PROJECT REFERENCE NO.	SHEET NO.
U-4405	UC-03M
DESIGNED BY: AMH	
DRAWN BY: AMH/AB	
CHECKED BY: AMH	
APPROVED BY: MWF	
REVISED:	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
UTILITIES ENGINEERING SEC.
PHONE:(919)707-6690
FAX:(919)250-4151

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025490 MARK W. FISHER

DocuSigned by: Mark W. Fisher 6/12/2018
968E3D7842D2400...

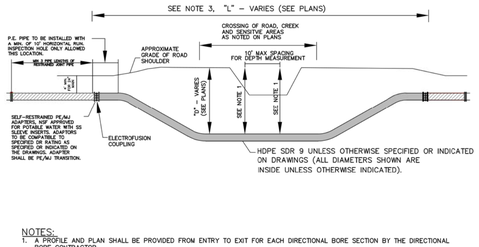
UTILITY CONSTRUCTION PLANS ONLY

UTILITY CONSTRUCTION

5/14/99

SHEET NO. 1 OF 1 | SCALE: NOT TO SCALE | DATE: 5/18/2015 | DWG. BY: WKD | PATH AND FILENAME:

Typical Directional Drill



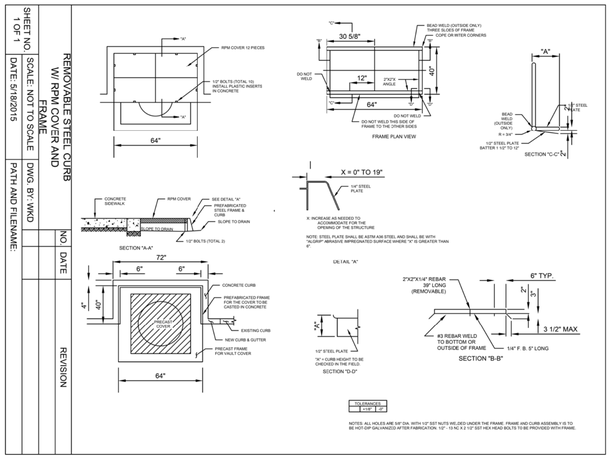
NOTES:
1. A PROFILE AND PLAN SHALL BE PROVIDED FROM ENTRY TO EXIT FOR EACH DIRECTIONAL BORE SECTION BY THE DIRECTIONAL BORE CONTRACTOR.
2. ALL BORE SECTIONS SHALL BE HYDROSTATICALLY TESTED, PER SPECIFICATIONS UPON COMPLETION OF INSTALLATION AND PRIOR TO CONNECTION TO THE MAIN WATER LINE.
3. LENGTH OF CROSSING, LOCATION OF INSPECTION/OBSERVATION EXCAVATION, NUMBER OF P.E. PIPE JOINTS, LOCATION OF BORE MACHINE, AUGER ENTRANCE LOCATION, AND TIE–IN POINTS ARE TO BE APPROVED BY ENGINEER PRIOR TO ANY START OF WORK OR ORDERING MATERIALS.
4. THE BORE DEVELOPED FOR THE LEAD IN END OF THE PIPE SHALL BE KEPT AT A MINIMUM DIAMETER FOR THE PIPE INSTALLATION. THE LEAD IN END SHALL BE PULLED THROUGH WITHOUT THE M.J. FLANGE ATTACHED FOR LARGER THAN 6" PIPE INSTALLATION. THE M.J. FLANGE FOR SAID LEAD IN END SHALL BE INSTALLED AFTER THE PIPE INSTALLATION WITH THE USE OF A SPLIT M.J. FLANGE.
5. IF BURIED OBSTRUCTIONS ARE LOCATED IN THE LENGTH OF THE DIRECTIONAL BORE, DIRECTIONAL BORE CONTRACTOR SHALL AVOID CONFLICT WITH THESE OBSTRUCTIONS BY GOING UNDER A MINIMUM OF 12" WITH PROPOSED PIPE UNLESS OTHERWISE SPECIFIED OR IDENTIFIED IN GENERAL NOTES ON SHEET, OR IN SPECIFICATIONS.
6. A MINIMUM OF 3 JOINTS OF RESTRAINED JOINT DUCTILE IRON PIPE ON BOTH SIDES OF THE SELF–RESTRAINED ADAPTER/FITTING SHALL BE PROVIDED. RESTRAINED JOINT DUCTILE IRON PIPE, THRUST COLLAR AND RESTRAINED MECHANICAL COUPLINGS ARE ACCEPTABLE DEVICES TO RESTRAIN APPROACH PIPE SECTIONS.

