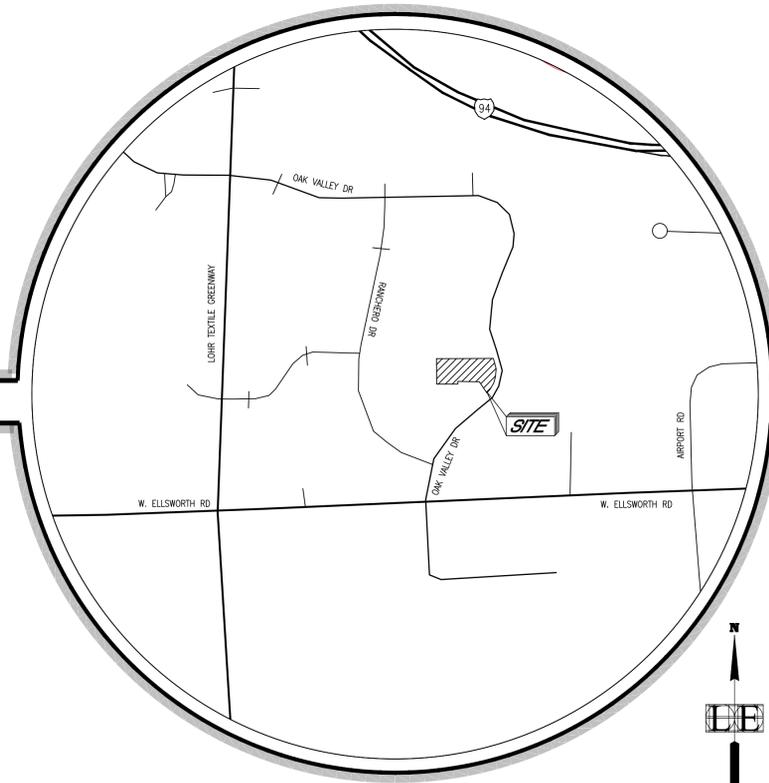


FINAL SITE/CONSTRUCTION PLANS FOR VALLEY RANCH - LOT 14

PARCEL ID# 12-08-310-014
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN



LOCATION MAP
NOT TO SCALE

LEGAL DESCRIPTION

Situated in the Township of Pittsfield, County of Washtenaw, State of Michigan.

Unit 14, Valley Ranch Business Condominiums, according to the Master Deed recorded in Liber 2719, Pages 567 through 577, inclusive, Washtenaw County Records, and any amendments thereto and designated as Washtenaw County Condominium Subdivision Plan No. 159, together with rights in general common elements and limited common elements as set forth in the above Master Deed and as described in Act 59 of the Public Acts of 1978.

Property Address:
Sidwell No.: 12-08-310-014

PARKING CALCULATIONS

REQUIRED PARKING PER ORDINANCE

BUSINESS AND PROFESSIONAL OFFICES:
18,050 S.F. @ 1 SP. PER 300 S.F. = 18,050/300 = 61 SPACES
ADA REQUIRED SPACES FOR 51 TO 75 TOTAL SPACES = 3 BARRIER FREE SPACES

PROVIDED PARKING

TOTAL SPACES PROPOSED: = 61 SPACES
INCL/ 3 BARRIER FREE SPACES

REQUIRED BICYCLE PARKING

PARKING LOTS WITH 10 OR MORE SPACES = 2 SPACES MINIMUM

PROVIDED BICYCLE PARKING

TOTAL SPACES PROPOSED: = 2 SPACES

REQUIRED LOADING SPACES

COMMERCIAL USE (18,050 SF)
1 SPACE FOR 5,001 TO 60,000 SF = 1 SPACE

PROVIDED LOADING SPACES

TOTAL LOADING SPACES PROPOSED: = 0 SPACES

BUILDING IS PLANNED AS OFFICE SPACE FOR UP TO A MAXIMUM OF THREE TENANTS. ALTHOUGH SPECIFIC TENANT INFORMATION IS NOT CURRENTLY KNOWN, LOADING SPACES ARE NOT NECESSARY FOR THE TYPICAL OFFICE SPACE USE THAT IS EXPECTED.

CSPA 18-02
VALLEY RANCH LOT 14

RECEIVED 2018-07-03

PERMITS & APPROVALS

| AGENCY | REQUIRED | STATUS |
|---|--------------------------------|----------------------|
| PITTSFIELD TOWNSHIP | PRELIMINARY SITE PLAN APPROVAL | APPROVED (5/3/2018) |
| PITTSFIELD TOWNSHIP | FINAL SITE PLAN APPROVAL | |
| PITTSFIELD TOWNSHIP | ENGINEERING PLAN APPROVAL | |
| PITTSFIELD TOWNSHIP FIRE DEPARTMENT | APPROVAL | PENDING |
| WASHTENAW COUNTY WATER RESOURCES COMMISSIONER | DRAINAGE REVIEW | APPROVED (5/4/2018) |
| WASHTENAW COUNTY ROAD COMMISSION | PERMIT | RECEIVED (6/26/2018) |

SHEET INDEX

| | |
|--------|--|
| 1 | COVER SHEET |
| 2 | EXISTING CONDITIONS & REMOVALS |
| 3 | OVERALL LAYOUT & UTILITY PLAN |
| 4 | STORM & SANITARY PLAN & PROFILE |
| 5 | WATERMAIN PLAN & PROFILE |
| 6 | GRADING & SESC PLAN |
| 7 | STORM WATER MANAGEMENT PLAN |
| 8 | DETAILS |
| 9 | FIRE PROTECTION PLAN |
| 10-L1 | LANDSCAPE PLAN |
| 11-L2 | LANDSCAPE DETAILS |
| 12-P1 | PHOTOMETRIC PLAN |
| 13-A1 | SCHEMATIC FLOOR PLAN |
| 14-A2 | SCHEMATIC ROOF PLAN |
| 15-A3 | SCHEMATIC ELEVATIONS |
| 16-SD1 | PITTSFIELD TOWNSHIP STANDARD DETAILS |
| 17-SD2 | STORM SEWER DETAILS AND SPECIFICATIONS |
| 18-SD3 | SANITARY SEWER DETAILS |
| 19-SD4 | SANITARY SEWER SPECIFICATIONS |
| 20-SD5 | WATER MAIN DETAILS |
| 21-SD6 | WATER MAIN SPECIFICATIONS |
| 22-SD7 | SOIL EROSION DETAILS AND NOTES |
| | EARTHWORK SPECIFICATIONS |

LEGEND

| | EXISTING | PROPOSED |
|------------------------|-------------|-------------|
| SPOT GRADE | < 000.00 | > 000.00 |
| CONTOUR | --- 000 --- | --- 000 --- |
| SANITARY SEWER | --- SAN --- | --- SAN --- |
| STORM SEWER | --- ST --- | --- ST --- |
| WATER | --- W --- | --- W --- |
| OVERHEAD | --- X --- | --- X --- |
| GAS | --- GAS --- | --- GAS --- |
| ELECTRIC | --- E --- | --- E --- |
| DRAINAGE AREA BOUNDARY | --- | --- |
| LIMITS OF DISTURBANCE | --- | --- |
| SILT FENCE | --- | --- |
| SIGN | --- | --- |
| LIGHT POLE | --- | --- |
| UTILITY POLE | --- | --- |
| DECIDUOUS TREE | --- | --- |
| GATE VALVE IN WELL | --- | --- |

OWNER

OAK VALLEY LOT 14, LLC
1182 OAK VALLEY DRIVE
ANN ARBOR, MI 48108

ARCHITECT

PUCCI + VOLLMAR ARCHITECTS, PC
508 E. GRAND RIVER AVE. SUITE 100B
BRIGHTON, MI 48116
PHONE: (810) 225-2930

DEVELOPER

RAND CONSTRUCTION
1270 RICKETT RD
BRIGHTON, MI 48116
PHONE: (810) 227-7011



ENGINEER

LE LIVINGSTON ENGINEERING
CIVIL ENGINEERING SURVEYING PLANNING
3300 S. OLD U.S.23, BRIGHTON, MI 48114
PHONE: (810) 225-7100 FAX: (810) 225-7699
<http://www.livingstoneg.com>

VALLEY RANCH - LOT 14
C.S.P.A #18-02
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN
FINAL SITE/CONSTRUCTION PLANS

ENGINEER'S SEAL

| REVISIONS | DATE | PROJECT No. |
|--------------------|-----------|--------------------|
| REV PER ENG REVIEW | 6/27/2018 | 17192 |
| | | SHEET 1 OF 22 |
| | | DATE: MAY 14, 2018 |

SITE DATA TABLE

| | REQUIRED | PROVIDED |
|---------------------------|----------------|-------------------------------|
| LOT AREA (GROSS) | 1.00 AC. (min) | 2.64 AC. (115,217 SF) |
| LOT AREA (NET) | | 2.64 AC. (115,217 SF) |
| LOT WIDTH | 150 FT (min) | 220 FT |
| LOT COVERAGE | 40% MAX | 18,050 SF/115,217 SF = 15.7% |
| IMPERVIOUS SURFACE AREA | | 50,493 SF |
| % IMPERVIOUS SURFACE AREA | | 50,493 SF/ 115,217 SF = 43.8% |

| BUILDING SETBACKS: | REQUIRED | PROVIDED |
|--------------------|----------|-----------|
| FRONT | 35 FT | 56.21 FT |
| SIDE | | |
| (NORTH) | 20 FT | 37.72 FT |
| (SOUTH) | 20 FT | 79.57 FT |
| REAR | 25 FT | 238.97 FT |

| BUILDING DATA: | REQUIRED | PROVIDED |
|-------------------------|-----------|------------------------------|
| TOTAL BUILDING ENVELOPE | 1 | 18,050 SF |
| FLOORS | 3 MAX | 1 |
| BUILDING HEIGHT | 45 FT MAX | 21.75 FT |
| FLOOR AREA RATIO | | 18,050 SF/115,217 SF = 15.7% |

| PARKING SETBACKS: | REQUIRED | PROVIDED |
|-------------------|----------|----------|
| SIDE & REAR | 5 FT | 5 FT |

ADJACENT PROPERTY TABLE

| Direction | Zoning | Use |
|-----------|--------|--------|
| North | PUD | Office |
| South | PUD | Office |
| East | PUD | Office |
| West | PUD | Office |

SITE DATA & GENERAL NOTES

- Property is zoned: PUD - Planned Unit Development
- Contractor is responsible for protecting all existing and proposed utilities from damage during all stages of construction.
- The engineer and applicable agency must approve, prior to construction, any alteration, or variance from these plans.
- Property to be serviced by connection to public sanitary and water.
- Underground dry utilities shall be extended from existing locations to service this site as required by utility companies.
- All construction shall be performed in accordance with the current standards and specifications of Pittsfield Township and Washtenaw County.
- Three working days prior to any excavation, the Contractor shall telephone MISS DIG (800-482-7171) for the location of underground utilities and shall also notify representatives of other utilities located in the vicinity of the work. It shall be the Contractor's responsibility to verify and/or obtain any information necessary regarding the presence of underground utilities which might affect this job.
- Site plan use: OFFICE
- Site storm drainage to outlet to existing regional detention pond.
- Site circulation is not designed to provide access for large semi-truck circulation, which will not be necessary for the proposed office space use.
- Outdoor light fixtures will be controlled with a lighting level controller, and will be turned off or reduced in lighting intensity between 11:00 pm and sunrise.

UTILITY DISCLAIMER

811 Know what's below. Call before you dig.
Utilities as shown indicate approximate location of facilities only, as described by the various companies and no guarantee is given either as to the completeness or accuracy thereof. Contractor shall call "MISS DIG" 1-800-482-7171 prior to the start of construction. Electric, gas, phone and television companies should be contacted prior to the commencement of field activities.



Know what's below.
Call before you dig.

EXISTING CONDITIONS & REMOVALS

© 2018
LIVINGSTON ENGINEERING
CIVIL ENGINEERING SURVEYING
3300 S. OLD US. HIGHWAY, MI 48114
PHONE: (810) 225-7100
FAX: (810) 225-7699

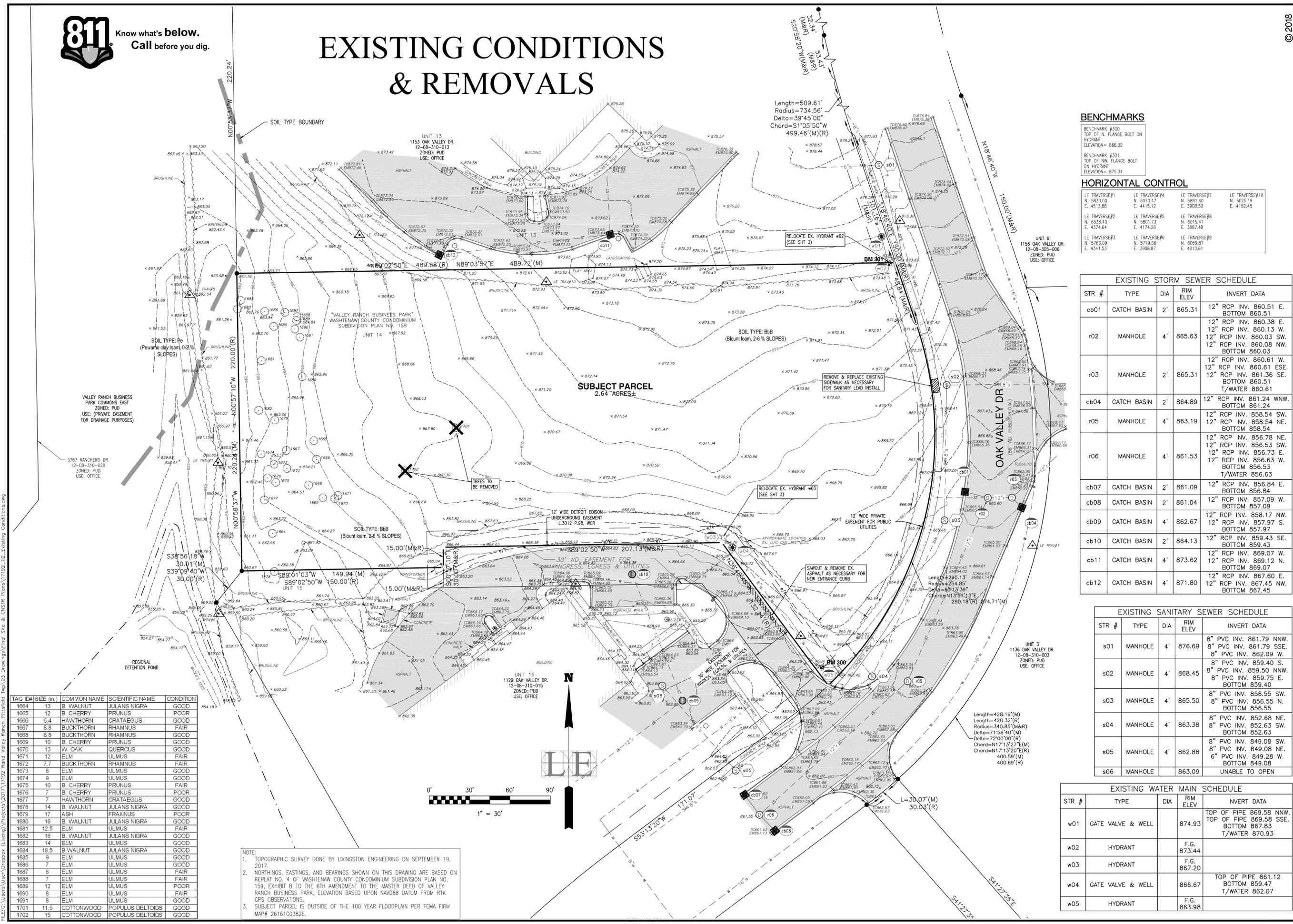


Client
RAND
CONSTRUCTION

Valley Ranch - Lot 14
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MI
FINAL SITE/CONSTRUCTION PLANS
EXISTING CONDITIONS & REMOVALS

| DATE | REVISIONS |
|---------------------------------------|--------------------|
| 6/27/2018 <td>REV PER ENG REVIEW</td> | REV PER ENG REVIEW |

Drawn: MJB
Checked:
Approved:
Date: 5/14/2018



BENCHMARKS

BENCHMARK #300
TOP OF N. FLANGE BOLT ON
HYDRANT
ELEVATION= 866.32
BENCHMARK #301
TOP OF NW. FLANGE BOLT
ON HYDRANT
ELEVATION= 875.34

HORIZONTAL CONTROL

| LE TRAVERSE#1 | LE TRAVERSE#4 | LE TRAVERSE#7 | LE TRAVERSE#10 |
|---------------|---------------|---------------|----------------|
| N. 5830.00 | N. 6070.47 | N. 5891.40 | N. 6025.19 |
| E. 4513.88 | E. 4415.12 | E. 3908.50 | E. 4152.48 |
| LE TRAVERSE#2 | LE TRAVERSE#5 | LE TRAVERSE#8 | LE TRAVERSE#9 |
| N. 6538.40 | N. 5801.73 | N. 6015.41 | N. 6015.41 |
| E. 4374.64 | E. 4174.28 | E. 3887.48 | E. 3887.48 |
| LE TRAVERSE#3 | LE TRAVERSE#6 | LE TRAVERSE#9 | LE TRAVERSE#9 |
| N. 5783.09 | N. 5719.66 | N. 6059.81 | N. 6059.81 |
| E. 4341.53 | E. 3908.87 | E. 4013.61 | E. 4013.61 |

EXISTING STORM SEWER SCHEDULE

| STR # | TYPE | DIA | RIM ELEV | INVERT DATA |
|-------|-------------|-----|----------|--|
| cb01 | CATCH BASIN | 2' | 865.31 | 12" RCP INV. 860.51 E. BOTTOM 860.51 |
| r02 | MANHOLE | 4' | 865.63 | 12" RCP INV. 860.38 E. 12" RCP INV. 860.13 W. 12" RCP INV. 860.03 SW. 12" RCP INV. 860.08 NW. BOTTOM 860.03 |
| r03 | MANHOLE | 2' | 865.31 | 12" RCP INV. 860.61 W. 12" RCP INV. 860.61 ESE. 12" RCP INV. 861.36 SE. BOTTOM 860.51 T/WATER 860.61 |
| cb04 | CATCH BASIN | 2' | 864.89 | 12" RCP INV. 861.24 WNW. BOTTOM 861.24 |
| r05 | MANHOLE | 4' | 863.19 | 12" RCP INV. 858.54 SW. 12" RCP INV. 858.54 NE. BOTTOM 858.54 |
| r06 | MANHOLE | 4' | 861.53 | 12" RCP INV. 856.78 NE. 12" RCP INV. 856.53 SW. 12" RCP INV. 856.73 E. 12" RCP INV. 856.63 W. BOTTOM 856.53 T/WATER 856.63 |
| cb07 | CATCH BASIN | 2' | 861.09 | 12" RCP INV. 856.84 E. BOTTOM 856.84 |
| cb08 | CATCH BASIN | 2' | 861.04 | 12" RCP INV. 857.09 W. BOTTOM 857.09 |
| cb09 | CATCH BASIN | 4' | 862.67 | 12" RCP INV. 858.17 NW. 12" RCP INV. 857.97 S. BOTTOM 857.97 |
| cb10 | CATCH BASIN | 2' | 864.13 | 12" RCP INV. 859.43 SE. BOTTOM 859.43 |
| cb11 | CATCH BASIN | 4' | 873.62 | 12" RCP INV. 869.07 W. 12" RCP INV. 869.12 N. BOTTOM 869.07 |
| cb12 | CATCH BASIN | 4' | 871.80 | 12" RCP INV. 867.60 E. 12" RCP INV. 867.45 NW. BOTTOM 867.45 |

EXISTING SANITARY SEWER SCHEDULE

| STR # | TYPE | DIA | RIM ELEV | INVERT DATA |
|-------|---------|-----|----------|---|
| s01 | MANHOLE | 4' | 876.69 | 8" PVC INV. 861.79 N. 8" PVC INV. 861.79 S. 8" PVC INV. 862.09 W. |
| s02 | MANHOLE | 4' | 868.45 | 8" PVC INV. 859.40 S. 8" PVC INV. 859.50 N. 8" PVC INV. 859.75 E. 8" PVC INV. 859.40 W. BOTTOM 859.40 |
| s03 | MANHOLE | 4' | 865.50 | 8" PVC INV. 856.55 SW. 8" PVC INV. 856.55 N. BOTTOM 856.55 |
| s04 | MANHOLE | 4' | 863.38 | 8" PVC INV. 852.68 NE. 8" PVC INV. 852.63 SW. BOTTOM 852.63 |
| s05 | MANHOLE | 4' | 862.88 | 8" PVC INV. 849.08 SW. 8" PVC INV. 849.08 NE. 6" PVC INV. 849.28 W. BOTTOM 849.08 |
| s06 | MANHOLE | 4' | 863.09 | UNABLE TO OPEN |

EXISTING WATER MAIN SCHEDULE

| STR # | TYPE | DIA | RIM ELEV | INVERT DATA |
|-------|-------------------|-----|-------------|---|
| w01 | GATE VALVE & WELL | | 874.93 | TOP OF PIPE 869.58 N. 8" TOP OF PIPE 869.58 S. BOTTOM 867.83 T/WATER 870.93 |
| w02 | HYDRANT | | F.G. 873.44 | |
| w03 | HYDRANT | | F.G. 867.20 | |
| w04 | GATE VALVE & WELL | | 866.67 | TOP OF PIPE 861.12 BOTTOM 859.47 T/WATER 862.07 |
| w05 | HYDRANT | | F.G. 863.98 | |

| TAG ID# | SIZE (in.) | COMMON NAME | SCIENTIFIC NAME | CONDITION |
|---------|------------|-------------|------------------|-----------|
| 1664 | 13 | B. WALNUT | JULANS NIGRA | GOOD |
| 1665 | 12 | B. CHERRY | PRUNUS | POOR |
| 1666 | 8.4 | HAWTHORN | CRATAEGUS | GOOD |
| 1667 | 8.8 | BUCKTHORN | RHAMNUS | FAIR |
| 1668 | 8.8 | BUCKTHORN | RHAMNUS | GOOD |
| 1669 | 10 | B. CHERRY | PRUNUS | GOOD |
| 1670 | 13 | W. OAK | QUERCUS | GOOD |
| 1671 | 12 | ELM | ULMUS | FAIR |
| 1672 | 7.7 | BUCKTHORN | RHAMNUS | FAIR |
| 1673 | 8 | ELM | ULMUS | GOOD |
| 1674 | 9 | ELM | ULMUS | GOOD |
| 1675 | 10 | B. CHERRY | PRUNUS | FAIR |
| 1676 | 7 | B. CHERRY | PRUNUS | POOR |
| 1677 | 7 | HAWTHORN | CRATAEGUS | GOOD |
| 1678 | 14 | B. WALNUT | JULANS NIGRA | GOOD |
| 1679 | 17 | ASH | FRAXINUS | POOR |
| 1680 | 16 | B. WALNUT | JULANS NIGRA | GOOD |
| 1681 | 12.5 | ELM | ULMUS | FAIR |
| 1682 | 16 | B. WALNUT | JULANS NIGRA | GOOD |
| 1683 | 14 | ELM | ULMUS | GOOD |
| 1684 | 18.5 | B. WALNUT | JULANS NIGRA | GOOD |
| 1685 | 9 | ELM | ULMUS | GOOD |
| 1686 | 7 | ELM | ULMUS | GOOD |
| 1687 | 6 | ELM | ULMUS | FAIR |
| 1688 | 7 | ELM | ULMUS | FAIR |
| 1689 | 12 | ELM | ULMUS | POOR |
| 1690 | 8 | ELM | ULMUS | FAIR |
| 1691 | 8 | ELM | ULMUS | GOOD |
| 1701 | 11.5 | COTTONWOOD | POPULUS DELTOIDS | GOOD |
| 1702 | 15 | COTTONWOOD | POPULUS DELTOIDS | GOOD |

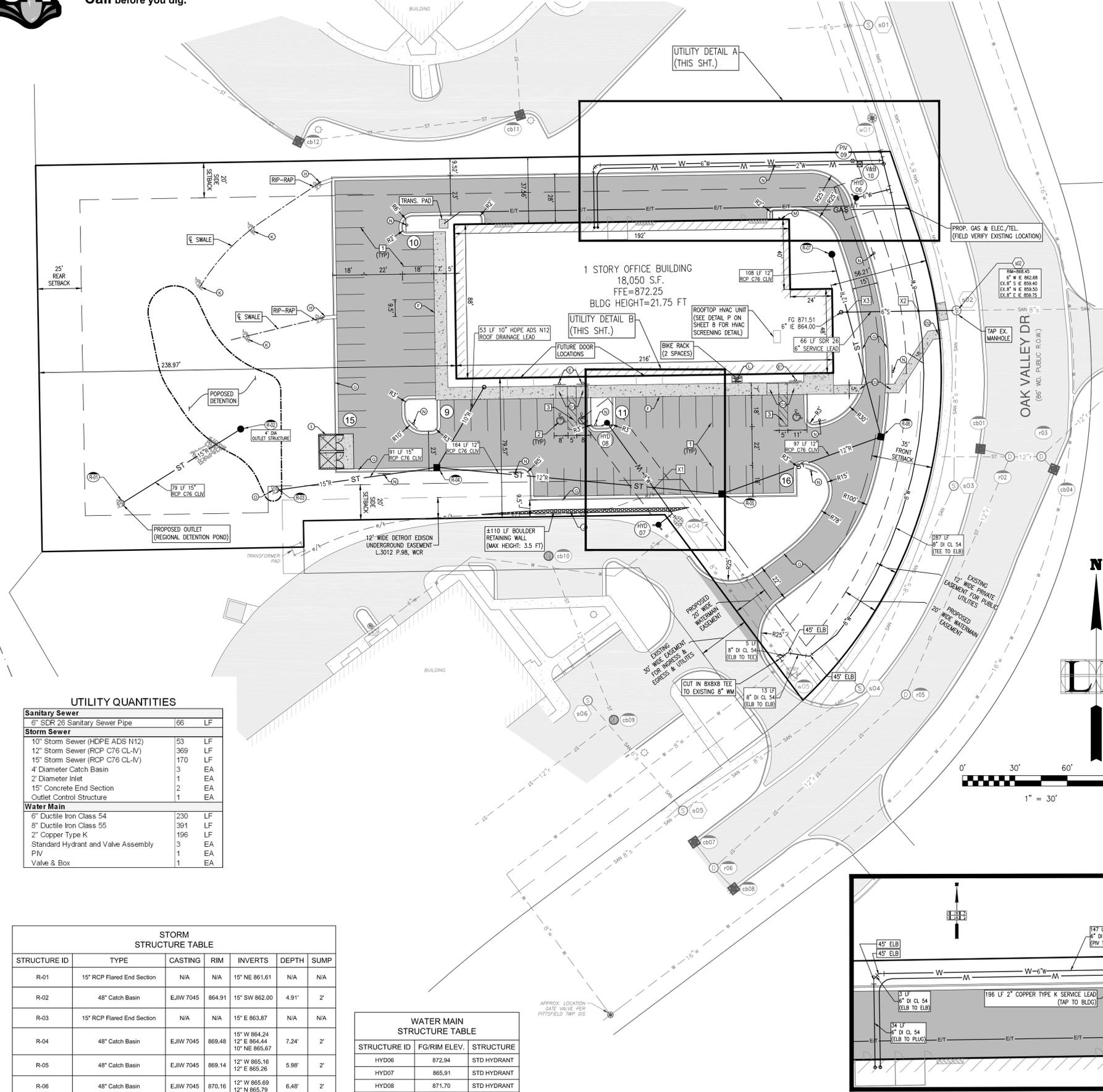
NOTE:
1. TOPOGRAPHIC SURVEY DONE BY LIVINGSTON ENGINEERING ON SEPTEMBER 19, 2017.
2. NORTHINGS, EASTINGS, AND BEARINGS SHOWN ON THIS DRAWING ARE BASED ON REPLAT NO. 4 OF WASHTENAW COUNTY CONDOMINIUM SUBDIVISION PLAN NO. 159, EXHIBIT B TO THE 6TH AMENDMENT TO THE MASTER DEED OF VALLEY RANCH BUSINESS PARK, ELEVATION BASED UPON NAVD83 DATUM FROM RTK GPS OBSERVATIONS.
3. SUBJECT PARCEL IS OUTSIDE OF THE 100 YEAR FLOODPLAIN PER FEMA FIRM MAP# 26161C0382E.

