



Sidock Group
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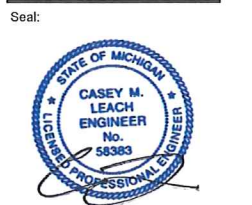
www.sidockarchitects.com
www.sidockgroup.com

Key Plan: No Scale

Client:
CITY OF
ROCHESTER HILLS

Project:
ROCHESTER HILLS
FIRE STATION No.4

2723 WALTON BLVD.
ROCHESTER HILLS, MI 48309



Date: 12/12/16 Issued For: OWNER REVIEW

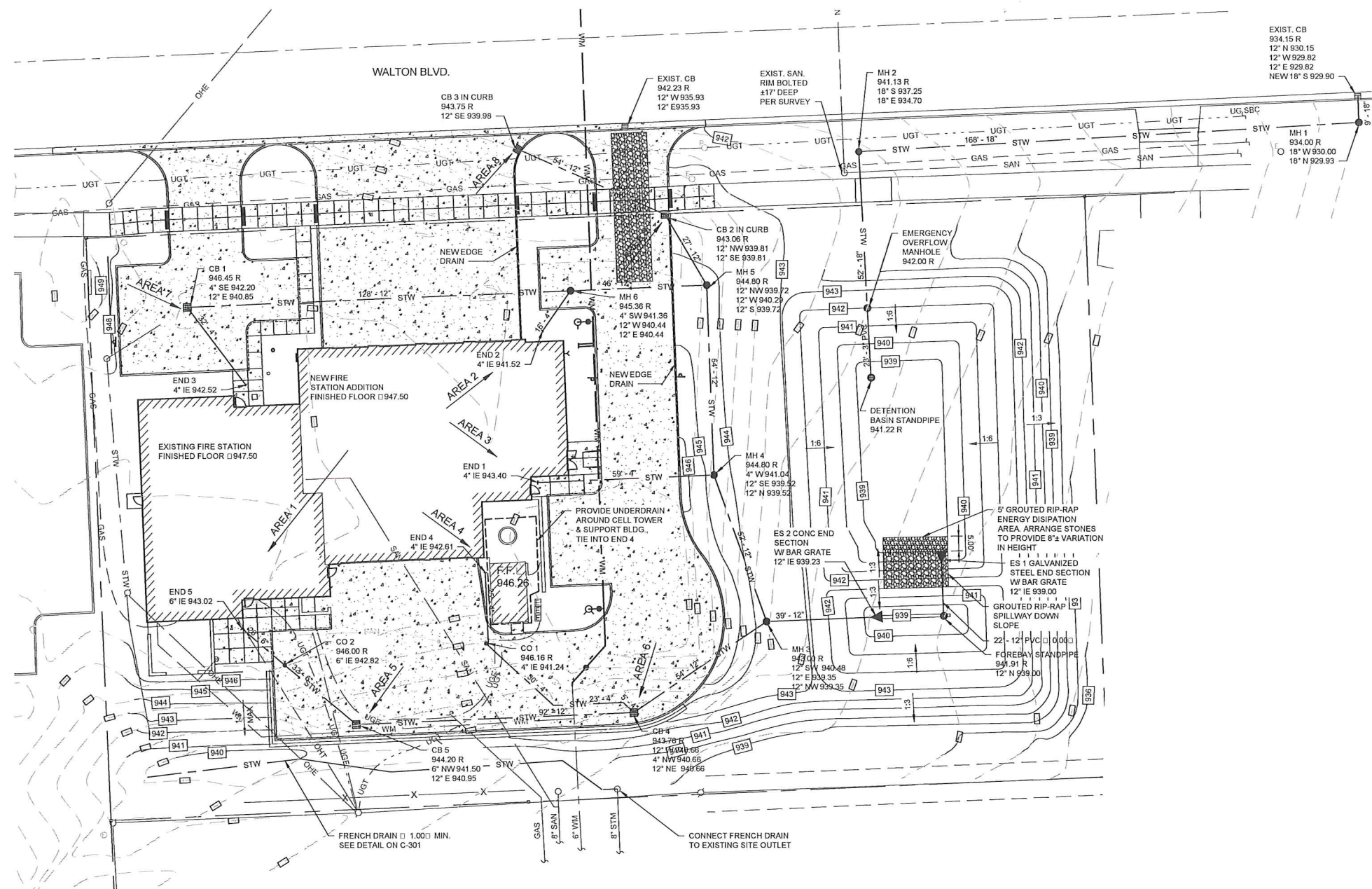
Drawn: C. JOHNSON
Checked: C. LEACH
Approved: S. PETERSON

Sheet Title:
STORM SEWER
PLAN

Project Number: 916407

Sheet Number: C-231

CITY FILE #: 14-020



STORM SEWER PLAN
SCALE: 1"=20'

Table with columns: Uplst, Dwnst, Pipe Len, Area, Address Area, Time of Conc, Intensity, PIPEDA, Pipe SLP, V Full, n Time, INVERT ELV., Q (capacity), RIM or GRADE, STR. NO.

- NOTES:
1. SEE SHEET C-800 FOR STANDARD DETAILS & MATERIAL SPECIFICATIONS.
2. TIE IN EDGE DRAIN TO NEAREST CATCH BASIN
3. PROVIDE UNDER DRAIN AT ALL STRUCTURES RECEIVING SURFACE WATER.
4. SEE SHEET C-301 FOR ADDITIONAL STORM SEWER DETAILS
5. SEE SHEET C-300 & C-301 FOR STORM SEWER PROFILES AND ARE OFFERED SOLELY FOR INFORMATIONAL PURPOSES. THEY MAY NOT REFLECT THE ACTUAL LOCATIONS AND MAY NOT BE ALL INCLUSIVE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.

DETENTION BASIN CALCULATIONS
AREAS: 1.50 ACRES TOTAL
IMP: 0.64 AC @ 0.05 C
FER: 0.66 AC @ 0.30 C
POND: 0.20 AC @ 1.00 C

WEIGHTED C = (0.55)(0.66) + (0.30)(0.66) + (1.00)(0.20) = 0.67
1.50(1.50)
Qd = (0.2 CFS/Ac)A = (0.2 CFS/Ac)(1.5 Ac) = 0.30 CFS
Qc = Qd = 0.30 CFS = 0.259 CFS/Ac
AC (1.50 Ac)(0.67)
100-YEAR STORM STORAGE TIME
T = 25 + (10.3125/Qd) = 25 + (10.3125/0.259) = 160.7 Min
Vd = 16.500T - 40Qd = 16.500(160.7) - (40)(0.259)(160.7) = 12,357 CF/Ac
T = 25
160.7(25)
Vd = Vd,AC = (12,357 CF/Ac)(1.50 Ac)(0.67) = 12,355 CF REQ'D
RECHARGE VOLUME
Re = 1.815AC = (1.815)(1.50)(0.67) = 1.824 CF REQ'D
WATER QUALITY/FIRST FLUSH
WQd = 1.815AC = (1.815)(1.50)(0.67) = 1.824 CF REQ'D
CHANNEL PROTECTION/BANKVELL
Cp = Vd = 6.788AC = (6.788)(1.50)(0.67) = 6.822 CF

Table with columns: FOREBAY VOLUME, REQ'D = 1.824, ELEV., AREA, INC. VOL., VOL.

941.91 = 1.546 SF -> 1.839 -> 1.824 CF REQ'D FOR FIRST FLUSH
FOREBAY STANDPIPE ORIFICE FORMULA
Qd = 0.62(Ao)(2Gh)^1/2
0.30 = 0.62(Ao)(2(31.2)(2.22))^1/2 -> Ao = 0.0333 SF
DIAMETER ORIFICE (Do) = (4Ao/n)^1/2 = (4(0.0333)/n)^1/2 = 0.212 FT = 2.54 IN < 3 IN REQ'D BY WRC

Ao = nD^2/4 = 7.07 IN^2
Ao = nD^2/4 = 0.79 IN^2
Ao/Ac = 7.07/0.79 = 8.94 -> USE (5) 1" DIA HOLES EQ. SPACED AT 939.00

FOREBAY OVERFLOW CONTROL FOR 100-YR STORM
Q = CIA
T = 17.07 MIN FROM STORM SEWER DESIGN
I = 275/T + 25 = 6.54 IN/Hr
Q = (0.67)(6.54)(1.5) = 6.57 CFS
Qc = 0.62(Ao)(2Gh)^1/2 -> Ao = Qc^2/(2Gh) = 6.57^2/(2(31.2)(2.22))^1/2 = 0.480 SF = 63.11 IN^2
Do = (4Ao/n)^1/2 = 9.38 IN -> USE 12" RCP

Table with columns: DETENTION VOLUME, ELEV., AREA, INC. VOL., VOL.

10,915 CF + FOREBAY 1,908 CF = 12,903 CF TOTAL STORAGE > 12,357 CF REQ'D
941.22 = 4,470 SF -> 6,855 CF = 6,822 CF REQ'D FOR BANK FULL

DETENTION STANDPIPE ORIFICE FORMULA
Qd = 0.62(Ao)(2Gh)^1/2
0.30 = 0.62(Ao)(2(31.2)(2.22))^1/2 -> Ao = 0.0333 SF
DIAMETER ORIFICE (Do) = (4Ao/n)^1/2 = (4(0.0333)/n)^1/2 = 0.207 FT = 2.48 IN < 3 IN MIN REQ'D BY WRC

DETENTION BASIN RISER OUTLET PIPE SLOPE
S = (4Ao/n)^1/2 = 9.00 IN -> USE 12" RCP
n = 0.012
Qd = 0.1105
R = 0.334 + 0.083
As = 0.0491 FT^2

DETENTION OVERFLOW CONTROL FOR 100-YR STORM
Q = CIA
T = 20 MIN
I = 275/T + 25 = 6.11 IN/Hr
Q = (0.67)(6.11)(1.5) = 6.14 CFS
Qc = 0.62(Ao)(2Gh)^1/2 -> Ao = Qc^2/(2Gh) = 6.14^2/(2(31.2)(2.22))^1/2 = 0.442 SF = 63.6 IN^2
Do = (4Ao/n)^1/2 = 9.00 IN -> USE 12" RCP

J:\PROJECTS\2016 PROJECTS\916407 ROCHESTER HILLS FIRE STATION NO. 4\CAD\05 CIVIL AND SURVEY\C-231 STORM SEWER & SESS PLANDING PLOT DATE: 2/7/2017 2:52:41 PM - SBONDERCZUK



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Seal:



