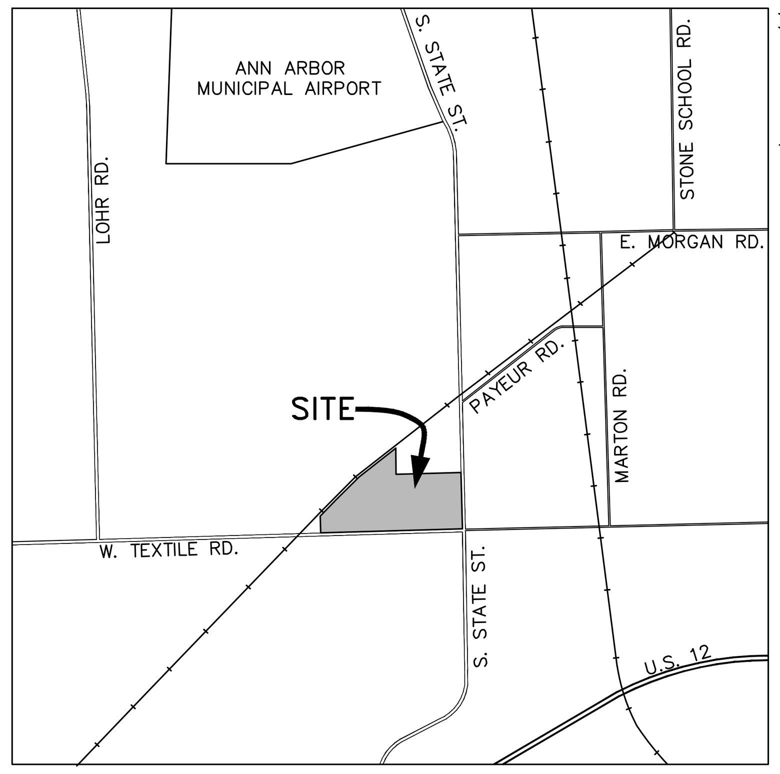
# FINAL SITE PLAN

# INGLEWOOD PARK

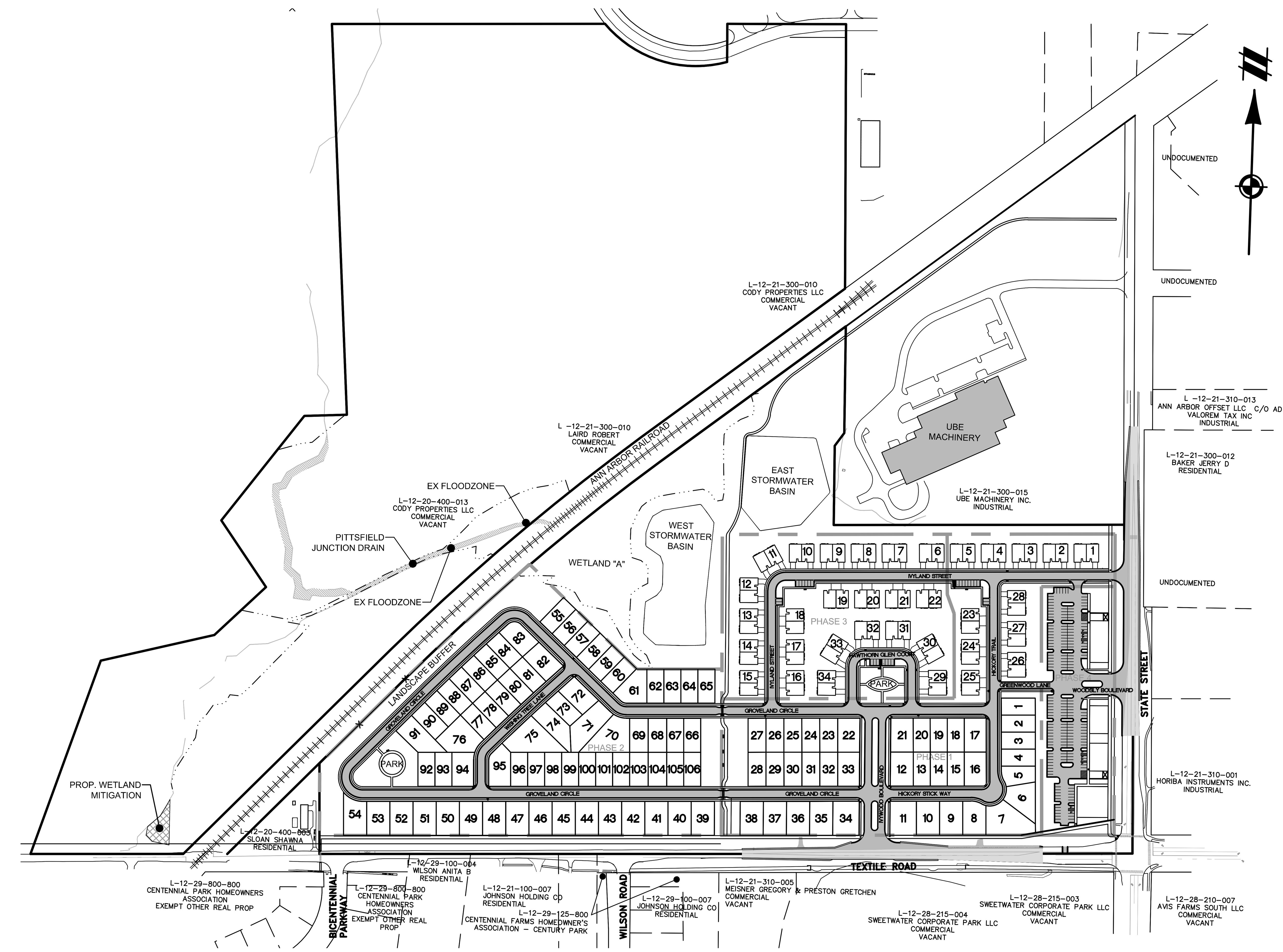
## A MIXED USE PLANNED UNIT DEVELOPMENT

## PITTSFIELD TOWNSHIP, SECTIONS 20 & 21

## WASHTENAW COUNTY, MICHIGAN




**VICINITY MAP**
NOT TO SCALE




## DEVELOPMENT TEAM


### PROPERTY OWNER

CODY PROPERTIES, LLC
C/O MICHAEL GOLAB &
SUSAN L JOHNSON
BUTZEL LONG
41000 WOODWARD AVENUE
BLOOMFIELD HILLS, MI 48304

### APPLICANT / DEVELOPER

SCHAFER DEVELOPMENT, LLC
29800 MIDDLEBELT RD, SUITE 150
FARMINGTON HILLS, MI 48334

### CIVIL ENGINEER

ATWELL, LLC
311 N. MAIN ST.
ANN ARBOR, MI 48104
PHONE: (734) 994-4000
FAX: (734) 994-1590
CONTACT: MATT BUSH


## DEVELOPMENT SUMMARY

- THE PROPOSED DEVELOPMENT CONSISTS OF:
  106 SINGLE FAMILY UNITS
  68 MULTI-FAMILY UNITS
  28,900 SF RETAIL
- REFUSE COLLECTION WILL BE CURB SIDE PICK UP SERVICE FOR RESIDENTIAL. DUMPSTERS ARE PROPOSED FOR THE RETAIL BUILDINGS ALONG STATE STREET.
- PROPOSED UTILITY SERVICES FOR THE DEVELOPMENT ARE AS FOLLOWS:

**SANITARY SEWER**
PUBLIC SANITARY SEWER IS PROPOSED FOR THIS DEVELOPMENT WITHIN PUBLIC EASEMENTS AND WILL BE SERVICED THROUGH THE EXISTING 21" WEST SIDE SANITARY SEWER WITHIN AN EASEMENT AS PART OF THE SITE.

**WATER MAIN**
PUBLIC WATER MAIN IS PROPOSED FOR THIS DEVELOPMENT WITHIN PUBLIC EASEMENTS AND WILL BE SUPPLIED THROUGH MULTIPLE CONNECTIONS TO THE EXISTING 16" WATER MAIN AND NEAR THE U.B.E. PROPERTY WITHIN AN EASEMENT AS PART OF THE SITE. AN EX. CONNECTION TO STATE RD. AND A HYDRANT SOUTH OF U.B.E. ARE TO BE ABANDONED.

**STORM WATER MANAGEMENT**
THE PROPOSED SITE DEVELOPMENT AREAS WILL BE COLLECTED INTO TWO STORMWATER MANAGEMENT BASIN SYSTEMS AND INFILTRATED, WITH ANY ADDITIONAL VOLUME OUTLETTED AT A RESTRICTED RATE TO THE EXISTING WETLANDS OR DRAINAGE DITCH. THE STORMWATER SYSTEM WILL BE DESIGNED PER THE WCWRC STANDARDS.

**GAS, TELEPHONE, ELECTRIC AND CABLE**
EXISTING FRANCHISE UTILITIES CURRENTLY SERVICING THE TOWNSHIP WILL BE EXTENDED TO SERVICE THE PROPOSED DEVELOPMENT.

**ROADS**
ALL ROADS WITHIN THE SITE ARE TO BE PRIVATE ROADS.

## LEGAL DESCRIPTION

DESCRIPTION OF A 63.41 ACRE PARCEL LOCATED IN THE SOUTHEAST 1/4 OF SECTION 20 AND THE SOUTHWEST 1/4 OF SECTION 21, T3S, R6E, PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

Begining at the Southeast corner of Section 20, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence S88°03'42"W 1297.65 feet along the centerline of Textile Road (120 feet wide) and the South line of said Section 20; thence N01°58'42"W 293.60 feet; thence along the Southeasterly line of Ann Arbor Railroad (100 feet wide) the following three (3) courses; N43°30'13"E 421.78 feet, 1049.48 feet along the arc of a 7509.26 foot radius circular curve to the right, having a chord bearing N47°46'28"E 1048.63 feet, and N51°58'28"E 745.71 feet; thence S01°07'56"E 345.03 feet; thence S34°34'56"W 51.39 feet; thence S01°07'56"E 256.29 feet; thence N88°00'01"E 970.60 feet; thence S01°43'44"E 1063.84 feet along the centerline of State Road (120 feet wide) and the East line of the West 1/2 of the Southwest 1/4 of Section 21, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence S87°59'52"W 1332.88 feet along the centerline of said Textile Road and the South line of said Section 21 to the Place of Beginning, being a part of the Southeast 1/4 of said Section 20 and the Southwest 1/4 of said Section 21, containing 63.41 acres of land, more or less, being subject to the rights of the public over the Southerly 60 feet thereof as occupied by said Textile Road and the Easterly 60 feet thereof as occupied by said State Road, and being subject to easements, conditions, restrictions and exceptions of record, if any.

K:\13001886\DWG\PLAN SETS\FINAL SITE PLAN\13001886SF-01-CV.DWG 2/9/2016 2:09 PM MICHAEL NORCIA

## SITE DATA

### PARCEL DATA

| | | | |
|---|---|---|---|
| PARCEL ID'S: | L-12-21-300-016; L-12-20-400-004 | | |
| EXISTING SITE ZONING | PUD (PLANNED UNIT DEVELOPMENT) & B (BUSINESS) | | |
| PROPOSED SITE ZONING | PUD (PLANNED UNIT DEVELOPMENT) | | |
| EXISTING LAND USE | AGRICULTURAL | | |
| PROPOSED LAND USE | MIXED USE OF SINGLE FAMILY, MULTI-FAMILY RESIDENTIAL, & RETAIL/RESTAURANT (WITH BUS STOP) | | |
| SITE AREA (TOTAL SITE): | | | |
| GROSS AREA | ±63.40 ACRES | 2,761,487 | SF |
| STATE STREET ROW | ±2.44 ACRES | 106,384 | SF |
| TEXTILE ROAD ROW | ±3.49 ACRES | 151,839 | SF |
| WETLANDS | ±3.33 ACRES | 145,133 | SF |
| UTILITY EASEMENTS | ±1.53 ACRES | 66,697 | SF |
| NET AREA | ±52.60 ACRES | 2,291,434 | SF |

### SINGLE FAMILY RESIDENTIAL:

| | | | |
|---|---|---|---|
| GROSS AREA | ±41.77 ACRES | 1,819,488 | SF |
| TEXTILE ROAD ROW | ±3.18 ACRES | 138,646 | SF |
| WETLANDS | ±3.33 ACRES | 145,133 | SF |
| UTILITY EASEMENTS | ±1.14 ACRES | 49,510 | SF |
| NET SITE AREA | ±34.12 ACRES | 1,486,199 | SF |
| 55' X 110' LOTS | 81 | | |
| 75' X 110' LOTS | 25 | | |
| TOTAL LOTS | 106 | | |
| SETBACKS | | | |
| FRONT | 20' | | |
| REAR | 30' | | |
| SIDE | 5' MIN/10' TOTAL | | |
| LOT COVERAGE | 44% MAX. | | |
| DENSITY (LOTS/ACRE) | 3.11 | | |
| IMPERVIOUS SURFACE | 4.30 ACRES | | |
| IMPERVIOUS SURFACE RATIO | 12.60% | | |

### MULTI-FAMILY RESIDENTIAL:

| | | | | |
|---|---|---|---|---|
| GROSS AREA | ±15.19 ACRES | 661,553 | SF | |
| STATE STREET ROW | ±0.38 ACRES | 16,639 | SF | |
| UTILITY EASEMENTS | ±0.39 ACRES | 17,130 | SF | |
| NET SITE AREA | ±14.41 ACRES | 627,784 | SF | |
| TOTAL UNITS | 68 | | | |
| SETBACKS | | | | |
| FRONT | 20' | SIDE TO SIDE (BLDG) | | 20' MIN. |
| REAR | 20' | REAR TO REAR (BLDG) | | 40' MIN. |
| SIDE | 10' | SIDE TO REAR (BLDG) | | 25' MIN. |
| MAXIMUM LOT COVERAGE | 25% | | | |
| MAXIMUM BLDG HEIGHT | 25' - 2 STORIES | | | |
| DENSITY (UNITS/ACRE) | 4.72 | | | |
| IMPERVIOUS SURFACE | 2.11 ACRES | | | |
| IMPERVIOUS SURFACE RATIO | 14.6% | | | |

### RETAIL:

| | | | |
|---|---|---|---|
| GROSS AREA | ±6.44 ACRES | 280,565 | SF |
| STATE STREET ROW | ±2.06 ACRES | 89,745 | SF |
| TEXTILE ROAD ROW | ±0.29 ACRES | 12,802 | SF |
| NET SITE AREA | ±4.09 ACRES | 178,018 | SF |
| RETAIL A | 8,100 SF | | |
| RETAIL B | 5,400 SF | | |
| RETAIL C | 5,400 SF | | |
| RETAIL D | 10,000 SF | | |
| TOTAL FLOOR AREA | 28,900 SF | | |
| LOT COVERAGE | 16.2% | | |
| FLOOR AREA RATIO | 0.16 | | |
| MAXIMUM BLDG HEIGHT | 30' | | |
| IMPERVIOUS SURFACE | 2.59 ACRES | 112,800 | SF |
| IMPERVIOUS SURFACE RATIO | 63.3% | | |

### PARKING:

| | REQUIRED | PROPOSED |
|---|---|---|
| TWO-FAMILY RESIDENTIAL | 2 PER DWELLING | 2 PER DWELLING |
| ADDITIONAL PARKING | - | 25 |
| ADA PARKING | 1 (FOR FIRST 25) | 2 |
| | REQUIRED | PROPOSED |
| FAST FOOD RESTAURANT (COFFEE SHOP - 2,000 SF) | 29 SPACES* | SEE TOTAL |
| CASUAL RESTAURANT (75 SEATS & 5,400 SF) | 38 SPACES** | SEE TOTAL |
| RETAIL (21,500 SF) | 86 SPACES*** | SEE TOTAL |
| TOTAL | 153 SPACES | 194 SPACES |

ADA PARKING REQUIREMENTS TO BE DETERMINED AND PROVIDED AT THE TIME OF RETAIL BUILDING USE DETERMINATION.

**1 SPACE PER 70 SF OF GROSS FLOOR AREA*
***1 SPACE PER 2 SEATS*
****1 SPACE PER 250 SF OF GROSS FLOOR AREA*

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RZ 14-02

811
Know what's **below.**
**Call** before you dig.

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

COVER SHEET

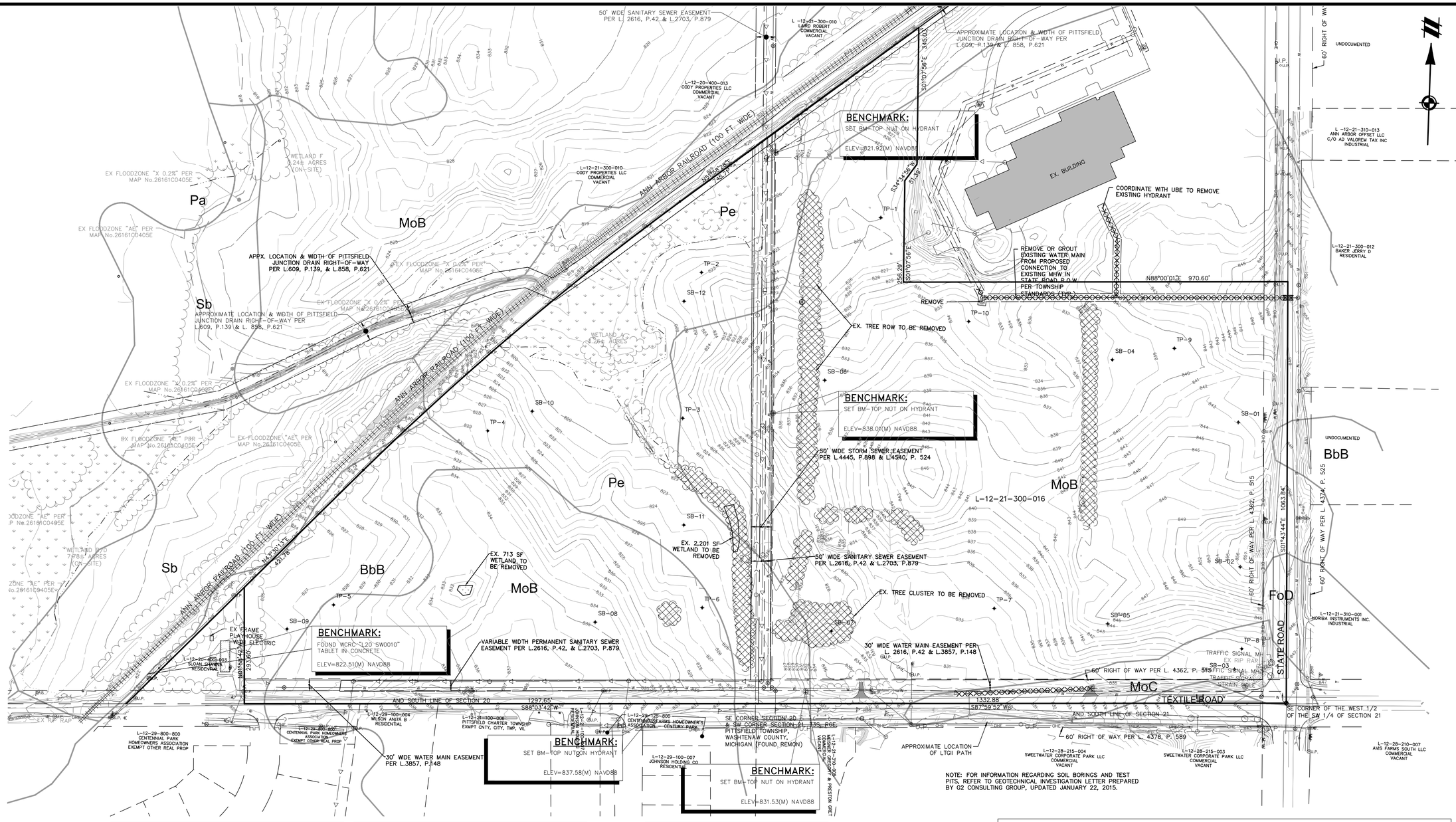
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 125 250
1" = 250 FEET

| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |
| SHEET NO. | 01 | | |




NOTE: FOR INFORMATION REGARDING SOIL BORINGS AND TEST PITS, REFER TO GEOTECHNICAL INVESTIGATION LETTER PREPARED BY G2 CONSULTING GROUP, UPDATED JANUARY 22, 2015.

| Map unit symbol | Map unit name | Rating | Rating reasons (1.00 being severe limitation) |
|---|---|---|---|
| BbB | Blount loam, 2 to 6 percent slopes | Very limited | Depth to saturated zone (1.00) |
| | | | Shrink-swell (0.50) |
| | | | Depth to saturated zone (1.00) |
| | | | Shrink-swell (0.50) |
| | | | Depth to saturated zone (1.00) |
| | | | Shrink-swell (0.50) |
| | | | Ponding (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Shrink-swell (0.93) |
| FoD | Fox sandy loam, 12 to 18 percent slopes | Very limited | Slope (1.00) |
| | | | Slope (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Slope (1.00) |
| | | | Slope (1.00) |
| | | | Large stones (0.11) |
| | | | Depth to saturated zone (1.00) |
| MoB | Morley loam, 2 to 6 percent slopes | Somewhat limited | Shrink-swell (0.42) |
| | | | Depth to saturated zone (0.35) |
| | | | Shrink-swell (0.07) |

| Map unit symbol | Map unit name | Rating | Rating reasons (1.00 being severe limitation) |
|---|---|---|---|
| MoC | Morley loam, 6 to 12 percent slopes | Somewhat limited | Shrink-swell (0.42) |
| | | | Slope (0.04) |
| | | | Slope (0.04) |
| | | | Shrink-swell (0.07) |
| | | | Slope (0.04) |
| MoD | Morley loam, 12 to 18 percent slopes | Very limited | Slope (1.00) |
| | | | Shrink-swell (0.42) |
| | | | Depth to saturated zone (1.00) |
| | | | Shrink-swell (1.00) |
| | | | Slope (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Shrink-swell (0.50) |
| | | | Slope (1.00) |
| Pe | Pewamo clay loam | Very limited | Ponding (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Shrink-swell (0.50) |
| | | | Ponding (1.00) |
| | | | Subsidence (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Shrink-swell (0.50) |
| | | | Ponding (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Ponding (1.00) |
| | | | Depth to saturated zone (1.00) |
| | | | Shrink-swell (1.00) |

| Map unit symbol | Depth to Water Table Rating | Flood Frequency | Ponding Frequency |
|---|---|---|---|
| BbB | 23 | none | none |
| FoD | >200 | none | none |
| MdA | 46 | none | none |
| MoB | 137 | none | none |
| MoC | >200 | none | none |
| MoD | >200 | none | none |
| Pa | 0 | none | frequent |
| Pc | 0 | none | frequent |
| Pe | 0 | none | frequent |
| Sb | 0 | none | frequent |
| SpC | >200 | none | none |

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING TREE LINE
- EXISTING VEGETATION TO BE REMOVED
- EXISTING FLOOD ZONE
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- PROPOSED UTILITY DEMO
- TEST PIT/SOIL BORING LOCATION
- 801 EXISTING 1' CONTOUR
- 800 EXISTING 5' CONTOUR
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- EXISTING SOIL TYPE BOUNDARY
- MoB EXISTING SOIL TYPE

811 Know what's below. Call before you dig.

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# OVERALL EXISTING CONDITIONS AND DEMOLITION PLAN

DATE
NOVEMBER 5, 2015

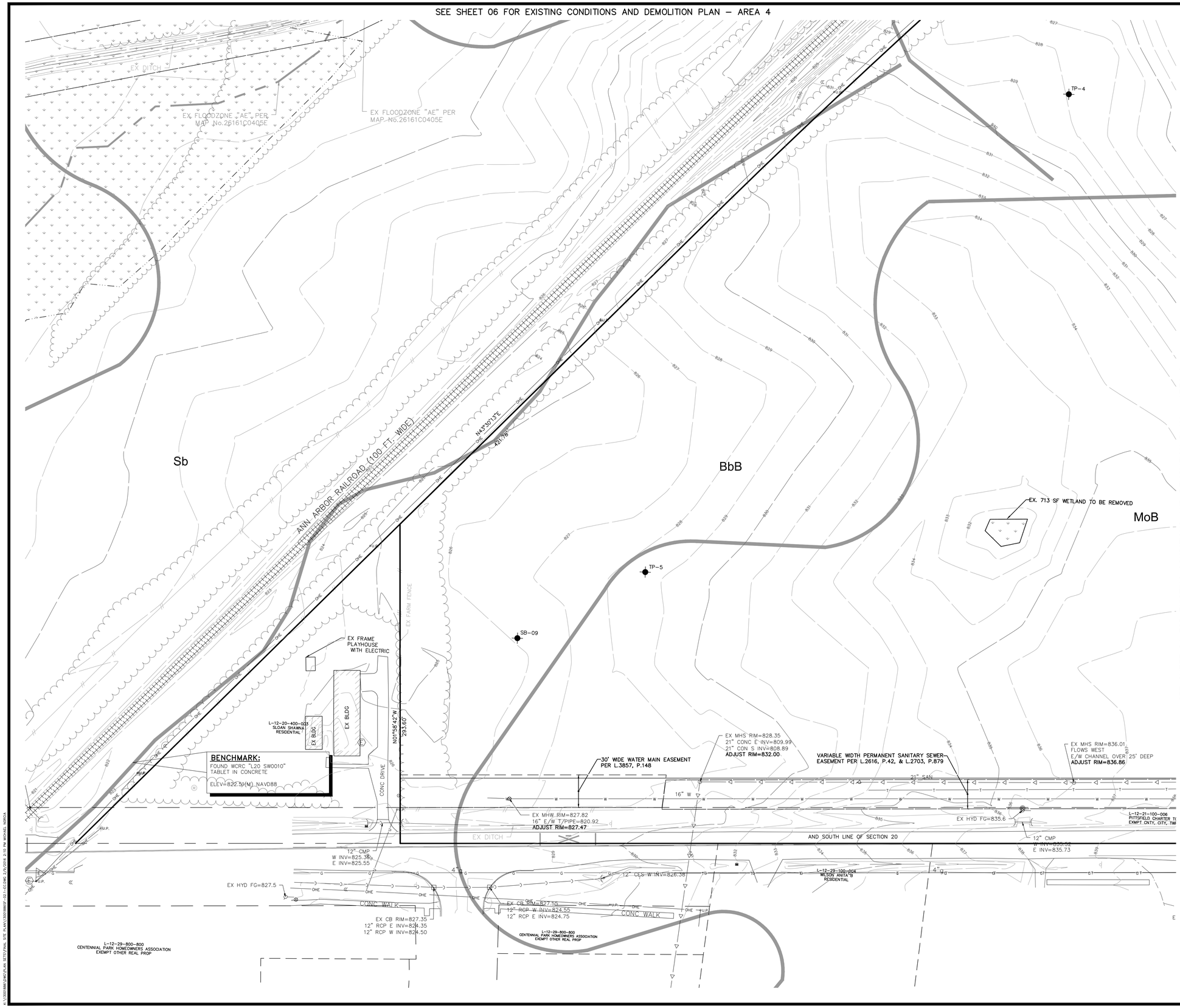
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

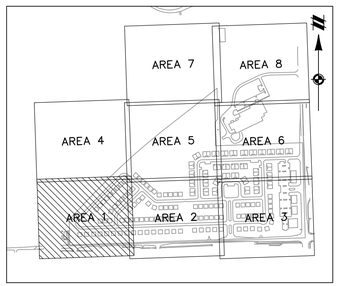
SCALE 0 60 120
1" = 120 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 02 | |

SEE SHEET 06 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 4




SEE SHEET 04 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 2




KEYMAP
1" = 800'

NOTE: FOR INFORMATION REGARDING SOIL BORINGS AND TEST PITS, REFER TO GEOTECHNICAL INVESTIGATION LETTER PREPARED BY G2 CONSULTING GROUP, UPDATED JANUARY 22, 2015.

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING TREE LINE
- EXISTING VEGETATION TO BE REMOVED
- EXISTING FLOOD ZONE
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING CONTOUR
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED UTILITY DEMO
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- EXISTING SOIL TYPE BOUNDARY
- MoB — EXISTING SOIL TYPE

811 Know what's below. Call before you dig.

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 1

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

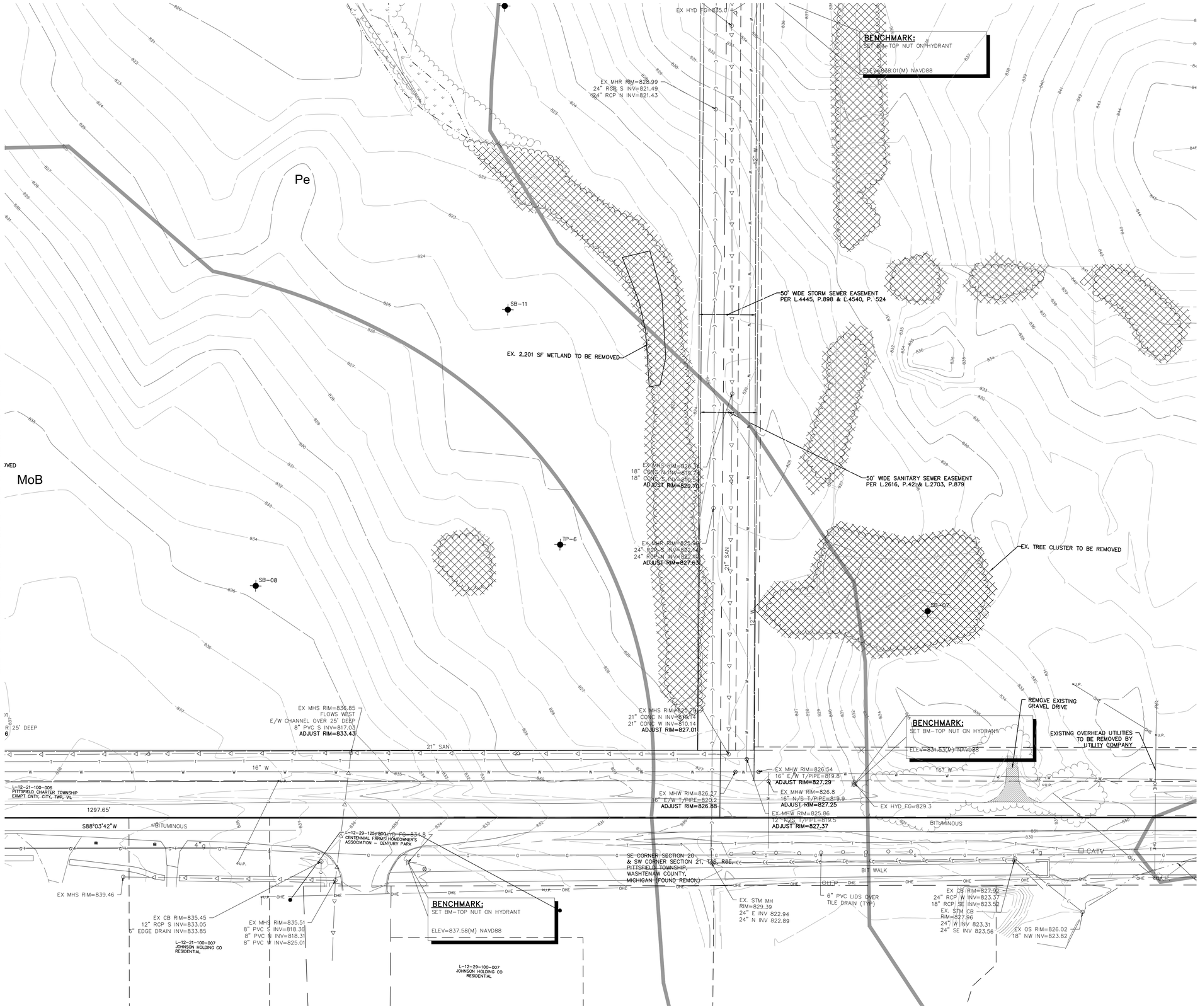
SCALE 0 20 40
1" = 40 FEET

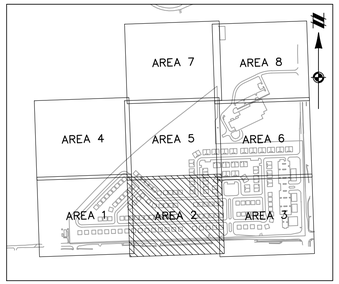
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 03 | |

SEE SHEET 07 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 5

SEE SHEET 03 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 1

SEE SHEET 05 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 3




KEYMAP
1" = 800'

NOTE: FOR INFORMATION REGARDING SOIL BORINGS AND TEST PITS, REFER TO GEOTECHNICAL INVESTIGATION LETTER PREPARED BY G2 CONSULTING GROUP, UPDATED JANUARY 22, 2015.

