

# REDWOOD ROCHESTER HILLS

E. AVON ROAD  
ROCHESTER HILLS, MI 48307  
OAKLAND COUNTY



7510 E. PLEASANT VALLEY RD  
INDEPENDENCE, OH 44131

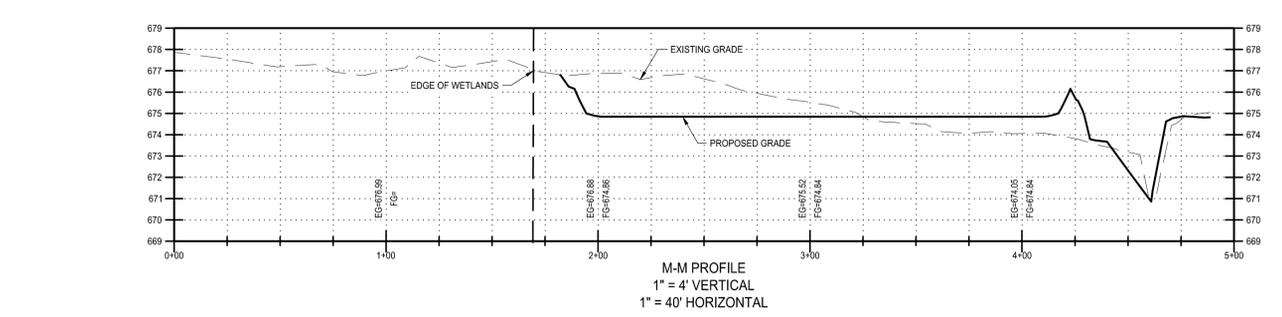
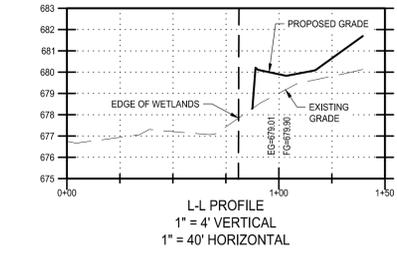
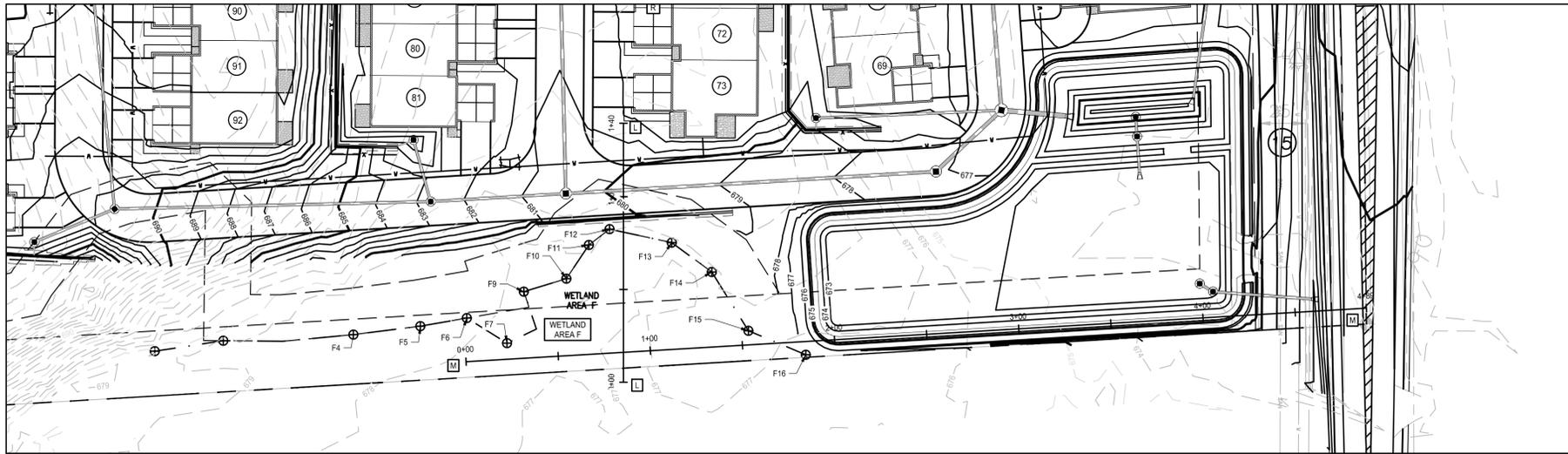
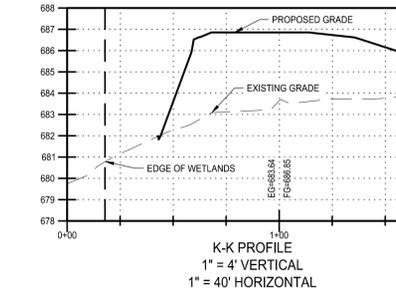
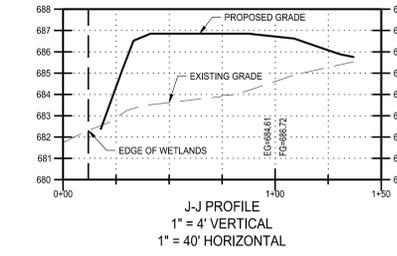
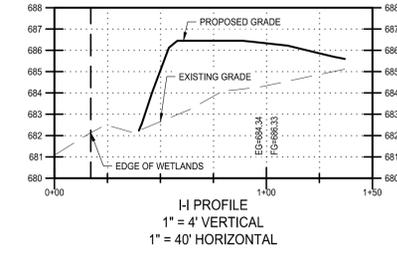
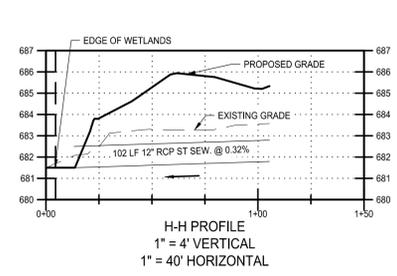
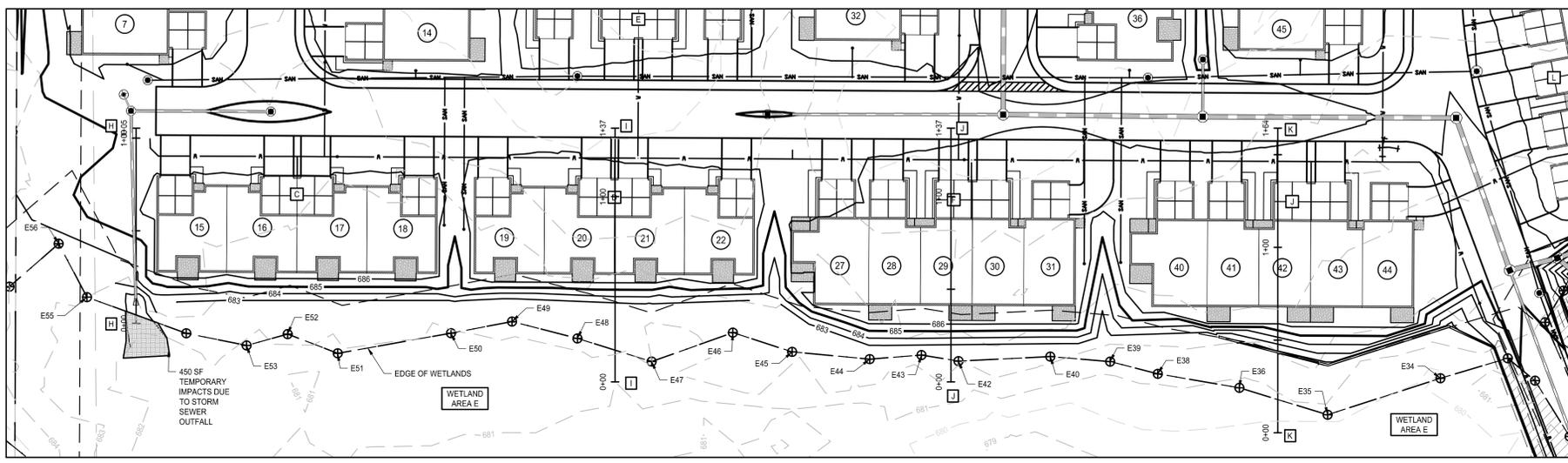


Bergmann Associates, Architects, Engineers,  
Landscape Architects & Surveyors, D.P.C.  
7050 West Saginaw Hwy.  
Suite 200  
Lansing, MI 48917

office: 517.272.9835  
fax: 517.272.9836

www.bergmannpc.com

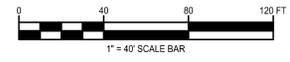
DATE	DESCRIPTION
11/16/2018	PUD REVIEW
02/04/2019	REV. PER CITY COMMENTS
03/21/2019	2ND REV. PER CITY COMMENTS
06/02/2019	3RD REV. PER CITY COMMENTS
08/22/2019	4TH REV. PER CITY COMMENTS
08/27/2019	STEP ONE PUD REVIEW
12/23/2019	CITY RESUBMITTAL
01/17/2020	PERMIT REVIEW
03/02/2020	ENGINEERING RESUBMITTAL
05/06/2020	ENGINEERING RESUBMITTAL
06/09/2020	ENGINEERING RESUBMITTAL
07/08/2020	ENGINEERING RESUBMITTAL



### WETLANDS NOTE:

ALL TEMPORARY IMPACTS ARE TO BE RESTORED TO ORIGINAL GRADE WITH ORIGINAL SOILS OR EQUIVALENT SOILS AND SEEDED WITH A CITY-APPROVED WETLAND SEED MIX. RESTORATION OF ANY TEMPORARY WETLAND IMPACTS WILL BE SUBJECT TO INSPECTION BY CITY AND ASTI UPON COMPLETION.

- PERMANENT WETLAND IMPACTS
- TEMPORARY WETLAND IMPACTS
- WETLAND FLAG IDENTIFICATION



*Not For Construction*

Copyright © Bergmann Associates, Architects, Engineers,  
Landscape Architects & Surveyors, D.P.C.

Project Manager: P. FURTAW, PE	Checked By: P. FURTAW, PE
Designed By: I. GRAHAM, PE	Drawn By: I. GRAHAM, PE
Date Issued: NOVEMBER 9, 2018	Project Number: 12963.00

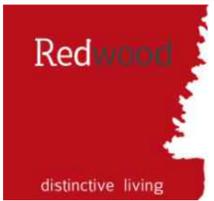
### WETLAND E & F PLAN

# C607

7/6/2020 11:50 AM C:\Redwood Living\2020\01 REDWOOD - ROCHESTER HILLS\01 DWG\K1 Civil\_PLOT FILES\0607 WETLAND E & F PLAN.dwg

# REDWOOD ROCHESTER HILLS

E. AVON ROAD  
ROCHESTER HILLS, MI 48307  
OAKLAND COUNTY



7510 E. PLEASANT VALLEY RD  
INDEPENDENCE, OH 44131



Bergmann Associates, Architects, Engineers,  
Landscape Architects & Surveyors, D.P.C.  
7050 West Saginaw Hwy.  
Suite 200  
Lansing, MI 48917

office: 517.272.9835  
fax: 517.272.9836

www.bergmannpc.com

DATE	DESCRIPTION
11/16/2018	PUD REVIEW
02/04/2019	REV. PER CITY COMMENTS
03/21/2019	2ND REV. PER CITY COMMENTS
06/02/2019	3RD REV. PER CITY COMMENTS
08/22/2019	4TH REV. PER CITY COMMENTS
08/27/2019	STEP ONE PUD REVIEW
12/23/2019	CITY RESUBMITTAL
01/17/2020	PERMIT REVIEW
03/02/2020	ENGINEERING RESUBMITTAL
05/06/2020	ENGINEERING RESUBMITTAL
06/09/2020	ENGINEERING RESUBMITTAL
07/08/2020	ENGINEERING RESUBMITTAL

### TOTAL VOLUME REQUIRED

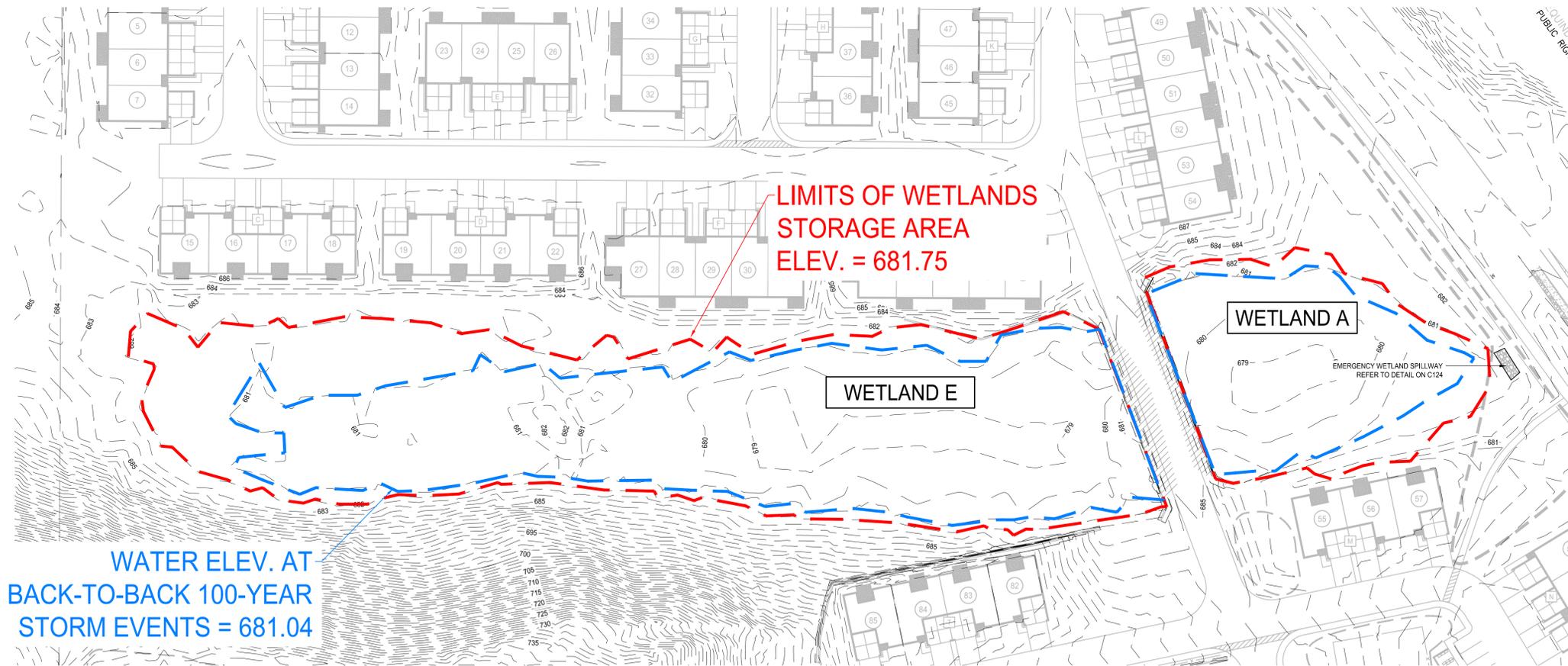
TOTAL 2-100 YEAR EVENT VOLUME REQUIRED =	93,725 CF
WETLAND E VOLUME PROVIDED =	131,670 CF
WETLAND A VOLUME PROVIDED =	30,598 CF
TOTAL WETLAND VOLUME PROVIDED =	162,268 CF

Wetland A Storage Provided				
Elevation	Area (sf)	Depth (ft)	Volume (cf)	Total Volume (cf)
679	2635	0	0	0
680	11967	1	7301	7301
681	12765	1	12366	19667
682	16385	1	14575	34242
681.75				30598.25

Wetland E Storage Provided				
Elevation	Area (sf)	Depth (ft)	Volume (cf)	Total Volume (cf)
679	9776	0	0	0
680	28427	1	19102	19102
681	73368	1	50898	69999
682	91088	1	82228	152227
681.75				131670

### GRADING LEGEND:

- 75— PROPOSED MAJOR CONTOUR
- 76— PROPOSED MINOR CONTOUR
- ✱ TC=78.01 BC=77.51 PROPOSED TOP OF CURB / BOTTOM OF CURB ELEVATION
- ✱ TW/BW=152.50 PROPOSED TOP OF WALL / BOTTOM OF WALL
- ✱ 77.73 PROPOSED SPOT ELEVATION
- ✱ EG=77.73 EXISTING ELEVATION
- ✱ HP=77.73 PROPOSED HIGH POINT ELEVATION
- ✱ TG=77.73 PROPOSED TOP OF GRATE ELEVATION
- ✱ FF=77.73 FINISHED FLOOR ELEVATION
- 2.5% PROPOSED SLOPE
- 72- EXISTING CONTOUR
- - - RIDGE LINE



Not For Construction

Copyright © Bergmann Associates, Architects, Engineers,  
Landscape Architects & Surveyors, D.P.C.