4 TYPICAL DIRECTIONAL BORE

NO.	DATE	REVISION

SHEET NO. 1 OF 1 | SCALE: NOT TO SCALE | DATE: 5/18/2015 | DWG. BY: WKD | PATH AND FILENAME:

REMOVABLE STEEL CURB W/ RIM, FRAME AND COVER



TOLERANCES (+/-) 1/4"

NOTES: ALL HOLES ARE 5/8" DIA. WITH 1/2" SST NUTS WELDED UNDER THE FRAME. FRAME AND CURB ASSEMBLY IS TO BE HOT-DIP GALVANIZED AFTER FABRICATION. 1/2" - 13 NC X 2 1/2" SST HEX HEAD BOLTS TO BE PROVIDED WITH FRAME.

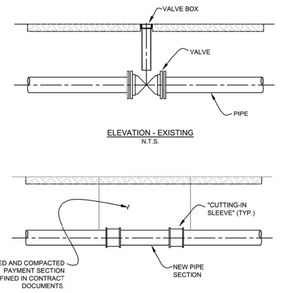
NO.	DATE	REVISION

SHEET NO. 1 OF 1 | SCALE: NOT TO SCALE | DATE: 5/18/2015 | DWG. BY: WKD | PATH AND FILENAME:

MINIMUM LENGTH OF BURIED PIPE BETWEEN CLOSED VALVE AND EXCAVATION FOR RESTRAINT

BASED ON MINIMUM TYPE 2 BEDDING IN SILT SOIL

Diameter (inches)	Depth of Cover (feet)	Length (feet)
16	3 - 3.99	221
16	4 - 5.99	173
16	6 - 7.99	120
16	8 - 9.99	92
16	>= 10	75
12	3 - 3.99	174
12	4 - 5.99	135
12	6 - 7.99	93
12	8 - 9.99	71
12	>= 10	57
10	3 - 3.99	149
10	4 - 5.99	115
10	6 - 7.99	79
10	8 - 9.99	60
10	>= 10	49
8	3 - 3.99	123
8	4 - 5.99	95
8	6 - 7.99	65
8	8 - 9.99	49
8	>= 10	40
6	3 - 3.99	95
6	4 - 5.99	73
6	6 - 7.99	50
6	8 - 9.99	38
6	>= 10	31



VALVE REMOVAL WITH EXCAVATION N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	NO.	DATE	REVISION
SHEET NO. 1 OF 1 | DWG. NO. M.15 | DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT			
DATE: JAN. 01, 2018 | APPROVED BY: J.E.G.				

