

# SITE PLAN

## SITE NOTES:

ZONING: R-1  
FRONT SETBACK: 40 FT.  
SIDE: 15 FT. / TOTAL: 30 FT.  
REAR: 35 FT.

## BASIS OF BEARING

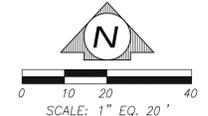
THE SOUTHERLY BOUNDARY OF SAID CHRISTIAN HILLS NO. 3

3 FULL WORKING DAYS BEFORE YOU DIG CALL

811

Know what's below  
Call before you dig  
MISS DIG System, Inc.

1-800-482-7171 www.missdig.net



## LEGEND:

- FOUND IRON
- SET IRON
- R RECORD DISTANCE
- M MEASURED DISTANCE
- ▨ EXISTING GRAVEL
- ▩ EXISTING BUILDING
- ▧ EXISTING CONCRETE
- ▦ EXISTING ASPHALT
- ▥ EXISTING LANDSCAPED AREA
- ▤ EXISTING STORM SEWER
- ▣ EXISTING SANITARY SEWER
- ▢ EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING FENCE
- ⊕ EXISTING UTILITY POLE
- ⊗ EXISTING WATER SHUT OFF
- ⊘ EXISTING GATE VALVE
- ⊙ EXISTING HYDRANT
- ⊚ EXISTING WELL
- ⊛ EXISTING GAS SHUT OFF
- ⊜ EXISTING SANITARY STRUCTURE
- ⊝ EXISTING STORM STRUCTURE
- ⊞ EXISTING DOWN SPOUT
- ⊟ EXISTING UTILITY PEDESTAL
- ⊠ EXISTING BOULDER RET. WALL
- ⊡ EXISTING GRADE
- ⊣ PROPOSED GRADE
- ▨ PROPOSED CONCRETE
- ▩ PROPOSED BILT FENCE
- ▧ PROPOSED SILD FENCE
- ▦ PROP. DRAINAGE ARROW
- ▥ PROP. MAJOR CONTOURS
- ▤ PROP. MINOR CONTOURS

## INDEX SHEETS:

1. SITE PLAN
2. GRADING PLAN
3. UTILITY PLAN
4. TREE & S.E.S.C. PLAN
5. DETAIL SHEET
6. DETAIL SHEET (2)
7. STORM SEWER DETAIL
8. WATERMAIN DETAIL
9. WATERMAIN DETAIL (2)
10. WATERMAIN DETAIL (3)
- A-1. ARCHITECTURAL FLOOR PLAN
- A-2. FRONT & RIGHT ELEVATIONS
- A-3. REAR & LEFT ELEVATIONS
- P-1. PHOTOMETRIC PLAN

## NOTE:

1. SUMP LINE MUST BE INSTALLED TO CATCH BASIN #2
2. A SOIL EROSION PERMIT FROM OAKLAND COUNTY DRAIN OFFICE OR AN EXEMPTION IS REQUIRED.
3. ALL WORK WITHIN THE CROOKS RD. RIGHT OF WAY WILL REQUIRE A PERMIT OR APPROVAL FROM THE DEPARTMENT PUBLIC SERVICES CITY OF ROCHESTER HILLS.
4. A PERMIT FROM THE CITY OF ROCHESTER HILLS, D.P.S. IS REQUIRED FOR THE SANITARY SEWER TAP IN CROOKS AVE. R.O.W.

## NOTES:

1. INSTALL SOIL EROSION CONTROLS PRIOR TO CONSTRUCTION.
2. COMPLETE ALL EARTH DISRUPTION.
3. RIGHT-OF-WAY, ALL SWALE AREAS, ALL SLOPES GREATER THAN 1 ON 5 AND 10" AROUND ALL STRUCTURES MUST BE STABILIZED PRIOR TO FINAL GRADE INSPECTION.
4. AFTER PERMANENT EARTH STABILIZATION IS COMPLETE, REMOVE EROSION CONTROL MEASURES.
5. SOIL EROSION CONTROL WILL BE MAINTAINED WEEKLY AND AFTER ANY MAJOR STORM EVENT
6. SUMP LEAD TO BE CONNECTED TO AN APPROVED DRAINAGE SYSTEM.
7. DRIVE APPROACH NOT TO CROSS PROPERTY LINE PROJECTED.

| Parcel Table     |               |
|------------------|---------------|
| Parcel #         | Area          |
| EX. LOT          | 74,902.62S.F. |
| PR. DRIVE & WALK | 7,407.36S.F.  |
| PR. HOUSE        | 6,827.98S.F.  |
| EX. DRIVE        | 3,283.04S.F.  |
| EX. BARN         | 1,225.77S.F.  |
| EX. CONCRETE PAD | 445.01S.F.    |
| EX. SHED         | 21.10S.F.     |

## LEGAL DESCRIPTION:

PARCEL 2: PART OF THE SOUTHEAST 1/4 OF SECTION 20, T.3N., R.11E., DESCRIBED AS FOLLOWS: BEGINNING AT THE SOUTHWEST CORNER OF CHRISTIAN HILLS NO. 3 SUBDIVISION, AS RECORDED IN L.83 OF PLATS, ON P.15 & 16, O.C.R., THENCE N.77°41'E., ALONG THE SOUTHERLY BOUNDARY OF SAID CHRISTIAN HILLS NO. 3 AND THE SOUTHERLY LINE OF LOTS 280 AND 281 OF SAID SUBDIVISION 345.39 FEET; THENCE S.08°49'E., ALONG THE WESTERLY LINE OF SAID SUBDIVISION 240.0 FEET; THENCE S.77°41'W., 345.39 FEET TO THE CENTERLINE OF CROOKS ROAD; THENCE N.08°49'W., ALONG SAID CENTERLINE 240.0 FEET TO THE POINT OF BEGINNING.

## FIRE DEPARTMENT NOTES:

CONSTRUCTION SITES SHALL BE SAFEGUARDED IN ACCORDANCE WITH IFC CHAPTER 14.

OPEN BURNING IS NOT PERMITTED, INCLUDING THE BURNING OF TRASH, DEBRIS, OR LAND CLEARING MATERIALS. OPEN BURNING FOR WARMING SAND AND/OR WATER FOR PREPARATION OF MORTAR SHALL BE WITHIN CITY OF ROCHESTER HILLS BURN PERMIT GUIDELINES. CONTACT ROCHESTER HILLS FIRE DEPARTMENT FOR PERMIT INFORMATION.

A KNOX KEY SYSTEM SHALL BE INSTALLED, IN A LOCATION APPROVED BY THE FIRE CODE OFFICIAL. ORDERING INFORMATION IS AVAILABLE FROM THE KNOX COMPANY AT "KNOXBOX.COM".

FIRE LANES SHALL BE CONSPICUOUSLY POSTED ON BOTH SIDES OF THE FIRE LANE, WITH FIRE LANE SIGNS SPACED NOT MORE THAN 100 FT. APART, FIRE LANE SIGNS SHALL READ "NO STOPPING, STANDING, PARKING, FIRE LANE", AND IN CONFORMANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

PROVIDE A "NO PARKING FIRE DEPARTMENT CONNECTION" SIGN OVER THE FIRE DEPARTMENT CONNECTION.

A WHITE/CLEAR STOBE LIGHT SHALL BE TIED INTO THE FIRE ALARM SYSTEM AND INSTALLED OVER THE FIRE DEPARTMENT CONNECTION.

## NOTES:

NO DUMPSTER ON SITE. TRASH WILL BE PICKED UP BY TRASH BINS.

THERE WILL BE NO OUTSIDE POST LIGHTS.

THERE WILL BE NO PROPOSED USE OF THE BARN AT THIS TIME. RENOVATIONS TO THE EXISTING BARN SHALL REQUIRE A BUILDING PERMIT AND APPROVAL FROM THE HISTORIC DISTRICT COMMISSION (HDC). DOCUMENTATION FOR THIS WORK MAY BE INCLUDED AS PART OF THE BUILDING PERMIT SUBMITTAL FOR THE PROPOSED BUILDING OR MAY BE APPLIED FOR SEPARATELY.

## BENCHMARK:

BM #1: NORTH RIM GATE VALVE AND WELL;  
LOCATED NEAR THE SOUTHWEST CORNER.  
ELEVATION: 842.01 NAVD88 DATUM

BM #2 NORTH RIM OF GATE VALVE WELL  
ELEVATION: 839.28 NAVD88 DATUM

**REICHERT SURVEYING INC.**  
P 248.651.0592  
F 248.656.7099  
Mail@ReichertSurveying.com  
140 Flumerfelt Lane  
Rochester, MI 48306

**SITE PLAN**  
PART OF THE S.E. 1/4 OF SECTION 20, T.3N., R.11E., CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN.  
ADDRESS: VACANT ON CROOKS RD. & 1841 CROOKS RD., ROCHESTER HILLS, MI 48309  
PARCEL# 15-20-428-003

PREPARED FOR:  
**GRACE PROPERTIES GROUP**  
2695 POWDERHORN RIDGE RD.  
ROCHESTER HILLS, MI 48309  
(248) 568-7194

SCALE:

| NO. | DATE     | DESCRIPTION      | BY  |
|-----|----------|------------------|-----|
| 1   | 8/15/22  | REV PER CITY     | GHR |
| 2   | 8/17/22  | REV. STORM CALLS | BGR |
| 3   | 10/16/22 | REV PER CITY     | BGR |
| 4   | 1/24/21  | REV PER CITY     | BGR |
| 5   | 3/9/21   | REV PER CITY     | BGR |

SCALE: 1"=20' DRAWN: B.G.R.

DATE: 2/27/20 CHECK: G.H.R.

JOB # 20-001 SHEET: 1 OF 14

SECTION #20  
CITY FILE #20-023

# GRADING PLAN

## LEGAL DESCRIPTION:

PARCEL 2: PART OF THE SOUTHWEST 1/4 OF SECTION 20, T.3N., R.11E., DESCRIBED AS FOLLOWS: BEGINNING AT THE SOUTHWEST CORNER OF CHRISTIAN HILLS NO. 3 SUBDIVISION, AS RECORDED IN L.63 OF PLATS; ON P.15 & 16, O.C.R.; THENCE N.77°41'E., ALONG THE SOUTHERLY BOUNDARY OF SAID CHRISTIAN HILLS NO. 3 AND THE SOUTHERLY LINE OF LOTS 280 AND 281 OF SAID SUBDIVISION 345.39 FEET; THENCE S.08°49'E., ALONG THE WESTERLY LINE OF SAID SUBDIVISION 240.0 FEET; THENCE S.77°41'W., 345.39 FEET TO THE CENTERLINE OF CROOKS ROAD; THENCE N.08°49'W., ALONG SAID CENTERLINE 240.0 FEET TO THE POINT OF BEGINNING.

## SITE NOTES:

ZONING: R-1  
FRONT SETBACK: 40 FT.  
SIDE: .15 FT. / TOTAL 30 FT.  
REAR: 35 FT

## BASIS OF BEARING

THE SOUTHERLY BOUNDARY OF SAID CHRISTIAN HILLS NO. 3

3 FULL WORKING DAYS BEFORE YOU DIG CALL

811

Know what's below  
Call before you dig

MISS DIG System, Inc.