Date: 10/25/16
Issued For: 60 REVIEW
02/03/17 SPA

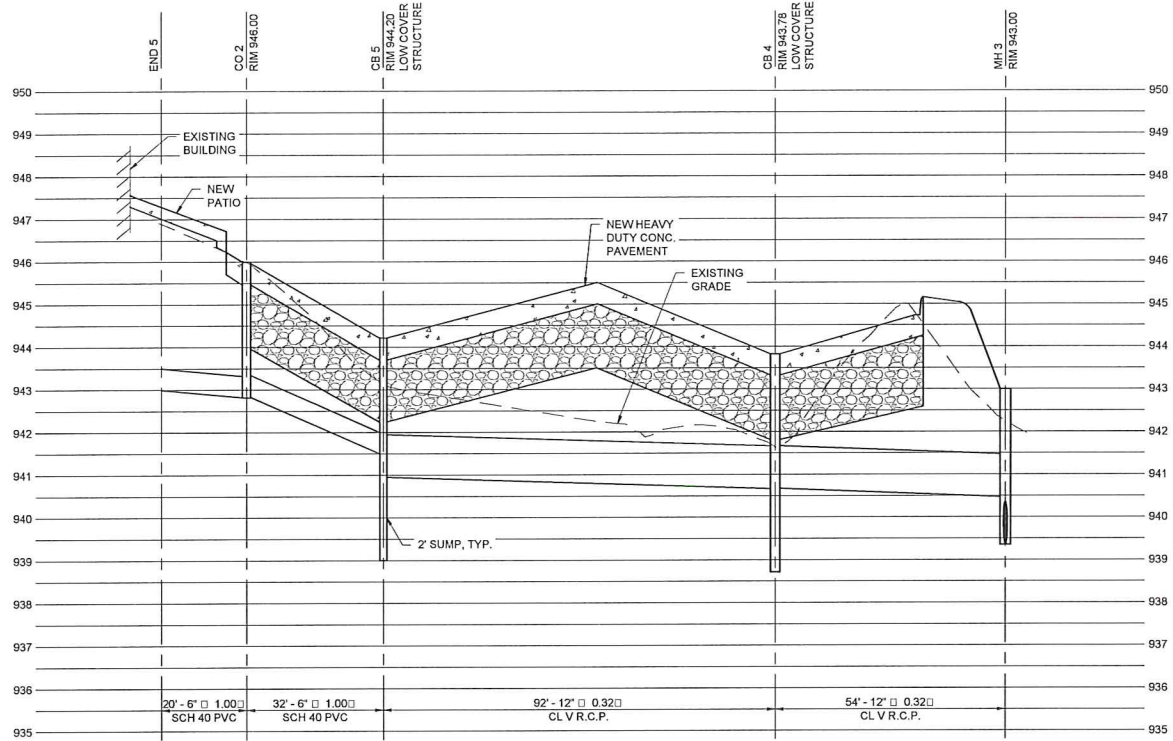
Drawn: C. JOHNSON
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Sheet Title:
STORM SEWER
PROFILES

Project Number: 916407

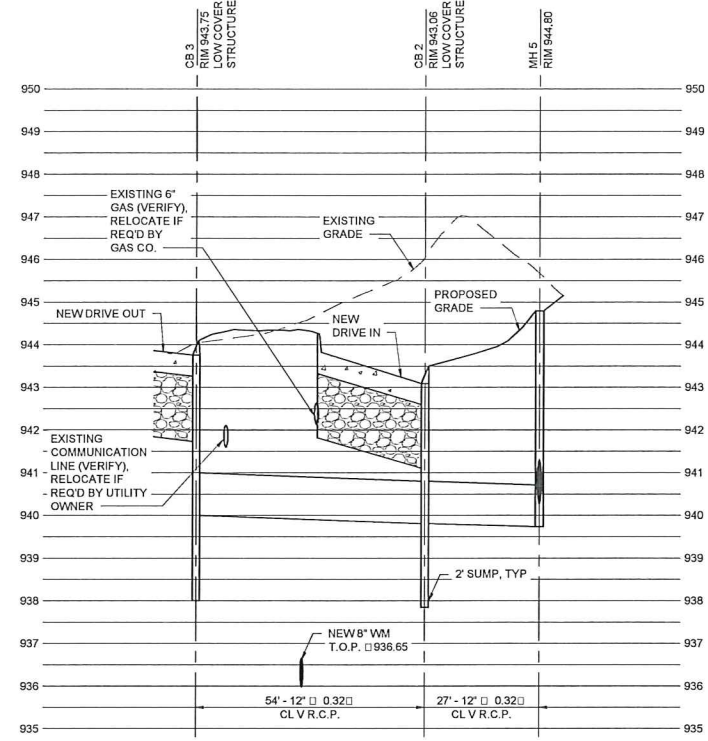
Sheet Number: C-300

CITY FILE #: 14-020



STORM SEWER PROFILE

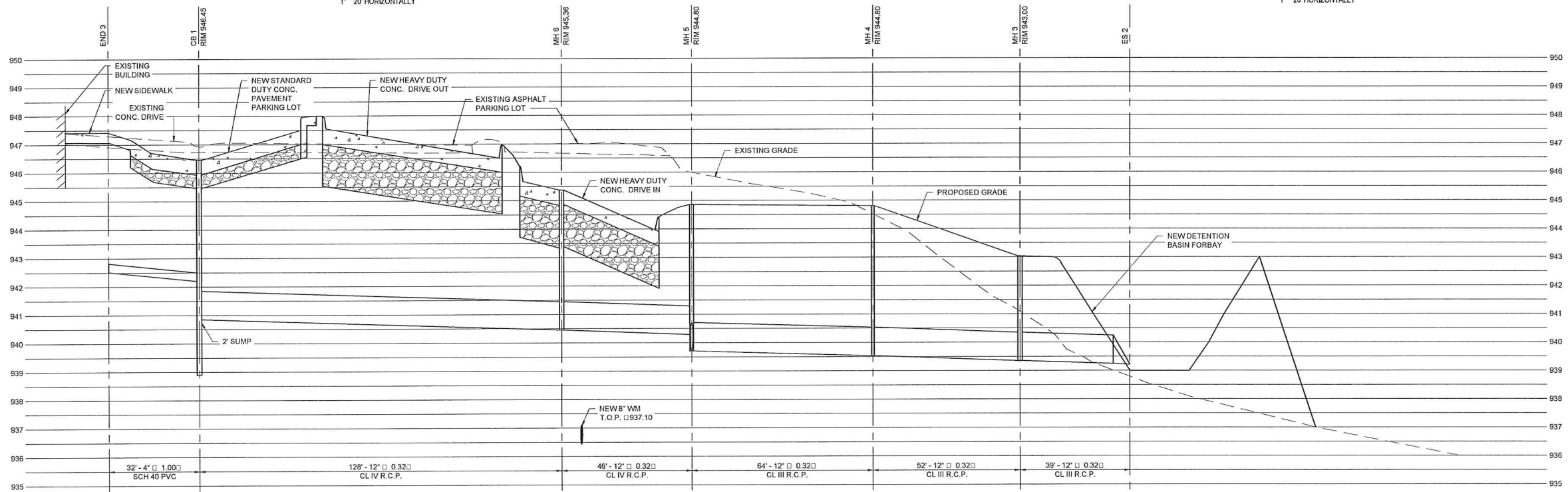
SCALE: 1" = 2' VERTICALLY
1" = 20' HORIZONTALLY



STORM SEWER PROFILE

SCALE: 1" = 2' VERTICALLY
1" = 20' HORIZONTALLY

- NOTES:
1. SEE C-231 FOR STORM SEWER PLAN
2. SEE SHEET C-800 AND C-301 FOR STORM SEWER DETAILS



STORM SEWER PROFILE

SCALE: 1" = 2' VERTICALLY
1" = 20' HORIZONTALLY

J:\PROJECTS\2016 PROJECTS\916407 ROCHESTER HILLS FIRE STATION NO. 4\CAD\05 CIVIL AND SURVEY\C-300 STORM SEWER PROFILING.DWG PLOT DATE: 10/27/2017 2:05:14 PM SBONBERGZUK



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02/03/15

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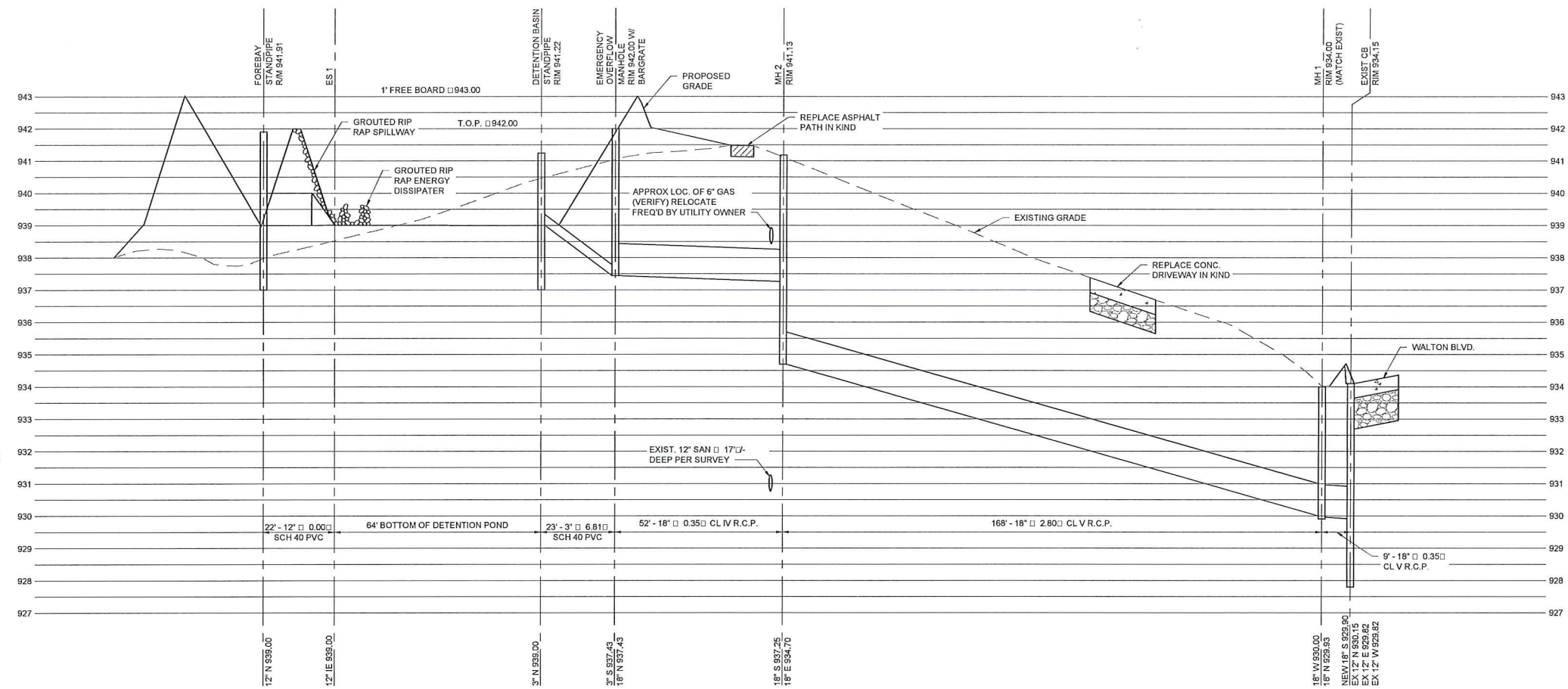
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Sheet Title:
STORM SEWER PROFILES & DETAILS