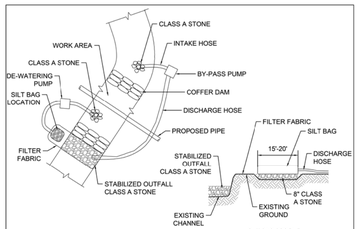
M15-VAL-REMOVAL.dwg

UTILITY GENERAL NOTES

1. PRIOR TO COMMENCEMENT OF ANY WORK WITHIN EASEMENTS OR RIGHTS-OF-WAYS THE CONTRACTOR IS REQUIRED TO NOTIFY CONCERNED UTILITY COMPANIES IN ACCORDANCE WITH GS 87-102. CONTRACTOR SHALL VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION.
2. THE CONTRACTOR SHALL DIG UP EACH UTILITY WHICH MAY CONFLICT WITH CONSTRUCTION 14 DAYS IN ADVANCE TO VERIFY LOCATIONS (HORIZONTALLY AND VERTICALLY) TO ALLOW THE ENGINEER AN OPPORTUNITY TO ADJUST THE DESIGN TO AVOID CONFLICTS (NO SEPARATE PAYMENT).
3. ALL SANITARY SEWER AND WATER CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIAL PROVISIONS. STORM DRAINAGE, STREET CONSTRUCTION ADD PAVING SHALL BE IN ACCORDANCE WITH NCDOT SPECIFICATIONS.
4. UTILITY SERVICES TO INDIVIDUAL PROPERTIES ARE NOT SHOWN IN THE PROFILES FOR SIMPLICITY OF THE DRAWINGS. SERVICES MAY INCLUDE WATER LATERALS, TELEPHONE, ELECTRIC, CABLE, GAS, ETC.
5. CONTRACTOR SHALL COORDINATE WITH UTILITY OWNER AND BE RESPONSIBLE FOR TEMPORARY RELOCATION AND/OR SECURING EXISTING UTILITY POLES AND SIGNS AND/OR UTILITIES IN ACCORDANCE WITH UTILITY OWNER REQUIREMENTS DURING THE UTILITY MAIN INSTALLATION.
6. CONTRACTOR SHALL PROVIDE TEMPORARY SUPPORTS FOR UTILITY CROSSINGS AND REPAIR DAMAGES DUE TO CONSTRUCTION TO THE SATISFACTION OF THE UTILITY INVOLVED AT NO ADDITIONAL EXPENSE TO THE OWNER. UNDERGROUND ELECTRICAL CROSSINGS SHALL BE CROSSED IN ACCORDANCE WITH THE N.E.C. AND TECHNICAL SPECIFICATION SECTION UNDERGROUND ELECTRICAL CROSSING REQUIREMENTS.
7. STORM DRAINAGE REPAIRS BY CONTRACTOR DUE TO CONSTRUCTION DAMAGE AND JOINTS EXPOSED DURING CONSTRUCTION SHALL BE INSPECTED BY THE OWNER PRIOR TO BACKFILLING.

UTILITY GENERAL NOTES	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	NO.	DATE	REVISION
SHEET NO. 1 OF 1 | DWG. NO. N.2 | DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT	1	05/29/18	NOTES 1, 3 AND 5 AND DELETED NOTE 7 FOR NCDOT U-4405.
DATE: JAN. 01, 2018 | APPROVED BY: J.E.G.				

N2-UTILITY-NOTES.dwg



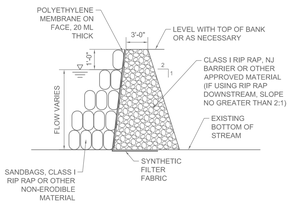
SILT BAG PROFILE

NOTES:
1. EXCAVATION SHALL BE PERFORMED ONLY IN DRY AND/OR ISOLATED SECTIONS OF CHANNEL.
2. IMPERVIOUS DIKES SHOULD BE USED TO ISOLATE WORK AREAS FROM STREAM FLOW.
3. THE CONTRACTOR SHALL NOT DISTURB MORE AREA THAN CAN BE STABILIZED IN ONE WORKING DAY. A MAXIMUM OF 1000 FEET MAY BE DISTURBED AT ANY ONE TIME.
4. THE BY-PASS PUMP SHOULD ADEQUATELY CONVEY MINIMUM 450 GALLONS / MINUTE UNLESS OTHERWISE NECESSITATED BY FIELD CONDITIONS.
5. DIKE MUST BE CONSTRUCTED OF NON-ERODIBLE MATERIALS SUCH AS SANDBAGS, SEE COFFER DAM DETAIL.