1-800-482-7171 www.missdig.net

(TOLL FREE)



## LEGEND:

- FOUND IRON
- SET IRON
- R RECORD DISTANCE
- M MEASURED DISTANCE
- ▨ EXISTING GRAVEL
- ▩ EXISTING BUILDING
- ▧ EXISTING CONCRETE
- ▦ EXISTING ASPHALT
- ▥ EXISTING LANDSCAPED AREA
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING WATER SHUT OFF
- EXISTING GATE VALVE
- EXISTING HYDRANT
- EXISTING WELL
- EXISTING GAS SHUT OFF
- EXISTING SANITARY STRUCTURE
- EXISTING STORM STRUCTURE
- EXISTING DOWN SPOUT
- EXISTING UTILITY PEDESTAL
- EXISTING BOULDER RET. WALL
- EXISTING GRADE
- x 655.00
- 100.00
- ▨ PROPOSED BUILDING
- ▩ PROPOSED SILT FENCE
- ▧ PROP. DRAINAGE ARROW
- ▦ PROP. MAJOR CONTOURS
- ▥ PROP. MINOR CONTOURS



**REICHERT SURVEYING INC.**

P 248.651.0592  
F 248.656.7099

Mail@ReichertSurveying.com  
140 Flumerfelt Lane  
Rochester, MI 48306

**GRADING PLAN**  
PART OF THE S.E. 1/4 OF SECTION 20, T.3N., R.11E., CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN.  
ADDRESS: VACANT ON CROOKS RD. & 1841 CROOKS RD., ROCHESTER HILLS  
PARCEL #15-20-428-003

PREPARED FOR:  
**GRACE PROPERTIES GROUP**  
2695 POWDERHORN RIDGE RD.  
ROCHESTER HILLS, MI 48309  
(248) 568-7194

| NO. | DATE    | DESCRIPTION   | BY  | CHK |
|-----|---------|---------------|-----|-----|
| 1   | 1/24/21 | REV. PER CITY | BGR | BGR |
| 2   | 3/9/21  | REV. PER CITY | BGR | BGR |

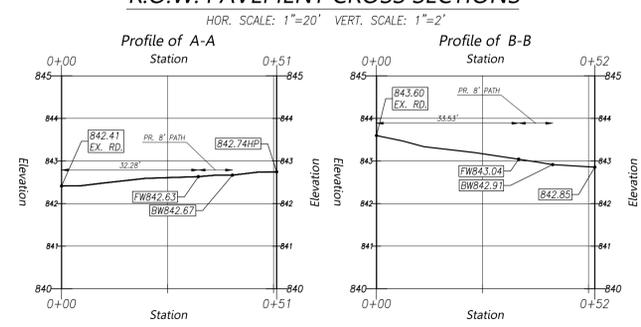
## NOTE:

- SUMP LINE MUST BE INSTALLED TO CATCH BASIN #2 OR AN EXEMPTION IS REQUIRED.
- A SOIL EROSION PERMIT FROM OAKLAND COUNTY DRAIN OFFICE OR AN EXEMPTION IS REQUIRED.
- ALL WORK WITHIN THE CROOKS RD. RIGHT OF WAY WILL REQUIRE A PERMIT OR APPROVAL FROM THE DEPARTMENT PUBLIC SERVICES CITY OF ROCHESTER HILLS.
- A PERMIT FROM THE CITY OF ROCHESTER HILLS, D.P.S. IS REQUIRED FOR THE SANITARY SEWER TAP IN CROOKS AVE. R.O.W.

## NOTES:

- INSTALL SOIL EROSION CONTROLS PRIOR TO CONSTRUCTION.
- COMPLETE ALL EARTH DISRUPTION.
- RIGHT-OF-WAY, ALL SWALE AREAS, ALL SLOPES GREATER THAN 1" ON 5" AND 10" AROUND ALL STRUCTURES MUST BE STABILIZED PRIOR TO FINAL GRADE INSPECTION.
- AFTER PERMANENT EARTH STABILIZATION IS COMPLETE, REMOVE EROSION CONTROL MEASURES.
- SOIL EROSION CONTROL WILL BE MAINTAINED WEEKLY AND AFTER ANY MAJOR STORM EVENT
- SUMP LEAD TO BE CONNECTED TO AN APPROVED DRAINAGE SYSTEM.
- DRIVE APPROACH NOT TO CROSS PROPERTY LINE PROJECTED.

## R.O.W. PAVEMENT CROSS SECTIONS

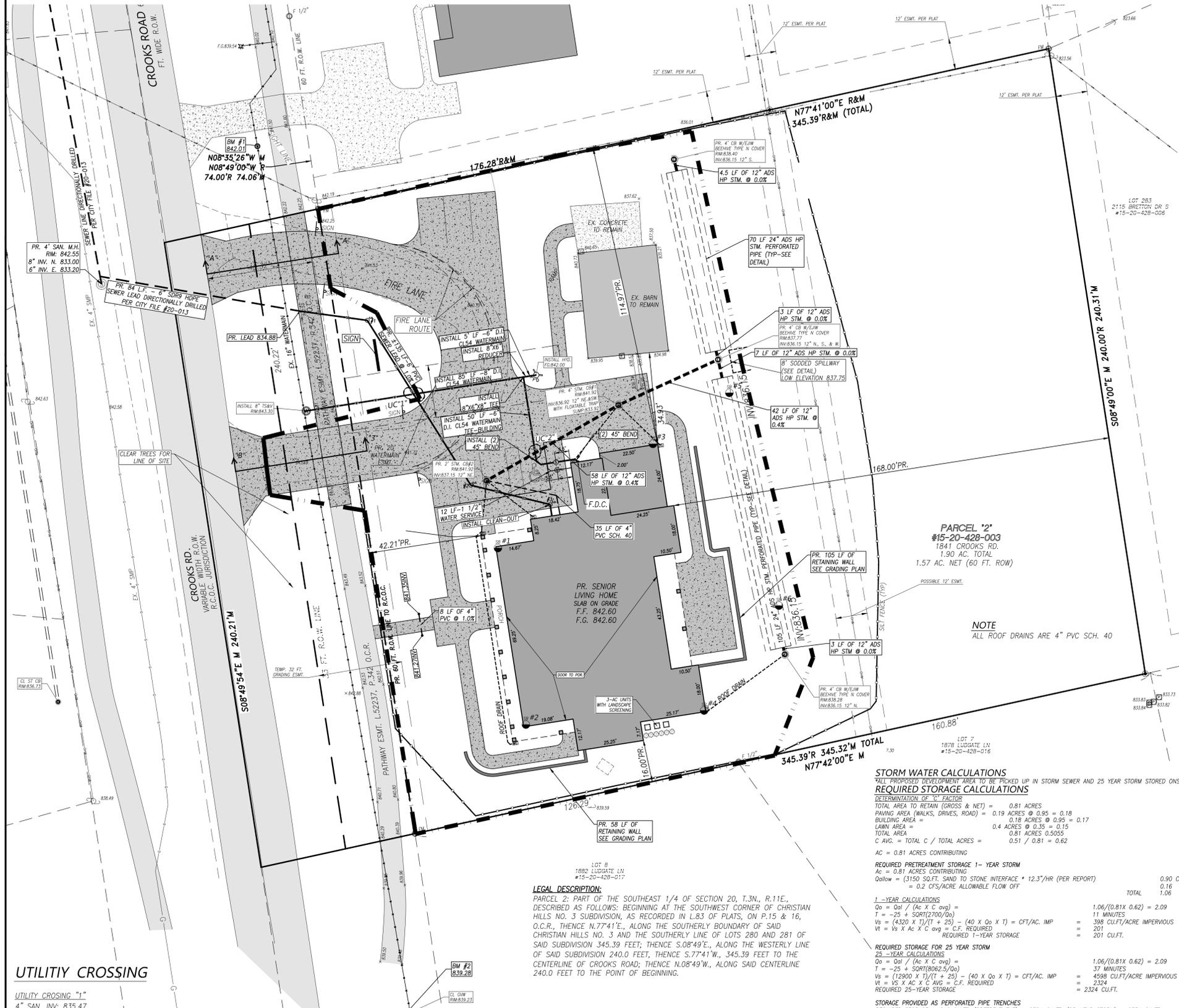


## BENCHMARK:

BM #1: NORTH RIM GATE VALVE AND WELL;  
LOCATED NEAR THE SOUTHWEST CORNER.  
ELEVATION: 842.01 NAVD88 DATUM

BM #2 NORTH RIM OF GATE VALVE WELL  
ELEVATION: 839.28 NAVD88 DATUM

# UTILITY PLAN



## UTILITY CROSSING

**UTILITY CROSSING "1"**  
 4" SAN. INV. 835.47  
 8" WATERMAIN T/PIPE: 833.87  
 CLEARANCE: 1.60'

**UTILITY CROSSING "2"**  
 6" WATERMAIN T/PIPE: 835.41  
 12" STORM INV. 837.06  
 CLEARANCE: 1.65'

**BENCHMARK:**  
 BM #1-NORTH RIM GATE VALVE AND WELL;  
 LOCATED NEAR THE SOUTHWEST CORNER.  
 ELEVATION: 842.01 NAVD88 DATUM

BM #2 NORTH RIM OF GATE VALVE WELL  
 ELEVATION: 839.28 NAVD88 DATUM

| ESTIMATED | WATERMAIN QUANTITY              | MEASURED | ESTIMATED | STORM SEWER QUANTITY               | MEASURED | ESTIMATED                         | SAN. SEWER QUANTITY | MEASURED |
|-----------|---------------------------------|----------|-----------|------------------------------------|----------|-----------------------------------|---------------------|----------|
| 1         | 85 LF 8" D.I. CL54 WATERMAIN    |          | 1         | 117.5 LF 12" HP STORM ADS          | 1        | 135 LF 6" PVC SCH. 40             |                     |          |
| 2         | 56 LF 6" D.I. CL54 WATERMAIN    |          | 2         | 215 LF 4" PVC SCH. 40 ROOF DRAIN   | 2        | 3 EA CLEANOUT                     |                     |          |
| 3         | 1 EA FIRE HYDRANT               |          | 3         | 8 LF 4" PVC SCH. 40                |          |                                   |                     |          |
| 4         | 12 LF 1 1/2" HDPE WATER SERVICE |          | 4         | 28 LF 4" PVC SCH. 40 SUMP LEAD     |          |                                   |                     |          |
| 5         | 1 EA 1 1/2" SHUT OFF - D-BOX    |          | 5         | 382 LF 24" HP STORM ADS PERFORATED | 1        | 901 SF NEW CONCRETE BIKE PATH     |                     |          |
| 6         | 1 EA TAPPING SLEEVE & WELL      |          | 6         | 4 EA 4" STM CATCH BASIN            | 2        | 8225 SF CONCRETE LOT AND ENTRANCE |                     |          |
| 7         | 1 EA D.I. TEE 8X6X8             |          | 7         | 1 EA 2' STM. CATCH BASIN           | 3        | 2844 SF SIDEWALK & PATIO          |                     |          |
| 8         | 1 EA D.I. REDUCER 8X6           |          | 8         | 5 EA DOWN SPOTS                    | 4        | 163 LF RETAINING WALL             |                     |          |
| 9         | 4 EA 45° BENDS                  |          |           |                                    |          |                                   |                     |          |
| 10        | 2 EA 6" SHUT OFF - D-BOX        |          |           |                                    |          |                                   |                     |          |

**STORM WATER CALCULATIONS**  
 ALL PROPOSED DEVELOPMENT AREA TO BE PICKED UP IN STORM SEWER AND 25 YEAR STORM STORED ON SITE

**REQUIRED STORAGE CALCULATIONS**  
 DETERMINATION OF "C" FACTOR  
 TOTAL AREA TO RETAIN (GROSS & NET) = 0.81 ACRES  
 PAVING AREA (WALKS, DRIVES, ROAD) = 0.19 ACRES @ 0.95 = 0.18  
 BUILDING AREA = 0.18 ACRES @ 0.95 = 0.17  
 LAWN AREA = 0.4 ACRES @ 0.35 = 0.15  
 TOTAL AREA = 0.81 ACRES @ 0.5055 = 0.41  
 C AVG. = TOTAL C / TOTAL ACRES = 0.31 / 0.81 = 0.62

AC = 0.81 ACRES CONTRIBUTING

**REQUIRED PRETREATMENT STORAGE 1-YEAR STORM**  
 Ac = 0.81 ACRES CONTRIBUTING  
 Galloway = (3150 SQ.FT. SAND TO STONE INTERFACE \* 12.3"/HR (PER PERM)) = 0.2 CFS/ACRE ALLOWABLE FLOW OFF

**1-YEAR CALCULATIONS**  
 Qo = Qo / (Ac X C avg) = 1.06 / (0.81 X 0.62) = 2.09  
 T = -25 + SORT(2700/Qo) = 11 MINUTES  
 Vs = (4320 X T) / (T + 25) = (40 X Qo X T) = CFT/AC. IMP = 398 CU.FT./ACRE IMPERVIOUS  
 Vt = Vs X AC X C AVG = C.F. REQUIRED = 201  
 REQUIRED 1-YEAR STORAGE = 201 CU.FT.