F:\C:\Users\User\Dropbox (Livingston)\Projects\2017\17192 Rand Valley Ranch Pittsfield Topo\3-Drawings\Final_Site_&_CONSTR_Plans\17192_02_Existing_Conditions.dwg



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OVERALL LAYOUT & UTILITY PLAN



UTILITY QUANTITIES

| Sanitary Sewer | | |
|-------------------------------------|-----|----|
| 6" SDR 26 Sanitary Sewer Pipe | 66 | LF |
| Storm Sewer | | |
| 10" Storm Sewer (HDPE ADS N12) | 53 | LF |
| 12" Storm Sewer (RCP C76 CL-IV) | 369 | LF |
| 15" Storm Sewer (RCP C76 CL-IV) | 170 | LF |
| 4" Diameter Catch Basin | 3 | EA |
| 2" Diameter Inlet | 1 | EA |
| 15" Concrete End Section | 2 | EA |
| Outlet Control Structure | 1 | EA |
| Water Main | | |
| 6" Ductile Iron Class 54 | 230 | LF |
| 8" Ductile Iron Class 55 | 391 | LF |
| 2" Copper Type K | 196 | LF |
| Standard Hydrant and Valve Assembly | 3 | EA |
| P/V | 1 | EA |
| Valve & Box | 1 | EA |

STORM STRUCTURE TABLE

| STRUCTURE ID | TYPE | CASTING | RIM | INVERTS | DEPTH | SUMP |
|--------------|----------------------------|-----------|--------|---|-------|------|
| R-01 | 15" RCP Flared End Section | N/A | N/A | 15' NE 861.61 | N/A | N/A |
| R-02 | 48" Catch Basin | EJIW 7045 | 864.91 | 15' SW 862.00 | 4.91' | 2' |
| R-03 | 15" RCP Flared End Section | N/A | N/A | 15' E 863.87 | N/A | N/A |
| R-04 | 48" Catch Basin | EJIW 7045 | 868.48 | 15' W 864.24 12' E 864.44 10' NE 865.67 | 7.24' | 2' |
| R-05 | 48" Catch Basin | EJIW 7045 | 869.14 | 12' W 865.16 12' E 865.26 | 5.98' | 2' |
| R-06 | 48" Catch Basin | EJIW 7045 | 870.16 | 12' W 865.69 12' N 865.79 | 6.48' | 2' |
| R-07 | 24" Inlet | EJIW 6508 | 870.50 | 12' S 866.26 | 4.24' | 0' |

WATER MAIN STRUCTURE TABLE

| STRUCTURE ID | FG/RIM ELEV. | STRUCTURE |
|--------------|--------------|-------------|
| HYD06 | 872.94 | STD HYDRANT |
| HYD07 | 865.91 | STD HYDRANT |
| HYD08 | 871.70 | STD HYDRANT |
| PIV09 | 873.75 | PIV |
| V&B10 | 873.63 | VALVE & BOX |

PROPOSED PAVEMENT LEGEND:

- ASPHALT PAVEMENT
SECTION PER DETAIL A, SHEET B
- CONCRETE PAVEMENT
DUMPSTER PAD SECTION PER DETAIL B, SHEET B
SIDEWALK SECTION PER DETAIL C & F, SHEET B

KEYED PAVEMENT MARKINGS:

- 1 4" SINGLE SOLID LINE, WHITE
- 2 PAINTED INTERNATIONAL SYMBOL OF ACCESSIBILITY, BLUE ADA COMPLIANT
- 3 4" SINGLE SOLID LINES, BLUE, 45° CROSS HATCH PATTERN (2' O.C.) WITH BORDER, ADA COMPLIANT

KEYED NOTES:

- (D1) SIDEWALK RAMP - MDT TYPE P, SEE DETAIL D1 ON SHEET B
- (D2) SIDEWALK RAMP - MDT TYPE R, SEE DETAIL D2 ON SHEET B
- (E) BARRIER FREE SIGN WITH R7-B, SEE DETAIL E ON SHEET B
- (F) BARRIER FREE SIGN WITH R7-8a INCLUDED, SEE DETAIL F ON SHEET B
- (G) CURB FACE WALK AT PROPOSED PAVEMENT, AS DIRECTED BY PITTSFIELD TWP FIRE DEPT., SEE DETAIL G ON SHEET B
- (H) CONCRETE SPILLWAY, SEE DETAIL H ON SHEET B
- (I) DUMPSTER SCREENING, SEE DETAIL I ON SHEET B
- (J) BOULDER RETAINING WALL, SEE DETAIL J ON SHEET B
- (K) CHECK DAM, SEE DETAIL K ON SHEET B
- (L) HOOP STYLE BIKE RACK, SEE DETAIL L ON SHEET B
- (M) FIRE DEPARTMENT CONNECTION, AS DIRECTED BY PITTSFIELD TWP FIRE DEPT., SEE DETAIL M ON SHEET B
- (N) "FIRE LANE, NO PARKING" SIGN, AS DIRECTED BY PITTSFIELD TWP FIRE DEPT., SEE DETAIL N ON SHEET B
- (O) FLARED END SECTION-RIP RAP, SEE TWP STANDARD DETAIL

GENERAL NOTES:

- ALL UTILITY COMPANIES SHALL BE CONTACTED PRIOR TO CONSTRUCTION AND ALL UTILITIES LOCATED. ANY DISCREPANCIES OR CONFLICTS SHALL BE REPORTED TO ENGINEER FOR RESOLUTION PRIOR TO COMMENCING CONSTRUCTION.
- ALL SIDEWALK RAMP TO MEET CURRENT ADA GUIDELINES AND SPECIFICATIONS.
- ALL DIMENSIONS TO CURB ARE MEASURED FROM BACK OF CURB.
- UNDERGROUND ELECTRIC CONNECTION WILL BE PROVIDED AS DETERMINED BY UTILITY COMPANY.
- ALL STORM SEWER, WATER MAIN AND SANITARY SEWER CONSTRUCTION SHALL BE IN ACCORDANCE WITH PITTSFIELD TOWNSHIP AND WASHTENAW COUNTY STANDARDS AND SPECIFICATIONS.

STORM SEWER NOTES:

- STORM SEWER TO BE RCP C76 CL IV UNLESS OTHERWISE NOTED.
- ALL PIPE LENGTHS SHOWN ARE FROM ϕ TO ϕ OF STRUCTURE OR FROM ϕ OF STRUCTURE TO END OF FLARED END SECTION.
- ALL STORM SEWER WITHIN 1:1 SLOPE INFLUENCE OF EXISTING OR PROPOSED PAVEMENT SHALL HAVE COMPACTED SAND BACKFILL.
- MAINTAIN A MIN. OF 18" VERTICAL CLEARANCE BETWEEN ALL UTILITIES.
- ALL CATCH BASIN'S ARE 4 FT DIA. UNLESS OTHERWISE NOTED.

SANITARY SEWER NOTES:

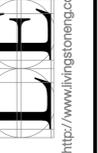
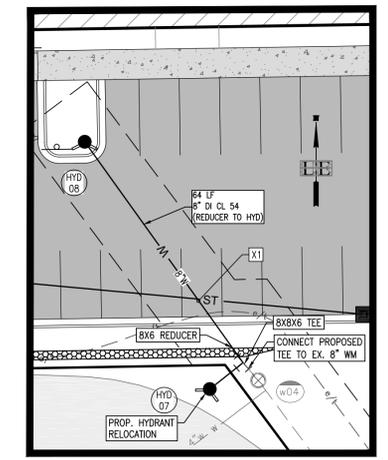
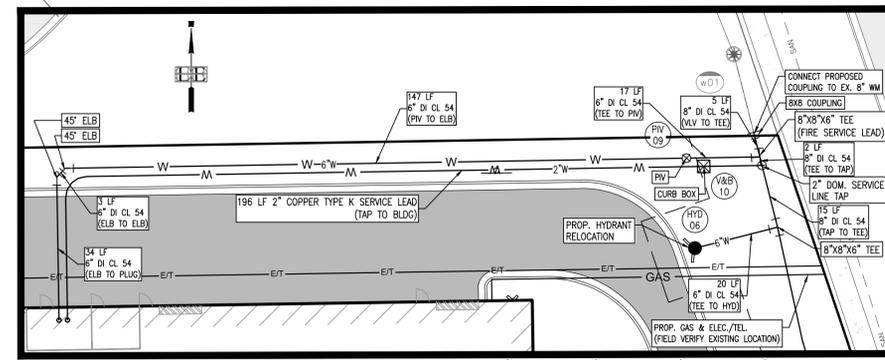
- SANITARY LEAD SHALL BE SDR 26 PVC PIPE LAID AT A MIN. 2% GRADE.
- ALL PIPE LENGTHS SHOWN ARE FROM ϕ TO ϕ OF STRUCTURE.
- ALL SEWER WITHIN 1:1 SLOPE INFLUENCE OF EXISTING OR PROPOSED PAVEMENT SHALL HAVE COMPACTED SAND BACKFILL.
- MAINTAIN A MIN. OF 18" VERTICAL CLEARANCE BETWEEN ALL UTILITIES.

WATER MAIN NOTES:

- ALL PIPE LENGTHS SHOWN ARE FROM ϕ TO ϕ OF STRUCTURE/FITTING.
- WATER MAIN SHALL BE D.I. CLASS 54 INSTALLED WITH A MIN. OF 5.5 FT OF COVER.
- WATER SERVICE LEADS SHALL BE 2" DIA. TYPE 'K' COPPER.
- MAINTAIN A MIN. OF 18" VERTICAL CLEARANCE BETWEEN ALL UTILITIES.
- ALL WATER MAIN WITHIN 1:1 SLOPE INFLUENCE OF EXISTING OR PROPOSED PAVEMENT SHALL HAVE COMPACTED SAND BACKFILL.

UTILITY CROSSING CHART

| Crossing | Bottom of Elev. | Top of Elev. | Clearance |
|----------|----------------------|----------------------|-----------|
| X1 | 12" STRM = 864.82 | 8" W/M = 862.99 | 1.83 |
| X2 | 6" SAN LEAD = 863.10 | 8" W/M = 861.60 | 1.50 |
| X3 | 12" STRM = 865.95 | 6" SAN LEAD = 864.45 | 1.50 |

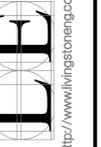




Know what's below.
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STORM & SANITARY PLAN & PROFILE

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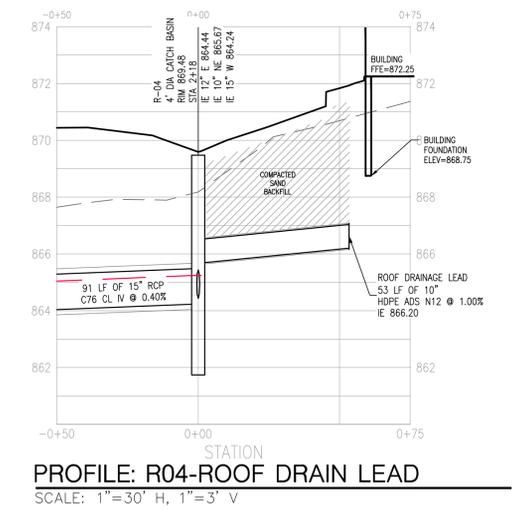
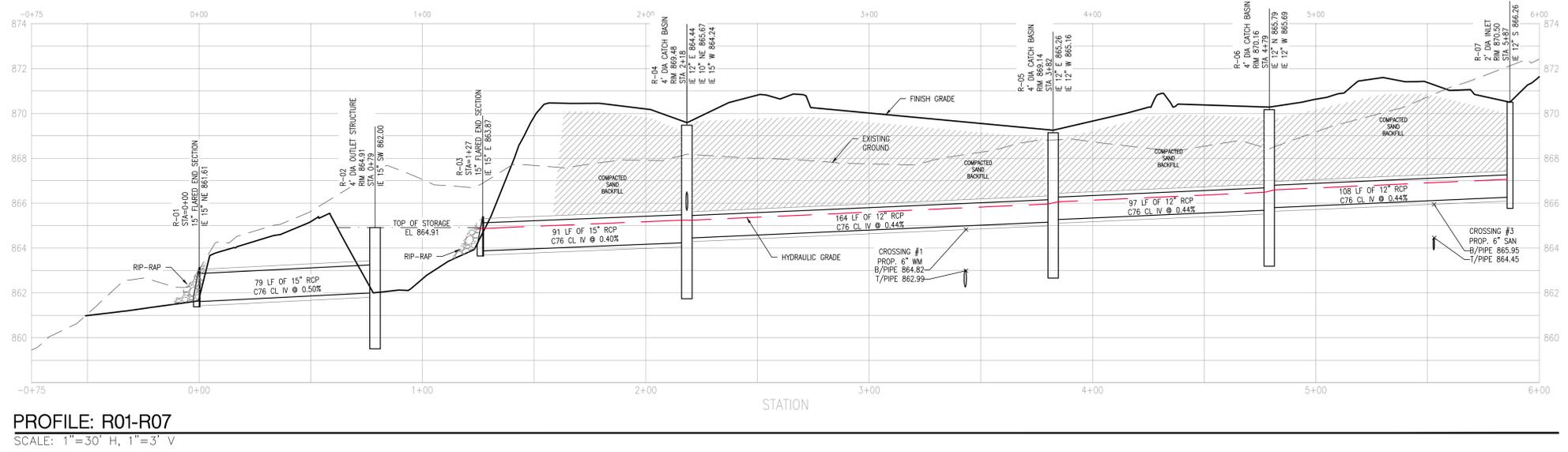
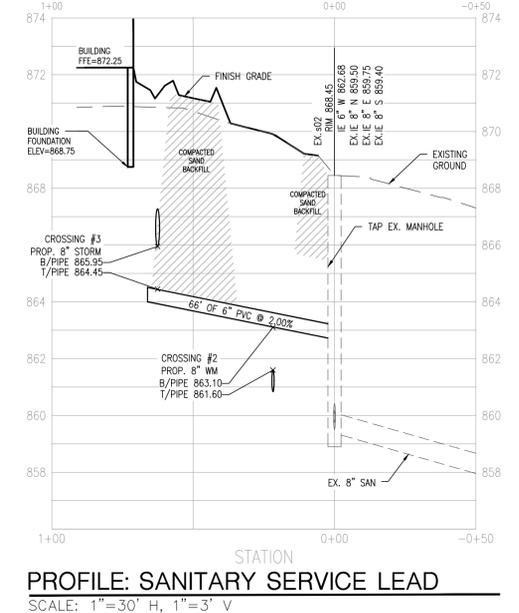
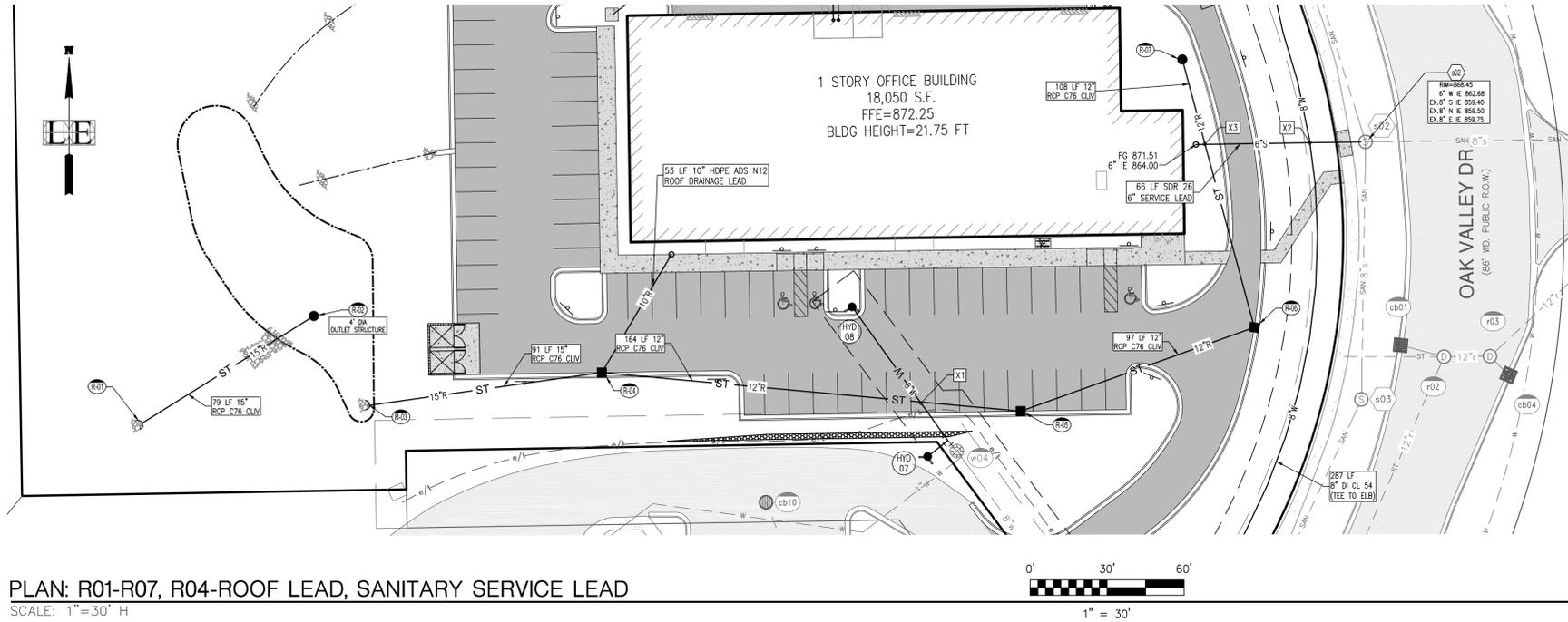


Client
VALLEY RANCH - LOT 14
PITTSFIELD TOWNSHIP, WASHTEENAW COUNTY, MI
FINAL SITE/CONSTRUCTION PLANS
STORM & SANITARY PLAN & PROFILE

| REV | DATE | DESCRIPTION |
|-----|-----------|--------------------|
| 1 | 6/27/2018 | REV PER ENG REVIEW |

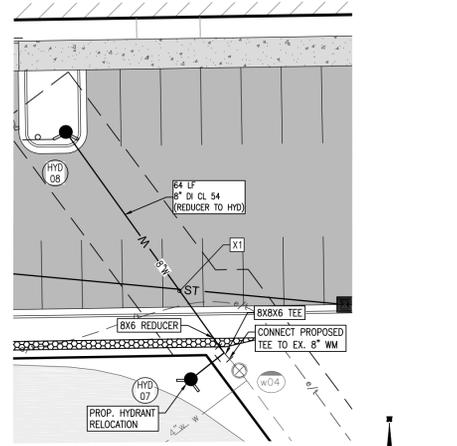
Drawn: MJB
Checked:
Approved:
Date: 5/14/2018

Job No. 17192
Scale:
Vertical: 1" = 3'
Horizontal: 1" = 30'



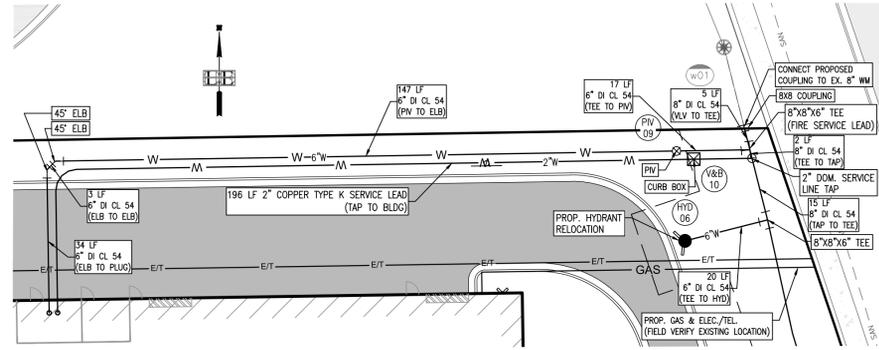
FILE:C:\Users\User\Dropbox (Living)\Projects\2017\17192 Band Valley Ranch Pittsfield Top\03 Drawings\Final Site & CONSTR Plans\17192_03-05_Layout & Utility Plan.dwg

WATERMAIN PLAN & PROFILE



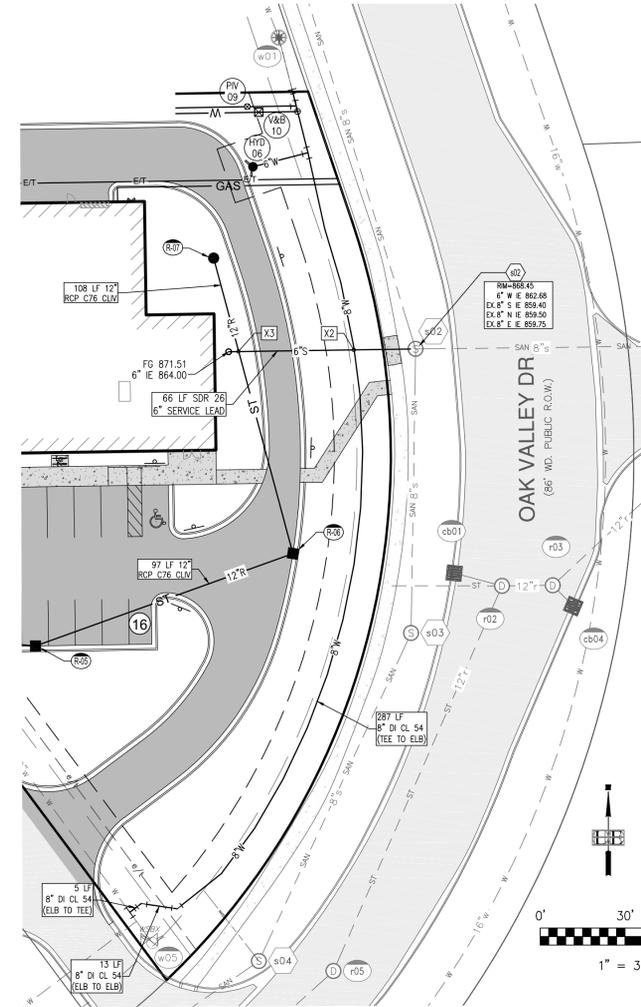
PLAN:
w04-HYD08
HYD07 LEAD

SCALE: 1" = 20' H



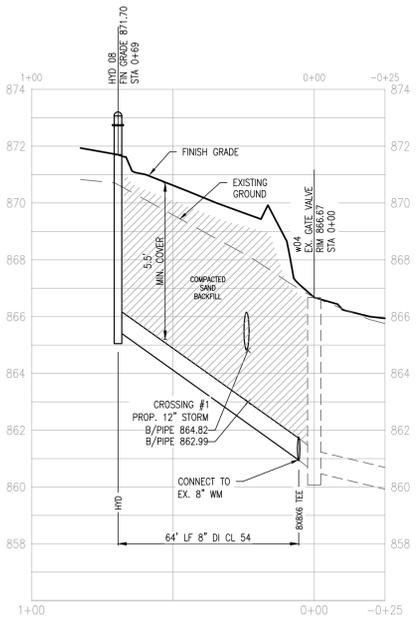
PLAN:
BUILDING FIRE SERVICE LEAD
BUILDING DOMESTIC WATER SERVICE

SCALE: 1" = 20' H



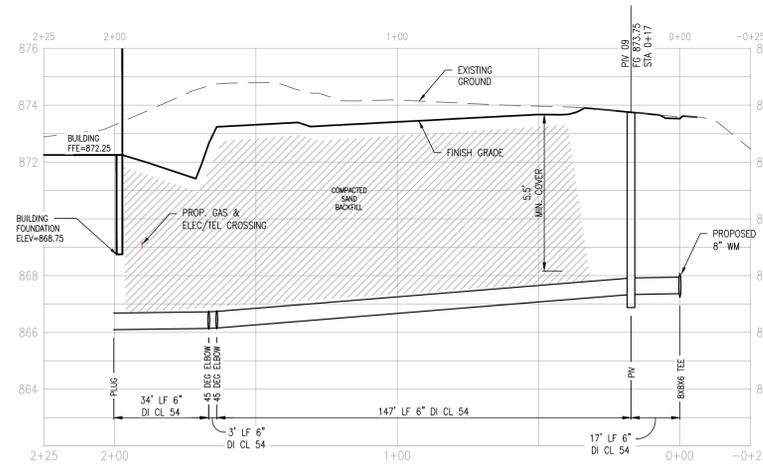
PLAN:
WATERMAIN ADJACENT TO OAK VALLEY DR.
HYD06 LEAD

SCALE: 1" = 30' H



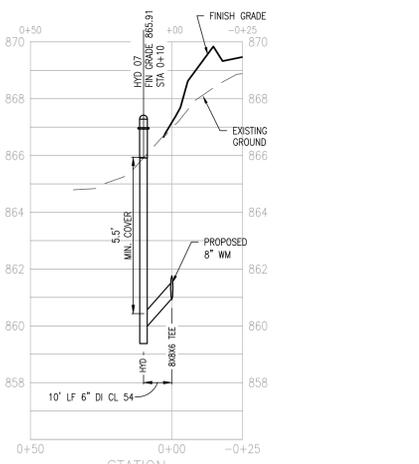
PROFILE: w04-HYD08

SCALE: 1" = 30' H, 1" = 3' V



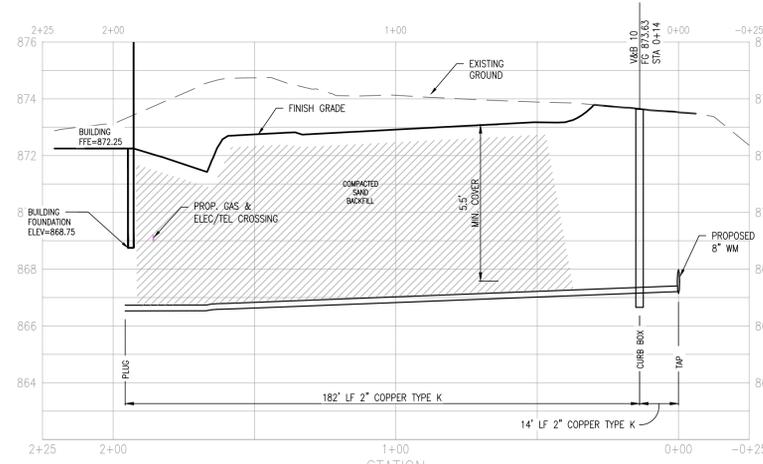
PROFILE: BUILDING FIRE SERVICE LEAD

SCALE: 1" = 30' H, 1" = 3' V



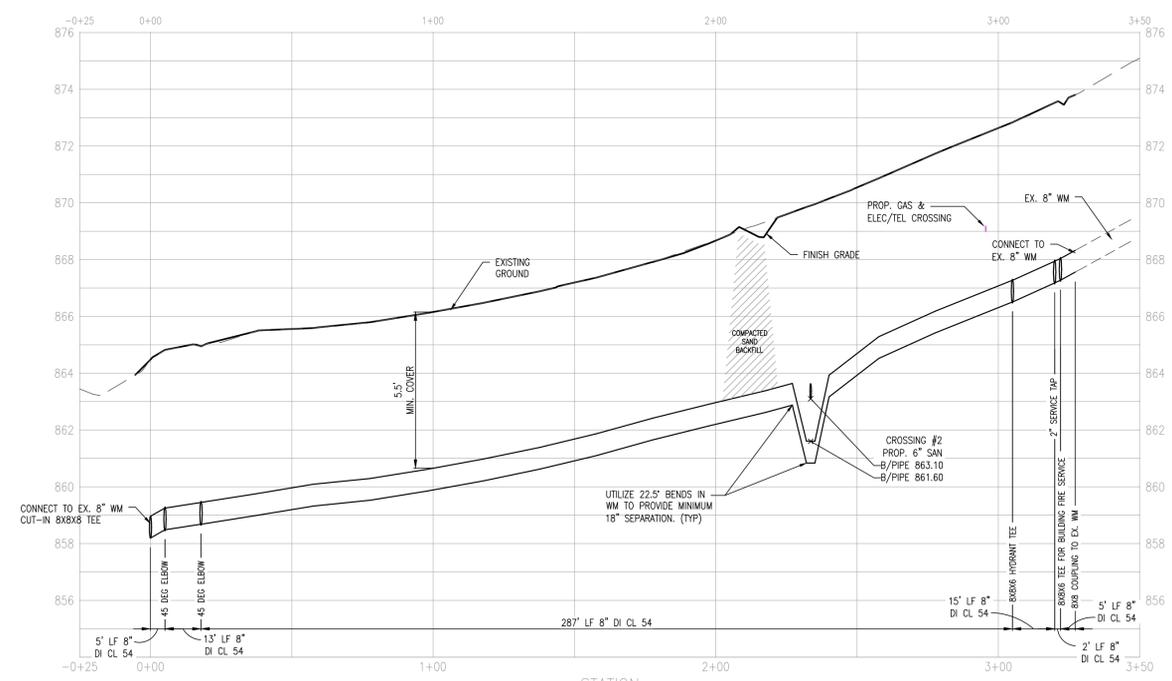
PROFILE: HYD07 LEAD

SCALE: 1" = 30' H, 1" = 3' V



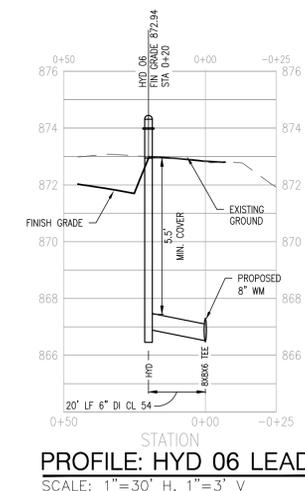
PROFILE: BUILDING DOMESTIC WATER SERVICE

SCALE: 1" = 30' H, 1" = 3' V



PROFILE: WATERMAIN ADJACENT TO OAK VALLEY DR.