Project Manager:	Checked By:
P. FURTAW, PE	P. FURTAW, PE
Designed By:	Drawn By:
I. GRAHAM, PE	I. GRAHAM, PE
Date Revisd:	Project Number:
NOVEMBER 9, 2018	12963.00



### WETLAND STORAGE PLAN

# C608

# REDWOOD ROCHESTER HILLS

E. AVON ROAD  
ROCHESTER HILLS, MI 48307  
OAKLAND COUNTY



7510 E. PLEASANT VALLEY RD  
INDEPENDENCE, OH 44131



Bergmann Associates, Architects, Engineers,  
Landscape Architects & Surveyors, D.P.C.  
7050 West Saginaw Hwy.  
Suite 200  
Lansing, MI 48917

office: 517.272.9835  
fax: 517.272.9836

www.bergmannpc.com

DATE	DESCRIPTION
11/16/2018	PUD REVIEW
02/04/2019	REV. PER CITY COMMENTS
03/21/2019	2ND REV. PER CITY COMMENTS
06/02/2019	3RD REV. PER CITY COMMENTS
08/02/2019	4TH REV. PER CITY COMMENTS
08/27/2019	STEP ONE PUD REVIEW
12/23/2019	CITY RESUBMITTAL
01/17/2020	PERMIT REVIEW
03/02/2020	ENGINEERING RESUBMITTAL
05/06/2020	ENGINEERING RESUBMITTAL
06/09/2020	ENGINEERING RESUBMITTAL
07/06/2020	ENGINEERING RESUBMITTAL



**LEGEND:**

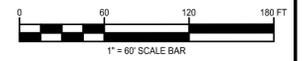
- DRAINAGE AREA
- STORM SEWER
- YARD BASIN
- CATCH BASIN
- STORM MANHOLE
- STORM STRUCTURE NUMBER

*Not For Construction*

Copyright © Bergmann Associates, Architects, Engineers,  
Landscape Architects & Surveyors, D.P.C.

Project Manager: P. FURTAW, PE	Checked By: P. FURTAW, PE
Designed By: I. GRAHAM, PE	Drawn By: I. GRAHAM, PE
Date Revisd: NOVEMBER 9, 2018	Project Number: 12963.00

## DRAINAGE AREA MAP



# C609

7/6/2020 11:55 AM C:\Redwood Living\2020\01 REDWOOD - ROCHESTER HILLS\01 DWG\411 Civil\_PLOT FILES\DRD09 DRAINAGE AREA MAP.dwg



**GRADING LEGEND:**

---72--- EXISTING CONTOUR

**UTILITY LEGEND:**

- STORM SEWER
- YARD BASIN
- CATCH BASIN
- STORM MANHOLE

# REDWOOD ROCHESTER HILLS

E. AVON ROAD  
ROCHESTER HILLS, MI 48307  
OAKLAND COUNTY



7510 E. PLEASANT VALLEY RD  
INDEPENDENCE, OH 44131



Bergmann Associates, Architects, Engineers,  
Landscape Architects & Surveyors, D.P.C.  
7050 West Saginaw Hwy.  
Suite 200  
Lansing, MI 48917

office: 517.272.9835  
fax: 517.272.9836

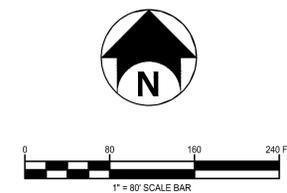
www.bergmannpc.com

DATE	DESCRIPTION
11/16/2018	PUD REVIEW
02/04/2019	REV. PER CITY COMMENTS
03/21/2019	2ND REV. PER CITY COMMENTS
08/02/2019	3RD REV. PER CITY COMMENTS
08/22/2019	4TH REV. PER CITY COMMENTS
08/27/2019	STEP ONE PUD REVIEW
12/23/2019	CITY RESUBMITTAL
01/17/2020	PERMIT REVIEW
03/02/2020	ENGINEERING RESUBMITTAL
05/06/2020	ENGINEERING RESUBMITTAL
06/09/2020	ENGINEERING RESUBMITTAL
07/08/2020	ENGINEERING RESUBMITTAL

*Not For Construction*

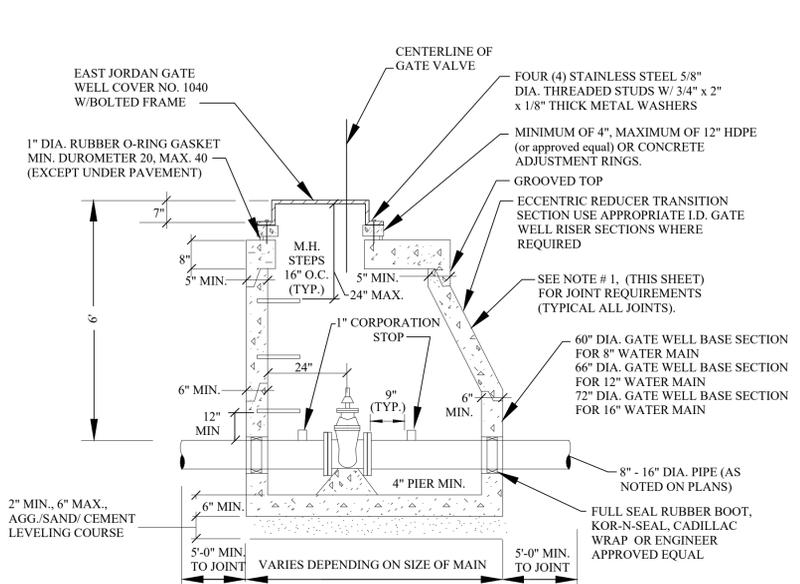
Copyright © Bergmann Associates, Architects, Engineers,  
Landscape Architects & Surveyors, D.P.C.

Project Manager: P. FURTAW, PE	Checked By: P. FURTAW, PE
Designed By: I. GRAHAM, PE	Drawn By: I. GRAHAM, PE
Date Issued: NOVEMBER 9, 2018	Project Number: 12963.00



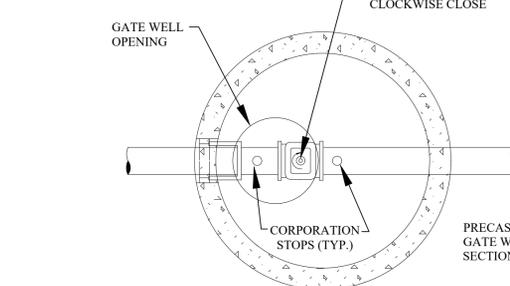
## STORMWATER OUTFALL PLAN

# C700

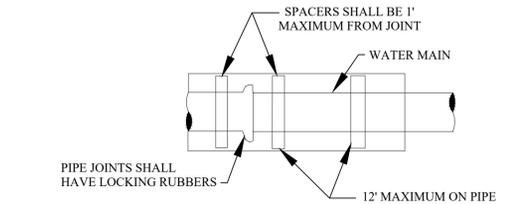


**ALL GATE WELLS**

MANHOLE STEPS TO BE PLASTIC COATED STEEL MEETING THE REQUIREMENTS IN ASTM D 2146, TYPE II, GRADE 49108, MA. INDUSTRIES, P.S.I. POLYPROPYLENE OR APPROVED EQUAL. STEPS TO BE INSTALLED DURING MANHOLE MANUFACTURE, PLACED AT 16" C. TO C.



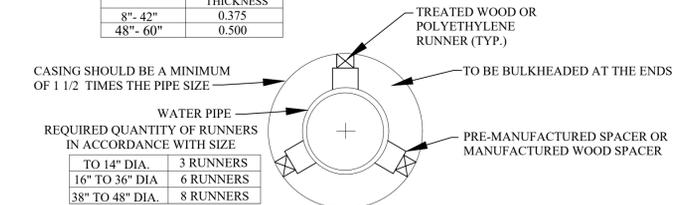
**GATE WELL (TYPICAL)**



**WATER MAIN IN CASING SECTION**

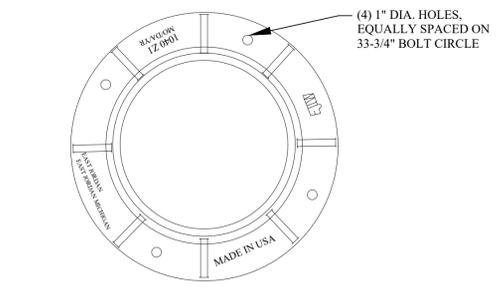
UNLESS OTHERWISE SPECIFIED, MINIMUM CASING PIPE SHALL BE ASTM A-139 GRADE B, WALL THICKNESS AS FOLLOWS:

NOMINAL SIZE	MINIMUM WALL THICKNESS
8" - 42"	0.375
48" - 60"	0.500

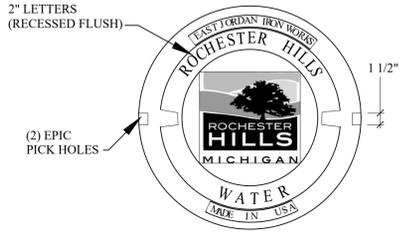


**SUPPORT FOR WATER MAIN CONSTRUCTED IN CASING PIPE**

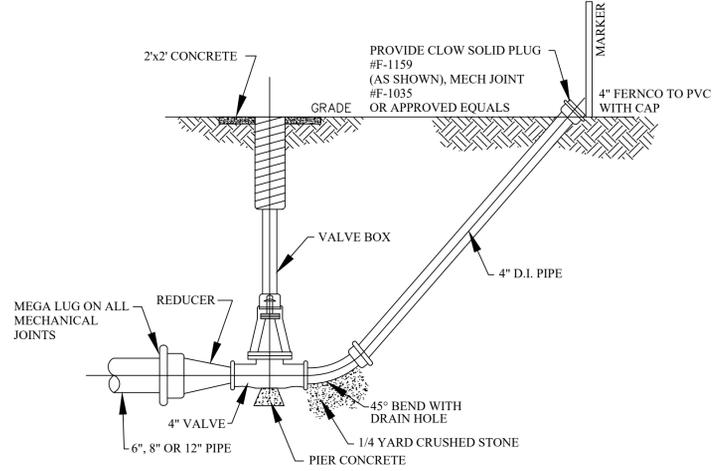
TO 14" DIA.	3 RUNNERS
16" TO 36" DIA.	6 RUNNERS
38" TO 48" DIA.	8 RUNNERS



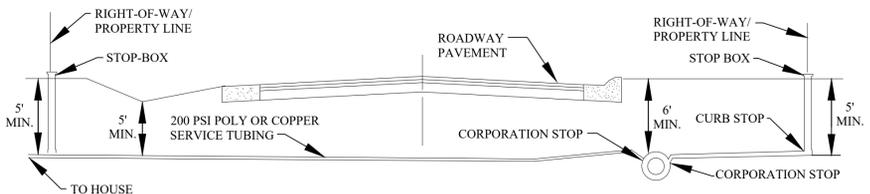
**FRAME**



**LETTERING LAYOUT FOR GATE WELL COVERS**

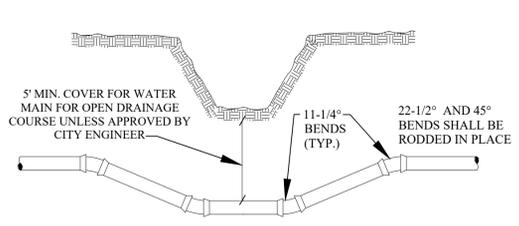


**DETAIL OF 4" BLOWOFF**

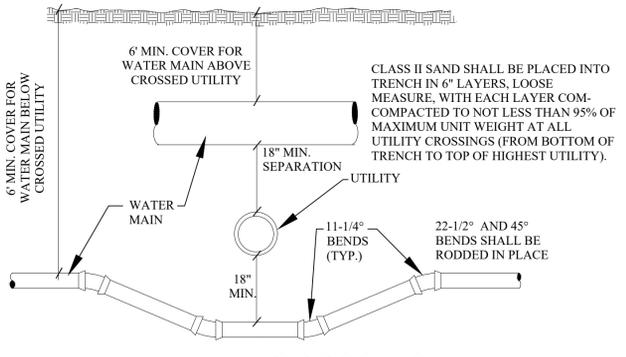


**TYPICAL PUBLIC ROAD WATER SERVICE CONNECTION**

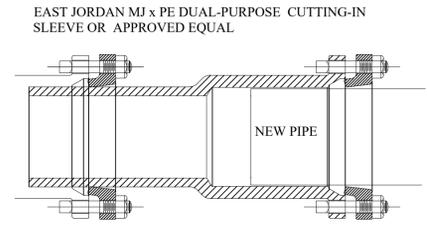
NOTES:  
 1. WATER SERVICE SHUT-OFF TO BE PLACED AT PROPERTY LINE.  
 2. LATERAL LOCATION SHALL BE AS REQUESTED BY THE ABUTTING PROPERTY OWNER.  
 3. ROCHESTER HILLS DPS PERFORMS SERVICE LEAD TAPS UP TO 2" DIAMETER.



