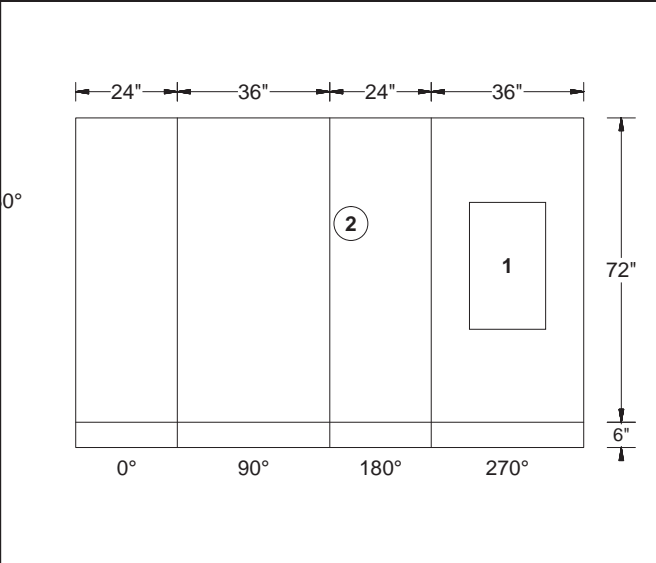
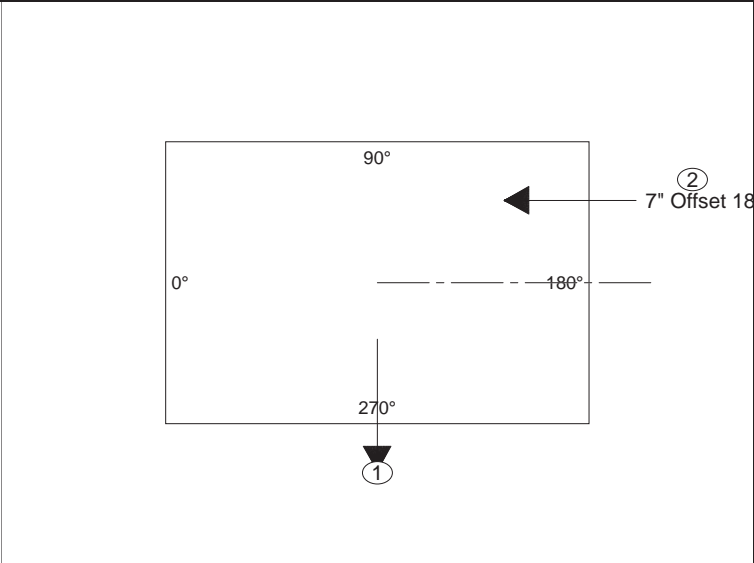
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-129 BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 643.88'  
Invert: 639.88'  
Rim to Invert: 4.00'  
Sump: 3.00'

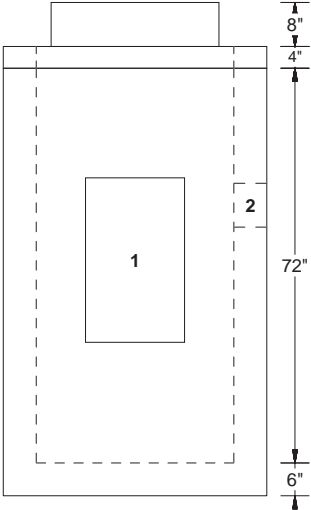
Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	6048
Hole in Flat Wall Structure	EA	1	0
Cleveland WPC CB-1			
IX Reviewed J.P. Sorma PE 9/29/20			