SCALE: 1" = 30' H, 1" = 3' V



PROFILE: HYD 06 LEAD

SCALE: 1" = 30' H, 1" = 3' V

FILE:C:\Users\User\Dropbox (Living)\Projects\2017\17192 Band Valley Ranch Pittsfield Top\03 Drawings\Final Site & CONSTR Plans\17192_03-05_Layout & Utility Plans.dwg

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Client

RAND CONSTRUCTION

VALLEY RANCH - LOT 14

PITTSFIELD TOWNSHIP, WASHTEENAW COUNTY, MI

FINAL SITE/CONSTRUCTION PLANS

WATERMAIN PLAN & PROFILE

| DATE | REVISIONS | DRAWN | CHECKED | APPROVED | DATE |
|-----------|--------------------|-------|---------|----------|-----------|
| 6/27/2018 | REV PER ENG REVIEW | MJB | | | 5/14/2018 |

Job no. 17192

Scale: T = 3'

Vertical: VARIES

Horizontal: VARIES

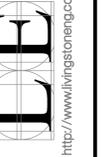
5



Know what's below.
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GRADING & SESC PLAN

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Client
RAND
CONSTRUCTION

VALLEY RANCH - LOT 14
PITTSFIELD TOWNSHIP, WASHENAW COUNTY, MI
FINAL SITE/CONSTRUCTION PLANS
GRADING & SESC PLAN

| | |
|--------------------|-------------------|
| DATE | 6/27/2018 |
| REVISIONS | |
| Drawn: MJB | Checked: |
| REV PER ENG REVIEW | Approved: |
| 17192 | Date: 5/14/2018 |
| Scale: | Vertical: T = 20' |
| Horizontal: | |

SESC NOTES:

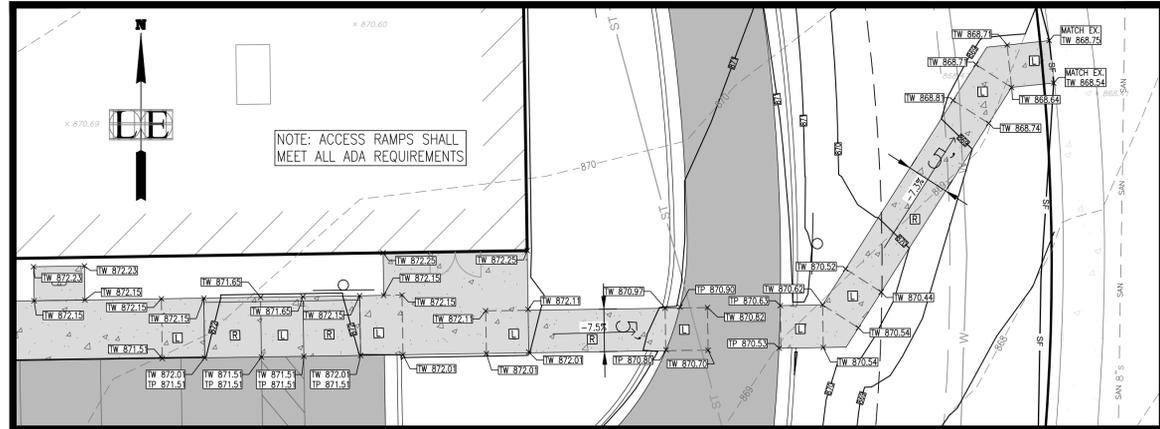
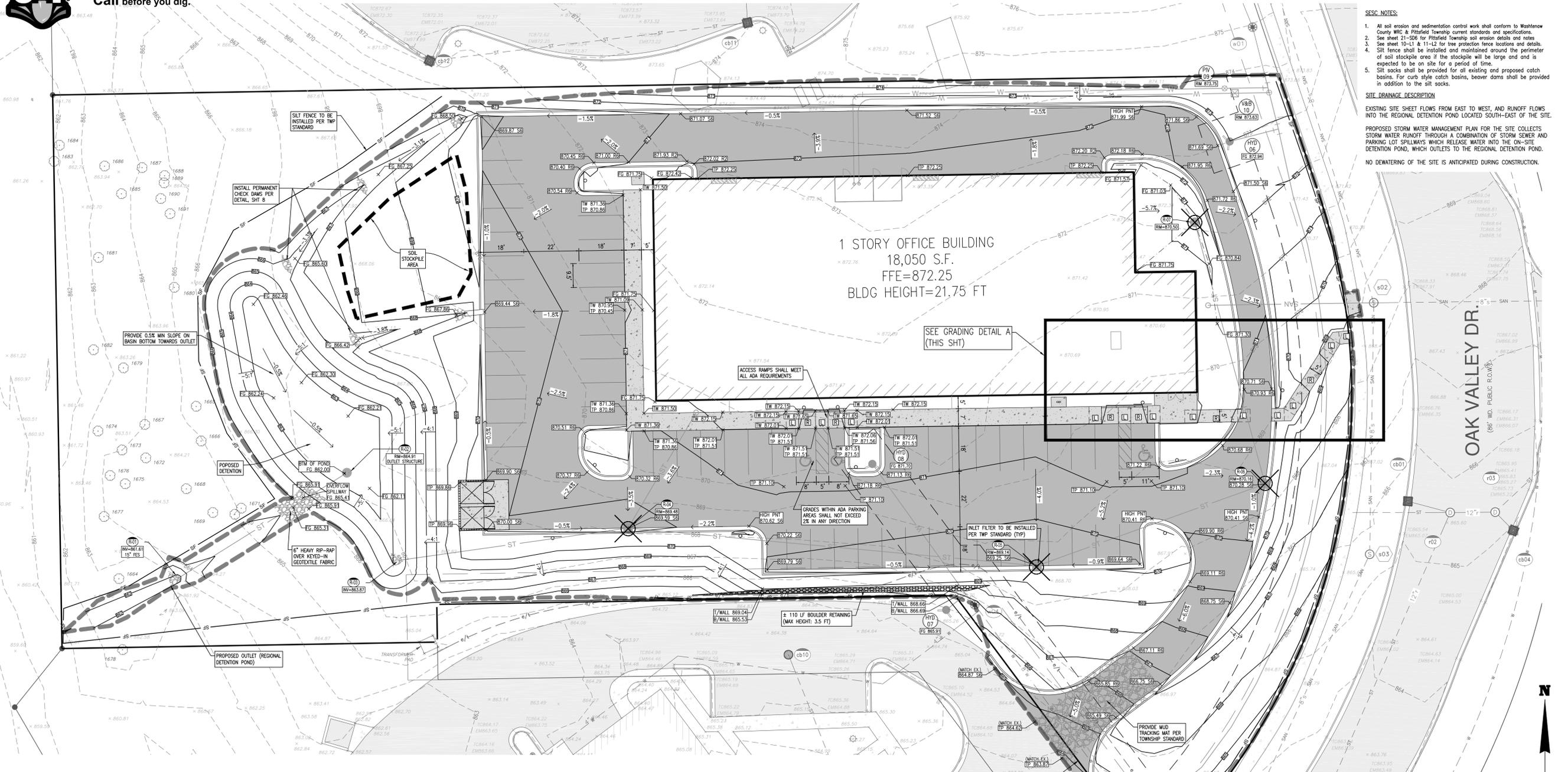
- All soil erosion and sedimentation control work shall conform to Washtenaw County WRC & Pittsfield Township current standards and specifications.
- See sheet 21-226 for Pittsfield Township soil erosion details and notes.
- See sheet 10-L1 & 11-L2 for tree protection fence locations and details.
- Silt fence shall be installed and maintained around the perimeter of soil stockpile areas if the stockpile will be large and is expected to be on site for a period of time.
- Silt sacks shall be provided for all existing and proposed catch basins. For curb style catch basins, beaver dams shall be provided in addition to the silt sacks.

SITE DRAINAGE DESCRIPTION

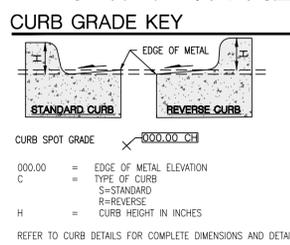
EXISTING SITE SHEET FLOWS FROM EAST TO WEST, AND RUNOFF FLOWS INTO THE REGIONAL DETENTION POND LOCATED SOUTH-EAST OF THE SITE.

PROPOSED STORM WATER MANAGEMENT PLAN FOR THE SITE COLLECTS STORM WATER RUNOFF THROUGH A COMBINATION OF STORM SEWER AND PARKING LOT SPILLWAYS WHICH RELEASE WATER INTO THE ON-SITE DETENTION POND, WHICH OUTLETS TO THE REGIONAL DETENTION POND.

NO Dewatering of the site is anticipated during construction.



- LEGEND**
- PR. SPOT GRADE
 - PR. CONTOUR
 - DRAINAGE ARROW
 - PR. SILT FENCE
 - LIMITS OF GRADING
 - LOW POINT INLET FILTER
- ADA RAMP KEYED NOTES:**
- R ADA COMPLIANT RAMP
 - L ADA COMPLIANT RAMP LANDING AREA
- SPOT GRADE ABBREVIATIONS LIST**
- TP = TOP OF PAVEMENT
 - TW = TOP OF WALK
 - IE = INVERT ELEVATION
 - FG = FINISHED GRADE
 - FF = FINISHED FLOOR
 - T/WALL = TOP OF RETAINING WALL
 - B/WALL = BOTTOM OF RETAINING WALL
 - TB = TOP OF BANK



PROPOSED CONSTRUCTION SCHEDULE:

2018

| ACTIVITY | JULY | AUG | SEPT | OCT |
|---------------------------|------|-----|------|-----|
| CLEAR & GRUB | | | | |
| MASS GRADING | | | | |
| UTILITIES & FINAL GRADING | | | | |
| PAVING | | | | |
| SEED & MULCH | | | | |

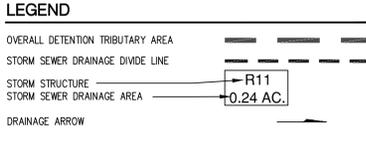
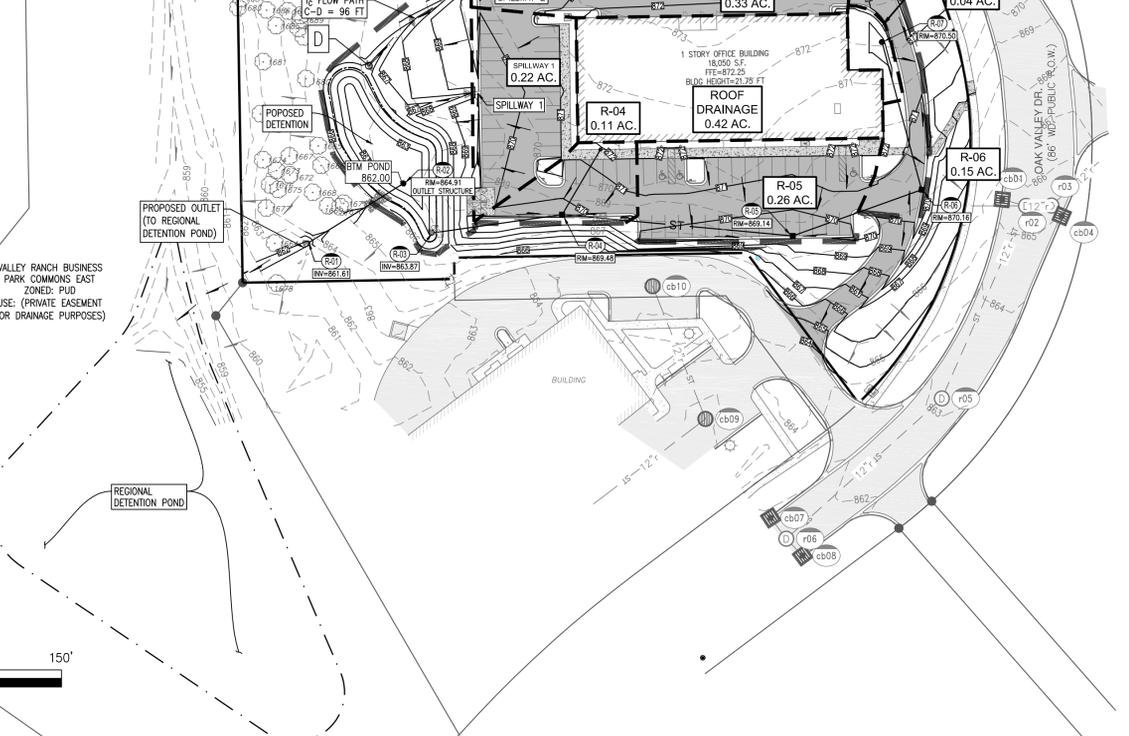
TOTAL DISTURBED AREA
93,584 S.F.
(2.15 AC.)

FILE:C:\Users\User\Dropbox (Living)\Projects\2017\17192 Band Valley Ranch Pittsfield Top\03 Drawings\Final Site & CONSTR Plans\17192_06_Grading & SESC.dwg

STORM WATER MANAGEMENT PLAN



TOTAL TRIB. AREA TO BASIN
 1.85 AC



STORM WATER NARRATIVE

The existing site is composed of grassy meadows with medium dense wooded areas on the western portion of the site. Subject parcel is part of the Valley Ranch Business Park, which has a regional detention pond sized for the post-development storm water flows from the business park. Prior to soil testing results, it was determined that on-site detention pond would be sized for the required forebay volume, as a means of water quality pre-treatment, prior to releasing to the regional detention pond.

Soil testing was performed Testing Engineers & Consultants on October 31, 2017 in the presence of a representative from the Washtenaw County Water Resources Commissioner. Due to the presence of clayey in-situ soil conditions no infiltration tests were performed, and it was determined that the site was not eligible for groundwater infiltration credit. Therefore, it was determined that on-site detention basin would be required to account for 20% of the required detention volume in addition to the forebay volume.

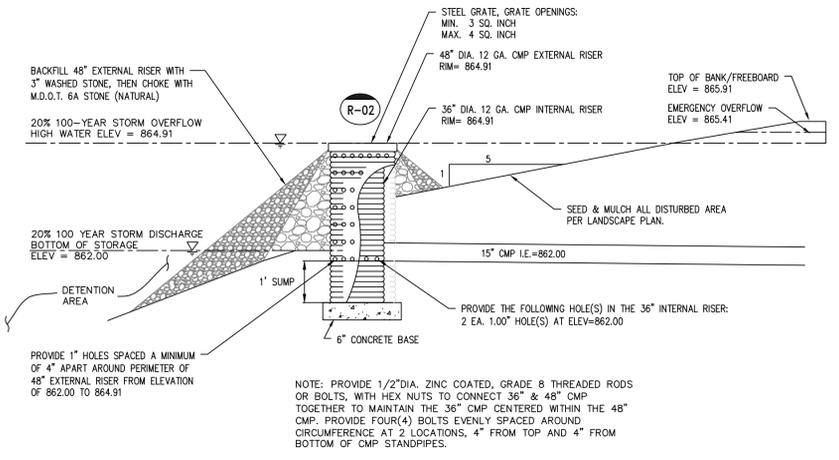
The storm water management plan for the proposed development collects storm water runoff from the site through storm sewer and parking lot spillways which release water into the on-site detention pond. Detention pond is designed with an outlet structure to store and release the required on-site volume at a pre-developed rate. During a storm event that exceeds the on-site detention volume, storm water will flow unrestricted through storm sewer which outlets at the regional detention pond.

Outlet Structure

The Detention Pond will have a 2-stage outlet. This will consist of a perforated 48" diameter external riser with a 36" diameter internal riser. The perforated external riser is backfilled with a stone filter for removal of sediment and debris. Internal riser will provide outlet holes to restrict flow and detain the required detention volume for a minimum of 24 hours. In the event that the storm event exceeds the provided volume, storm water is designed to top the stand pipe, and flow unrestricted through storm sewer which outlets at the regional storm water detention pond.

Outlet Structure Orifice Design:

- Calculate average release rate to retain the storage volume a minimum of 24 hrs.
 Vtotal = 6,769 cf
 $Q = (124 \text{ hrs}) \times (1 \text{ hr}/3600 \text{ sec}) \times 6769 \text{ CF} = 0.078 \text{ CFS}$
- Calculate maximum orifice area for 24 hour detention time at calculated average release rate.
 Orifice area at Elev. 862.00 to produce this average discharge:
 $H = 864.91 - 862.00 = 2.91 \text{ FT}$
 $H_A = (2/3 H) = 1.94 \text{ FT}$
 $\text{Area of Orifice} = Q / (0.62 \times (2 \times g \times H_A)^{0.5}) = 0.0113 \text{ SF}$
 Where:
 H = Head
 H_A = Average Head
 g = Gravitational Const (32.2 fps)
 Therefore, use **Two (2) 1.00" hole(s) at Elev. = 862.00**
- Calculate size and quantity of holes.
 No. of 1.00" hole(s) = $0.0113 / 0.0055 = 2.07$ hole(s)
Two (2) 1.00" hole(s) at Elev. = 862.00
- Calculate the proposed outlet rate for
 $Q_{100} = A \times (0.62 \times 2g \times H_A)^{0.5}$
 $Q_{100} = (2 \times 0.0055) \times (0.62 \times 2g \times 1.94)^{0.5}$
 $Q_{100} = 0.076 \text{ CFS}$
- Calculate the proposed detention time
 $T_{100} = V_{100} / Q_{100}$
 $T_{100} = 6769 / (0.076 \times 3600) = 24.9 \text{ hrs.}$



DETENTION BASIN OUTLET CONTROL STRUCTURE DETAIL

NO SCALE

W1 Determining Post-Development Cover Types, Areas, Curve No.s & Runoff Coefficients.

Total Site Area = 1.85 Acres
 Total Site Area Excluding "Self-Crediting" BMPs = 1.85 Acres

| Cover Type | Soil Type | Area (sf) | Area (ac) | Runoff Coef. C | C x Area |
|---------------------|-----------|-----------|-----------|----------------|----------|
| Roof/pave | | 48,779 | 1.12 | 0.95 | 1.06 |
| grass | C | 27,233 | 0.63 | 0.3 | 0.19 |
| Detention Pond | | 4,630 | 0.11 | 1 | 0.11 |
| Total(C x Area)(ac) | | | | | 1.36 |
| Total Area(ac) | | | | | 1.85 |
| Weighted C | | | | | 0.73 |

| Pervious Cover Type | Soil Type | Area (sf) | Area (ac) | Curve No. CN | C x Area |
|----------------------|-----------|-----------|-----------|--------------|----------|
| grass | C | 27,233 | 0.63 | 74 | 46.26 |
| Total(CN x Area)(ac) | | | | | 46.26 |
| Total Area(ac) | | | | | 0.63 |
| Weighted CN | | | | | 74 |

| Impervious Cover Type | Soil Type | Area (sf) | Area (ac) | Curve No. CN | C x Area |
|-----------------------|-----------|-----------|-----------|--------------|----------|
| roof / pave | | 48,779 | 1.12 | 98 | 109.74 |
| Detention Pond | | 4,630 | 0.11 | 98 | 10.42 |
| Total(CN x Area)(ac) | | | | | 120.16 |
| Total Area(ac) | | | | | 1.23 |
| Weighted CN | | | | | 98 |

W6 Standard Method Runoff Volume Calculations

Pervious Cover Post-Development 100-year Runoff Calculations (V_{100-per-post})
 100-year/24 hour storm event P = 5.11 in
 Pervious Cover CN from W1 CN = 74
 S = (1000/CN) - 10 S = 3.51 in
 Q = (P - 0.2S) / (P + 0.8S) Q = 2.45 in
 Pervious Cover Area from W1 Area = 27,233 sf
 V_{100-per-post} = Q(1/12)(Area) V_{100-per-post} = 5,565 ft³

W8 Standard Method Runoff Volume Calculations

Determine Time of Concentration for Applicable Flow Types (T_{con})

| Flow Type | K | Change in Elevation | Length (L) | Slope % (S) | S ^{0.5} | V = K * S ^{0.5} | T = L / (V * 3600) |
|-----------------|------|---------------------|------------|-------------|------------------|--------------------------|--------------------|
| Sheet Flow | 0.48 | 6 | 95 | 6.32 | 2.51 | 1.21 | 0.02 |
| Waterway | 1.2 | | | | | | |
| Small Tributary | 2.1 | 1.27 | 253 | 0.50 | 0.71 | 1.49 | 0.05 |
| Small Tributary | 2.1 | 5 | 96 | 5.21 | 2.28 | 4.79 | 0.01 |

 Total Time of Concentration (T_{con}) = 0.07

W7 Standard Method Runoff Volume Calculations

Impervious Cover Post-Development 100-year Runoff Calculations (V_{100-imp-post})
 100-year/24 hour storm event P = 5.11 in
 Impervious Cover CN from W1 CN = 98
 S = (1000/CN) - 10 S = 0.20 in
 Q = (P - 0.2S) / (P + 0.8S) Q = 4.87 in
 Pervious Cover Area from W1 Area = 53,409 sf
 V_{100-imp-post} = Q(1/12)(Area) V_{100-imp-post} = 21,689 cf

W9 Standard Method Runoff Volume Calculations

Runoff Summary & Onsite Infiltration Requirement
 Runoff Summary From Previous Worksheets
 Pervious Cover Post-Development 100-year Volume (V_{100-per-post}) = 5,565 ft³
 Impervious Cover Post-Development 100-year Volume (V_{100-imp-post}) = 21,689 ft³
 Total 100-year Volume (V₁₀₀) = 27,254 ft³

W10 Standard Method Runoff Volume Calculations

Detention/Retention Requirement
 Detention
 A. Q₁₀₀ = 238.67 cfs
 Peak of the Unit Hydrograph
 B. Total Site Area (ac) excluding "Self-Crediting" BMPs Area = 1.85 ac
 C. Q₁₀₀ = Q_{100-per} + Q_{100-imp} = 2.45 + 4.87 = 7.33 in
 D. Peak Flow (PF) = 640 cfs
 E. Δ = PF (cfs) - 0.15 Area (ac) = 42.44 cfs
 F. V_{det} = (Δ cfs) / PF (cfs) * V₁₀₀ (ft³) = 27,254 ft³ / 42.44 cfs = 642 ft³

Pond Elevations

| Elev. | Area (sf) | Vol (cf) | Acc. |
|-------------|-----------|----------|------|
| 862.00 | 1 | 0 | 0 |
| 863.00 | 1800 | 901 | 901 |
| 864.00 | 3046 | 2423 | 3324 |
| 865.00 | 4516 | 3781 | 7105 |
| Total: 7105 | | | |

The following interpolation determines the pond water elevations for
 Vtotal = 642 = (x - 864.00) * (7105 - 3324) / (865.00 - 864.00)
 x = 864.91

This yields pond water elevations of:
 864.91 for the top of storage
 862.00 for the bottom of storage

Stormwater Maintenance Plan Tasks and Schedule

TASKS

| TASKS | Catch Basin Inlet Casing | Ditches and Swales | Outlet Control Structure | Rip-Rap | Storm Detention Areas | Emergency Overflow |
|---|--------------------------|--------------------|--------------------------|---------|-----------------------|--------------------|
| Inspect for sediment accumulation | X | X | X | X | X | X |
| Remove sediment accumulation | X | X | X | X | X | X |
| Inspect for floatables and debris | X | X | X | X | X | X |
| Cleaning of floatables and debris | X | X | X | X | X | X |
| Inspect for erosion | X | X | X | X | X | X |
| Re-establish permanent vegetation on eroded slopes | X | X | X | X | X | X |
| Replacement of Stone | X | X | X | X | X | X |
| Mowing | X | X | X | X | X | X |
| Inspect Stormwater system components during wet weather and compare to as-built plans (by professional engineer reporting to XYZ Co.) | X | X | X | X | X | X |
| Make adjustments or replacements as determined by annual wet weather inspection | X | X | X | X | X | X |
| Keep records of all inspections and maintenance activities and report to XYZ Co. | X | X | X | X | X | X |
| Keep records of all costs for inspections, maintenance and repairs. Report to XYZ Co. | X | X | X | X | X | X |