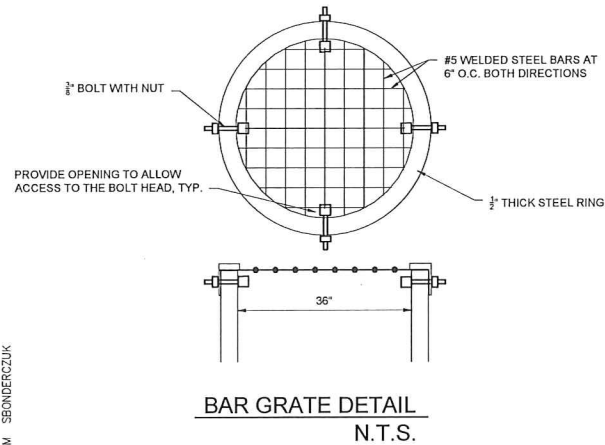
Project Number: 916407

Sheet Number: **C-301**

CITY FILE #: 14-020



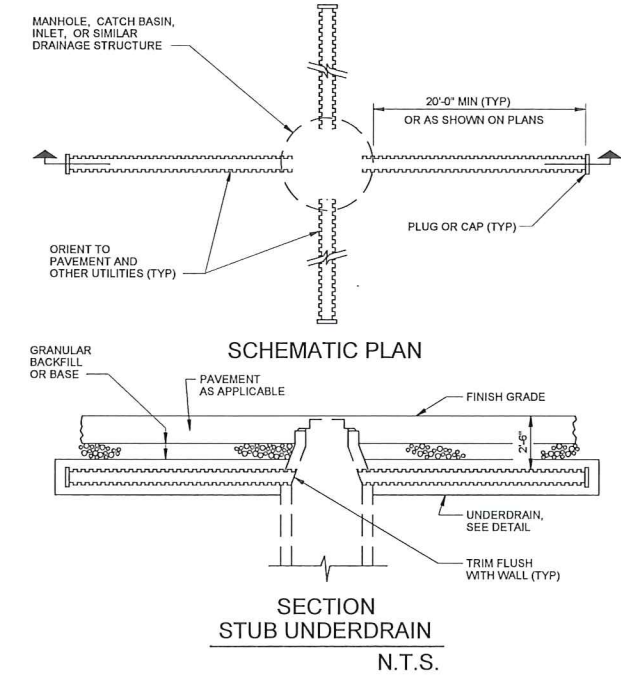
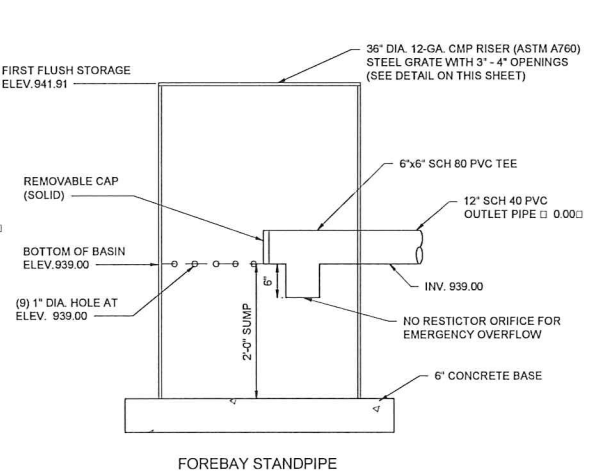
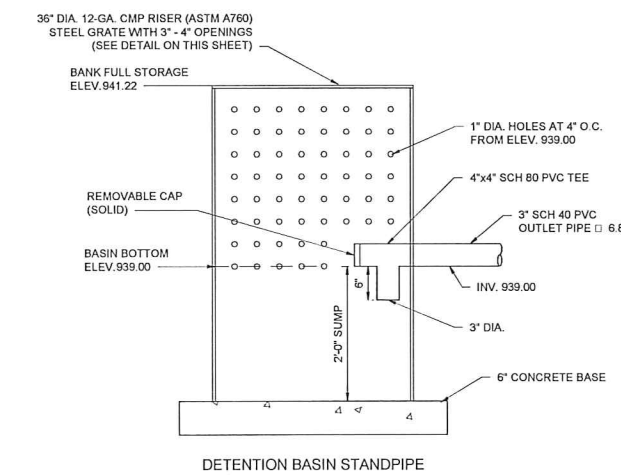
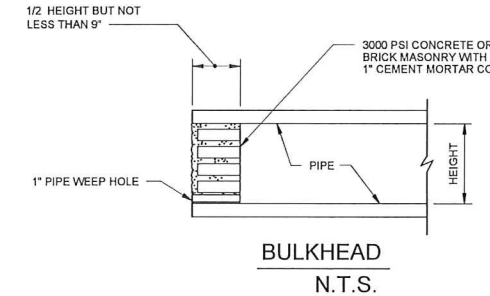
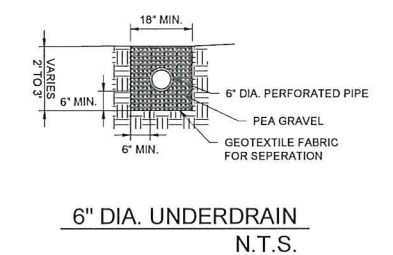
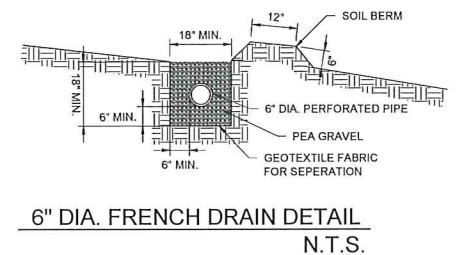
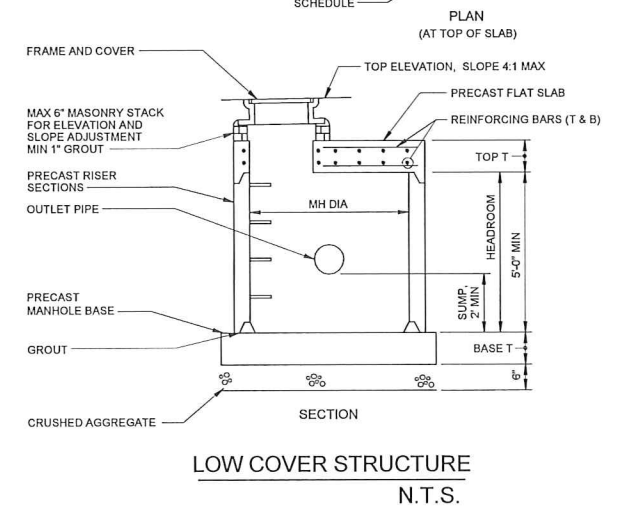
STORM SEWER PROFILE
SCALE: 1" = 2' VERTICALLY
1" = 20' HORIZONTALLY



- NOTES:
- REFERENCE: COMPLY WITH REQUIREMENTS OF STANDARD MANHOLE, EXCEPT AS INDICATED.
 - HEADROOM: WHERE 5'-0" OR MORE, OMIT SUMP AND PROVIDE CONCRETE CHANNEL AS SHOWN BY DASHED LINES.
 - PRECAST FLAT SLAB: DESIGN BASIS, 16,000 LB WHEEL LOAD, 4000 PSI CONCRETE.

SIZE SCHEDULE

MH DIA IN	T IN	REINFORCING BARS (EACH WAY)	
		TOP	BASE
48	9	#6 @ 9"	AS SHOWN
54	9	#6 @ 9"	AS SHOWN
60	12	#6 @ 9"	AS SHOWN
66	12	#6 @ 9"	AS SHOWN



J:\PROJECTS\2016 PROJECTS\916407 ROCHESTER HILLS FIRE STATION NO. 4\CAD\05 CIVIL AND SURVEY\C-301 STORM SEWER PROFILES & DETAILS.DWG PLOT DATE: 2/7/2017 2:42:16 PM SBONDERCZUK



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Seal:



Date: 10/25/16
Issued For: 603 REVIEW
02/03/17 SFA

Drawn: MMG
Checked: CL
Approved: SEP

Sheet Title:
CITY OF ROCHESTER HILLS STORM SYSTEM DETAILS

Project Number: 916407

Sheet Number: C-800

DATE: 7/21/2008

CITY FILE #: 14-020

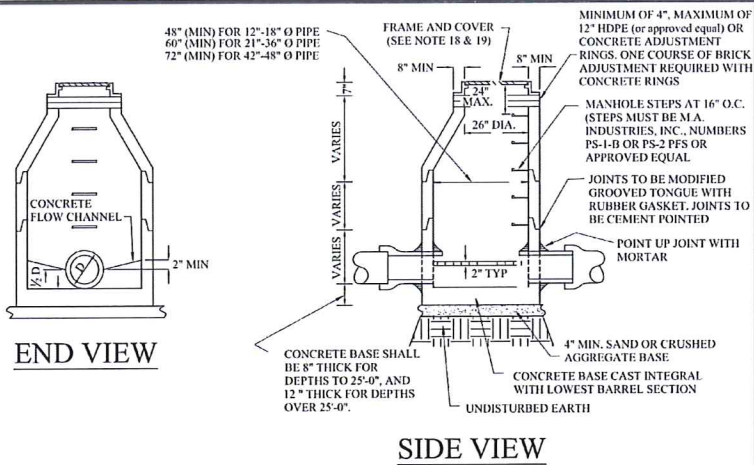
GENERAL NOTES:

- ALL EXISTING AND NEW STORM SYSTEMS SHALL BE CLEANED AND FLUSHED ONCE SITE IS 90% BUILT OUT AND VEGATED. 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 TIES, 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 SIZE 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" - 1/2" 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 O.C.D.C.
- MINIMUM SUMP DEPTH IS 2' FOR CATCH BASINS.
- A FLOATABLE TRAP IS REQUIRED PRIOR TO THE OUTLET, IN ACCORDANCE WITH CURRENT CITY OF ROCHESTER HILLS DESIGN STANDARDS.
- 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.

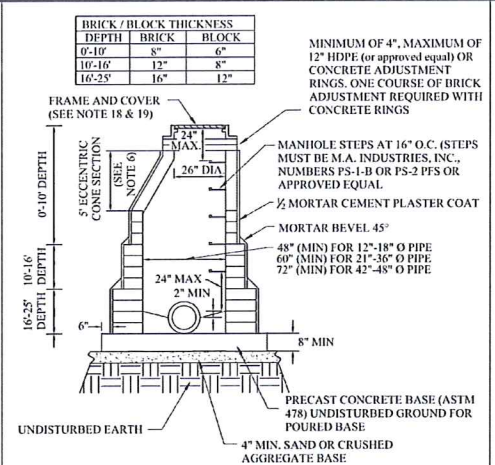
- PROJECTS THAT THE CITY ENGINEER MAY IMPOSE THESE REQUIREMENTS ARE:
- ALL PUBLIC PROJECTS OR PROJECTS BEING CONSTRUCTED ON PUBLIC PROPERTY.
 - ANY PROJECT INVOLVING A DEVELOPMENT, SUBDIVISION, SITE CONDOMINIUM, CONDOMINIUM, OR ASSOCIATION.
 - ANY PROJECT THAT WILL RESULT IN MORE THAN ONE OWNER RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF THE COMPLETE STORM DRAINAGE SYSTEM.

COVERS FOR MANHOLES, CATCH BASINS, AND INLETS

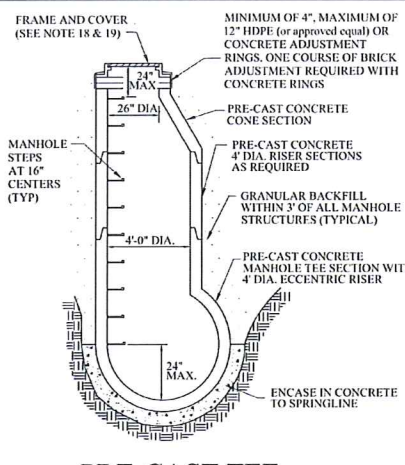
- MANHOLE FRAME AND COVER SHALL BE EJIW 1040, TYPE A COVER OR EQUIVALENT.
 - CATCH BASINS AND INLET FRAME AND COVER SHALL BE AS FOLLOWS:
 - EJW 7045 WITH TYPE M1 GRATE AND 7050 T1 BACK, OR EQUAL, FOR USE WITH CONCRETE CURB AND GUTTER, (STRAIGHT CURB M.D.O.T. F CURB) AND WITH CONCRETE PAVEMENT WITH INTEGRAL CURB.
 - EJW 7085 WITH TYPE M1 GRATE OR EQUAL, FOR USE WITH CONCRETE B-2 MODIFIED INTEGRAL CURB AND GUTTER, AND WITH CONCRETE WITH B-2 MODIFIED INTEGRAL CURB.
 - EJW 7065 WITH TYPE M1 GRATE AND 7060 T1 BACK, OR EQUAL, FOR USE WITH MOUNTABLE CURB AND GUTTER, AND WITH CONCRETE PAVEMENT WITH MOUNTABLE INTEGRAL CURB.
 - EJW FRAME 1040 WITH TYPE N OVAL GRATE OR TYPE 02 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.
 - EJW FRAME 7030 WITH TYPE M6 VANE GRATE AND T1 BACK, OR EQUAL, FOR USE WITH RELIEF BASINS WHICH ARE ON LONGITUDINAL ROAD SLOPE OF 4% OR GREATER.
 - EJW FRAME 5105 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).