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING TREE LINE
- EXISTING VEGETATION TO BE REMOVED
- EXISTING FLOOD ZONE
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING CONTOUR
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED UTILITY DEMO
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
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- EXISTING SOIL TYPE BOUNDARY
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CLIENT
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INGLEWOOD PARK
FINAL SITE PLAN

# EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 2

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

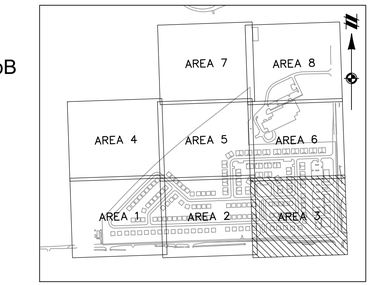
REVISIONS

SCALE 0 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 04 | |

SEE SHEET 08 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 6

SEE SHEET 04 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 2




KEYMAP
1" = 800'

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## LEGEND

| | |
|---|---|
| | EXISTING WETLAND LINE |
| OHE OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C C C | EXISTING STORM |
| | EXISTING TREE LINE |
| | EXISTING VEGETATION TO BE REMOVED |
| | EXISTING FLOOD ZONE |
| | EXISTING EASEMENT |
| | SECTION LINE |
| | BOUNDARY/PROPERTY LINE |
| 890 | EXISTING CONTOUR |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G G | EXISTING GAS |
| | EXISTING RAILROAD |
| | PROPOSED UTILITY DEMO |
| | EXISTING SIGN |
| O.U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | EXISTING SOIL TYPE BOUNDARY |
| MoB | EXISTING SOIL TYPE |

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FINAL SITE PLAN

# EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 3

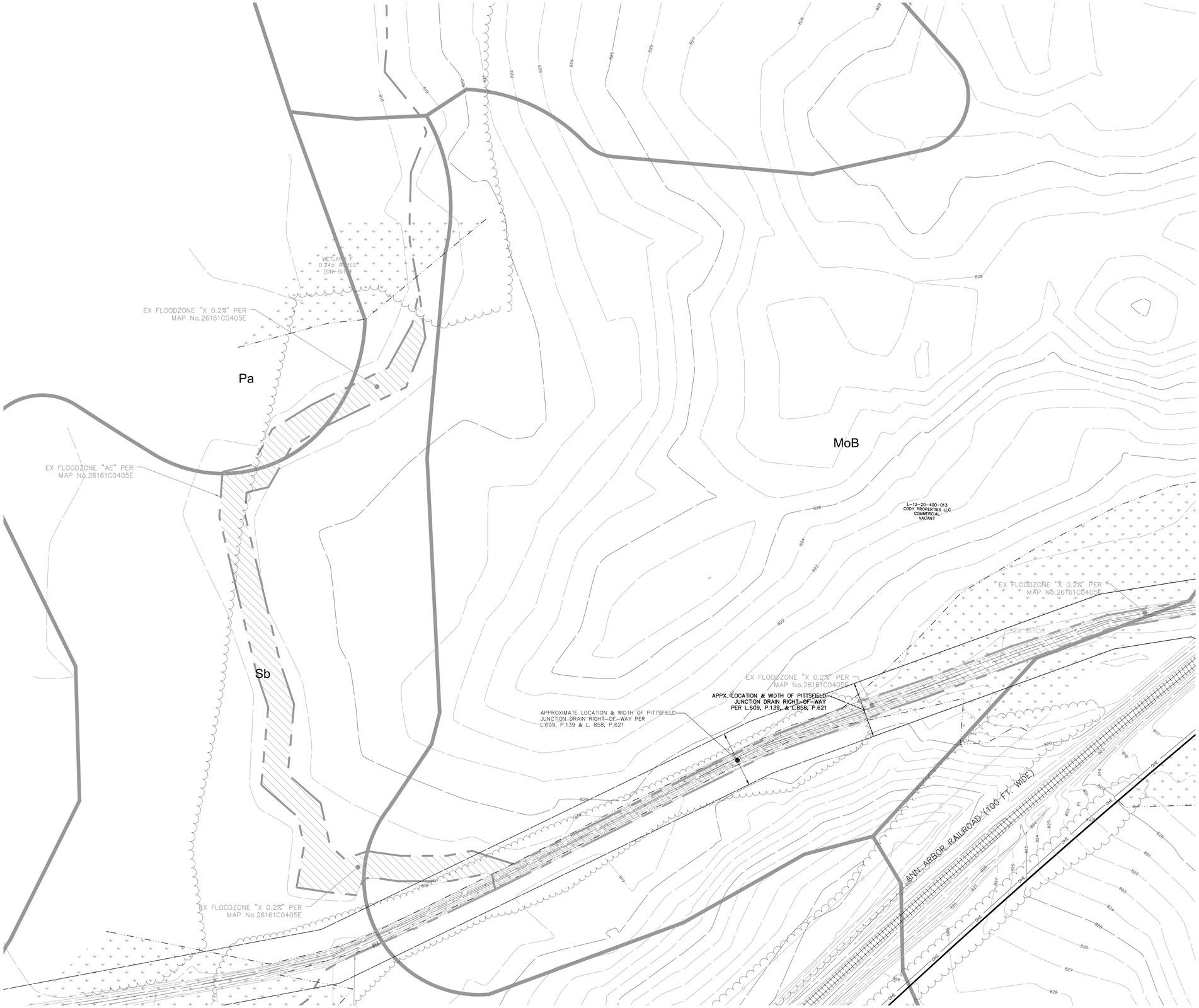
DATE
NOVEMBER 5, 2015

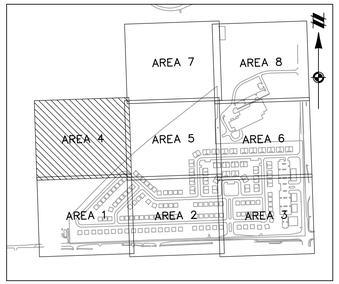
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 05 | |




KEYMAP
1" = 800'

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## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING TREE LINE
- EXISTING VEGETATION TO BE REMOVED
- EXISTING FLOOD ZONE
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING CONTOUR
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED UTILITY DEMO
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- EXISTING SOIL TYPE BOUNDARY
- MoB — EXISTING SOIL TYPE

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EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 4

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |
| SHEET NO. | 06 | | |

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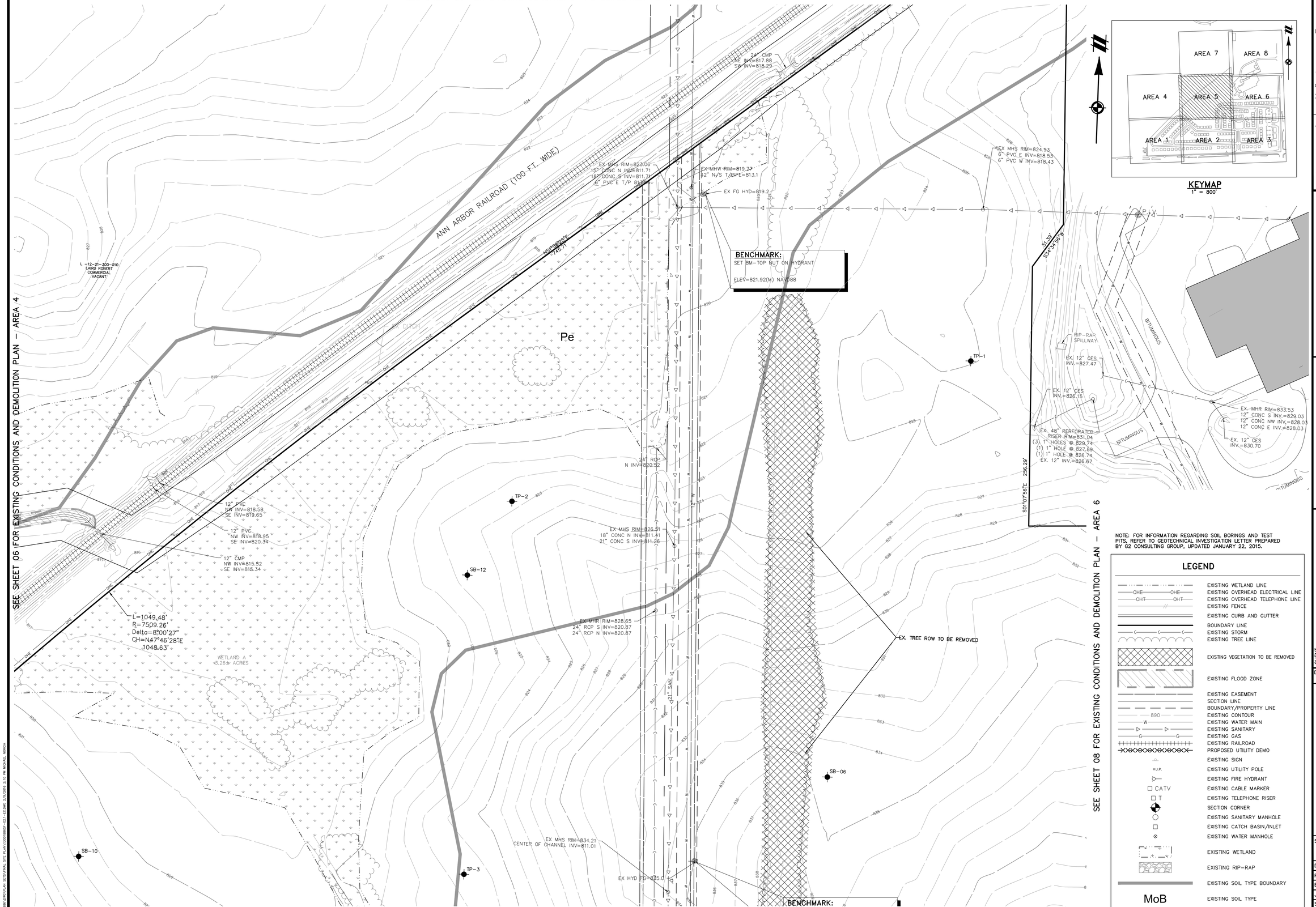
SEE SHEET 09 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 7







**KEYMAP**
1" = 800'

NOTE: FOR INFORMATION REGARDING SOIL BORINGS AND TEST PITS, REFER TO GEOTECHNICAL INVESTIGATION LETTER PREPARED BY G2 CONSULTING GROUP, UPDATED JANUARY 22, 2015.

## LEGEND

| | |
|---|---|
| | EXISTING WETLAND LINE |
| OHE — OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT — OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C — C — C | EXISTING STORM |
| | EXISTING TREE LINE |
| | EXISTING VEGETATION TO BE REMOVED |
| | EXISTING FLOOD ZONE |
| | EXISTING EASEMENT |
| | SECTION LINE |
| | BOUNDARY/PROPERTY LINE |
| 890 | EXISTING CONTOUR |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G — G | EXISTING GAS |
| | EXISTING RAILROAD |
| | PROPOSED UTILITY DEMO |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | EXISTING SOIL TYPE BOUNDARY |
| MoB | EXISTING SOIL TYPE |

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CLIENT
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INGLEWOOD PARK
FINAL SITE PLAN

# EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 5

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

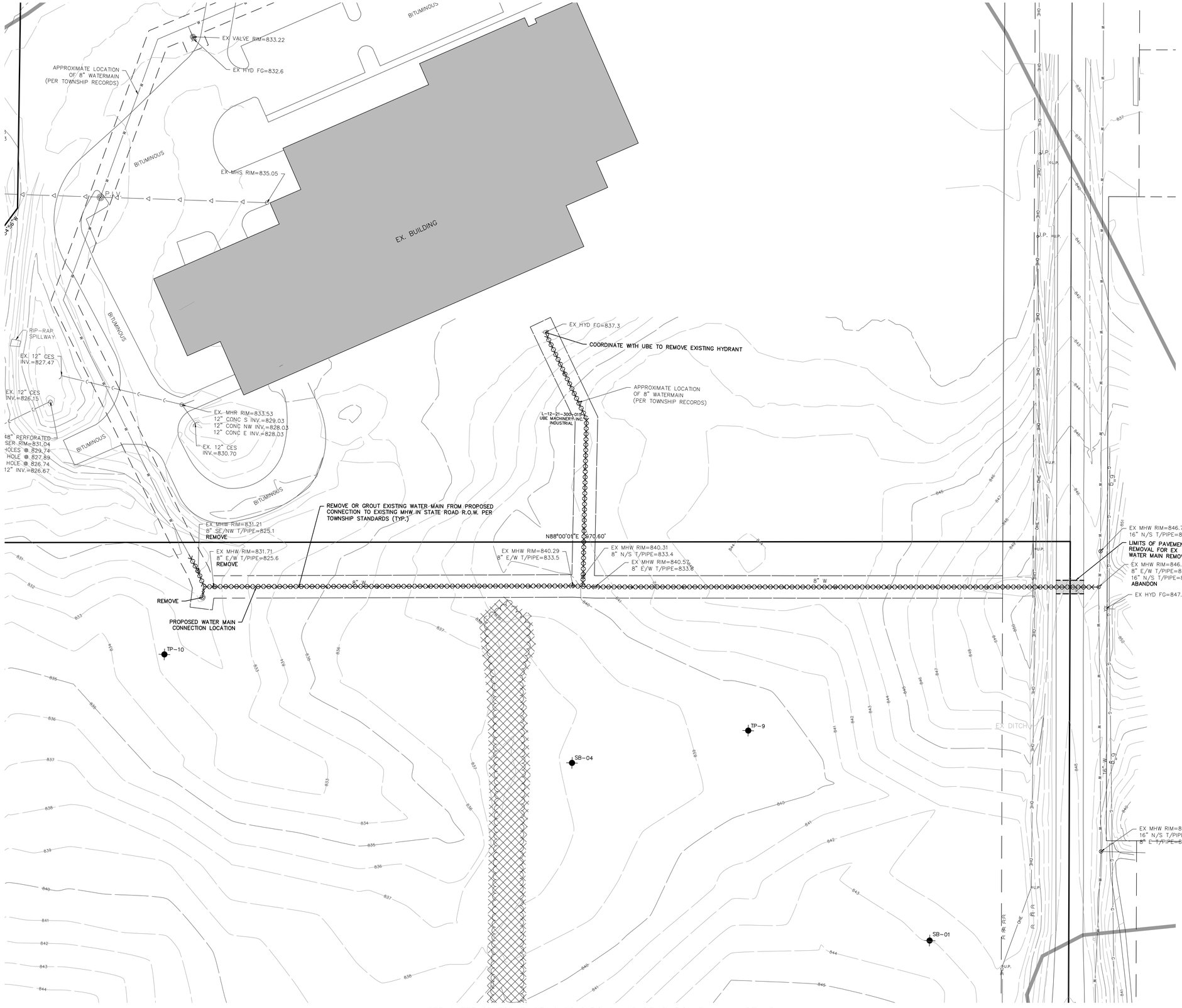
REVISIONS

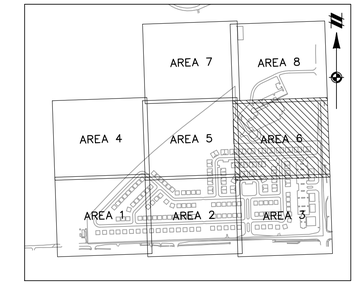
SCALE 0 20 40
1" = 40 FEET

| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |
| SHEET NO. | 07 | | |

SEE SHEET 10 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 8

SEE SHEET 07 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 5




KEYMAP
1" = 800'

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## LEGEND

| | |
|---|---|
| | EXISTING WETLAND LINE |
| OHE OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C C C | EXISTING STORM |
| | EXISTING TREE LINE |
| | EXISTING VEGETATION TO BE REMOVED |
| | EXISTING FLOOD ZONE |
| | EXISTING EASEMENT |
| | SECTION LINE |
| | BOUNDARY/PROPERTY LINE |
| 890 | EXISTING CONTOUR |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G G | EXISTING GAS |
| | EXISTING RAILROAD |
| | PROPOSED UTILITY DEMO |
| | EXISTING SIGN |
| O.U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | EXISTING SOIL TYPE BOUNDARY |
| MoB | EXISTING SOIL TYPE |

SEE SHEET 05 FOR EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 3

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EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 6

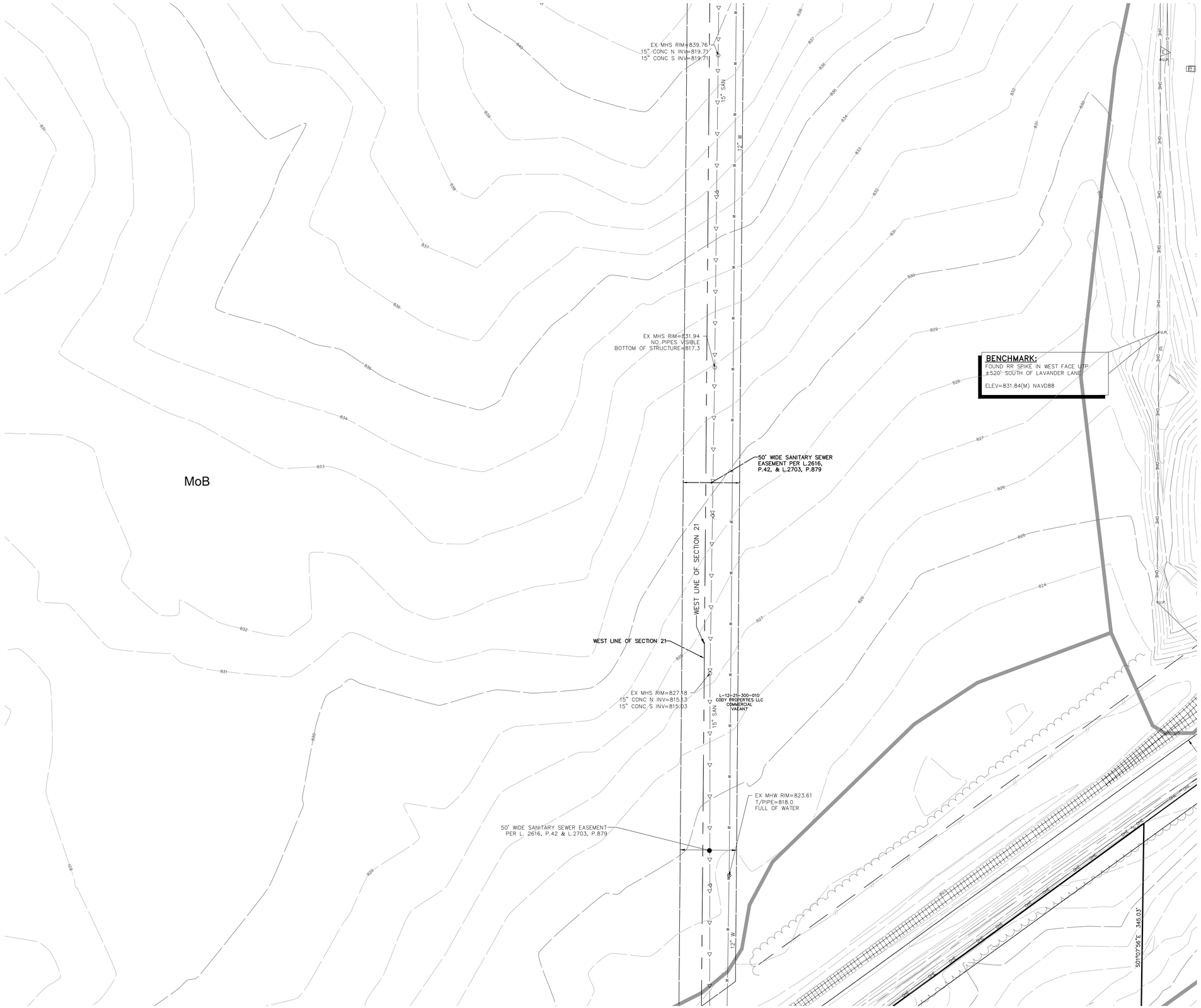
DATE
NOVEMBER 5, 2015

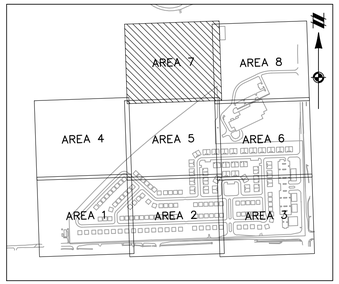
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 08 | |




KEYMAP
1" = 800'

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## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
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TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 7

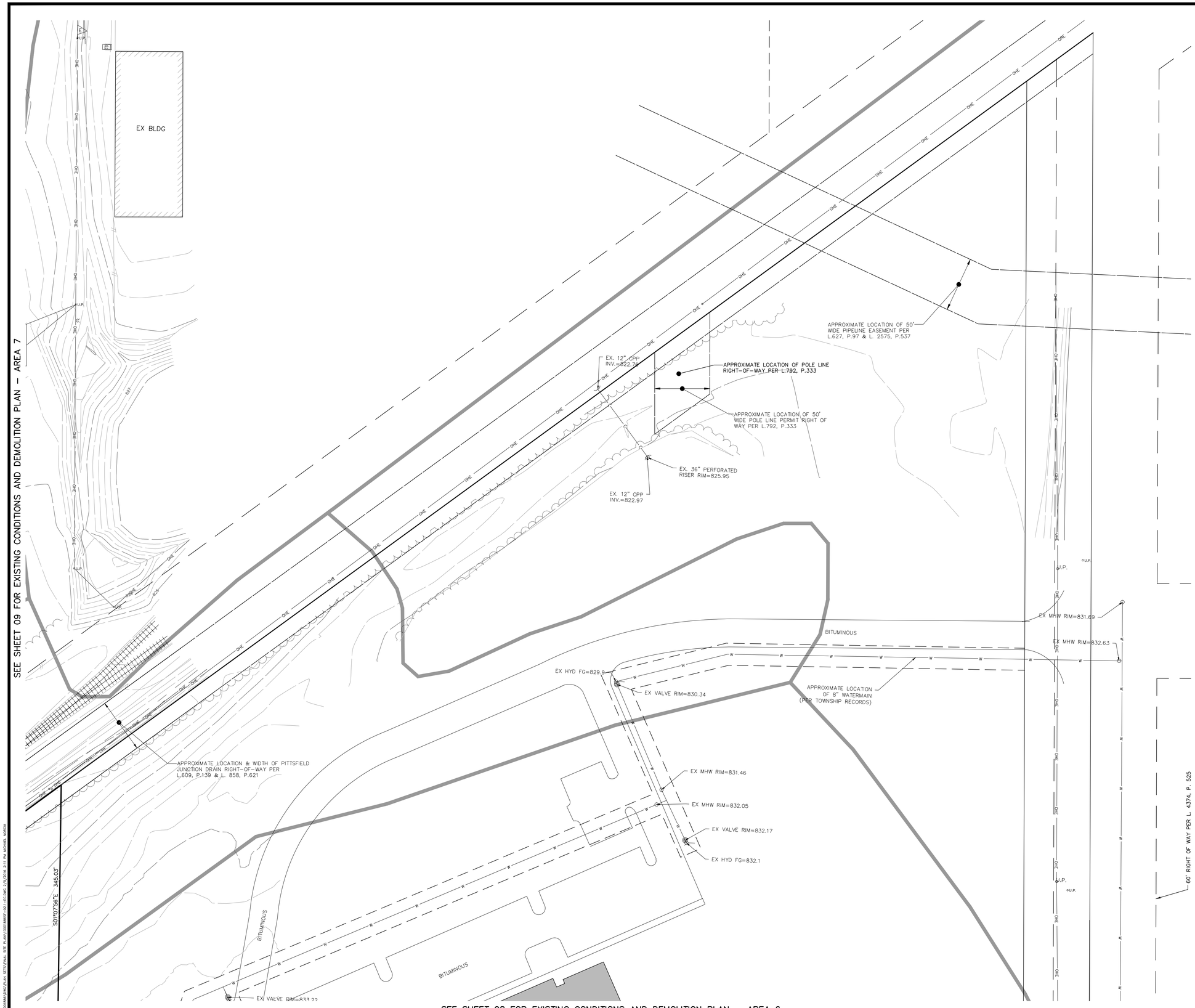
DATE
NOVEMBER 5, 2015

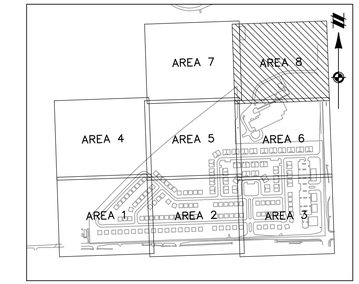
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 09 | |




KEYMAP
1" = 800'

NOTE: FOR INFORMATION REGARDING SOIL BORINGS AND TEST PITS, REFER TO GEOTECHNICAL INVESTIGATION LETTER PREPARED BY G2 CONSULTING GROUP, UPDATED JANUARY 22, 2015.

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING TREE LINE
- EXISTING VEGETATION TO BE REMOVED
- EXISTING FLOOD ZONE
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING CONTOUR
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED UTILITY DEMO
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- EXISTING SOIL TYPE BOUNDARY
- MoB — EXISTING SOIL TYPE

811
Know what's **below.**
**Call** before you dig.

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

EXISTING CONDITIONS AND DEMOLITION PLAN – AREA 8

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

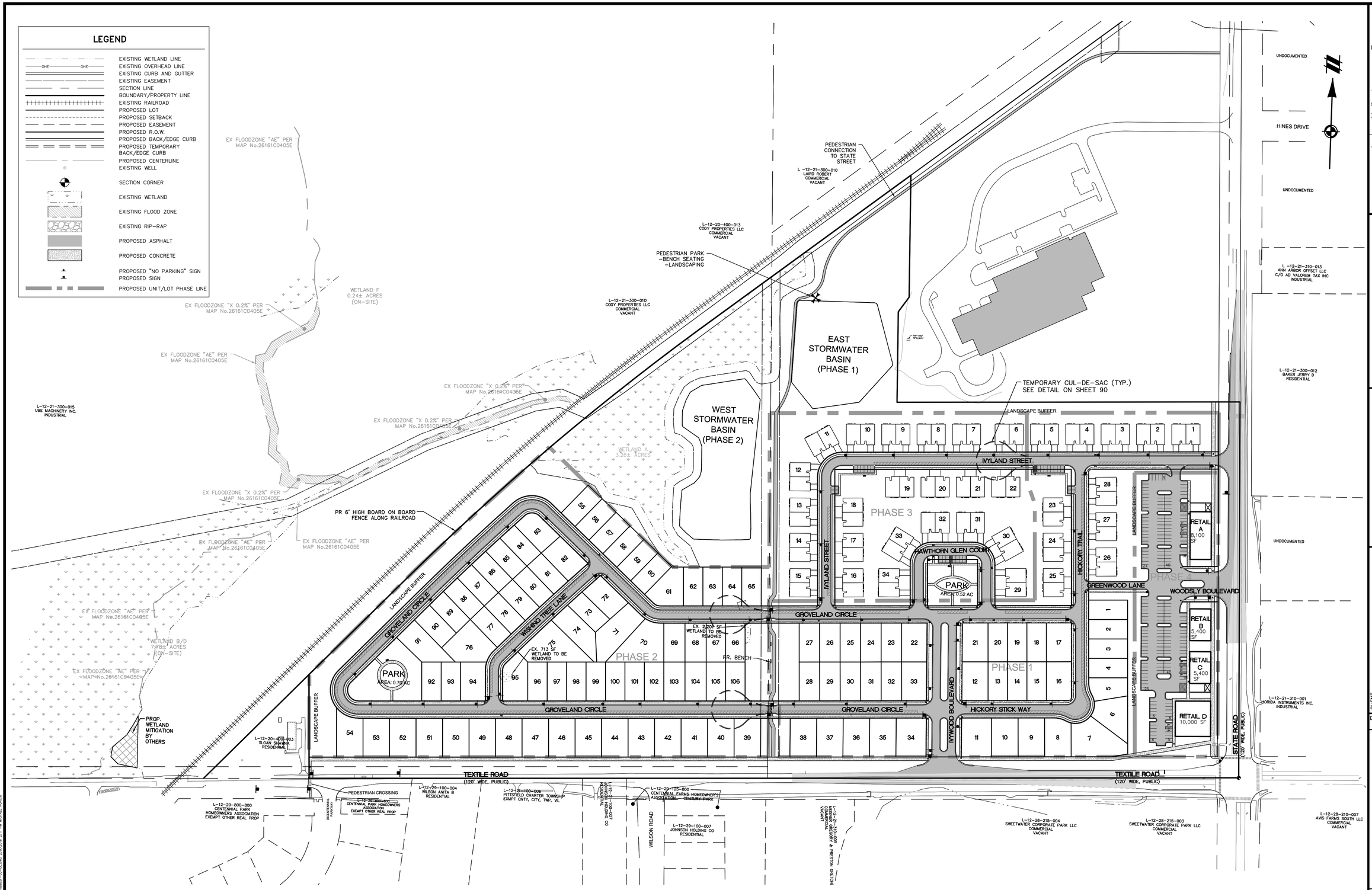
REVISIONS

SCALE 0 20 40
1" = 40 FEET

DR. SK | CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 10

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD LINE
- EXISTING CURB AND GUTTER
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING RAILROAD
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED TEMPORARY BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- SECTION CORNER
- EXISTING WETLAND
- EXISTING FLOOD ZONE
- EXISTING RIP-RAP
- PROPOSED ASPHALT
- PROPOSED CONCRETE
- PROPOSED "NO PARKING" SIGN
- PROPOSED SIGN
- PROPOSED UNIT/LOT PHASE LINE




| Wetland Area | Wetland Area (acres) | Township regulated? | MDEQ Regulated? | Impact Area (square feet) | Impact Volumes (cubic yards) |
|---|---|---|---|---|---|
| A | 3.26 | Yes | Yes | 0 | 0 |
| C | 0.02 | No | No | 713 | 224 (FILL) |
| E | 0.05 | Yes | No | 2201 | 367 (FILL) |
| Total | 3.33 | | | 2914 (0.067-acres) | 591 (FILL) |

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

# OVERALL LAYOUT PLAN

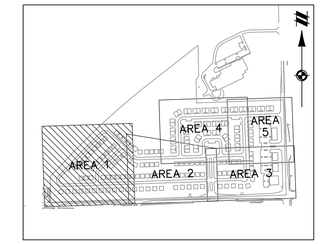
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

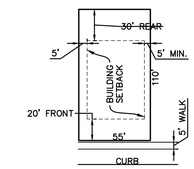
REVISIONS

SCALE 0 60 120
1" = 120 FEET

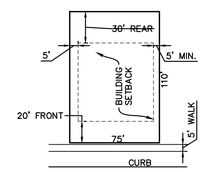
DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 11




KEYMAP
1" = 800'




55' WIDE TYPICAL LOT DETAIL
NO SCALE




75' WIDE TYPICAL LOT DETAIL
NO SCALE

SEE SHEET 90 FOR TYPICAL ROAD SECTIONS

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD LINE
- EXISTING CURB AND GUTTER
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING RAILROAD
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- SECTION CORNER
- EXISTING WETLAND
- EXISTING FLOOD ZONE
- EXISTING RIP-RAP
- PROPOSED ASPHALT
- PROPOSED "NO PARKING" SIGN / FIRE LANE (DETAIL ON SHEET 90)
- PROPOSED SIGN (DETAIL ON SHEET 90)
- WETLAND BUFFER

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

LAYOUT PLAN – AREA 1

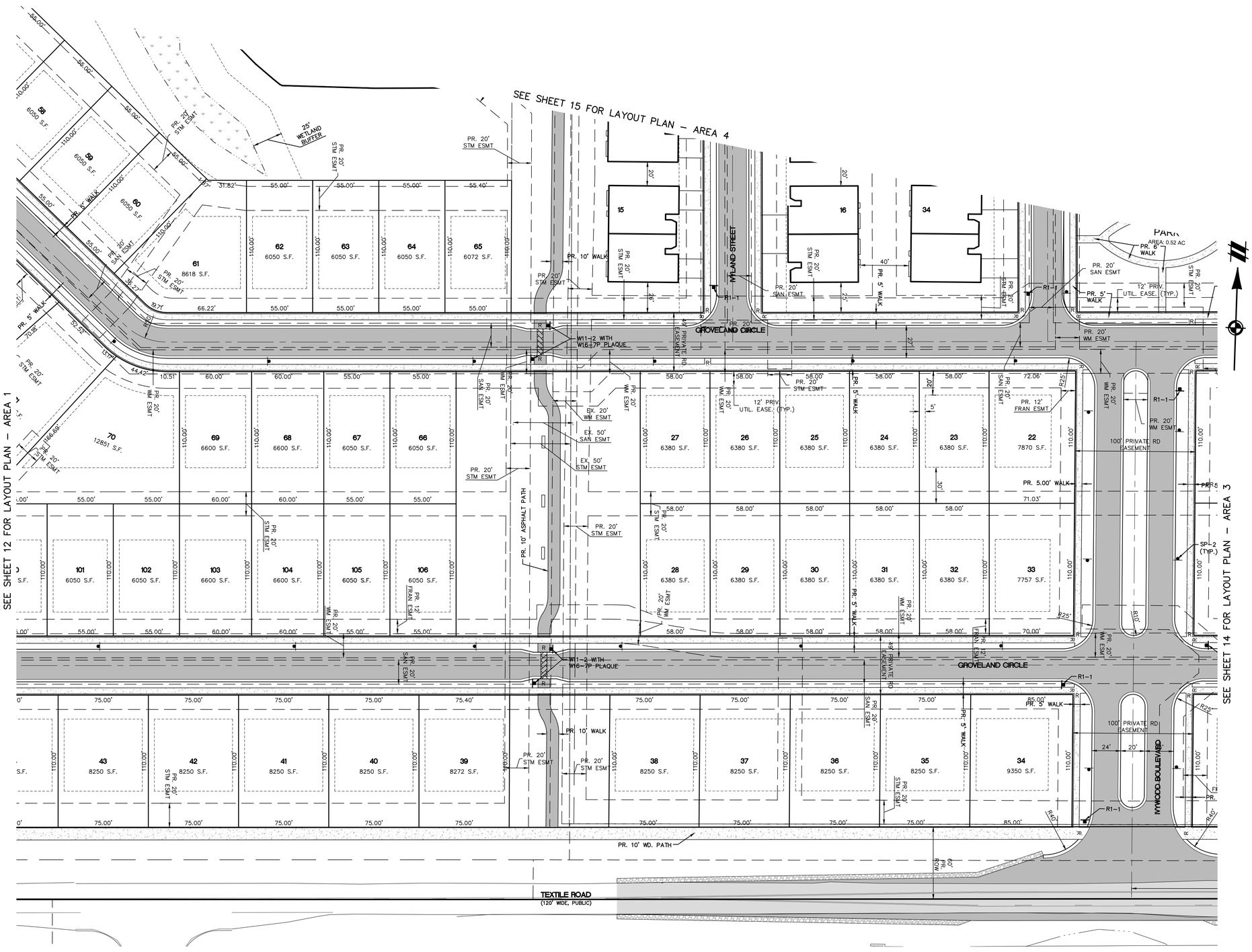
DATE
NOVEMBER 5, 2015

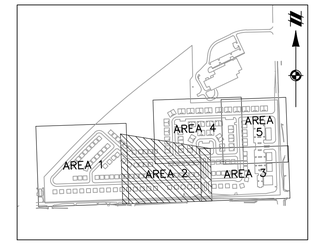
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 12 | |