SCHEDULE

| Frequency | Task | Cost |
|----------------------------|---|-------------------|
| Annually | Annual inspection for sediment accumulation | \$100.00 |
| Annually | Remove sediment accumulation every 2 years as needed | \$500.00 |
| Annually | Inspect for floatables and debris annually and after major storms | \$100.00 |
| Annually | Remove floatables and debris annually and after major storms | \$150.00 |
| Annually | Inspect system for erosion annually and after major storms | \$100.00 |
| Annually | Re-establish permanent vegetation on eroded slopes as needed | \$350.00 |
| Annually | Replacement of stone | \$100.00 |
| Annually | Mowing 0-2 times per year | \$400.00 |
| Annually | Inspect structural elements during wet weather and compare to as-built plans every 2 years | \$150.00 |
| Annually | Make structural adjustments or replacements as determined by inspection as needed | \$400.00 |
| Annually | Have professional engineer carry out emergency inspections upon identification of severe problems | \$200.00 |
| Total Annual Budget | | \$2,550.00 |

BUDGET FOR MAINTENANCE PLAN

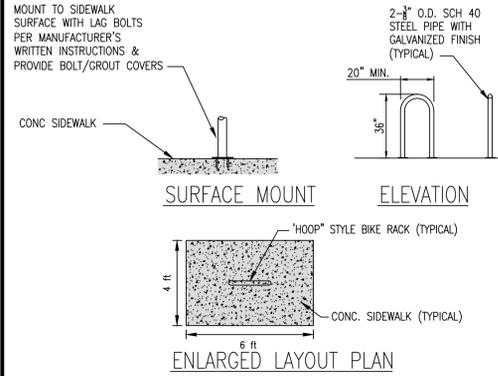
| TASKS | COST |
|---|-------------------|
| Annual inspection for sediment accumulation | \$100.00 |
| Remove sediment accumulation every 2 years as needed | \$500.00 |
| Inspect for floatables and debris annually and after major storms | \$100.00 |
| Remove floatables and debris annually and after major storms | \$150.00 |
| Inspect system for erosion annually and after major storms | \$100.00 |
| Re-establish permanent vegetation on eroded slopes as needed | \$350.00 |
| Replacement of stone | \$100.00 |
| Mowing 0-2 times per year | \$400.00 |
| Inspect structural elements during wet weather and compare to as-built plans every 2 years | \$150.00 |
| Make structural adjustments or replacements as determined by inspection as needed | \$400.00 |
| Have professional engineer carry out emergency inspections upon identification of severe problems | \$200.00 |
| Total Annual Budget | \$2,550.00 |

STORM DRAINAGE CALCULATION SHEET

| Structure No. | Drainage Area A (Acres) | %imperv | Runoff Coef. C | C x A | ADD. C x A | Σ C x A | Time T (min) | Rainfall I (in./hr.) | Q (cfs) | Pipe Dia. (in.) | Pipe Length (ft.) | Slope % | H.G. Slope % | Velocity Flowing Full (ft./sec) | Travel Time (min) | Pipe Capacity (cfs) | Rim Elev. Upstr. | H.G. Upstr. | Invert Elev. Upstr. | H.G. Dwnstr. | Invert Elev. Dwnstr. | |
|---------------|-------------------------|---------|----------------|-------|------------|---------|--------------|----------------------|---------|-----------------|-------------------|---------|--------------|---------------------------------|-------------------|---------------------|------------------|-------------|---------------------|--------------|----------------------|--------|
| R07 | R06 | 0.04 | 0.00 | 0.30 | 0.01 | 0.01 | 15.00 | 4.38 | 0.05 | 12 | 108 | 0.44 | 0.00 | 3.02 | 0.60 | 2.37 | 870.50 | 867.06 | 866.59 | 866.26 | 865.79 | |
| R06 | R05 | 0.15 | 80.00 | 0.82 | 0.12 | 0.14 | 15.60 | 4.31 | 0.58 | 12 | 97 | 0.44 | 0.03 | 3.02 | 0.54 | 2.37 | 870.16 | 866.49 | 866.06 | 865.69 | 865.26 | |
| R05 | R04 | 0.26 | 100.00 | 0.95 | 0.25 | 0.38 | 16.13 | 4.25 | 1.63 | 12 | 164 | 0.44 | 0.21 | 3.02 | 0.91 | 2.37 | 869.14 | 865.96 | 865.24 | 865.16 | 864.44 | |
| R04 | R03 | 0.11 | 100.00 | 0.95 | 0.10 | 0.40 | 0.89 | 17.04 | 4.16 | 3.69 | 15 | 91 | 0.40 | 0.33 | 3.34 | 0.46 | 4.10 | 869.48 | 865.24 | 864.87 | 864.24 | 863.87 |
| R02 | R01 | | | | | | | | 3.69 | 15 | 79 | 0.50 | 0.33 | 3.73 | 0.35 | 4.58 | 864.91 | 863.00 | 862.61 | 862.00 | 861.61 | |
| RD | R04 | 0.42 | 100.00 | 0.95 | 0.40 | | | | | | | | | | | | | | | | | |

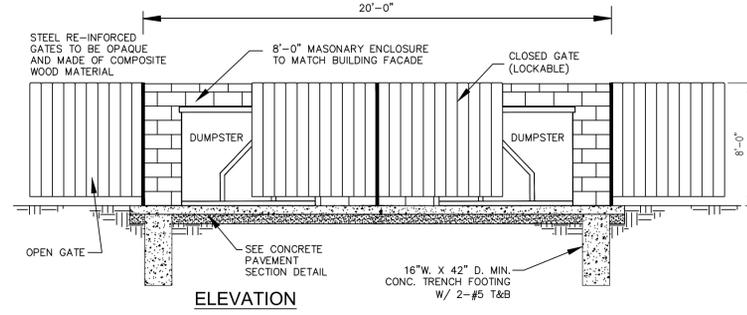


DETAILS



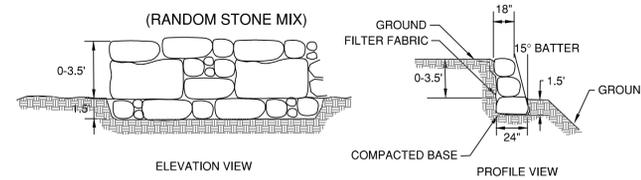
HOOP STYLE BIKE RACK (TWO SPACES)
NOT TO SCALE

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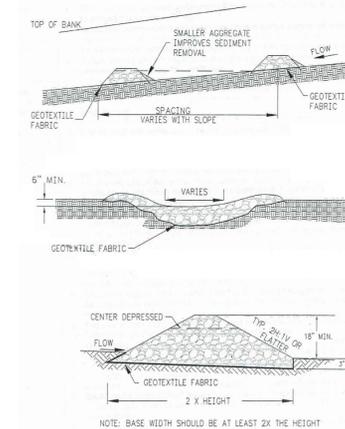
DUMPSTER SCREENING DETAIL
NOT TO SCALE

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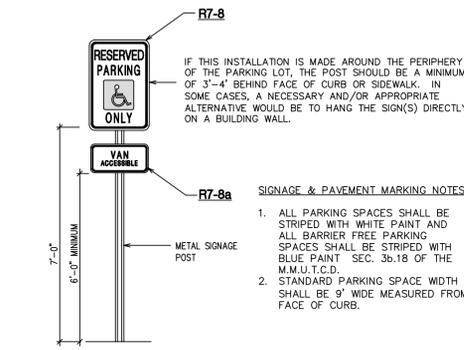
BOULDER RETAINING WALL
NOT TO SCALE

J

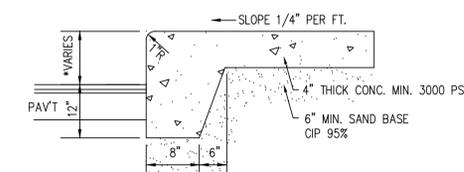


CHECK DAM DETAIL
NOT TO SCALE

K

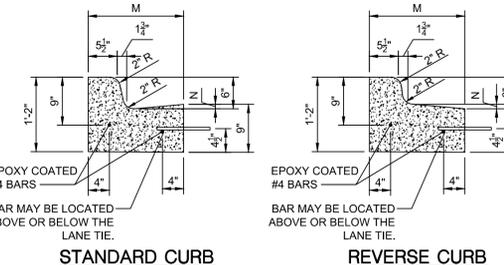


BARRIER FREE SIGN
NOT TO SCALE



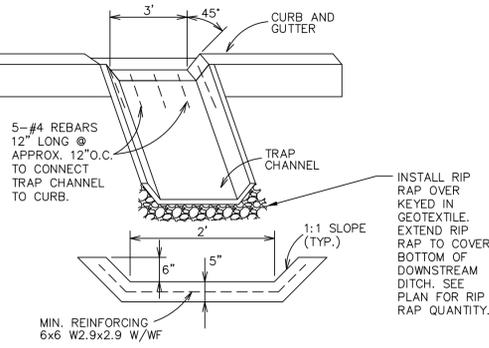
* NOTE: 0" IN AREAS WHERE T/P & T/W ARE FLUSH. ALL OTHER AREAS WALK IS 6" ABOVE ADJACENT PAVEMENT.

F



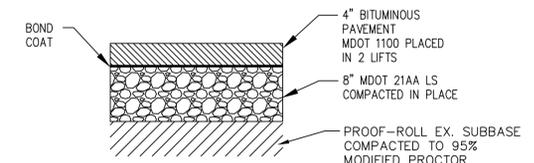
| DETAIL | DIMENSIONS | LANE TIES | CONCRETE CU. YD. / LIN. FT. |
|--------|--------------|-----------|-----------------------------|
| F1 | 1'-0" 7/8" | AS SHOWN | 0.0484 |
| F2 | 1'-0" 7/8" | OMITTED | 0.0484 |
| F3 | 2'-0" 1 1/8" | AS SHOWN | 0.0810 |
| F4 | 2'-0" 1 1/8" | OMITTED | 0.0810 |
| F5 | 2'-0" 1 7/8" | AS SHOWN | 0.0737 |
| F6 | 2'-0" 1 7/8" | OMITTED | 0.0737 |

MDOT "F" CONCRETE CURB
NOT TO SCALE

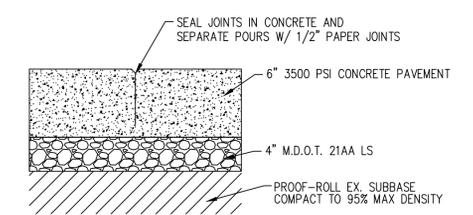


CURB AND GUTTER SPILLWAY
NOT TO SCALE

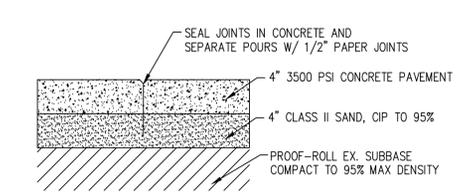
H



ASPHALT PAVEMENT SECTION
NOT TO SCALE

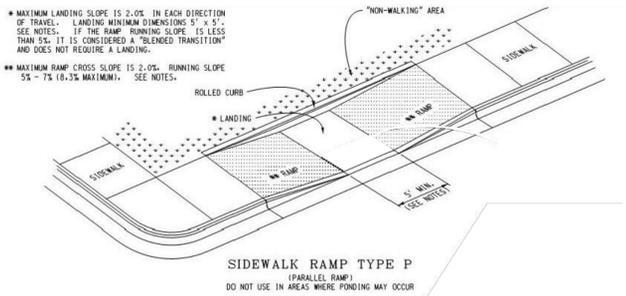


CONCRETE PAVEMENT SECTION
** FOR USE IN DUMPSTER PAD **
NOT TO SCALE



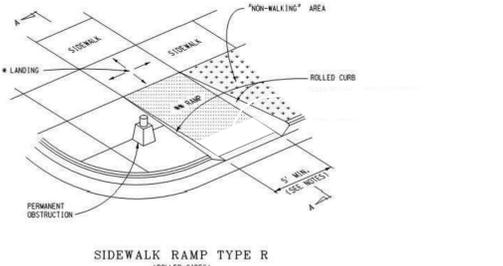
CONCRETE SIDEWALK SECTION
** FOR USE IN SIDEWALK AREAS THAT DO NOT ABUT PAVEMENT **
NOT TO SCALE

C



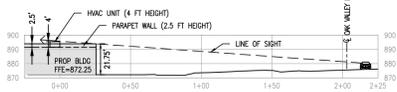
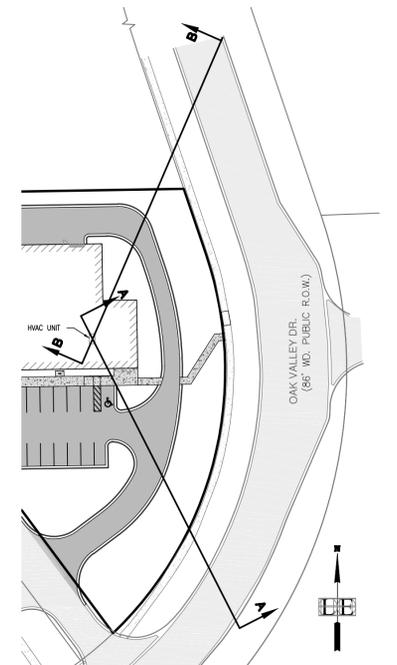
SIDEWALK RAMP - MDOT TYPE P
NOT TO SCALE

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES. IF THE RAMP RUNNING SLOPE IS LESS THAN 5%, IT IS CONSIDERED A "BLENDED TRANSITION" AND DOES NOT REQUIRE A LANDING.
** MAXIMUM RAMP CROSS SLOPE IS 2.0% RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.

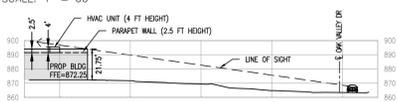


SIDEWALK RAMP - MDOT TYPE R
NOT TO SCALE

D2



SECTION B-B
SCALE: 1" = 60"



SECTION A-A
SCALE: 1" = 60"

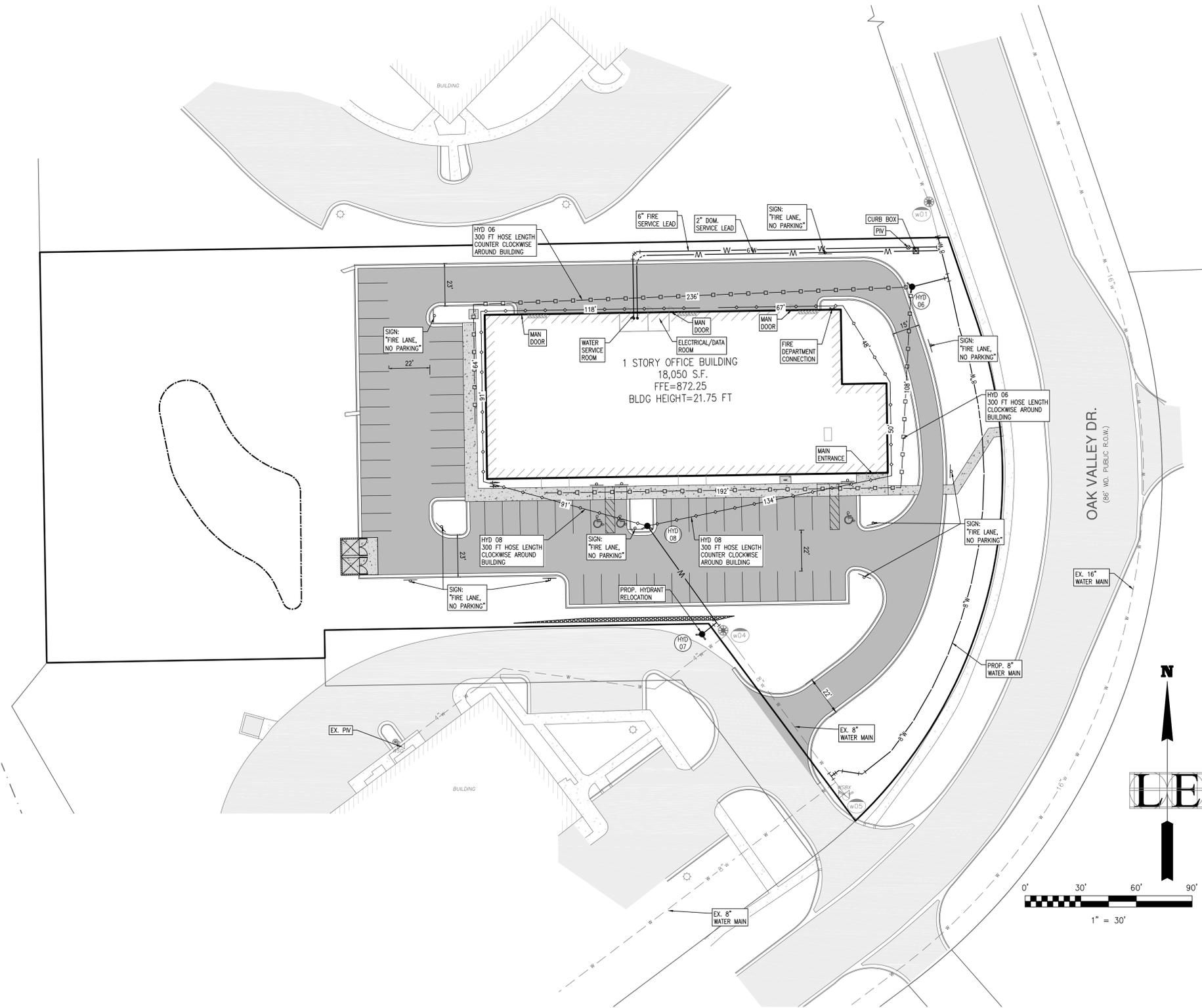
ROOF MOUNTED HVAC SCREENING DETAIL
1" = 60"

P

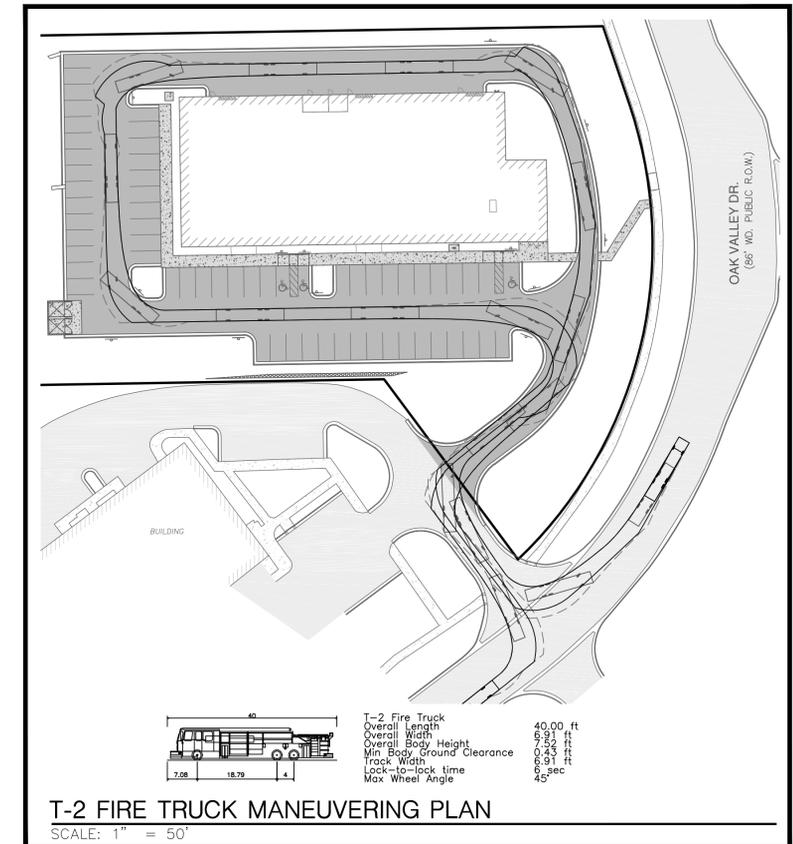
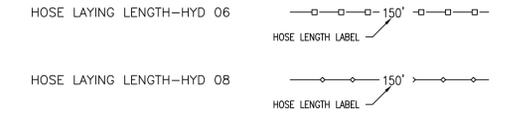


Know what's below.
Call before you dig.

FIRE PROTECTION PLAN



LEGEND



FILE:C:\Users\User\Desktop\Projects\2017\17192 Band Valley Ranch Pittsfield Top\03 Drawings\Final Site & CONSTR Plans\17192_09_Fire Protection Plan.dwg



| REV | DATE | DESCRIPTION |
|-----|-----------|--------------------|
| 1 | 6/27/2018 | REV PER ENG REVIEW |

Drawn: MJB
Checked:
Approved:
Date: 5/14/2018



Know what's below.
Call before you dig.

LANDSCAPE PLAN

General Landscape Notes:

- The contractor(s) shall verify the location of all underground utilities prior to construction.
- All existing vegetation shown is to be saved and protected during the demolition and construction process. See Detail on sheet L2 for tree protection method.
- See tree survey for identification of the trees to remain and the two that are to be removed.
- All landscape areas to be grass common to region except where other plant material is called for.
- All trees and shrubs are to be planted in mulch beds with a spade edge separating mulch from turf grass areas.
- Any landscape areas disturbed by construction shall be scarified to a depth of 2", graded smooth to allow for positive drainage. For any landscape area so designated to remain either on or off site, remove weeds, rocks construction items, etc., scarify area, re-seed and fertilize. All R.O.W. curb and gutters are to be cleaned of debris.
- All disturbed areas within the R.O.W and areas shown on the plan as "Irrigated Seed", shall be seeded with:
 - 50 percent creeping red fescue (*Festuca rubra* variety).
 - 30 percent Kentucky blue grass (*Poa pratensis*).
 - 20 percent perennial rye grass (*Lolium perenne*).
 Mulch with a straw mulch blanket staked in place or hydroseeded.
- Sod areas as shown on plan with a low maintenance hybrid turf from local grower. Test soil for proper pH for select sod. Amend soil with organic material, fertilize and finish grade. Stagger all sod seams, fill any gaps with sand, water and roll smooth. Contractor shall replace any dead sod within one growing season.
- Seed the bottom of the detention basin with "New England Erosion Control/Restoration Mix For Detention Basins and Moist Sites", by New England Wetland Plants, Inc. (newp.com, 820 West Street, Amherst, MA 01002, Phone: 413-548-8000). APPLICATION RATE: 35 lbs/acre | 1250 sq ft/lb, OR APPROVED EQUAL.

SPECIES: Riverbank Wild Rye (*Elymus riparius*), Creeping Red Fescue (*Festuca rubra*), Little Bluestem (*Schizachyrium scoparium*), Big Bluestem (*Andropogon gerardii*), Switch Grass (*Panicum virgatum*), Upland Bentgrass (*Agrostis perennans*), Nodding Bur Marigold (*Bidens cernua*), Hollow-Stem Joe Pye Weed (*Eupatorium fistulosum/Eutrochium fistulosum*), New England Aster (*Aster novae-angliae*), Boneset (*Eupatorium perfoliatum*), Blue Vervain (*Verbena hastata*), Soft Rush (*Juncus effusus*), Wool Grass (*Scirpus cyperinus*).

*This is a proprietary seed mix. Manufacturer does not supply weights/percentages/quantities, etc of the individual seed species. This information is printed on the seed tag at time of purchase.

The New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites contains a selection of native grasses and wildflowers designed to colonize generally moist, recently disturbed sites where quick growth of vegetation is desired to stabilize the soil surface. It is an appropriate seed mix for ecologically sensitive restorations that require stabilization as well as long-term establishment of native vegetation.

This mix is particularly appropriate for detention basins that do not hold standing water. The mix may be applied by hand, by mechanical spreader, or by hydro-seeder. After sowing, lightly rake, roll or cultipack to insure good seed to soil contact. Best results are obtained with a Spring or late Summer seeding. Late Fall and Winter dormant seeding requires an increase in the application rate.

10. All additional disturbed areas that are not designated to be Irrigated Sod, Irrigated Seed or Detention Seed, shall be a blend of fescues such as the "No Mow Lawn Grass Seed" as provided by American Meadows (www.americanmeadows.com, 877-309-7333) or approved equal. Sow at a rate of 5 lbs per 1000 s.f. in early spring (April 15-May 15) or fall (Aug. 20-Sept. 20). No Mow lawn shall be cut back to 3 1/2" - 4" once or twice a year (October and possibly mid July based on personal preference).

11. Finish grade in landscape islands shall be installed so that they are 1" lower than the top of the surrounding curbs.

12. The Contractor shall provide a **WATER PERMEABLE WEED MAT** for all planting beds !!!!

13. All shrub beds and irrigated seed and sod (within property lines) as shown on the drawing to receive permanent underground irrigation system designed by an irrigation contractor licensed by the State. The Contractor shall provide drawings for approval by the Township prior to installation.

14. Install pipe sleeves where irrigation lines cross or are under pavement. All sleeves to be twice the diameter of the pipe(s) it houses.

15. Plants shall conform to the sizes as shown on the drawings and shall be of sound health. All measurements such as spread, ball size, height, caliper and quality designations shall be in conformance to the latest edition of the American Standards for Nursery Stock. All plant material shall be hardy to the Ann Arbor area, be free of disease and insects, and conform to the American Standard for Nursery Stock of the American Nurserymen.