SEQUENCE OF CONSTRUCTION FOR TYPICAL PUMP AROUND

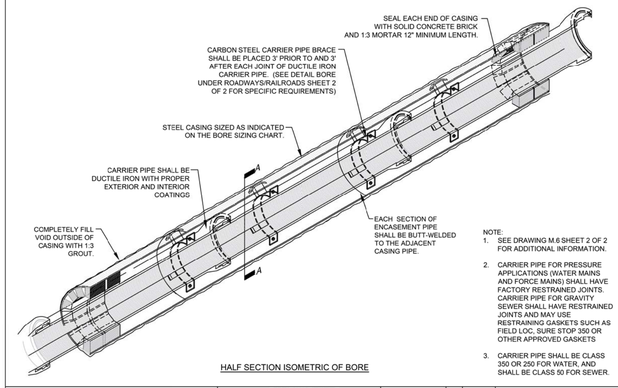
1. INSTALL STILLING BASIN AND STABILIZED OUTFALL USING CLASS A RIP RAP AT THE DOWNSTREAM END OF THE DESIGNATED PROJECT WORKING AREA.
2. THE CONTRACTOR WILL INSTALL THE PUMP AROUND PUMP AND THE TEMPORARY PIPING THAT WILL CONVEY THE BASE FLOW FROM UPSTREAM OF THE WORK AREA TO THE STABILIZED OUTFALL.
3. INSTALL UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. INSTALL THE DOWNSTREAM IMPERVIOUS DIKE AND DEWATERING PUMPING APPARATUS IF NEEDED TO DEWATER THE ENTRAPPED AREA. THE PUMP AND HOSE FOR THIS PURPOSE SHALL BE OF SUFFICIENT SIZE TO DEWATER THE WORK AREA IN A REASONABLE TIME. THE PUMP SHALL BE OPERATED SO AS TO AVOID RESUSPENDING SILT.
5. THE CONTRACTOR WILL PERFORM STREAM RESTORATION AND/ OR UTILITY CROSSING WORK IN ACCORDANCE WITH THE PLAN AND FOLLOWING THE GENERAL CONSTRUCTION SEQUENCE.
6. THE CONTRACTOR WILL EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF THE IMPERVIOUS DIKE. WHEN DEWATERING AREA, ALL DIRTY WATER MUST BE PUMPED THROUGH A SILT BAG. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE/PIPING STARTING WITH THE DOWNSTREAM DIKE FIRST.
7. ONCE THE WORKING AREA IS COMPLETED, REMOVE ALL RIP RAP AND IMPERVIOUS DIKES AND STABILIZE DISTURBED AREAS IN ACCORDANCE WITH STREAM STABILIZATION REQUIREMENTS.
8. ALL WORK IN CHANNEL MUST BE COMPLETED BEFORE REMOVING IMPERVIOUS DIKE.

STREAM PUMP AROUND	NO.	DATE	REVISION
SHEET NO. 1 OF 1 | SCALE: NOT TO SCALE | DWG. BY: WKD			
DATE: 5/18/2015 | PATH AND FILENAME:			



NOTES:
1. CONTRACTOR SHALL INSTALL COFFER DAM WITH BYPASS ARRANGEMENTS ALONG ALL JURISDICTIONAL STREAMS PRIOR TO SEWER INSTALLATION TO ENSURE DRY CONDITIONS. SEE STREAM PUMP AROUND DETAIL.
2. CONTRACTOR SHALL FOLLOW CONSTRUCTION SEQUENCE AS NOTED ON CONTRACT DRAWINGS.

COFFER DAM DETAIL	NO.	DATE	REVISION
SHEET NO. 1 OF 1 | SCALE: NOT TO SCALE | DWG. BY: WKD			
DATE: 5/18/2015 | PATH AND FILENAME:			



HALF SECTION ISOMETRIC OF BORE

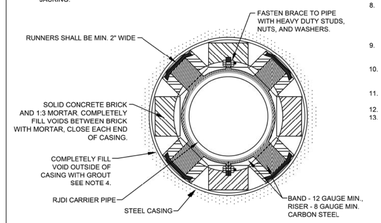
NOTE:
1. SEE DRAWING M.6 SHEET 2 OF 2 FOR ADDITIONAL INFORMATION.
2. CARRIER PIPE FOR PRESSURE APPLICATIONS (WATER MAINS AND FORCE MAINS) SHALL HAVE FACTORY RESTRAINED JOINTS. CARRIER PIPE FOR GRAVITY SEWER SHALL HAVE RESTRAINED JOINTS AND MAY USE RESTRAINING GASKETS SUCH AS FIELD LOC, SURE STOP 350 OR OTHER APPROVED GASKETS
3. CARRIER PIPE SHALL BE CLASS 350 OR 250 FOR WATER, AND SHALL BE CLASS 50 FOR SEWER.