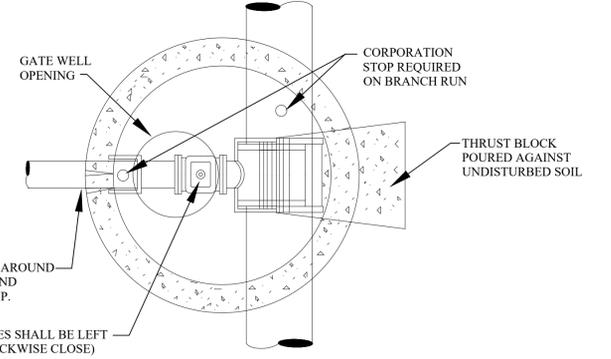
**DITCH CROSSING**



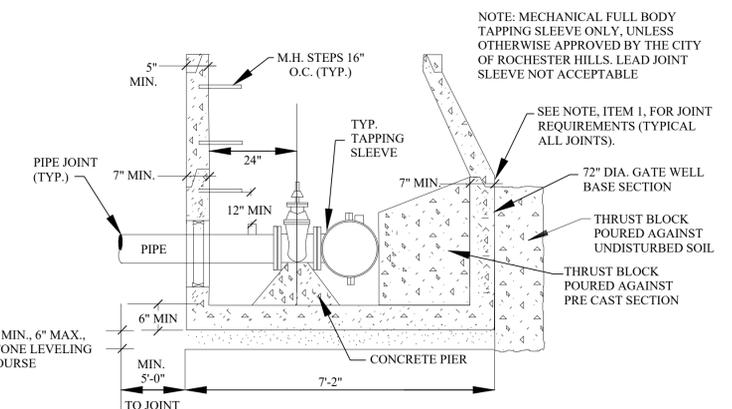
**UTILITY CROSSING**



**BOTTLE SLEEVE**



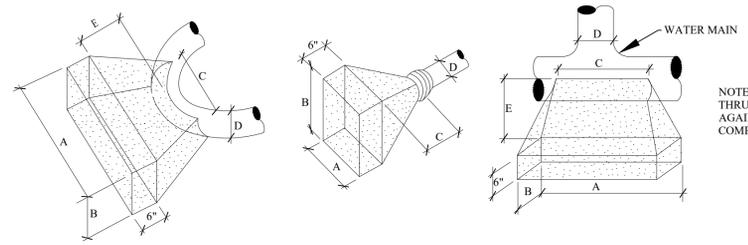
**PLAN TAPPING SLEEVE VALVE & WELL (TYPICAL)**



**TAPPING SLEEVE, VALVE AND WELL (TYPICAL)**

**NOTES:**

- ALL PRECAST CONCRETE GATE WELL SECTIONS SHALL BE MANUFACTURED TO CONFORM WITH A.S.T.M. C478, STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS, EXCEPT WALL THICKNESS SHALL BE AS SHOWN ON THESE DETAILS. ALL JOINTS FOR PRECAST CONCRETE GATE WELL SECTIONS SHALL BE "MODIFIED GROOVE TONGUE" WITH GASKET MANUFACTURED TO CONFORM WITH A.S.T.M. C 443, STANDARD SPECIFICATION FOR JOINTS FOR CIRCULAR CONCRETE SEWER AND CULVERT PIPE USING RUBBER GASKETS.
- CONTRACTOR SHALL INSTALL VALVES, TAPPING SLEEVES AND GATE WELL STRUCTURES IN STRICT COMPLIANCE WITH MEASUREMENTS PROVIDED ON SHEET 1 (i.e. 2'-0" BETWEEN GATE WELL WALL & CENTERLINE OF OPERATING NUT) TO ALLOW PROPER OPERATION OF VALVE THROUGH GATE WELL OPENING. FAILURE TO DO SO WILL REQUIRE CONTRACTOR TO CORRECT AT HIS EXPENSE.
- TAPPING SLEEVES SHALL BE MANUFACTURED BY ROMAC INDUSTRIES; MUELLER; EAST JORDAN; SMITH-BLAIR OR APPROVED EQUAL AND APPROVED BY THE CITY OF ROCHESTER HILLS. FULL BODY SLEEVES MUST BE USED EXCEPT FOR REINFORCED CONCRETE PRESSURE PIPE OR A.C. PIPE.
- FOR ALL PIPE USE A 1" CORPORATION STOP. NO CORPS SHALL BE USED IN CONCRETE PRESSURE PIPE.
- RUBBER O-RINGS SHALL NOT BE USED IN PAVEMENT.



FOR 90° BENDS OR SMALLER

D	A	B	C	E MIN.
20"	8"	6.5'	3.5'	2.5'
16"	6"	4'	2.5'	2'
12"	4"	3'	2'	1.75'
10"	3'	3'	2'	1.75'
8"	3'	2'	2'	1.5'
6"	2'	1.5'	2'	1.25'

FOR PLUGS

D	A	B	C MIN.
20"	7"	5'	2.5'
16"	4'-10"	4'-10"	2'
12"	4'-4"	3'	1'-9"
10"	3'	2'	1'-6"
8"	2'-10"	2'-6"	1'-6"
6"	1'-6"	1'-6"	3"

FOR TEES

D	A	B	C	E MIN.
20"	6.5'	4.5'	3.5'	3'
16"	4'-8"	4'-8"	2.5'	2.75'
12"	4'	3'	2.5'	2.5'
10"	3'	2'	2'	2.25'
8"	2'-6"	2'	2'	2.25'
6"	2'	2'	2'	2.25'

**THRUST BLOCK DETAILS**

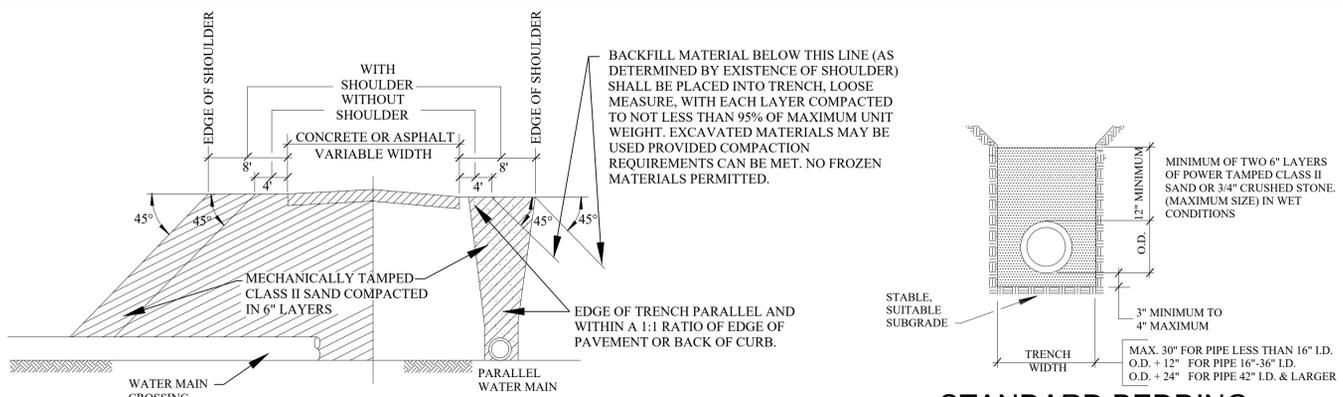


REVISIONS	DATE	APPROVED BY CITY COUNCIL, DATE:	NOTIFY ROCHESTER HILLS ENGINEERING DIVISION @ 248-841-2510 48 HRS. PRIOR TO START OF CONSTRUCTION

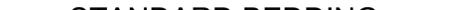
**City of Rochester Hills**  
 1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

**WATER MAIN  
 STANDARD DETAILS**

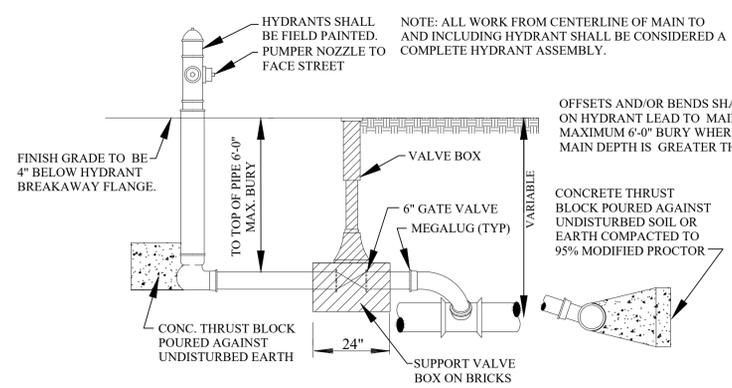
NOT TO SCALE DATE: 1/10/2018  
 SHEET 1 OF 2



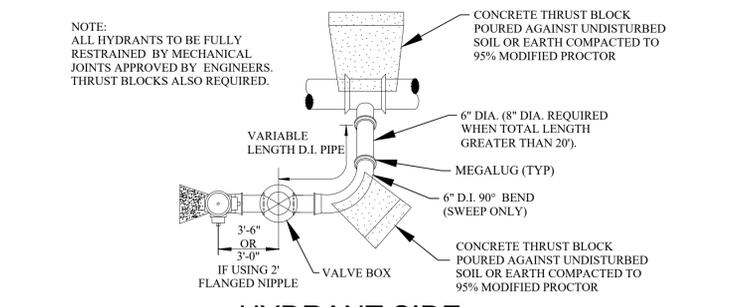
**MINIMUM BACKFILL UNDER OR WITHIN PAVEMENT INFLUENCE**



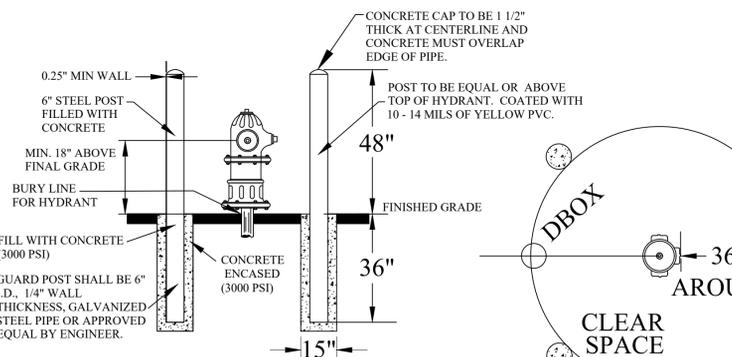
**STANDARD BEDDING FOR WATER MAIN**



**HYDRANT SIDE OUTLET OPTION**

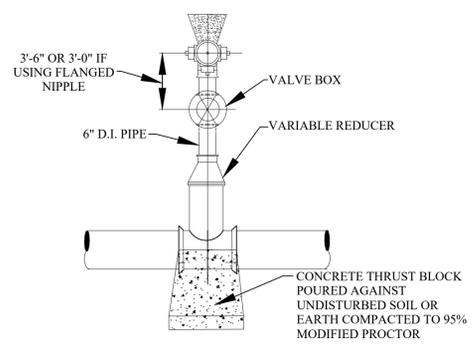


**HYDRANT SIDE OUTLET OPTION**

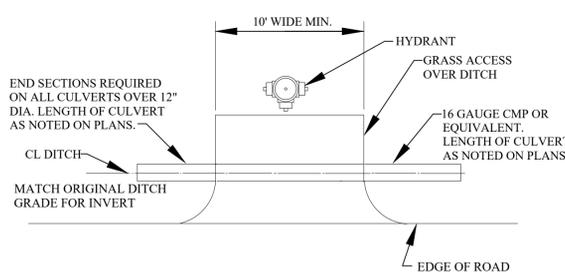


**GUARD POST**

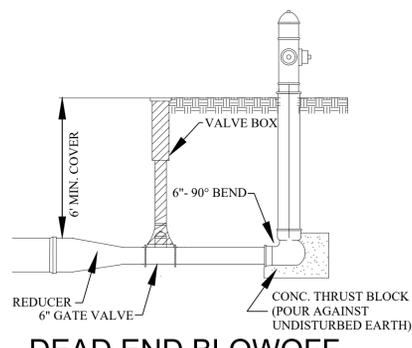
**HYDRANT & BLOWOFF DETAILS**



**HYDRANT CONNECTION (TYPICAL)**



**DITCH ENCLOSURE AT HYDRANT/ GATE WELL**



**DEAD END BLOWOFF CONNECTION**

**GENERAL NOTES**

1. ALL CONSTRUCTION PROCEDURES AND MATERIALS SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF ROCHESTER HILLS.
2. A PRE-CONSTRUCTION MEETING SHALL BE SCHEDULED BY THE CITY OF ROCHESTER HILLS AND HELD PRIOR TO THE START OF CONSTRUCTION.
3. CONTRACTOR MUST CONTACT MISS DIG (811) AT LEAST THREE WORKING DAYS PRIOR TO THE START OF CONSTRUCTION FOR UNDERGROUND UTILITY LOCATIONS. ALL UTILITIES SHALL BE STAKED BEFORE CONSTRUCTION BEGINS.
4. ALL WATER MAIN EASEMENTS SHALL BE PROVIDED PRIOR TO CONSTRUCTION AND ACCEPTANCE OF THE WATER DISTRIBUTION SYSTEM.
5. WATER MAINS SHALL BE CONSTRUCTED WITH A MINIMUM COVER OF 6 FEET BELOW FINISHED GRADES, INCLUDING OPEN DRAINAGE COURSES.
6. ALL TRENCHES UNDER OR WITHIN A 1:1 RATIO OF EXISTING OR PROPOSED PAVEMENT OR DRIVEWAYS, SHALL BE BACKFILLED WITH COMPACTED CLASS II SAND TO GRADE (95% MAXIMUM UNIT DENSITY).
7. WHERE TWO UTILITIES CROSS, PROVIDE CLASS II BACKFILL MATERIAL IN SIX (6) INCH COMPACTED LAYERS TO TOP OF HIGHEST UTILITY.
8. WHERE WATER MAINS DIP UNDER OTHER UTILITIES, THE SECTIONS WHICH ARE DEEPER THAN NORMAL SHALL BE CONSTRUCTED WITH 11-1/4 VERTICAL BENDS, 22 1/2 OR 45 BENDS MUST BE RODDED AND PROPERLY ANCHORED.
9. ALL PRECAST CONCRETE GATE WELL SECTIONS SHALL BE IN ACCORDANCE WITH A.S.T.M. C478, STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS. WALL THICKNESS SHALL BE AS SHOWN ON THESE DETAILS. ALL JOINTS FOR PRECAST CONCRETE GATE WELL SECTIONS SHALL BE "MODIFIED GROOVE TONGUE" WITH GASKET MANUFACTURED TO CONFORM WITH A.S.T.M. C 443, STANDARD SPECIFICATION FOR JOINTS FOR CIRCULAR CONCRETE SEWER AND CULVERT PIPE USING RUBBER GASKETS.
10. CONTRACTOR SHALL INSTALL VALVES, TAPPING SLEEVES AND GATE WELL STRUCTURES IN STRICT COMPLIANCE WITH MEASUREMENTS PROVIDED ON SHEET 1 (2'-0" BETWEEN GATE WELL WALL & CENTERLINE OF OPERATING NUT) TO ALLOW PROPER OPERATION OF VALVE THROUGH GATE WELL OPENING.
11. ALL CROSS-CONNECTION CONTROL DEVICES SHALL BE INSTALLED AS REQUIRED BY THE ROCHESTER HILLS PLUMBING INSPECTOR AND IN ACCORDANCE WITH THE STANDARDS OF THE OAKLAND COUNTY DRAIN COMMISSIONER OPERATION AND MAINTENANCE DIVISION AND THE MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF DRINKING WATER AND RADIOLOGICAL PROTECTION.
12. ALL WATER SERVICE CONNECTIONS TWO (2) INCHES AND SMALLER SHALL BE MADE BY THE CITY OF ROCHESTER HILLS, DEPARTMENT OF PUBLIC SERVICES AFTER WATER MAIN ACCEPTANCE AND APPLICABLE PERMITS ARE OBTAINED.
13. ALL FITTINGS AND BENDS SHOULD BE BLOCKED IN ACCORDANCE WITH THRUST BLOCK DETAILS, UNLESS ALTERNATE THRUST RESTRAINT SYSTEM, AS INDICATED PLANS AND SPECIFICATIONS, IS APPROVED BY THE CITY OF ROCHESTER HILLS DEPARTMENT OF PUBLIC SERVICE.