16. Prune all dead and broken branches from all plants immediately after installation.

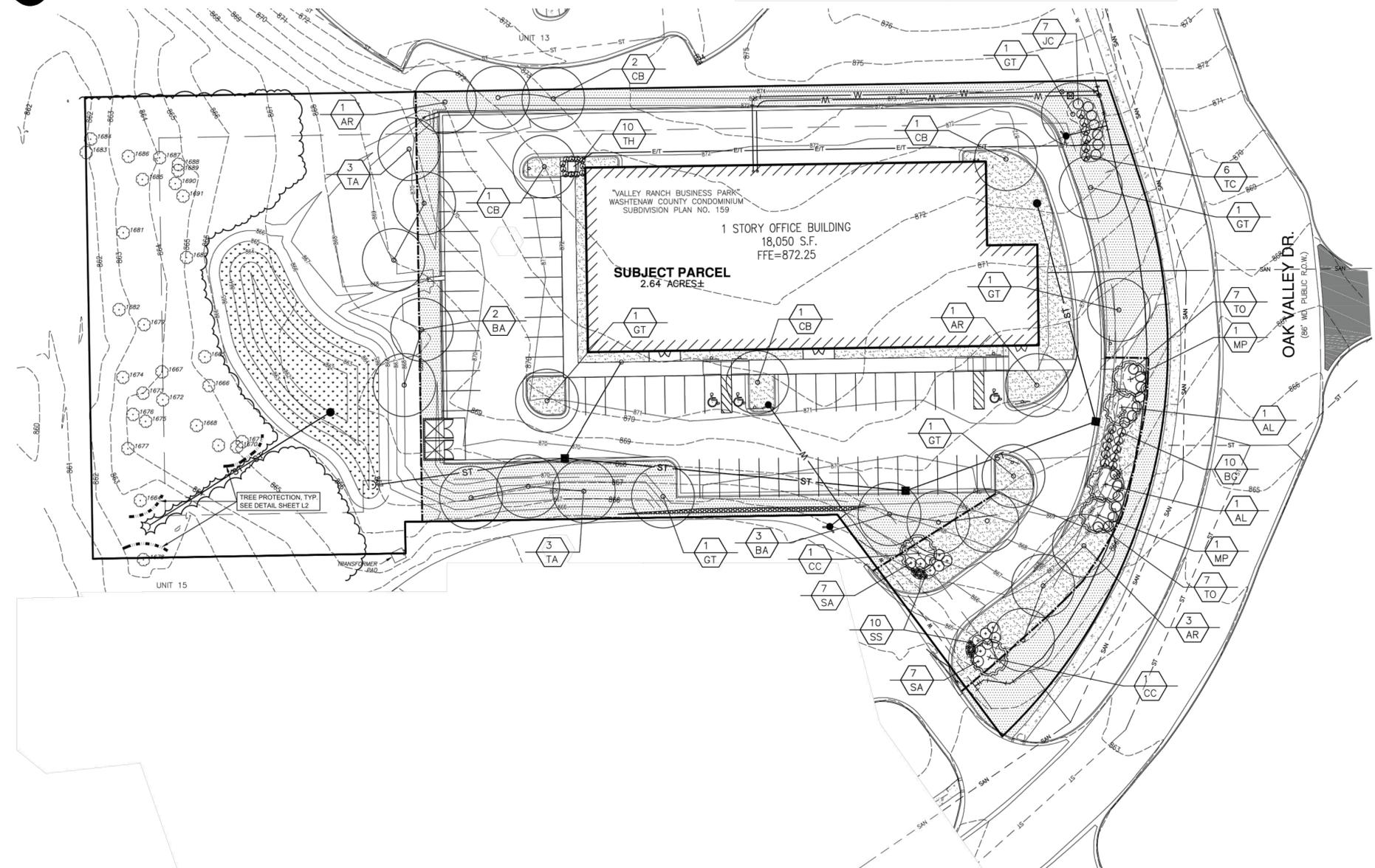
17. Planting soil mixture shall be prepared on-site by mixing 3 parts topsoil to 1 part existing site soils to 1 part compost mix. Add a phosphate free fertilizer appropriate for trees and shrubs per manufacturers guidelines.

18. Organic mulch requirements: shade trees, ornamental trees and evergreen trees - 6" of shredded bark; shrubs and shrub beds - 4" of shredded bark; perennial flowers - 2" of shredded bark. A four (4) foot diameter ring of mulch shall be placed around any and all proposed trees that are not in shrub beds.

19. Slope Stabilization: After seeding, overlay turf mats on all slopes of 3:1 or greater. If sod can not be staked properly, use Pyramat by Synthetic Industries or equal. Contractor to repair all areas of erosion to satisfaction of Owner/Township to establish proper turf within one year.

20. All landscaping shall be maintained in a healthy, neat and orderly state following installation. Any and all plant material that dies or becomes diseased, shall be replaced within one year of damage or death or the next appropriate planting period, whichever comes first.

21. See Sheet L2 for Plant List and Planting Details.

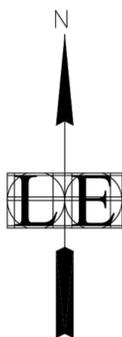
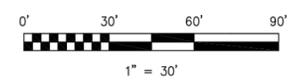


Landscape Requirements:

- COMPOSITION:**
REQUIRED:
One species may not exceed twenty percent (20%) of the total number of canopy trees, ornamental trees, or shrubs.
PROVIDED:
Of the 27 canopy trees, each species constitutes approximately 20% of the total number. Due to the smaller quantity of ornamental trees (6), each species constitutes 33%. And due to the nature of the design, 2 shrub species do exceed 20% (22.95%), but 6 different species make up the 61 proposed shrubs.
- NATIVE SPECIES:**
REQUIRED:
Native species of trees and shrubs shall constitute at least fifty percent (50%) of the total proposed plantings.
PROVIDED:
Of the total number of 33 proposed trees, 75% of the species are native to the south-east Michigan area, and 65% of the 52 shrubs are natives.
- EXISTING TREES:**
REQUIRED:
The preservation and incorporation of existing trees in a landscape plan.....is encouraged.
PROVIDED:
All existing trees with a dbh of 6" or greater, with the exception of two, are to remain and shall be protected during the construction process. The two trees to be removed are Cottonwoods, not heritage trees.
- PARKING LOT LANDSCAPING:**
REQUIRED:
(1) There shall be a minimum of one (1) canopy tree for every eight (8) parking spaces.
(2) The number of parking spaces in a bay shall not exceed twenty (20).
(3) Each parking lot shall provide an area that is a minimum of five percent (5%) of the lot's paved surface area for purposes of planting shade trees and other landscape materials.
PROVIDED:
(1) Sixty one (61) parking spaces are proposed. 61 divided by 8 equals 7.6. Eight (8) trees have been provided - 4 in islands and 4 in corners of the parking lot or at the ends of rows.
(2) The number of parking spaces in a bay DO NOT exceed 20.
(3) A minimum of 5% of the parking lot area HAS been provided in the interior of the lot for shade trees and landscape materials.
- PARKING LOT PERIMETERS:**
REQUIRED:
(1) Canopy trees shall be provided along the perimeter of a parking lot at a minimum rate of one (1) tree per each forty (40) feet of lot perimeter.
(2) Parking lot entrances shall be landscaped with canopy trees, shrubs and other plant material in a manner consistent with the character and quality of the site.
PROVIDED:
(1) The parking lot perimeter is 523 feet long. 523 divided by 40 equals 13. Thirteen trees have been provided around the perimeter of the parking lot.
(2) The parking lot entrance has been landscaped with canopy trees, ornamental trees, shrubs and ornamental grasses.
- GREENBELT:**
REQUIRED:
(1) A landscaped berm at least three (3) feet in height along the perimeter of the road right-of-way shall be used to screen the parking lot from the public road.
(2) The greenbelts shall be landscaped with a minimum of one (1) deciduous tree for every thirty (30) lineal feet or fraction thereof, of frontage abutting a public road right-of-way.
PROVIDED:
(1) The slope of the site does not allow for a three foot high berm above the parking lot elevation. In lieu of a berm, evergreen shrubs that will reach a minimum of 3 feet in height have been provided to screen the parking lot from the public road.
(2) The frontage abutting the public road is 339 feet long. 339 divided by 30 equals 11.3 Twelve (12) deciduous trees have been provided in the greenbelt.
- SITE LANDSCAPING:**
REQUIRED:
A minimum of twenty percent (20%) of the site area shall be comprised of landscape material.
PROVIDED:
Approximately 50% of the site is comprised of existing undisturbed and proposed landscape material.

Legend

- EXISTING TREE TO REMAIN - (circle with dot)
- CANOPY TREE - (circle with dot and larger circle)
- ORNAMENTAL TREE - (circle with dot and smaller circle)
- SHRUBS - (circle with dot and smaller circle)
- GRASSES - (circle with dot and smaller circle)
- IRRIGATED SOD - (stippled pattern)
- IRRIGATED SEED - (dotted pattern)
- DETENTION SEED - (cross-hatched pattern)
- TREE PROTECTION - (dashed line)
- EXISTING BRUSH TO REMAIN - (wavy line)
- SPADE BED EDGE - (dashed line)
- PLANTKEY - (hexagon with AS)
- SOD/SEED LIMITS - (dashed line)



Design Solutions LLC
Landscape Architects & Planners
2580 Dustin RD
Okemos, MI 48864
517 333-7026

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LEE

RAND CONSTRUCTION

Client

VALLEY RANCH - LOT 14
PITTSFIELD TOWNSHIP, WASHTEWAW COUNTY, MI
FINAL SITE/CONSTRUCTION PLANS
LANDSCAPE PLAN

| | | | | | |
|---------|-----------|----------|--------------------|-------|-----------|
| DATE | 6/27/2018 | REVISED | REV PER ENG REVIEW | DRAWN | MJB |
| CHECKED | | APPROVED | | DATE | 5/14/2018 |
| SCALE | | TITLE | | | |
| | | | | | |

17192

1" = 30'

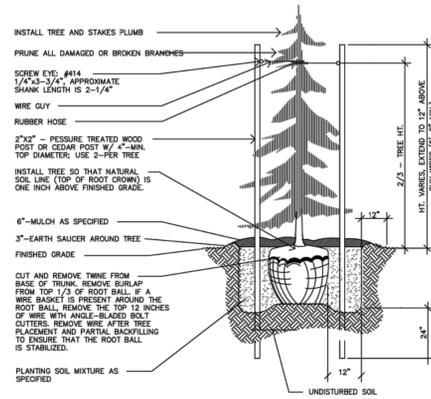
10-L1

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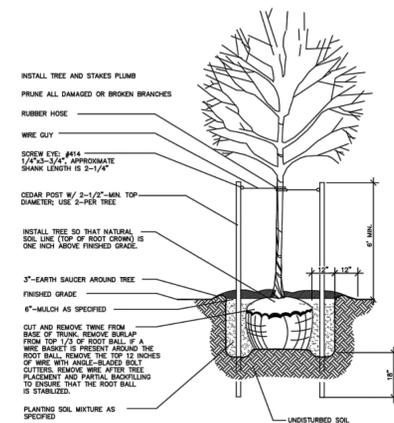
Know what's below.
Call before you dig.

LANDSCAPE DETAILS



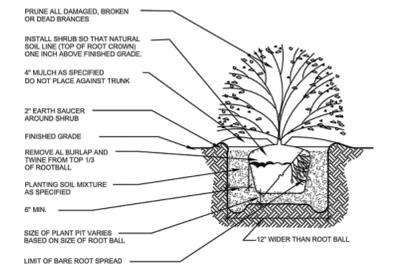
Evergreen Tree Planting/Staking

6" IN HEIGHT AND ABOVE



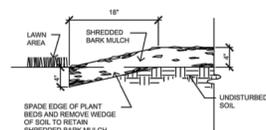
Deciduous Tree Planting/Staking

UNDER 3" IN CALIPER



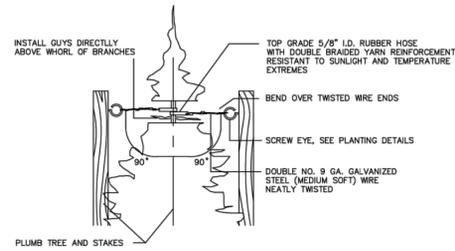
Shrub Planting Detail

SCALE: NO SCALE



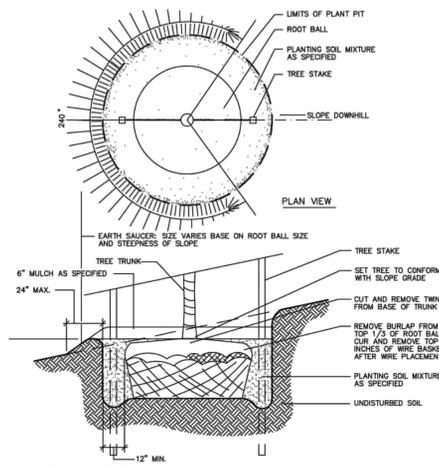
Spade Edge Plant Bed

SCALE: NO SCALE



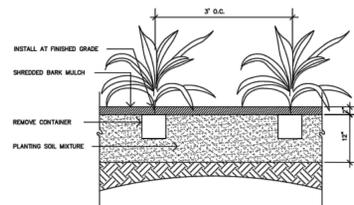
Guy Installation

FOR EVERGREEN AND DECIDUOUS TREES



Deciduous Tree Planting/Staking

FOR SLOPE OR BERM INSTALLATION



Grasses - Container Plantings

Scale: No Scale

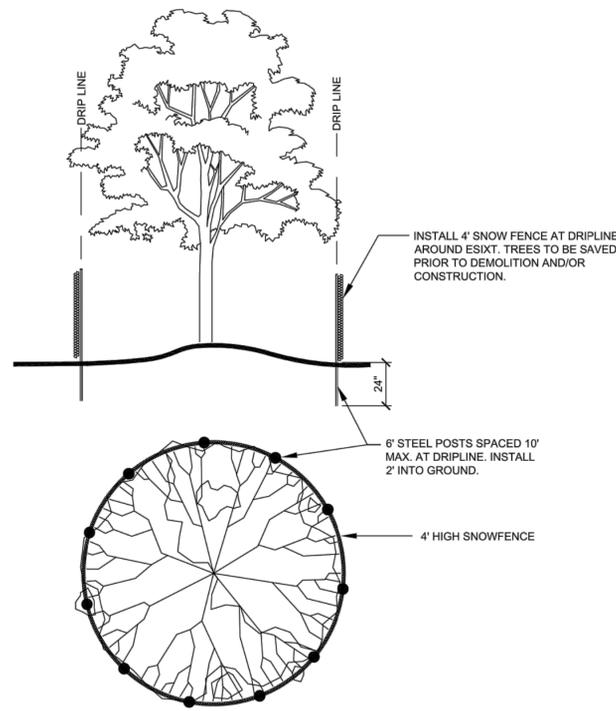
PLANT LIST

| Qty. | Key | Botanical Name | Common Name | Size | | | | Root | Remarks |
|-----------------------------|-----|----------------------------------|-------------------------|---------|---------|--------|-------|-------|---------|
| | | | | Caliper | Height | Spread | Other | | |
| Trees | | | | | | | | | |
| 2 | AL | Amelanchier laevis | Allegheny Serviceberry | 2 1/2" | | | | B&B | Clump |
| 5 | AR | Acer rubrum | Red Maple | 2 1/2" | | | | B&B | |
| 5 | BA | Betula alleghaniensis | Yellow Birch | 2 1/2" | | | | B&B | |
| 5 | CB | Carpinus b. 'Fastigiata' | Common Hornbeam | 2 1/2" | | | | B&B | |
| 2 | CC | Cercis canadensis | Redbud | 2 1/2" | | | | B&B | |
| 6 | GT | Gleditsia t. i. 'Skyline' | Skyline Honeylocust | 2 1/2" | | | | B&B | |
| 2 | MP | Malus 'Pink Princess' | Pink Princess Crabapple | 2 1/2" | | | | B&B | |
| 6 | TA | Tilia americana | Basswood | 2 1/2" | | | | B&B | |
| Shrubs | | | | | | | | | |
| 10 | BG | Buxus 'Green Gem' | Green Gem Boxwood | | 24"-36" | | | B&B | |
| 7 | JC | Juniperus communis var. depressa | Common Juniper | | 24"-36" | | | Cont. | |
| 14 | SA | Spiraea alba | Meadowsweet | | 24"-36" | | | Cont. | |
| 6 | TC | Taxus canadensis | Canadian Yew | | 24"-36" | | | B&B | |
| 10 | TH | Taxus x. media 'Hicksii' | Hicks Yew | | 24"-36" | | | B&B | |
| 14 | TO | Thuja o. 'Golden Globe' | American Arborvitae | | 24"-26" | | | Cont. | |
| Grasses / Perennials | | | | | | | | | |
| 10 | SS | Schizachrium scoparium | Little Bluestem | | | | | Gal. | Cont. |

B&B = Balled & Burlapped

Cont. = Container

Gal. = Gallon



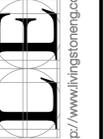
TREE PROTECTION DETAIL

SCALE: NO SCALE



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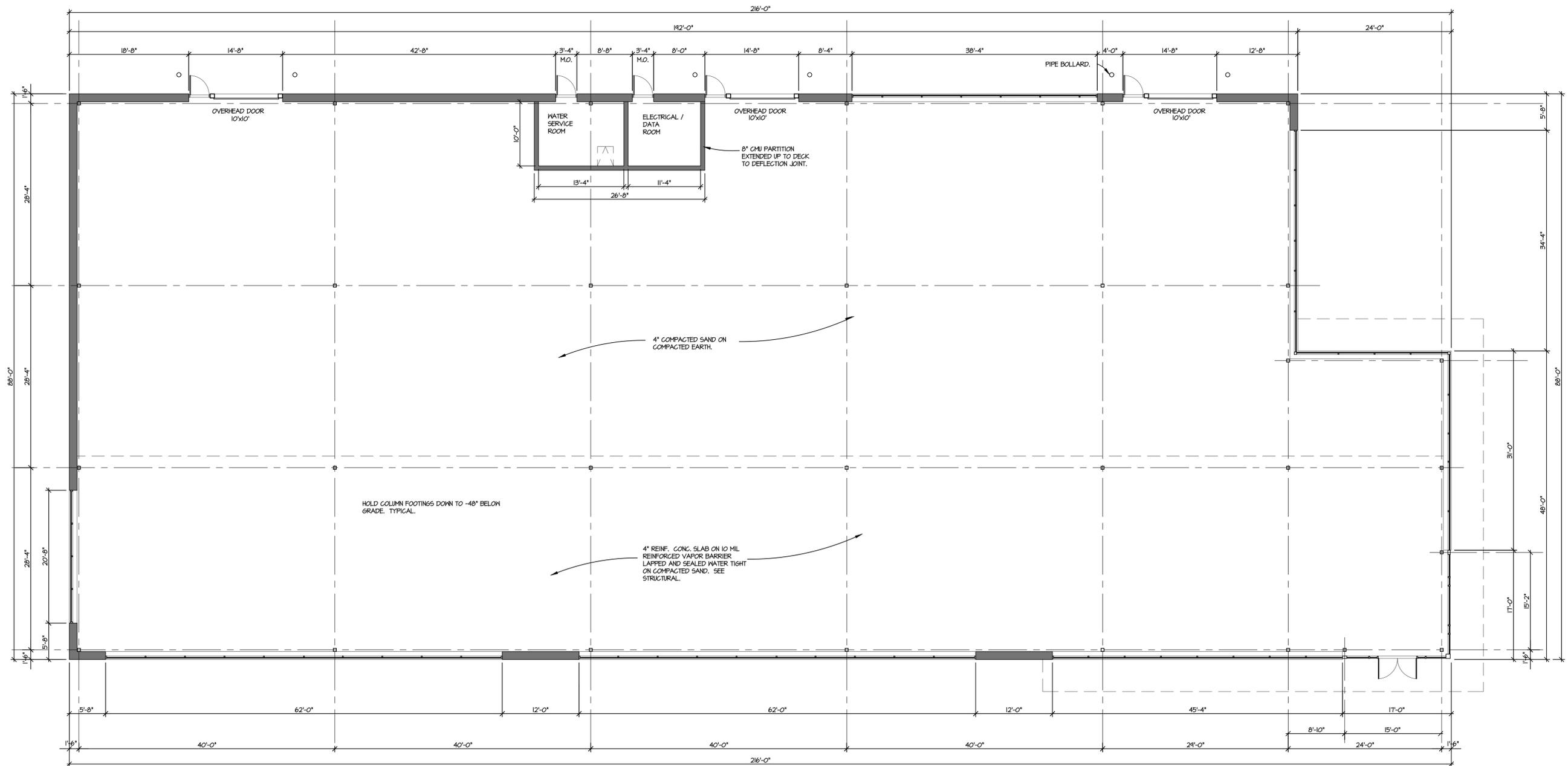
Client
RAND
CONSTRUCTION

VALLEY RANCH - LOT 14
PITTSFIELD TOWNSHIP, WASHTEWAW COUNTY, MI
FINAL SITE/CONSTRUCTION PLANS
LANDSCAPE DETAILS

| DATE | REVISIONS |
|-----------|--------------------|
| 6/27/2018 | REV PER ENG REVIEW |

Drawn: MJB
Checked:
Approved:
Date: 5/14/2018

Job no. 17192
Scale:
Vertical: T=30'
Horizontal:



SCHMATIC FLOOR PLAN
SCALE: 1/8" = 1'-0"



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ARCHITECTURE + DESIGN + PLANNING
508 E. GRAND RIVER AVE., SUITE 100B, BRIGHTON, MI 48116-1566
PHONE: (810) 225-2930
www.pv-a.com

FOR:
RAND CONSTRUCTION
1210 RICKETT ROAD
BRIGHTON, MI 48116
PHONE: 810-227-1011

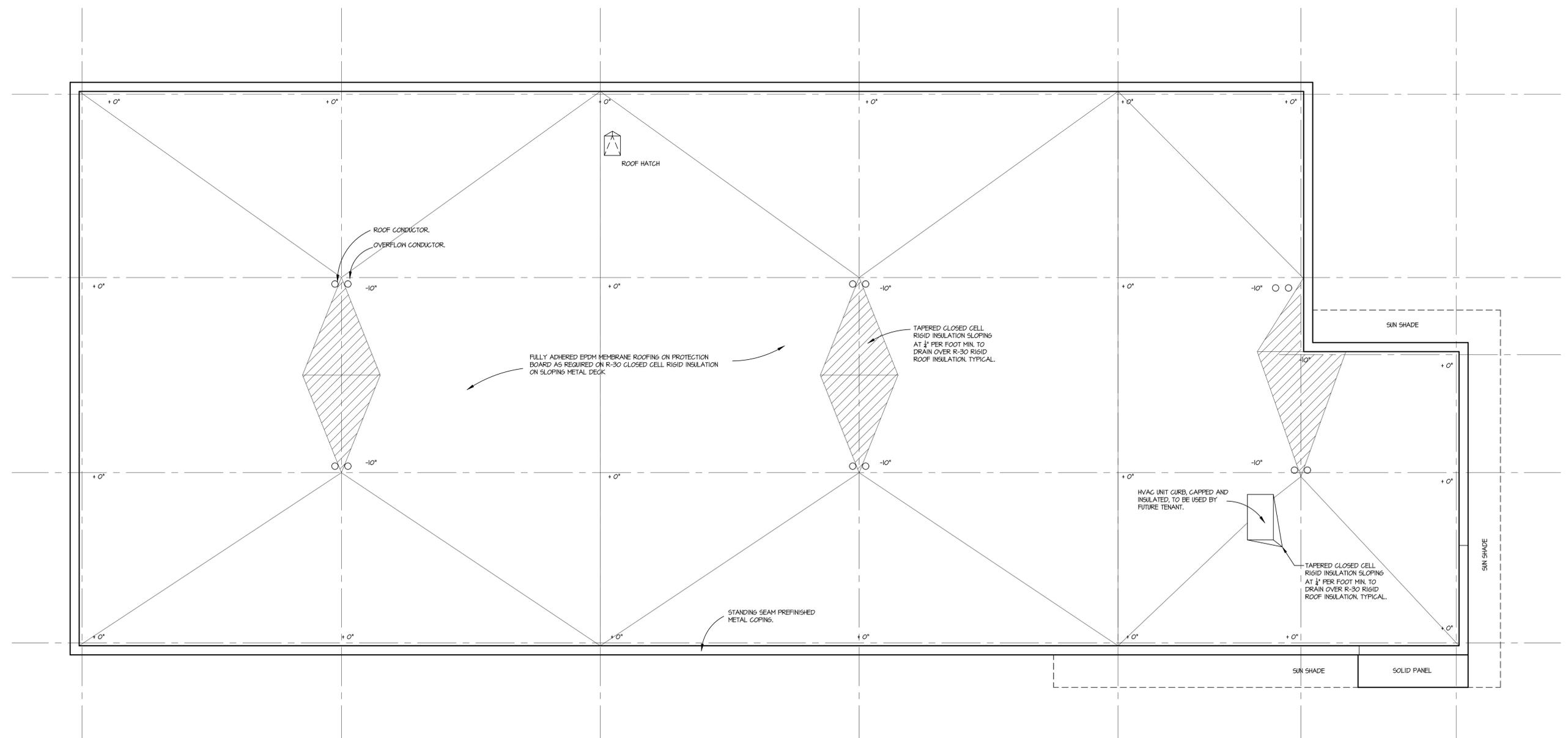
PROJECT: **OAK VALLEY LOT 14**
OAK VALLEY DRIVE
PITTSFIELD TOWNSHIP, MICHIGAN
SHEET TITLE: **SCHMATIC FLOOR PLAN**

| REV | DATE | BY | DESCRIPTION |
|-----|----------|----|--------------------------------|
| 1 | 4-6-2018 | KV | REV PER TWP AND WCVRC COMMENTS |
| 2 | 1-8-2018 | KV | ISSUED FOR BUDGET PRICING |
| 3 | | | ISSUED FOR: |

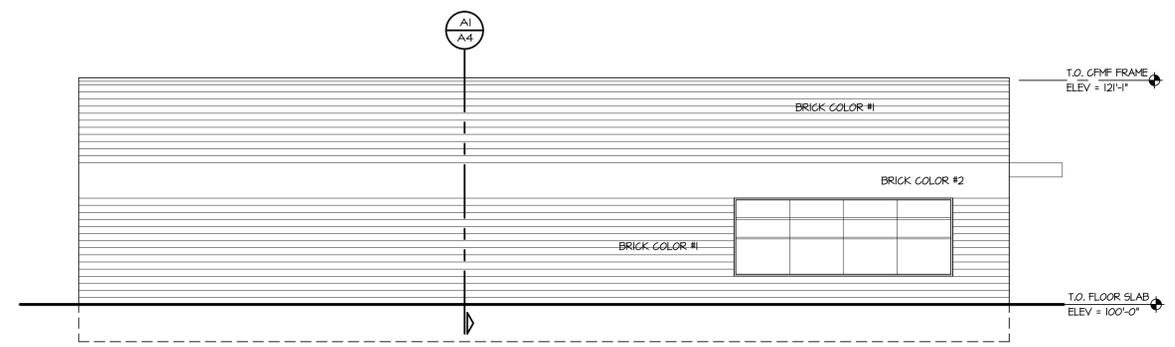
DO NOT SCALE THIS PRINT, USE DIMENSIONS SHOWN ONLY
DRAWN BY: KV
APPROVED BY: KV
PROJECT: 1741

SHEET: 13-A1

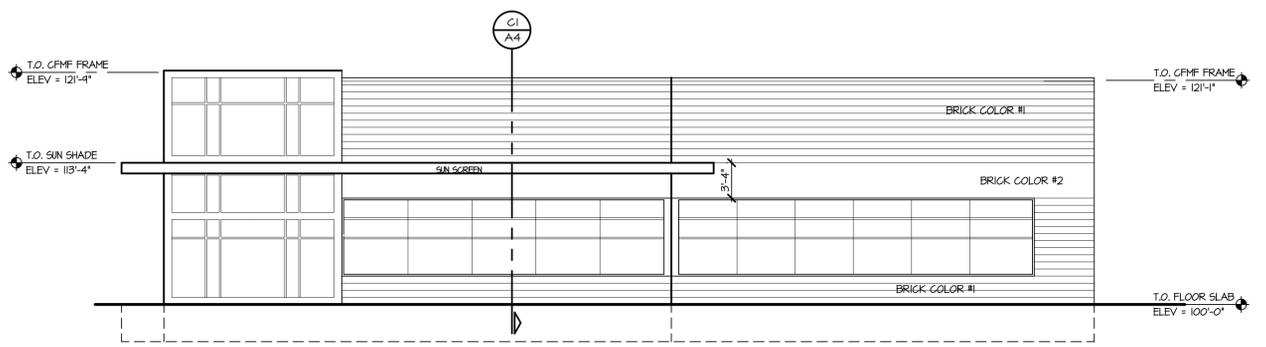
| REV | DATE | ISSUED FOR BUDGET PRICING | ISSUED FOR: |
|---------|-----------|---------------------------------|-------------|
| 46-2018 | 1-18-2018 | REV PER TMP AND WCM/RC COMMENTS | |
| | | | |
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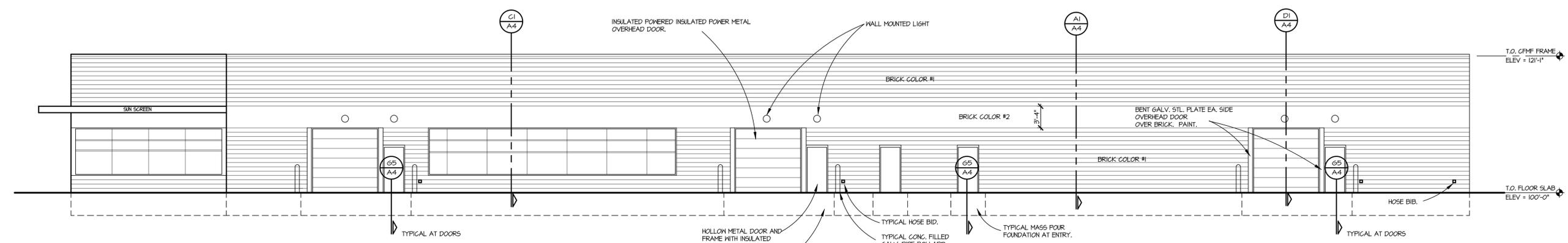
 **SCHEMATIC ROOF PLAN**
SCALE - 1/8" = 1'-0"



SCHEMATIC EAST ELEVATION
SCALE: 1/8" = 1'-0"



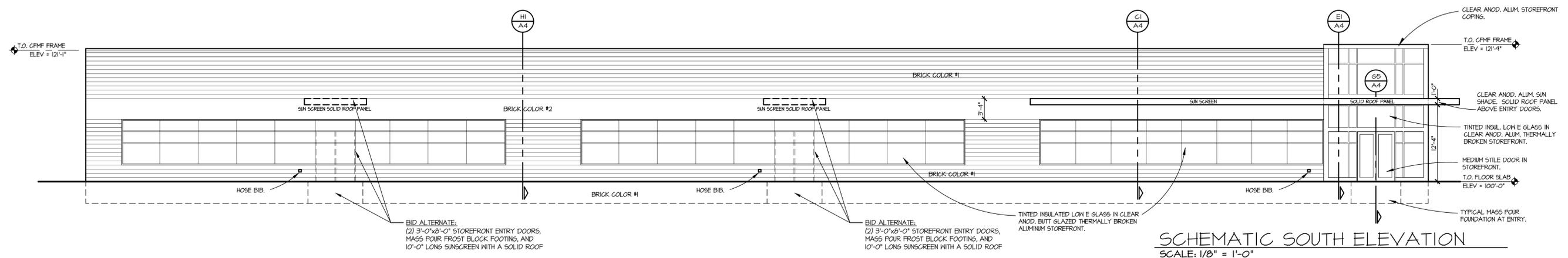
SCHEMATIC WEST ELEVATION
SCALE: 1/8" = 1'-0"



SCHEMATIC NORTH ELEVATION
SCALE: 1/8" = 1'-0"

SEE FLOOR PLAN FOR METER CONCEPT DIAGRAM (FINAL LOCATIONS BY ENGINEER).