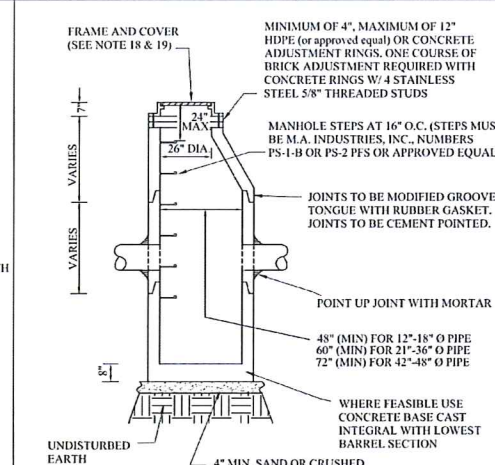
PRE-CAST STORM MANHOLE



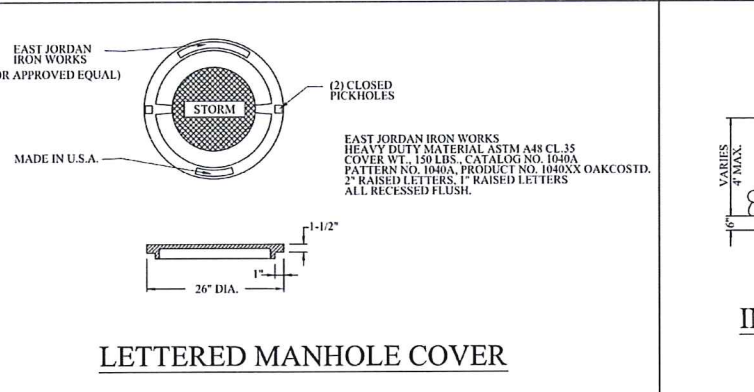
BRICK OR BLOCK MANHOLE



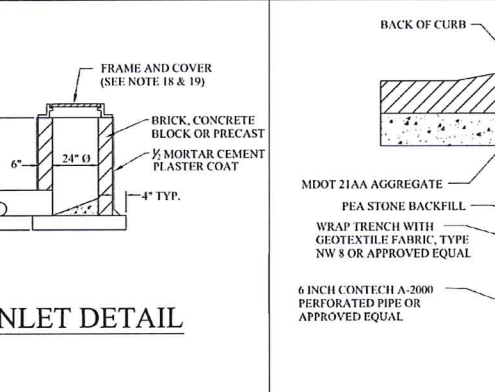
PRE-CAST TEE MANHOLE DETAIL



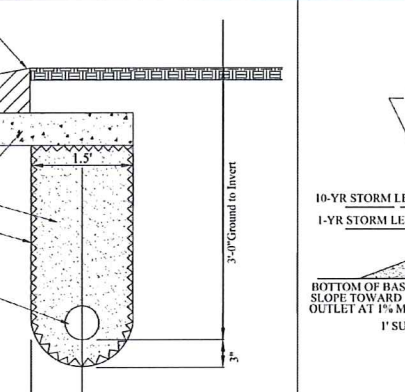
PRECAST STORM CATCH BASIN



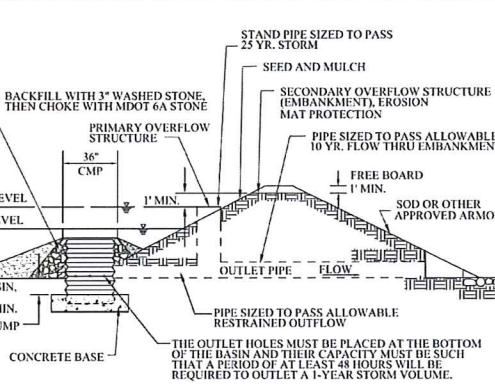
LETTERED MANHOLE COVER



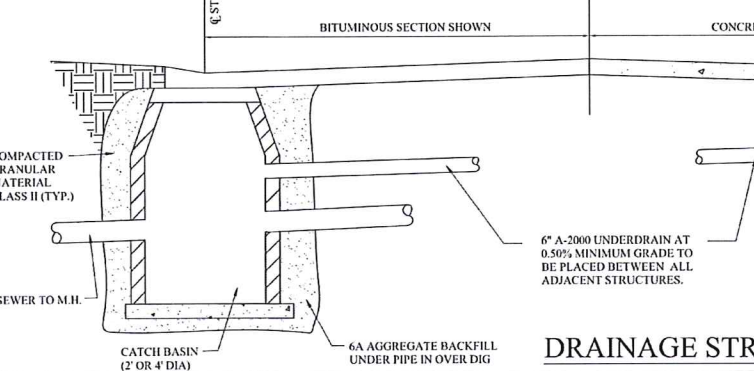
INLET DETAIL



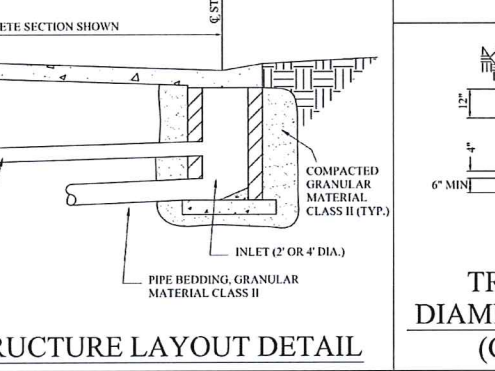
EDGE DRAIN DETAIL



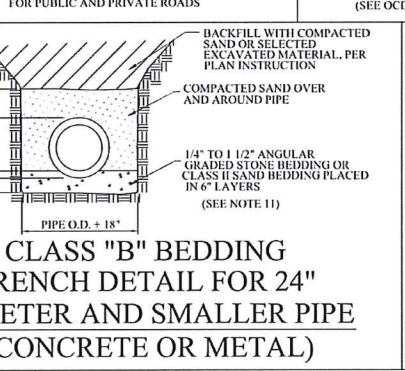
SO-2 DETENTION BASIN OUTLET FILTER (CMP)



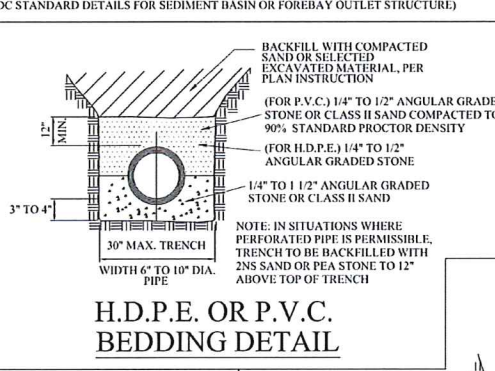
DRAINAGE STRUCTURE LAYOUT DETAIL



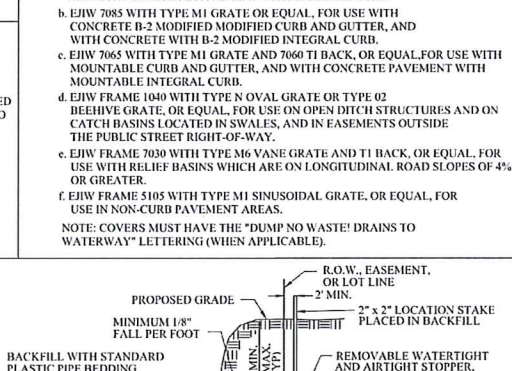
CLASS "B" BEDDING TRENCH DETAIL FOR 24" DIAMETER AND SMALLER PIPE (CONCRETE OR METAL)



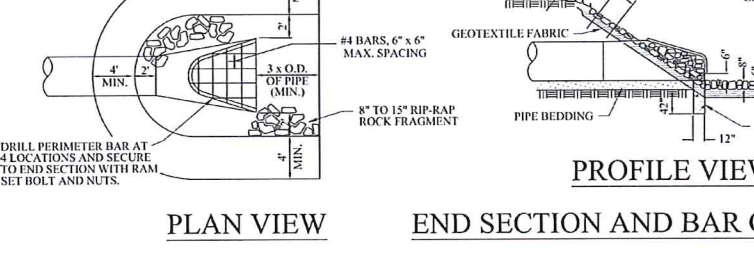
H.D.P.E. OR P.V.C. BEDDING DETAIL



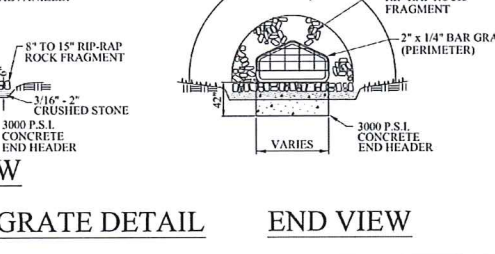
CLASS "B" BEDDING TRENCH DETAIL FOR ELLIPTICAL OR 27" DIA. AND LARGER PIPE (CONCRETE OR METAL)



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



PROFILE VIEW



END SECTION AND BAR GRATE DETAIL



END VIEW

REVISIONS	DATE	APPROVED BY
Edge Drain Detail	11-7-12	CITY COUNCIL, DATE: JULY 21, 2008

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: 7/21/2008
SHEET 1 OF 1

Project Number: 916407
Sheet Number: C-800



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02/03/17 SPA

Drawn: MMG
Checked: CL
Approved: SEP

Sheet Title:
**CITY OF ROCHESTER HILLS
SANITARY SEWER
DETAILS**

Project Number: 91640

Sheet Number: C-801

CITY FILE # 14-020

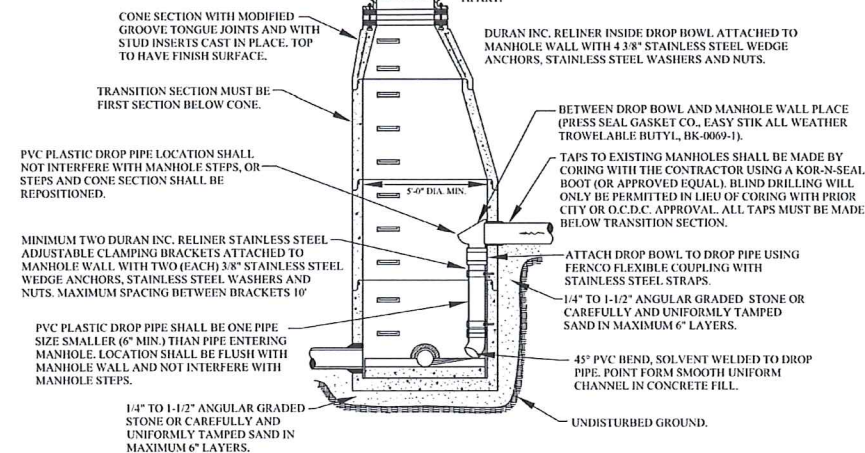
SANITARY SEWER CONSTRUCTION NOTES

- ALL CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF ROCHESTER HILLS AND THE OAKLAND COUNTY DRAIN COMMISSIONER (O.C.D.C.). 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 DRAIN COMMISSIONER STANDARDS. PRELIMINARY-AIR TESTS ARE WITNESSED BY THE CITY AND FINAL AIR TESTS ARE WITNESSED BY BOTH THE CITY AND THE O.C.D.C. 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 FILLER 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 LAYED.
- ALL BUILDING LEADS AND RISERS SHALL BE SIX INCH SDR 23.5 PVC PIPE WITH CHEMICALLY FUSED JOINTS OR GASKETED JOINTS APPROVED BY CITY ENGINEER. BUILDING LEADS TO BE FURNISHED WITH REMOVABLE AIRTIGHT AND WATERTIGHT STOPPERS.
- 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 RUBBER GASKET 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 TELEPHONE 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 OAKLAND COUNTY DRAIN COMMISSIONER OR 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.