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EJIW 7035 by Ind Exc




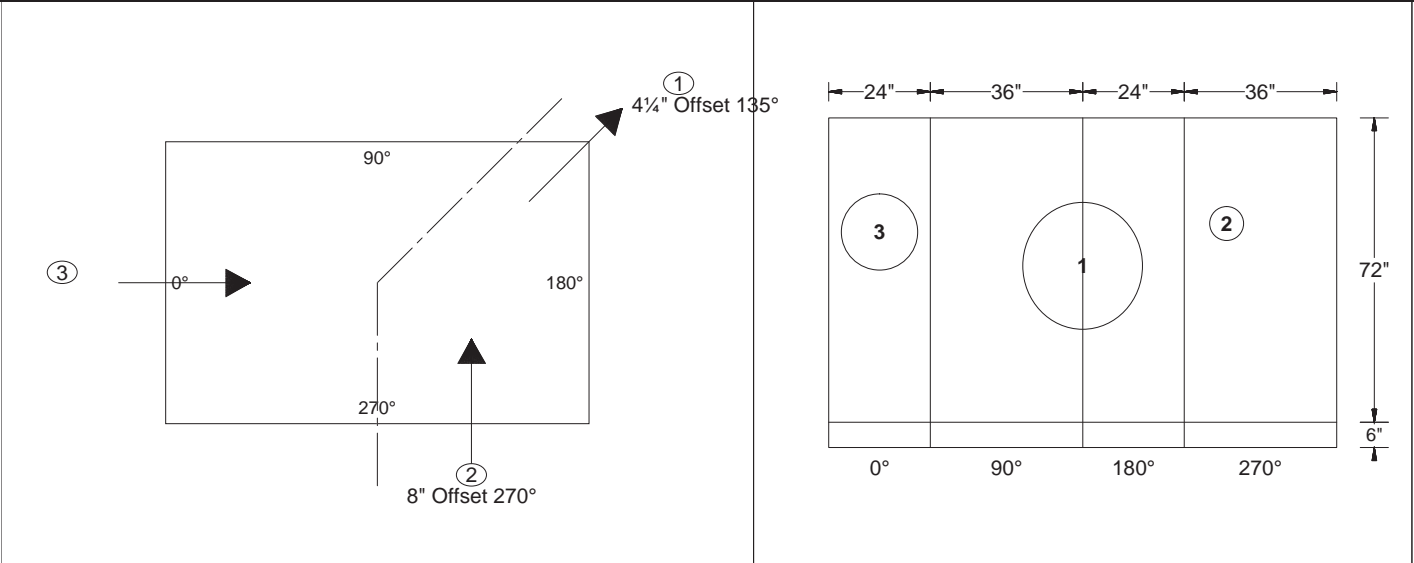
EJIW 5964-12 trap  
by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	639.88	0	270	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	640.55	0	180	6" - HDPE	8"Ø FW

Hole in Flat Wall Structure				09/24/2020
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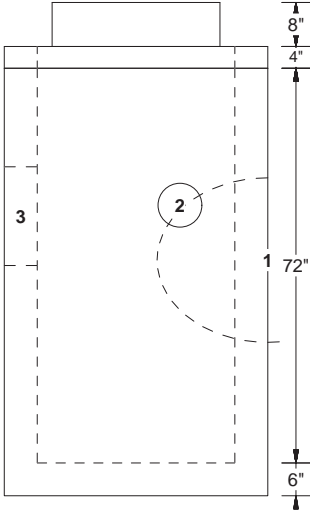


Customer: INDEPENDENCE EXCAVATING, INC. Job Name: ODOT 173000 - Opp Corridor Ph 3 Job #: 173408 Structure ID: D-131, Pc A BU-05 Station: Sept 23,'20 Type: City of Cleveland Curb Inlet SalesPerson: Ralph Hastings	Description	UOM	Quantity	Weight	 1-800-837-7788 6845 Erie Ave. N.W. PO Box 578 Canal Fulton, Ohio 44614
	24" X 36" Catch Basin Base X 72" Tall	EA	1	5886	
	Corner Hole in Structure for Pipe	EA	1	0	
	Hole in Flat Wall Structure	EA	2	0	
Rim: 651.72' Invert: 647.72' Rim to Invert: 4.00' Sump: 3.00'	Cleveland WPC CB-3, Pc A  IX Reviewed J.P. Sorma PE 9/29/20				



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	647.72	0	135	EJIW 5964-12	20"W X 30"T CORNER
(2)	648.39	0	270	6" - HDPE	8"Ø FW
(3)	647.97	0	0	12" - VCP LOGAN	18"Ø FW