KEYMAP
1" = 800'

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD LINE
- EXISTING CURB AND GUTTER
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING RAILROAD
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- SECTION CORNER
- EXISTING WETLAND
- EXISTING FLOOD ZONE
- EXISTING RIP-RAP
- PROPOSED ASPHALT
- PROPOSED "NO PARKING" SIGN / FIRE LANE (DETAIL ON SHEET 90)
- PROPOSED SIGN (DETAIL ON SHEET 90)
- WETLAND BUFFER

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

LAYOUT PLAN – AREA 2

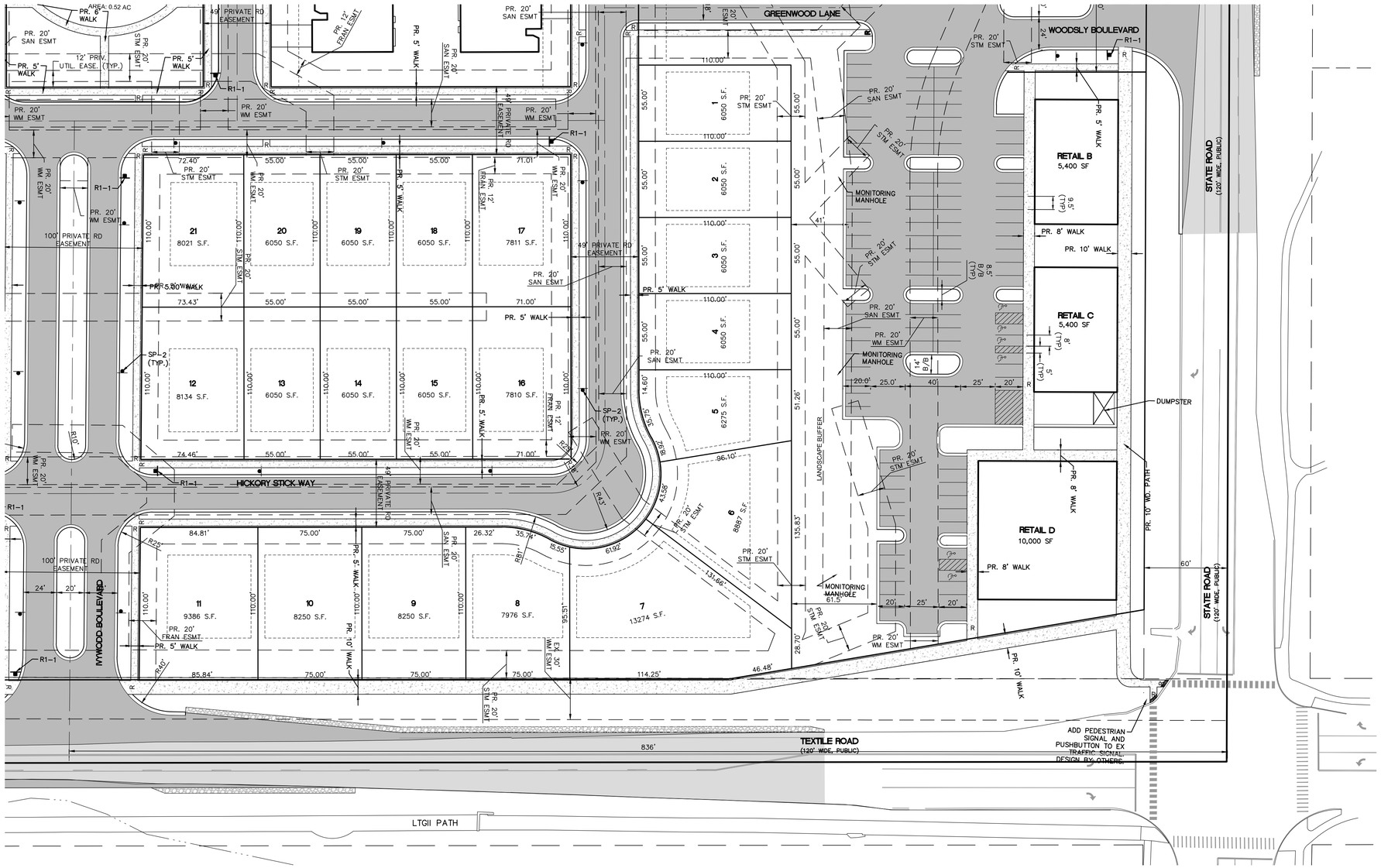
DATE
NOVEMBER 5, 2015

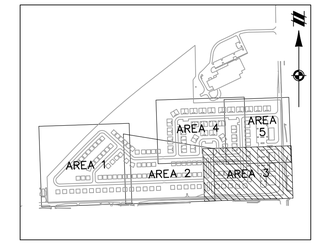
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 13 | |




KEYMAP
1" = 800'

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD LINE
- EXISTING CURB AND GUTTER
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING RAILROAD
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- SECTION CORNER
- EXISTING WETLAND
- EXISTING FLOOD ZONE
- EXISTING RIP-RAP
- PROPOSED ASPHALT
- PROPOSED "NO PARKING" SIGN / FIRE LANE (DETAIL ON SHEET 90)
- PROPOSED SIGN (DETAIL ON SHEET 90)
- WETLAND BUFFER

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

LAYOUT PLAN – AREA 3

DATE
NOVEMBER 5, 2015

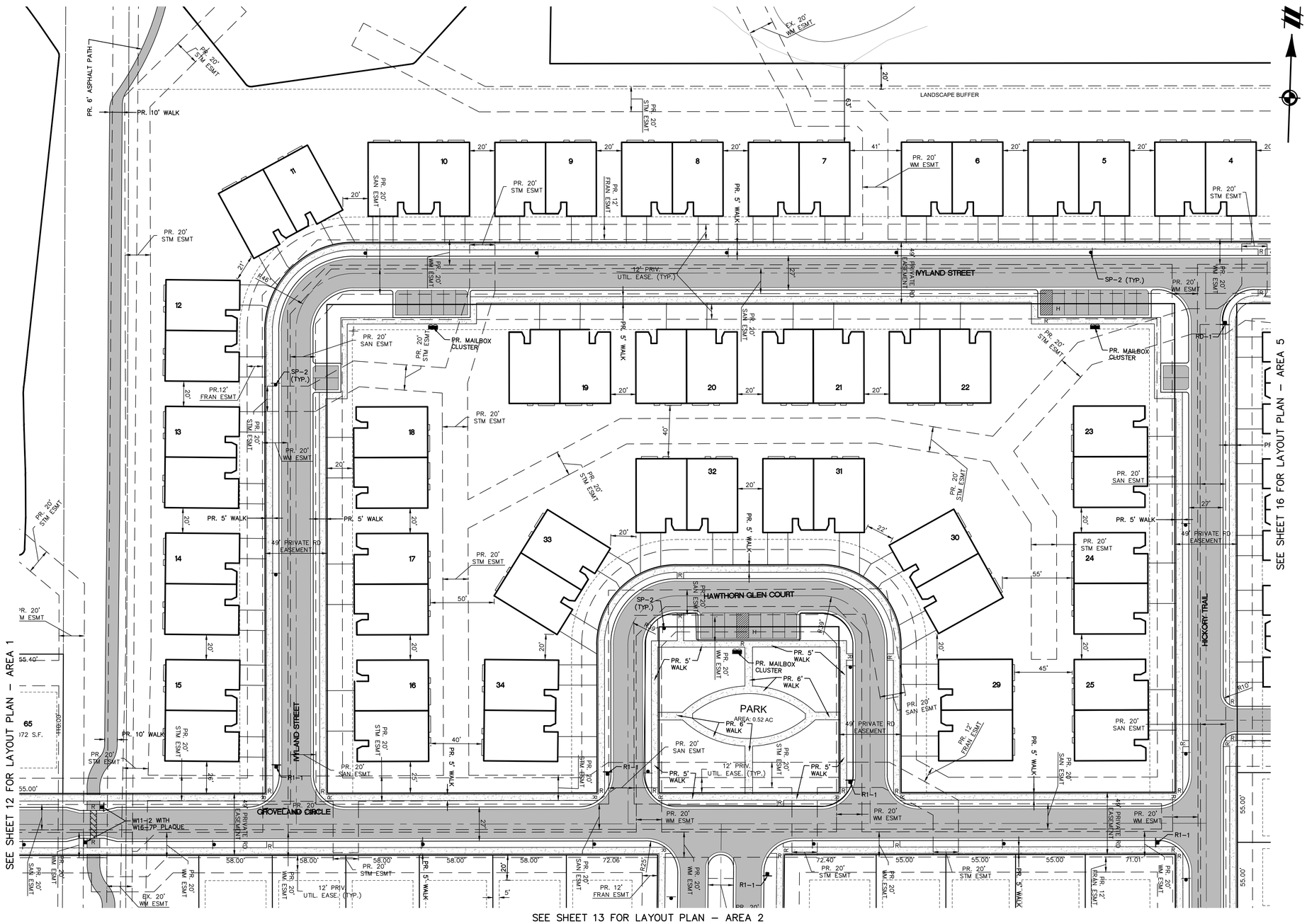
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

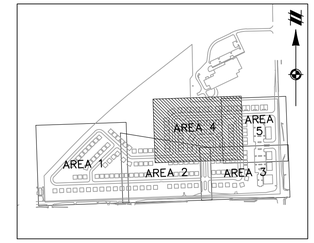
REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 14 | |

J:\13001886\DWG\FD-AR-SITE\FINAL SITE PLAN\13001886SP-04-LOPC-2-9-2016 2:12 PM MICHAEL NOWICKI




KEYMAP
1" = 800'

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD LINE
- EXISTING CURB AND GUTTER
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING RAILROAD
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- SECTION CORNER
- EXISTING WETLAND
- EXISTING FLOOD ZONE
- EXISTING RIP-RAP
- PROPOSED ASPHALT
- PROPOSED "NO PARKING" SIGN / FIRE LANE (DETAIL ON SHEET 90)
- PROPOSED SIGN (DETAIL ON SHEET 90)

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

LAYOUT PLAN – AREA 4

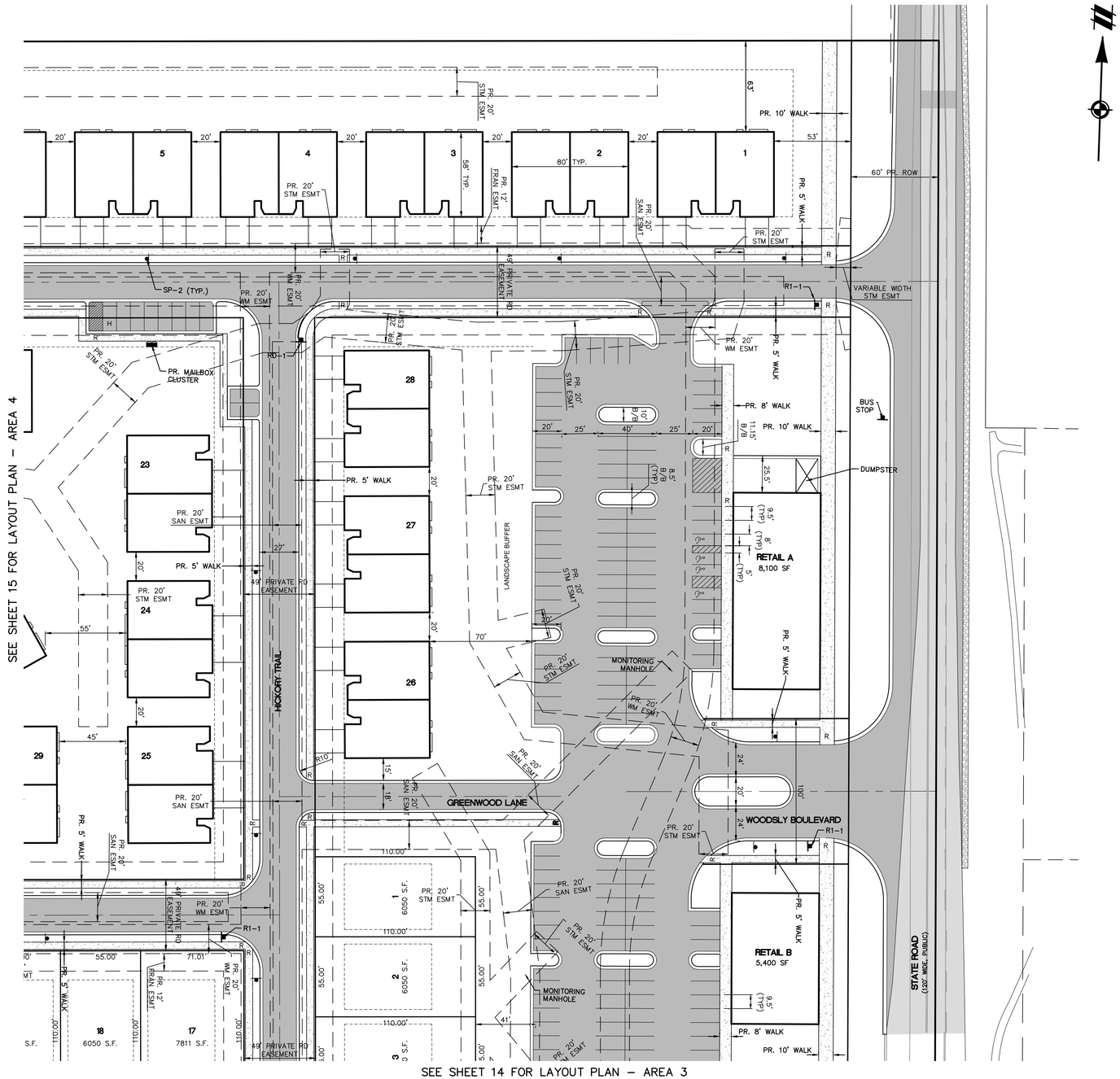
DATE
NOVEMBER 5, 2015

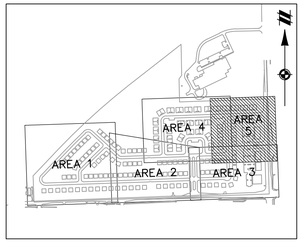
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 15 | |




KEYMAP
1" = 800'

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD LINE
- EXISTING CURB AND GUTTER
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXISTING RAILROAD
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- SECTION CORNER
- EXISTING WETLAND
- EXISTING FLOOD ZONE
- EXISTING RIP-RAP
- PROPOSED ASPHALT
- PROPOSED "NO PARKING" SIGN / FIRE LANE (DETAIL ON SHEET 90)
- PROPOSED SIGN (DETAIL ON SHEET 90)
- WETLAND BUFFER

811
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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

LAYOUT PLAN – AREA 5

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

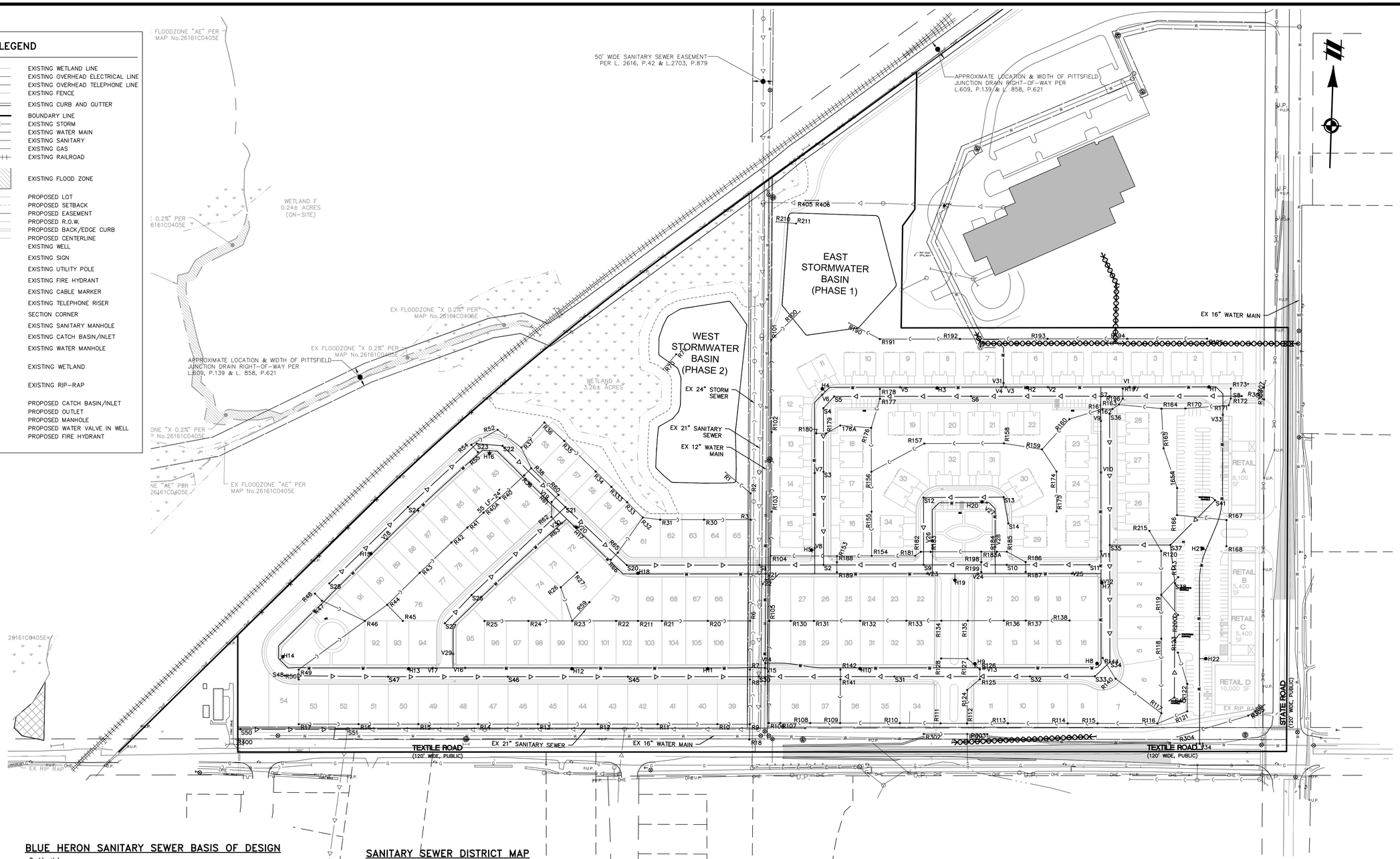
REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 16 | |

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT




## BLUE HERON SANITARY SEWER BASIS OF DESIGN

**Residential**

| | | | |
|---|---|---|---|
| Number of Single family lots = | | 106 | lots |
| Number of Multi-family units = | | 68 | units |
| | | 174 | E.R.U. |

**Non-Residential**

| | | | | | |
|---|---|---|---|---|---|
| Restaurant = | 7400 s.f. | | | | |
| ERU = | 4 units/1000 sf | 7400 | sf = | 29.6 | E.R.U. |
| Retail = | 21500 s.f. | | | | |
| ERU = | 0.35 units/1000 sf | 21500 | units = | 7.5 | E.R.U. |
| **TOTAL =** | | | | 211.1 | E.R.U. |

Number of Persons per lot = 3.5 persons/ERU

Design Population 211.1 units x 3.5 units = 738.9 people

Average Discharge Rate = 100 G.P.C.P.D.

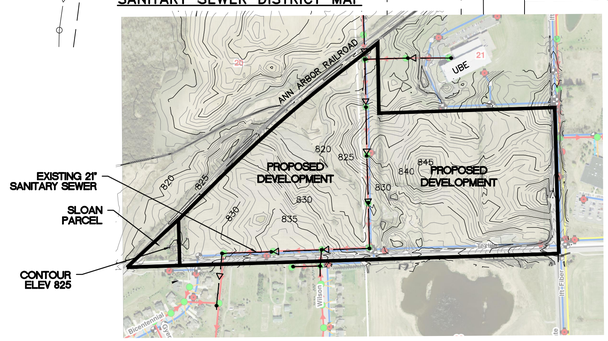
Average Discharge =
(756.4 People x 100 G.P.C.P.D.)/(1440 min/day)(448.8 gpm/cfs 0.114 cfs

Peaking Factor = $(18 + (\text{Population}/1000)^{0.5})/(4 + (\text{Population}/1000)^{0.5})$ = 3.88

Peak Flow = Average Discharge x Peaking Factor = 0.444 cfs

Capacity of a 8 " pipe @ 0.50 %= 0.86 cfs > 0.444 cfs

## SANITARY SEWER DISTRICT MAP




## SANITARY SERVICE AREA FLOW CALCULATIONS

| | Acres | S.F. Lots/acre | E.R.U. | # Persons per Lot | Design Population | Avg. Discharge (cfs) | Peak Factor | Peak Flow (cfs) |
|---|---|---|---|---|---|---|---|---|
| Proposed Development | 63.39 | - | 212 | 3.5 | 742 | 0.115 | 3.880 | 0.445 |
| Sloan Residence | 1.01 | 4.0 | 4 | 3.5 | 14 | 0.002 | 4.399 | 0.010 |
| **Total** | | | | | | **0.117** | | **0.455** |

| | |
|---|---|
| **Capacity of 10" Sewer (cfs) at 0.28%** | **1.360** |

## SANITARY & WATER NOTES:

1. ALL PROPOSED SANITARY SEWER SHALL BE 8" DIAMETER.
2. ALL PROPOSED WATER MAIN SHALL BE 8" DIAMETER.
3. ALL PROPOSED WATER MAIN TIE-INS MUST BE LIVE TAPS.
4. SANITARY & WATER SERVICE SHALL BE PROVIDED TO EVERY LOT, EACH MULTI-FAMILY UNIT, AND EACH COMMERCIAL BUILDING. SERVICE LEAD SIZES FOR EACH COMMERCIAL BUILDING SHALL BE DETERMINED BASED ON INTENDED BUILDING USE (TO BE DETERMINED).
5. AT PROPOSED 8" WATER MAIN BENDS MADE WITHOUT FITTINGS, THE MAXIMUM DEGREE OF DEFLECTION SHALL BE 5°; THEREFORE, A RADIUS OF 205' FOR 18' PIPE LENGTHS A RADIUS OF 230' FOR 20' PIPE LENGTHS.

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THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# OVERALL UTILITIES PLAN

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 60 120
SCALE: 1" = 120'

| | |
|---|---|
| DR. | SK |
| CH. | SS |
| P.M. | MB |
| BOOK | |
| JOB | 13001886.10 |
| SHEET NO. | 17 |

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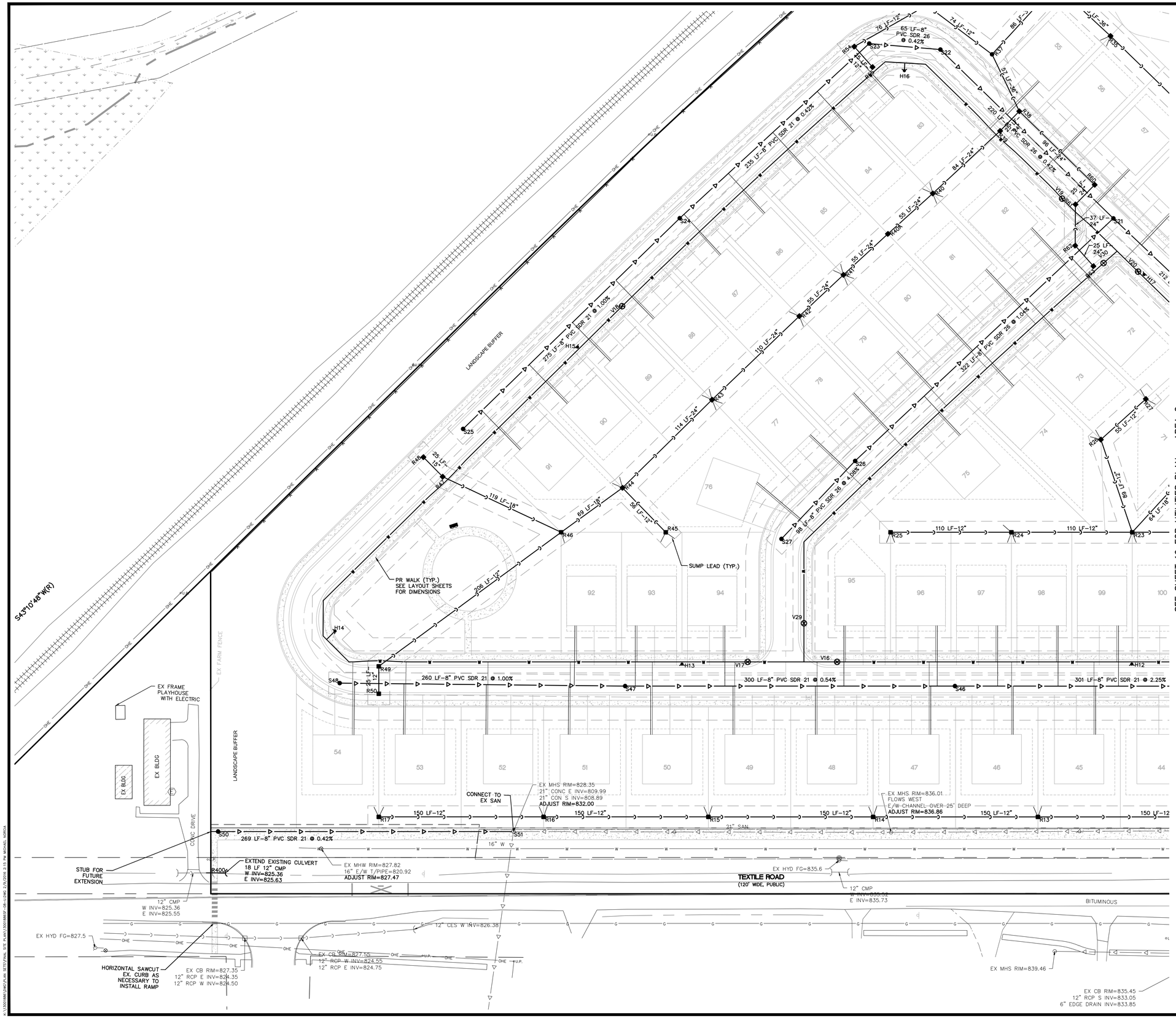


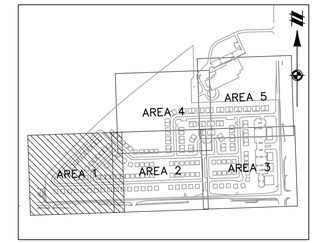


KEYMAP
1" = 800'

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED STORM SEWER
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CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# UTILITIES PLAN – AREA 1

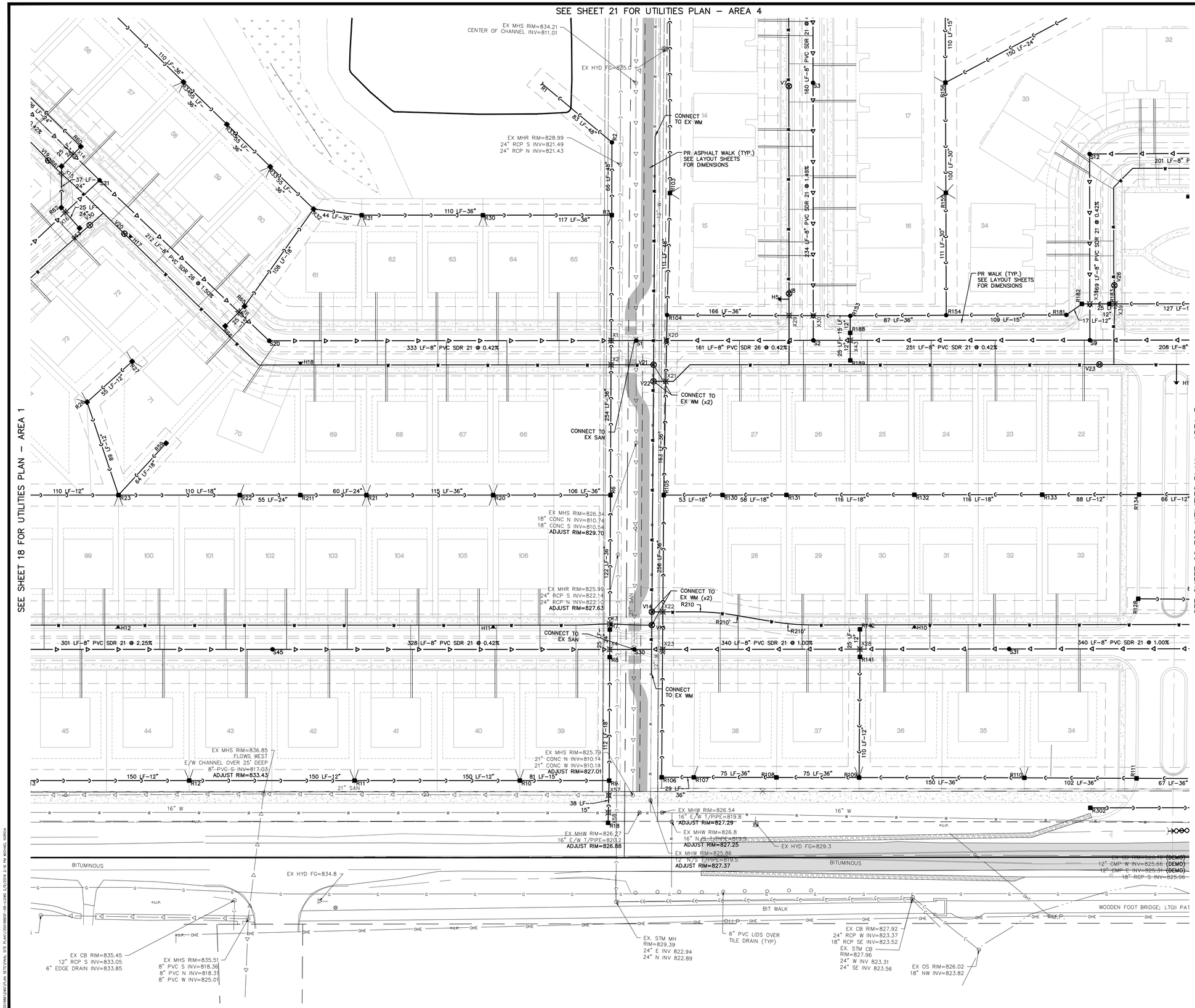
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 18 | |