SANITARY SEWER MATERIALS

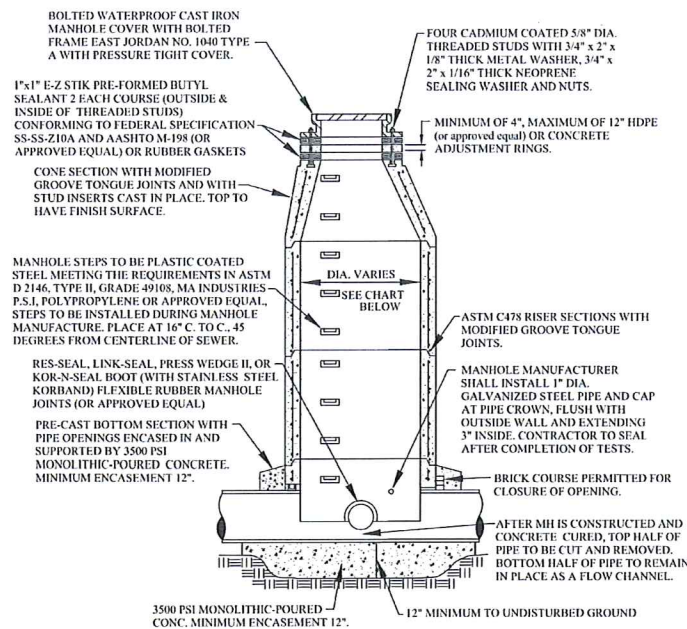
- THE FOLLOWING MATERIALS MAY BE USED FOR PUBLIC SANITARY SEWER CONSTRUCTION, APPROVED PIPE MATERIALS MUST CONFORM TO STANDARDS ADOPTED BY THE OFFICE OF THE OAKLAND COUNTY DRAIN COMMISSIONER:
 - FOR SEWERS 8" TO 15" TO BE PVC TRUSS PIPE, ASTM D-2680, WITH GASKET JOINTS, OTHER TYPES OF PIPE AS APPROVED BY CITY ENGINEER.
 - FOR 6" SEWER LEADS SHALL BE SOLID WALLED PVC, SDR 23.5, D-2751. PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 150 P.S.I. AND A MINIMUM DEFLECTION OF 15% AT FAILURE. THE SEWER LEAD MATERIAL SHALL BE COMPATIBLE WITH SEWER MAIN MATERIAL.
 - FOR SEWERS GREATER THAN 15" TO BE REINFORCED CONCRETE PIPE (RCP) SHALL CONFORM TO THE CURRENT ASTM D76 WALL B. JOINTS SHALL BE SYNTHETIC RUBBER AND MEET OR EXCEED THE REQUIREMENTS ESTABLISHED BY ASTM C361.

ALTERNATE TO DROP BOWL (ON 5" DIA. OR LARGER MANHOLES ONLY) POLYVINYL CHLORIDE (PVC) SEWER PIPE TEE (ASTM D-3034). SECURE IN PLACE WITH WITH 2 #8x1" SHEET METAL SCREWS AT 180° APART.



INTERIOR DROP CONNECTION

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

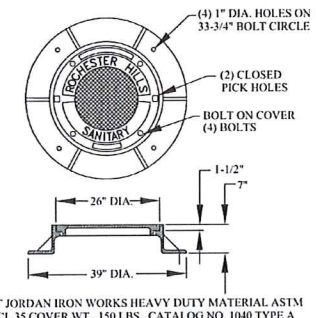
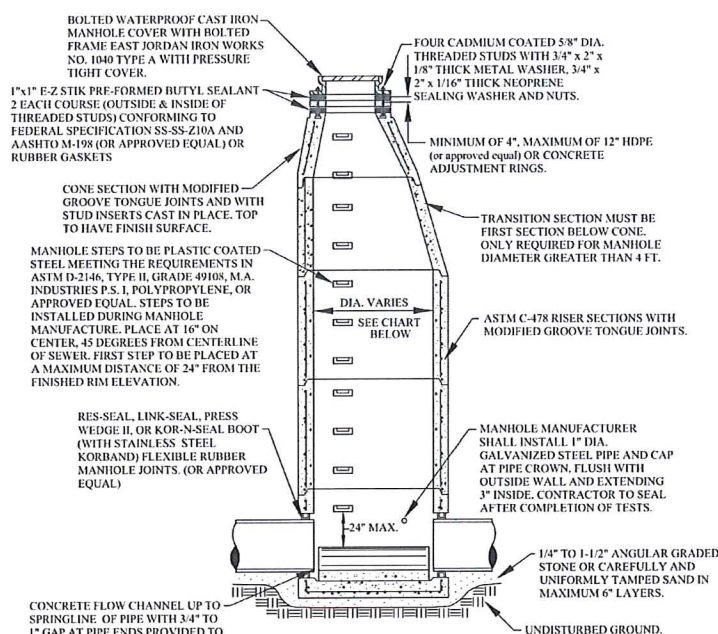


MANHOLE CONSTRUCTED OVER EXISTING SEWER

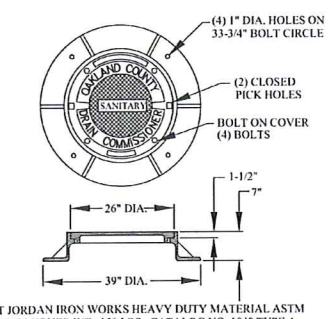
MANHOLE SIZING CHART	
MANHOLE DIAMETER	MAX. PIPE SIZE FOR STRAIGHT THRU INST.
4"	24"
5"	36"
6"	42"
7"	60"

STANDARD MANHOLE

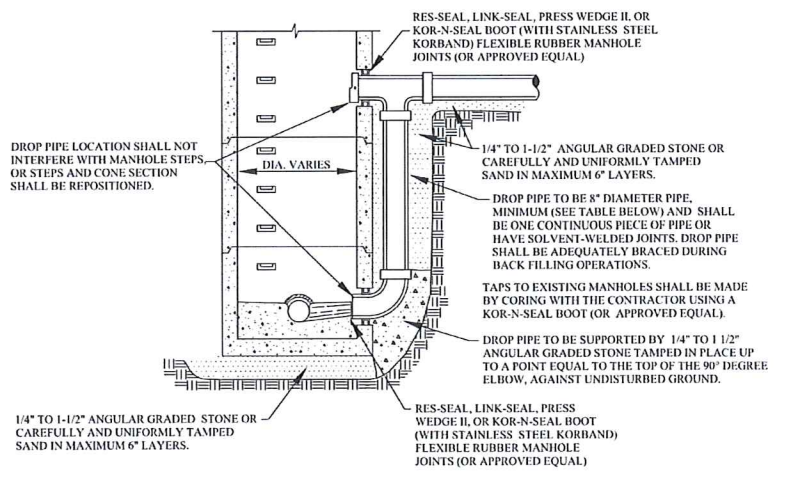
MANHOLE SIZING CHART		
MANHOLE DIAMETER	MAX. PIPE SIZE FOR STRAIGHT THRU INST.	MAX. PIPE SIZE FOR RIGHT ANGLE INST.
4"	24"	18"
5"	36"	24"
6"	42"	36"
7"	60"	42"



ROCHESTER HILLS MANHOLE COVER



O.C.D.C. LETTERED MANHOLE COVER



EXTERIOR DROP CONNECTION

SEWER SIZE	DROP SIZE	MH SIZE
UP TO 10"	8"	4"
UP TO 18"	10"	4"
UP TO 30"	18"	5"

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

SANITARY SEWER STANDARD DETAILS

NOT TO SCALE DATE: 7/21/2008

SHEET 1 OF 2

REVISIONS	DATE	APPROVED BY
		CITY COUNCIL, DATE: JULY 21, 2008
		PREPARED BY ENGINEERING DIVISION DEPARTMENT OF PUBLIC SERVICES

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

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Novi, Michigan 48375

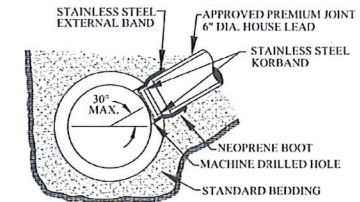
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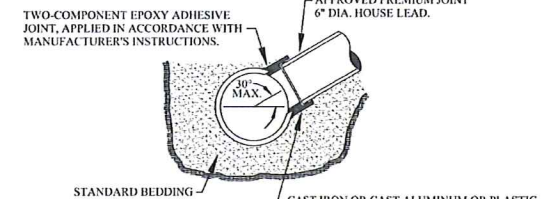
Key Plan: No Scale

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 ODCD-OPERATED SYSTEMS, CALL 248-858-1110 48-HOURS IN ADVANCE PRIOR TO SCHEDULING INSPECTION.
- SANITARY SEWER MAY NOT BE USED AS A DEWATERING 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 D2751, SDR 23.5.
 - DUCTILE IRON PIPE, AMERICAN WATER WORKS ASSOCIATION (AWWA) C-104/A21.4, CLASS 54. JOINTS SHALL BE SUPER BEL TITE, TYTON, TY-SEAL, MULTI-TITE, DUAL-TITE, OR VERI-TITE.
 - ANY DEVIATIONS FROM ABOVE SPECIFICATIONS REQUIRES APPROVAL BY CITY ENGINEER.
- ALLOWABLE TYPES OF SEWER PIPE ADAPTERS: FERROCO ADAPTER OR FERROCO FLEXIBLE COUPLING.
- 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

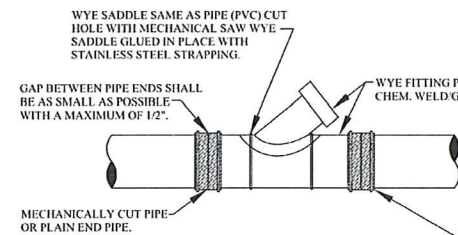


KOR-N-TEE TAP FOR CONCRETE PIPE

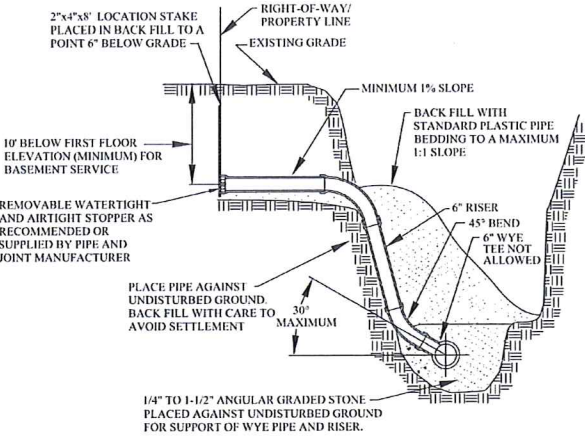


NOTE: SURFACE OF MAIN SEWER SHALL BE CLEANED WITH AN ABRASIVE GRINDER PRIOR TO EPOXY APPLICATION DUE TO VARIATION OF SET-UP TIME OF EPOXY ADHESIVE WITH TEMPERATURE. ANCHOR STRAPS SHALL BE USED TO SECURE SADDLE IN POSITION IN COLD WEATHER OR WHENEVER WORK IS TO PROCEED PRIOR TO COMPLETE CURE OF EPOXY.