EJIW 7035 by Ind Exc



EJIW 5964-12 trap  
by Ind Exc

NOTE

> The 6" U/D from the north must be on the 270° wall <

Corner Hole in Structure for Pipe  
Hole in Flat Wall Structure

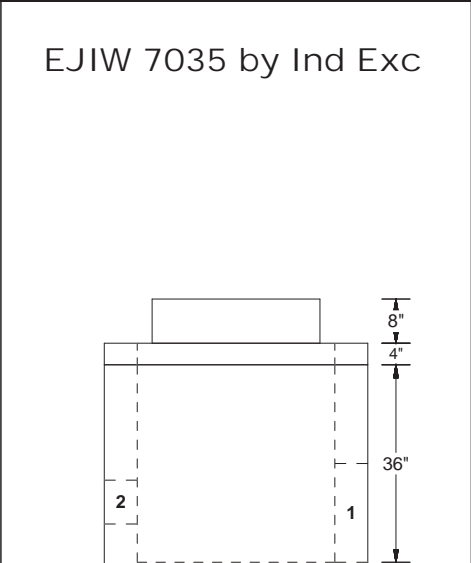
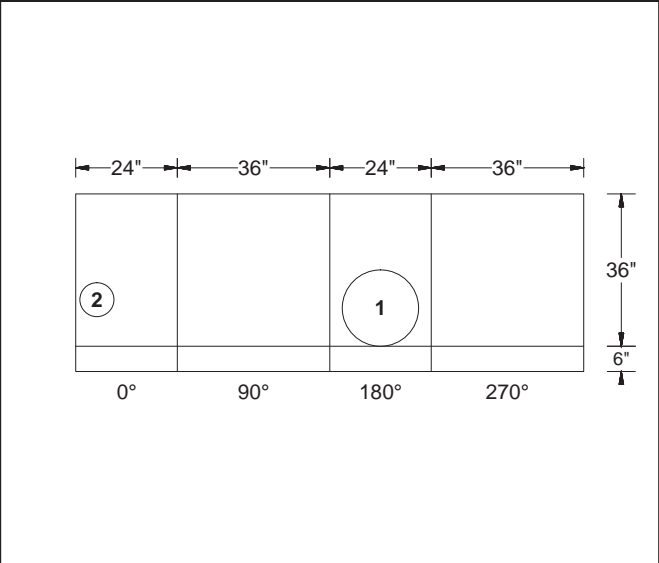
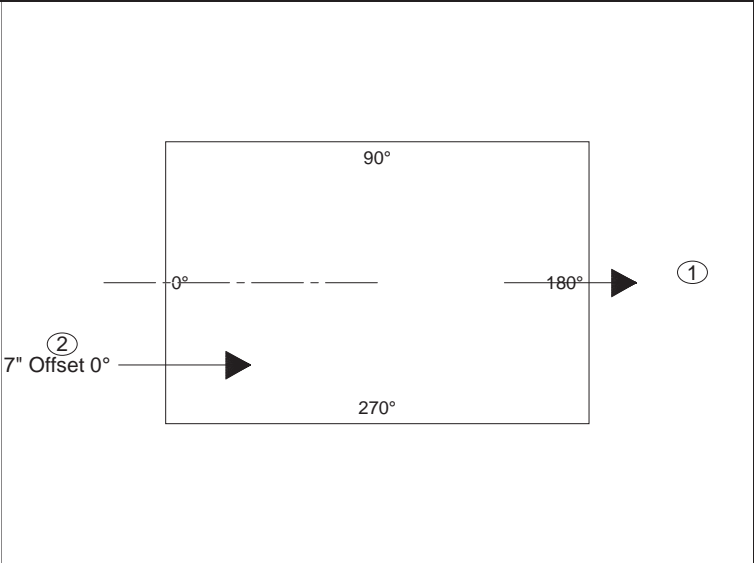
09/24/2020

Customer:	INDEPENDENCE EXCAVATING, INC.
Job Name:	ODOT 173000 - Opp Corridor Ph 3
Job #:	173408
Structure ID:	D-131, Pc B BU-05
Station:	Sept 23,'20
Type:	City of Cleveland Curb Inlet
SalesPerson:	Ralph Hastings
Rim:	651.72'
Invert:	647.97'
Rim to Invert:	3.75'
Sump:	0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 36" Tall	EA	1	3439
Hole in Flat Wall Structure	EA	2	0
<div>Cleveland WPC CB-3, Pc B</div> <div>IX Reviewed J.P. Sorma PE</div> <div>9/29/20</div>			