## LEGEND

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# UTILITIES PLAN – AREA 2

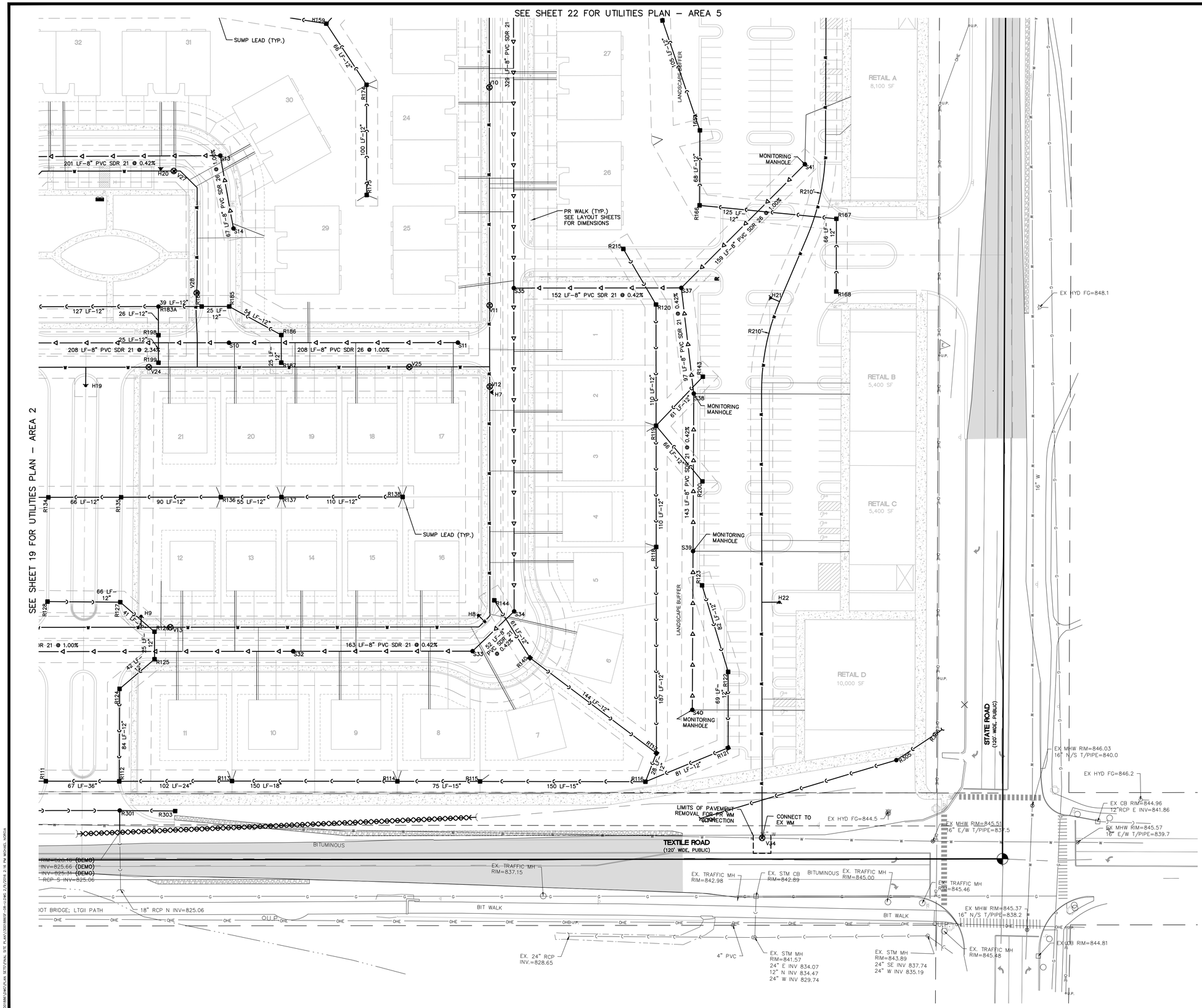
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |
| SHEET NO. | 19 | | |

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CLIENT
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INGLEWOOD PARK
FINAL SITE PLAN

# UTILITIES PLAN – AREA 3

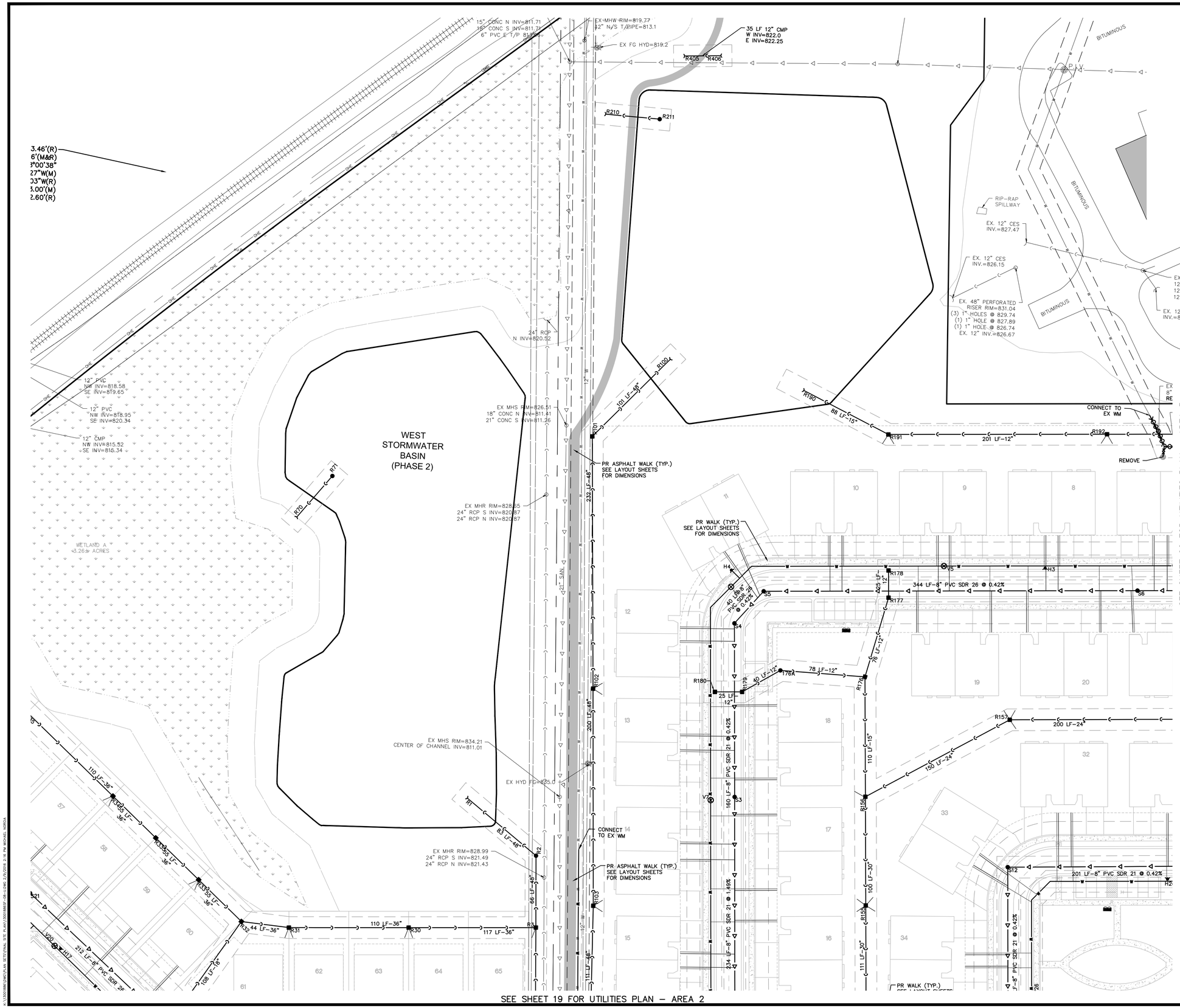
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 20 | |




## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
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- PROPOSED CENTERLINE
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INGLEWOOD PARK
FINAL SITE PLAN

UTILITIES PLAN – AREA 4

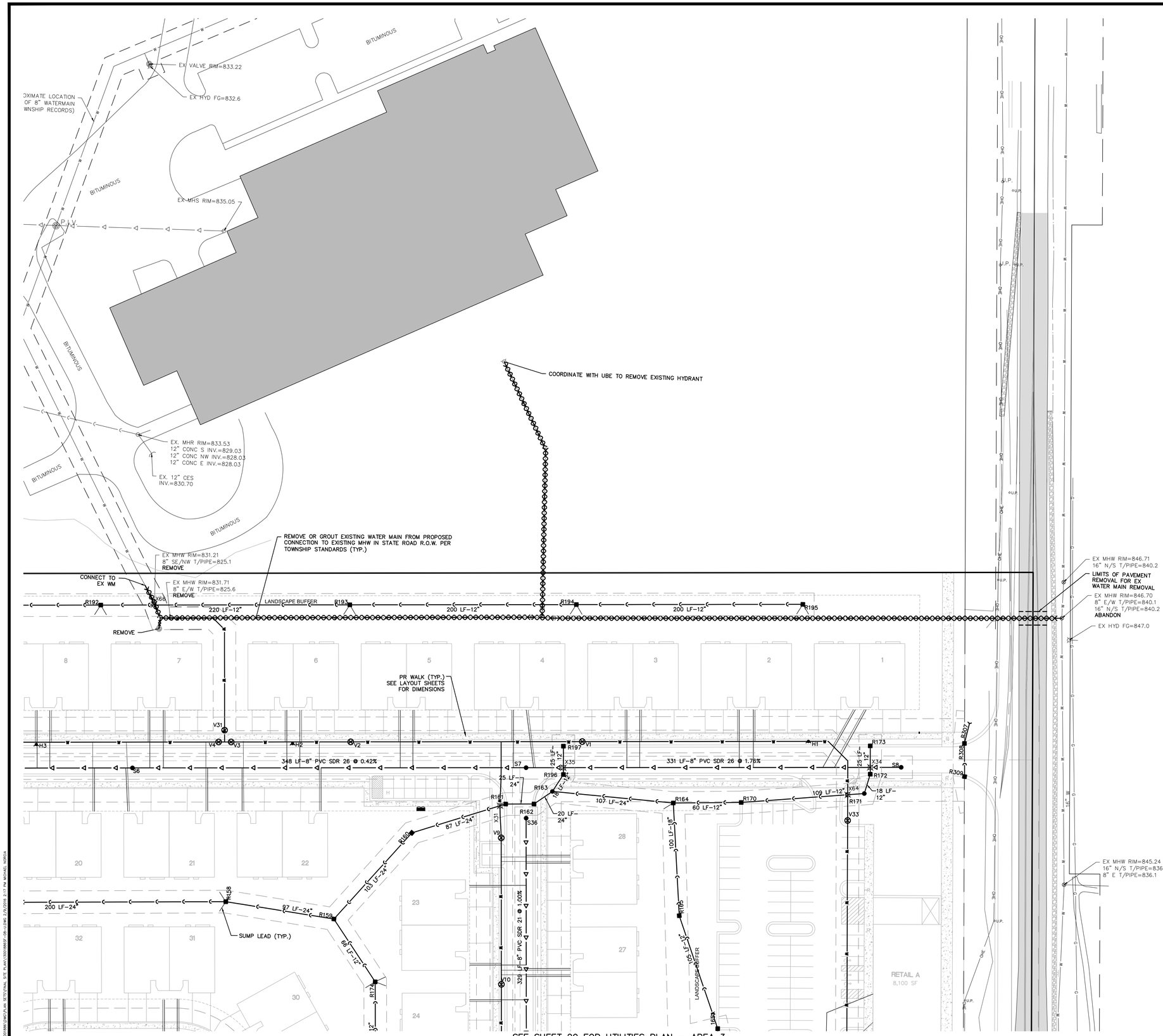
DATE
NOVEMBER 5, 2015

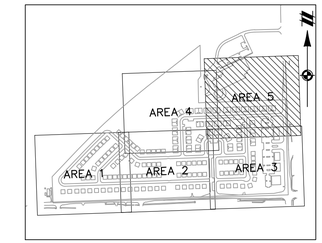
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 21 | |




KEYMAP
1" = 800'

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
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INGLEWOOD PARK
FINAL SITE PLAN

UTILITIES PLAN – AREA 5

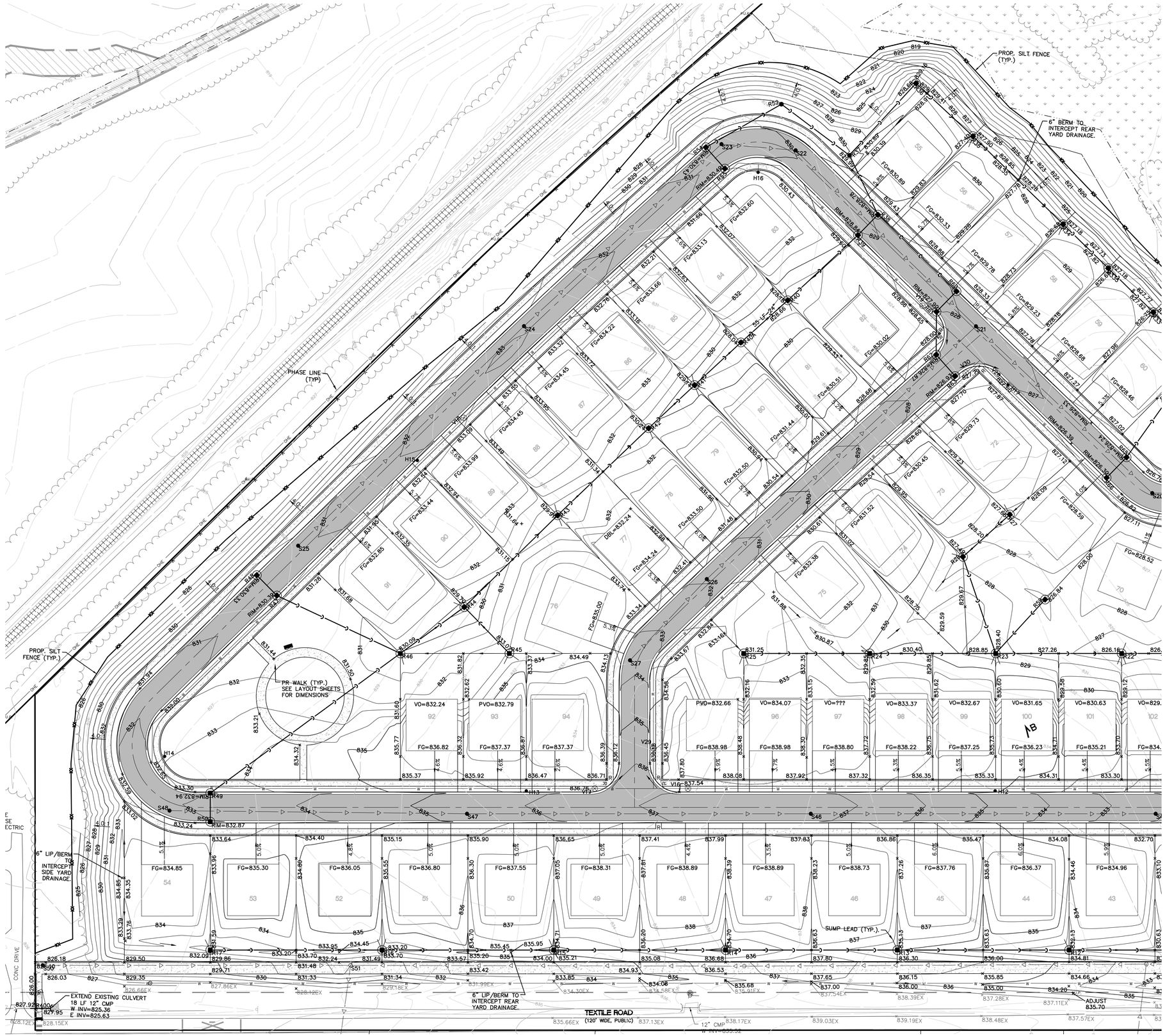
DATE
NOVEMBER 5, 2015

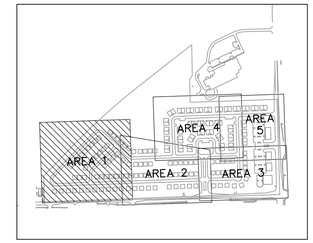
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. | SK |
| CH. | SS |
| P.M. | MB |
| BOOK | |
| JOB | 13001886.10 |
| SHEET NO. | 22 |




**KEYMAP**
1" = 800'

| WO=752.5 | VO=754.20 |
|---|---|
| 760.00 F.G. | 760.00 FG |
| WO=FINISH GRADE OF WALK-OUT | (P)VO=FINISH GRADE OF (PARTIAL) VIEW-OUT |
| FG=FINISH GRADE | FG=FINISH GRADE |
| DBL = DROP BRICK LEDGE | |

**GRADING DETAILS**
NO SCALE

NOTE: SEE SHEET 90 FOR MASS GRADING SCHEMATICS

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
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- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT
- PROPOSED INLET FILTER
- PROPOSED MUD MAT

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734.994.4000

SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

GRADING AND EROSION CONTROL PLAN – AREA 1

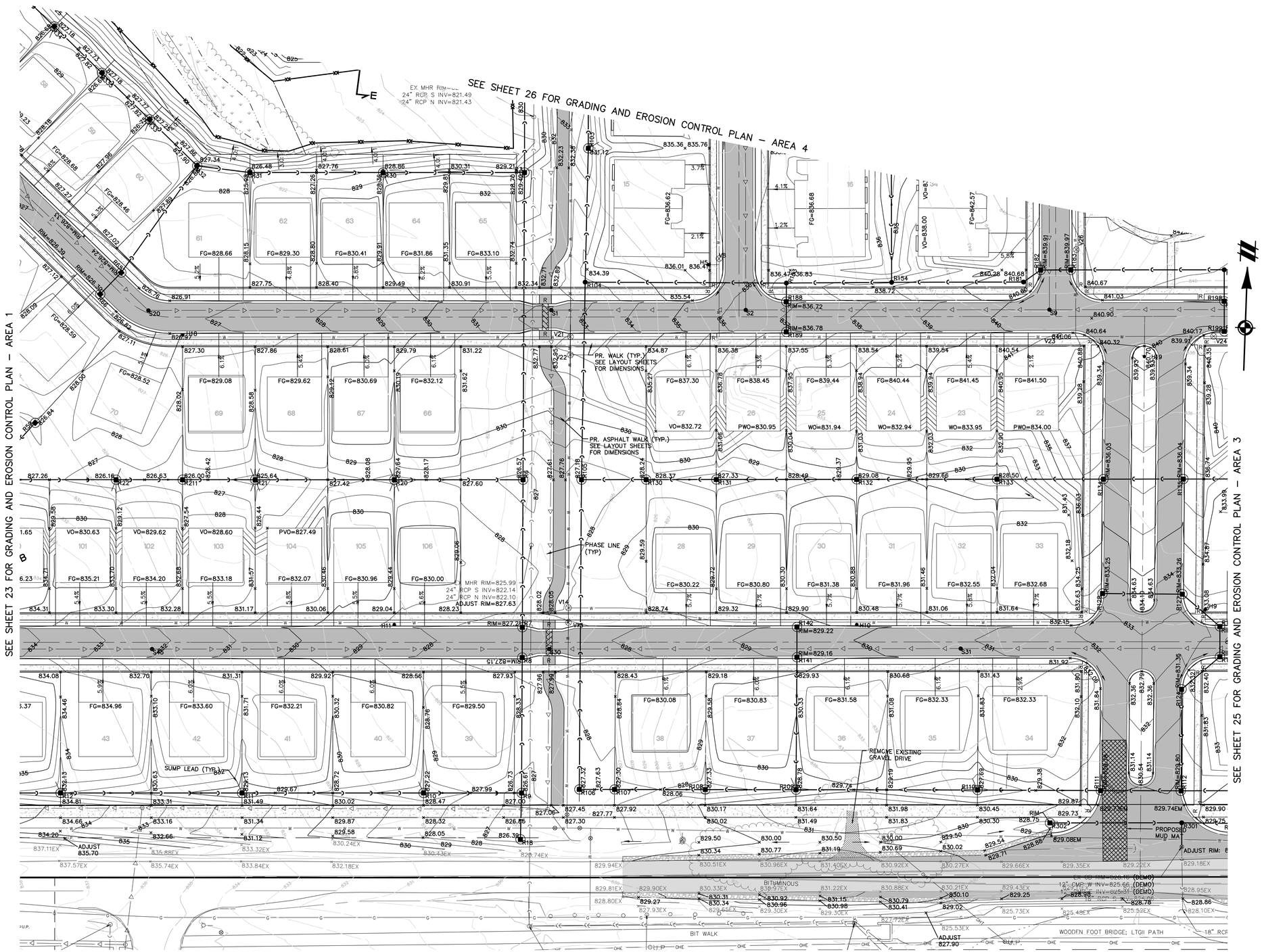
DATE
NOVEMBER 5, 2015

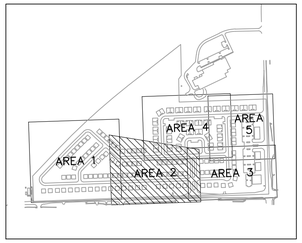
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |
| SHEET NO. | 23 | | |




KEYMAP
1" = 800'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| 890 | PROPOSED CONTOUR |
| | PROPOSED SILT FENCE |
| W | EXISTING WELL |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WETLAND |
| | PROPOSED RIP–RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |
| | PROPOSED INLET FILTER |
| | PROPOSED MUD MAT |

811
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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

GRADING AND EROSION CONTROL PLAN – AREA 2

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

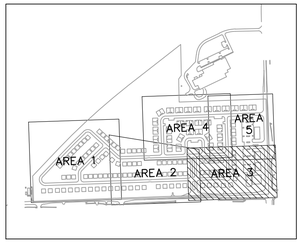
REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 24 | |

SEE SHEET 26 FOR GRADING AND EROSION CONTROL PLAN – AREA 4

SEE SHEET 24 FOR GRADING AND EROSION CONTROL PLAN – AREA 2




KEYMAP
1" = 800'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CONTOUR
- PROPOSED SILT FENCE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WETLAND
- PROPOSED RIP–RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT
- PROPOSED INLET FILTER
- PROPOSED MUD MAT

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CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

GRADING AND EROSION CONTROL PLAN – AREA 3

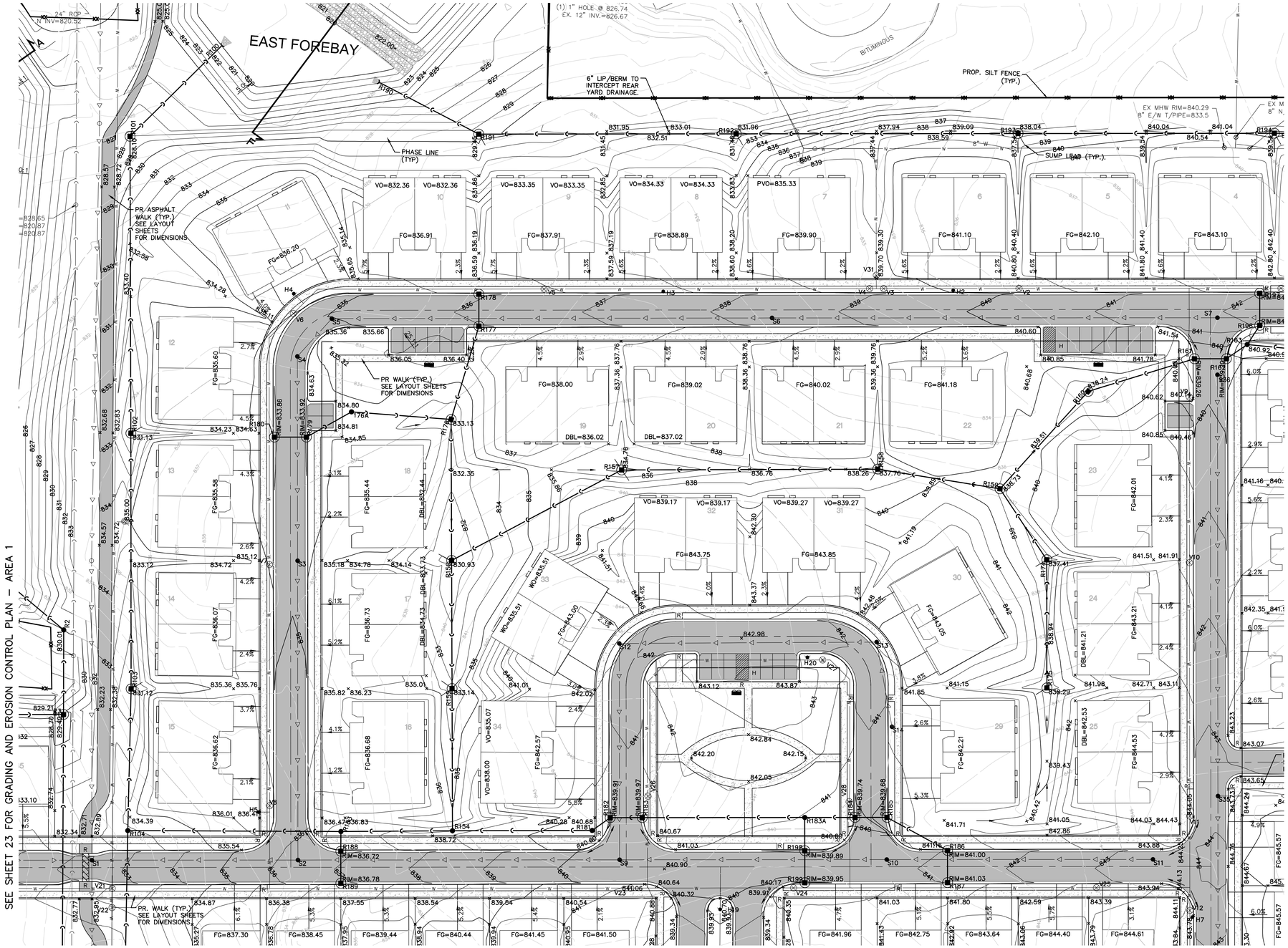
DATE
NOVEMBER 5, 2015

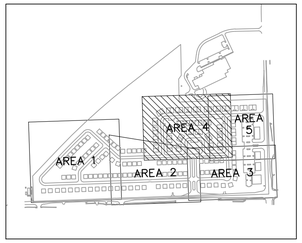
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 25 | |




KEYMAP
1" = 800'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CONTOUR
- PROPOSED SILT FENCE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WETLAND
- PROPOSED RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT
- PROPOSED INLET FILTER
- PROPOSED MUD MAT

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CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

GRADING AND EROSION CONTROL PLAN – AREA 4

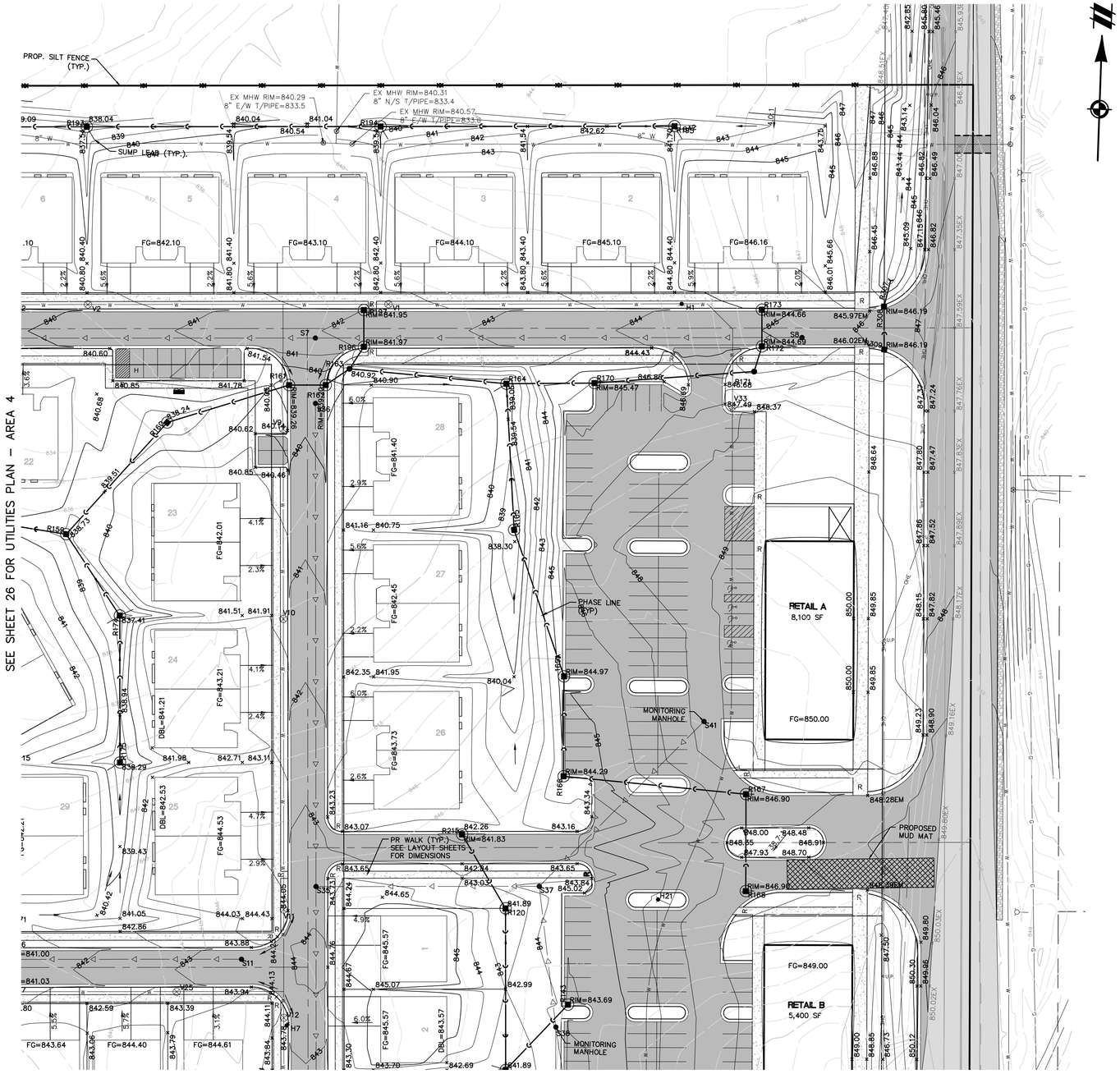
DATE
NOVEMBER 5, 2015

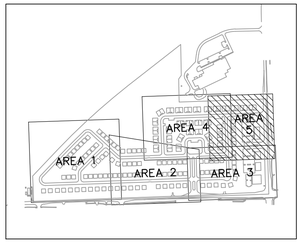
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 26 | |




KEYMAP
1" = 800'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CONTOUR
- PROPOSED SILT FENCE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WETLAND
- PROPOSED RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT
- PROPOSED INLET FILTER
- PROPOSED MUD MAT

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# GRADING AND EROSION CONTROL PLAN – AREA 5

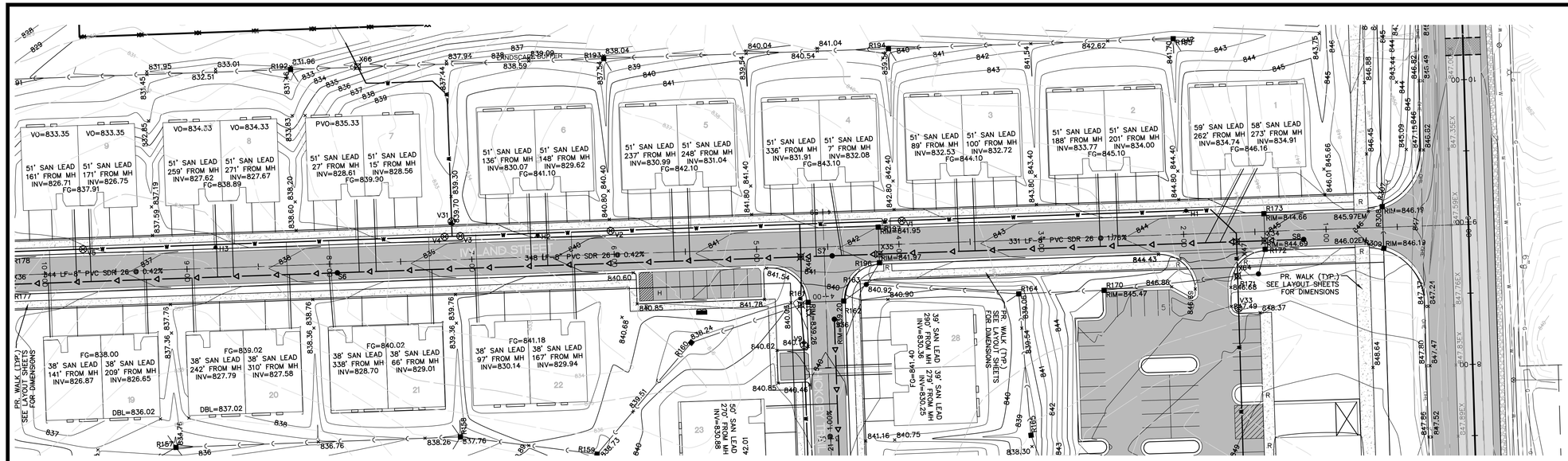
DATE
NOVEMBER 5, 2015

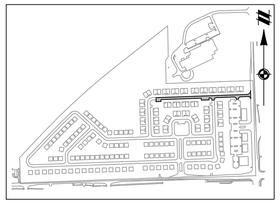
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