**REQUIRED STORAGE FOR 25 YEAR STORM**  
 Qo = Qo / (Ac X C avg) = 1.06 / (0.81 X 0.62) = 2.09  
 T = -25 + SORT(8062/Qo) = 37 MINUTES  
 Vs = (12900 X T) / (T + 25) = (40 X Qo X T) = CFT/AC. IMP = 4598 CU.FT./ACRE IMPERVIOUS  
 Vt = Vs X AC X C AVG = C.F. REQUIRED = 2324  
 REQUIRED 25-YEAR STORAGE = 2324 CU.FT.

STORAGE PROVIDED AS PERFORATED PIPE TRENCHES  
 REQUIRED STORAGE = 210 CU.FT. (PRETREATMENT) + 2324 CU.FT. (25-YEAR STORM) = 2534 CU.FT.

PROVIDED STORAGE = 2 TRENCHES @ 105 LF - 2 TRENCHES @ 70 LF = 24" PIPE IN A 4'X4' STONE AREA

PROVIDED STORAGE IN PIPE AND STONE  
 350 LF 24" PIPE @ 3.14 CU.FT./FOOT = 1648.5 CU.FT. STORAGE WITHIN PIPE

STORAGE AREA IN TRENCH LESS PIPE  
 350 LF X 12.86 SF LF (16 CF/LF (4'X4') STONE BED - 3.14 CF) = 4501 CU.FT.  
 4501 \* 0.3 (30% VOID RATIO) = 1350.3 CU.FT.

REQUIRED STORAGE 2534 CU.FT. < 2998 CU.FT. - THEREFORE, OK.

**INFILTRATION CALCULATIONS**  
 PE = 151 CPM \* 1815 \* 0.81 AC \* 0.62 (C) = 917.48 CF  
 PROVIDED INFILTRATION = 2998 CF > 917.48 CF - THEREFORE, OK

**NOTE**  
 IF STORM EXCEED 25-YR DRAINAGE WILL FLOW OUT RIM OF STRUCTURE IN DIRECTION IT HAS FLOWN IN DECADES PAST.

## SITE NOTES:

ZONING: R-1  
 FRONT SETBACK: 40 FT.  
 SIDE: 15 FT. / TOTAL 30 FT.  
 REAR: 35 FT.

## BASIS OF BEARING

THE SOUTHERLY BOUNDARY OF SAID CHRISTIAN HILLS NO. 3

## 3 FULL WORKING DAYS BEFORE YOU DIG CALL

**811**  
 Know what's below  
 Call before you dig  
 MISS DIG System, Inc.  
 1-800-482-7171 www.missdig.net  
 (TOLL FREE)

## ENGINEER INFO:

**Powell Engineering & Associates, LLC**  
 4700 Cornerstone Drive  
 White Lake, Michigan 48383  
 P: 248.714.9895 help@powelleng.net

## SANITARY SEWER BASIS DESIGN

INITIAL AND FINAL BASIS OF DESIGN IS THE SAME.  
 PARCEL 1 - TAX ID #15-20-428-002 - VACANT PROPERTY PROPOSED TO BE A 6 BED MEDICAL FACILITY.  
 PARCEL 2 - TAX ID #15-20-428-003 - SINGLE FAMILY HOME  
 POPULATION=10 BED MEDICAL FACILITY = 10 PEOPLE @ 250 GPD = 2500 GPD  
 6 PEOPLE @ 100 GPD = 600 GPD  
 SINGLE FAMILY HOME = 350 GPD  
 TOTAL GPD = 3450 GPD

AVERAGE FLOW =  $\frac{3450 \text{ GPD}}{(86400 \text{ SEC/DAY} \times 7.48 \text{ GAL/CF})} = 0.0053 \text{ CFS}$   
 PEAKING FACTOR = 4.34  
 PEAK FLOW = 3450 GPD x 4.34 = 14973 GPD = 0.023 CFS  
 CAPACITY OF 8" SEWER @ 0.4% = 0.75 CFS  
 0.75 CFS > 0.023 CFS - THEREFORE, OK.

## NOTES:

CONSTRUCTION SITES SHALL BE SAFEGUARDED IN ACCORDANCE WITH IFC CHAPTER 14.

OPEN BURNING IS NOT PERMITTED, INCLUDING THE BURNING OF TRASH, DEBRIS, OR LAND CLEARING MATERIALS. OPEN BURNING FOR WARMING SAND AND/OR WATER FOR PREPARATION OF MORTAR SHALL BE WITHIN CITY OF ROCHESTER HILLS BURN PERMIT GUIDELINES. CONTACT ROCHESTER HILLS FIRE DEPARTMENT FOR PERMIT INFORMATION.

A KNOX KEY SYSTEM SHALL BE INSTALLED, IN A LOCATION APPROVED BY THE FIRE CODE OFFICIAL. ORDERING INFORMATION IS AVAILABLE FROM THE KNOX COMPANY AT "KNOXBOX.COM".

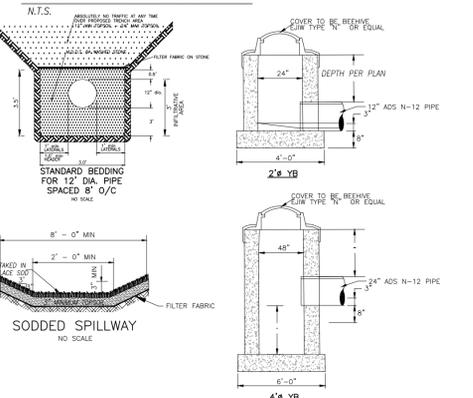
FIRE LANES SHALL BE CONSPICUOUSLY POSTED ON BOTH SIDES OF THE FIRE LANE, WITH FIRE LANE SIGNS SPACED NOT MORE THAN 100 FT. APART. FIRE LANE SIGNS SHALL READ "NO STOPPING, STANDING, PARKING, FIRE LANE", AND IN CONFORMANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

NO DUMPSTER ON SITE. TRASH WILL BE PICKED UP BY TRASH BINS. THERE WILL BE NO OUTSIDE POST LIGHTS.

## LEGEND:

- FOUND IRON
- SET IRON
- RECORD DISTANCE
- MEASURED DISTANCE
- ▨ EXISTING GRAVEL
- ▨ EXISTING BUILDING
- ▨ EXISTING CONCRETE
- ▨ EXISTING ASPHALT
- ▨ EXISTING LANDSCAPED AREA
- ▨ EXISTING STORM SEWER
- ▨ EXISTING SANITARY SEWER
- ▨ EXISTING WATERMAIN
- ▨ EXISTING OVERHEAD WIRES
- ▨ EXISTING FENCE
- ▨ EXISTING UTILITY POLE
- ▨ EXISTING WATER SHUT OFF
- ▨ EXISTING GATE VALVE
- ▨ EXISTING HYDRANT
- ▨ EXISTING WELL
- ▨ EXISTING GAS SHUT OFF
- ▨ EXISTING SANITARY STRUCTURE
- ▨ EXISTING STORM STRUCTURE
- ▨ EXISTING DOWN SPOUT
- ▨ EXISTING UTILITY PEDESTAL
- ▨ EXISTING BOULDER RET. WALL
- ▨ EXISTING GRADE
- ▨ PROPOSED GRADE
- ▨ PROPOSED CONCRETE
- ▨ PROPOSED BUILDING
- ▨ PROPOSED SILT FENCE
- ▨ PROP. DRAINAGE ARROW
- ▨ PROP. MAJOR CONTOURS
- ▨ PROP. MINOR CONTOURS

## STORM FIELD DETAIL:



## NOTE:

- SUMP LINE MUST BE INSTALLED TO CATCH BASIN #2
- A SOIL EROSION PERMIT FROM OAKLAND COUNTY DRAIN OFFICE OR AN EXEMPTION IS REQUIRED.
- ALL WORK WITHIN THE CROOKS RD. RIGHT OF WAY WILL REQUIRE A PERMIT OR APPROVAL FROM THE DEPARTMENT PUBLIC SERVICES CITY OF ROCHESTER HILLS.
- A PERMIT FROM THE CITY OF ROCHESTER HILLS D.P.S. IS REQUIRED FOR THE SANITARY SEWER TAP IN CROOKS AVE. R.O.W.

## NOTES:

- INSTALL SOIL EROSION CONTROLS PRIOR TO CONSTRUCTION.
- COMPLETE ALL EARTH DISRUPTION.
- RIGHT-OF-WAY, ALL SWALE AREAS, ALL SLOPES GREATER THAN 1 ON 5 AND 10' AROUND ALL STRUCTURES MUST BE STABILIZED PRIOR TO FINAL GRADE INSPECTION.
- AFTER PERMANENT EARTH STABILIZATION IS COMPLETE, REMOVE EROSION CONTROL MEASURES.
- SOIL EROSION CONTROL WILL BE MAINTAINED WEEKLY AND AFTER ANY MAJOR STORM EVENT.
- SUMP LEAD TO BE CONNECTED TO AN APPROVED DRAINAGE SYSTEM.
- DRIVE APPROACH NOT TO CROSS PROPERTY LINE PROJECTED.