**WATER MAIN MATERIALS NOTES**

1. TEMPORARY CONNECTIONS, WHICH MAY BE MADE FOR CHLORINATING AND FLUSHING PURPOSES, SHALL INCLUDE A TESTABLE DOUBLE CHECK VALVE BACKFLOW PREVENTER WITH CURRENT CERTIFICATION.
2. CORPORATION STOPS USED FOR INSERTION INTO MAINS SHALL BE FORD TYPE B-44. ALL STOPS SHALL HAVE BRONZE CAST BODIES, KEYS, STEM WASHERS AND NUTS. INLET THREADS SHALL CONFORM TO THE LATEST VERSION OF AWWA C800.
3. ALL DUCTILE IRON PIPE (D.I.P.) WATER MAIN SHALL BE DESIGNED FOR 150 PSI MINIMUM WORKING PRESSURE. A ZINC COATING WITH CLASS 52 MAY BE PROPOSED AND IS SUBJECT TO FINAL DECISION FOR APPROVAL BY THE CITY ENGINEER.
4. THE DUCTILE IRON PIPE TO BE FURNISHED AND DELIVERED UNDER THIS SPECIFICATION SHALL MEET ALL THE REQUIREMENTS OF THE CURRENT AWWA C151 (ANSI A21.5), EXCEPT AS OTHERWISE SPECIFIED HEREIN. PIPE SHALL BE DOUBLE CEMENT-LINED AND SEAL COATED WITH AN APPROVED BITUMINOUS SEAL COAT IN ACCORDANCE WITH AWWA C104 (ANSI A21.4).
5. DUCTILE IRON PIPE SHALL BE CLASS 54 FOR SIZES THREE (3) INCH THROUGH TWENTY (20) INCHES SIZE. TWENTY-FOUR (24) INCH AND LARGER SHALL BE CLASS 55 DUCTILE IRON PIPE.
6. PIPES TWENTY-FOUR (24) INCHES AND LARGER IN NOMINAL DIAMETER SHALL MEET ALL THE REQUIREMENTS OF THE CURRENT AWWA C100 FOR DUCTILE IRON WATER PIPE.
7. MECHANICAL JOINTS FOR DUCTILE IRON WATER MAIN SHALL BE IN ACCORDANCE WITH AWWA C111 (ANSI A21.11).
8. FLANGE JOINTS FOR DUCTILE IRON WATER MAIN SHALL BE IN ACCORDANCE WITH AWWA C110 (ANSI A21.10).
9. FITTINGS FOR DUCTILE IRON PIPE SHALL BE DUCTILE IRON AND SHALL MEET REQUIREMENTS OF AWWA C110 (ANSI A21.10) OR AWWA C153 (ANSI A21.53). DUCTILE IRON FITTINGS SHALL BE RATED FOR 350 PSI. PIPE SIZES TWENTY-FOUR (24) INCH DIAMETER AND LESS, AND 250 PSI FOR PIPE SIZES OVER TWENTY-FOUR (24) INCH DIAMETER. DUCTILE IRON FLANGE FITTINGS SHALL BE RATED FOR 250 PSI FOR ALL PIPE DIAMETERS.
10. ALL DUCTILE IRON PIPE, FITTINGS AND HYDRANTS SHALL BE ENCASED WITH POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF A.N.S.I./A.W.W.A. STANDARD SPECIFICATION D1248 AND AWWA C105. POLYETHYLENE TUBE MATERIAL SHALL HAVE A THICKNESS OF .008" (8-MILS). ADHESIVE TAPE SHALL BE A GENERAL PURPOSE ADHESIVE TAPE 2" WIDE AND APPROXIMATELY 10-MILS THICK, SUCH AS SCOTCHRAP, NO.50, POLYKEN NO. 900, OR TAPECOAT CT.

**VALVE AND SLEEVE NOTES**

1. GATE VALVES, SIZES THREE (3) INCH THROUGH SIXTEEN (16) INCH AND TAPPING VALVES SHALL MEET THE CITY OF ROCHESTER HILLS STANDARD AS DETAILED WITH NON-RISING STEM. (EAST JORDAN, AMERICAN FLOW CONTROL, MUELLER)
2. ALL IN LINE GATE VALVES EIGHT (8) INCH AND LARGER SHALL BE IN WELLS. SPECIFICATIONS SHALL INCLUDE THE DIRECTION OF OPERATION OF ALL VALVES (CLOCKWISE CLOSURE). VALVE BOX USE TO BE APPROVED BY ENGINEERING DIVISION.
3. ALL GATE WELL COVERS SHALL BE CITY OF ROCHESTER HILLS STANDARD AS DETAILED.
4. ALL GATE VALVES WITH OPERATING NUTS AT A DISTANCE GREATER THAN FIVE (5) FEET BELOW GROUND SURFACE SHALL BE PROVIDED WITH AN EXTENSION STEM. THE LENGTH OF THE EXTENSION STEM SHALL REACH WITHIN FIVE (5) FEET FROM THE GROUND SURFACE. WHEN AN EXTENSION STEM IS USED, IT SHALL BE HELD IN PLACE BY AN EXTENSION STEM GUIDE SUITABLY FASTENED TO THE WALL OF THE GATE WELL. THE EXTENSION STEM SHALL BE MECHANICALLY ATTACHED TO THE OPERATING NUT. DETAILS OF THE EXTENSION SYSTEM AND THE METHOD OF INSTALLATION SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
5. BUTTERFLY VALVES SHALL BE USED FOR VALVES GREATER THAN 16-INCH DIAMETER AND SHALL BE MODEL 2F11 AS MANUFACTURED BY HENRY PRATT COMPANY OR APPROVED EQUAL.
6. TAPPING VALVES SHALL BE SERIES "A" AS MANUFACTURED BY EAST JORDAN OR RESILIENT SEATED GATE VALVES AS APPROVED BY THE CITY OF ROCHESTER HILLS ENGINEERING SERVICES.
7. TAPPING SLEEVES SHALL BE MANUFACTURED BY ROMAC INDUSTRIES; MUELLER; EAST JORDAN; SMITH-BLAIR OR APPROVED EQUAL AND APPROVED BY THE CITY OF ROCHESTER HILLS. FULL BODY SLEEVES MUST BE USED EXCEPT FOR REINFORCED CONCRETE PRESSURE PIPE OR A.C. PIPE.

**HYDRANT REQUIREMENTS**

1. ALL HYDRANTS SHALL BE CONSTRUCTED WITH A SIX (6) INCH COMPANION GATE VALVE IN A THREE (3) PIECE, ADJUSTABLE DUCTILE IRON VALVE BOX, WHICH SHALL INCLUDE A FIVE AND ONE-QUARTER (5-1/4) INCH SCREW SHAFT. VALVE BOXES SHALL BE SERIES 6860 AS MANUFACTURED BY TYLER PIPE OR APPROVED EQUAL.
2. ALL HYDRANTS SHALL BE EAST JORDAN NO. 5-BR-250 TRAFFIC MODEL, OR CITY APPROVED EQUAL. SELF-DRAINING HYDRANTS SHALL NOT BE USED. HYDRANTS SHALL HAVE BREAKAWAY FLANGE.
3. ALL HYDRANTS SHALL BE PAINTED RED ABOVE GROUND WITH A FINISH COAT OF RUST-OLEUM SAFETY RED OR APPROVED EQUAL. HYDRANT CAPS SHALL BE PAINTED SAME COLOR AS THE HYDRANT.
4. ALL FIRE HYDRANT JOINTS SHALL BE TOTALLY RESTRAINED BY THE USE OF RESTRAINED JOINT. THRUST BLOCKS ARE ALSO REQUIRED.

**ACCEPTANCE OF NEW WATER MAINS**

1. PRIOR TO WATER MAIN ACCEPTANCE THE FOLLOWING CONDITIONS MUST BE MET: 1) PRESSURE TESTING AND BACTERIA TESTING MUST BE COMPLETED IN ACCORDANCE WITH THE CITY OF ROCHESTER HILLS 2) ALL EASEMENT AND RIGHT-OF-WAY ACQUISITION MUST BE ACCEPTED BY THE CITY OF ROCHESTER HILLS ENGINEERING SERVICES 3) THE CITY OF ROCHESTER HILLS MUST BE PROVIDED WITH THE BILL OF SALE AND 4) ALL MYLAR "AS-BUILT DRAWINGS" MUST BE ACCEPTED AND APPROVED BY THE CITY OF ROCHESTER HILLS, ENGINEERING SERVICES. THE CITY OF ROCHESTER HILLS INSPECTION DIVISION MUST WITNESS THE CONNECTION OF THE WATER MAIN TO THE EXISTING WATER MAIN, AFTER WHICH RESIDENTIAL AND COMMERCIAL TAPS WILL BE ALLOWED.
2. THE CONTRACTOR SHALL NOTIFY THE CITY OF ROCHESTER HILLS, INSPECTION DEPARTMENT (248.841.2510) FOR PRESSURE TESTING, BACTERIOLOGICAL SAMPLING, CONNECTIONS TO EXISTING WATER MAIN AND FINAL FIELD REVIEW. A FORTY-EIGHT (48) HOUR ADVANCE NOTICE IS REQUIRED.
3. THE CONTRACTOR SHALL DISINFECT AND PRESSURE TEST ALL NEW WATER MAIN IN ACCORDANCE WITH ROCHESTER HILLS STANDARDS. THE WATER MAIN SHALL PASS A 150 PSI PRESSURE TEST FOR A TWO (2) HOUR PERIOD. WATER LOSS SHALL NOT EXCEED A RATE OF 11.65 U.S. GALLONS PER INCH DIAMETER PER MILE OF WATER MAIN IN TWENTY-FOUR (24) HOURS.
4. WHERE CONTRACTOR SUPPLIED GAUGES ARE REQUIRED, MINIMUM SIZE SHALL BE 3 1/2" DIAMETER OR LARGER GRADUATED IN ONE (1) OR TWO (2) POUND INCREMENTS FROM 1 TO 160 P.S.I. OR HIGHER AND HAVE CURRENT CERTIFICATION.
5. PRESSURE TESTING AND BACTERIA TESTING MUST BE COMPLETED AND APPROVED PRIOR TO CONNECTING TO THE EXISTING WATER MAIN.

**CITY OF ROCHESTER HILLS WATER SYSTEMS AS-BUILT DRAWING SPECIFICATIONS**

IN AREAS WHERE WATER SYSTEMS ARE OPERATED AND MAINTAINED BY THE CITY OF ROCHESTER HILLS DEPARTMENT OF PUBLIC SERVICES, FINAL ACCEPTANCE OF THE WATER SYSTEM MUST BE RENDERED BY THE DEPARTMENT OF PUBLIC SERVICES, BEFORE THE SYSTEM CAN BE USED FOR THE SERVICE INTENDED.

ONE ITEM REQUIRED FOR FINAL ACCEPTANCE SHALL BE THE SUBMISSION OF AS-BUILT DRAWINGS TO THE CITY OF ROCHESTER HILLS, DPS, BY THE DESIGN ENGINEER. AS-BUILT DRAWINGS SHALL BE DEFINED AS AND CONTAIN THE FOLLOWING INFORMATION:

1. FINAL AS-BUILT DRAWINGS SHALL BE PROVIDED IN REPRODUCIBLE PDF FORMAT VIA DIGITAL STORAGE MEDIA. XEROX OR ANY HEAT PROCESS REPRODUCTIONS WILL NOT BE ACCEPTED.
2. ALONG WITH THE PDF PLAN SET PROVIDE TWO (2) SETS OF BLACK-LINED DRAWINGS AND THE PLANS ON ELECTRONIC MEDIA IN AUTOCAD FORMAT (LATEST VERSION).
3. EACH AND EVERY SHEET SHALL BE SEALED BY THE DESIGN ENGINEER, ALONG WITH THE FOLLOWING CERTIFICATION STATEMENT ON THE COVER SHEET:

I HEREBY CERTIFY THAT OUR FIRM HAS PREPARED THESE AS-BUILT DRAWINGS OF THE IMPROVEMENTS AS CONSTRUCTED, AND THAT TO THE BEST OF MY KNOWLEDGE THOSE IMPROVEMENTS NOTED AS "AS BUILT" WERE CONSTRUCTED IN SUBSTANTIAL CONFORMANCE WITH THE APPROVED CONSTRUCTION PLANS; AND ALSO THAT THE WATER MAIN AND STRUCTURES, AS CONSTRUCTED, LIE WITHIN THE EASEMENT DESCRIPTIONS REQUIRED BY THE CITY OF ROCHESTER HILLS.

\_\_\_\_\_  
(COMPANY NAME)

\_\_\_\_\_  
(ENGINEER'S SIGNATURE)

PROFESSIONAL ENGINEER NO. \_\_\_\_\_

\_\_\_\_\_  
ENGINEER SEAL

4. THE MAXIMUM SCALE SHALL BE ONE (1) INCH EQUALS FIFTY (50) FEET.
5. THE SIZE, LENGTH, CLASS AND MANUFACTURER OF PIPE INSTALLED SHALL BE INDICATED.
6. THE SIZE, BRAND AND MODEL NUMBERS OF ALL VALVES AND HYDRANTS INSTALLED SHALL BE INDICATED.
7. A TOTAL AS-BUILT DRAWING QUANTITY LIST SHALL BE INCLUDED, AS WELL AS AN AS-BUILT DRAWING QUANTITY LIST ON EACH INDIVIDUAL SHEET.
8. THE LOCATIONS SHALL BE SHOWN ON THE PLANS WITH AN ACCURACY OF ONE (1) FOOT.
9. THE OFFSET OF THE WATER MAIN FROM PROPERTY LINES SHALL BE INDICATED.
10. ALL GATE VALVE WELLS, HYDRANTS AND ALL WATER SYSTEM APPURTENANCES SHALL BE LOCATED FROM TWO FIXED OBJECTS (MANHOLES, BUILDING CORNERS ECT.).
11. ALL UNDERGROUND APPURTENANCES, SUCH AS GATE VALVE WELLS, METER PITS, PRESSURE REDUCING VALVE PITS, ETC. SHALL BE LOCATED FROM THE NEAREST HYDRANT THAT IS CONNECTED TO THE SAME WATER MAIN AS THE APPURTENANCE.
12. THE LOCATION AND SIZE OF EVERY RESTRAINED JOINT SHALL BE NOTED.
13. THE ACCURATE LOCATION OF ALL UTILITY CROSSINGS WHERE THE VERTICAL SEPARATION, IS LESS THAN 18" SHALL BE NOTED.
14. AS-BUILT SHALL BE PREPARED IN ACCORDANCE WITH THE CITY OF ROCHESTER HILLS AS-BUILT GUIDELINES AS PROVIDED AT THE PRE-CONSTRUCTION MEETING.