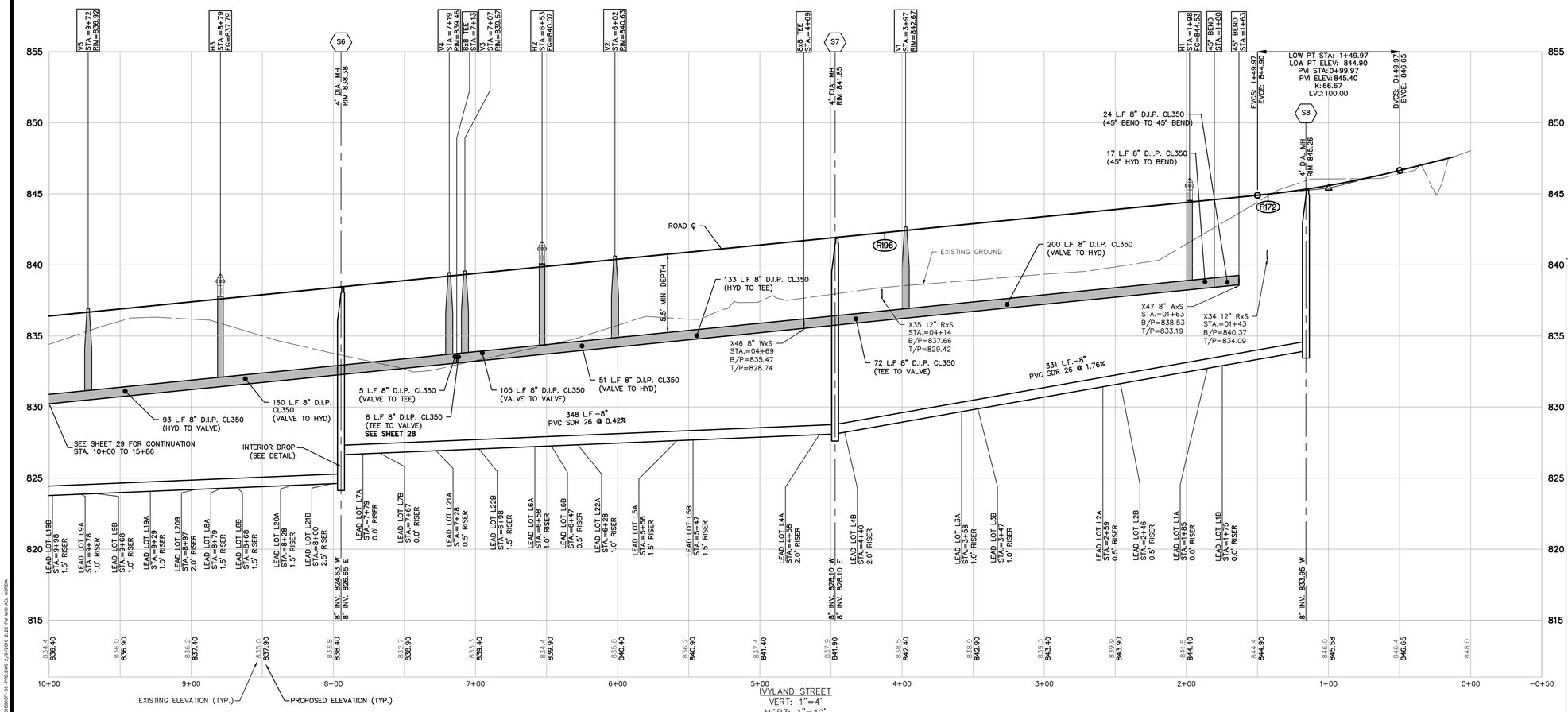
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. | SK |
| CH. | SS |
| P.M. | MB |
| BOOK | |
| JOB | 13001886.10 |
| SHEET NO. | 27 |



KEYMAP
1" = 800'




QUANTITIES:

WATERMAIN:
866 L.F. 8" D.I.P. CL350 (VALVE TO 45° BEND)
(3) 8" HYDRANT ASSEMBLIES
(4) 8" VALVES

SANITARY:
679 L.F. 8" PVC SDR 26
(3) 4' MANHOLES

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C C C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G G | EXISTING GAS |
| | EXISTING RAILROAD |
| | EXISTING FLOOD ZONE |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C C C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED SETBACK |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | EXISTING WELL |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

IVYLAND STREET PLAN AND PROFILE
STA. 0+00 TO 10+00

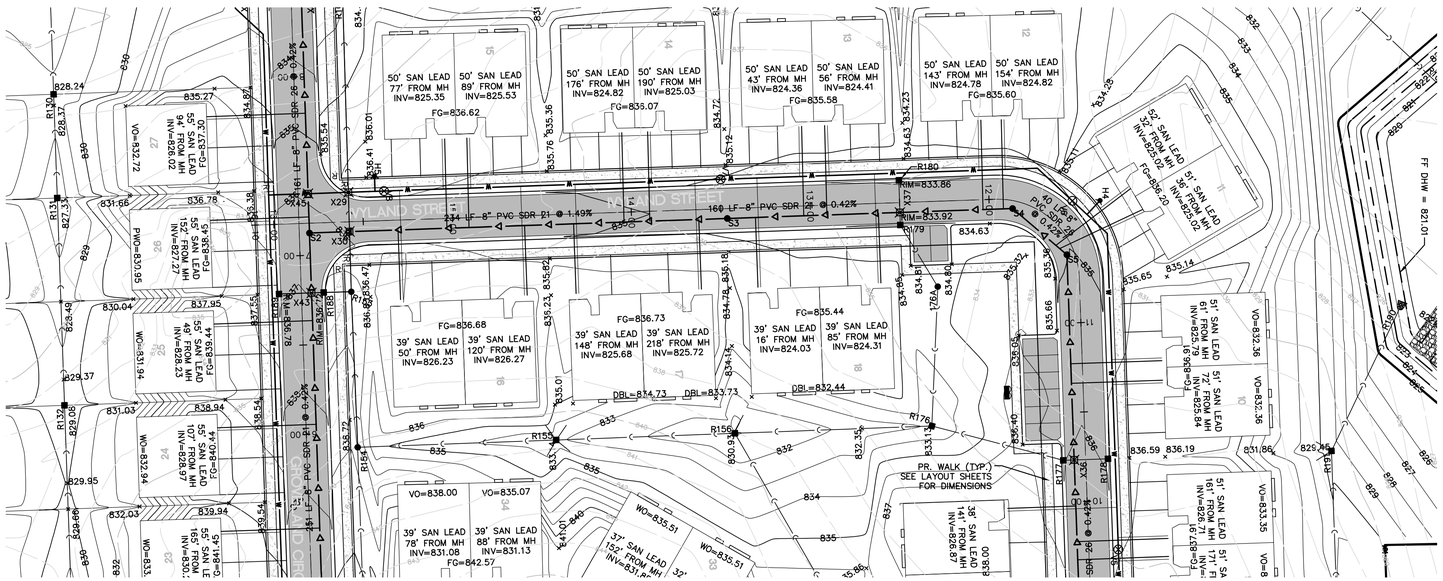
DATE
NOVEMBER 5, 2015

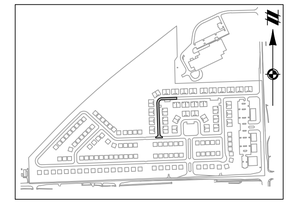
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

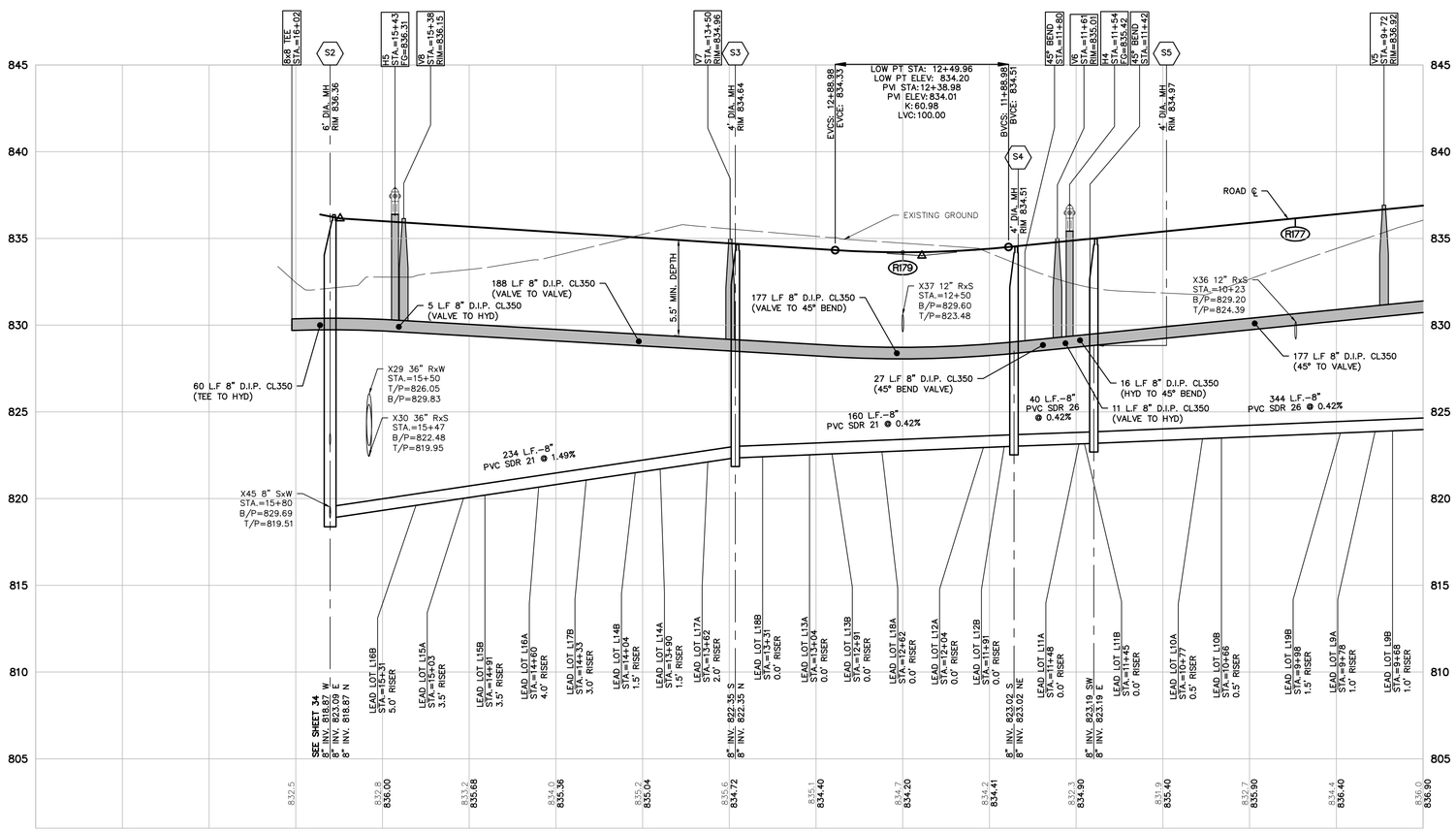
SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 28 | |



KEYMAP
1" = 800'




IVYLAND STREET
VERT: 1"=4'
HORZ: 1"=40'

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

QUANTITIES:

WATERMAIN:
661 L.F. 8" D.I.P. CL350 (TEE TO VALVE)
(2) 8" HYDRANT ASSEMBLIES
(4) 8" VALVES

SANITARY:
394 L.F. 8" PVC SDR 21
384 L.F. 8" PVC SDR 26
(4) 4' MANHOLES

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT

811 Know what's below. Call before you dig.

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# IVYLAND STREET PLAN AND PROFILE STA. 10+00 TO 15+86

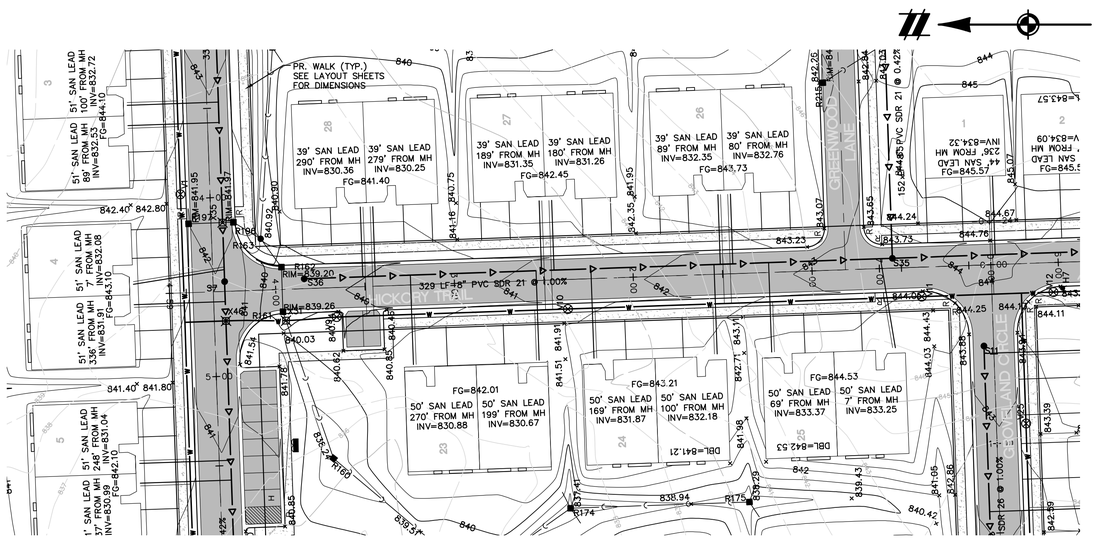
DATE
NOVEMBER 5, 2015

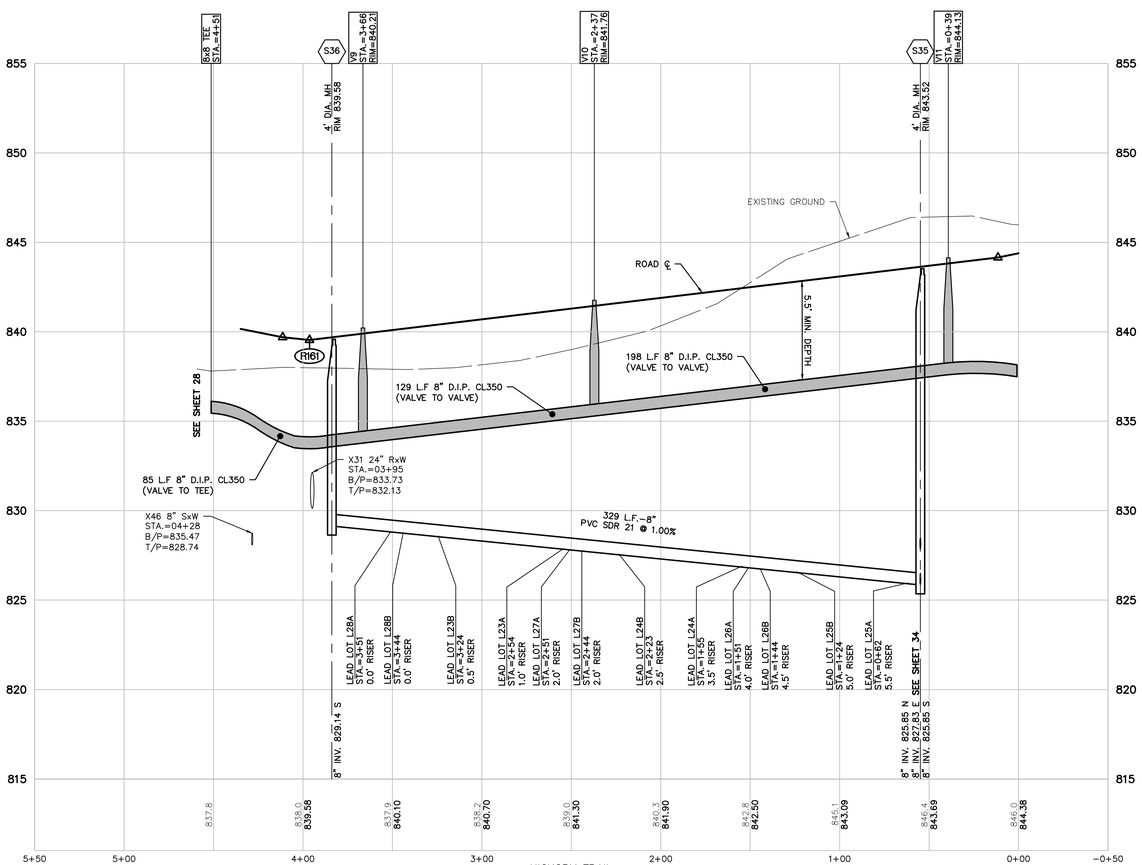
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. | SK |
| CH. | SS |
| P.M. | MB |
| BOOK | |
| JOB | 13001886.10 |
| SHEET NO. | 29 |




HICKORY TRAIL
VERT: 1"=4'
HORZ: 1"=40'

QUANTITIES:

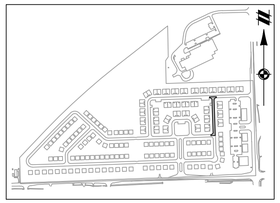
WATERMAIN:
412 L.F. 8" D.I.P. CL350 (TEE TO V5)
(3) 8" VALVES

SANITARY:
329 L.F. 8" PVC SDR 21
(1) 4' MANHOLES

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| | EXISTING FLOOD ZONE |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED SETBACK |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | EXISTING WELL |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |



KEYMAP
1" = 800'

811
Know what's **below.**
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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

HICKORY TRAIL PLAN AND PROFILE
STA. 0+00 TO 4+33

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 30 | |

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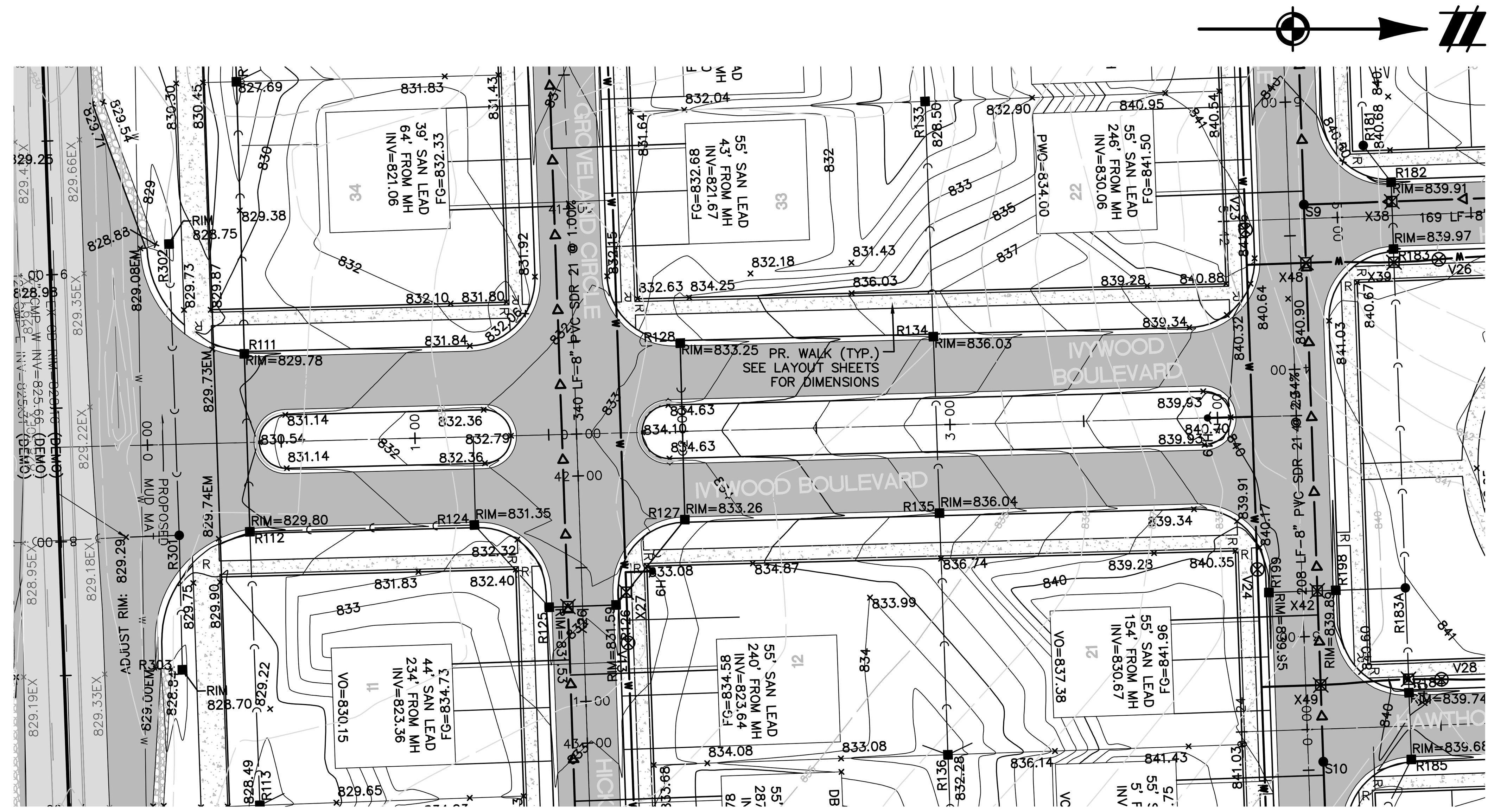
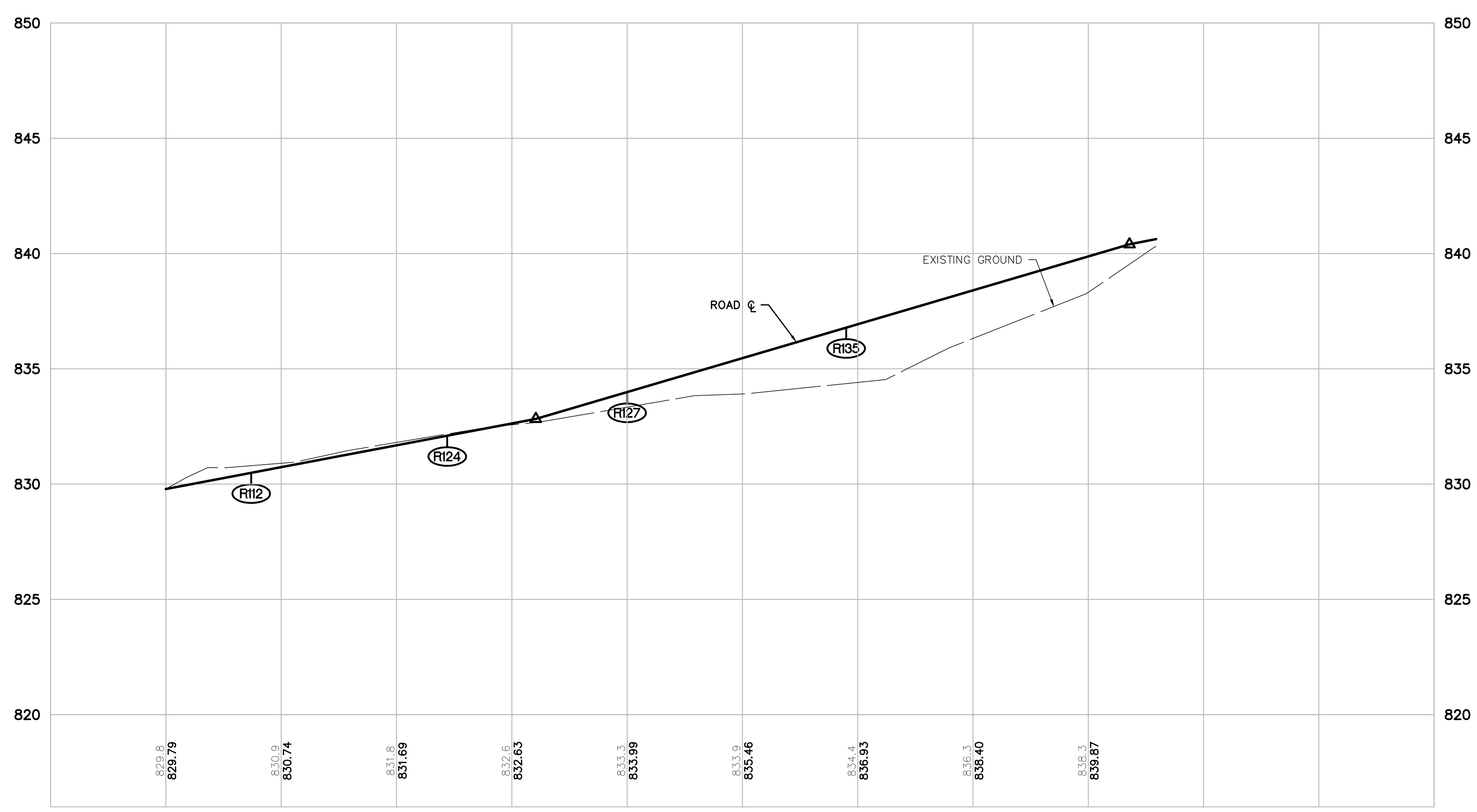
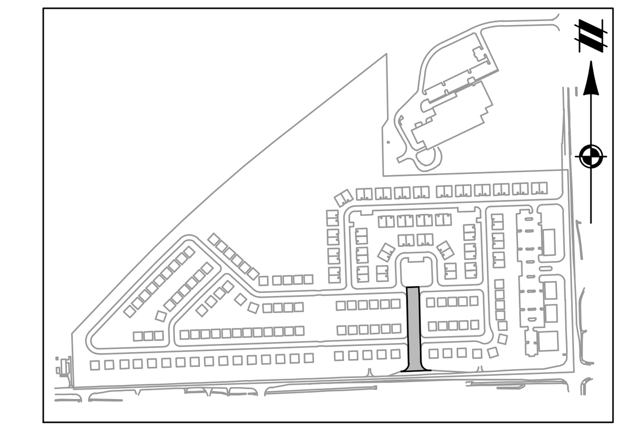



IVYWOOD BOULEVARD
VERT: 1"=4'
HORZ: 1"=40'



**KEYMAP**
1" = 800'

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN
IVYWOOD BOULEVARD PLAN AND PROFILE STA. 0+00 TO 4+29

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 31 | |

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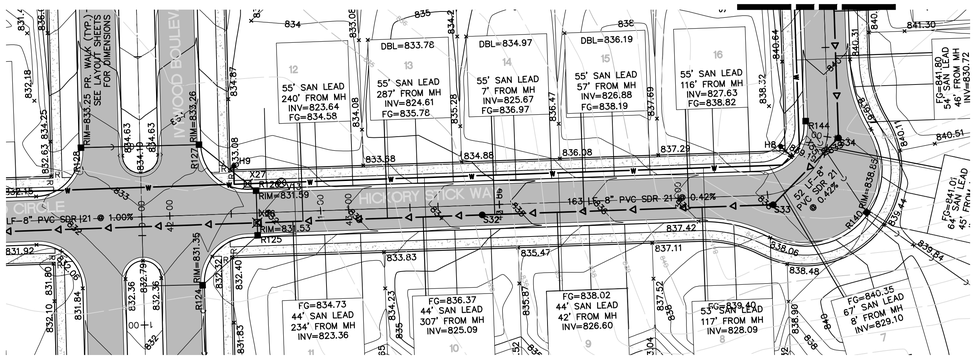


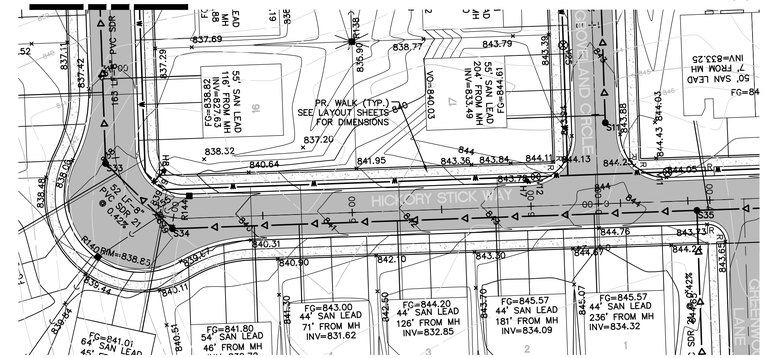


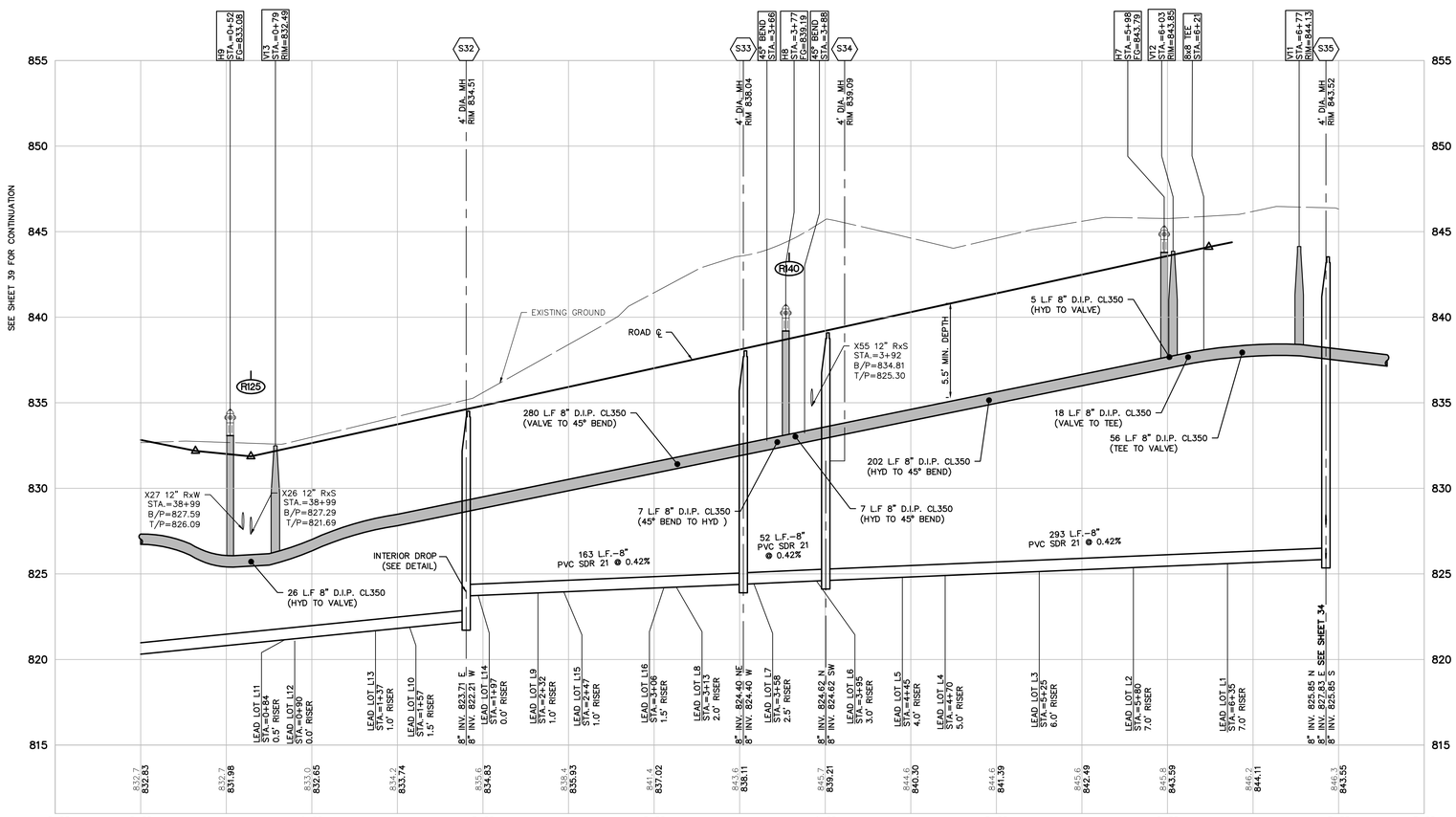


HICKORY STICK WAY
VERT: 1"=4'
HORZ: 1"=40'

NOTE:
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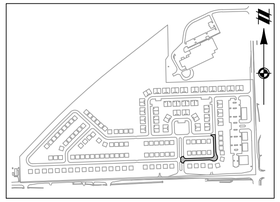
QUANTITIES:

WATERMAIN:
601 L.F. 8" D.I.P. CL350 (HYD TO VALVE)
(3) 8" HYDRANT ASSEMBLIES
(2) 8" VALVES

SANITARY:
508 L.F. 8" PVC SDR 21
(4) 4' MANHOLES

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT



KEYMAP
1" = 800'