SECTION #20  
 CITY FILE #20-023

**REICHERT SURVEYING INC.**  
 P 248.651.0592  
 F 248.656.7099  
 Mail@ReichertSurveying.com  
 140 Flumerfelt Lane  
 Rochester, MI 48306

**UTILITY PLAN**  
 PART OF THE S.E. 1/4 OF SECTION 20, T.3N., R.1E., CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN.  
 ADDRESS: VACANT ON CROOKS RD. & 1841 CROOKS RD., ROCHESTER HILLS, MI 48309  
 PARCEL#15-20-428-003

PREPARED FOR:  
**GRACE PROPERTIES GROUP**  
 2695 POWDERHORN RIDGE RD.  
 ROCHESTER HILLS, MI 48309  
 (248) 568-7194

SCALE: 1"=20' DRAWN: B.G.R.  
 DATE: 12/18/20 CHECK: G.H.R.  
 JOB # 20-001 SHEET: 3 OF 14

# TREE & S.E.S.C. PLAN

## LEGAL DESCRIPTION:

PARCEL 2: PART OF THE SOUTHWEST 1/4 OF SECTION 20, T.3N., R.11E., DESCRIBED AS FOLLOWS: BEGINNING AT THE SOUTHWEST CORNER OF CHRISTIAN HILLS NO. 3 SUBDIVISION, AS RECORDED IN L.B.3 OF PLATS, ON P.15 & 16, O.C.R., THENCE N.77°41'E., ALONG THE SOUTHERLY BOUNDARY OF SAID CHRISTIAN HILLS NO. 3 AND THE SOUTHERLY LINE OF LOTS 280 AND 281 OF SAID SUBDIVISION 345.39 FEET; THENCE S.08°49'E., ALONG THE WESTERLY LINE OF SAID SUBDIVISION 240.0 FEET; THENCE S.77°41'W., 345.39 FEET TO THE CENTERLINE OF CROOKS ROAD; THENCE N.08°49'W., ALONG SAID CENTERLINE 240.0 FEET TO THE POINT OF BEGINNING.

## SITE NOTES:

ZONING: R-1  
FRONT SETBACK: 40 FT.  
SIDE: 15 FT. / TOTAL 30 FT.  
REAR: 35 FT.

## BASIS OF BEARING

THE SOUTHERLY BOUNDARY OF SAID CHRISTIAN HILLS NO. 3

## 3 FULL WORKING DAYS BEFORE YOU DIG CALL

**811**  
Know what's below  
Call before you dig  
MISS DIG System, Inc.  
1-800-482-7171 www.missdig.net  
(TOLL FREE)

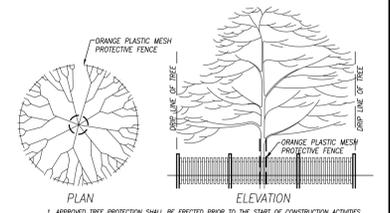
SCALE: 1" = 20'  
EQ. 20'

## LEGEND:

- FOUND IRON
- SET IRON
- R RECORD DISTANCE
- M MEASURED DISTANCE
- EXISTING GRAVEL
- EXISTING BUILDING
- EXISTING CONCRETE
- EXISTING ASPHALT
- EXISTING LANDSCAPED AREA
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING OVERHEAD WIRES
- EXISTING FENCE
- EXISTING UTILITY POLE
- EXISTING WATER SHUT OFF
- EXISTING GATE VALVE
- EXISTING HYDRANT
- EXISTING WELL
- EXISTING GAS SHUT OFF
- EXISTING SANITARY STRUCTURE
- EXISTING STORM STRUCTURE
- EXISTING DOWN SPOUT
- EXISTING UTILITY PEDESTAL
- EXISTING BOULDER RET. WALL
- EXISTING GRADE
- PROPOSED GRADE
- PROPOSED CONCRETE
- PROPOSED BUILDING
- PROP. DRAINAGE ARROW
- PROP. MAJOR CONTOURS
- PROP. MINOR CONTOURS

## S.E.S.C. LEGEND:

- PROPOSED TREE PROTECTION
- PROPOSED SILT FENCE



- APPROVED TREE PROTECTION SHALL BE ERECTED PRIOR TO THE START OF CONSTRUCTION ACTIVITIES, AND SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE. THE FORESTRY DIVISION SHALL BE NOTIFIED AFTER TREE PROTECTION IS IN PLACE PRIOR TO CONSTRUCTION ACTIVITIES. HOLDING DELIVERY OF MATERIALS.
- NO PERSON MAY CONDUCT ANY ACTIVITY WITHIN THE DRIP LINE OF ANY TREE DESIGNATED TO REMAIN, INCLUDING, BUT NOT LIMITED TO, PLACING SOLVENTS, BUILDING MATERIALS, CONSTRUCTION EQUIPMENT, OR SOIL GRASSES WITHIN THE DRIP LINE.
- GRADE CHANGES MAY NOT OCCUR WITHIN THE DRIP LINES OF PROTECTED TREES.
- URING CONSTRUCTION, NO PERSON SHALL ATCH ANY DEVICE OR HE TO ANY REMAINING TREE.
- ALL UTILITY SERVICE REQUESTS MUST INCLUDE NOTIFICATION TO THE INSTALLER THAT PROTECTED TREES MUST BE AVOIDED. ALL TRENCHING SHALL OCCUR OUTSIDE OF THE PROTECTIVE FENCING.
- SWALES SHALL BE ROUTED TO AVOID THE AREA WITHIN THE DRIP LINES OF PROTECTED TREES.
- IF TREE PROTECTION CANNOT BE MAINTAINED FOR A TREE THROUGHOUT THE CONSTRUCTION PERIOD, REPLACEMENT OF THAT TREE MAY BE REQUIRED PRIOR TO THE ISSUANCE OF THE CERTIFICATE OF OCCUPANCY.
- REGULATED TREE LOCATED ON ADJACENT PROPERTY THAT MAY BE AFFECTED BY CONSTRUCTION ACTIVITIES MUST BE PROTECTED.

## STANDARD TREE PROTECTION

NOT TO SCALE

## NOTE:

- SUMP LINE MUST BE INSTALLED TO CATCH BASIN #2
- A SOIL EROSION PERMIT FROM OAKLAND COUNTY DRAIN OFFICE OR AN EXEMPTION IS REQUIRED.
- ALL WORK WITHIN THE CROOKS RD. RIGHT OF WAY WILL REQUIRE A PERMIT OR APPROVAL FROM THE DEPARTMENT PUBLIC SERVICES CITY OF ROCHESTER HILLS.
- A PERMIT FROM THE CITY OF ROCHESTER HILLS, D.P.S. IS REQUIRED FOR THE SANITARY SEWER TAP IN CROOKS AVE. R.O.W.

## NOTES:

- INSTALL SOIL EROSION CONTROLS PRIOR TO CONSTRUCTION.
- COMPLETE ALL EARTH DISRUPTION.
- RIGHT-OF-WAY, ALL SWALE AREAS, ALL SLOPES GREATER THAN 1 ON 5 AND 10" AROUND ALL STRUCTURES MUST BE STABILIZED PRIOR TO FINAL GRADE INSPECTION.
- AFTER PERMANENT EARTH STABILIZATION IS COMPLETE, REMOVE EROSION CONTROL MEASURES.
- SOIL EROSION CONTROL WILL BE MAINTAINED WEEKLY AND AFTER ANY MAJOR STORM EVENT.
- SUMP LEAD TO BE CONNECTED TO AN APPROVED DRAINAGE SYSTEM.
- DRIVE APPROACH NOT TO CROSS PROPERTY LINE PROJECTED.

## TREE NOTES:

- NO TREES REMOVE OUTSIDE OF BUILDING ENVELOPE
- TREES REMOVE BY CITY DURING PATH INSTALL

## TREE CALC'S:

SEE LANDSCAPE PLAN BY: ANTONELLI LANDSCAPE P:586-336-7800

## BENCHMARK:

BM #1: NORTH RIM GATE VALVE AND WELL; LOCATED NEAR THE SOUTHWEST CORNER. ELEVATION: 842.01 NAVD88 DATUM

BM #2 NORTH RIM OF GATE VALVE WELL ELEVATION: 839.28 NAVD88 DATUM

| TREE TABLE |              |        |      | TREE TABLE |            |        |      | TREE TABLE |              |        |      | TREE TABLE |              |        |      | TREE TABLE |              |        |      | TREE TABLE |                     |        |      |   |       |       |      |
|------------|--------------|--------|------|------------|------------|--------|------|------------|--------------|--------|------|------------|--------------|--------|------|------------|--------------|--------|------|------------|---------------------|--------|------|---|-------|-------|------|
| #          | DESC.        | ELEV.  | SAVE | #          | DESC.      | ELEV.  | SAVE | #          | DESC.        | ELEV.  | SAVE | #          | DESC.        | ELEV.  | SAVE | #          | DESC.        | ELEV.  | SAVE | #          | DESC.               | ELEV.  | SAVE | # | DESC. | ELEV. | SAVE |
| 3010       | 26" OAK      | 843.03 | YES  | 4874       | 6" POPLAR  | 843.93 | NO   | 4890       | 6" POPLAR    | 844.93 | YES  | 4908       | 20" PINE     | 842.52 | YES  | 4924       | 9" PINE      | 835.48 | NO   | 4940       | 10" PINE            | 836.24 | YES  |   |       |       |      |
| 3011       | 8" OAK       | 841.66 | YES  | 4875       | 6" POPLAR  | 844.52 | YES  | 4891       | 7" POPLAR    | 844.22 | YES  | 4909       | 12" 16" PINE | 843.24 | YES  | 4925       | 6" APPLE     | 834.02 | NO   | 4941       | 8" PINE             | 836.00 | YES  |   |       |       |      |
| 3012       | 9" OAK       | 840.91 | YES  | 4876       | 6" POPLAR  | 844.33 | YES  | 4893       | 10" BOXELDER | 841.27 | YES  | 4910       | 12" PINE     | 841.32 | YES  | 4926       | 6" APPLE     | 833.69 | NO   | 4942       | 16" BOXELDER        | 835.78 | YES  |   |       |       |      |
| 3013       | 6" OAK       | 840.38 | YES  | 4877       | 13" CHERRY | 840.79 | YES  | 4894       | 10" CHERRY   | 840.79 | YES  | 4911       | 18" PINE     | 841.58 | YES  | 4927       | 9" APPLE     | 834.39 | NO   | 4943       | 10" 14" ELM         | 835.37 | YES  |   |       |       |      |
| 3014       | 10" OAK      | 840.03 | YES  | 4878       | 7" POPLAR  | 844.66 | YES  | 4895       | 9" APPLE     | 839.08 | YES  | 4912       | 25" 30" OAK  | 841.09 | YES  | 4928       | 8" CHERRY    | 835.23 | NO   | 4944       | 9" CHERRY           | 834.79 | YES  |   |       |       |      |
| 3017       | 12" OAK      | 839.20 | YES  | 4879       | 9" POPLAR  | 844.47 | YES  | 4897       | 8" APPLE     | 841.59 | YES  | 4913       | 10" WALNUT   | 839.96 | YES  | 4929       | 8" APPLE     | 834.72 | NO   | 4945       | 8" APPLE            | 834.32 | YES  |   |       |       |      |
| 3018       | 8" CHERRY    | 839.74 | YES  | 4880       | 7" POPLAR  | 844.40 | NO   | 4898       | 10" PINE     | 840.98 | YES  | 4914       | 9" BOXELDER  | 840.05 | NO   | 4930       | 8" APPLE     | 836.82 | YES  | 4946       | 7" ELM              | 835.48 | YES  |   |       |       |      |
| 3019       | 22" OAK      | 840.90 | YES  | 4881       | 7" POPLAR  | 844.27 | NO   | 4899       | 10" PINE     | 841.60 | YES  | 4915       | 21" ELM      | 838.84 | YES  | 4931       | 9" PINE      | 837.52 | YES  | 4947       | 13" WALNUT          | 835.86 | YES  |   |       |       |      |
| 3020       | 9" OAK       | 840.94 | YES  | 4882       | 7" POPLAR  | 844.48 | NO   | 4900       | 9" PINE      | 842.46 | NO   | 4916       | 9" CEDAR     | 838.78 | YES  | 4932       | 10" MULBERRY | 838.78 | YES  | 4948       | 10" ELM             | 835.79 | YES  |   |       |       |      |
| 3032       | 9" 9" ELM    | 844.33 | YES  | 4883       | 10" POPLAR | 844.61 | YES  | 4901       | 16" PINE     | 844.86 | NO   | 4917       | 14" CEDAR    | 839.03 | YES  | 4933       | 6" PINE      | 836.64 | YES  | 4949       | 11" 14" MULBERRY    | 835.44 | YES  |   |       |       |      |
| 3034       | 9" 9" ELM    | 843.80 | YES  | 4884       | 9" POPLAR  | 844.86 | YES  | 4902       | 9" OAK       | 844.08 | YES  | 4918       | 9" CEDAR     | 839.18 | YES  | 4934       | 11" PINE     | 836.39 | YES  | 4950       | 6" APPLE            | 835.18 | YES  |   |       |       |      |
| 4869       | 7" BOXELDER  | 843.14 | NO   | 4885       | 8" POPLAR  | 844.74 | YES  | 4903       | 8" POPLAR    | 844.28 | YES  | 4919       | 40" MAPLE    | 842.23 | NO   | 4935       | 13" BOXELDER | 836.20 | YES  | 4951       | 6" APPLE            | 834.01 | YES  |   |       |       |      |
| 4870       | 7" POPLAR    | 844.18 | NO   | 4886       | 7" POPLAR  | 845.05 | YES  | 4904       | 7" POPLAR    | 844.03 | YES  | 4920       | 28" MAPLE    | 841.00 | NO   | 4936       | 8" APPLE     | 835.47 | YES  | 4952       | 17" BOXELDER        | 828.06 | YES  |   |       |       |      |
| 4871       | 7" POPLAR    | 844.48 | NO   | 4887       | 6" CHERRY  | 843.83 | YES  | 4905       | 8" POPLAR    | 843.83 | YES  | 4921       | 19" MULBERRY | 839.80 | NO   | 4937       | 8" APPLE     | 835.09 | YES  | 4953       | 15" 16" BOXELDER    | 827.03 | YES  |   |       |       |      |
| 4872       | 7" 9" POPLAR | 844.66 | NO   | 4888       | 6" POPLAR  | 844.54 | NO   | 4906       | 9" BOXELDER  | 843.25 | YES  | 4922       | 9" ELM       | 836.15 | NO   | 4938       | 8" APPLE     | 835.59 | YES  | 4954       | 6" 10" 12" BOXELDER | 828.17 | YES  |   |       |       |      |
| 4873       | 8" POPLAR    | 844.22 | NO   | 4889       | 7" POPLAR  | 844.77 | YES  | 4907       | 7" BOXELDER  | 843.07 | YES  | 4923       | 12" WILLOW   | 838.44 | NO   | 4939       | 8" PINE      | 835.77 | YES  | 4955       | 14" MAPLE           | 833.91 | YES  |   |       |       |      |