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Canal Fulton, Ohio 44614



PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	647.97	0	180	12" - VCP LOGAN	18"Ø FW
(2)	648.39	0	0	6" - HDPE	8"Ø FW

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	Hole in Flat Wall Structure	09/24/2020
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Customer: INDEPENDENCE EXCAVATING, INC.  
 Job Name: ODOT 173000 - Opp Corridor Ph 3  
 Job #: 173408  
 Structure ID: D-133 BU-05  
 Station: Sept 23,'20  
 Type: ODOT 2-3 Catch Basin  
 SalesPerson: Ralph Hastings

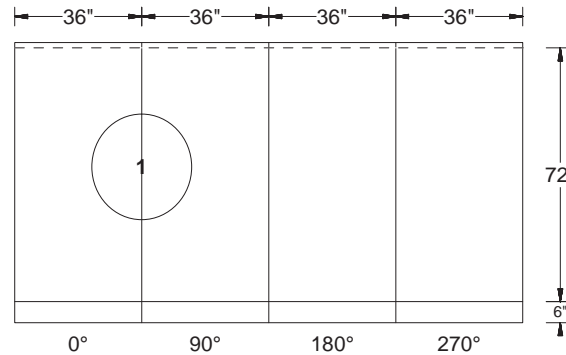
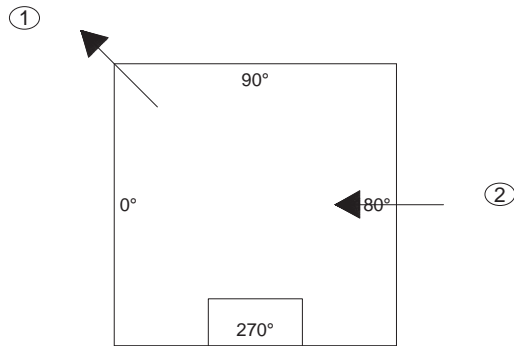
Rim: 664.5'  
 Invert: 651.94'  
 Rim to Invert: 12.56'  
 Sump Height: 3.11'

Description	UOM	Quantity	Weight
48" x 48" Stock Lid w/ Groove	EA	1	900
36" X 36" Catch Basin Riser X 42" Tall	EA	1	3613
36" X 36" Catch Basin Riser X 68" Tall	EA	1	5950
36" X 36" Catch Basin Base X 72" Tall	EA	1	6722
Square hole	EA	1	0
Corner Hole in Structure for Pipe	EA	1	0

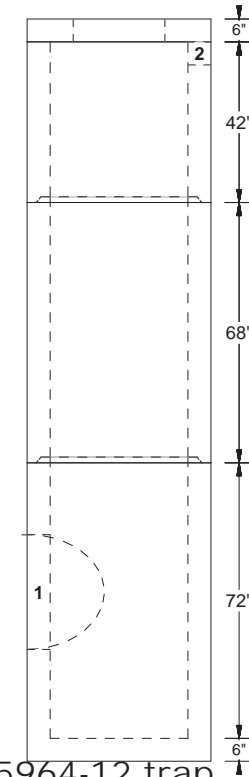
ODOT CB 2-2A APP -  
 Upsized to 36" x 36" CB-2-3 due to depth  
 > See notes below  
 IX Reviewed J.P. Sorma PE  
 9/29/20



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EJIW 5110 by Ind Exc



PipeNum	Elevation	%G rad	Angle	Pipe	Former	Description
(1)	651.94	0	45	EJIW 5964-12	20"W X 30"T CORNER	RN: 14.14L X 14.14L
(2)	663.5	0	180	6" x 24" WINDOW	6"t X 24"w Ko	L 6.01 / R 6.01

EJIW 5964-12 trap  
 by Ind Exc

> 1. Upgraded to CB 2-3 due to depth. 2. Added steps. 3. Raised Rim to 664.50 to accommodate the 2-3 lid, and, maintain the window at 663.50 <