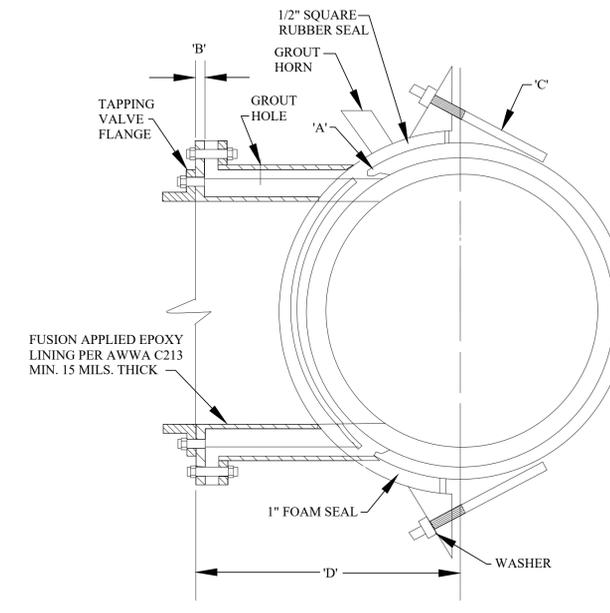
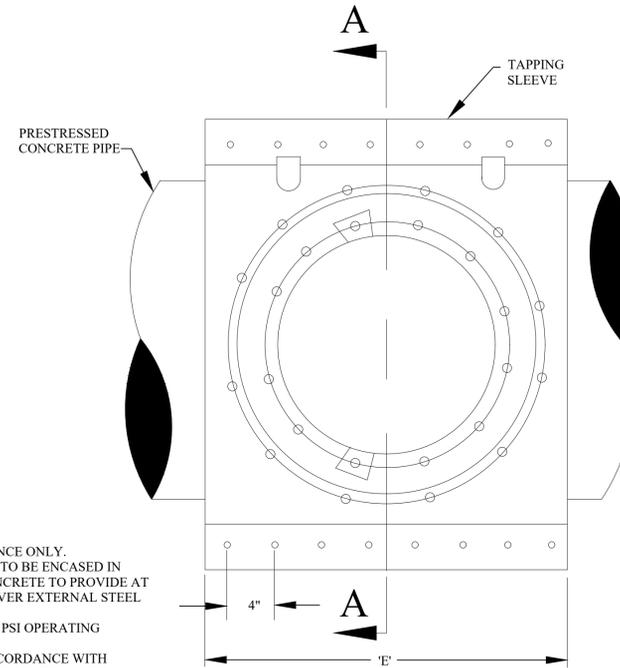
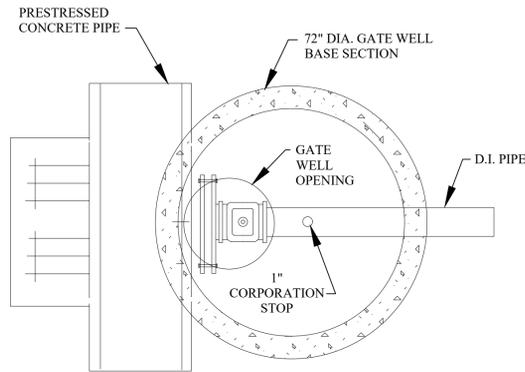
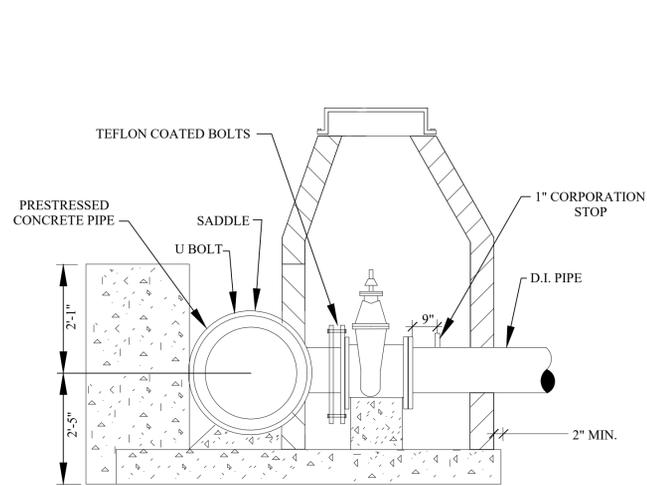
REVISIONS	DATE	APPROVED BY CITY COUNCIL, DATE: _____
		PREPARED BY ENGINEERING DIVISION DEPARTMENT OF PUBLIC SERVICES

NOTIFY ROCHESTER HILLS ENGINEERING DIVISION @ 248-841-2510 48 HRS. PRIOR TO START OF CONSTRUCTION

**City of Rochester Hills**  
1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

**WATER MAIN STANDARD DETAILS**

NOT TO SCALE DATE: 1/10/2019  
SHEET 2 OF 2



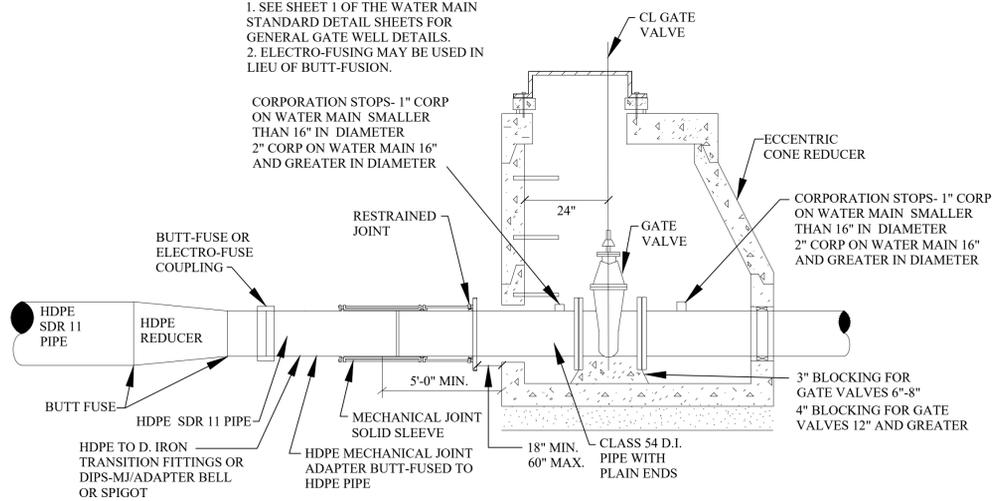
- NOTES:
- 1) THESE DIMENSIONS ARE FOR REFERENCE ONLY.
  - 2) ENTIRE SADDLE, INCLUDING STRAPS, TO BE ENCASED IN PORTLAND CEMENT MORTAR OR CONCRETE TO PROVIDE AT LEAST ONE (1) INCH OF THICKNESS OVER EXTERNAL STEEL SURFACES PRIOR TO BACKFILLING.
  - 3) TAP SADDLES ARE DESIGNED FOR 150 PSI OPERATING PRESSURE.
  - 4) FLANGE DRILLED AND TAPPED IN ACCORDANCE WITH AWWA C207 CLASS D, CENTERING RING CONFORMS TO MSS-SP 60.
  - 5) GROUT SHALL SET A MINIMUM OF TWENTY-FOUR (24) HOURS PRIOR TO PRESSURE TESTING.

PIPE SIZE X TAP SIZE	A	B	C	D	E
16" X 4"	1/4"	7/8"	6	14-1/16"	24"
16" X 6"	1/4"	1-1/8"	6	14-5/16"	24"
16" X 8"	1/4"	1-1/8"	6	14-5/16"	24"
16" X 10"	1/4"	1-3/8"	7	14-9/16"	28"
16" X 12"	1/4"	1-3/8"	8	14-9/16"	32"
20" X 4"	1/4"	7/8"	6	16-1/2"	24"
20" X 6"	1/4"	1-1/8"	6	16-1/2"	24"
20" X 8"	1/4"	1-1/8"	6	16-1/2"	24"
20" X 10"	1/4"	1-3/8"	7	17"	28"
20" X 12"	1/4"	1-3/8"	8	17"	32"
24" X 4"	1/4"	7/8"	6	18-3/4"	24"
24" X 6"	1/4"	1-1/8"	6	19"	24"
24" X 8"	1/4"	1-1/8"	6	19"	24"
24" X 10"	1/4"	1-3/8"	7	19-1/4"	28"
24" X 12"	1/4"	1-3/8"	8	19-1/4"	32"
30" X 4"	1/4"	7/8"	6	22-1/8"	24"
30" X 6"	1/4"	1-1/8"	6	22-3/8"	24"
30" X 8"	1/4"	1-1/8"	6	22-3/8"	24"
30" X 10"	1/4"	1-3/8"	7	22-5/8"	28"
30" X 12"	1/4"	1-3/8"	8	22-5/8"	32"
36" X 4"	1/4"	7/8"	6	25-1/2"	24"
36" X 6"	1/4"	1-1/8"	6	25-3/4"	24"
36" X 8"	1/4"	1-1/8"	7	25-3/4"	28"
36" X 10"	1/4"	1-3/8"	8	26"	32"
36" X 12"	1/4"	1-3/8"	9	26"	36"
42" X 4"	1/4"	7/8"	6	28-7/8"	24"
42" X 6"	1/4"	1-1/8"	7	29-1/8"	28"
42" X 8"	1/4"	1-1/8"	8	29-1/8"	32"
42" X 10"	3/8"	1-3/8"	9	29-3/8"	36"
42" X 12"	3/8"	1-3/8"	10	29-3/8"	40"
48" X 4"	3/8"	7/8"	7	32-1/4"	28"
48" X 6"	3/8"	1-1/8"	7	32-1/2"	28"
48" X 8"	3/8"	1-1/8"	7	32-1/2"	28"
48" X 10"	3/8"	1-3/8"	7	32-3/4"	28"
48" X 12"	3/8"	1-3/8"	9	32-3/4"	36"

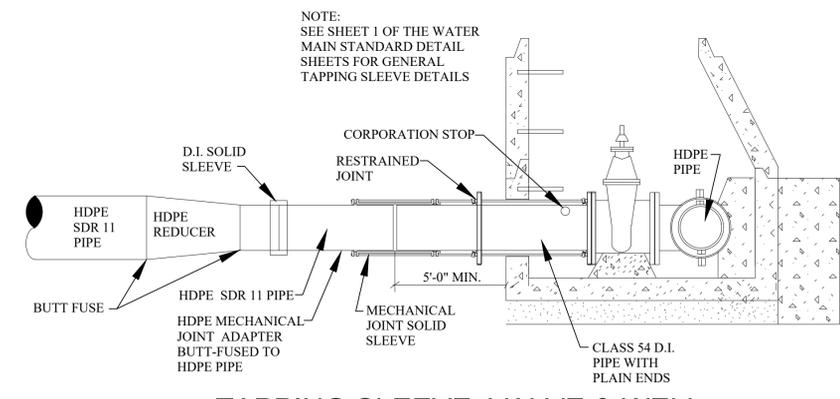
**CONCRETE PRESSURE TAP VALVE & WELL ASSEMBLY W/ CONCRETE ENCASEMENT**

**CONCRETE TAPPING SLEEVE DETAILS**

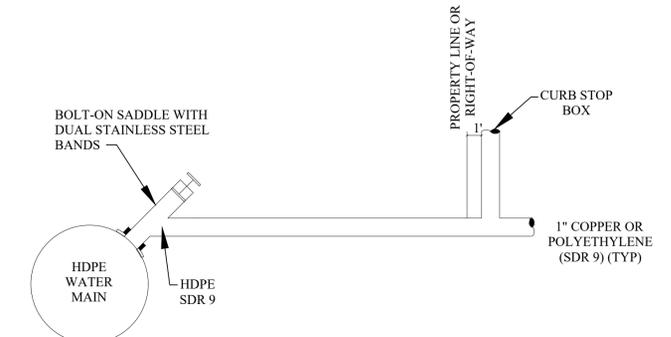
- NOTES:
1. SEE SHEET 1 OF THE WATER MAIN STANDARD DETAIL SHEETS FOR GENERAL GATE WELL DETAILS.
  2. ELECTRO-FUSING MAY BE USED IN LIEU OF BUTT-FUSION.



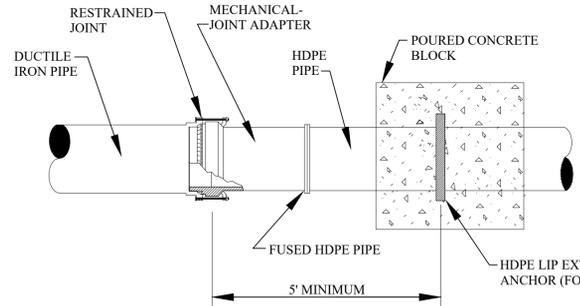
**TYPICAL GATE VALVE CONNECTION TO HDPE**



**TAPPING SLEEVE, VALVE & WELL**

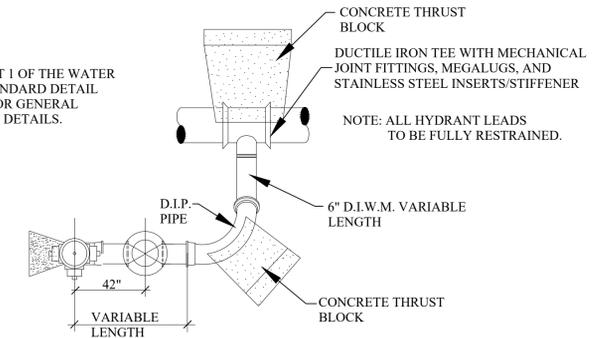


**HOUSE LEAD DETAIL HDPE TO COPPER OR POLYETHYLENE (SDR 9)**



**MECHANICAL-JOINT ADAPTER**

- NOTE: SEE SHEET 1 OF THE WATER MAIN STANDARD DETAIL SHEETS FOR GENERAL HYDRANT DETAILS.



**PLAN HYDRANT SIDE OUTLET**

- NOTE: ALL BURIED BOLTS SHALL BE CORTEN OR LOW ALLOY AND POLY-WRAPPED.

**DETAILS FOR HIGH DENSITY POLYETHYLENE PIPE (HDPE)**

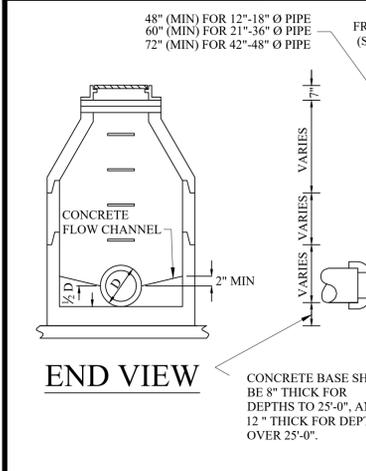
**City of Rochester Hills**  
 1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

**WATER MAIN SPECIAL DETAILS**

NOT TO SCALE DATE: 1/10/2019  
 SHEET 1 OF 1

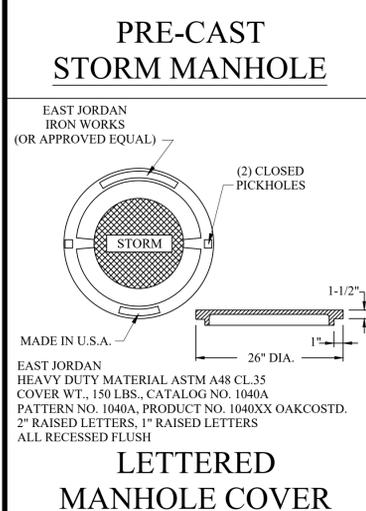


REVISIONS	DATE	APPROVED BY	NOTIFY ROCHESTER HILLS ENGINEERING DIVISION @ 248-841-2510 48 HRS. PRIOR TO START OF CONSTRUCTION