**REICHERT SURVEYING INC.**  
P 248.651.0592  
F 248.656.7099  
Mail@ReichertSurveying.com  
140 Flumerfelt Lane  
Rochester, MI 48306

**TREE & S.E.S.C. PLAN**  
PART OF THE S.E. 1/4 OF SECTION 20, T.3N., R.11E., CITY OF ROCHESTER HILLS, OAKLAND COUNTY, MICHIGAN.  
ADDRESS: VACANT ON CROOKS RD. & 1841 CROOKS RD., ROCHESTER HILLS, MI 48306  
PARCEL# 15-20-428-003

PREPARED FOR:  
**GRACE PROPERTIES GROUP**  
2695 POWDERHORN RIDGE RD.  
ROCHESTER HILLS, MI 48309  
(248) 568-7194

SCALE: 1"=20' DRAWN: B.G.R.

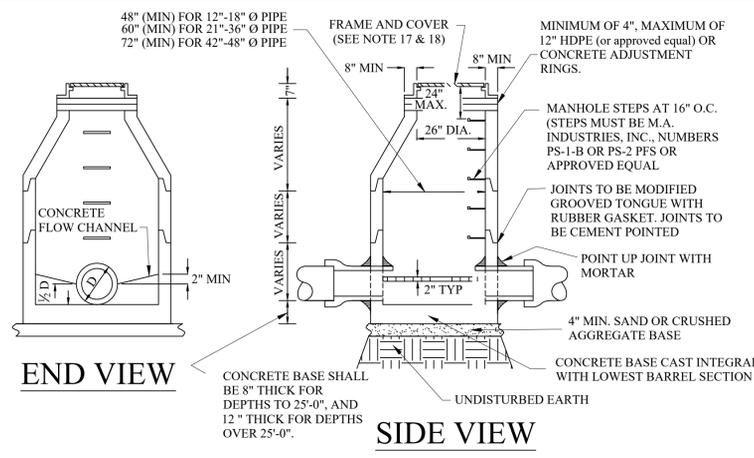
DATE: 12/18/20 CHECK: G.H.R.

JOB # 20-001 SHEET: 4 OF 14

SECTION #20  
CITY FILE #20-023



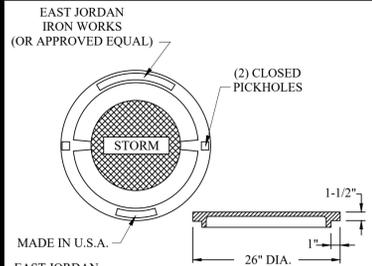




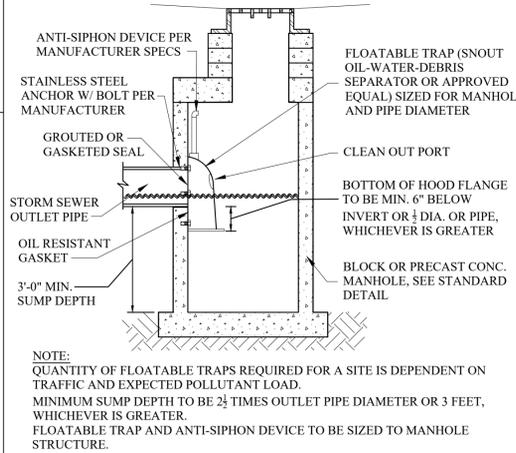
END VIEW

SIDE VIEW

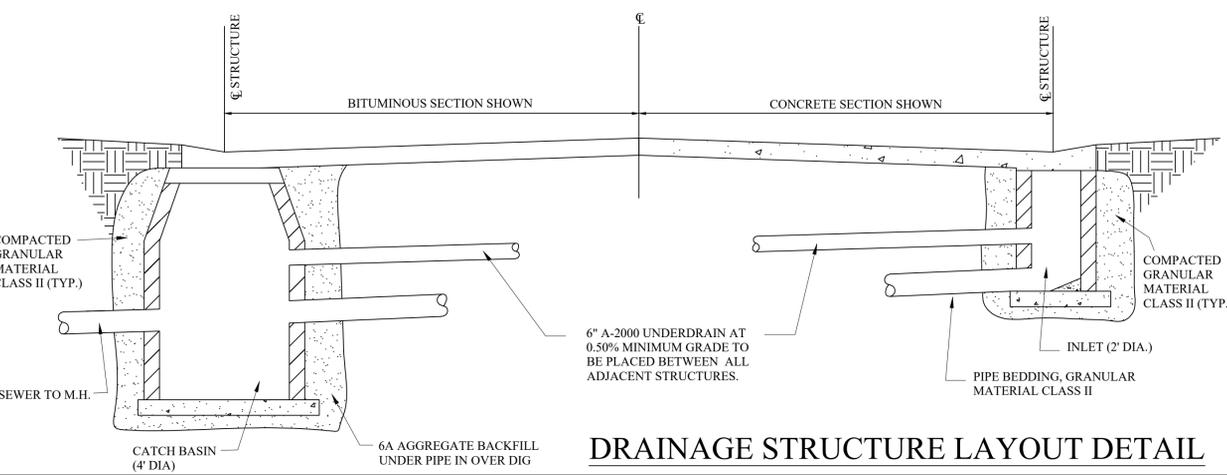
**PRE-CAST STORM MANHOLE**



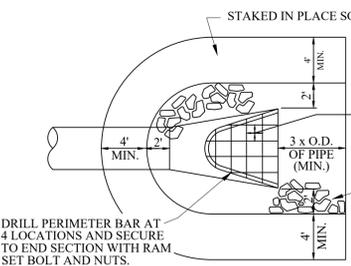
LETTERED MANHOLE COVER



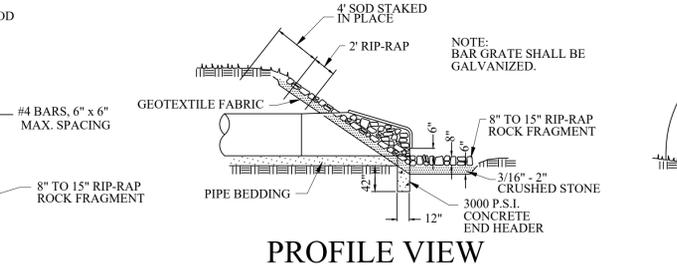
CATCH BASIN WITH FLOATABLE TRAP



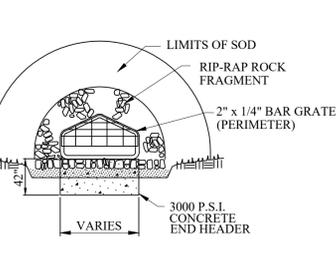
DRAINAGE STRUCTURE LAYOUT DETAIL



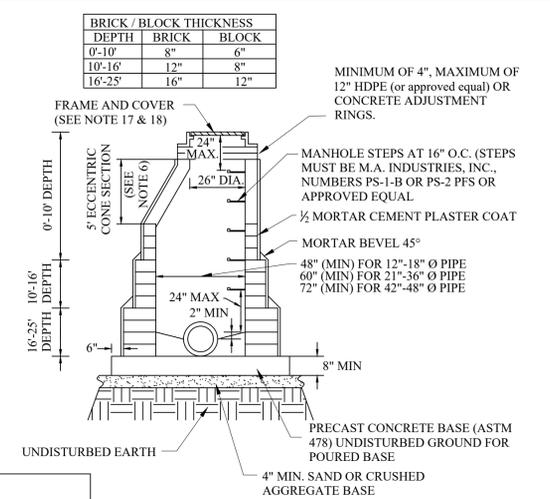
PLAN VIEW



END SECTION AND BAR GRATE DETAIL

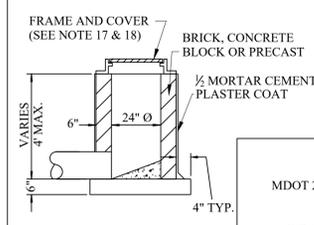


END VIEW

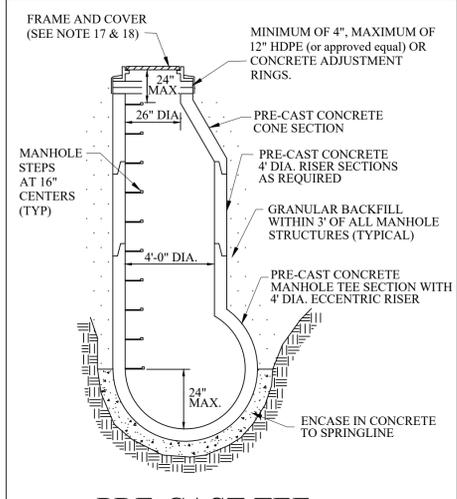


**BRICK OR BLOCK MANHOLE**

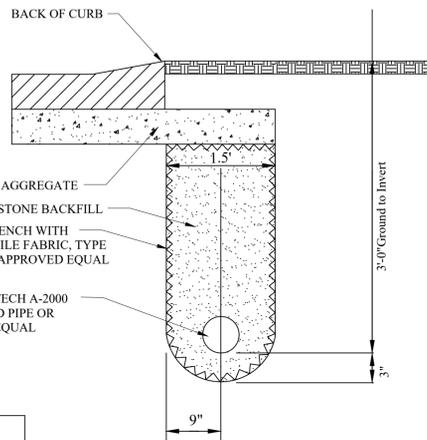
(NOTE: PERMITTED BY CITY ONLY FOR SPECIAL CIRCUMSTANCES)