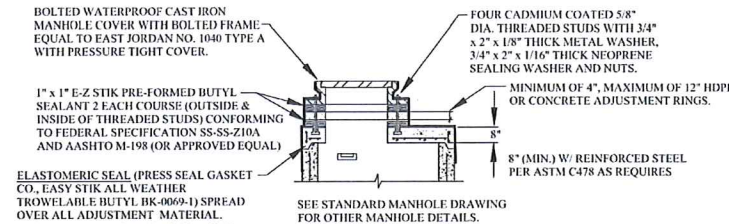
SEWER TAP-ALL SIZES OF MAIN SEWER PIPES VITRIFIED CLAY



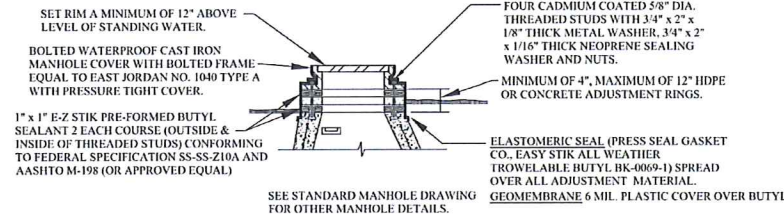
WYE PIPE INSERTION WITH FLEXIBLE COUPLINGS (RIGID PIPE)



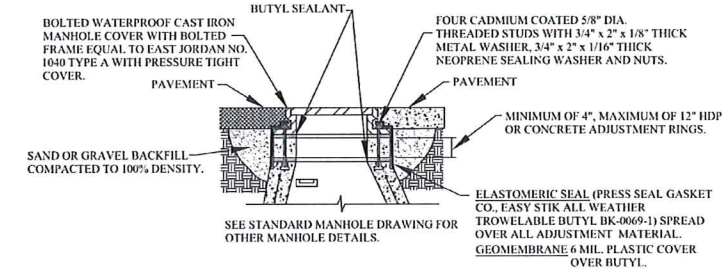
HOUSE LEAD DETAIL



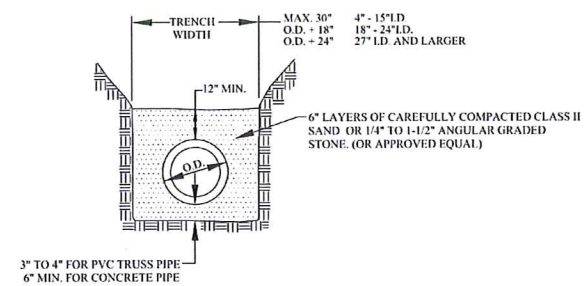
FLAT TOP MANHOLE



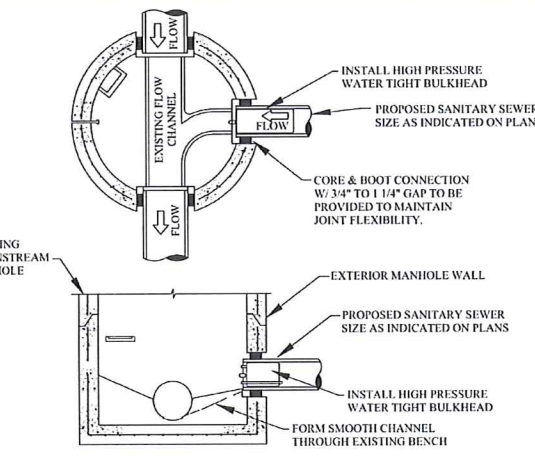
ADJUSTMENT DETAIL FOR MANHOLE TOPS WITHIN FLOOD PRONE AREAS



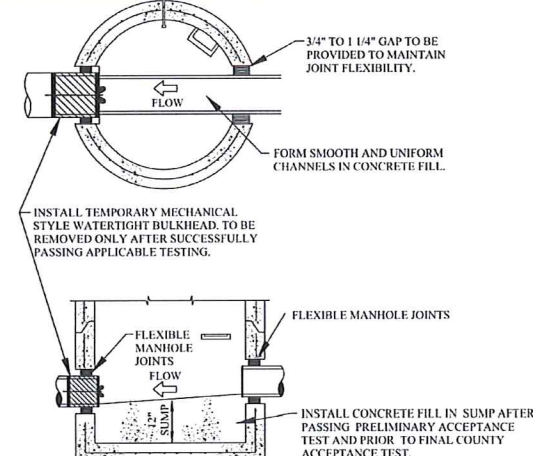
ADJUSTMENT DETAIL MANHOLE TOPS WITHIN PAVEMENT AREAS



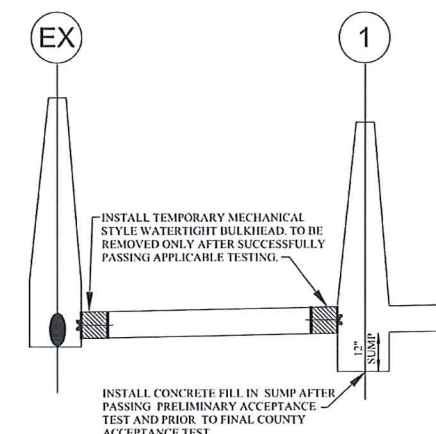
STANDARD BEDDING (CLASS B)



TESTING BULKHEAD IN EXISTING MANHOLE



FIRST MANHOLE UPSTREAM FROM SANITARY TAP



PROFILE OF BULKHEADS AND ONE FOOT SUMP

CITY OF ROCHESTER HILLS SANITARY SEWER SYSTEM AS-BUILT DRAWING SPECIFICATIONS

IN AREAS WHERE SANITARY SEWER SYSTEMS ARE OPERATED AND MAINTAINED BY THE CITY OF ROCHESTER HILLS DEPARTMENT OF PUBLIC SERVICES, FINAL ACCEPTANCE OF THE SANITARY SEWER 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 ENGINEERING DIVISION, BY THE DESIGN ENGINEER. AS-BUILT DRAWINGS SHALL BE DEFINED AS AND CONTAIN THE FOLLOWING INFORMATION:

- FINAL AS-BUILT DRAWINGS SHALL BE PROVIDED ON MYLAR, XEROX OR ANY HEAT PROCESS REPRODUCTIONS WILL NOT BE ACCEPTED.
- ALONG WITH THE MYLAR PLAN SET, PROVIDE THREE (3) SETS OF BLUEPRINTS, PRODUCED FROM THE MYLARS AND THE PLANS ON ELECTRONIC MEDIA IN AUTOCAD FORMAT (LATEST VERSION).
- THE COVER SHEET SHALL BE SEALED BY THE PROJECT DESIGN ENGINEER, ALONG WITH THE FOLLOWING CERTIFICATION STATEMENT.

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

- 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/ARY 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



Date: 10/25/16
Issued For: 600 REVIEW
Checked: SFA

Drawn: MMG
Checked: CL
Approved: SEP

Sheet Title:
CITY OF ROCHESTER HILLS
SANITARY SEWER
DETAILS

Project Number: 91640

Sheet Number: C-802

CITY FILE #: 14-020

REVISIONS	DATE	APPROVED BY
		CITY COUNCIL, DATE: JULY 21, 2008
		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

SANITARY SEWER STANDARD DETAILS

NOT TO SCALE
DATE: 7/21/2008
SHEET 2 OF 2



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Key Plan: No Scale

Client:
CITY OF
ROCHESTER HILLS

Project:
ROCHESTER HILLS
FIRE STATION No.4

2723 WALTON BLVD.
ROCHESTER HILLS, MI 48309

Seal:



Date: 10/25/16
10/25/16 600 REVIEW
02/03/17 SPA

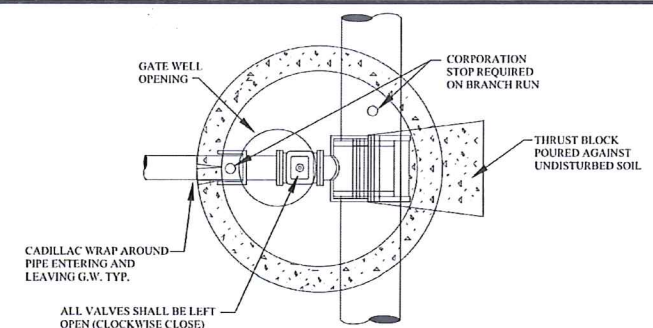
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Approved: SEP

Sheet Title:
CITY OF
ROCHESTER HILLS
WATER MAIN
STANDARD
DETAILS

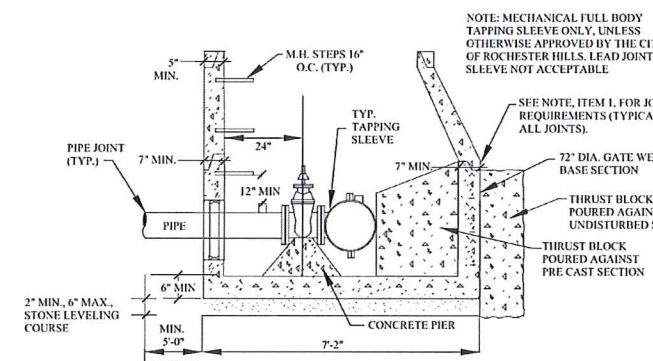
Project Number: 916407

Sheet Number: C-803

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CITY FILE #: 14-020

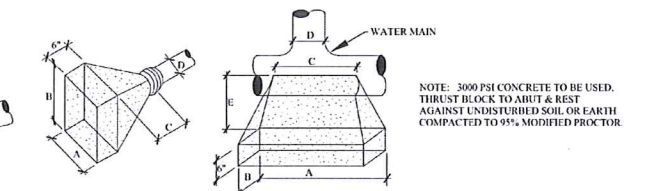


PLAN TAPPING SLEEVE VALVE & WELL (TYPICAL)



TAPPING SLEEVE, VALVE AND WELL (TYPICAL)

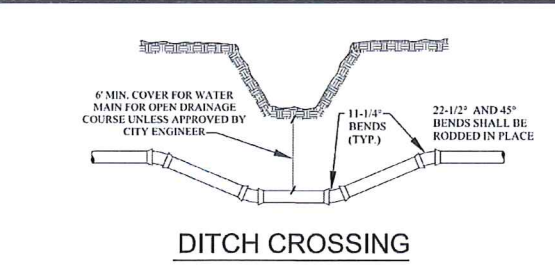
- NOTES:
1. ALL PRECAST CONCRETE GATE WELL SECTIONS SHALL BE MANUFACTURED TO CONFORM WITH A.S.T.M. C478, STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS, EXCEPT WALL THICKNESS SHALL BE AS SHOWN ON THESE DETAILS. ALL JOINTS FOR PRECAST CONCRETE GATE WELL SECTIONS SHALL BE "MODIFIED 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.
 2. CONTRACTOR SHALL INSTALL VALVES, TAPPING SLEEVES AND GATE WELL STRUCTURES IN STRICT COMPLIANCE WITH MEASUREMENTS PROVIDED ON SHEET 10.e. 2-4" 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.
 3. 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.
 4. FOR ALL PIPE USE A 1" CORPORATION STOP. NO CORPS SHALL BE USED IN CONCRETE PRESSURE PIPE.
 5. RUBBER O-RINGS SHALL NOT BE USED IN PAVEMENT.