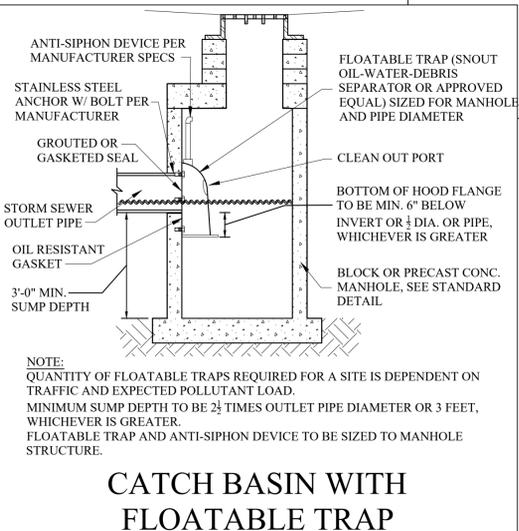
**END VIEW**

**SIDE VIEW**

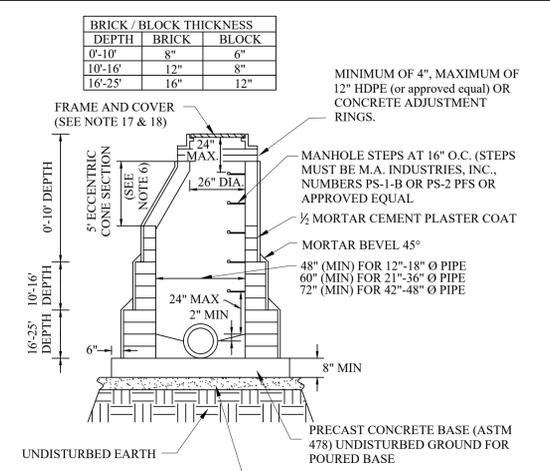


**PRE-CAST STORM MANHOLE**

**LETTERED MANHOLE COVER**

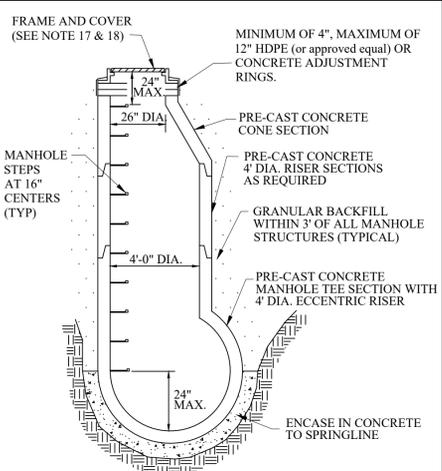


**CATCH BASIN WITH FLOATABLE TRAP**

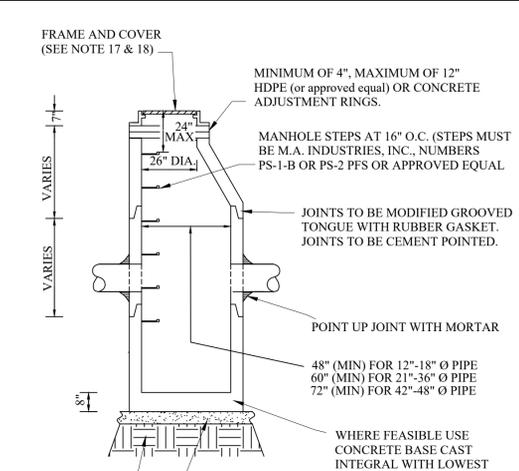


**BRICK OR BLOCK MANHOLE**

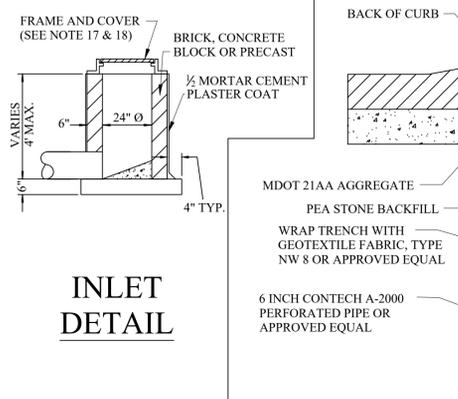
(NOTE: PERMITTED BY CITY ONLY FOR SPECIAL CIRCUMSTANCES)



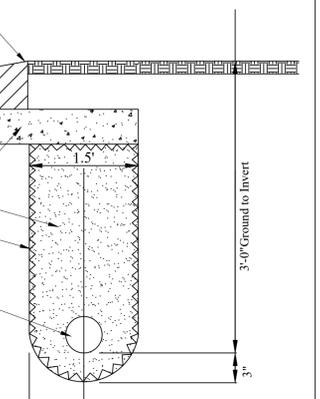
**PRE-CAST TEE MANHOLE DETAIL**



**PRECAST STORM CATCH BASIN**

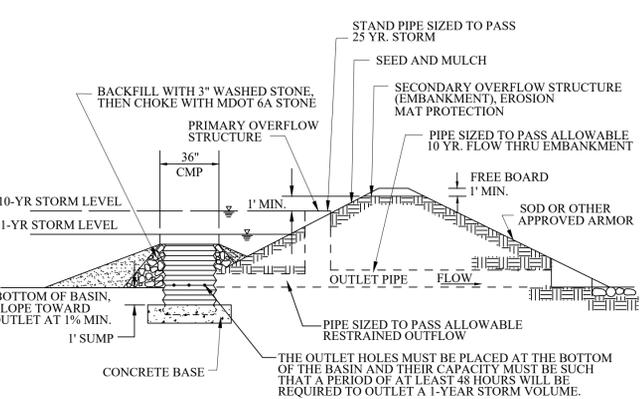


**INLET DETAIL**



**EDGE DRAIN DETAIL**

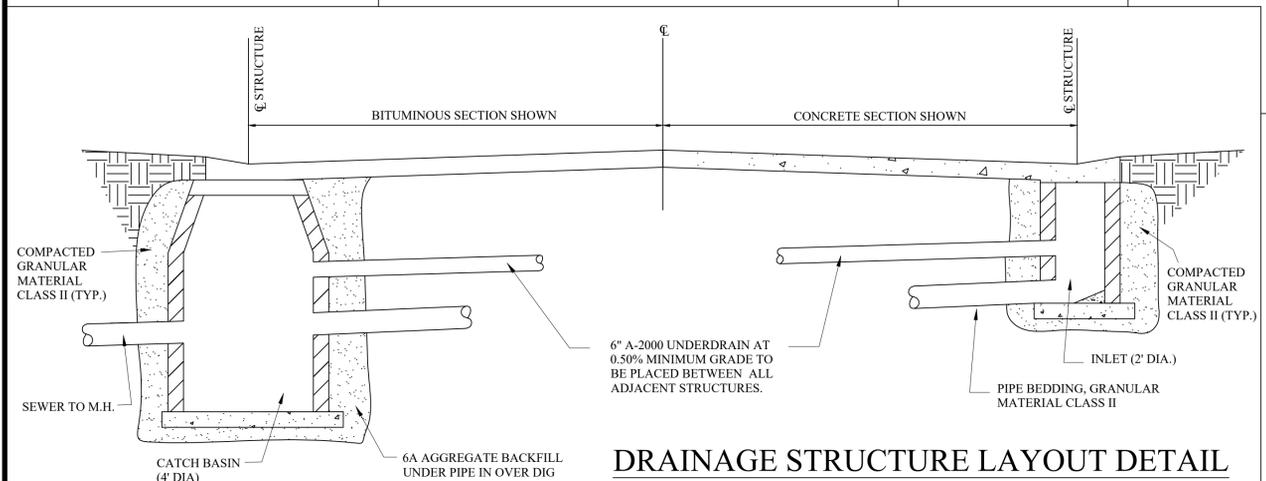
FOR PUBLIC AND PRIVATE ROADS



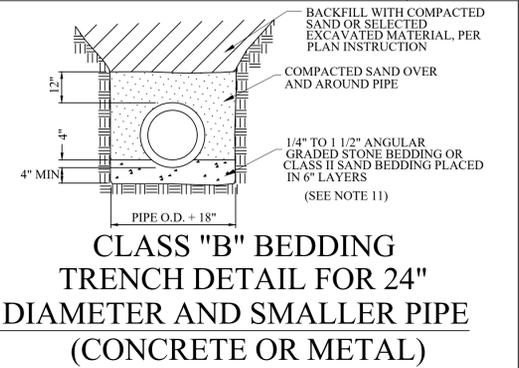
**PROFILE VIEW**

**SO-2 FOREBAY OUTLET FILTER (CMP)**

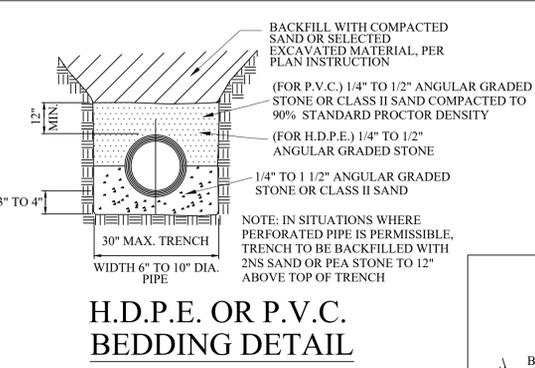
(SEE OCWRC STANDARD DETAILS FOR FOREBAY OUTLET STRUCTURE)



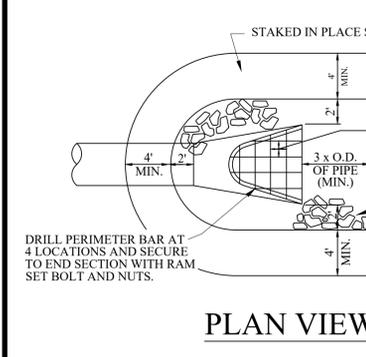
**DRAINAGE STRUCTURE LAYOUT DETAIL**



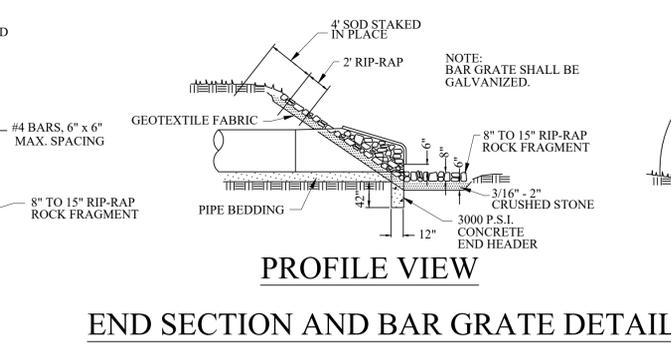
**CLASS "B" BEDDING TRENCH DETAIL FOR 24" DIAMETER AND SMALLER PIPE (CONCRETE OR METAL)**



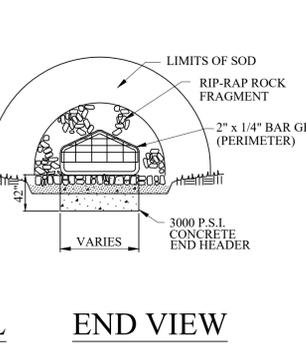
**H.D.P.E. OR P.V.C. BEDDING DETAIL**



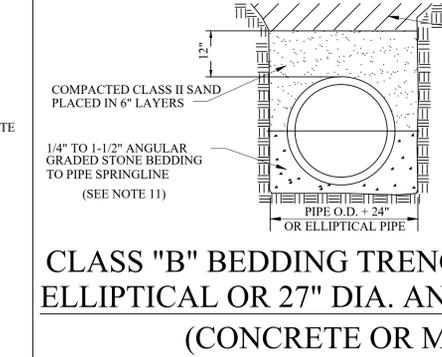
**PLAN VIEW**



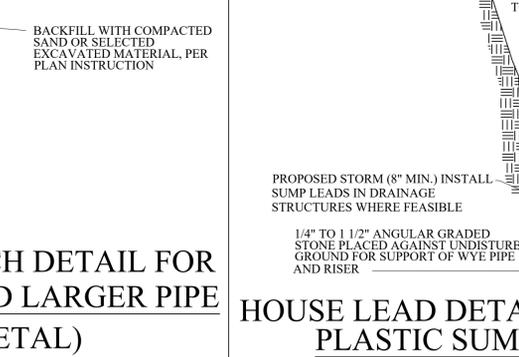
**END SECTION AND BAR GRATE DETAIL**



**END VIEW**



**CLASS "B" BEDDING TRENCH DETAIL FOR ELLIPTICAL OR 27" DIA. AND LARGER PIPE (CONCRETE OR METAL)**

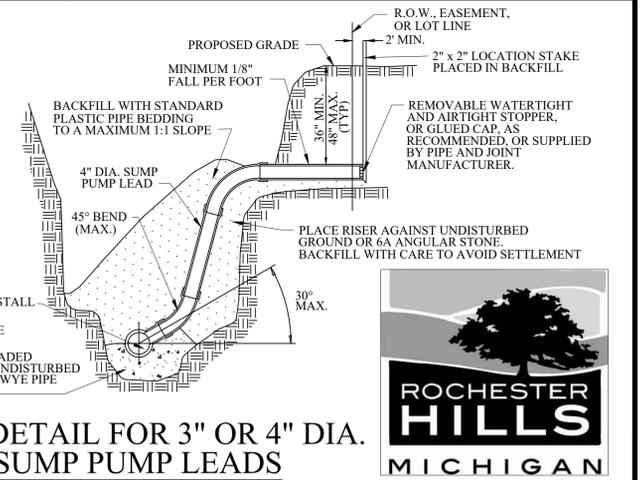


**HOUSE LEAD DETAIL FOR 3" OR 4" DIA. PLASTIC SUMP PUMP LEADS**

- GENERAL NOTES:**
- ALL EXISTING AND NEW STORM SYSTEMS SHALL BE CLEANED AND FLUSHED ONCE SITE IS 90% BUILT OUT AND VEGETATED. SEDIMENT, ROCK, AND OTHER DEBRIS SHALL BE COLLECTED AND DISPOSED OF IN A PROPER MANNER. IN NO CASE SHALL DEBRIS BE FLUSHED DOWN A STORM OR SANITARY SEWER FOR DISPOSAL. ALL DAMAGED IRRIGATION AND HOUSE DRAINAGE PIPE, DRAIN TILES, SEWER LATERALS AND CULVERTS SHALL BE REPAIRED EXPEDITIOUSLY. DEBRIS COLLECTED SHALL BE DISPOSED IN A COMMERCIAL LANDFILL OR OTHER APPROVED LOCATION.
  - STORM SEWER PIPE SHALL BE OF SIZE AND TYPE NOTED ON THE APPROVED PLANS.
  - REINFORCED CONCRETE PIPE (RCP) SHALL BE MODIFIED GROOVED TONGUE JOINTS WITH O-RING TYPE RUBBER GASKET, PER ASTM C443.
  - ALL CATCH BASIN LEADS AND INLET LEADS SHALL BE ASTM C76-CLASS IV PIPE.
  - MINIMUM PIPE SIZE FOR SEWERS, CATCH BASIN LEADS, AND INLET LEADS SHALL BE 12" NOMINAL INTERNAL DIAMETER.
  - ECCENTRIC CONES SHALL BE PROVIDED ON ALL STRUCTURES, REGARDLESS OF THE MATERIAL USED. PRECAST REINFORCED CONCRETE MANHOLE, BLOCK, OR BRICK TO PROVIDE A TRUE VERTICAL FACE FOR PLACEMENT OF MANHOLE STEPS.
  - THE INSIDE JOINTS OF PIPES SIZES 42" AND LARGER DIAMETER SHALL BE POINTED UP WITH MORTAR UPON COMPLETION OF BACKFILLING OPERATIONS.
  - ALL PIPES SHALL HAVE CLASS, LOT NUMBER, AND DATE OF MANUFACTURE CONSPICUOUSLY MARKED ON EACH LENGTH BY MANUFACTURER.
  - ALL END SECTIONS 18" AND LARGER SHALL BE PROVIDED WITH A GALVANIZED BAR SCREEN.
  - PRECAST REINFORCED CONCRETE SECTIONS SHALL CONFORM TO ASTM 2478.
  - IN DRY, STABLE SOILS, PEASTONE (EQUIVALENT TO M.D.O.T. 34R SPECIFICATIONS) MAY BE SUBSTITUTED FOR THE STANDARD BEDDING. IF THE TRENCH IS WET OR UNSTABLE A GEOTEXTILE FABRIC MUST BE USED TO LINE THE TRENCH PRIOR TO THE PLACEMENT OF THE 2NS SAND, PEASTONE, OR 1/4" - 1 1/2" ANGULAR GRADED STONE.
  - SCHEDULE INSPECTIONS 48 HOURS PRIOR TO START OF CONSTRUCTION BY CALLING THE CITY'S INSPECTION LINE AT 248-841-2510. FULL TIME INSPECTION SHALL BE REQUIRED FOR ALL UNDERGROUND STORM SEWER CONSTRUCTION.
  - THE CONTRACTOR SHALL CONTACT MISS DIG 72 HOURS BEFORE CONSTRUCTION AT (811) TO LOCATE EXISTING UNDERGROUND UTILITIES.
  - PRIOR TO START OF CONSTRUCTION CONTRACTOR SHALL HAVE IN HIS POSSESSION A CURRENT SOIL EROSION CONTROL PERMIT AS ISSUED BY THE OCWRC.
  - MINIMUM SUMP DEPTH IS 2' FOR CATCH BASINS, MINIMUM SUMP DEPTH IS 3' FOR CATCH BASINS WITH FLOATABLE TRAP INSTALLATIONS.
  - AS A MEANS OF INSURING PROPER INSTALLATION OF THE STORM SEWER PIPE, AT THE DISCRETION OF THE CITY ENGINEER, THE CONTRACTOR SHALL VIDEO INSPECT, ACCORDING TO THE CITY OF ROCHESTER HILLS VIDEO INSPECTION STANDARDS, 100% OF THE STORM SEWER PIPE 12" AND LARGER IN DIAMETER. IF VIDEO INSPECTION IS REQUIRED BY THE CITY ENGINEER THE CONTRACTOR SHALL PROVIDE 24 HOURS NOTICE TO THE CITY OF ROCHESTER HILLS PRIOR TO VIDEO INSPECTION, SO A REPRESENTATIVE MAY BE PRESENT. ROCHESTER HILLS WILL BE PROVIDED WITH A DIGITAL COPY OF THE VIDEO INSPECTION AND LOG IN ACCORDANCE WITH THE CITY OF ROCHESTER HILLS VIDEO INSPECTION STANDARDS.
- PROJECTS THAT THE CITY ENGINEER MAY IMPOSE THESE REQUIREMENTS ARE:
- ALL PUBLIC PROJECTS OR PROJECTS BEING CONSTRUCTED ON PUBLIC PROPERTY.
  - ANY PROJECT INVOLVING A DEVELOPMENT, SUBDIVISION, SITE CONDOMINIUM, CONDOMINIUM, OR ASSOCIATION.
  - ANY PROJECT THAT WILL RESULT IN MORE THAN ONE OWNER RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF THE COMPLETE STORM DRAINAGE SYSTEM.