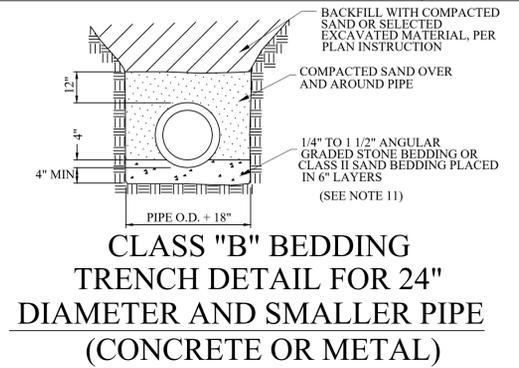
INLET DETAIL



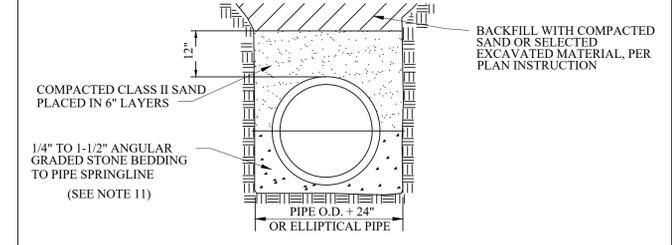
PRE-CAST TEE MANHOLE DETAIL



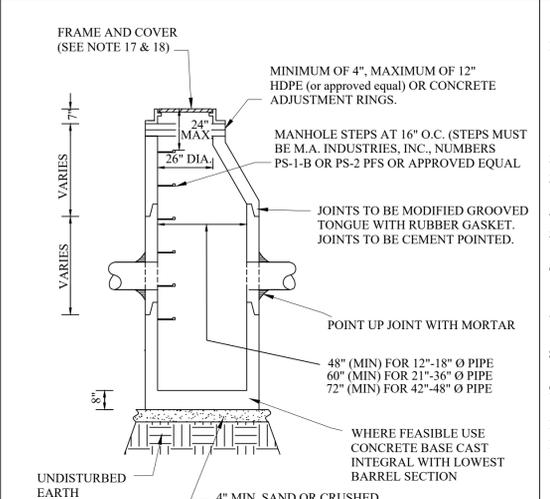
EDGE DRAIN DETAIL FOR PUBLIC AND PRIVATE ROADS



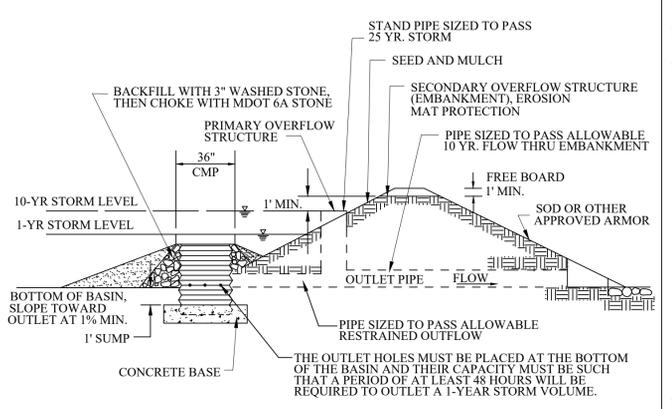
CLASS "B" BEDDING TRENCH DETAIL FOR 24" DIAMETER AND SMALLER PIPE (CONCRETE OR METAL)



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



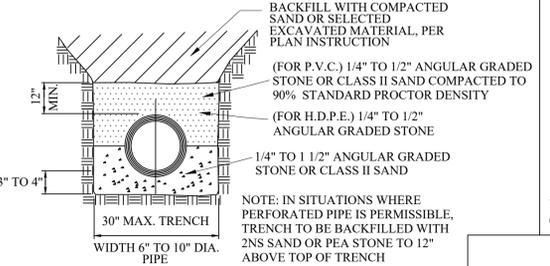
PRECAST STORM CATCH BASIN



PROFILE VIEW

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

(SEE OCWRC STANDARD DETAILS FOR FOREBAY OUTLET STRUCTURE)

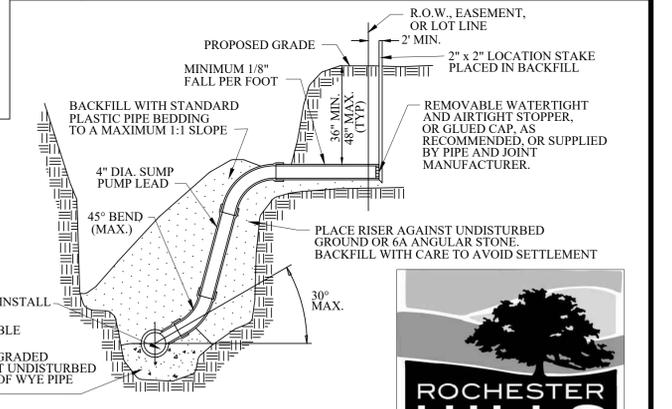


H.D.P.E. OR P.V.C. BEDDING DETAIL

- 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).



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



| REVISIONS | DATE | APPROVED BY |
|-----------|------|-------------|
|           |      |             |
|           |      |             |

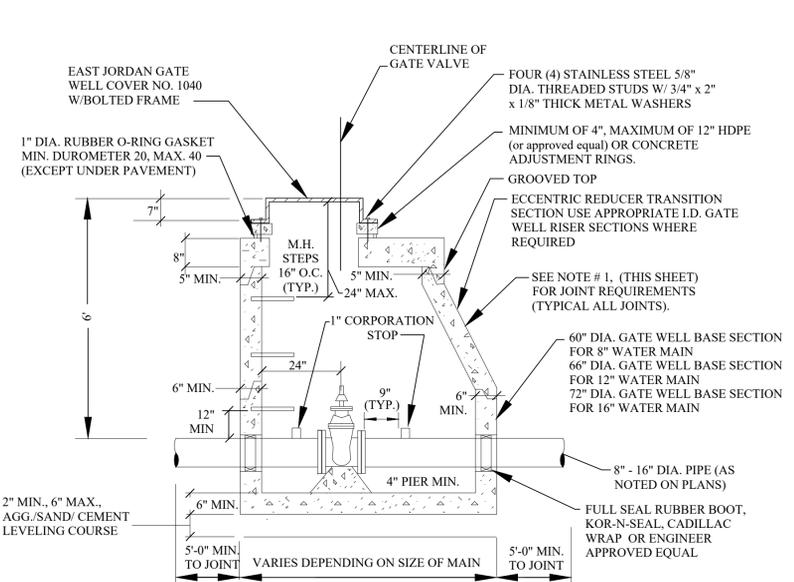
DATE: \_\_\_\_\_

PREPARED BY ENGINEERING DIVISION  
DEPARTMENT OF PUBLIC SERVICES

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

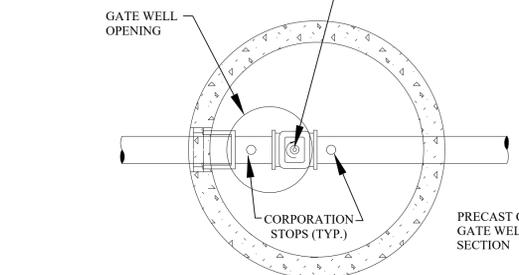
**City of Rochester Hills**  
1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

**STORM SYSTEM STANDARD DETAILS**

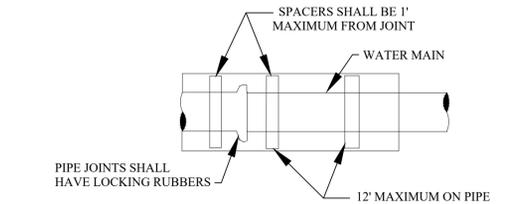


**ALL GATE WELLS**

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.



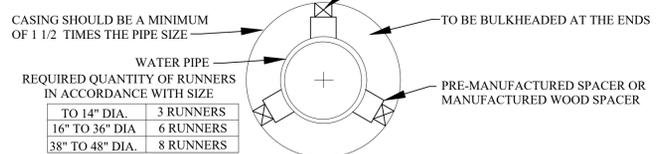
**GATE WELL (TYPICAL)**



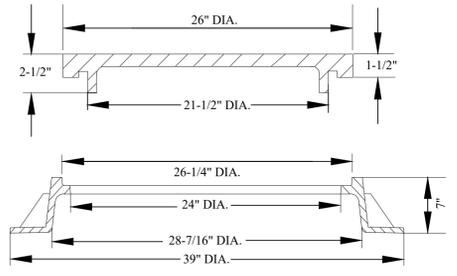
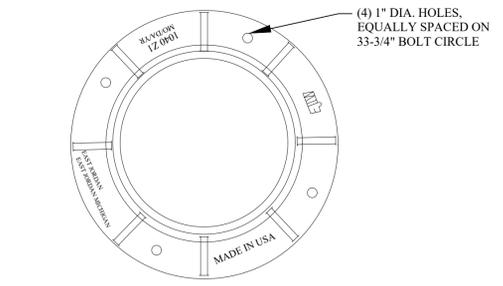
**WATER MAIN IN CASING SECTION**

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

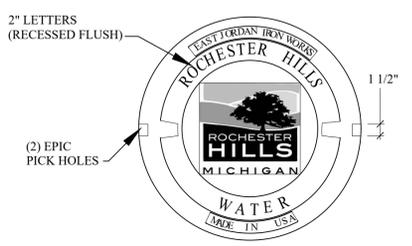
| NOMINAL SIZE | MINIMUM WALL THICKNESS |
|--------------|------------------------|
| 8" - 42"     | 0.375                  |
| 48" - 60"    | 0.500                  |



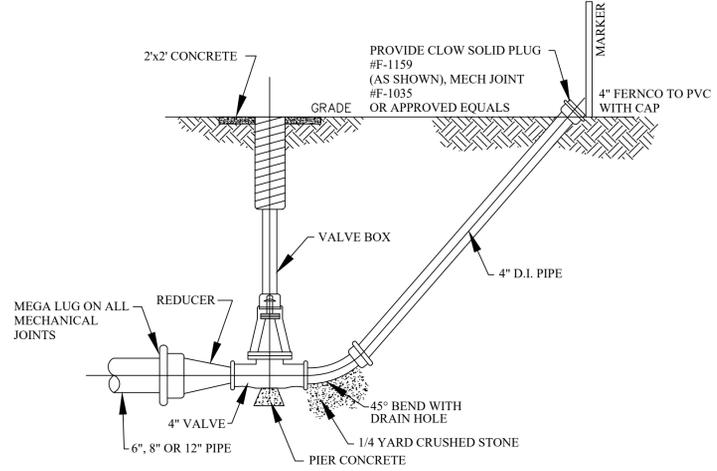
**SUPPORT FOR WATER MAIN CONSTRUCTED IN CASING PIPE**