BORE UNDER ROADWAYS/RAILROADS N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	NO.	DATE	REVISION
SHEET NO. 1 OF 2 | DWG. NO. M.6 | DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT	1	01/05	ADDED NOTES 2 AND 3
DATE: JAN. 01, 2018 | APPROVED BY: J.E.G.		2	10/09	CLARIFIED RESTRAINT REQUIREMENTS

M6-BORE-ROAD-RAIL.dwg

BORE SIZING CHART*			
CARRIER PIPE SIZE	MIN. CASING SIZE	ROADWAYS MIN. WALL THICKNESS	RAILROADS MIN. WALL THICKNESS
4"	10"	0.188"	0.188"
6"	12"	0.25"	0.281"
8"	16"	0.25"	0.281"
12"	24"	0.25"	0.375"
16"	30"	0.312"	0.469"
18"	30"	0.312"	0.469"
24"	36"	0.375"	0.532"
30"	42"	0.500"	0.625"
36"	48"	0.500"	0.688"

*CONTRACTOR MAY SUBSTITUTE A LARGER SIZE CASING PIPE HAVING THE MINIMUM WALL THICKNESS SHOWN FOR SEWER MAINS. ALL ADDITIONAL COSTS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR BORING AND JACKING.



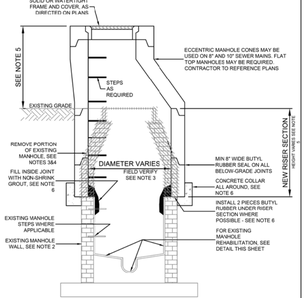
SECTION "A-A" CARBON STEEL CARRIER PIPE BRACE

NOTES:
1. INSTALLATION SHALL BE DRY BORE AND JACKING OF SMOOTH WALL STEEL PIPE. JETTING OR WET BORING WITH WATER SHALL NOT BE ALLOWED.
2. SEE BORE SIZING CHART FOR CARRIER PIPE SIZE AND STEEL CASING SIZE, MINIMUM DIAMETER, AND WALL THICKNESS.
3. CASING PIPE SHALL BE IN ACCORDANCE WITH ASTM A-53, GRADE B WITH A MINIMUM YIELD STRENGTH OF 35,000PSI.
4. EACH END OF ENCASEMENT TO BE PLUGGED WITH BRICK. ALL VOIDS OUTSIDE THE CASING PIPE SHALL BE COMPLETELY FILLED WITH 1:3 PORTLAND CEMENT GROUT AT SUFFICIENT PRESSURE TO INSURE NO SETTLEMENT OF ROADWAY/RAILROAD. METHOD OF GROUTING SHALL BE AS APPROVED BY THE PERMITTING AGENCY.
5. IT IS RECOMMENDED THAT THE BORE BE ACCOMPLISHED BEFORE PIPE CONSTRUCTION BEGINS.
6. SHOULD THE BORE NOT BE ON GRADE, A REVISED PLAN SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL.
7. THE BORING OPERATION SHALL BE CONDUCTED IN A MANNER THAT THE FLOW OF TRAFFIC IS NOT IMPEDED OR IN SUCH A MANNER SO AS NOT TO CREATE A HAZARD.
8. IF AN OBSTRUCTION IS ENCOUNTERED DURING THE BORING OPERATION, THE AUGER SHALL BE WITHDRAWN, THE EXCESS CASING PIPE CUT-OFF, CAPPED AND THE INTERIOR AND EXTERIOR VOIDS SHALL BE COMPLETELY FILLED WITH 1:3 PORTLAND CEMENT GROUT UNDER PRESSURE.
9. CONTRACTOR SHALL FIELD ADJUST AND INSTALL PROPER PIPE BRACES TO ACCOMPLISH GRADE AND INVERTS AS SHOWN ON THE DRAWINGS.
10. A MANUAL CONTROL STEERING HEAD OR OTHER GUIDANCE SYSTEM IS RECOMMENDED FOR BORES 30" DIAMETER AND/OR LARGER AND FOR BORES EXCEEDING 100' IN LENGTH OR AS SPECIFIED.
11. CONTRACTOR SHALL EXECUTE AND PERFORM ALL REQUIREMENTS AND CONDITIONS STIPULATED BY THE PERMITTING AGENCY.
12. SEE DRAWING M.6 SHEET 1 OF 2 FOR ADDITIONAL INFORMATION.
13. CARRIER PIPE FOR PRESSURE APPLICATIONS (WATER MAINS AND FORCE MAINS) SHALL HAVE FACTORY RESTRAINED JOINTS. CARRIER PIPE FOR GRAVITY SEWER SHALL HAVE RESTRAINED JOINTS AND MAY USE RESTRAINING GASKETS SUCH AS FIELD LOK, SURE STOP 350 OR OTHER APPROVED GASKETS.