**COVERS FOR MANHOLES, CATCH BASINS, AND INLETS**

- MANHOLE FRAME AND COVER SHALL BE EJ 1040, TYPE A COVER OR EQUIVALENT.
  - CATCH BASINS AND INLET FRAME AND COVER SHALL BE AS FOLLOWS:
    - EJ 7045 WITH TYPE M1 GRATE AND 7050 T2 ADJUSTABLE BACK, OR EQUAL, FOR USE WITH CONCRETE CURB AND GUTTER, (STRAIGHT CURB/M.D.O.T. F CURB) AND WITH CONCRETE PAVEMENT WITH INTEGRAL CURB.
    - EJ 7085 WITH TYPE M1 GRATE OR EQUAL, FOR USE WITH CONCRETE B-2 MODIFIED CURB AND GUTTER, AND WITH CONCRETE WITH B-2 MODIFIED INTEGRAL CURB.
    - EJ 7065 WITH TYPE M1 GRATE AND 7060 T1 DRIVE OVER CURB BACK, OR EQUAL, FOR USE WITH MOUNTABLE CURB AND GUTTER, AND WITH CONCRETE PAVEMENT WITH MOUNTABLE INTEGRAL CURB.
    - EJ FRAME 1040 WITH TYPE N OVAL GRATE OR TYPE O2 BEEHIVE GRATE, OR EQUAL, FOR USE ON OPEN DITCH STRUCTURES AND ON CATCH BASINS LOCATED IN SWALES, AND IN EASEMENTS OUTSIDE THE PUBLIC STREET RIGHT-OF-WAY.
    - EJ FRAME 7045Z WITH TYPE M4 VANE STYLE INLET GRATE (RIGHT HAND FLOW OR LEFT HAND FLOW) AND 7060 T1 BACK OR 7050 T2 BACK DEPENDING ON CURB STYLE, OR EQUAL, FOR USE WITH RELIEF BASINS WHICH ARE ON LONGITUDINAL ROAD SLOPES OF 4% OR GREATER.
    - EJ FRAME 5100 WITH TYPE M1 SINUSOIDAL GRATE, OR EQUAL, FOR USE IN NON-CURB PAVEMENT AREAS.
- NOTE: COVERS MUST HAVE THE "DUMP NO WASTE! DRAINS TO WATERWAY" LETTERING (WHEN APPLICABLE).



REVISIONS	DATE	APPROVED BY

DATE: \_\_\_\_\_  
 CITY COUNCIL, DATE: \_\_\_\_\_  
 PREPARED BY ENGINEERING DIVISION  
 DEPARTMENT OF PUBLIC SERVICES

NOTIFY ROCHESTER HILLS  
 ENGINEERING DEPARTMENT  
 @ 248-841-2510 48 HRS. PRIOR  
 TO START OF  
 CONSTRUCTION

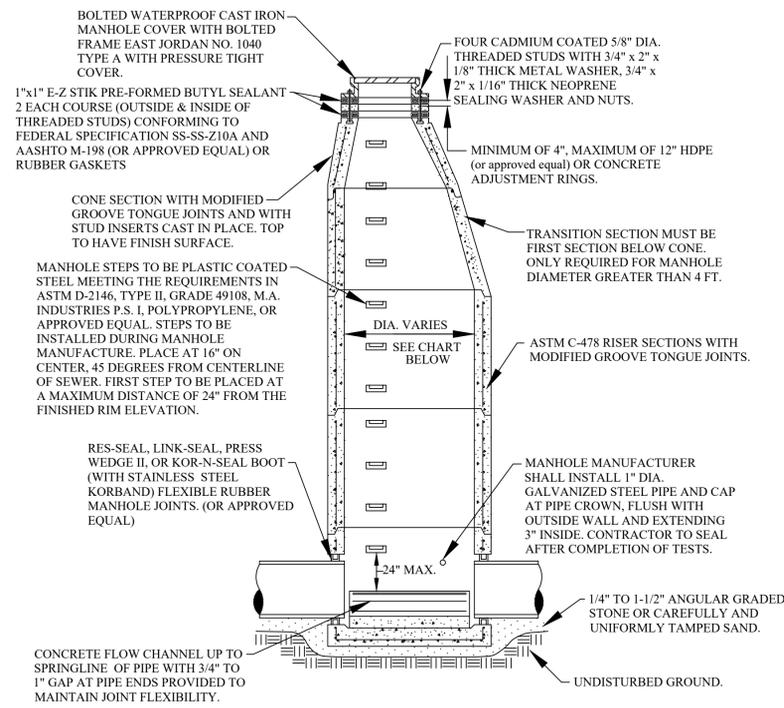
**City of Rochester Hills**  
 1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

**STORM SYSTEM  
 STANDARD DETAILS**

NOT TO SCALE  
 DATE: 1/10/2019  
 SHEET 1 OF 1

# SANITARY SEWER CONSTRUCTION NOTES

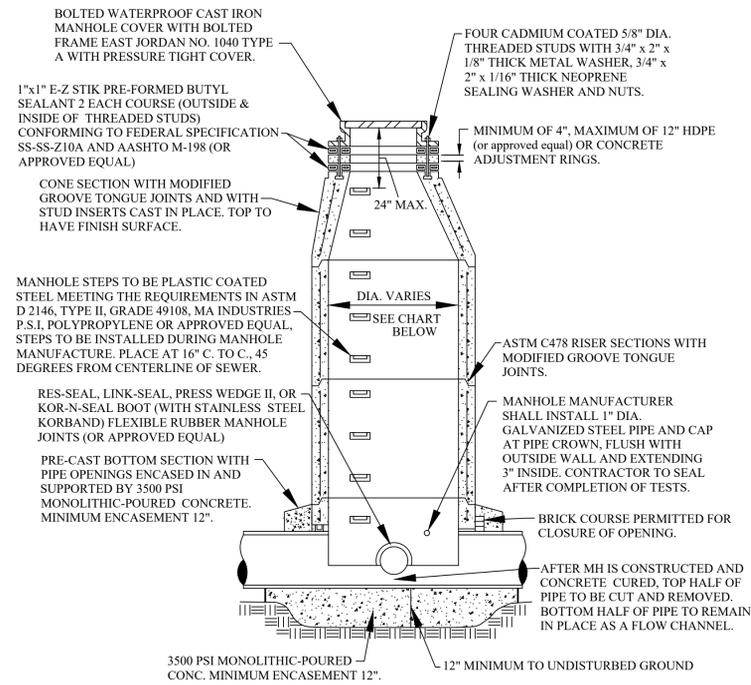
- ALL CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF ROCHESTER HILLS AND THE OAKLAND COUNTY WATER RESOURCES COMMISSIONER (OCWRC). ALL SANITARY SEWER CONSTRUCTION SHALL HAVE FULL-TIME INSPECTION SUPERVISED BY THE CITY OF ROCHESTER HILLS INSPECTION SERVICES.
- NO SEWER INSTALLATION SHALL HAVE AN INFILTRATION EXCEEDING 100 GALLONS PER INCH DIAMETER PER MILE OF PIPE IN A 24 HOUR PERIOD, AND NO SINGLE RUN OF SEWER BETWEEN MANHOLES SHALL EXCEED 100 GALLONS PER INCH DIAMETER PER MILE. AIR TESTS IN LIEU OF INFILTRATION TESTS SHALL BE AS SPECIFIED IN THE OAKLAND COUNTY WATER RESOURCES COMMISSIONER STANDARDS. PRELIMINARY-AIR TESTS ARE WITNESSED BY THE CITY AND FINAL AIR TESTS ARE WITNESSED BY BOTH THE CITY AND THE OCWRC. ONLY PIPE AND PIPE JOINTS APPROVED BY THE CITY MAY BE USED FOR SANITARY SEWER CONSTRUCTION.
- LOCATED IN THE FIRST MANHOLE UPSTREAM FROM THE POINT OF ALL CONNECTIONS TO AN EXISTING SEWER, OR EXTENSION, A TEMPORARY 12-INCH DEEP SUMP SHALL BE PROVIDED IN THE FIRST MANHOLE ABOVE THE CONNECTION WHICH WILL BE FILLED IN AFTER SUCCESSFUL COMPLETION OF ANY ACCEPTANCE TEST UP TO THE STANDARD FILLET PROVIDED FOR THE FLOW CHANNEL. A WATERTIGHT BULKHEAD SHALL BE PROVIDED ON THE DOWNSTREAM SIDE OF THE SUMP MANHOLE.
- AT ALL TIMES WHEN LAYING OF NEW PIPE IS NOT ACTUALLY IN PROGRESS, THE UPSTREAM OPEN END OF THE PIPE SHALL BE CLOSED BY TEMPORARY WATERTIGHT PLUGS OR BY OTHER APPROVED MEANS. IF WATER IS IN THE TRENCH WHEN WORK IS RESUMED, THE PLUG SHALL NOT BE REMOVED UNTIL THE DANGER OF WATER ENTERING THE PIPE HAS PASSED. ALL MAIN LINE PIPE SHALL BE LAID WITH A PIPE LASER BEAM FOR LINE AND GRADE. A TARGET MUST BE INSTALLED AT THE END OF THE PIPE BEING LAID.
- SELF-LEVELING ACCESS ASSEMBLY STRUCTURES SHALL BE USED FOR ADJUSTING STRUCTURES WITHIN ASPHALT AND CONCRETE PAVEMENT.
- ALL SEWER PIPE SHALL BE INSTALLED IN CLASS "B" BEDDING OR BETTER.
- ALL NEW MANHOLES SHALL HAVE CITY APPROVED FLEXIBLE, WATERTIGHT SEALS WHERE PIPES PASS THROUGH WALLS. MANHOLES SHALL BE OF PRE CAST SECTIONS WITH MODIFIED GROOVE TONGUE AND BUTYL TYPE JOINTS. PRE CAST MANHOLE CONE SECTIONS SHALL BE CITY APPROVED MODIFIED ECCENTRIC CONE TYPE. ALL MANHOLES SHALL BE PROVIDED WITH BOLTED, WATERTIGHT COVERS.
- AT ALL CONNECTIONS TO MANHOLES IN ALL SEWERS, OR EXTENSIONS, DROP CONNECTIONS WILL BE REQUIRED WHEN THE DIFFERENCE IN INVERT ELEVATIONS EXCEEDS 18 INCHES.
- GROUND WATER, STORM WATER, CONSTRUCTION WATER, DOWN SPOUT DRAINAGE OR WEEP TILE DRAINAGE SHALL NOT BE ALLOWED TO ENTER ANY SANITARY SEWER INSTALLATION.
- PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL CONTACT MISS DIG THREE (3) DAYS IN ADVANCE (811) FOR THE LOCATION OF UNDERGROUND PIPELINE AND CABLE FACILITIES AND SHALL ALSO NOTIFY REPRESENTATIVES OF OTHER UTILITIES LOCATED IN THE VICINITY OF THE WORK.
- AN 18 INCH MINIMUM VERTICAL SEPARATION AND A 10 FOOT MINIMUM HORIZONTAL SEPARATION MUST BE MAINTAINED BETWEEN SANITARY SEWER AND ALL OTHER UTILITIES.
- AS A MEANS OF INSURING PROPER INSTALLATION OF THE SANITARY SEWER PIPE, THE CONTRACTOR SHALL VIDEO INSPECT, ACCORDING TO THE CITY OF ROCHESTER HILLS VIDEO INSPECTION STANDARDS, 100% OF THE SANITARY SEWER PIPE. THE CONTRACTOR SHALL PROVIDE 24 HOURS NOTICE TO THE CITY OF ROCHESTER HILLS PRIOR TO VIDEO INSPECTION, SO A REPRESENTATIVE MAY BE PRESENT. ROCHESTER HILLS WILL BE PROVIDED WITH A DIGITAL COPY OF THE VIDEO INSPECTION AND LOG IN ACCORDANCE WITH THE CITY OF ROCHESTER HILLS INSPECTION STANDARDS.



## STANDARD MANHOLE

MANHOLE SIZING CHART

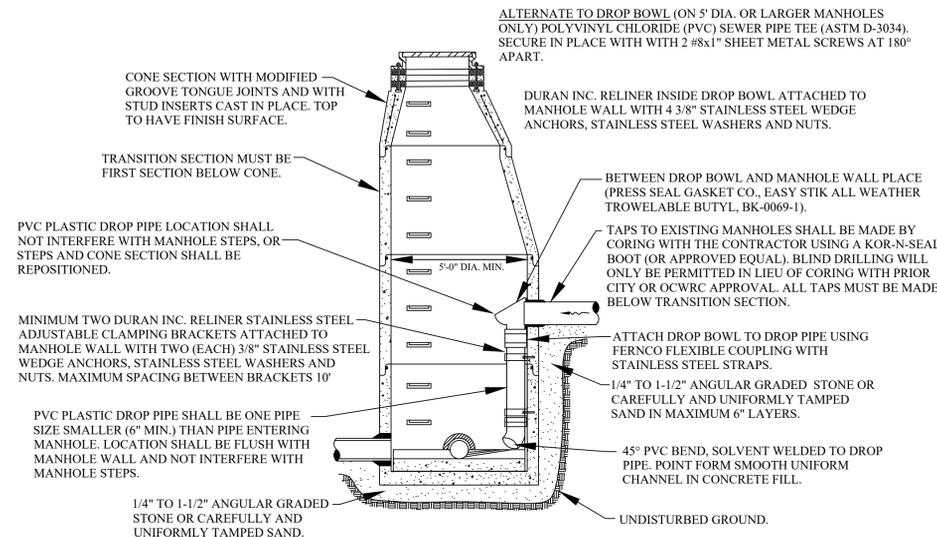
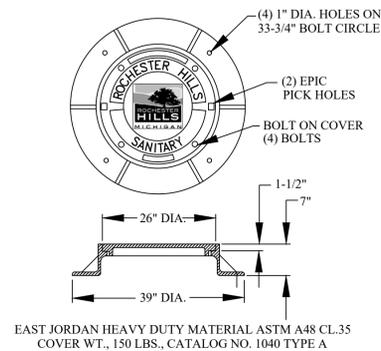
MANHOLE DIAMETER	MAX. PIPE SIZE FOR STRAIGHT THRU INST.	MAX. PIPE SIZE FOR RIGHT ANGLE INST.
4'	24"	18"
5'	36"	24"
6'	42"	36"
7'	60"	42"



## MANHOLE CONSTRUCTED OVER EXISTING SEWER

MANHOLE SIZING CHART

MANHOLE DIAMETER	MAX. PIPE SIZE FOR STRAIGHT THRU INST.
4'	24"
5'	36"
6'	42"
7'	60"



## INTERIOR DROP CONNECTION

NOTE: INTERIOR DROP CONNECTION PERMITTED ONLY WHEN APPROVED BY CITY ENGINEER.