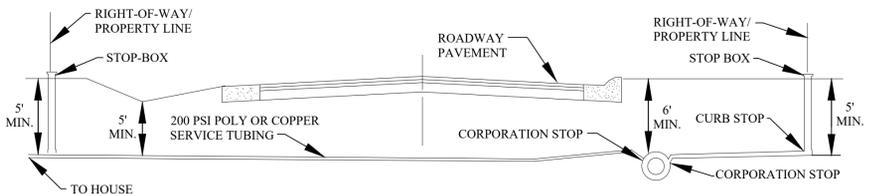
**FRAME**



**LETTERING LAYOUT FOR GATE WELL COVERS**

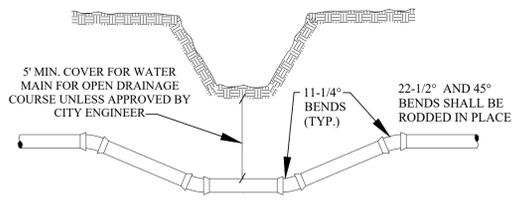


**DETAIL OF 4" BLOWOFF**

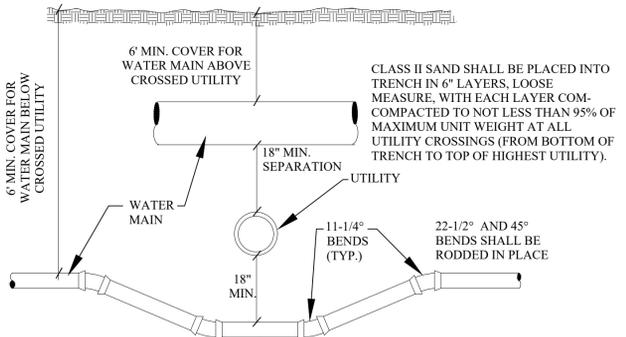


**TYPICAL PUBLIC ROAD WATER SERVICE CONNECTION**

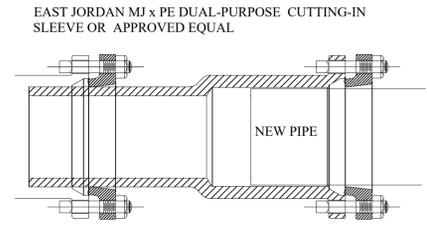
NOTES:  
1. WATER SERVICE SHUT-OFF TO BE PLACED AT PROPERTY LINE.  
2. LATERAL LOCATION SHALL BE AS REQUESTED BY THE ABUTTING PROPERTY OWNER.  
3. ROCHESTER HILLS DPS PERFORMS SERVICE LEAD TAPS UP TO 2" DIAMETER.



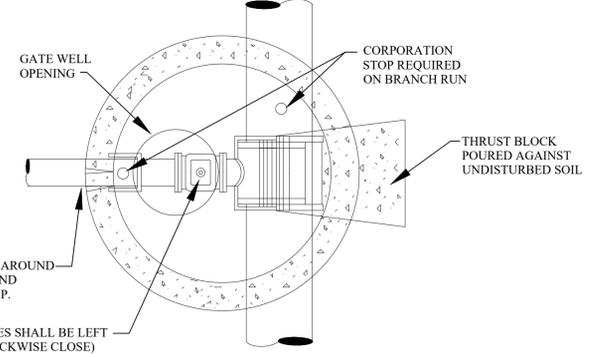
**DITCH CROSSING**



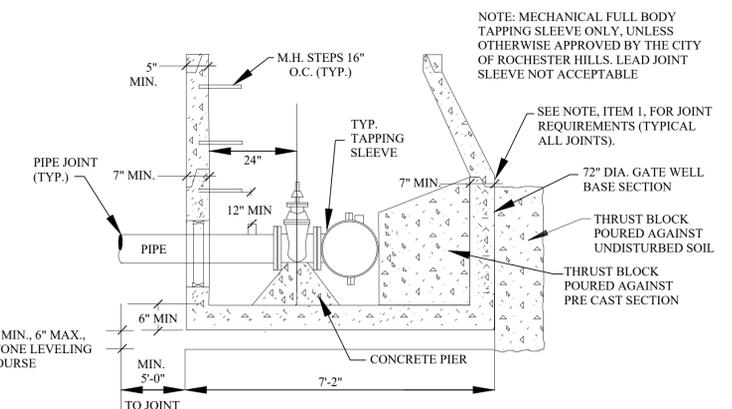
**UTILITY CROSSING**



**BOTTLE SLEEVE**



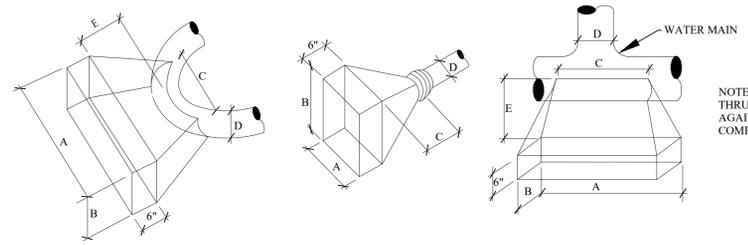
**PLAN TAPPING SLEEVE VALVE & WELL (TYPICAL)**



**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.



**THRUST BLOCK DETAILS**



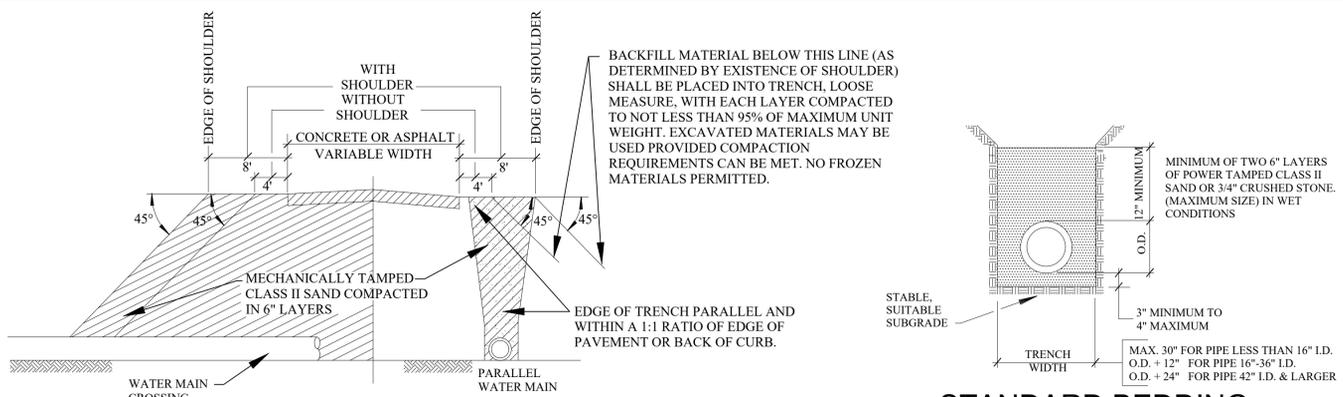
| REVISIONS | DATE | APPROVED BY  |
|-----------|------|--|
|           |      | CITY COUNCIL, DATE: SEPTEMBER 23, 2019                         |
|           |      | PREPARED BY ENGINEERING DIVISION DEPARTMENT OF PUBLIC SERVICES |

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

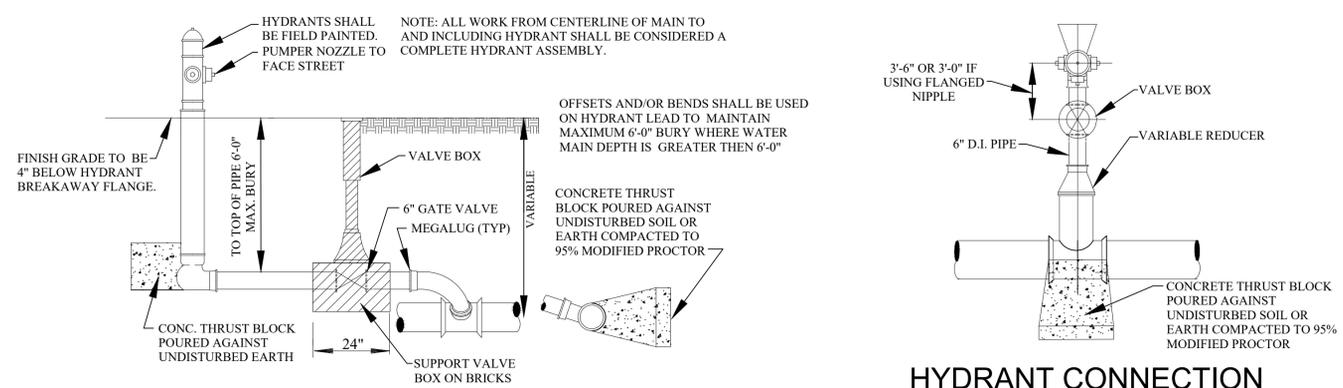
**City of Rochester Hills**  
1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

**WATER MAIN STANDARD DETAILS**

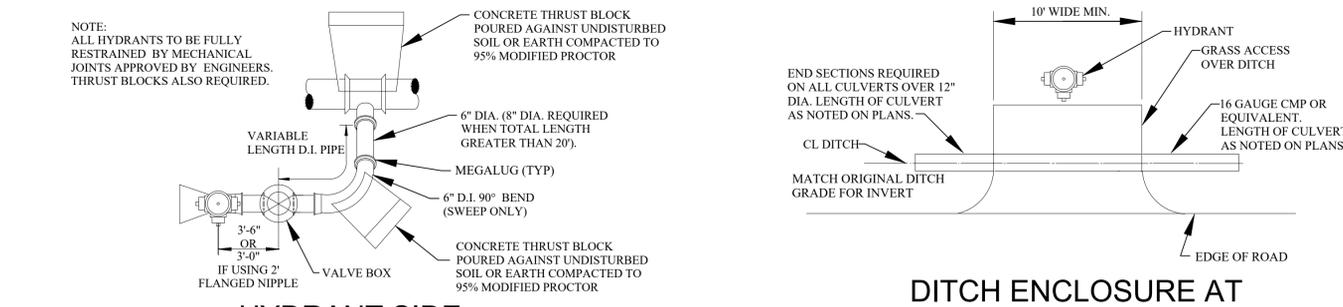
NOT TO SCALE DATE: 1/10/2018  
SHEET 1 OF 2



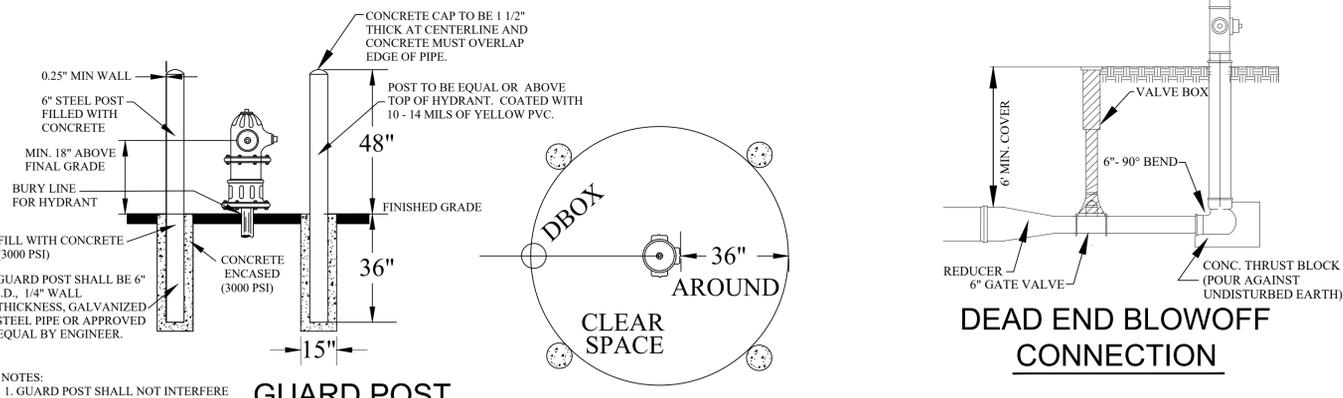
**MINIMUM BACKFILL UNDER OR WITHIN PAVEMENT INFLUENCE**



**HYDRANT CONNECTION (TYPICAL)**



**HYDRANT SIDE OUTLET OPTION**



**HYDRANT & BLOWOFF DETAILS**

NOTES:  
1. GUARD POST SHALL NOT INTERFERE WITH HYDRANT OPERATION.  
2. TO BE INSTALLED IN ALL PAVED AREAS WHERE VEHICLE EQUIPMENT DAMAGE TO HYDRANT IS POSSIBLE.