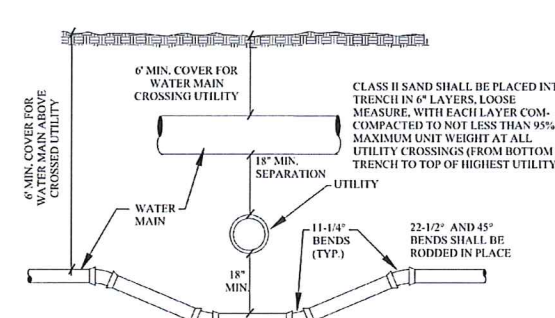
NOTE: 3000 PSI CONCRETE TO BE USED. THRUST BLOCK TO ABUT & REST AGAINST UNDISTURBED SOIL OR EARTH COMPACTED TO 95% MODIFIED PROCTOR.

FOR 90° BENDS OR SMALLER					FOR PLUGS			FOR TEES					
D	A	B	C	E MIN.	D	A	B	C MIN.	D	A	B	C	E MIN.
20"	8"	6.5"	3.5"	2.5"	20"	7"	5"	2.5"	20"	6.5"	4.5"	3.5"	3"
16"	6"	4"	2.5"	2"	16"	4'-10"	4'-10"	2"	16"	4'-8"	4'-8"	2.5"	2.75"
12"	4"	3"	2"	1.75"	12"	4'-4"	3"	1'-9"	12"	4"	3"	2.5"	2.5"
10"	3"	3"	2"	1.75"	10"	3"	2"	1'-6"	10"	3"	2"	2"	2.25"
8"	3"	2"	2"	1.5"	8"	2'-10"	2'-6"	1'-6"	8"	2'-6"	2"	2"	2.25"
6"	2"	1.5"	2"	1.25"	6"	1'-6"	1'-6"	3"	6"	2"	2"	2"	2.25"

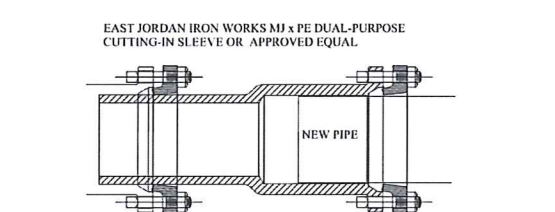
THRUST BLOCK DETAILS



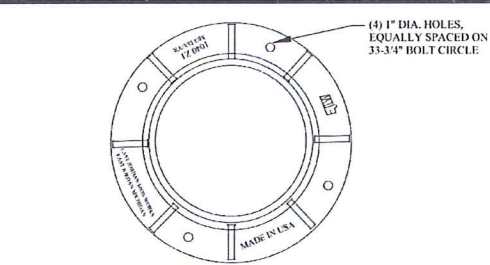
DITCH CROSSING



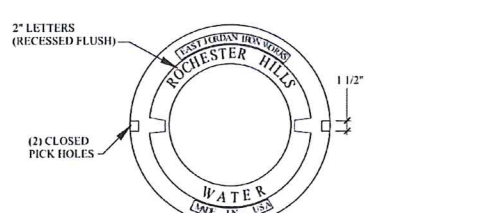
UTILITY CROSSING



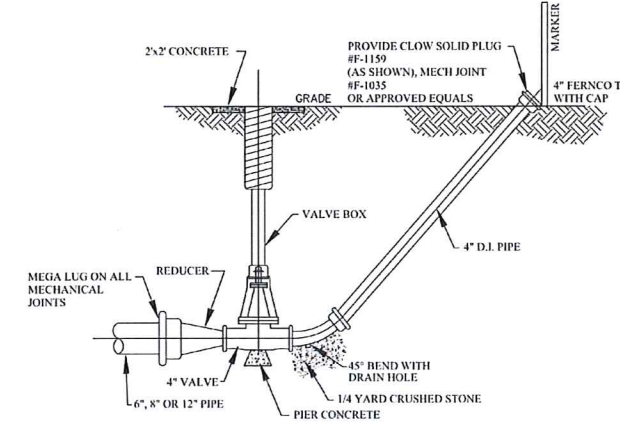
BOTTLE SLEEVE



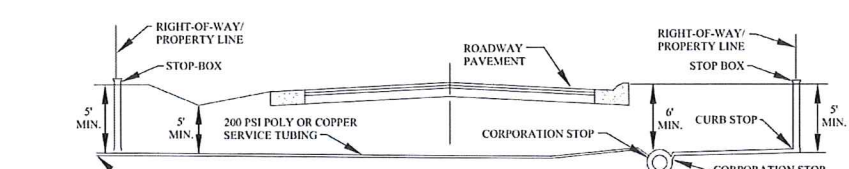
FRAME



LETTERING LAYOUT FOR GATE WELL COVERS

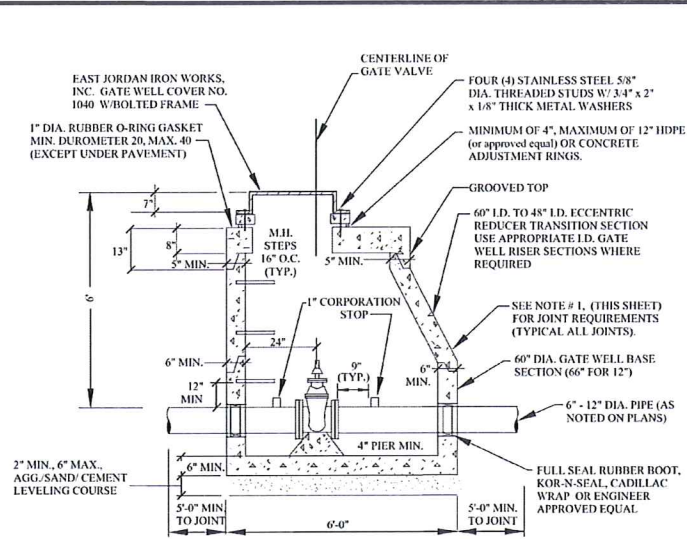


DETAIL OF 4" BLOWOFF



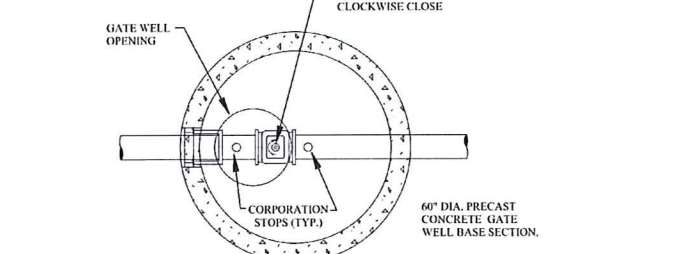
TYPICAL PUBLIC ROAD WATER SERVICE CONNECTION

- 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 DPW PERFORMS SERVICE LEAD TAPS UP TO 2" DIAMETER.

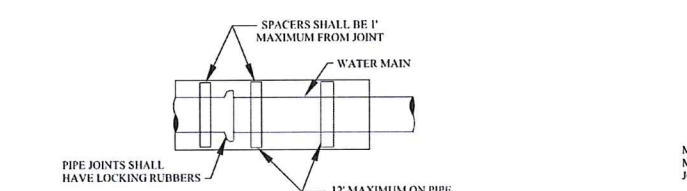


ALL GATE WELLS

MANHOLE STEPS TO BE PLASTIC COATED STEEL MEETING THE REQUIREMENTS IN ASTM D 2146, TYPE II, GRADE 49168, MA. INDUSTRIES P.S.I. POLYPROPYLENE OR APPROVED EQUAL. STEPS TO BE INSTALLED DURING MANHOLE MANUFACTURE, PLACED AT 16" C. TO C.



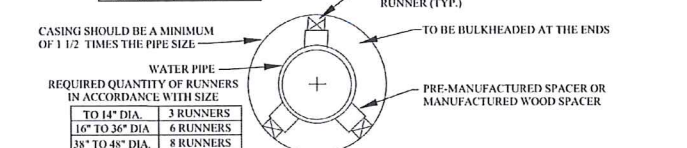
GATE WELL (TYPICAL)



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"-12"	0.375
14"-60"	0.500



SUPPORT FOR WATER MAIN CONSTRUCTED IN CASING PIPE

REVISIONS	DATE	APPROVED BY	NOTIFY ROCHESTER HILLS ENGINEERING DEPARTMENT @ 248-841-2510 48 HRS. PRIOR TO START OF CONSTRUCTION
		CITY COUNCIL, DATE: JULY 21, 2008	
		PREPARED BY ENGINEERING DIVISION DEPARTMENT OF PUBLIC SERVICES	

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

WATER MAIN STANDARD DETAILS
NOT TO SCALE DATE: 7/21/2008
SHEET 1 OF 2



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Lansing • Gaylord • Sault Ste. Marie

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www.sidockgroup.com

Key Plan: No Scale

Client:
CITY OF
ROCHESTER HILLS

Project:
ROCHESTER HILLS
FIRE STATION No.4

2723 WALTON BLVD.
ROCHESTER HILLS, MI 48309



Date: 10/25/16
Issued For: 600 REVIEW
02/03/17 SPA

Drawn: MMG
Checked: CL
Approved: SEP

Sheet Title:
CITY OF
ROCHESTER HILLS
WATER MAIN
STANDARD
DETAILS

Project Number: 916407

Sheet Number: C-804

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CITY FILE #: 14-020

GENERAL NOTES

- ALL CONSTRUCTION PROCEDURES AND MATERIALS SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF ROCHESTER HILLS.
- A PRE-CONSTRUCTION MEETING SHALL BE SCHEDULED BY THE CITY OF ROCHESTER HILLS AND HELD PRIOR TO THE START OF CONSTRUCTION.
- 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.
- ALL WATER MAIN EASEMENTS SHALL BE PROVIDED PRIOR TO CONSTRUCTION AND ACCEPTANCE OF THE WATER DISTRIBUTION SYSTEM.
- WATER MAINS SHALL BE CONSTRUCTED WITH A MINIMUM COVER OF 6 FEET BELOW FINISHED GRADES, INCLUDING OPEN DRAINAGE COURSES.
- 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).
- WHERE TWO UTILITIES CROSS, PROVIDE CLASS II BACKFILL MATERIAL IN SIX (6) INCH COMPACTED LAYERS TO TOP OF HIGHEST UTILITY.
- WHERE WATER MAINS DIP UNDER OTHER UTILITIES, THE SECTIONS WHICH ARE DEEPER THAN NORMAL SHALL BE CONSTRUCTED WITH 11-14" VERTICAL BENDS, 22 1/2" OR 45" BENDS MUST BE RODDED AND PROPERLY ANCHORED.
- 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.
- CONTRACTOR SHALL INSTALL VALVES, TAPPING SLEEVES AND GATE WELL STRUCTURES IN STRICT COMPLIANCE WITH MEASUREMENTS PROVIDED ON SHEET 11 (2'-0" BETWEEN GATE WELL WALL & CENTERLINE OF OPERATING NUT) TO ALLOW PROPER OPERATION OF VALVE THROUGH GATE WELL OPENING.
- 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.
- 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.
- 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

- TEMPORARY CONNECTIONS, WHICH MAY BE MADE FOR CHLORINATING AND FLUSHING PURPOSES, SHALL INCLUDE A TESTABLE DOUBLE CHECK VALVE BACKFLOW PREVENTER WITH CURRENT CERTIFICATION.
- 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 C80.
- ALL DUCTILE IRON PIPE (D.I.P.) WATER MAIN SHALL BE DESIGNED FOR 150 PSI MINIMUM WORKING PRESSURE.
- 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).
- 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.
- 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.
- MECHANICAL JOINTS FOR DUCTILE IRON WATER MAIN SHALL BE IN ACCORDANCE WITH AWWA C111 (ANSI A21.11).
- FLANGE JOINTS FOR DUCTILE IRON WATER MAIN SHALL BE IN ACCORDANCE WITH AWWA C110 (ANSI A21.10).
- 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 TWENTY-FOUR (24) INCH DIAMETER. DUCTILE IRON FLANGE FITTINGS SHALL BE RATED FOR 250 PSI FOR ALL PIPE DIAMETERS.
- ALL DUCTILE IRON PIPE, FITTINGS AND HYDRANTS SHALL BE ENCASED WITH POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF A.S.T.M. 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