NOTE: BRICK EXPANSION AT 20' O.G. MAX - NOT SHOWN.



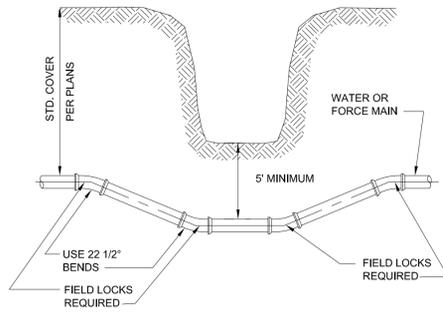
SCHEMATIC SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

| | | | |
|-----------|--------------------------------|---------------------------|-------------|
| 4-6-2018 | REV PER TWP AND WDWRC COMMENTS | ISSUED FOR BUDGET PRICING | ISSUED FOR: |
| 1-18-2018 | | | DATE: |

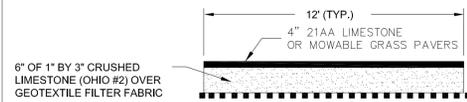
DO NOT SCALE THIS PRINT, USE DIMENSIONS SHOWN ONLY

DRAWN BY: KV
APPROVED BY: KV

PROJECT: 1741

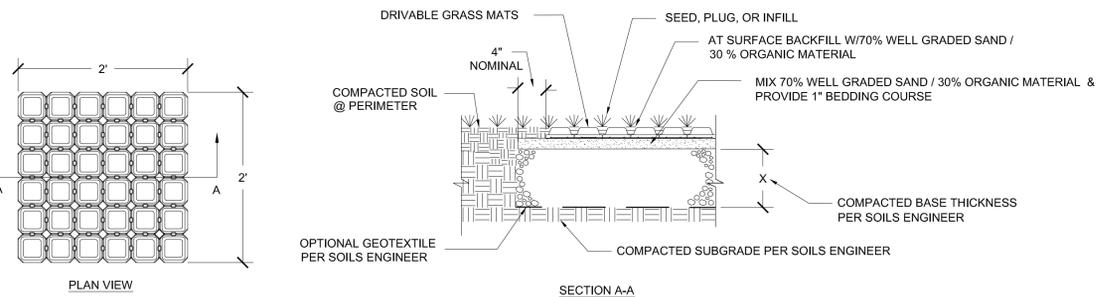


DITCH & STREAM CROSSING

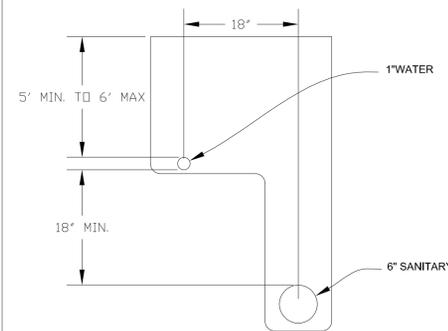


SANITARY SEWER ACCESS PATH

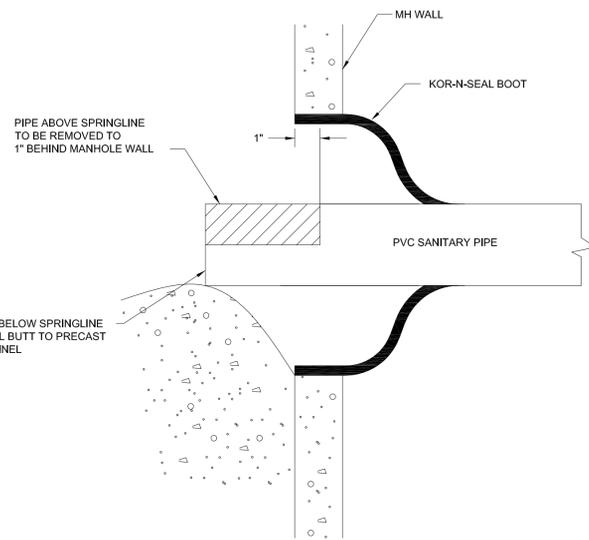
NOTE:
FOR STORMWATER MANAGEMENT APPLICATIONS INCLUDING STORAGE AND INFILTRATION, ALTERNATE INFILLS, BASE MATERIAL, AND DRAINAGE MAY BE REQUIRED



TYPICAL HEAVY TRAFFIC DRIVABLE GRASS DETAIL



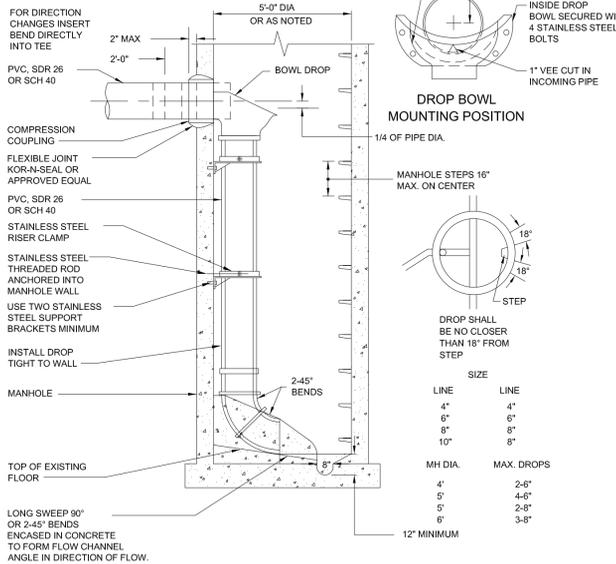
TYPICAL L TRENCH DETAIL HOUSE LEADS



SANITARY PIPE PENETRATION

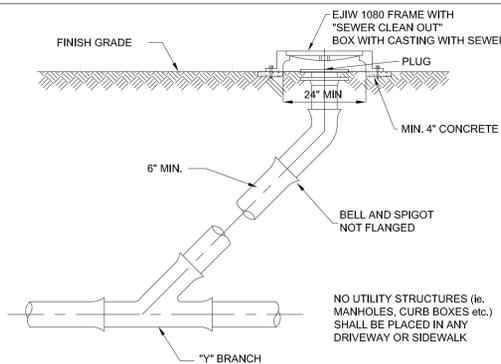
NOTES:

1. SECURE DROP PIPE TO MANHOLE WALL WITH RELINER-DURAN, INC STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS OR EQUAL.
2. ATTACH THE DROP BOWL & EACH CLAMPING BRACKET TO THE MANHOLE WALL WITH 3/8" X 3/4" RAMSET/RED HEAD BOLTS HELD IN PLACE WITH 2 STAGE EPOXY PASTE.

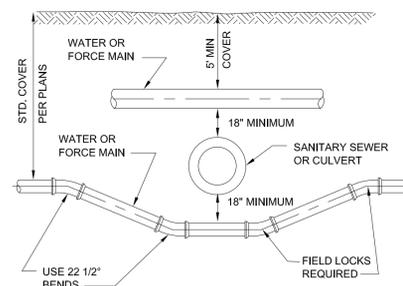


NO UTILITY STRUCTURES (ie. MANHOLES, CURB BOXES etc.) SHALL BE PLACED IN ANY DRIVEWAY OR SIDEWALK

INTERIOR DROP SANITARY MANHOLE



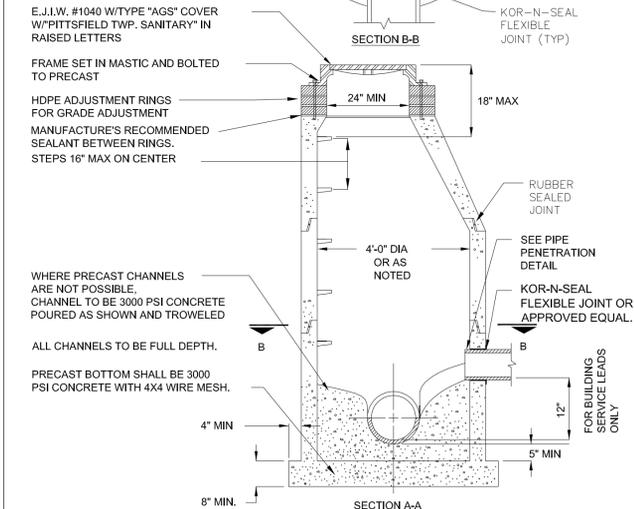
SANITARY SEWER CLEANOUT



SEWER OR CULVERT CROSSING

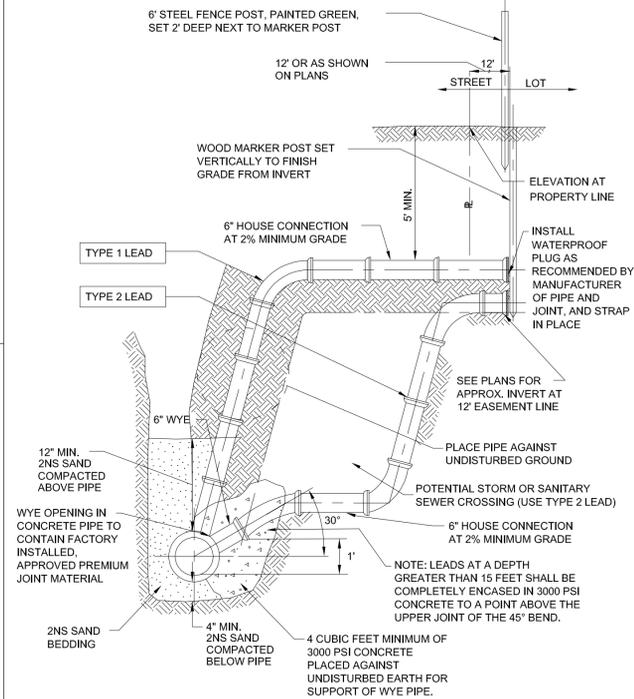
PRE-CAST CONCRETE MANHOLE

1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS.
3. COME TO BE ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5. PROVIDE INTEGRAL BASE WITH PRECAST CONCRETE CHANNELS.
6. WHERE MANHOLES ARE CONSTRUCTED OVER EXISTING SEWERS, POURED IN PLACE OR PRECAST COOKIE AND DOGHOUSE STRUCTURES MAY BE USED IN PLACE OF INTEGRAL BASE.



NO UTILITY STRUCTURES (ie. MANHOLES, CURB BOXES etc.) SHALL BE PLACED IN ANY DRIVEWAY OR SIDEWALK

SANITARY MANHOLE



SANITARY SEWER SERVICE & RISER CONNECTION DETAIL



Pittsfield Charter Township
6201 W. Michigan Ave.
Ann Arbor, MI 48108-9721
48108-9721
Tel. 734.822.3101
www.pittsfield-mi.gov

| | | | |
|---------------------|-----|-------|----------|
| COVER DETAIL UPDATE | MRH | DRW | 14.01.24 |
| TWP REV | BWA | DRW | 11.04.27 |
| MANHOLE UPDATES | BWA | DRW | 10.10.25 |
| UPDATES | TIN | DRW | 10.01.20 |
| Revision | By | Appd. | YY.MM.DD |

Issued By Appd. YY.MM.DD

File Name: SS-01 BWA DRW DRW 07.10.01
Dwn. Chkd. Dsgn. YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SANITARY SEWER DETAILS

Project No. 2075001300 Scale NOT TO SCALE

SHEET: 17-SD2 Revision

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall furnish all labor, materials, and equipment required to construct a water main and necessary appurtenant work as herein specified. The water main shall be installed in the locations as shown on the Plans and shall meet all acceptance tests.

1.02 NOTIFICATION

- A. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department at (734) 882-2110, 24 hours prior to flushing or chlorination of the water main.
- B. CONTRACTOR shall schedule bacteriological testing with the ENGINEER 48 hours prior.
- C. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department 48 hours prior to connecting to an existing water main.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, valves, hydrants and the B-1 Poly Pig. The Contractor shall submit a certification letter for all pipe proposed on the project. The letters shall contain the following: Contractor name, project name, Township name, current date, certification of pipe provided and letterhead of the certifying company.

1.04 TESTING

- A. General
1. CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein. All tests shall be conducted under the supervision of the ENGINEER. All water mains, branches and valves shall be subject to cleaning with a poly-pig, hydrostatic pressure testing, disinfection and bacteriological testing. No acceptance tests shall be conducted until the water main has been installed and backfilled for not less than 30 days. A copy of all test results shall be furnished to the ENGINEER.

2. Hydrostatic pressure testing must be performed in accordance with ANSI/AWWA C600. Disinfection and bacteriological testing must be performed in accordance with ANSI/AWWA C651.

3. CONTRACTOR shall furnish all material and labor to provide for an acceptable full size blow-off to flush the poly-pigs out of the main at the far end of the project not connected to the existing system.

4. Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall, at his own expense, locate and repair the rejected section and retest until it is within the specified allowance.

5. Only Pittsfield Township personnel or the CONTRACTOR under direct supervision of Pittsfield Township personnel may fill or flush lines.

B. Preparation

1. After the pipe has been laid and backfilled as specified, the CONTRACTOR shall fill the line, or a valve section thereof, to be tested with water in such a manner as to expel all air from the pipe. This may be done through fire hydrants at the high points; or, if no hydrant is available at such point, the CONTRACTOR shall make the taps necessary to accomplish the expulsion of all air. At the close of the test, all taps shall be satisfactorily plugged with brass plugs.

C. Sequence

1. All water mains connected to an existing water system shall be flushed, swabbed, chlorinated and bacteriological tested prior to pressure testing. The sequence for acceptance testing shall be:

- a. Flushing with approved B-1 Poly-Pig
- b. Chlorination
- c. Flushing
- d. Bacteriological Testing
- e. Pressure Testing

2. Where mains can be totally isolated from the existing water system with airgaps, pressure testing shall precede chlorination and bacteriological testing. The sequence for acceptance testing shall be:

- a. Pressure Testing
- b. Connect to System
- c. Flushing with approved B-1 Poly Pig
- d. Chlorination
- e. Flushing
- f. Bacteriological Testing

3. If a hydrostatic pressure test fails, the chlorination and flushing process must be repeated after repairs to the system are completed.

D. Flushing

1. All flushing will be conducted by the TOWNSHIP with clean potable water until the water runs clear.

E. Chlorination

1. All new mains and pipe or any existing mains contaminated by the CONTRACTOR shall be chlorinated to a minimum residual chlorine concentration of fifty (50) parts per million with commercial liquid chlorine solution or approved equal. The chlorinated water shall be allowed to stand in the mains for 24 hours. The end of the 24-hour period the chlorinated water at all parts of the mains shall show a free available chlorine residual of not less than twenty-five (25) parts per million. If less than twenty-five (25) parts per million residual is shown at the end of the first 24 hours period, additional chlorine shall be added until a residual of not less than twenty-five (25) parts per million at all parts of the system is shown after a subsequent 24 hour period. The chlorinated water shall then be removed from the mains and the mains flushed with potable water for bacteriological testing. No flushing shall take place between the two required bacteriological testing.

F. Bacteriological Testing

1. The Pittsfield Township Utilities Department will take bacteriological samples of the water in the mains for analysis at two different times. The first samples will be taken 24 hours after the mains have been satisfactorily chlorinated, flushed and filled with potable water. The second sample will be taken 24 hours later. Each sample will be incubated for 48 hours. No flushing shall be done during or between tests, unless supervised and approved by ENGINEER. Two sets of safe consecutive bacteriological samples, collected at least 24 hours apart, must be obtained before placing the water main in service.

2. The CONTRACTOR shall provide a sufficient number of corporation cocks and copper tubing for taking samples. Samples shall not be collected from hoses or fire hydrants.

3. Bacteriological testing must begin on Mondays to allow Pittsfield Township personnel and the testing laboratory a full work week to conduct the testing.

G. Hydrostatic Pressure Testing

1. The CONTRACTOR shall pressure test sections of water main as sections of 2,000 feet or less unless otherwise authorized by the ENGINEER. When permitted to test lengths in excess of 2,000 feet, only the allowable leakage for 2,000 feet will be permitted.

2. All water mains shall be subjected to a hydrostatic pressure of 150 psi based on the elevation of the lowest point in the system. The main shall be maintained under the test pressure for a minimum continuous period of two (2) hours by pumping potable water into the line at frequent intervals. The volume of water so added shall be measured and considered to include the leakage from the main. No pipeline installed will be accepted until the leakage measured is less than 0.092 gallons per inch diameter of the pipe per 1 hour per 1,000 feet.

3. In the event that the leakage exceeds the specified amount, the main shall be carefully inspected for leaks and repaired as necessary. Any cracked or defective pipe, fittings, valves or hydrants discovered shall be removed and replaced with sound material and the test repeated to the satisfaction of the ENGINEER.

4. If the CONTRACTOR chooses to pressure test against an existing valve he assumes the responsibility of meeting the leakage requirements. The CONTRACTOR may at his discretion provide a physical break and cutting in sleeve for pressure testing.

5. Temporary connections (jumpers) between existing water mains and the newly constructed system for testing purposes, shall include a reduced zone backflow preventer to prevent backflow and possible contamination of the public water.

H. Material Tests

1. The CONTRACTOR shall have test of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of water main per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturer's certificate of compliance to the specifications.

2.00 PRODUCTS

A. All products shall be consistent with the current component part submittal sheet posted on the Township website.

2.01 PIPE AND FITTINGS

A. Ductile-iron pipe water main shall meet all the requirements of the latest revision of ANSI/AWWA C151/A21.51. Pipe shall be furnished in eighteen-foot or twenty-foot lengths, unless otherwise required. All joints, to include joints for fittings, valves and hydrants, must be of the push on joint type and compatible nylon joint gaskets. Ductile iron pipe must be designed in accordance with the latest revision of ANSI/AWWA C150/A21.50 to meet requirements for Pressure Class 350.

B. Ductile iron pipe and fittings shall be double-cement lined with an approved bituminous seal coat in accordance with ANSI/AWWA C104/A21.4.

C. Ductile iron fittings shall meet all the requirements of the latest revision of ANSI/AWWA C110/A21.10 for full body fittings and ANSI/AWWA C153/A21.53 for compact fittings for a minimum working pressure of 250 psi and be of the push-on joint type. Flugs, where shown on the plans, shall be solid mechanical joint plug type.

D. Restrained mechanical joints of the wedge action type shall use a follower gland and shall include a restraining mechanism which, when activated, impart multiple wedging action against the pipe, increasing its resistance as the pressure increases. Twist off nuts shall be used to insure proper actuating of the restraining device. Restrained mechanical joints for ductile iron pipe shall be Megalug, Series 1100, or approved equal. Mechanical joints shall be in conformity with the requirements of the latest revision of the ANSI/AWWA C111/A21.11. Bolts and nuts must be type 304 stainless steel.

E. Push-on joints shall meet all requirements of ANSI/AWWA C111/A21.11. Push-on joints shall consist of a ductile-iron bell provided with a recess to receive a circular molder rubber gasket to effect the joint seal. A rubber gasket and sufficient lubricant to assemble the joint shall be furnished with each joint. The lubricant shall have no deleterious effect upon the color, taste or odor of potable water and shall not be corrosive to either the pipe or gasket. Pipe furnished with push-on type joints shall be equal in strength and leak tightness to pipe furnished with mechanical joints as specified when installed under identical conditions, and shall meet all other requirements of these specifications. In addition to the above requirements, the gasket and lubricant shall conform to the latest revision of ANSI/AWWA C111/A21.11. When it is necessary to utilize a locking mechanism for a push-on joint upstream or downstream of a restrained mechanical joint, field-lok gaskets or equal shall be utilized and shall be used in conformance with DIPRA Standards for restraint distance from a restrained mechanical joint fitting.

F. All pipe and fittings shall be manufactured in the United States of America.

G. The ENGINEER shall witness the delivery and unloading of all pipe and collect the appropriate manufacturer's certificate of compliance per Section 1.04 of this Specification.

2.02 VALVES

A. All valves installed under this Specification shall conform to the applicable requirements of ANSI/AWWA C500, C504 and C509 standards governing construction materials and workmanship. Each valve shall carry the name or trademark of the manufacturer. All valves shall have operating nuts that turn to the right (clockwise) to open.

B. Resilient-Seated Gate Valves

1. Resilient seated gate valves shall conform to the applicable requirements of ANSI/AWWA C515. Valves shall have a minimum working pressure of 250 psi. The gate shall be ductile iron encased in a bonded synthetic rubber to form resilient seating surfaces. Stem shall be bronze with a non-rising design and double O-ring packing. Joints shall be push-on type.

2. Resilient Seated Gate Valves shall be manufactured by American Flow Control or Clow.

C. Tapping Sleeves and Valves

1. Tapping sleeves shall be full length of heavy-duty stainless steel construction designed for use with the type of pipe to be tapped. Tapping sleeve flange and body shall be type 304 stainless steel. Bolts and nuts shall be 304 stainless steel. Gasket shall be full circumferential SBR compounded for water service. Tapping sleeve shall contain a test plug to assure seal prior to tapping. Tapping sleeve shall be JCM Industries 432; Romac Industries SST, Ford FAST, Powerseal 3490AS; Dresser 630 or equal.

2. Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve.

3. The tapping sleeves and valves shall be subjected to a hydrostatic pressure of 200 psi. The sleeves and valves shall be maintained under pressure for a minimum continuous period of 5 minutes by pumping potable water into the sleeve. Upon any visual leakage observed by the ENGINEER, the tapping sleeve and valve shall be removed and replaced, and the test repeated at the CONTRACTOR'S expense to the satisfaction of the ENGINEER.

D. Corporation Stops

1. Corporation stops used for insertion into mains shall be ball valve type. All stops shall have no lead brass bodies, keys, stem washers and nuts. Inlet threads shall conform to the latest revision of AWWA C800. The outlet connection shall be of the compression type to receive copper service pipe.

E. Valve Boxes

1. Valves boxes shall be 5-1/4-inch and be of cast-iron construction. They shall be of three-piece, screw-type adjustment design. All valve boxes shall be installed flush with the top of the proposed site grade. Cover shall be designed to be removed easily to provide access to the valve. The base shall not rest upon the valve assembly. Valve boxes shall be Tyler 8680 Item DD with number 6 base, or equal.

F. Valve Extensions

1. All gate valves with operating nuts at a distance greater than 6.5 feet below ground surface shall be provided with an extension stem. The length of the extension stem shall reach within 6.5 feet of the ground surface. Details of the extension system and method of installation shall be approved by the ENGINEER prior to installation.

G. Post Indicators and Valves

1. Post indicators, when specified, shall be American Flow Control series A240 or Clow series 2945A with aluminum plates indicating OPEN and SHUT. Post indicators shall open left.

2. Post indicator valves shall be American Flow Control Model 2500 or Clow model F-6120. All valves shall open left.

3. Post indicators and their corresponding valves must be made by the same manufacturer.

4. Bollards must be placed to protect post indicators, except as specified by the ENGINEER.

5. Bollards shall be 4-inch diameter galvanized schedule 40 steel posts 36 to 48 inches high with minimum depth of 24 inches. The posts shall be set in and filled with 3000 psi concrete. Bollards protecting hydrants and PIVs shall be painted red.

G. Post Indicators and Valves

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2. Post indicator valves shall be American Flow Control Model 2500 or Clow model F-6120. All valves shall open left.

3. Post indicators and their corresponding valves must be made by the same manufacturer.

4. Bollards must be placed to protect post indicators, except as specified by the ENGINEER.

5. Bollards shall be 4-inch diameter galvanized schedule 40 steel posts 36 to 48 inches high with minimum depth of 24 inches. The posts shall be set in and filled with 3000 psi concrete. Bollards protecting hydrants and PIVs shall be painted red.

G. Post Indicators and Valves

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2. Post indicator valves shall be American Flow Control Model 2500 or Clow model F-6120. All valves shall open left.

3. Post indicators and their corresponding valves must be made by the same manufacturer.

4. Bollards must be placed to protect post indicators, except as specified by the ENGINEER.

5. Bollards shall be 4-inch diameter galvanized schedule 40 steel posts 36 to 48 inches high with minimum depth of 24 inches. The posts shall be set in and filled with 3000 psi concrete. Bollards protecting hydrants and PIVs shall be painted red.

G. Post Indicators and Valves

1. Post indicators, when specified, shall be American Flow Control series A240 or Clow series 2945A with aluminum plates indicating OPEN and SHUT. Post indicators shall open left.

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5. Bollards shall be 4-inch diameter galvanized schedule 40 steel posts 36 to 48 inches high with minimum depth of 24 inches. The posts shall be set in and filled with 3000 psi concrete. Bollards protecting hydrants and PIVs shall be painted red.