Square hole  
 Corner Hole in Structure for Pipe

09/24/2020

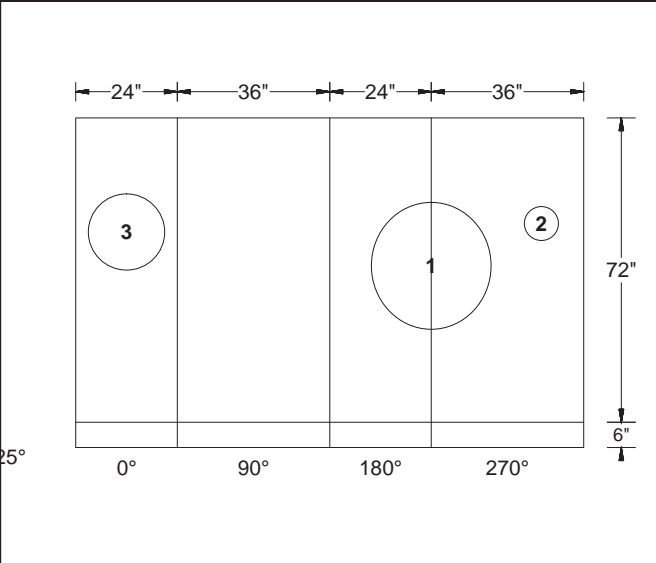
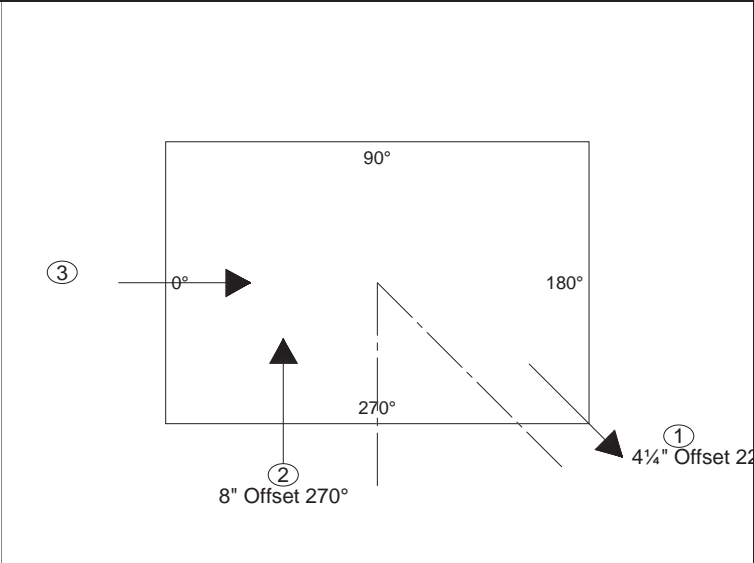
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-134, Pc A BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 646.49'  
Invert: 642.49'  
Rim to Invert: 4.00'  
Sump: 3.00'

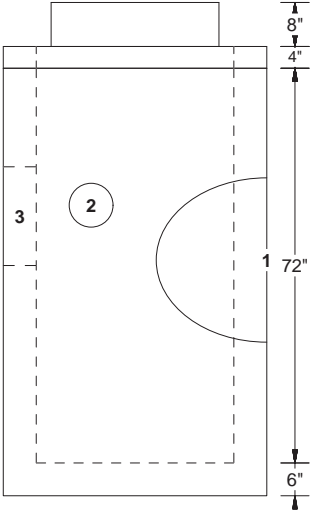
Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	5886
Corner Hole in Structure for Pipe	EA	1	0
Hole in Flat Wall Structure	EA	2	0
Cleveland WPC CB-3, Pc A			
IX Reviewed J.P. Sorma PE 9/29/20			



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EJIW 7035 by Ind Exc



EJIW 5964-12 trap  
by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	642.49	0	225	EJIW 5964-12	20"W X 30"T CORNER
(2)	643.16	0	270	6" - HDPE	8"Ø FW
(3)	642.74	0	0	12" - VCP LOGAN	18"Ø FW