**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 WATER RESOURCE 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.

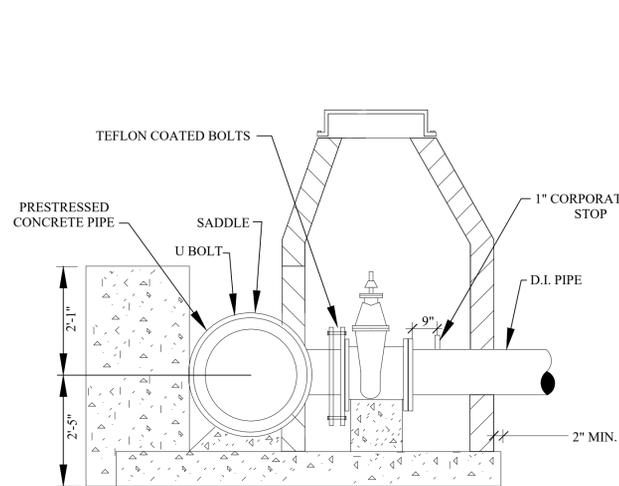


|           |      |  |   |
|-----------|------|--|---|
| REVISIONS | DATE | APPROVED BY<br>CITY COUNCIL, DATE: SEPTEMBER 23, 2019          | NOTIFY ROCHESTER HILLS ENGINEERING DIVISION @ 248-841-2510 48 HRS. PRIOR TO START OF CONSTRUCTION |
|           |      | PREPARED BY ENGINEERING DIVISION DEPARTMENT OF PUBLIC SERVICES |   |

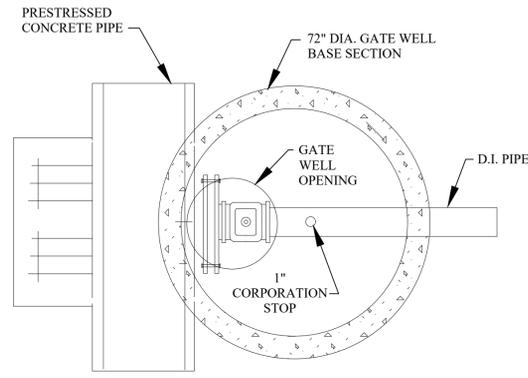
**City of Rochester Hills**  
1000 Rochester Hills Drive, Rochester Hills, Michigan 48309

**WATER MAIN STANDARD DETAILS**

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

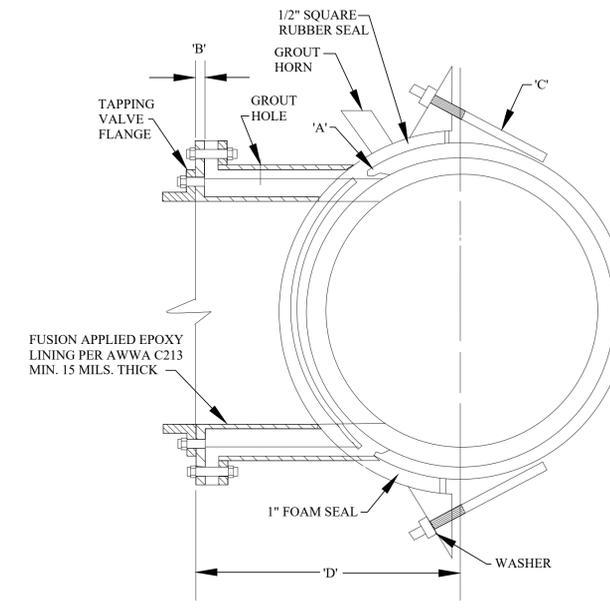
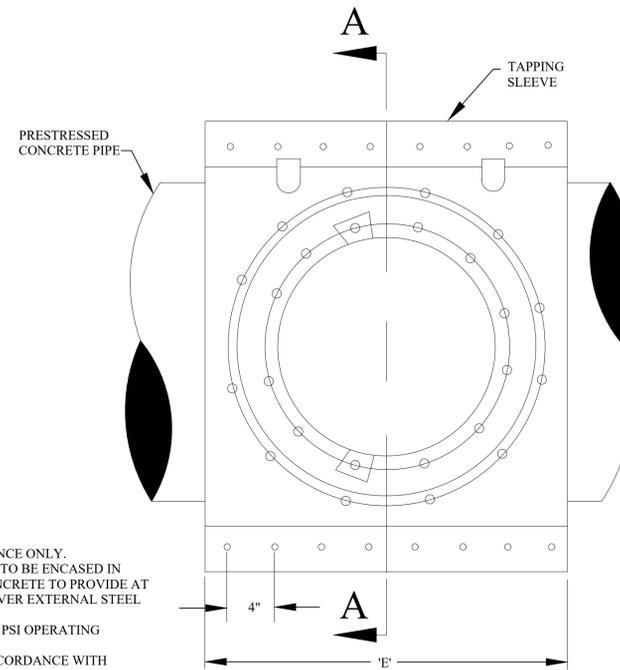


**CONCRETE PRESSURE TAP VALVE & WELL ASSEMBLY W/ CONCRETE ENCASEMENT**



- 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.

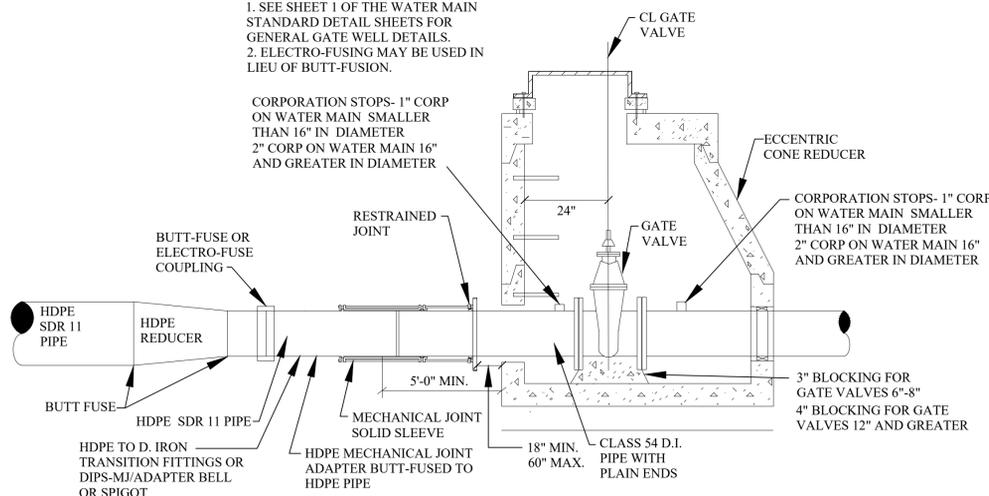
**CONCRETE TAPPING SLEEVE DETAILS**



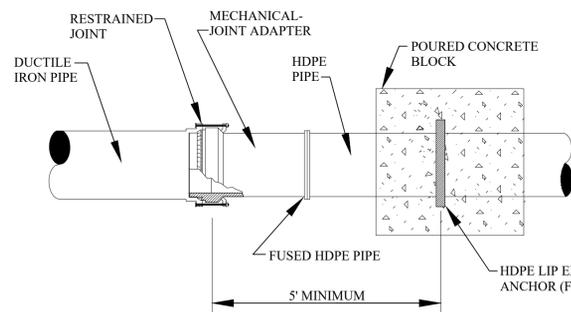
**SECTION A-A**

| 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" |

- 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.

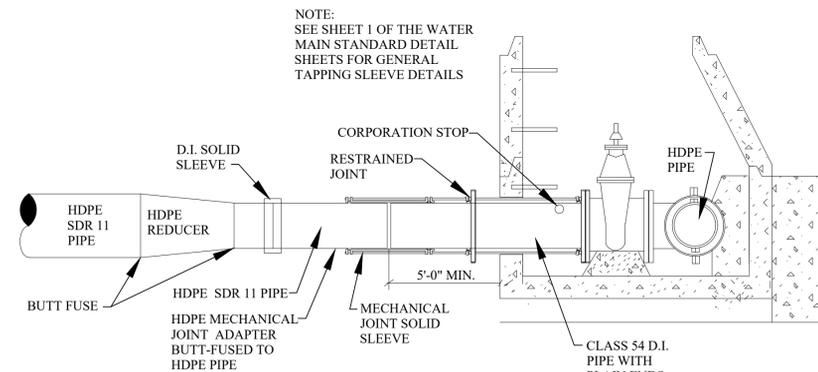


**TYPICAL GATE VALVE CONNECTION TO HDPE**



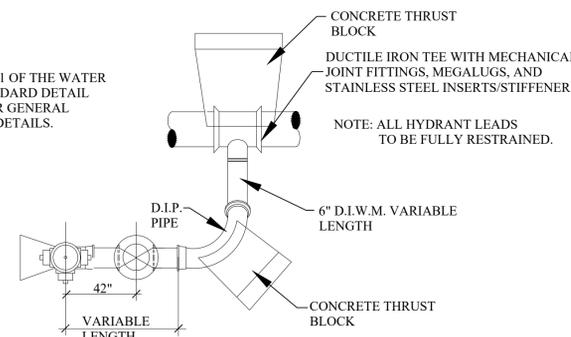
**MECHANICAL-JOINT ADAPTER**

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



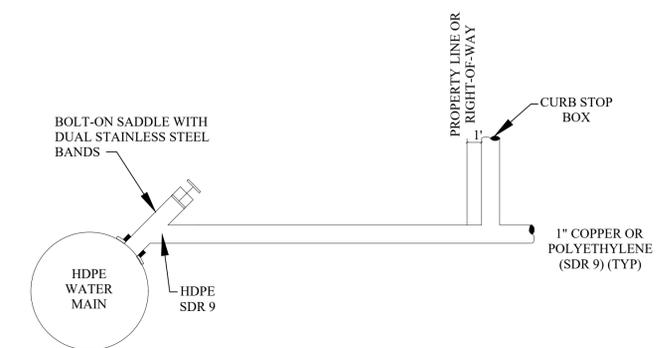
**TAPPING SLEEVE, VALVE & WELL**

- 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.



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

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



| REVISIONS | DATE | APPROVED BY  |
|-----------|------|--|
|           |      | CITY COUNCIL, DATE: SEPTEMBER 23, 2019                         |
|           |      | 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 SPECIAL DETAILS**

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