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

HICKORY STICK WAY PLAN AND PROFILE STA. 0+00 TO 6+39

DATE
NOVEMBER 5, 2015

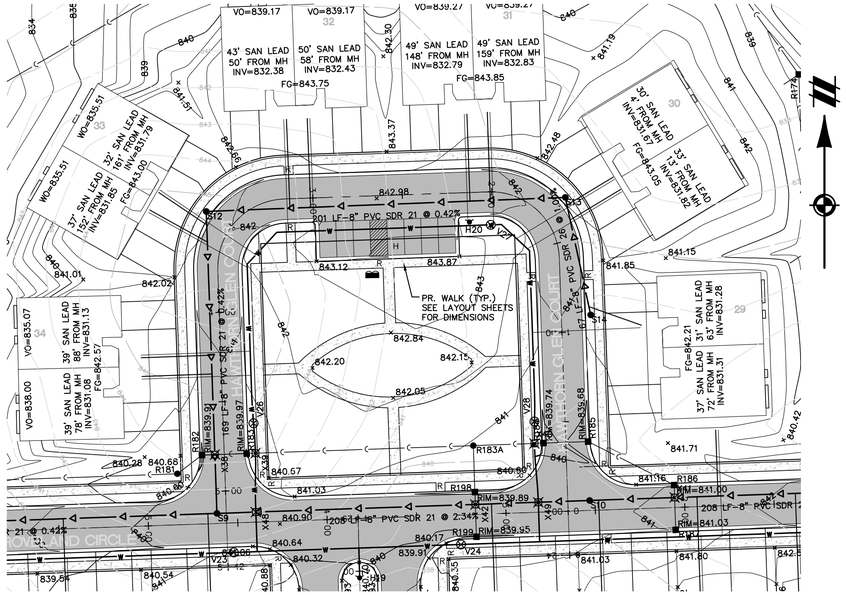
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

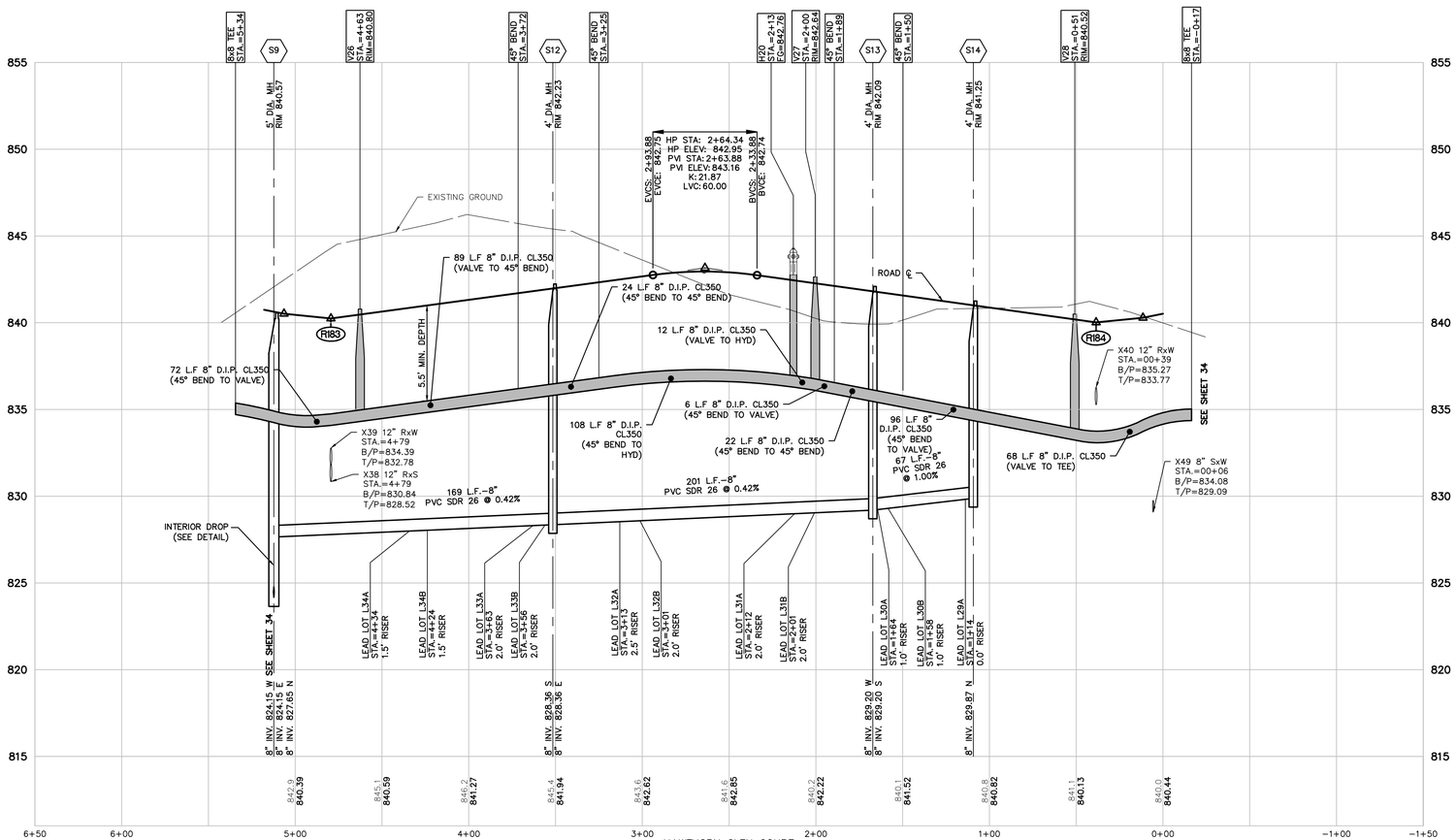
REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |

SHEET NO.
32




HAWTHORN GLEN COURT
VERT: 1"=4'
HORZ: 1"=40'

NOTE:
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QUANTITIES:

WATERMAIN:
497 L.F. 8" D.I.P. CL350 (TEE TO TEE)
(1) 8" HYDRANT ASSEMBLY
(3) 8" VALVES

SANITARY:
437 L.F. 8" PVC SDR 26
(4) 4' MANHOLES

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
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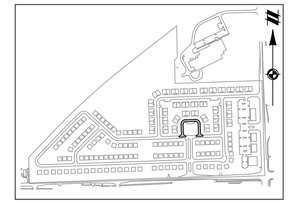

KEYMAP
1" = 800'

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# HAWTHORN GLEN COURT PLAN AND PROFILE STA. 0+00 TO 5+09

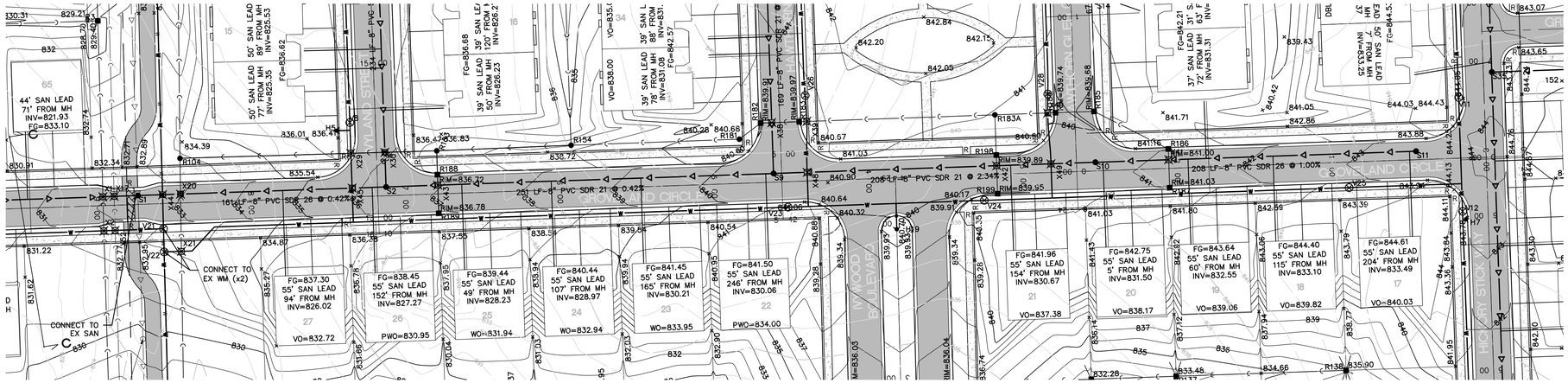
DATE
NOVEMBER 5, 2015

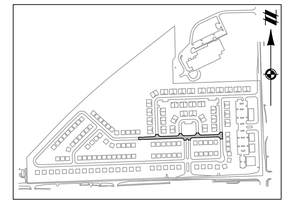
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 33 | |



KEYMAP
1" = 800'

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## LEGEND

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- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
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- EXISTING FENCE
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- PROPOSED LOT
- PROPOSED SETBACK
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- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
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- SECTION CORNER
- EXISTING SANITARY MANHOLE
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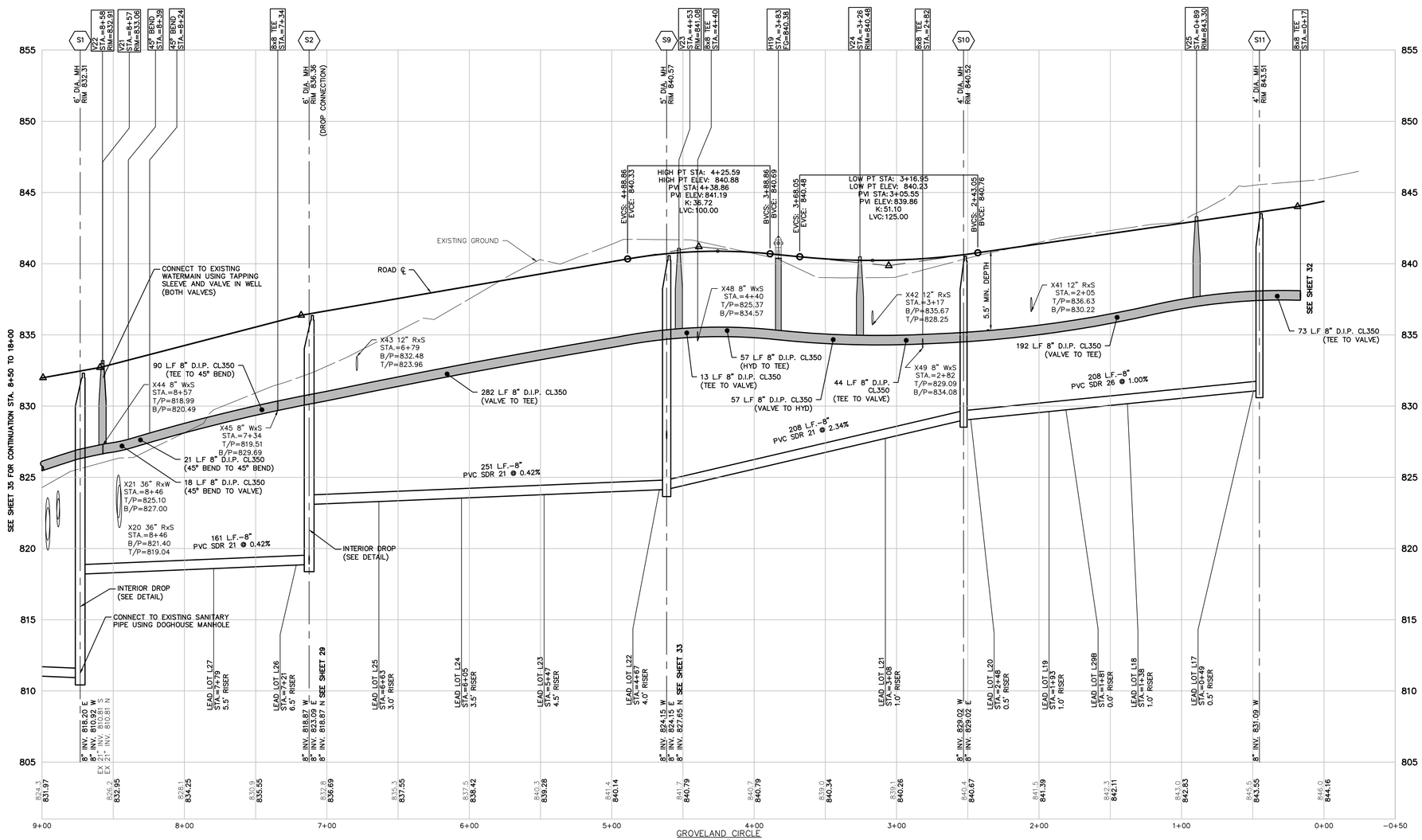


GROVELAND CIRCLE
VERT: 1"=4'
HORZ: 1"=40'

QUANTITIES:

WATERMAIN:
847 L.F. 8" D.I.P. CL350 (VALVE TO TEE)
(1) 8" HYDRANT ASSEMBLY
(5) 8" VALVES

SANITARY:
620 L.F. 8" PVC SDR 21
208 L.F. 8" PVC SDR 26
(5) 4' MANHOLES

811 Know what's below. Call before you dig.

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

GROVELAND CIRCLE PLAN AND PROFILE STA. 0+00 TO 8+50

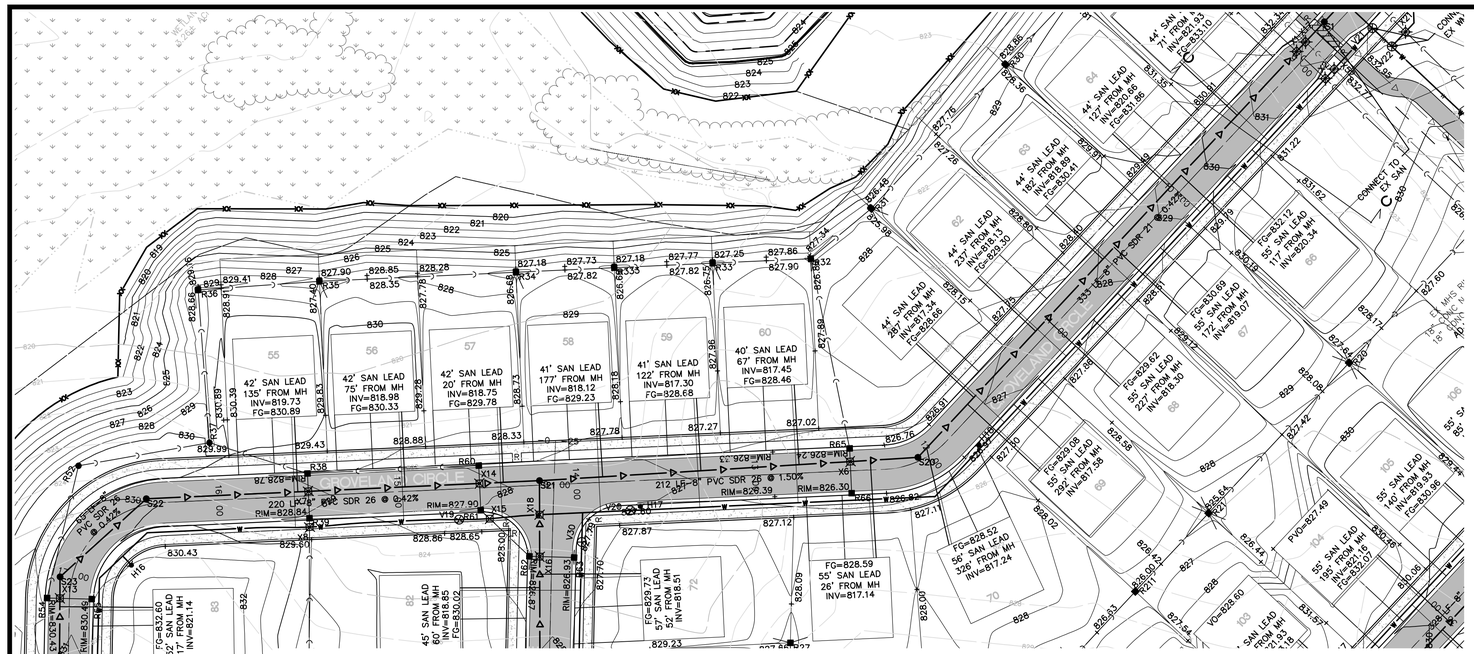
DATE
NOVEMBER 5, 2015

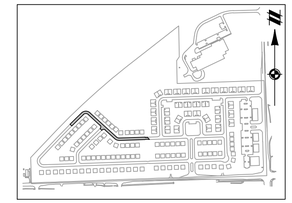
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 34 | |



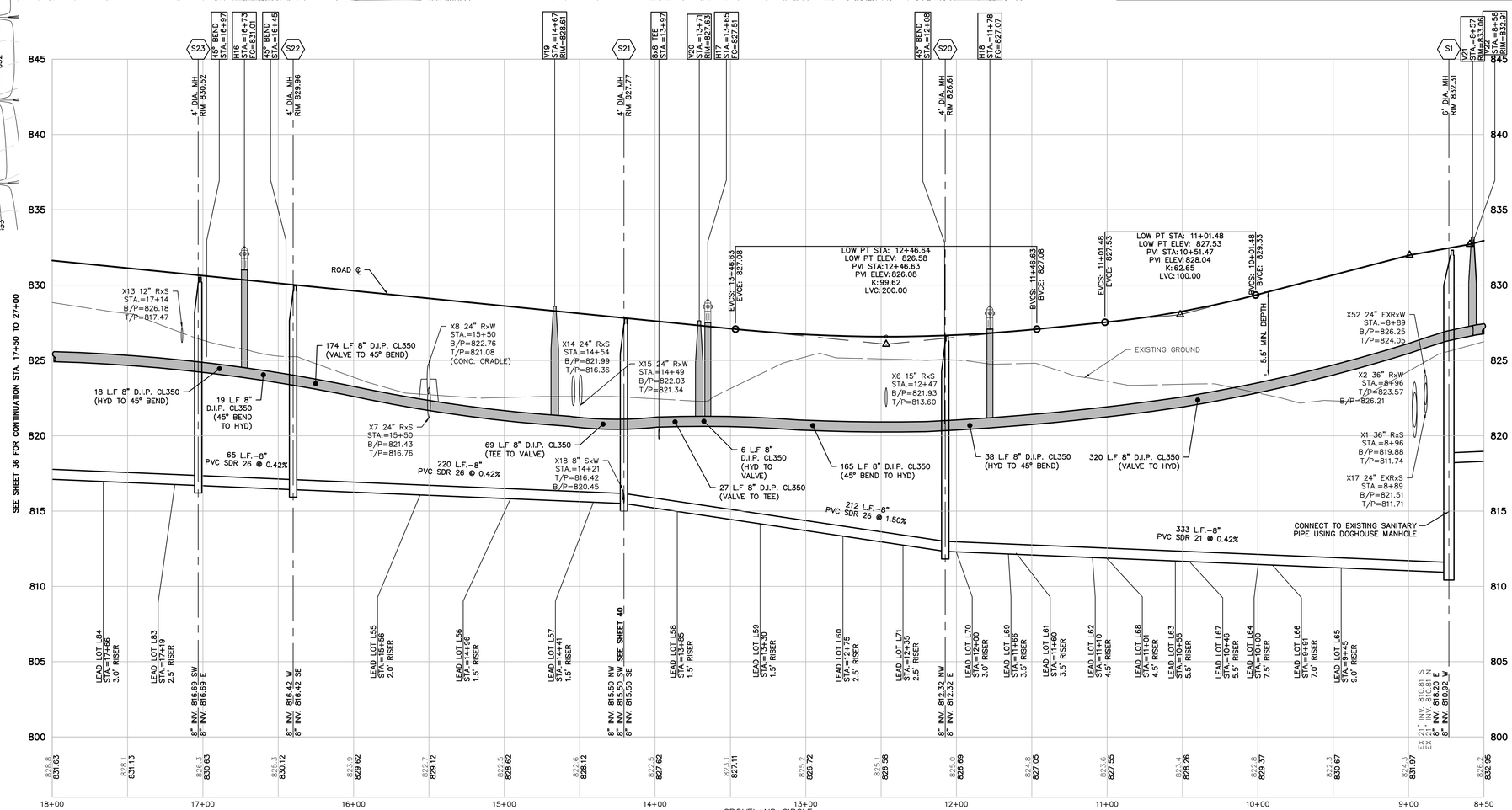



KEYMAP
1" = 800'

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

## LEGEND

| | |
|---|---|
| EXISTING 1' CONTOUR | EXISTING WELL |
| EXISTING 5' CONTOUR | EXISTING SIGN |
| EXISTING WETLAND LINE | |
| EXISTING OVERHEAD ELECTRICAL LINE | EXISTING UTILITY POLE |
| EXISTING OVERHEAD TELEPHONE LINE | EXISTING FIRE HYDRANT |
| EXISTING FENCE | EXISTING CABLE MARKER |
| EXISTING CURB AND GUTTER | EXISTING TELEPHONE RISER |
| BOUNDARY LINE | PROPOSED 1' CONTOUR |
| EXISTING STORM | PROPOSED 5' CONTOUR |
| EXISTING WATER MAIN | PROPOSED STORM SEWER |
| EXISTING SANITARY | PROPOSED SANITARY |
| EXISTING GAS | PROPOSED WATER MAIN |
| EXISTING RAILROAD | PROPOSED LOT |
| | PROPOSED SETBACK |
| EXISTING FLOOD ZONE | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| SECTION CORNER | PROPOSED CENTERLINE |
| EXISTING SANITARY MANHOLE | PROPOSED CATCH BASIN/INLET |
| EXISTING CATCH BASIN/INLET | PROPOSED OUTLET |
| EXISTING WATER MANHOLE | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| EXISTING WETLAND | PROPOSED FIRE HYDRANT |
| EXISTING RIP-RAP | |




GROVELAND CIRCLE
VERT: 1"=4'
HORZ: 1"=40'

QUANTITIES:

WATERMAIN:
836 L.F. 8" D.I.P. CL350 (V21 TO 45°)
(3) 8" HYDRANT ASSEMBLIES
(3) 8" VALVES

SANITARY:
333 L.F. 8" PVC SDR 21
497 L.F. 8" PVC SDR 26
(4) 4' MANHOLES

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# GROVELAND CIRCLE PLAN AND PROFILE STA. 8+50 TO 18+00

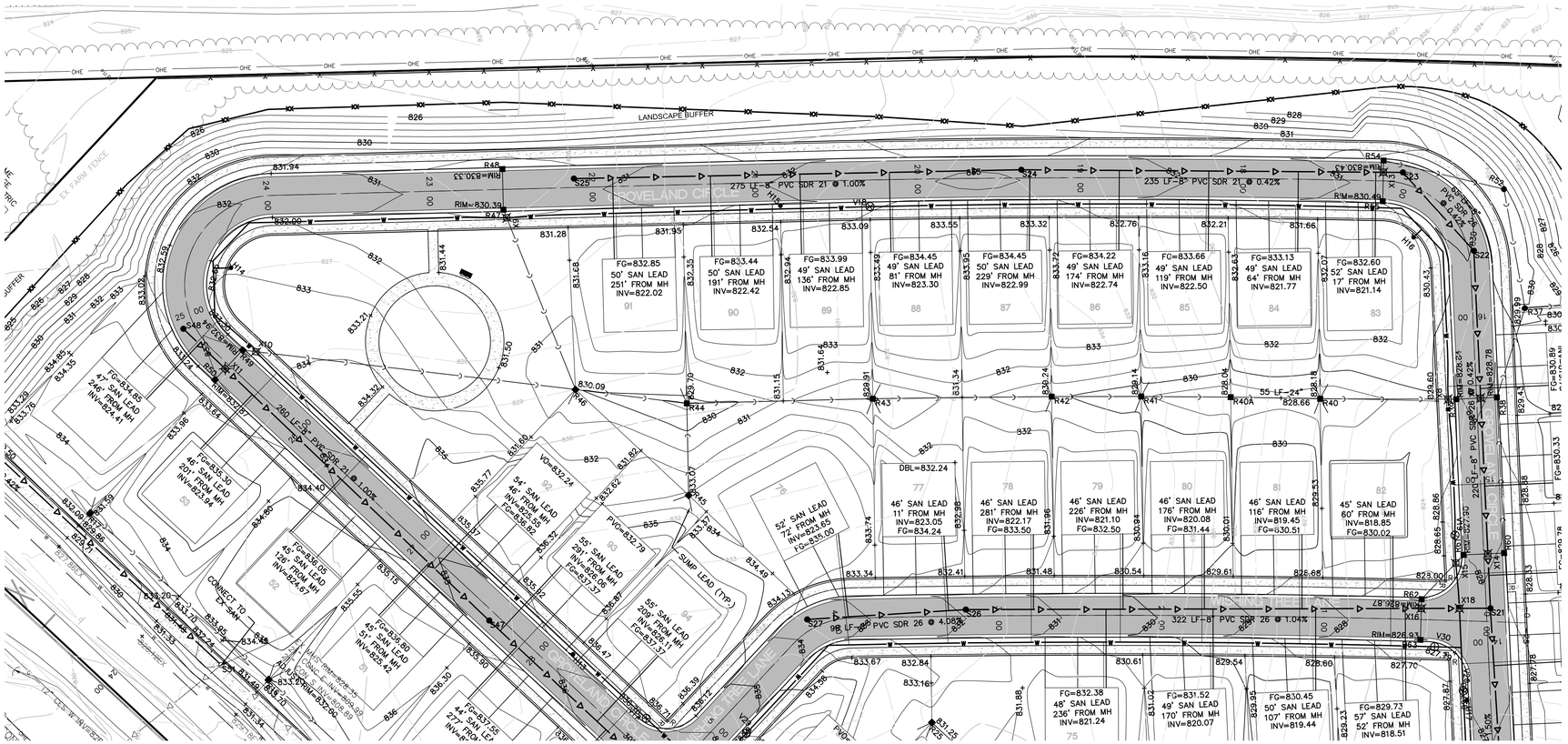
DATE
NOVEMBER 5, 2015

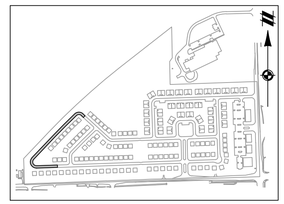
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 35 | |



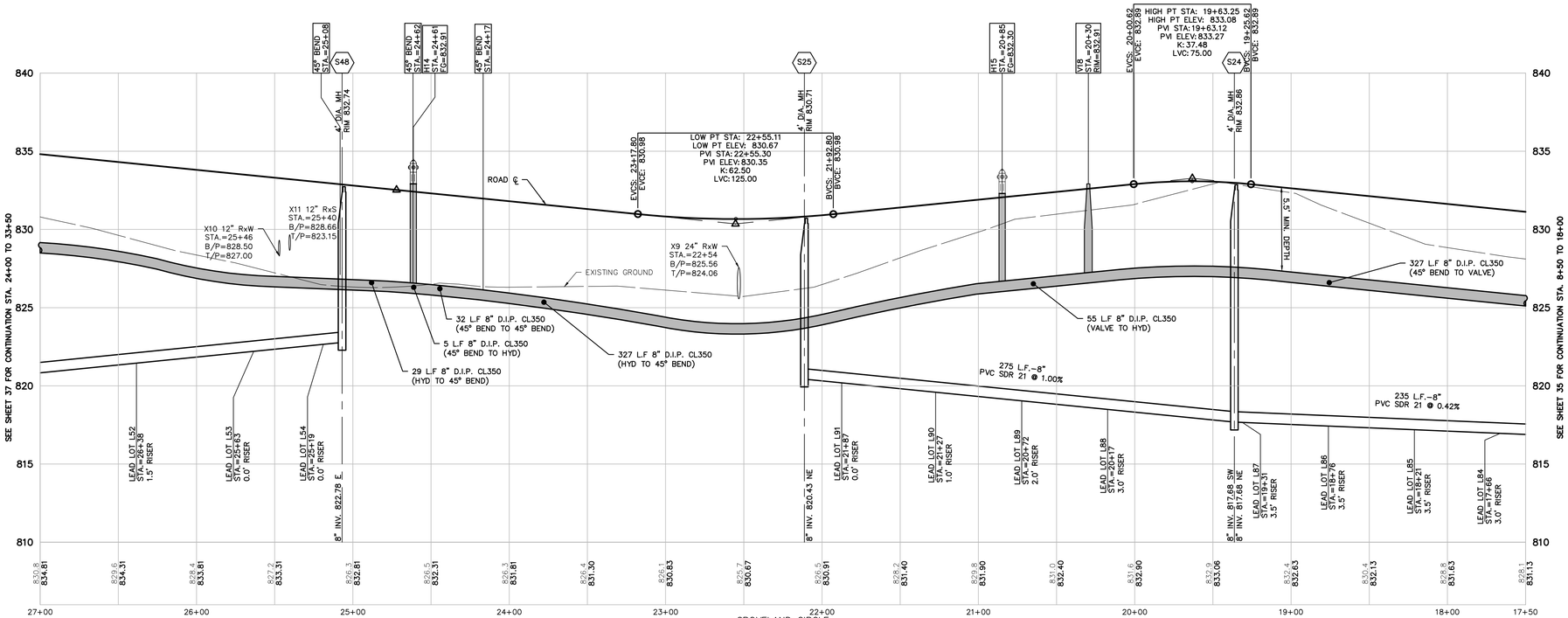



KEYMAP
1" = 800'

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT




QUANTITIES:

WATERMAIN:
775 L.F. 8" D.I.P. CL350 (45° TO 45°)
(2) 8" HYDRANT ASSEMBLIES
(1) 8" VALVES

SANITARY:
510 L.F. 8" PVC SDR 21
(2) 4' MANHOLES

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

GROVELAND CIRCLE PLAN AND PROFILE STA. 17+50 TO 27+00

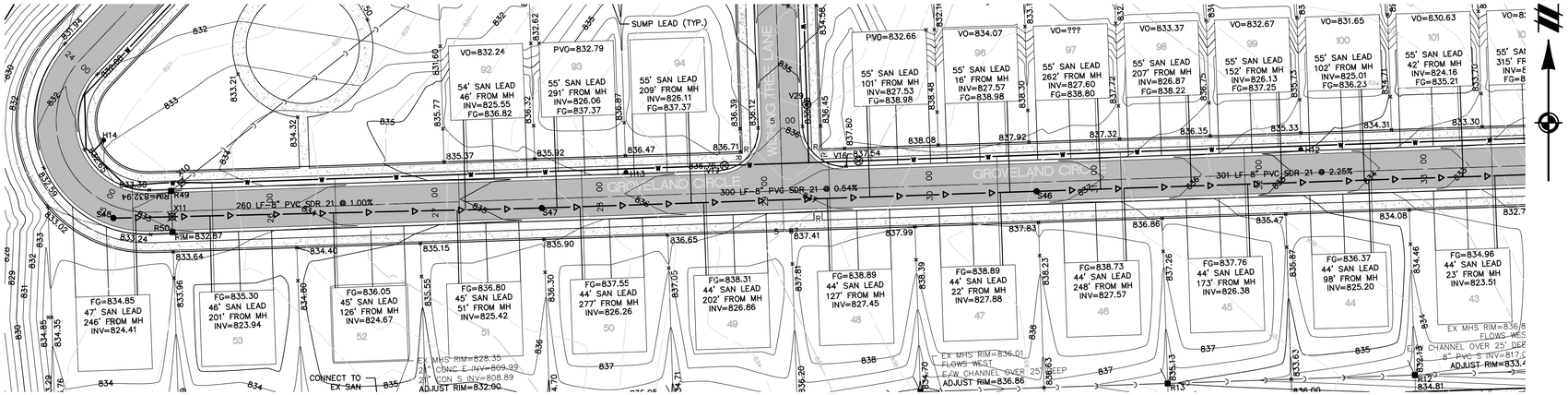
DATE
NOVEMBER 5, 2015

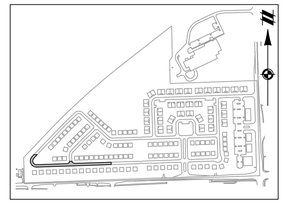
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. | SK |
| CH. | SS |
| P.M. | MB |
| BOOK | |
| JOB | 13001886.10 |
| SHEET NO. | 36 |