NOTE

> 6" U/D from the west must be on the 270° wall <

Corner Hole in Structure for Pipe  
Hole in Flat Wall Structure

09/24/2020

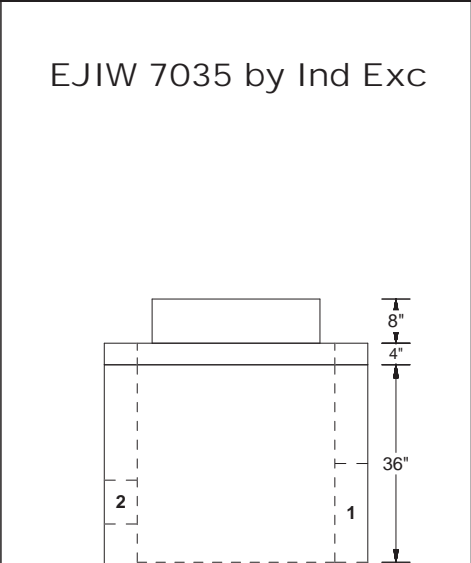
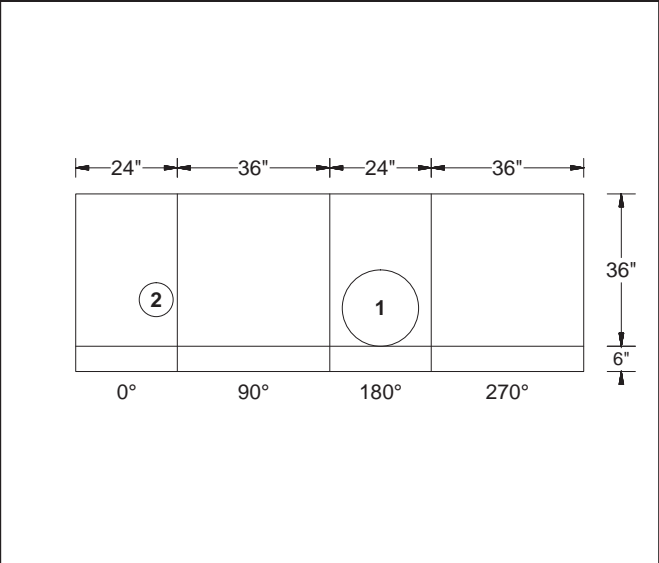
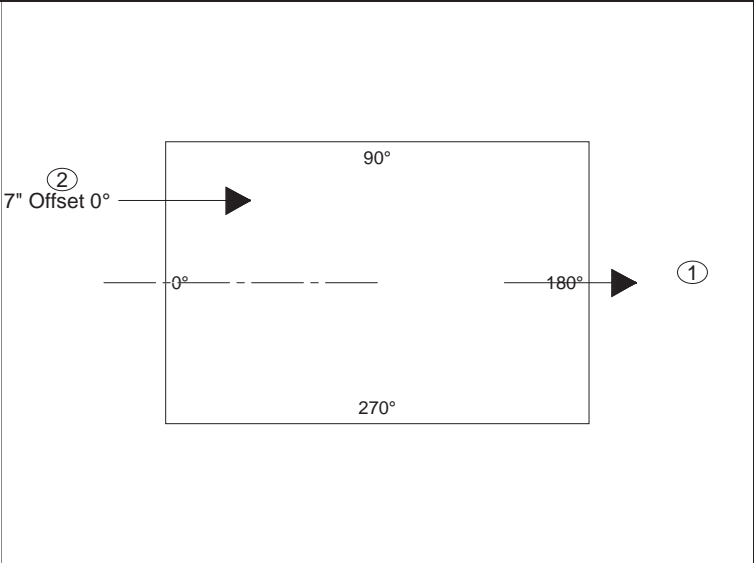
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-134, pc B BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 646.49'  
Invert: 642.74'  
Rim to Invert: 3.75'  
Sump: 0.25'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 36" Tall	EA	1	3439
Hole in Flat Wall Structure	EA	2	0
Cleveland WPC CB-3, Pc B			
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PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	642.74	0	180	12" - VCP LOGAN	18"Ø FW
(2)	643.16	0	0	6" - HDPE	8"Ø FW