2.03 GATEWELLS

A. Gatewells shall conform to the latest revision of ASTM C478 for Precast Reinforced Concrete Manhole Sections. Section joints shall be rubber gasketed and shall conform to ASTM C990. Cone sections shall be eccentric, with an offset step configuration.

B. All gatewell components shall have the name of the manufacturer stenciled on the inside. The lettering shall be a minimum of 4-inches high.

C. Gatewells constructed over an existing water main shall have a doghouse mudded to an 8-inch thick cookie. All other gatewells shall have precast integral base sections.

D. Mortar for masonry or plastering outside of gatewells shall be made of one part of Portland Cement to two parts fine aggregate. Mortar materials and mixing shall correspond, in general, to those for concrete. All openings in gate wells shall be closed with brick and mortar in a manner that will make them watertight.

E. Gatewell steps shall be reinforced polypropylene coated steel. They shall be M.A. Industries models PS1-PF or PS1-B, or approved equal.

2.04 GATEWELL FRAMES AND COVERS

A. Gatewell frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitable notched for convenient removal of the cover.

B. Frames and covers shall be East Jordan Iron Works Model 1040Z frame with 1040 A cover. Each cover shall have the Pittsfield Township logo and the letters "PITTSFIELD TWP WATER" cast integrally into the cover.

C. All frames and covers shall be coated at the place of manufacturer with coal tar pitch varnish or other asphaltum coating approved by the ENGINEER.

2.05 GATEWELL CONNECTIONS

A. Water pipe to gate well connections shall be through a watertight flexible pipe-to-manhole connector, which shall be securely clamped into a core-drilled port. Pipe ports shall be core-drilled at the point of manufacturer and shall be accurately located within 1/2-inch of the proposed water main centerline. Flexible pipe-to-manhole connectors shall meet the requirements of ASTM C923 and shall be NFC, Kon-N-Seal, or equal.

B. All non-rubber components including wedges, bands and pipe clamps shall be stainless steel.

2.06 GATEWELL ADJUSTMENTS

A. All final grade adjustment of gatewell cover and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by Ladtech, Inc., or approved equal. The adjustment rings shall be manufactured from polyethylene plastic meeting the requirements of ASTM D4976. Brick adjustments are not acceptable.

B. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.

C. Each adjustment ring shall be sealed with a 3/16 to 1/4-inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet the requirements of ASTM C990.

D. All castings and adjustment rings shall be securely fastened to the cone of the structure with four 3/8-inch threaded rods. The rods shall be galvanized or stainless steel anchored to the structure with Redhead Tru-bolt concrete anchors, or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.

E. When the depth of the gate well requires an adjustment greater than the maximum allowed, the CONTRACTOR shall provide additional pre-cast gate well barrel sections required to maintain acceptable chimney heights.

2.07 HYDRANTS

A. Fire hydrants shall comply with the latest revision of ANSI/AWWA C502. Hydrants shall be compression type to open with the pressure. They shall have a 5-1/4" mechanical joint inlet. Hydrants shall have two 3-1/2" (4.05" O.D.) pumper connections with National Standard 7-1/2 threads per inch. All hydrants shall have City of Ann Arbor standard thread pattern.

B. Fire hydrants shall have an inside barrel dimension of not less than 7.375" I.D. from top to bottom. The 1-1/8" pentagon operating nut shall open left (counter clockwise).

C. All nozzles shall be on a removable head with a flange so that they may be rotated by changing the position of the flange.

D. Hydrant shall be fully bronze mounted, including top of the operating stem where it passes through the double O-ring seal in the bronze packing gland. The forged operating stem in the base and the valve seat shall also be of bronze. The molded valve shall be of composition rubber and the cast iron valve clamps shall be packed with O-ring seals and held tight to the stem by a threaded bronze hex retainer ring and threaded bronze locknut, anchored with set screws.

E. Hydrant shall be designed for 150 psi working pressure and tested to 300 psi. Those portions of the hydrant above grade shall have two coats of red enamel. All unpainted surfaces shall have two coats of coal tar pitch varnish.

F. The hydrants shall be EJIW WaterMaster 5BR-250 with mechanical joint connections and break flange barrel with standard head.

G. Hydrant bolts located below grade shall be type 304 stainless steel

H. All hydrants shall have a 4" Harrington Integral Hydr-Storz (HHS) adaptor. The HHS shall meet the requirements of AWWA C502 regarding material and pressure testing. Storz nozzle shall have a brass metal face and hard anodized ramps and lugs. The aluminum finish shall be hardcoat anodized to Mil-A-8625F, type 3 dark gray. The adaptor shall be made from forged or extruded 6061-T6 aluminum.

I. The blind cap shall have hard anodized aluminum Storz ramps and lugs, made of forged or extruded 6061-T6 aluminum, the cap shall be equipped with suction seal. The cap shall be connected to the adapter or the hydrant with 0.125 vinyl coated aircraft cable.

J. Fire hydrant extensions shall be manufactured by the hydrant manufacturer for use with the model hydrant being installed.

K. Hydrants adjacent to truck routes on commercial developments shall be protected by bollards.

2.08 SERVICE LEADS

A. Pipe for service leads 1-1/4 inch to 2-inch shall be soft annealed Type K copper. Service leads 4-inch to 8-inch shall be Pressure Class 350 Ductile Iron, Double cement lined.

B. Curb Stops

1. Curb stops used for service connections shall be ball valve type. All parts shall be no lead brass. Both the inlet and outlet connections shall be of the compression type to receive copper service pipe. Curb stops shall be consistent with the most current shop drawing checklist posted on the Township website.

C. Curb Boxes

1. Curb boxes shall be the Bibby Screw Style V010 with S169 top, V201 bottom, V223 extension, and V240 water cover. All curb boxes shall be coated inside and out with a tar base enamel. The minimum bury shall be 5'-0" (60") and the maximum 6' (72"). Curb boxes shall be consistent with the most current shop drawing checklist posted on the Township website.

D. Couplings

1. Couplings used for service connections shall be located outside the pavement and more than 10 feet from any building wherever possible. They shall have a three part union, and both connections shall be of the compression type to receive copper service pipe. All parts shall be no lead brass.

2. All service connections between two copper service pipes (two-inch or less in diameter) located under the pavement or within 10 feet of a building shall be connected using wrought copper, solder-sweat type couplings conforming to ASME B16.18 or ASME B16.22. Fittings shall bear made in USA labels. Joining of copper piping shall be a solder-sweat connection using lead free Siflos. The use of 95-5, Tin-Antimony or equivalent solders will not be allowed.

2.09 TRACER WIRE

A. Tracer wire to be used on open cut pipe shall be AWG #12 single strand copper with blue 30 mil HDPE insulation. Connections shall be made using 3M DBR-6 wire connectors, or equal.

2.10 POLYETHYLENE ENCASEMENT

A. All ductile iron pipe and fittings must be polyethylene encased. In addition, the initial 24-inches of copper service lead must be encased from the corporation stop. Polyethylene encasement must be manufactured in accordance with the requirements of the latest revision of ANSI/AWWA C105/A21.5.

B. Polyethylene Encasement shall be black linear low-density polyethylene with a minimum thickness of 8 mils.

C. The wrap shall overlap the joint by 12 inches to either side and be secured to the pipe with polyethylene adhesive tape.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill shall conform to the Earthwork specification.

3.02 PIPE INSTALLATION

A. The installation of ductile iron water main must conform to the requirements of ANSI/AWWA C600.

B. Any pipe damaged in transport or handling shall be rejected and removed from the site of the work.

C. Before lowering in the trench, and while suspended, each pipe and fitting shall be inspected for defects. Defective, damaged or unsound pipe shall immediately be removed from the construction site. The interior of each pipe shall be inspected for cleanliness and cleared of all dirt and foreign matter before being lowered into the trench.

D. In handling and placing ductile iron pipe and fittings, no metal shall be used in contact with the inside of the pipe to fit or support the pipe. The pipe shall be moved only through the use of bell slings or automatic release type pipe tongs. Care shall be taken not to injure the pipe or pipe coating, and no damaged or imperfect pipe shall be used in the work except that minor damage to pipe coating may be repaired subject to the review of the ENGINEER.

E. Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of laying. After a length of pipe is placed in the trench, the spigot shall be centered in the bell of the adjacent pipe; the pipe shoved into position and brought to a true alignment. It will then be secured with sand backfill tamped under and on each side of the pipe, except at bell holes. No earth or other foreign matter shall be allowed to enter the joint space.

F. All excavation and backfill above the pipe shall conform to specifications under Earthwork and as shown on the Drawings.

G. A minimum of 18-inches vertical clearance shall be provided between the water main and any existing underground facility, unless otherwise approved by the ENGINEER. Whenever a main is installed under any existing utility line such as gas, buried electric power, telephone line, sewer or water, provisions shall be made to properly support or distribute any concentrated load to avoid settlement and possible failure of either main. Such provisions shall consist of concrete bedding of the main, complete concrete encasement, or some other method as shown on the plans. Water mains passing under sewers, in addition, shall be protected by providing:

1. A vertical separation of at least 18-inches between the bottom of the sewer and the top of the water main.

2. Adequate structural support for the sewer to prevent excessive deflection of joints and settlement of the sewer about the water main, i.e., a concrete saddle under the pipe with a span length extending to undisturbed earth bearing.

H. Water mains shall be installed at least 10 feet horizontally from any existing or proposed gravity sanitary or storm sewer, septic tank, or subsol treatment system. The distance shall be measured edge to edge.

I. In assembly of push-on or shove type joints, the bell socket recess and the gasket shall be wiped clean and the gasket placed properly in position. A thin film of lubricant shall then be applied to the surface of the gasket to come into contact with the entering pipe. The plain end of the entering pipe shall be cleaned and then entered and forced home to the base of the socket.

J. Where necessary to cut pipe, cutting shall be done with approved tools and cut ends of pipe shall be square and regular. Cutting shall be done in a manner to avoid damage to lining and coating. Minor damage may be repaired subject to review of the ENGINEER.

K. To prevent trench water from entering the pipe, joints, which for any reason may not be completed as the pipe is laid, shall be thoroughly packed with approved material, in a manner to make them watertight. Open ends of fittings shall be tightly closed with approved plugs and well packed, as shall the end of the last pipe laid whenever work is not in progress.

L. Each pipe shall be laid accurately to the line and grade shown on the Plans. Whenever deflections at joints are required by changes in grade or alignment or to plumb valve stems, the deflection at any bell and spigot joint shall not exceed that which will cause the spigot end of pipe to be away from home in the bell of the adjacent pipe a distance of 1/4 inch at the point of greatest opening.

M. The deflection at any mechanical joint shall not exceed three-quarters of the maximum deflection recommended by the manufacturer or 3 degrees, whichever is more conservative of the joint used.

N. The CONTRACTOR shall not be entitled to any additional compensation because depth is more than specified at certain locations or due to clearances at manholes, or due to unforeseen obstacles, or occasioned in order to avoid undue changes in grade.

O. Pipe shall be laid at depths to provide minimum cover of 5'-6" over the top of the pipe unless otherwise noted on the Drawings or elsewhere in these specifications.

3.03 GATE VALVES AND WELLS

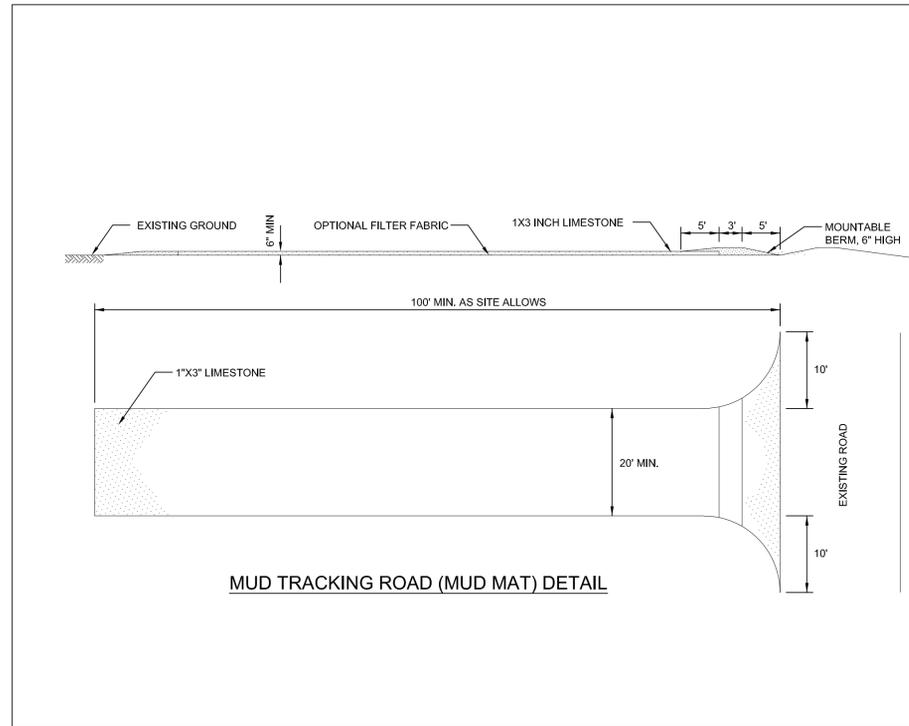
A. All pre-cast section joints and lift holes shall be pointed and plugged, inside and outside, with mortar.

B. Gate valves shall be of the size and installed at the location as shown on the plans. They shall be set square with the line of the main and unless otherwise directed by the Township ENGINEER, all gate valves shall be set with stems plumb. At each side of gate valve, the CONTRACTOR shall furnish and install a 1-inch corporation stop on the main as shown on the Standard Details.

C. All gate valves with operating nuts at a distance greater than 6.5 feet below ground surface shall be provided with an extension stem.

3.04 HYDRANTS

A. Fire hydrants shall be constructed in accordance with the details shown on the plans. Finish grade



MUD TRACKING ROAD (MUD MAT) DETAIL

**PITTSFIELD CHARTER TOWNSHIP
SOIL EROSION AND SEDIMENTATION CONTROL NOTES**

- GENERAL**
- The contractor shall implement and maintain the soil erosion control measures as shown on the plans at all times during construction on this project. Any modifications or additions to the soil erosion control measures due to construction or changed conditions, shall be complied with as required or directed by the owner, project engineer or Pittsfield Township.
 - All soil erosion and sedimentation control work shall conform to the permit requirements of Pittsfield Township and the laws of the State of Michigan.
 - A NPDES construction activity permit is required for all sites greater than 5 acres.
 - Daily inspections shall be made by the contractor. Periodic inspections may be made by the owner/project engineer/Township to determine the effectiveness of erosion and sedimentation control measures. Any necessary corrections shall be made without delay.
 - Erosion and sedimentation from work on the site shall be contained on the site and not be allowed to collect on any off-site areas or in waterways.
 - All mud/dirt tracked onto roads from the site due to construction, shall be promptly removed by the contractor.
 - Restoration of all disturbed areas, including placement of topsoil, seed, fertilizer and mulch and/or sod shall be done within 5 days of the completion of final grade.
 - Construction operations shall be scheduled and performed so that preventative soil erosion control measures are in place prior to excavation in critical areas and temporary stabilization measures are in place immediately following backfilling operations.
 - Special precautions will be taken in the use of construction equipment to prevent situations that promote erosion.
 - Proper dust control shall be maintained during construction by use of water trucks and/or chloride as required.
 - The contractor shall be responsible for maintaining all temporary soil erosion control measures and removal of some upon authorized completion of project. Completion of project will not be authorized until all site work, home building, road work and utility construction is complete and all soils are stabilized.
 - The contractor shall not grade in existing wetland or conservation areas to be protected. Silt fence shall be installed and maintained adjacent to existing wetland and conservation areas to prevent grading, erosion and sedimentation into them.
 - Tree protection fencing must remain intact until restoration of the site is complete.

SEQUENCE OF CONSTRUCTION

- Install sediment fence and tree protection fencing prior to any grading operation.
- Install mud-tracking pad.
- Construct temporary sediment/detention basin.
- Place topsoil, fertilizer, seed and mulch over the entire detention basin area.
- Rough grade site, stockpile topsoil and begin building construction.
- Install storm drainage system including riprap and parking lot inlet filters and detention basin standpipe.
- Maintain erosion and sedimentation control measures, as required.
- Install sanitary sewer and water systems.
- Bring pavement areas to sub-base grade, place sub-base and bituminous pavement.
- Install franchised utilities.
- Finish grade, redistribute topsoil, seed and mulch all disturbed areas.
- Remove any accumulated sediment within the detention basin and replace clean washed stone around standpipe.
- Complete construction of site.
- Insure all soil is stabilized. Remove all temporary soil erosion control measures.

SEEDING/SOD

- Seed or sod in accordance with project specifications.
- All areas of disturbed earth that are not to be paved or sodded shall have 4 inches of topsoil, seed, fertilizer and mulch.
- Immediately after seeding, mulch all seeded areas with unweathered small grain straw (preferably wheat) or hay spread. Spread uniformly at the rate of 1 1/2 to 2 tons or 100 pounds (2 to 3 bales) per 1,000 square foot. This mulch should be anchored with a disc-type mulch-anchoring tool.
- Any disturbed area not paved, seeded or mulched, sodded or built upon by November 15, is to be mulched in the manner as specified above, in order to provide soil erosion protection during the winter and early spring.
- All erosion and sedimentation control prevention procedures and structures are to comply with the Standards and Specifications for soil erosion and sediment control of the Washtenaw County Soil Conservation District.
- Drainage ditches and slopes steeper than 1:4 (25%) shall be stabilized with erosion control blankets.
- Slopes that do not take upon initial seeding must be re-seeded and stabilized with erosion control blankets.
- Where excavation has been through lawn areas, the CONTRACTOR shall restore the disturbed area by placing topsoil and seeding or sodding over the final backfill material.

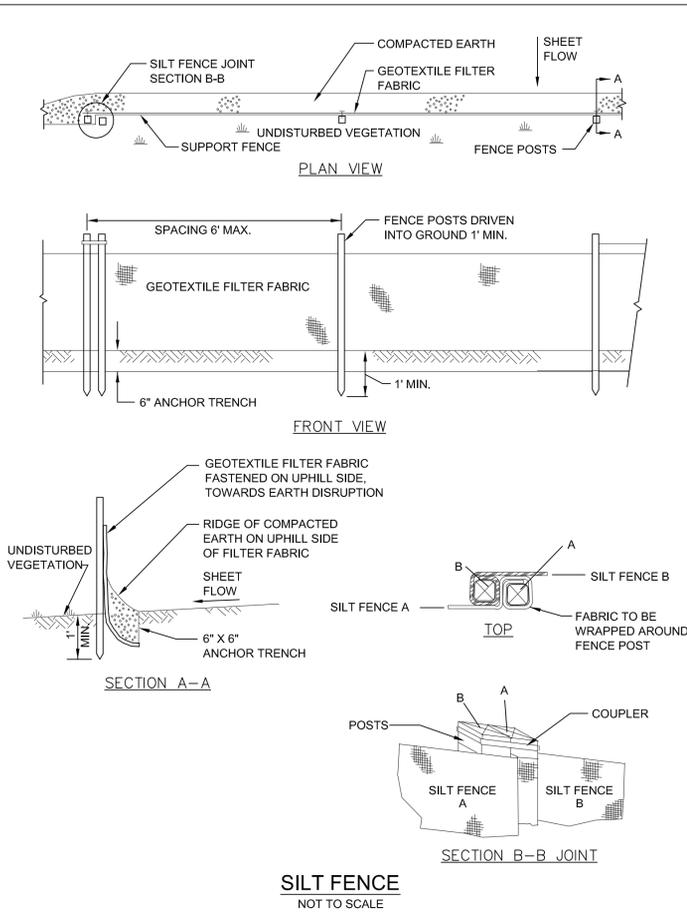
CATCH BASIN/MANHOLE PROTECTION

- Protect storm sewer catch basins with Siltsack, or approved equivalent as follows:

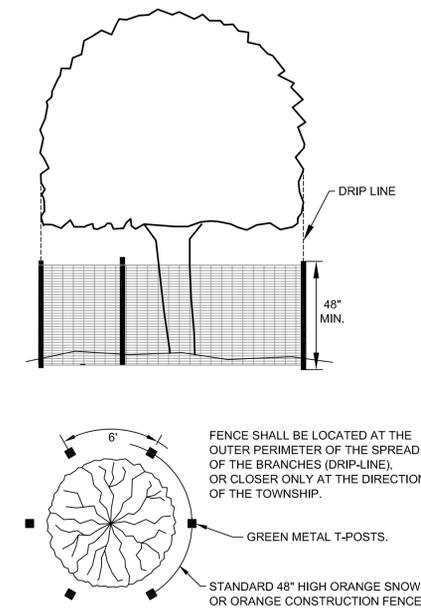
ROADS

- During construction, all roads shall be protected from unvegetated areas washing onto road surfaces by placement of silt fence behind curb or a 10 foot wide straw mulch bank behind the curb or other approved method and/or as shown on the plans.
- During construction of any portion of the project, roads shall be maintained free of dirt, silt and construction debris.

Pittsfield SEC 9/22/2009

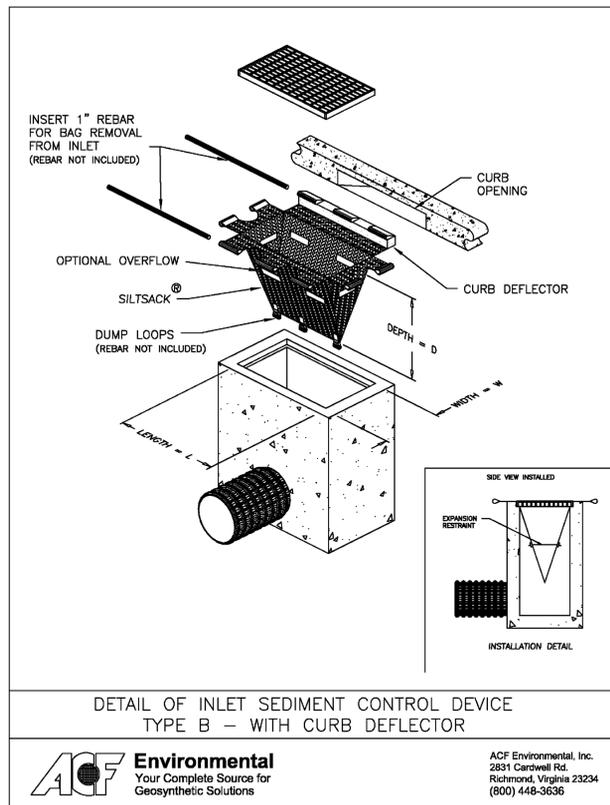


SILT FENCE
NOT TO SCALE



TREE PROTECTION FENCE DETAIL
NOT TO SCALE

- NOTES:
- ALL TREES TO BE REMOVED WILL BE IDENTIFIED BY RED FLAGGING.
 - TREE PROTECTION FENCING IS TO BE ERECTED PRIOR TO ANY EARTHWORK OR CONSTRUCTION AND IS TO REMAIN IN PLACE UNTIL CONSTRUCTION AND GRADING IS COMPLETE.
 - ALL DEBRIS, FILL, EQUIPMENT OR MATERIAL IS TO BE KEPT CLEAR OF AREA WITHIN PROTECTIVE FENCE. NO CLEANING OF EQUIPMENT OR MATERIAL OR STORAGE OR DISPOSAL OF ANY MATERIAL WITHIN THE DRIP LINE OF ANY TREES TO BE SAVED.



DETAIL OF INLET SEDIMENT CONTROL DEVICE
TYPE B - WITH CURB DEFLECTOR

ACF Environmental, Inc.
Your Complete Source for
Geosynthetic Solutions

ACF Environmental, Inc.
2831 Carowell Rd.
Richmond, Virginia 23234
(800) 448-3636

**SILTSACK®
SPECIFICATIONS**

NOTE: THE SILTSACK® WILL BE MANUFACTURED FROM A WOVEN POLYPROPYLENE FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS.

REGULAR FLOW SILTSACK®

(FOR AREAS OF LOW TO MODERATE PRECIPITATION AND RUN-OFF)

| PROPERTIES | TEST METHOD | UNITS | |
|-------------------------|-------------|-------|------------------|
| GRAB TENSILE STRENGTH | ASTM D-4632 | | 300 LBS |
| GRAB TENSILE ELONGATION | ASTM D-4632 | | 20 % |
| PUNCTURE | ASTM D-4853 | | 120 LBS |
| MULLEN BURST | ASTM D-3786 | | 800 PSI |
| TRAPEZOID TEAR | ASTM D-4533 | | 120 LBS |
| UV RESISTANCE | ASTM D-4355 | | 90 % |
| APPARENT OPENING SIZE | ASTM D-4751 | | 40 US SIEVE |
| FLOW RATE | ASTM D-4491 | | 45 GAL/MIN/50 FT |
| PERMITTIVITY | ASTM D-4491 | | 0.55 SEC -1 |

*** HI-FLOW SILTSACK®**

(FOR AREAS OF MODERATE TO HEAVY PRECIPITATION AND RUN-OFF)

| PROPERTIES | TEST METHOD | UNITS | |
|-------------------------|-------------|-------|------------------|
| GRAB TENSILE STRENGTH | ASTM D-4632 | | 265 LBS |
| GRAB TENSILE ELONGATION | ASTM D-4632 | | 20 % |
| PUNCTURE | ASTM D-4853 | | 135 LBS |
| MULLEN BURST | ASTM D-3786 | | 420 PSI |
| TRAPEZOID TEAR | ASTM D-4533 | | 45 LBS |
| UV RESISTANCE | ASTM D-4355 | | 90 % |
| APPARENT OPENING SIZE | ASTM D-4751 | | 80 US SIEVE |
| FLOW RATE | ASTM D-4491 | | 90 GAL/MIN/50 FT |
| PERMITTIVITY | ASTM D-4491 | | 1.5 SEC -1 |

OIL-ABSORBANT SILTSACK®

(FOR AREAS WHERE THERE IS A CONCERN FOR OIL RUN-OFF OR SPILLS)

DEPENDING ON YOUR PARTICULAR APPLICATION, THE SILTSACK CAN BE MADE FROM EITHER ONE OF THE ABOVE FABRICS WITH AN OIL-ABSORBANT PILLLOW INSERT OR, MADE COMPLETELY FROM AN OIL-ABSORBANT SILTSACK WITH A WOVEN PILLLOW INSERT.

SILTSACK DISTRIBUTORS:

PRICE & COMPANY
(www.priceandcompany.com)

METRO GRAND RAPIDS, MI
425 36TH STREET SW
WYOMING, MI 49548-2108
1-800-248-8230

METRO DETROIT, MI
28165 WALL STREET
WIXOM, MI 48393-3525
1-866-960-4300

(* HI-FLOW SILT SACK SHALL BE USED FOR ALL APPLICATIONS WITHIN
PITTSFIELD TOWNSHIP)

SILTSACK
NOT TO SCALE



Pittsfield Charter Township
6201 W. Michigan Ave.
Ann Arbor, MI 48108-9721
48108-9721
Tel. 734.822.3101
www.pittsfield-mi.gov

| Revision | By | Appd. | YY.MM.DD |
|----------|-----|-------|----------|
| SILTSACK | BWA | DRW | 12.01.03 |
| TWP REV | BWA | DRW | 11.04.27 |
| UPDATES | TTN | DRW | 10.01.20 |

Issued By Appd. YY.MM.DD

File Name: SE-01 TTN DRW DRW 07.10.01

Permit-Seal Dwn. Chkd. Dsgn. YY.MM.DD

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SOIL EROSION DETAILS AND NOTES

Project No. 2075001300 Scale NOT TO SCALE

SHEET:
21-SD6

Revision

Earthwork

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall perform all excavation and backfilling necessary to complete the work. This shall include the excavation of earth and rock, the removal and disposal of unsuitable material, dewatering, placement of suitable fill and backfill material, pipe boring and jacking, all quality assurance testing, and the restoration and final grading for all earth surfaces.