- 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 IRON WORKS, AMERICAN FLOW CONTROL, MUELLER)
- 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.
- ALL GATE WELL COVERS SHALL BE CITY OF ROCHESTER HILLS STANDARD AS DETAILED.
- 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.
- 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.
- TAPPING VALVES SHALL BE SERIES "A" AS MANUFACTURED BY EAST JORDAN IRON WORKS OR RESILIENT SEATED GATE VALVES AS APPROVED BY THE CITY OF ROCHESTER HILLS ENGINEERING SERVICES.
- 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

- 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.
- ALL HYDRANTS SHALL BE EAST JORDAN IRON WORKS NO. 5-BR-250 TRAFFIC MODEL, OR AMERICAN FLOW CONTROL MODEL WP-67250. SELF-DRAINING HYDRANTS SHALL NOT BE USED. HYDRANTS SHALL HAVE BREAKAWAY FLANGE.
- ALL HYDRANTS SHALL BE PAINTED RED ABOVE GROUND AND BLACK BELOW GROUND WITH A FINISH COAT OF GLAMORTOX 501 ENAMEL, COLOR 314 VERMILLION OR APPROVED EQUAL. HYDRANT CAPS SHALL BE PAINTED SAME COLOR AS THE HYDRANT.
- ALL FIRE HYDRANT JOINTS SHALL BE TOTALLY RESTRAINED BY THE USE OF RESTRAINED JOINT. THRUST BLOCKS ARE ALSO REQUIRED.

ACCEPTANCE OF NEW WATER MAINS

- 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.
- 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.
- 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.
- WHERE CONTRACTOR SUPPLIED GAUGES ARE REQUIRED, MINIMUM SIZE SHALL BE 3/12" DIAMETER OR LARGER GRADUATED IN ONE (1) OR TWO (2) FOUND INCREMENTS FROM 1 TO 160 P.S.I. OR HIGHER AND HAVE CURRENT CERTIFICATION.
- 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:

- FINAL AS-BUILT DRAWINGS SHALL BE PROVIDED ON THREE (3) MIL. MYLAR, XEROX OR ANY HEAT PROCESS REPRODUCTIONS WILL NOT BE ACCEPTED.
- ALONG WITH THE MYLAR PLAN SET, PROVIDE THREE (3) SETS OF BLUEPRINTS, PRODUCED FROM THE MYLARs AND THE PLANS ON ELECTRONIC MEDIA IN AUTOCAD FORMAT (LATEST VERSION).
- 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.

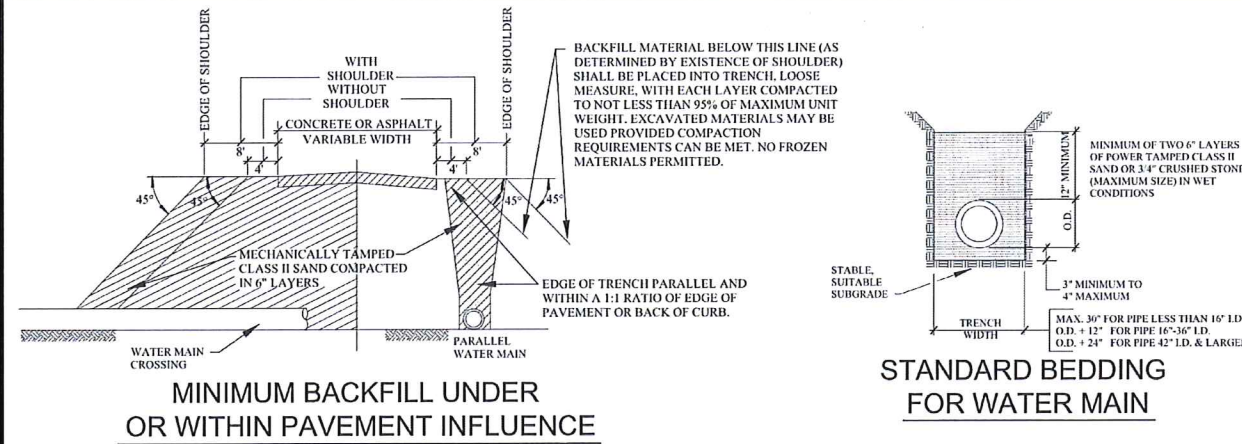
(COMPANY NAME)

(ENGINEER'S SIGNATURE)

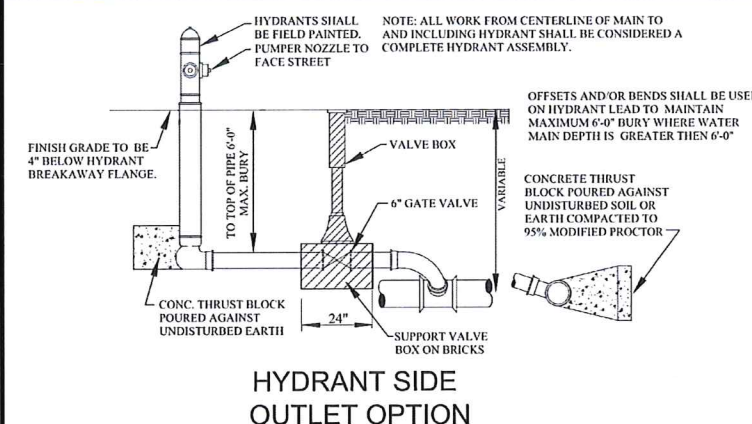
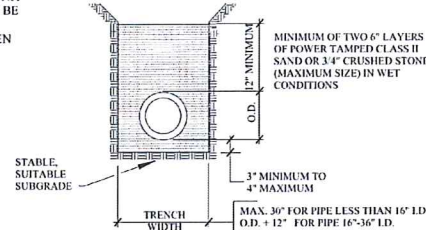
PROFESSIONAL ENGINEER NO. _____

ENGINEER SEAL

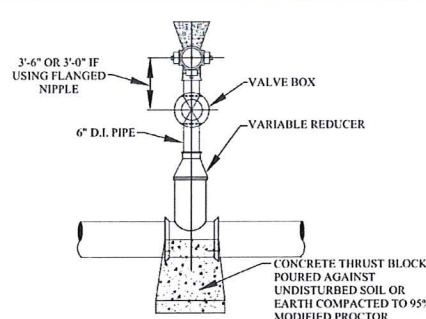
- THE MAXIMUM SCALE SHALL BE ONE (1) INCH EQUALS FIFTY (50) FEET.
- THE SIZE, LENGTH, CLASS AND MANUFACTURER OF PIPE INSTALLED SHALL BE INDICATED.
- THE SIZE, BRAND AND MODEL NUMBERS OF ALL VALVES AND HYDRANTS INSTALLED SHALL BE INDICATED.
- A TOTAL AS-BUILT DRAWING QUANTITY LIST SHALL BE INCLUDED, AS WELL AS AN AS-BUILT DRAWING QUANTITY LIST ON EACH INDIVIDUAL SHEET.
- THE LOCATIONS SHALL BE SHOWN ON THE PLANS WITH AN ACCURACY OF ONE (1) FOOT.
- THE OFFSET OF THE WATER MAIN FROM PROPERTY LINES SHALL BE INDICATED.
- ALL GATE VALVE WELLS, HYDRANTS AND ALL WATER SYSTEM APPURTENANCES SHALL BE LOCATED FROM TWO FIXED OBJECTS (MANHOLES, BUILDING CORNERS ETC.).
- 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.
- THE LOCATION AND SIZE OF EVERY RESTRAINED JOINT SHALL BE NOTED.
- THE ACCURATE LOCATION OF ALL UTILITY CROSSINGS WHERE THE VERTICAL SEPARATION, IS LESS THAN 18" SHALL BE NOTED.
- AS-BUILT SHALL BE PREPARED IN ACCORDANCE WITH THE CITY OF ROCHESTER HILLS AS-BUILT GUIDELINES AS PROVIDED AT THE PRE-CONSTRUCTION MEETING.



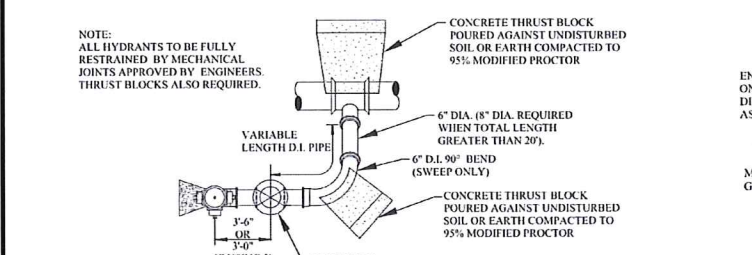
STANDARD BEDDING FOR WATER MAIN



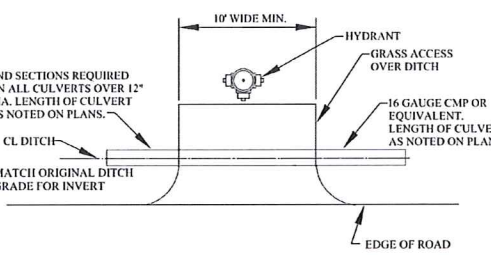
HYDRANT SIDE OUTLET OPTION



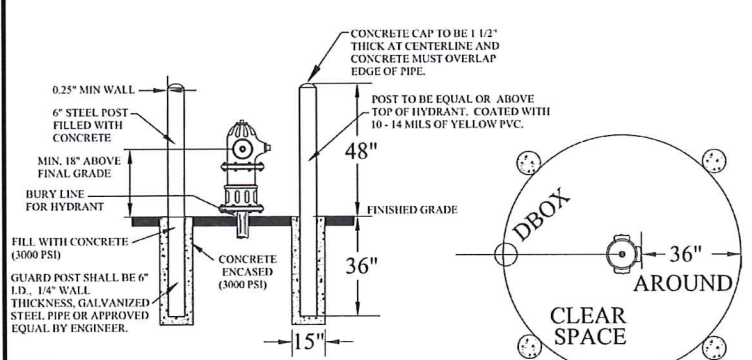
HYDRANT CONNECTION (TYPICAL)



HYDRANT SIDE OUTLET OPTION

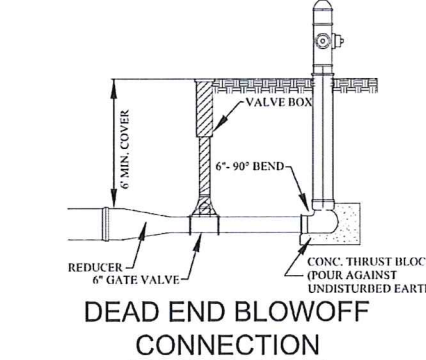


DITCH ENCLOSURE AT HYDRANT/ GATE WELL



GUARD POST

HYDRANT & BLOWOFF DETAILS



DEAD END BLOWOFF CONNECTION

REVISIONS	DATE	APPROVED BY	DATE
		CITY COUNCIL, DATE: JULY 21, 2008	
		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

WATER MAIN STANDARD DETAILS

NOT TO SCALE
SHEET 2 OF 2
DATE: 7/21/2008