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				Hole in Flat Wall Structure	09/24/2020
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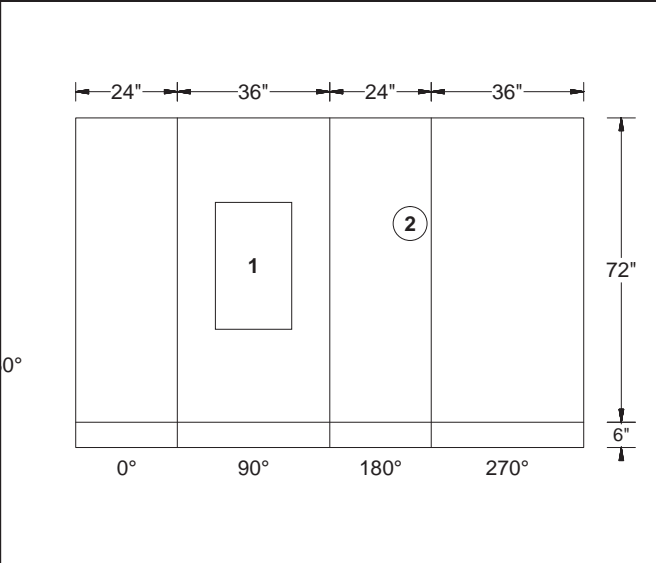
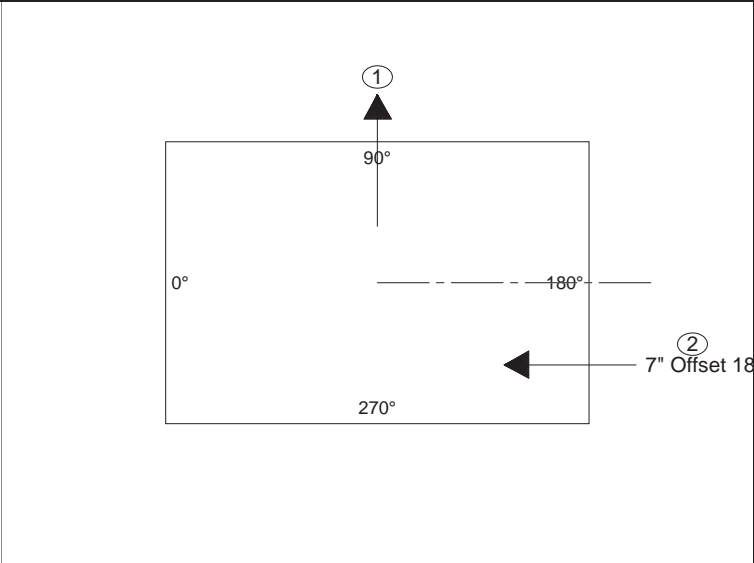
Customer: INDEPENDENCE EXCAVATING, INC.  
Job Name: ODOT 173000 - Opp Corridor Ph 3  
Job #: 173408  
Structure ID: D-135 BU-05  
Station: Sept 23,'20  
Type: City of Cleveland Curb Inlet  
SalesPerson: Ralph Hastings

Rim: 643.45'  
Invert: 639.45'  
Rim to Invert: 4.00'  
Sump: 3.00'

Description	UOM	Quantity	Weight
24" X 36" Catch Basin Base X 72" Tall	EA	1	6048
Hole in Flat Wall Structure	EA	1	0
Cleveland WPC CB-1			
IX Reviewed J.P. Sorma PE 9/29/20			



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EJIW 7035 by Ind Exc

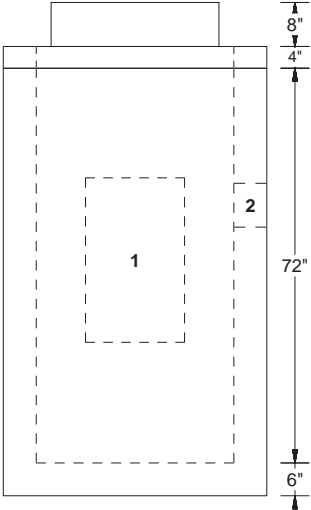


Diagram showing the side view of the catch basin. The overall dimensions are 8" x 4" x 72" x 6". The internal layout shows a central area labeled '1' and a side area labeled '2'. The diagram includes a 0° line, a 90° line, a 180° line, and a 270° line.

EJIW 5964-12 trap  
by Ind Exc

PipeNum	Elevation	%Grade	Angle	Pipe	Hole or Pipe Seal Type
(1)	639.45	0	90	EJIW 5964-12	Trap Ko 30"T x 18"W
(2)	640.12	0	180	6" - HDPE	8"Ø FW

	Hole in Flat Wall Structure	09/24/2020
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