1.02 WORK WITHIN RIGHTS-OF-WAY

A. Where the governmental bodies having jurisdiction of the streets or rights-of-way have specific specifications relating to the requirements for work within their jurisdiction, such requirements must be met as a minimum requirement, and if these Specifications impose further limitation on the work, they shall also be met as the required work standard.
 B. During all operations of the CONTRACTOR in the streets and roadways, the CONTRACTOR shall maintain barricades, lights, and warning signs as required by the agency having jurisdiction.

1.03 WORK WITHIN EASEMENTS

A. During construction within any easements, the CONTRACTOR shall confine himself to the limits shown on the Plans. He shall notify property owners in advance of moving equipment on easements and use of the access routes which will be designated by the OWNER. The OWNER will cooperate in working out the details of access. The topsoil over the trench shall be removed and carefully replaced upon completion of the work. The backfill of the trench in the easement may be left slightly high to provide for any slight residual settlement. Any trees, shrubs, or bushes removed shall be replaced to the satisfaction of the property owner.

1.04 SOIL BORINGS

A. Soil boring results, if taken on a site, are appended to these Specifications with locations noted. Boring logs are shown to be generally representative of the site and to assist in the design and construction of the work.

2.00 PRODUCTS

2.01 BACKFILL MATERIAL

A. For areas not requiring "granular backfill" material, backfill shall be of the excavated material, with the exception that materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, boulders and other objectionable and non-packing earth shall be excluded from the backfill and removed from the site. Stone larger than 3 inches in any dimension shall be excluded from the backfill and removed from the site by the CONTRACTOR.
 B. Where "granular material" backfill is required as specified herein, backfill material shall be defined as a material meeting granular material Class II as defined in 2003 MDOT 902.08.
 C. All utilities within road right-of-way corridor (existing or proposed) shall be backfilled with MDOT CL II granular material compacted to 95% maximum unit weight.
 D. All utilities shall be installed with 2 NS sand bedding or better.

2.02 ENCASING PIPE

A. Steel encasing pipe for boring and jacking shall conform to the requirements of either, ASTM A53, Type E or S, Grade B or ASTM A139, Grade B.
 B. Steel encasing pipe used under channels and highways shall meet the requirements of the governmental agency having jurisdiction and the following minimum requirements:

| Nominal Diameter (Inches) | Maximum Wall Thickness |
|---------------------------|------------------------|
| Under 13 | 0.188 inches |
| 13-24 | 0.250 inches |
| 25-36 | 0.312 inches |
| 42 | 0.438 inches |
| 48 | 0.500 inches |
| 54 | 0.563 inches |

C. Steel encasing pipe used under railroads shall meet the requirements of the railroad and the following minimum requirements:

| Minimum Wall Thickness (inches) | | |
|---------------------------------|----------------------------------|------------------------|
| Nominal Diameter (Inches) | Coated or Cathodically Protected | Uncoated & Unprotected |
| Under 14 | 0.180 | 0.251 |
| 14-16 | 0.219 | 0.282 |
| 18 | 0.250 | 0.313 |
| 20 | 0.281 | 0.344 |
| 22 | 0.312 | 0.375 |
| 24 | 0.344 | 0.407 |
| 26 | 0.375 | 0.438 |
| 28-30 | 0.406 | 0.469 |
| 32 | 0.438 | 0.501 |
| 34-36 | 0.469 | 0.532 |
| 38-42 | 0.500 | 0.563 |
| 48 | 0.563 | 0.626 |

D. Casing pipe joints shall be welded to form a leak-proof continuous casing.
 E. The inside diameter of casing pipe shall be at least 2 inches greater than the largest outside diameter of the casing pipe joints or couplings for casing pipe less than 6 inches in diameter, and at least 4 inches greater than the largest outside diameter of the carrier pipe joints for casing pipe 6 inches and over in diameter, unless otherwise shown on the Plans.
 F. The steel casing pipe shall be of smooth interior and shall be placed accurately to line and grade, allowing for the encased pipe thickness and supports under each length of encased pipe.

3.00 EXECUTION

3.01 GENERAL EXCAVATION

A. Excavation shall be performed by any practicable method consistent with the integrity and protection of the work and neighboring structures, workmen, and the public. Topsoil shall be separately removed and stockpiled for reuse.
 B. All excavation, except where necessary to tunnel, bore or jack under roads, railroads, tree roots and other obstructions within the limits indicated on the Plans, may be open cut from the surface. Tunneling or boring under trees shall be considered as incidental to construction and will not be considered as cause for request for additional payment.
 C. Foreign material or unsuitable foundation material encountered such as wood, boulders, etc., which obstruct the excavation, shall be removed. Such materials found at the bottom of the excavation shall be removed and the foundation restored with approved materials.
 D. If excess excavation is made or the material becomes disturbed so as to require removal beyond the prescribed limits, the resulting space shall be filled with selected material tamped into place, in not more than 6-inch layers to the satisfaction of the ENGINEER, before the construction work proceeds. At the direction of the ENGINEER, the excess excavation may be filled with 2000 psi concrete at the CONTRACTOR'S expense.
 E. The excavation shall be kept dry during the work. Where water is encountered in the excavation, it shall be removed by pumping or well points. All necessary precautions shall be taken to prevent damage to existing wells and to completed or partially completed structures. The CONTRACTOR shall be responsible for all damages caused by him due to inadequate or improper protection.
 F. The CONTRACTOR shall take ample precautions to protect all trees and ornamental shrubbery not within the limits of the construction areas, or within the construction areas shown on the Plans to be retained from injury by workmen, equipment, or any other agencies connected with the work, including subcontractors. Such protection shall be provided during the progress of the excavation, grading, or other phases of the work as necessary. Such trees or shrubbery shall be surrounded by protective posts or fencing before construction begins, when in judgment of the ENGINEER, such precautionary measures are necessary. If, as a result of any phase of the work, trees are damaged or it is necessary to remove limbs in the way of construction, the repair of the damage and such limb removal shall be done by the CONTRACTOR as directed by the ENGINEER. All costs for the protective work shall be borne by the CONTRACTOR as incidental to the Contract work.
 G. Any excavation not backfilled at the end of each day must be clearly marked and surrounded by appropriate safety fencing as directed by the ENGINEER. If directed by the ENGINEER, the CONTRACTOR shall cover the open excavation with a steel plate and light the excavated area.

3.02 EXCAVATION FOR SEWERS AND WATER MAINS

A. Trenches shall be excavated to the depth required with allowance for bedding the pipe. The trench shall be cut wider and deeper at each pipe joint location to provide for properly completing the pipe joint and to relieve the joint of all loadings.
 B. The width of the trench at the top of a rigid pipe shall be sufficient to allow the pipe to be laid and jointed properly and shall provide for a minimum net clearance of 6 inches and a maximum net clearance of 12 inches on each side of the barrel of the pipe and to allow the backfill to be placed and properly compacted.
 C. The width of trench at the top of a flexible pipe backfill when using concrete bedding shall be sufficient to allow the pipe to be laid and jointed properly with the minimum net clearance of 12 inches and a maximum net clearance of 18 inches on each side of the barrel of the pipe.
 D. Where the conditions of the ground require or where the work is in close proximity of existing structures, the sides of excavation shall be securely held by bracing and/or sheeting which may be removed in units when the level of the backfill has reached a point where it is safe to pull the sheeting without disturbing the protected feature. No sheeting, bracing, or other timber shall be left in the excavation upon the completion of the main or other structures, except with the specific review and direction of the ENGINEER.
 E. Other underground mains, sewers or structures encountered in the excavation shall be adequately supported during the CONTRACTOR'S operations, and before backfilling, shall be given permanent support as directed by the ENGINEER to meet the standards or requirements of the owning utility or agency.
 F. Water, sewer, gas and other utility services disturbed by the CONTRACTOR in his operations shall be repaired or replaced in a manner equal to the original condition by the CONTRACTOR at his own expense. Where these services are encountered and are undamaged, they shall be supported and/or protected by the CONTRACTOR at his expense against later settlement and/or damage after backfill. The CONTRACTOR shall consult the agency or the utility firm having jurisdiction over any duct line, gas main, etc., which may cross the excavation to determine method of supporting such duct or pipe.
 G. All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve manhole covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clean, or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed except as otherwise provided for herein on a temporary basis.

3.03 EXCAVATION FOR STRUCTURES

A. Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for form construction and for practicable construction methods to be followed.
 B. Requirements for excavation of sewers and water mains shall also apply to this Section.

3.04 EXCAVATION FOR PAVED SURFACES

A. In excavating around manholes and catch basins or inlets, care shall be exercised to avoid removing the casings and pushing dirt into the structures. Dirt pushed into manholes, catch basins or inlets by the CONTRACTOR'S operations shall be immediately removed so that the dirt will not be carried into the sewer by the flow of sewage or storm water.
 B. The CONTRACTOR shall take ample precautions to protect all trees and ornamental shrubbery not within the limits of the construction area, or within the construction areas shown on the Plans to be retained from injury by workmen, equipment, or any other agencies connected with the work, including subcontractors. Such protection shall be provided during the progress of the excavation, grading, or other phases of the work as necessary. Such trees or shrubbery shall be surrounded by protective posts or fencing before construction begins, when in judgment of the ENGINEER, such precautionary measures are necessary. If, as a result of any phase of the work, trees are damaged or it is necessary to remove limbs in the way of construction, the repair of the damage and such limb removal shall be done by the CONTRACTOR as directed by the ENGINEER. All costs for the protective work shall be borne by the CONTRACTOR as incidental to the Contract work.

3.05 ROCK EXCAVATION

A. Rock excavation shall consist of excavating igneous, metamorphic and sedimentary rock which cannot be excavated without continuous drilling and blasting or drilling and splitting to fracture the rock. Blasting shall be permitted only after it has been shown that other methods of excavation are impractical. All rock excavation shall be carried to a minimum depth of 8 inches below the pipe or manhole bottom and to the bottom of all footings. The width of the rock excavation shall not exceed the diameter of the pipe plus 12 inches on either side or the edge of the foundation footing.
 B. When the use of explosives is necessary for the progression of the work, the CONTRACTOR shall comply with all laws, ordinances and applicable safety code requirements and regulations relative to the handling, storage and use of explosives and protection of life and property. A person competent and experienced in the use of explosives shall be employed to supervise the work. The CONTRACTOR shall schedule all blasting for a definite hour of the day and shall so notify all residents and businesses in the area as to the scheduled day and hour for such blasting operations. Explosive materials shall not be stockpiled and stored in residential areas. Explosives and initiating devices shall not be carried in the same vehicle.
 C. Suitable weighted plank coverings or timber mats shall be provided to confine all materials lifted by blasting within the limits of the excavation or trench. Excessive blasting or overshooting shall not be permitted. Any material outside of the authorized excavation cross section which may be shattered or loosened shall be removed at the CONTRACTOR'S expense. The CONTRACTOR shall be responsible for all damage resulting from the use of explosives.

3.06 PIPE BORING AND JACKING

A. The CONTRACTOR shall obtain all necessary permits for jacking the encasing pipe under channels, railroads and/or shall notify the governmental agency and/or company having jurisdiction 48 hrs before work at any crossing is started. The CONTRACTOR shall pay all costs for an inspector and/or flagmen required by a railroad or governmental agency.
 B. A suitable approach trench shall be opened, adjacent to the toe of the slope of the embankment. The approach trench shall be long enough to accommodate the length of pipe units to be placed, and wide enough to provide sufficient working room. Guide timbers or rails for keeping the pipe on-line and grade shall be installed in the bottom of the trench and heavy timber backstop supports installed at the rear of the trench to take the thrust of the jacks. A timber bearing a "pushing frame" shall be built and furnished to fit or match the end of the pipe to be jacked, so that the pressure of the jacks will be evenly distributed over the end of the pipe. Two (2) hydraulic jacks of sufficient power shall be used to apply pushing or jacking pressures. For firm ground, excavation shall be carried on from inside the pipe, not to exceed twelve (12) inches ahead of the lead pipe. For unstable ground, the lead pipe shall precede the auger. Excavation at the top and sides shall be accurately cut to line and grade. Adjoining sections of steel pipe shall be welded. Pipe shall be jacked on successive shifts until completed to guard against the "freezing of the line" due to settlement and compaction of surrounding soil.
 C. The sheeting of pits along any road will be required if the leading edge of all work pits will be closer to the pavement edge than the shoulder point or ten (10) ft, which ever distance is greater, or on curb and gutter sections, at least five (5) ft from back of curb.
 D. Upon completion of the installation of the steel pipe encasement, the contractor shall furnish and install a bolted style casing spacer as described below on the carrier pipe. Casing spacers shall be placed a maximum of seven (7) feet apart along the length of the carrier pipe with one casing spacer within 2-1/2 feet of each side of a pipe joint and the rest evenly spaced. Wood skids are not an acceptable method of supporting the carrier pipe.
 E. Casing spacers for carrier pipes from 4" - 24" shall be made of a molded, segmented high density polyethylene plastic with 304 stainless steel connecting nuts and bolts. Minimum spacer width shall be 5.2" for carrier pipes from 4" - 12" and 7.0" for carrier pipes 14" - 24". Each casing spacer shall have at least six (6) integrally molded skids extending 1" beyond the bell or mechanical joint of the carrier pipe. The casing spacers shall be equal to the PSI Ranger as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.
 F. Casing spacers for carrier pipes larger than 24" shall be a PVC fusion bonded coated (10-16 mils) steel shell (minimum 14 gauge steel) with a 90 mil PVC inner liner and 2" wide 30% glass reinforced polyester runners (minimum compressive strength = 18,000 psi) (polyethylene is not an acceptable runner material) attached by 3/8" coated steel studs welded to the steel shell. All bolts and nuts used to fasten the shell to the carrier pipe shall be cadmium plated steel. Where riser are required under the runners they shall be a minimum 10 gauge steel welded to the shell and coated as specified for the shell (epoxy is not an acceptable coating for the shell riser). The casing spacers shall be equal to the PSI Model C as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas.

E. Boring shall be performed by accepted and recognized methods which will provide adequate safety and protection at all times to workmen employed in the work and to inspectors and others involved in the construction.
 F. If voids should develop around the outside of the encasing pipe, grouting or other methods approved by the ENGINEER shall be employed to fill such voids.
 G. After the pipes are tested satisfactorily, the remaining space between the carrier pipe and the encasing pipe shall be pressure grouted or otherwise filled with concrete. The carrier pipe shall be adequately braced to prevent floating or movement of the pipe.

3.07 SHORING, SHEETING AND BRACING

A. Where sheet piling, shoring, sheeting, bracing, or other supports are necessary, they shall be furnished, placed, maintained, and except as shown or specified otherwise, removed by the CONTRACTOR.
 B. All sheet piling, shoring, sheeting and bracing shall be designed by a professional engineer engaged by the CONTRACTOR with demonstrated competence and experience in such work. The sheeting system shall be designed to prevent bottom failure and hydrostatic uplift within the excavation. Provision shall also be made in the design for lateral pressures due to side slope and construction equipment or other surcharge loads, as applicable.
 C. The CONTRACTOR shall provide to the ENGINEER for his review, design calculation and arrangement drawings of the sheeting system prior to ordering any materials for bracing, sheeting, etc., and prior to the commencement of the excavation.
 D. All materials, except as otherwise specified, used for sheeting and sheet piling, lagging, braces, shores, and stringers, or waling strips shall be of approved quality and dimensions throughout.
 E. Materials for sheeting systems shall be furnished and driven or set in place by the CONTRACTOR, where necessary or wherever ordered by the ENGINEER, whether the same is or is not considered necessary by the CONTRACTOR. If, in the opinion of the ENGINEER, the materials furnished by the CONTRACTOR are not of proper quality or sufficient size or not properly placed to ensure the safety of the work or of adjacent structures and property, the CONTRACTOR shall, upon notice from the ENGINEER to that effect, forthwith procure, furnish and set in place or drive other and satisfactory materials, or place the material in a satisfactory manner; and if he shall fail or neglect to do so, the ENGINEER may order all or any part of the work to be stopped until such materials so used are furnished and placed; and the CONTRACTOR shall not be entitled to claim, demand, or receive any compensation for larger size or better quality or different disposal of materials ordered by the ENGINEER, nor any compensation for allowance of any kind whatsoever for or on account of any damage or delay resulting from such stoppage of work.
 F. Steel sheet piling may be either new or used. It shall be of adequate strength, straight and properly braced. Steel sheet piling shall be of the interlocking type. Friction in the interlocks shall not be assumed to contribute to the strength of the sheet piling.
 G. The design, planning, installation and removal, if required, of all sheet piling, shoring, sheeting, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.

H. Steel sheet piling for the excavation shall be driven straight and in-line. The piling shall be supported above ground, before driving, by a guide frame at least 20 ft high which will keep the piling accurately in the required position and vertical. Each piece of piling shall be driven only a few feet at a time and driving shall proceed continuously around the perimeter so that the piles shall reach their full penetration together.

I. Waters and bracing shall be supplied and installed as required to complete the sheeting system. Waters and braces shall be of adequate strength for the load imposed. Splices in waters shall develop the full strength of the member in bending, shear, and axial compression.

J. If bracing members are to be removed during construction, the liming and procedure for removal shall not induce excessive stresses in the permanent structures or in steel sheet piling and bracing members.

K. If the construction sequence of structures requires the transfer of bracing to the completed portions of any structure, the CONTRACTOR shall secure written acceptance of the ENGINEER prior to the installation of such bracing.

L. In trenching operations the use of horizontal strutting below the barrel of pipe or the use of the pipe as support for trench raking will not be permitted. The use of a traveling shield for sewer construction shall require that the device be approved for use by a professional engineer. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe.

M. The neglect, failure, or refusal of the ENGINEER to order the use of sheeting, or sheet piling or steel, or to order the same to be left in place, or the giving or failure to give of any order or directions as to the manner or methods of driving or placing sheeting, sheet piling, bracing, shores, etc., shall not in any way relieve the CONTRACTOR of any or all obligations under this Contract. Sheeting left in place shall be cut off one (1) ft below existing grade.

N. The rules of the OSHA and the State Department of Labor with respect to excavation and construction shall at all times be strictly observed.

3.08 GENERAL BACKFILLING

A. For all areas, unless otherwise noted, backfilling shall consist of placing excavated material as defined in Paragraph 2.01.A. of this Section, in 12-inch lifts to finish grade. Compaction of backfill shall be such as to obtain 90% of the maximum density.
 B. Under pavements, curb, paved driveways, and sidewalks, and where pipe is within a one on one influence of pavement, compaction testing shall be performed by an independent testing laboratory. Testing shall be performed at intervals of one test per lift per 50 feet of trench or as determined necessary by the ENGINEER.
 C. In residential developments, all backfill within the road corridor shall be granular material compacted in layers not to exceed 12 inches loose thickness with backfilling carried up to subgrade. Compaction of backfill shall be as such to obtain 95% of the maximum unit density as determined at the optimum moisture content. For purposes of this section, the road corridor is defined as front of house to front of house, including right-of-way and adjacent easements and setbacks.

3.09 BACKFILLING FOR SEWERS AND WATER MAINS

A. Backfilling shall consist of placement of the prescribed materials from a level 12 inches above the crown of the pipe. Placement shall be as follows:
 1. Under gravel driveways, gravel roads and shoulders, the backfill shall be granular material which shall be solidly compacted by mechanical tampers in layers of not more than 12 inches loose thickness with backfilling carried up to within 12 inches of finished grade. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content.
 2. Under pavements, curb, paved driveways, and sidewalks, the backfill shall be granular material compacted in layers not to exceed 12 inches loose thickness with backfilling carried up to subgrade. Compaction of backfill shall be as such to obtain 95% of the maximum unit density as determined at the optimum moisture content. After a period of about 60 days or less, if the backfill compaction is satisfactory to the ENGINEER, to provide for any slight settlement, the CONTRACTOR shall retrim neatly any broken edges of pavement and replace the top surface of the backfill within the pavement area with pavement surface equal to that surface which was removed. The pavement shall be replaced in accordance with the standard specifications of the agency having jurisdiction.
 3. Backfill around lift stations, or buried underground structures shall be granular material compacted in 12-inch lifts. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content.
 4. For all other areas, backfilling shall consist of placing excavated material as defined in Paragraph 2.01.A. of this Section, in 12-inch lifts to finish grade. Compaction of backfill shall be such as to obtain 90% of the maximum unit density as determined at the optimum moisture content.

3.10 FILLING AND BACKFILLING FOR STRUCTURES

A. Embankments underlying structural footings, streets and drives, sidewalks and around structures shall be granular material meeting the requirements of the Michigan Department of Transportation for granular material compacted to 95% density.
 B. In all other areas, material required for embankments and backfilling shall be soil or soil-rock mixture free of organic and other deleterious matter and shall contain no more than 15% rocks or lumps larger than 2-1/2 inches in the greatest dimension, compacted to 90% density.
 C. Under all interior and exterior floor slabs, an 8-inch thick granular cushion shall be placed. This material shall be clean mineral aggregate meeting the following gradation requirements:

| | |
|---------------------------|------|
| Passing the No. 4 Sieve | 100% |
| Passing the No. 200 Sieve | 0-3% |

 D. Where embankment material is placed to achieve a new surface elevation, the top 4 inches shall be approved topsoil either salvaged from the site or hauled in by the CONTRACTOR.

3.11 FILLING AND BACKFILLING FOR PAVED SURFACES

A. Embankments, including sand cushions and granular fills, shall be placed in successive layers not more than 6 inches in depth the full width of the cross section, each layer to be thoroughly compacted by means of vibratory compactors or by an approved pneumatic-tired roller or combination thereof, as required by the ENGINEER. Each layer shall be compacted to not less than 95% of the maximum unit density as determined at the optimum moisture content. All parts of the embankment shall be uniformly compacted and the CONTRACTOR shall so direct all earthmoving equipment used in the work so that the same shall be attained. Embankment or fill outside the limits of the subgrade where sand or gravel is not required shall be made with suitable material which is free from perishable organic matter, rubbish, stones, broken concrete, roots, or other foreign materials, at no additional compensation. Before any embankments are begun, the base shall be made firm and cleared of topsoil, soil or other perishable material. The sides of the embankment shall be neatly and evenly dressed to the slope shown on the Plans, or such other slope as the ENGINEER may direct.
 B. Upon completion of the placing of the curbs, and after the concrete has cured sufficiently, forms shall be removed and the excavated space behind the curb shall be backfilled with a good quality of surface soil, free of rubbish, stone, broken concrete, roots or other foreign material. Where adequate acceptable material for backfill behind the curb is not available, granular fill conforming to 2003 MDOT 8.02.06, Class II, shall be used. Where the area behind the curb is in cut, it shall be trimmed from the top of the curb on the slope shown on the Plans. If the area is in embankment or fill, an earth berm shall be placed immediately adjacent to the top of the curb and then the embankment of fill shall be finished to the slope shown on the Plans. All trimming and finishing shall be done in a neat, workmanlike manner. All excess concrete and debris shall be removed from the excavation behind the curb line before backfilling begins.

C. In construction of non-rigid pavements, backfilling back of curb and gutter shall be completed before placement and compaction of the base course of the roadway.

3.12 PREPARATION OF SUBGRADE FOR ROADWAY SURFACES

A. The bottom of the excavation for the pavement or top of the fill shall be known as the pavement subgrade and shall be smoothed, trimmed and compacted to the required line, grade and cross section to receive the road metal. It shall be thoroughly compacted by rolling with a roller of approved type weighing not less than 8 tons. The subgrade shall be compacted to at least 95% of the maximum density as designated by the test method AASHTO T-180. Inaccessible areas, where rolling is not practical, shall be thoroughly compacted by mechanical tampers capable of striking a blow equivalent to at least 250 foot-pounds per square foot. The subgrade thus formed shall be maintained in a smooth and compacted condition until the pavement has been placed. No base course, surfacing, curb, or curb and gutter, shall be placed until the subgrade has been reviewed by the ENGINEER. The subgrade shall be finished in an acceptable condition at least one day in advance of the pavement construction at all times. Six inches of compacted depth of granular material shall be used where uncompacted soil is encountered. The granular fill shall conform to the 2003 MDOT 9.02.08, Class II, compacted to 95% of its density.

B. Immediately prior to placing the pavement, the subgrade shall be tested for conformity with the cross section shown on the Plans by means of an approved template riding on the curb and gutter sections or on side forms. If necessary, materials shall be removed or added, as required, to bring all portions of the subgrade to the correct elevation. Corrected portions shall then be thoroughly compacted and again tested with the template. Pavement material shall not be placed at any portion of the subgrade which has not been tested for correct elevation.

C. The finished subgrade shall be maintained in a smooth and compacted condition until the pavement is placed. No storage piles of fine or coarse aggregate shall be placed directly upon the finished subgrade. Should the subgrade become rutted or disturbed in any manner, it shall be reshaped and recompacted.

3.13 GRADING

A. The CONTRACTOR shall grade the site to achieve the elevations as shown on the Plans. All disturbed areas beyond the grading limits shall be restored to prior condition.
 B. Surplus excavated material not needed for embankment shall be disposed of by the CONTRACTOR. Headwalls, culverts, drains, sewers and appurtenances filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, repaired, or replaced at his expense.
 C. All temporary earth changes shall be in conformance with the Soil and Erosion Control Act.

3.14 RESTORATION

A. Headwalls, culverts, and drainage systems filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, relaid or rebuilt with new materials to a condition equal to the original state, and of thickness equal to the original structure and to the original line and grade at the CONTRACTOR'S expense.
 B. Where the excavation is located beside a ditch and/or where an existing ditch is filled or disturbed in the CONTRACTOR'S operations, the CONTRACTOR shall clean, repair, or replace the ditch with properly pitched bottom and side slopes and of section and capacity not less than the original section.
 C. Where excavation has been through lawn areas, the CONTRACTOR shall restore the disturbed area by placing topsoil and seeding or sodding over the final backfill material.
 D. The CONTRACTOR shall remove excess dirt and other construction material from the site of the work and leave the site in a condition equal to its original state.
 E. The final condition of the streets and roadways shall be subject to the approval of the governmental body having jurisdiction thereof, as well as review by the ENGINEER.



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| Revision | By | Appd. | YY.MM.DD |
|------------------|------|-------|----------|
| TWP REV | BWA | DRW | 11.04.27 |
| UPDATES | TTN | DRW | 10.01.20 |
| Issued | By | Appd. | YY.MM.DD |
| File Name: SE-02 | TTN | DRW | 07.10.01 |
| Permit-Seal | Dwn. | Chkd. | Dsgn. |

Client/Project
PITTSFIELD TOWNSHIP
 Pittsfield Township, Michigan
 Title
EARTHWORK SPECIFICATIONS

Project No. 2075001300
 Scale NOT TO SCALE

SHEET:
22-SD7

Revision
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