BORE UNDER ROADWAYS/RAILROADS N.T.S.	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, N.C.	NO.	DATE	REVISION
SHEET NO. 2 OF 2 | DWG. NO. M.6 | DWG. BY: FAYPWC	WATER RESOURCES ENGINEERING DEPARTMENT	1	02/11/04	ADDED 6" CARRIER PIPE TO BORE SIZING CHART
DATE: JAN. 01, 2018 | APPROVED BY: J.E.G.		2	07/10	REVISED NOTES, SIZING CHART
		3	05/29/18	REVISED NOTES 6 AND 8 AND DELETED NOTE 11 FOR NCDOT U-4405

M6-BORE-ROAD-RAIL.dwg

NOTES:
1. ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
2. THIS DETAIL DEPICTS AN EXISTING BRICK MANHOLE WITH A TYPICAL CHIMNEY SECTION.
3. CONTRACTOR TO MEASURE THE INSIDE DIAMETER OF EXISTING MANHOLE TO SELECT APPROPRIATE DIAMETER OF NEW RISERS.
4. CONTRACTOR TO REMOVE EXISTING WALLS TO SOLID STRUCTURE (TO AT LEAST BELOW THE CONE OR CHIMNEY SECTION) OR TO THEIR SPECIFIED LOCATION. THE LIMITS OF REMOVAL SHALL BE APPROVED BY THE ENGINEER IN THE FIELD. CONTRACTOR TO ALSO REMOVE EXISTING FRAMES AND COVER, VENT PIPES AND ALL APPURTENANCES, ETC. CONTRACTOR TO DISPOSE OF ALL MATERIALS OFF-SITE.
5. CONTRACTOR TO INSTALL NEW RISER AND CONE SECTIONS AS NECESSARY TO EXTEND THE MANHOLE TO THE SPECIFIED/APPROVED ELEVATION. THE FINAL ELEVATION MAY BE HIGHER THAN, LOWER THAN OR EQUAL TO THE EXISTING ELEVATION THIS DETAIL ILLUSTRATES A HIGHER ELEVATION. THE CONTRACTOR SHALL DETERMINE THE REQUIRED RISER AND CONE HEIGHTS TO MEET THE SPECIFIED ELEVATION. ENGINEER SHALL APPROVE FINAL ELEVATIONS IN THE FIELD. BOTTOM RISER TO BE PROVIDED WITH A FLAT JOINT UNLESS OTHERWISE APPROVED.
6. CONTRACTOR TO INSTALL NEW RISER SECTION/EXISTING WALL JOINT TO BE PROVIDE A LEAK-TIGHT JOINT. THE CONTRACTOR SHALL PERFORM ALL WORK NECESSARY TO PROVIDE A LEAK-TIGHT SEAL WHERE POSSIBLE. BUTYL RUBBER SEALANT SHALL BE PROVIDED UNDER THE NEW RISER SECTION. IN ALL CASES A CONCRETE COLLAR SHALL BE POURED AROUND THE JOINT. COLLAR TO BE MINIMUM 6 INCHES WIDE AND 12 INCHES HIGH CENTERED ON JOINT ALL AROUND. ON THE INSIDE OF THE JOINT, CONTRACTOR TO SEAL JOINT WITH NON-SHRINK GROUT. GROUT TO COMPLETELY FILL JOINT AND SHALL EXTEND AT LEAST 6 INCHES EACH SIDE OF JOINT ALL AROUND. GROUT TO BE TAPERED TO THE EXISTING WALL SECTION BELOW THE JOINT. GROUT TO BE RESISTANT TO HYDROGEN-SULFIDE.



RAISE AND REPLACE EXISTING MANHOLE
NOT TO SCALE

RAISE AND REPLACE EXISTING MANHOLE	NO.	DATE	REVISION
SHEET NO. 1 OF 1 | SCALE: NOT TO SCALE | DWG. BY: WKD			
DATE: 5/18/2015 | PATH AND FILENAME:			

01-JUN-2018 12:00
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