## SANITARY SEWER STANDARD DETAILS

NOT TO SCALE DATE: 1/10/2019  
SHEET 1 OF 2

**City of Rochester Hills**  
1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

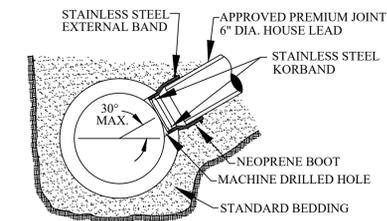


REVISIONS	DATE	APPROVED BY	NOTIFY ROCHESTER HILLS ENGINEERING DIVISION @ 248-841-2510 48 HRS. PRIOR TO START OF CONSTRUCTION

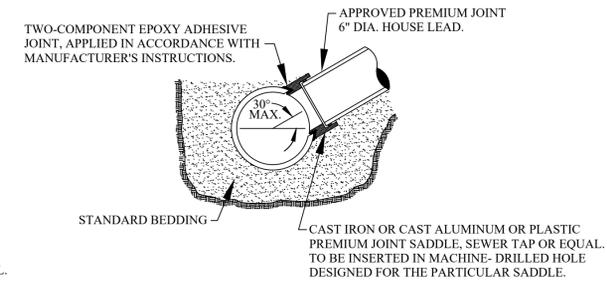
PREPARED BY ENGINEERING DIVISION DEPARTMENT OF PUBLIC SERVICES

# CITY OF ROCHESTER HILLS GRAVITY BUILDING LEAD REQUIREMENTS AND DETAILS

- ALL BUILDING LEAD WORK MUST BE PERFORMED UNDER THE CITY OF ROCHESTER HILLS INSPECTION.
- FOR ALL CITY OF ROCHESTER HILLS SYSTEMS CALL 248-841-2510 48-HOURS PRIOR TO SCHEDULING INSPECTION.  
FOR ALL OCWRC-OPERATED SYSTEMS, CALL 248-858-1110 48-HOURS IN ADVANCE PRIOR TO SCHEDULING INSPECTION.
- SANITARY SEWER MAY NOT BE USED AS A DE-WATERING OUTLET.
- WHERE AN EXISTING BUILDING LEAD IS BEING EXTENDED, DISSIMILAR TYPES AND SIZES OF PIPE SHALL BE JOINED USING A CITY OF ROCHESTER HILLS APPROVED ADAPTER.
- APPROVED BUILDING LEAD PIPE FOR GRAVITY SEWER LEADS:
  - PVC PLASTIC, ASTM D3034, SDR 23.5
  - SOLID WALL PVC SCHEDULE 40, ASTM D-2665
  - ANY DEVIATIONS FROM ABOVE SPECIFICATIONS REQUIRES APPROVAL BY CITY ENGINEER.
- ALLOWABLE TYPES OF SEWER PIPE ADAPTERS: FERNCO STRONGBACK COUPLING OR APPROVED EQUAL.
- FOR 6" LEADS A CLEANOUT MUST BE INSTALLED EVERY 100 FT. FOR 4" LEADS A CLEANOUT MUST BE INSTALLED EVERY 50 FT. 90° BENDS NOT ALLOWED EXCEPT FROM THE HORIZONTAL TO THE VERTICAL WITHIN 5 FEET OF THE BUILDING.

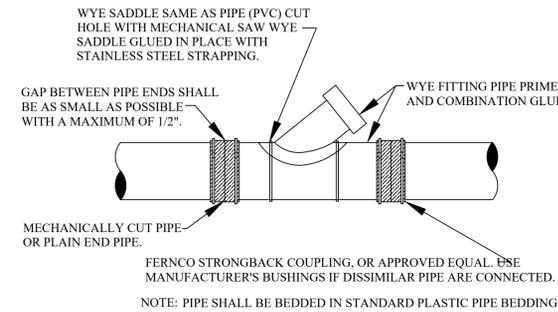


## KOR-N-TEE TAP FOR CONCRETE PIPE

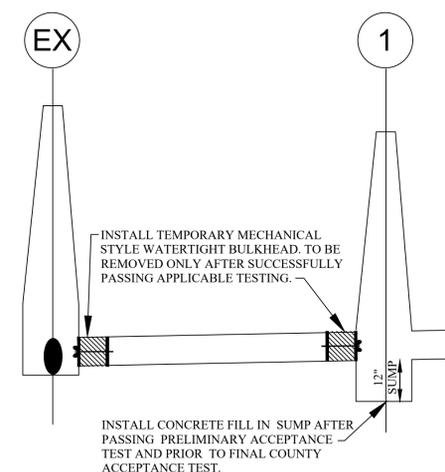


NOTE: SURFACE OF MAIN SEWER SHALL BE CLEANED WITH AN ABRASIVE GRINDER PRIOR TO EPOXY APPLICATION. DUE TO VARIATION OF SET-UP TIME OF EPOXY ADHESIVE WITH TEMPERATURE, ANCHOR STRAPS SHALL BE USED TO SECURE SADDLE IN POSITION IN COLD WEATHER OR WHENEVER WORK IS TO PROCEED PRIOR TO COMPLETE CURE OF EPOXY.

## SEWER TAP-OVER 12" MAIN SEWER PIPES VITRIFIED CLAY



## WYE SADDLE OR WYE PIPE INSERTION WITH FLEXIBLE COUPLINGS (RIGID PIPE)



## PROFILE OF BULKHEADS AND ONE FOOT SUMP

- THE MAXIMUM SCALE SHALL BE ONE (1) INCH EQUALS FIFTY (50) FEET.
- THE SIZE, LENGTH, CLASS AND MANUFACTURER OF PIPE INSTALLED SHALL BE INDICATED.
- THE SIZE, MANUFACTURER AND MODEL NUMBERS OF ALL VALVES AND PUMPS INSTALLED SHALL BE INDICATED.
- A TOTAL AS-BUILT DRAWING QUANTITY LIST SHALL BE INCLUDED.
- THE LOCATIONS SHALL BE SHOWN ON THE PLANS WITH AN ACCURACY OF ONE (1) FOOT.
- THE OFFSET OF THE SANITARY MAIN FROM PROPERTY LINES SHALL BE INDICATED.
- ALL MANHOLES, VALVE WELLS, PUMPS AND ALL SANITARY SYSTEM APPURTENANCES SHALL BE LOCATED FROM TWO FIXED OBJECTS (MANHOLES, BUILDING CORNERS ETC.).
- ALL UNDERGROUND APPURTENANCES, SUCH AS TFC/ARV WELLS, METER PITS, GRINDER PUMPS AND PUMP STATION PITS, ETC. SHALL BE LOCATED FROM THE NEAREST MANHOLE THAT IS CONNECTED TO THE SAME SANITARY MAIN AS THE APPURTENANCE.
- THE ACCURATE LOCATION OF ALL UTILITY CROSSINGS WHERE THE VERTICAL SEPARATION IS LESS THAN 18" SHALL BE NOTED.
- AS-BUILTS SHALL BE PREPARED IN ACCORDANCE WITH CITY OF ROCHESTER HILLS AS-BUILT GUIDELINES AS PROVIDED AT THE PRE-CONSTRUCTION MEETING.

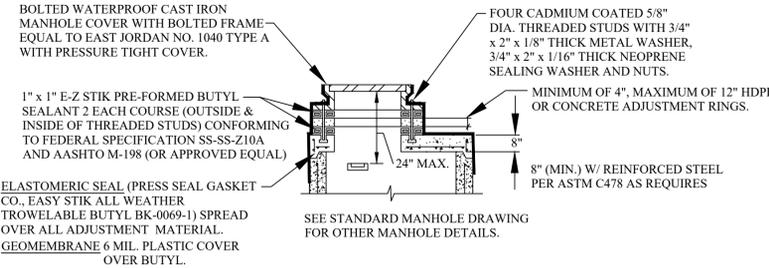
I HEREBY CERTIFY THAT OUR FIRM HAS PREPARED THESE AS-BUILT DRAWINGS OF THE IMPROVEMENTS AS CONSTRUCTED, AND THAT TO THE BEST OF MY KNOWLEDGE THOSE IMPROVEMENTS NOTED AS "AS BUILT" WERE CONSTRUCTED IN SUBSTANTIAL CONFORMANCE WITH THE APPROVED CONSTRUCTION PLANS; AND ALSO THAT THE SANITARY SEWER AND STRUCTURES, AS CONSTRUCTED, LIE WITHIN THE EASEMENT DESCRIPTIONS REQUIRED BY THE CITY OF ROCHESTER HILLS.

\_\_\_\_\_  
(COMPANY NAME)

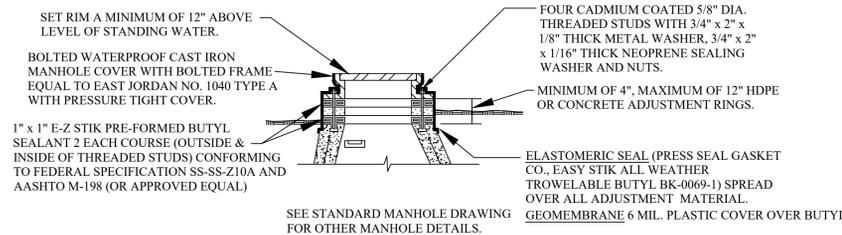
\_\_\_\_\_  
(ENGINEER'S SIGNATURE)

PROFESSIONAL ENGINEER NO. \_\_\_\_\_

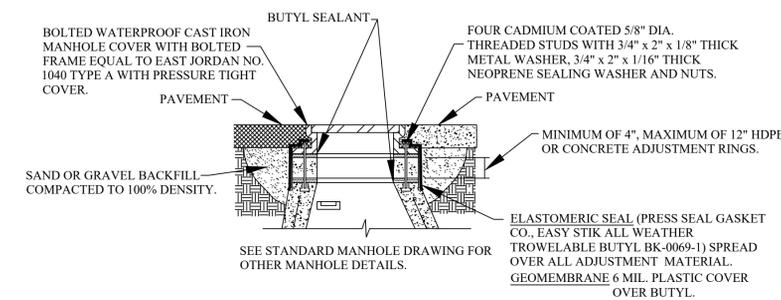
ENGINEER SEAL



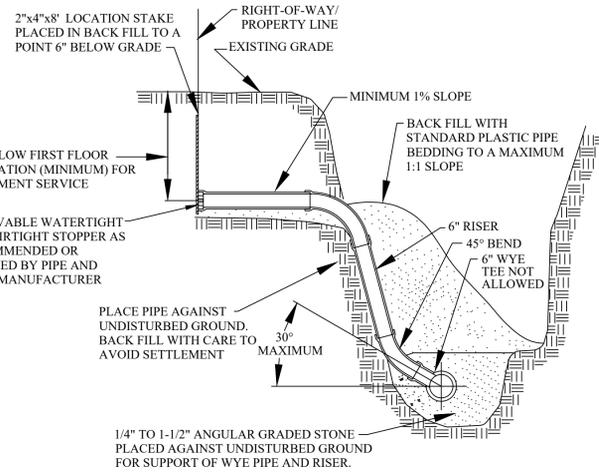
## FLAT TOP MANHOLE



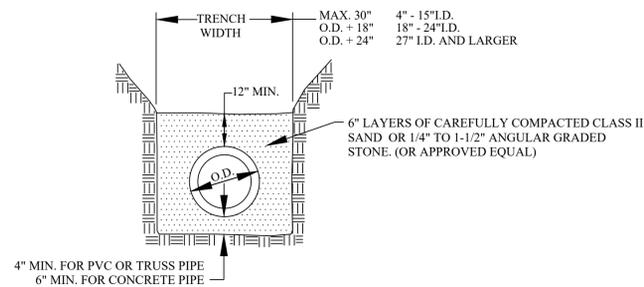
## ADJUSTMENT DETAIL FOR MANHOLE TOPS WITHIN FLOOD PRONE AREAS



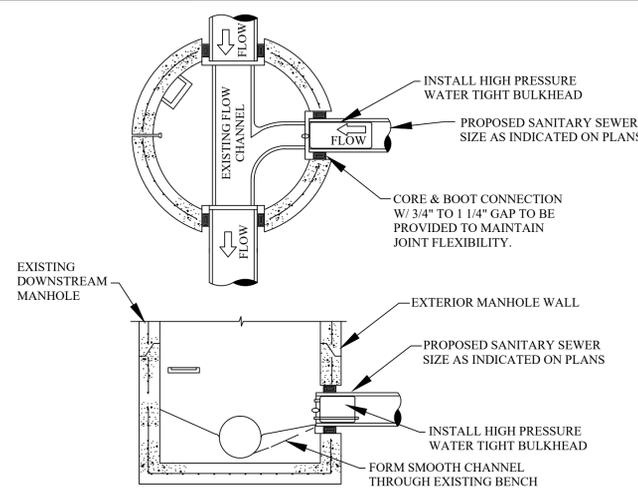
## ADJUSTMENT DETAIL MANHOLE TOPS WITHIN PAVEMENT AREAS



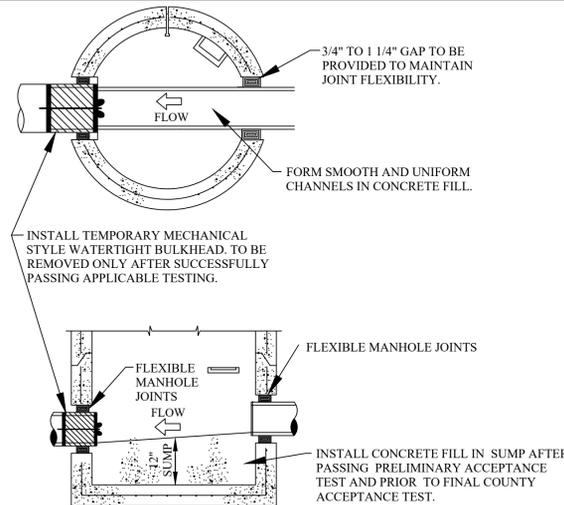
## HOUSE LEAD DETAIL



## STANDARD BEDDING (CLASS B)



## TESTING BULKHEAD IN EXISTING MANHOLE



## FIRST MANHOLE UPSTREAM FROM SANITARY TAP

REVISIONS	DATE	APPROVED BY CITY COUNCIL, DATE: _____

PREPARED BY ENGINEERING DIVISION  
DEPARTMENT OF PUBLIC SERVICES

NOTIFY ROCHESTER HILLS  
ENGINEERING DIVISION @  
248-841-2510 48 HRS. PRIOR  
TO START OF  
CONSTRUCTION

**City of Rochester Hills**  
1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

**SANITARY SEWER  
STANDARD DETAILS**

NOT TO SCALE DATE: 1/10/2019  
SHEET 2 OF 2