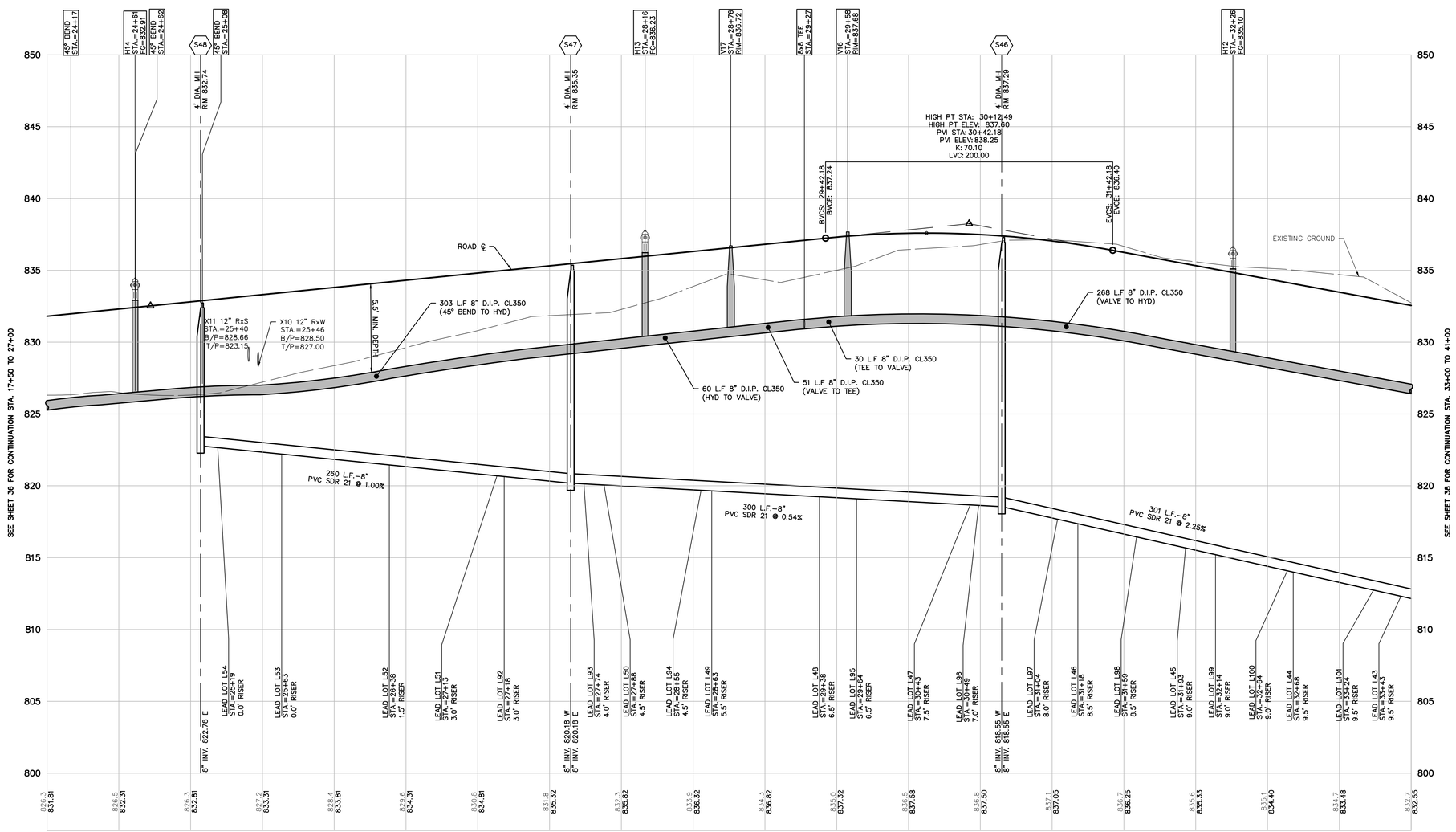



KEYMAP
1" = 800'

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

## LEGEND

- 801 — EXISTING 1' CONTOUR
- 800 — EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- OHT — EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- W — EXISTING WATER MAIN
- EXISTING SANITARY
- G — EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- 801 — PROPOSED 1' CONTOUR
- 800 — PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- W — PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- O.U.P. — EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- CATV — EXISTING CABLE MARKER
- T — EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT




QUANTITIES:

WATERMAIN:
712 L.F. 8" D.I.P. CL350 (45° TO HYD)
(2) 8" HYDRANT ASSEMBLIES
(2) 8" VALVES

SANITARY:
861 L.F. 8" PVC SDR 21
(3) 4' MANHOLES

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

GROVELAND CIRCLE PLAN AND PROFILE STA. 24+00 TO 33+50

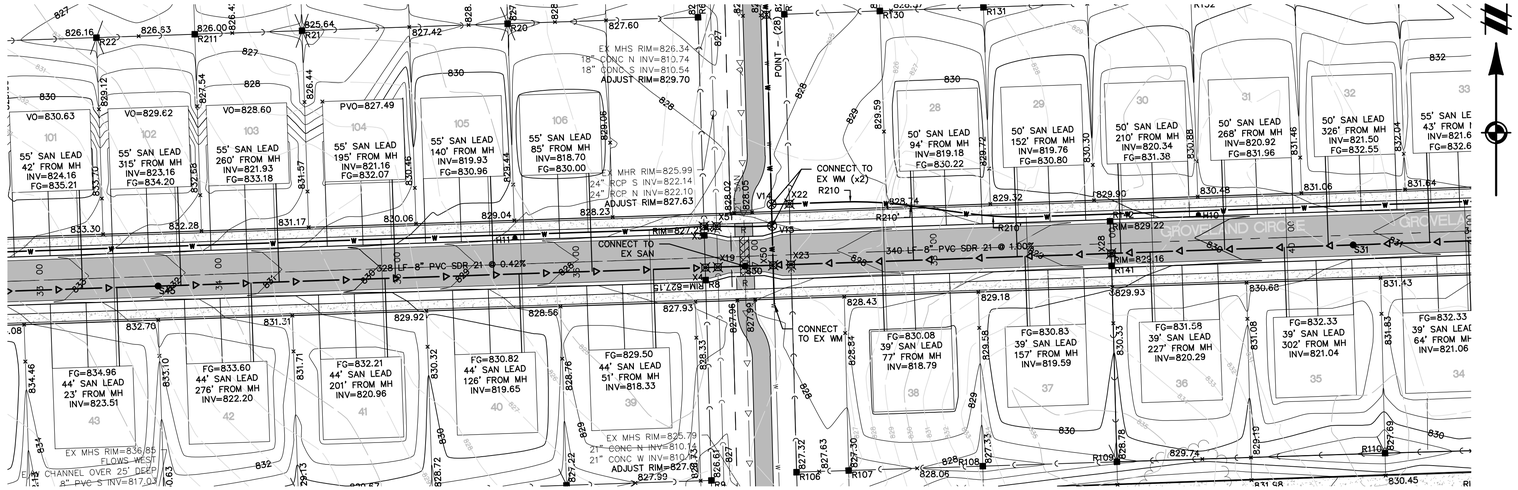
DATE
NOVEMBER 5, 2015

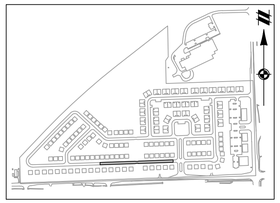
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 37



KEYMAP
1" = 800'

NOTE:
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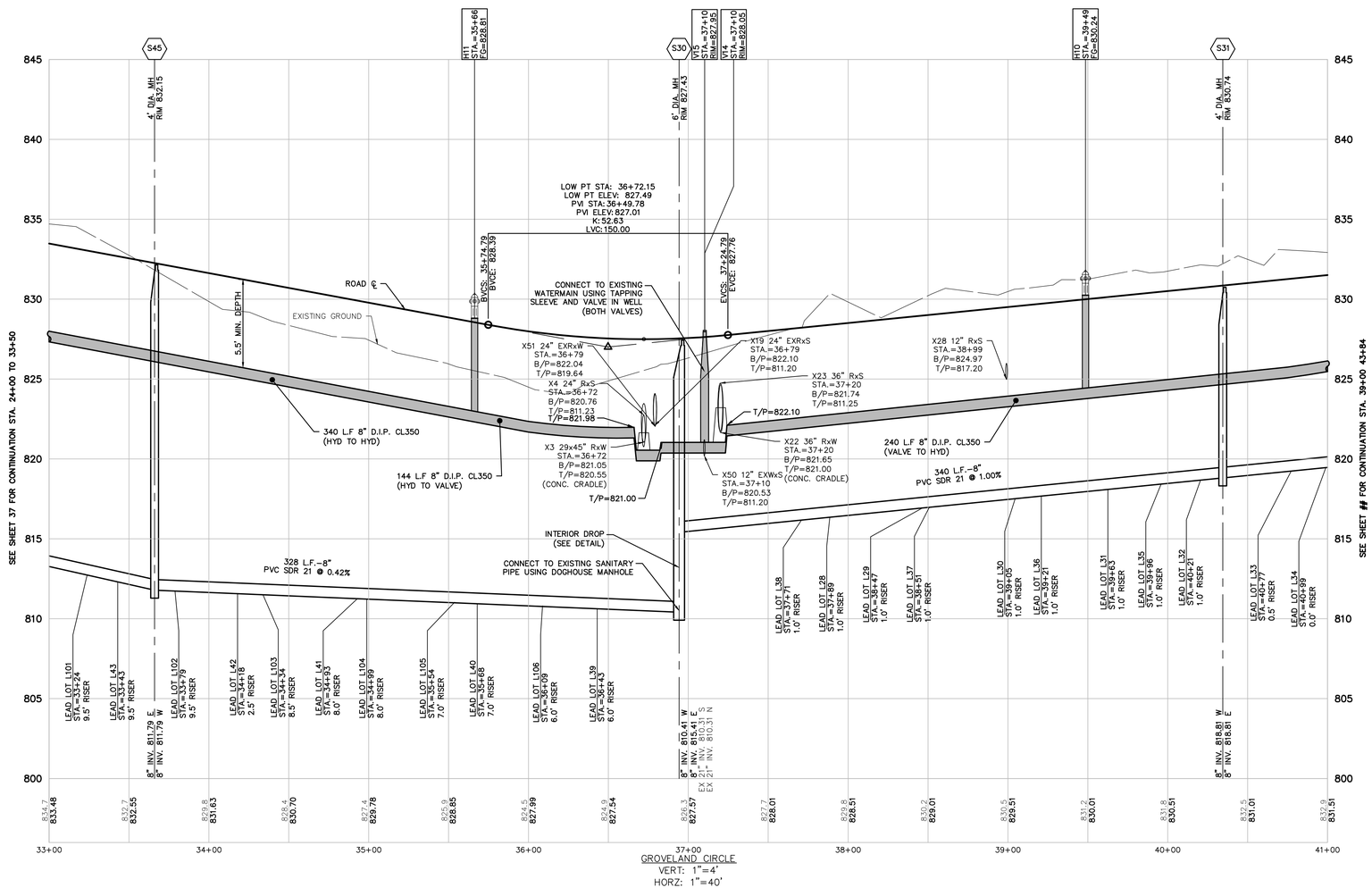
## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT




QUANTITIES:

WATERMAIN:
724 L.F. 8" D.I.P. CL350 (HYD TO HYD)
(2) 8" HYDRANT ASSEMBLIES
(2) 8" VALVES

SANITARY:
668 L.F. 8" PVC SDR 21
(3) 4' MANHOLES

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CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

GROVELAND CIRCLE PLAN AND PROFILE STA. 33+00 41+00

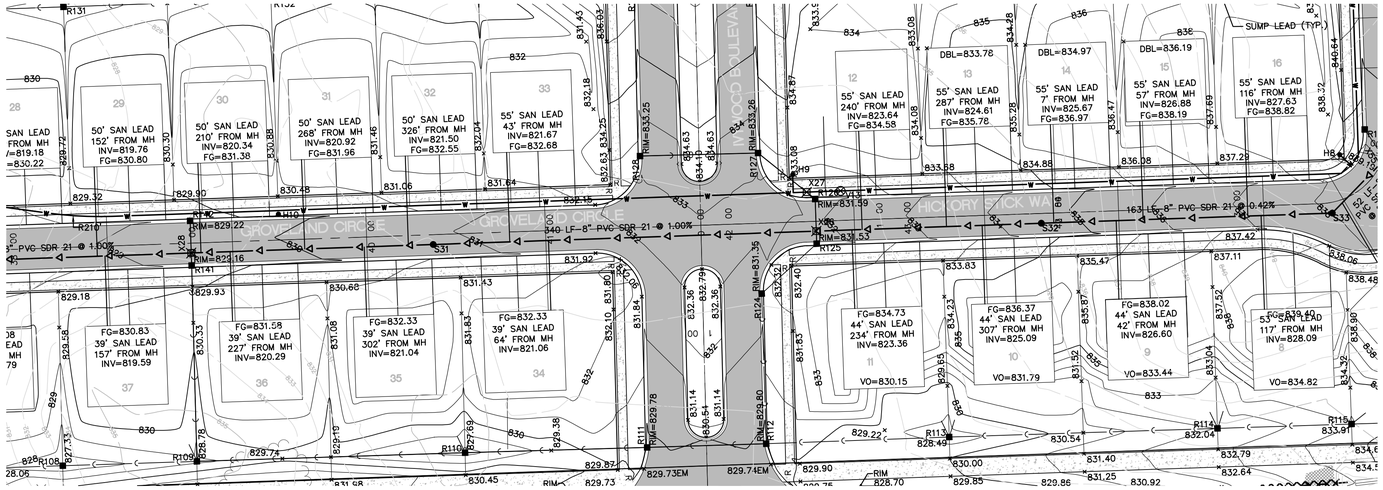
DATE
NOVEMBER 5, 2015

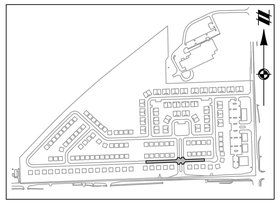
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

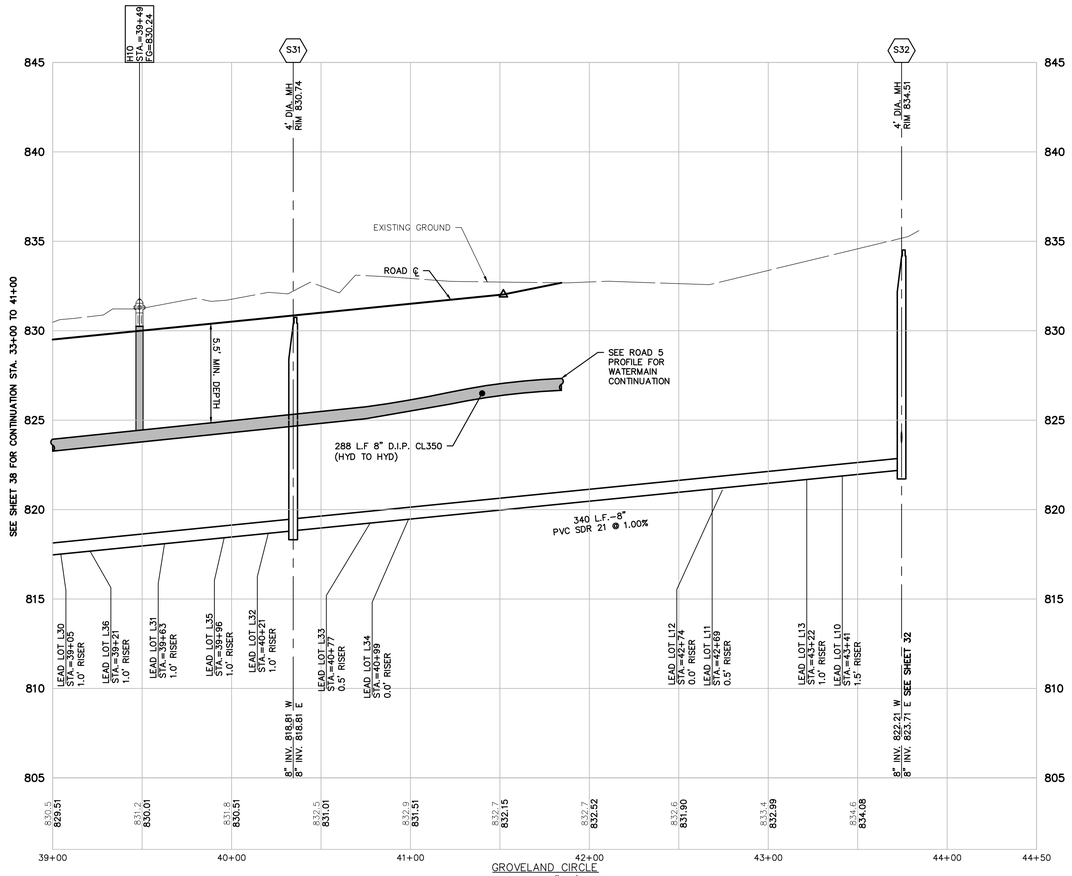
SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 38 | |



KEYMAP
1" = 800'




GROVELAND CIRCLE
VERT: 1"=4'
HORZ: 1"=40'

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QUANTITIES:

WATERMAIN:
288 L.F. 8" D.I.P. CL350 (HYD TO HYD)

SANITARY:
340 L.F. 8" PVC SDR 21
(1) 4' MANHOLES

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| S | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| | EXISTING FLOOD ZONE |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| S | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED SETBACK |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | EXISTING WELL |
| | EXISTING SIGN |
| e.u.p. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

GROVELAND CIRCLE PLAN AND PROFILE STA. 39+00 TO 43+84

DATE
NOVEMBER 5, 2015

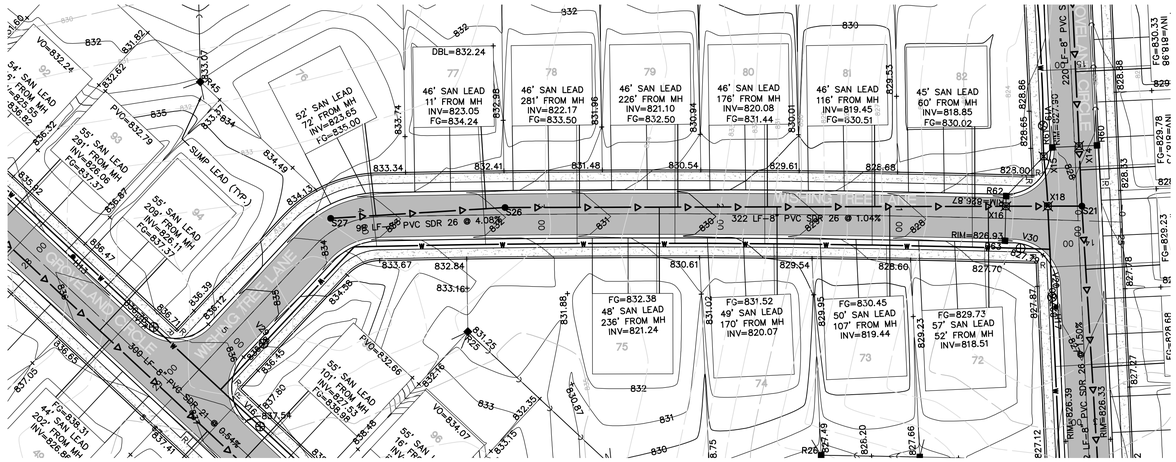
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

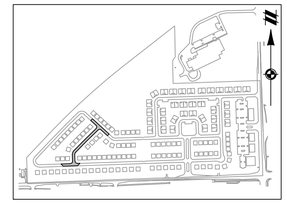
REVISIONS

SCALE 0 20 40
1" = 40 FEET

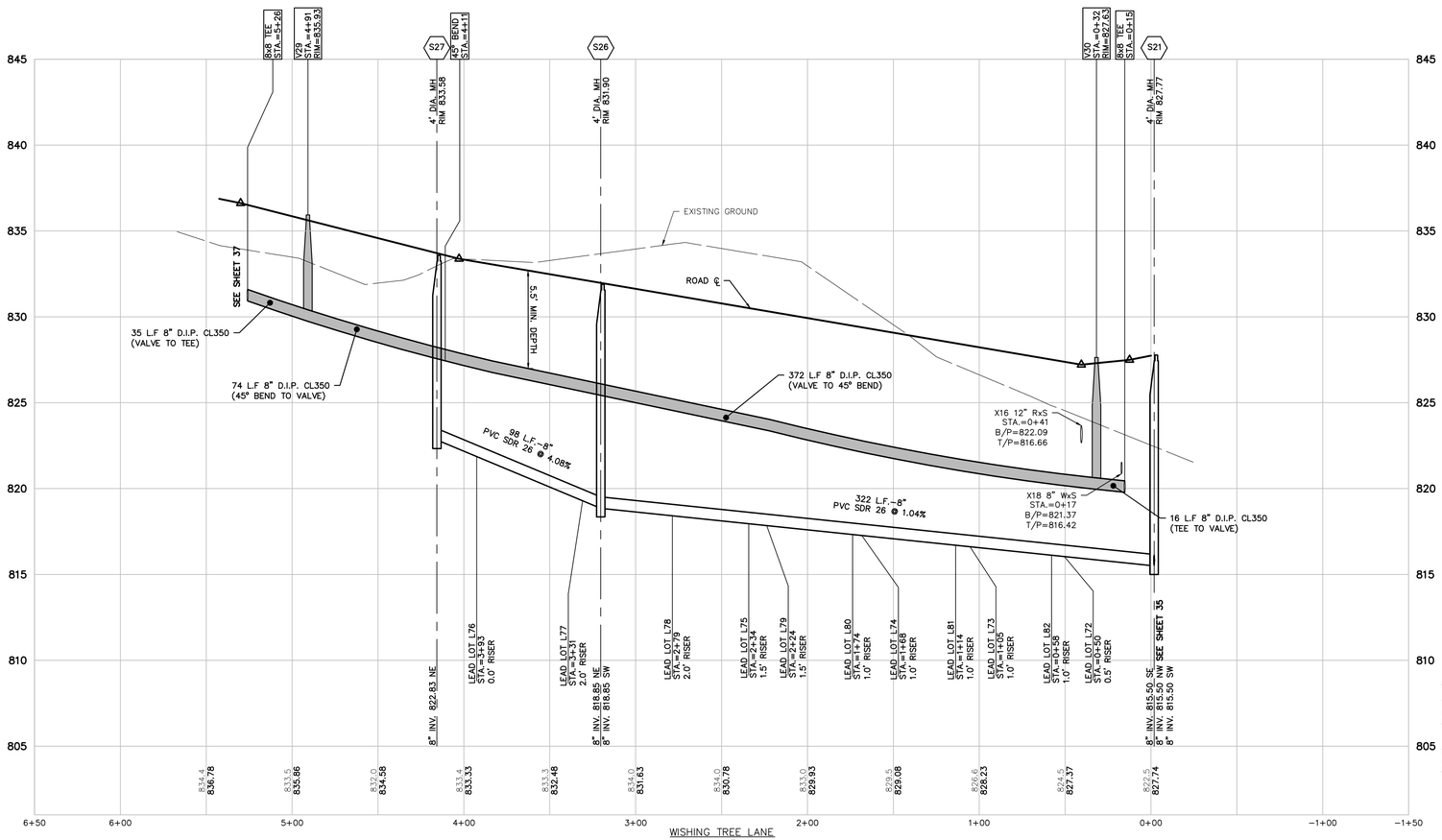
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 39 | |

G:\13001886\DWG\PLAN SET\FINAL SITE PLAN\13001886SF-06-PRELIMF 2/9/2016 2:32 PM MICHAEL GARCIA



KEYMAP
1" = 800'




WISHING TREE LANE
VERT: 1"=4'
HORZ: 1"=40'

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

QUANTITIES:

WATERMAIN:
497 L.F. 8" D.I.P. CL350 (TEE TO TEE)
(2) 8" VALVES

SANITARY:
420 L.F. 8" PVC SDR 26
(2) 4' MANHOLES

## LEGEND

- 801 — EXISTING 1' CONTOUR
- 800 — EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- OHE — EXISTING OVERHEAD ELECTRICAL LINE
- OHT — EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- C — EXISTING STORM
- W — EXISTING WATER MAIN
- EXISTING SANITARY
- G — EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- 801 — PROPOSED 1' CONTOUR
- 800 — PROPOSED 5' CONTOUR
- C — PROPOSED STORM SEWER
- PROPOSED SANITARY
- W — PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- U.P. — EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- CATV — EXISTING CABLE MARKER
- T — EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT

811
Know what's **below.**
**Call** before you dig.

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# WISHING TREE LANE PLAN AND PROFILE STA. 0+00 TO 5+57

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. | SK |
| CH. | SS |
| P.M. | MB |
| BOOK | |
| JOB | 13001886.10 |
| SHEET NO. | 40 |

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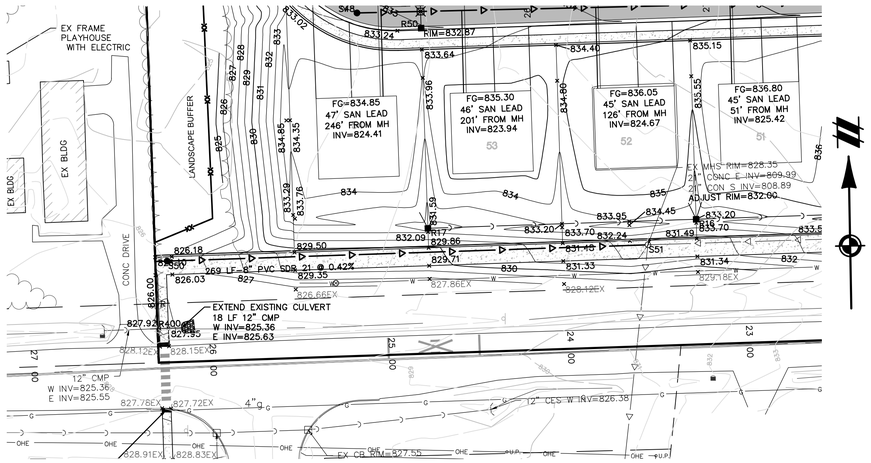
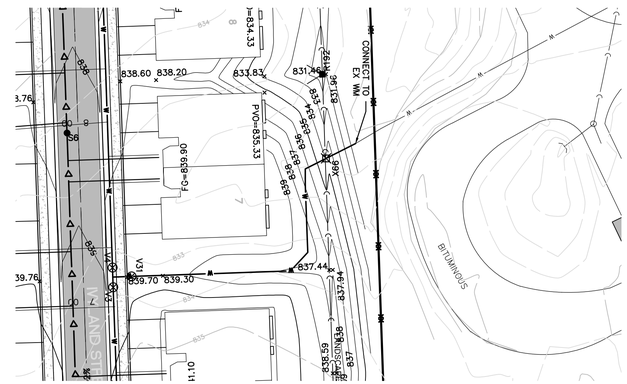
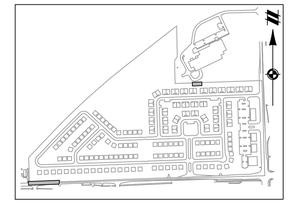
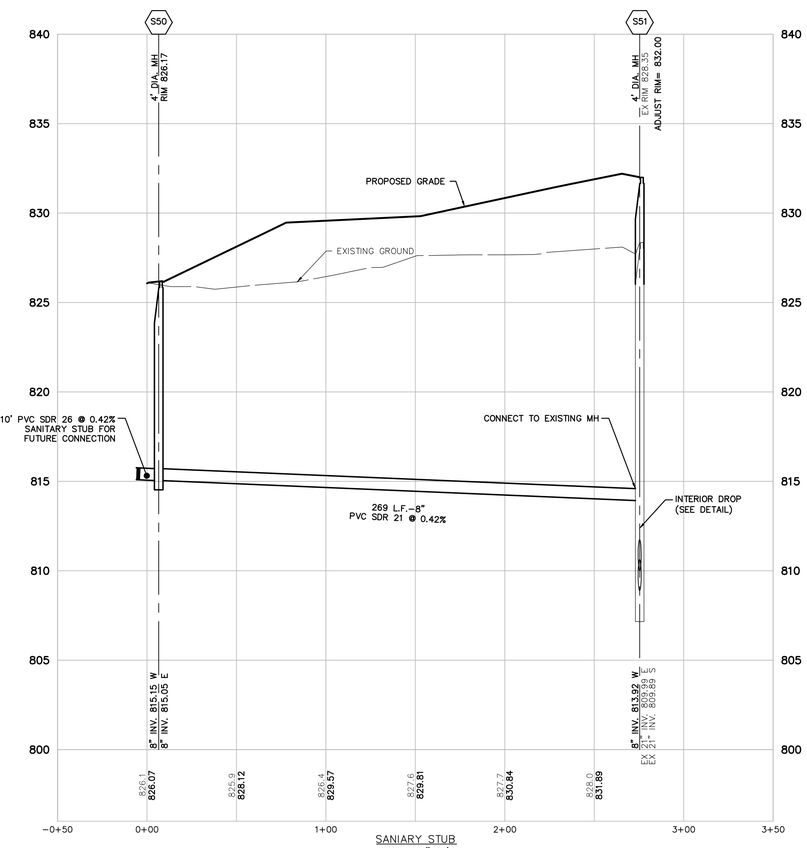


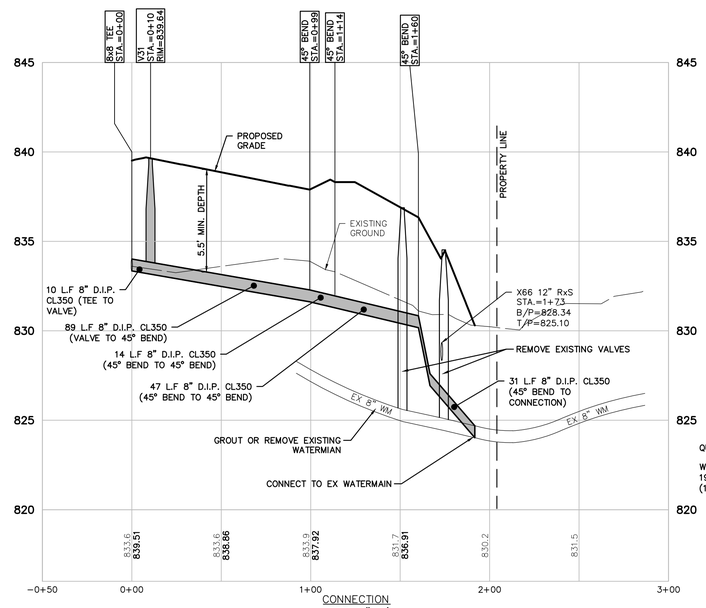
KEYMAP
1" = 800'




SANIARY STUB
VERT: 1"=4'
HORZ: 1"=40'

QUANTITIES:

SANITARY:
269 L.F. 8" PVC SDR 21
(2) 4' MANHOLES




CONNECTION
VERT: 1"=4'
HORZ: 1"=40'

QUANTITIES:

WATERMAIN:
191 L.F. 8" D.I.P. CL350 (TEE TO (1) 8" VALVE

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C C C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G G | EXISTING GAS |
| | EXISTING RAILROAD |
| | EXISTING FLOOD ZONE |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C C C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED SETBACK |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | EXISTING WELL |
| | EXISTING SIGN |
| e.u.p. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

811
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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

SANITARY SEWER PLAN AND PROFILE
– TEXTILE ROAD EXTENSION

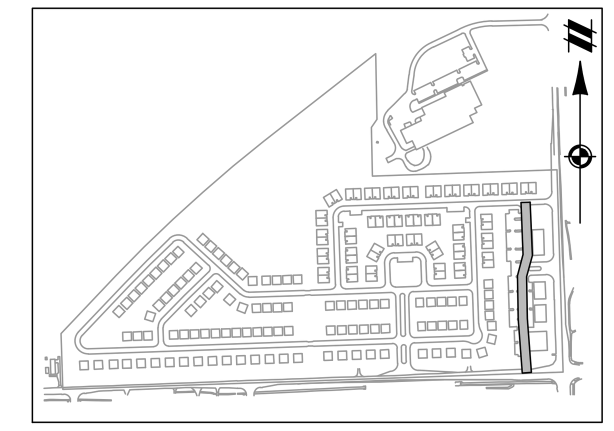
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 41 | |



**KEYMAP**
1" = 800'

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
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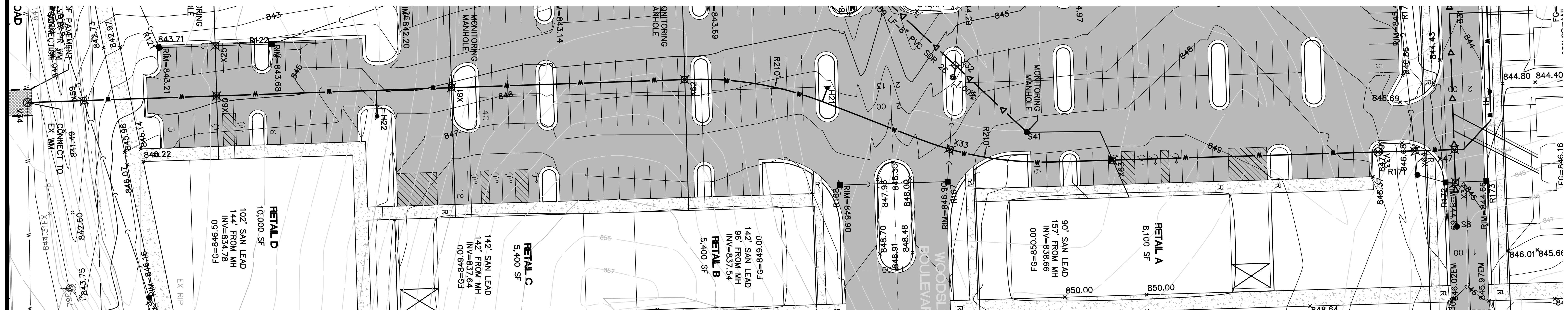
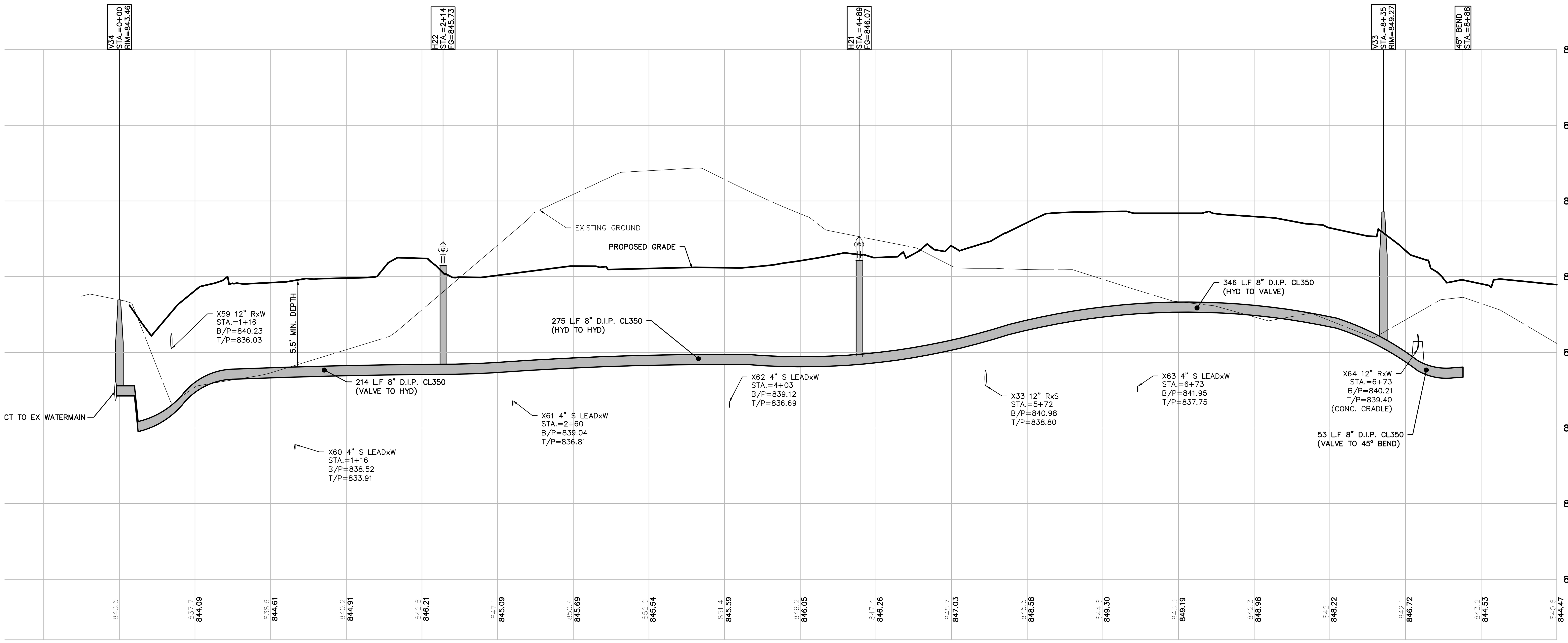
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT




COMMERCIAL WATER MAIN
VERT: 1"=4'
HORZ: 1"=40'

QUANTITIES:

WATERMAIN:
888 L.F. 8" D.I.P. CL350 (VALVE TO 45° BEND)
(2) 8" HYDRANT ASSEMBLIES
(2) 8" VALVES

811 Know what's **below.** **Call** before you dig.

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

COMMERCIAL WATERMAIN PLAN AND PROFILE

DATE
NOVEMBER 5, 2015

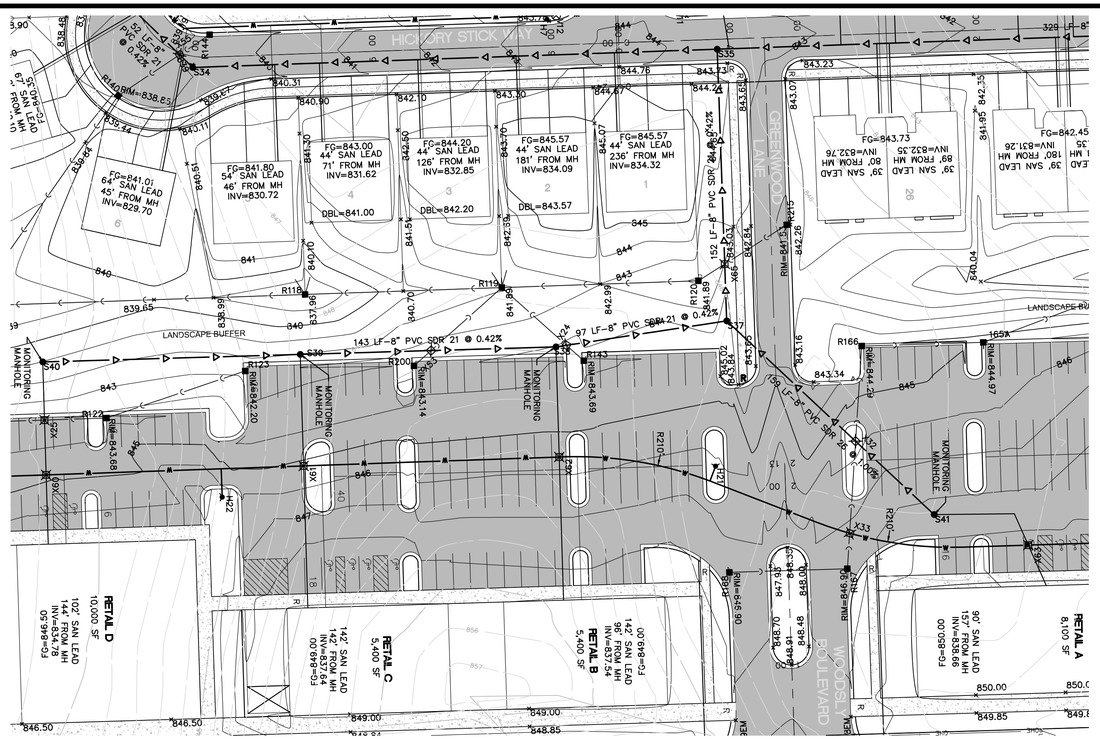
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

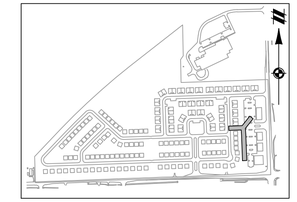
REVISIONS

SCALE 0 20 40
1" = 40 FEET

| DR. SK | CH. SS |
|---|---|
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 42 | |

K:\13001886\DWG\PLAN SETS\FINAL SITE PLAN\13001886SF-06-PRD.DWG 2/9/2016 2:34 PM MICHAEL NORCIA



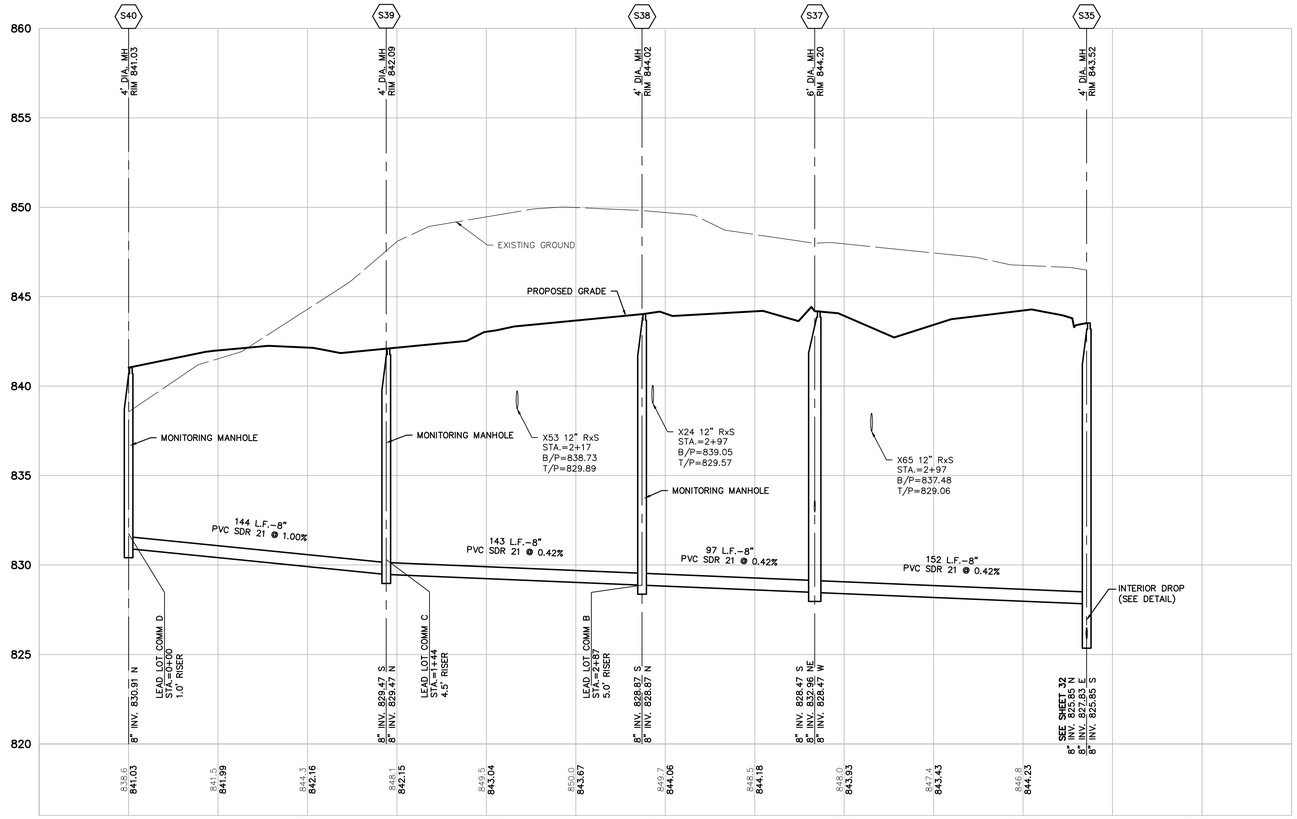



KEYMAP
1" = 800'

NOTE:
COMPACTION OF TRENCHES IS REQUIRED IN ROADWAY CORRIDORS (CLASS II GRANULAR BACKFILL AT 95% COMPACTION). ROADWAY CORRIDORS CONSTITUTE FRONT OF HOUSE TO FRONT OF HOUSE IN RESIDENTIAL DEVELOPMENTS.

## LEGEND

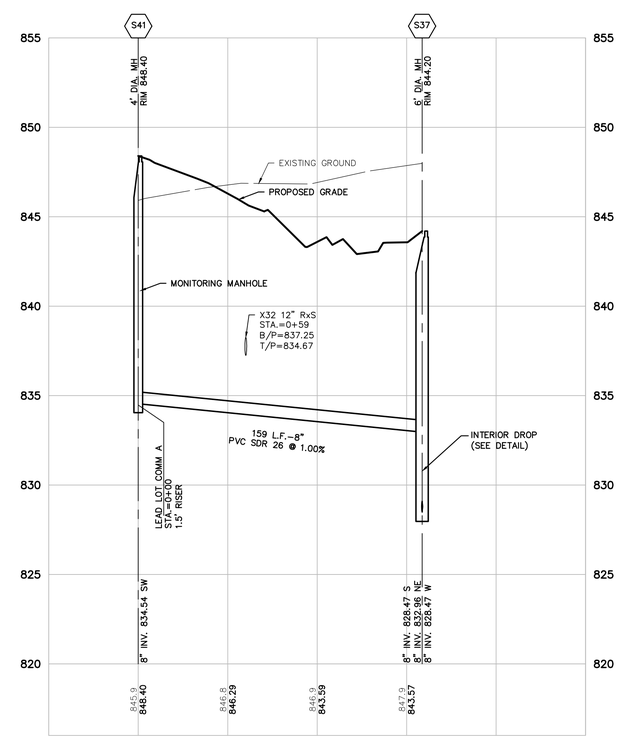
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT




REAR YARD SANITARY
VERT: 1"=4'
HORZ: 1"=40'

QUANTITIES:

SANITARY:
536 L.F. 8" PVC SDR 21
(4) 4' MANHOLES




COMMERCIAL SANITARY
VERT: 1"=4'
HORZ: 1"=40'

QUANTITIES:

SANITARY:
159 L.F. 8" PVC SDR 26
(1) 4' MANHOLES

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# COMMERCIAL SANITARY SEWER PLAN AND PROFILE

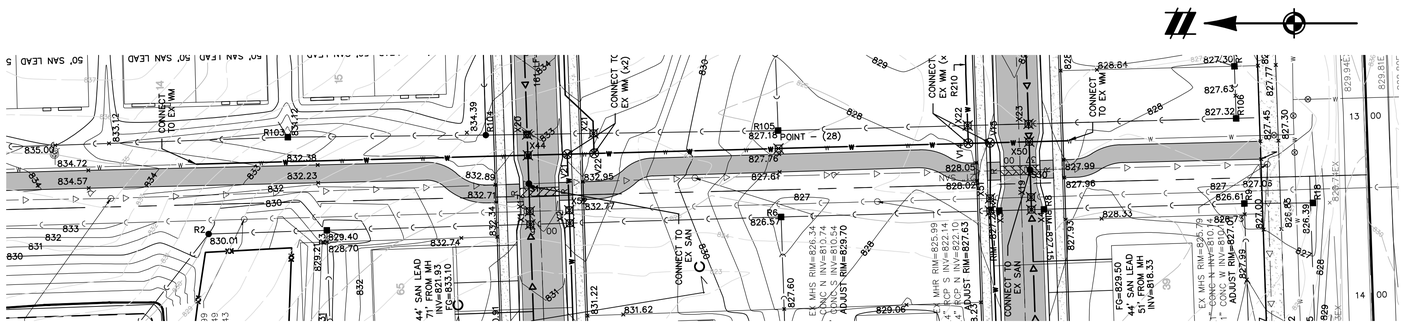
DATE
NOVEMBER 5, 2015

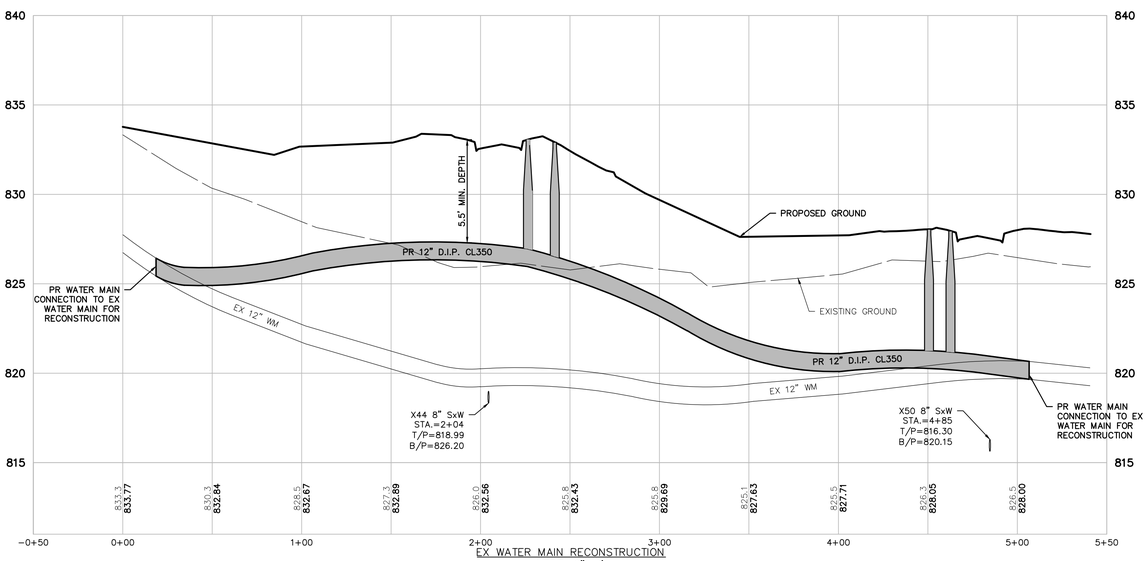
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

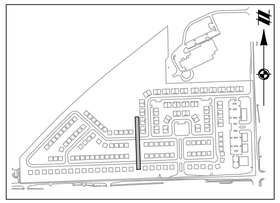
SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 43 | |






EX WATER MAIN RECONSTRUCTION
VERT: 1"=4'
HORZ: 1"=40'



KEYMAP
1" = 800'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT OHT | EXISTING OVERHEAD TELEPHONE LINE |
| // | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C C C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| ▷ ▷ | EXISTING SANITARY |
| G G | EXISTING GAS |
| | EXISTING RAILROAD |
| | EXISTING FLOOD ZONE |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C C C | PROPOSED STORM SEWER |
| ▷ ▷ | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED SETBACK |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | EXISTING WELL |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

WATERMAIN RECONSTRUCTION PROFILE

DATE
NOVEMBER 5, 2015

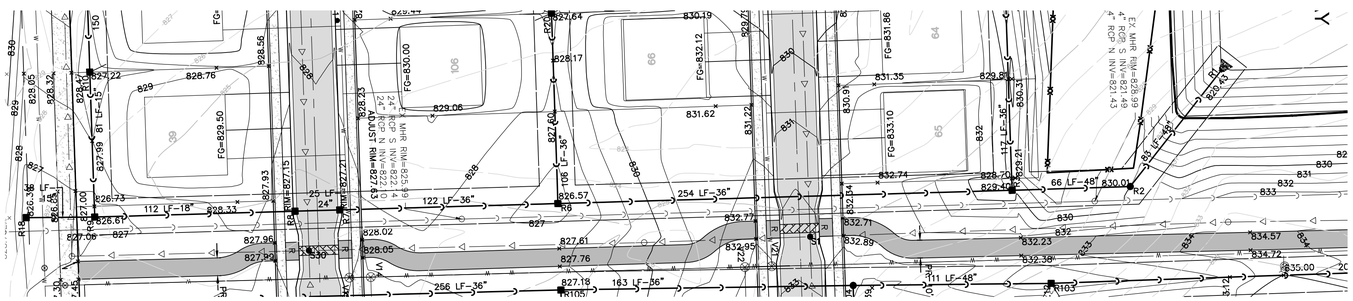
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

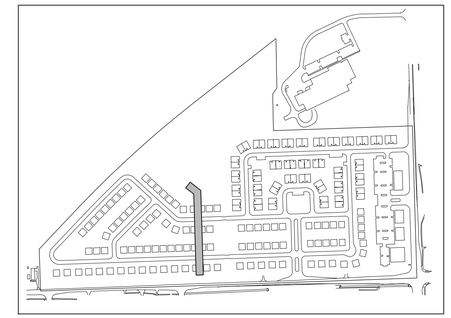
REVISIONS

SCALE 0 20 40
1" = 40 FEET

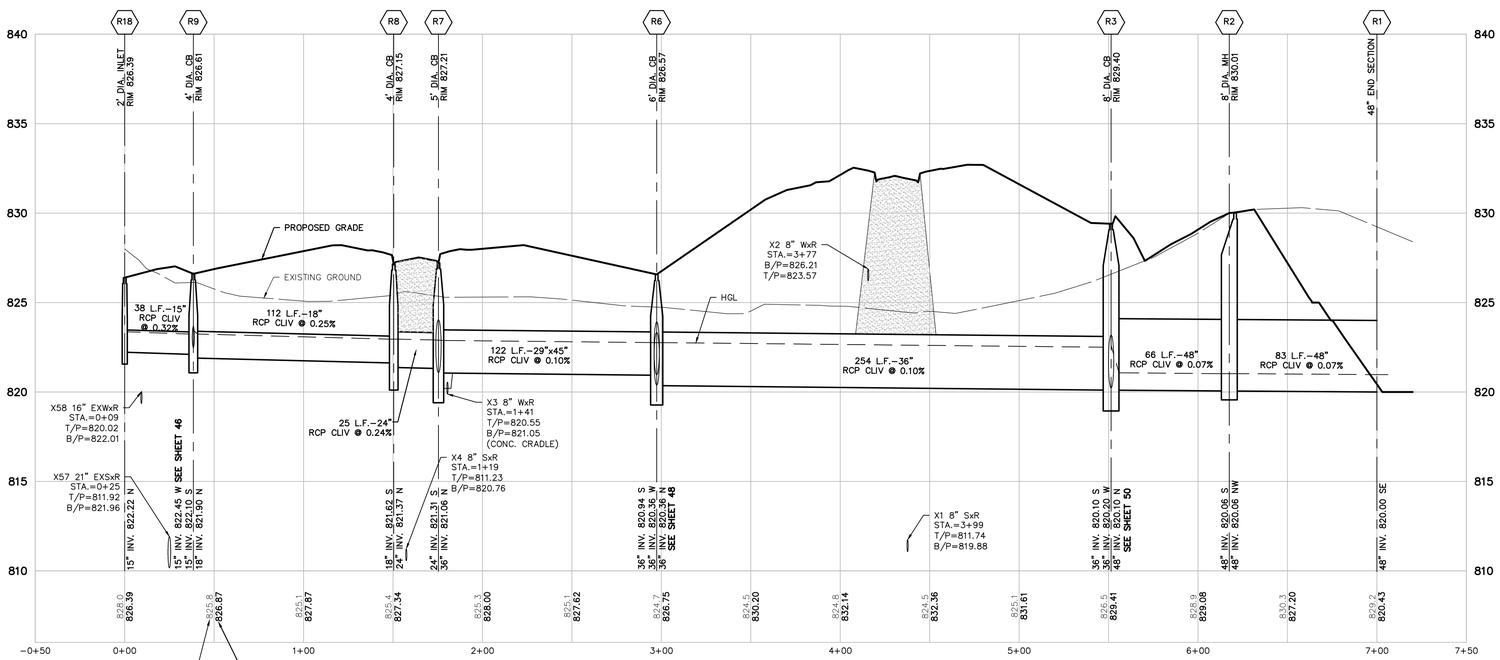
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 44 | |

J:\13001886\DWG\PLAN SET\FINAL SITE PLAN\13001886SP-06-PROGRAM 2/9/2016 2:26 PM MICHAEL HORCH





KEYMAP
1" = 500'




R1–R9
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- PROPOSED RIP–RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 1

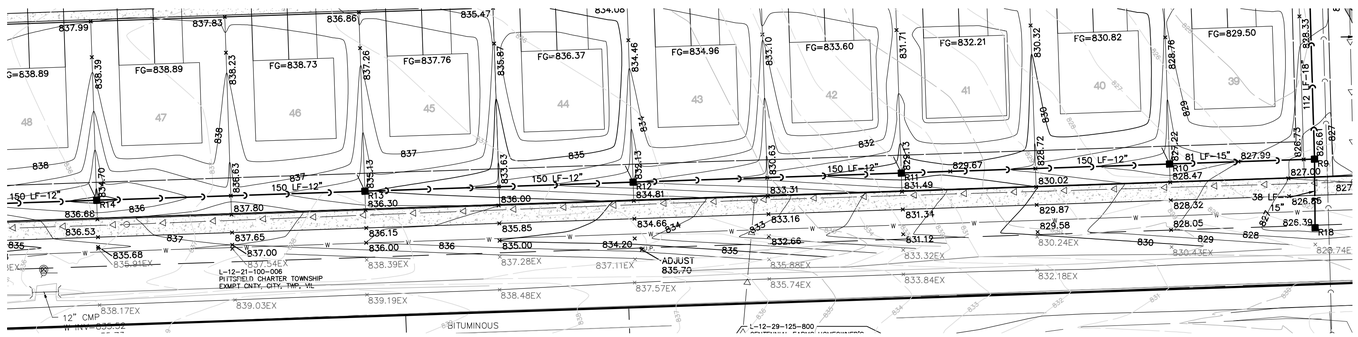
DATE
NOVEMBER 5, 2015

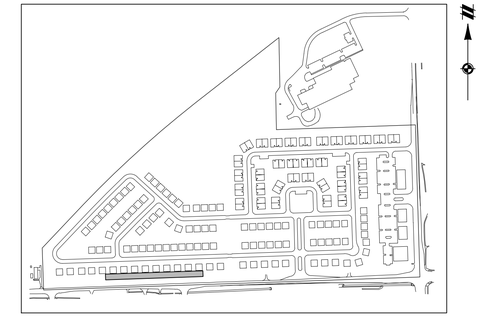
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

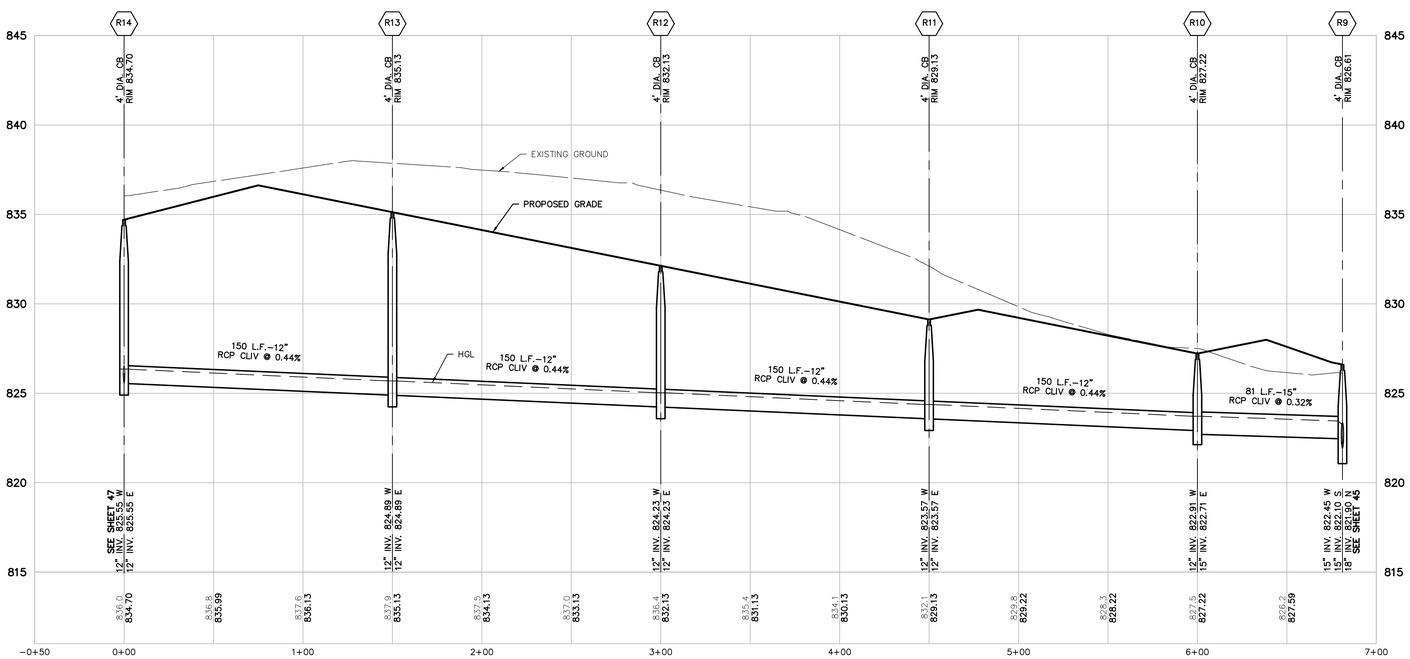
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 45 | |



KEYMAP
1" = 500'




R9–R14
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- PROPOSED RIP-RAP
- PROPOSED CATCH BASIN/INLET
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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 2

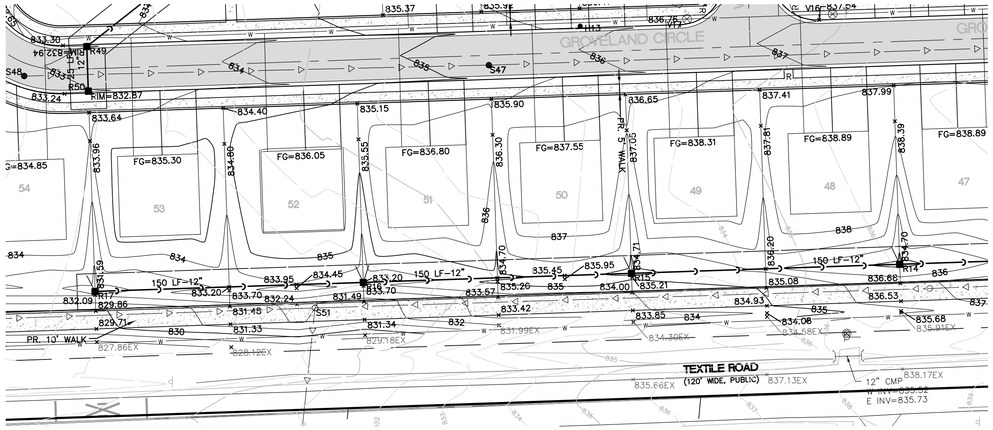
DATE
NOVEMBER 5, 2015

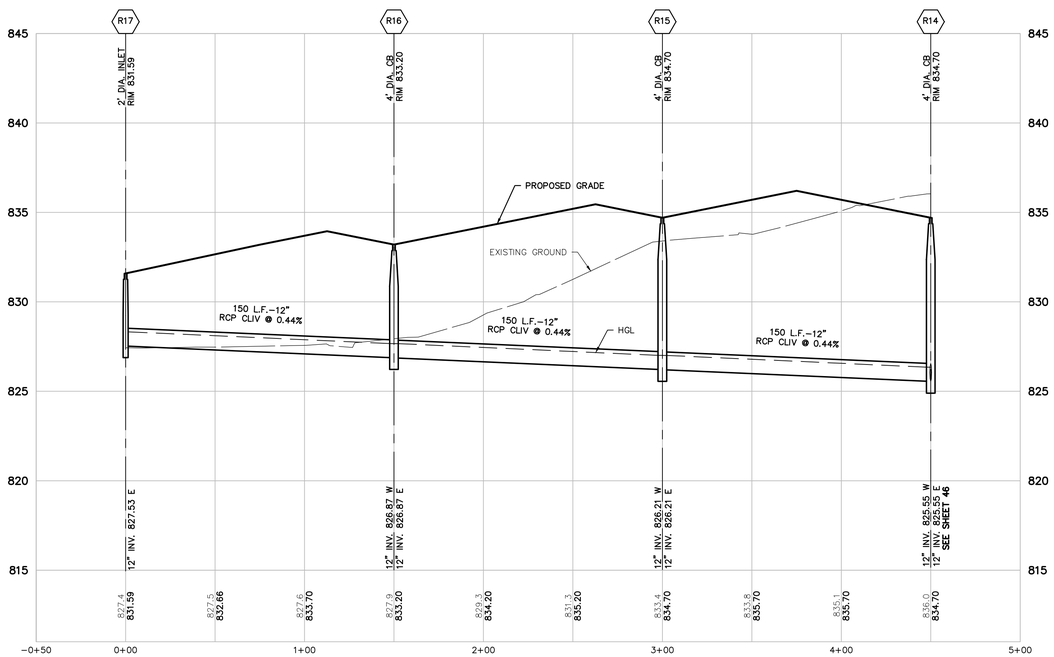
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

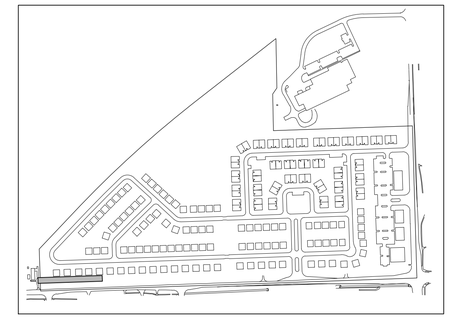
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 46 | |




R14–R17
VERT: 1"=4'
HORZ: 1"=40'



KEYMAP
1" = 500'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| | EXISTING STORM |
| | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 3

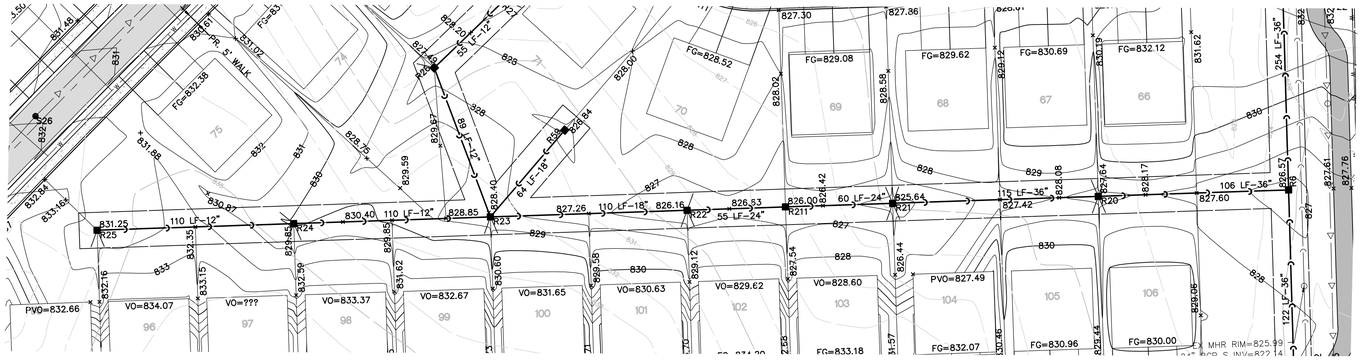
DATE
NOVEMBER 5, 2015

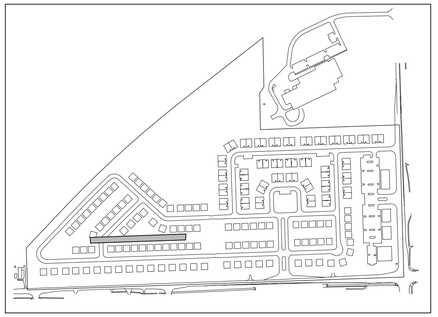
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

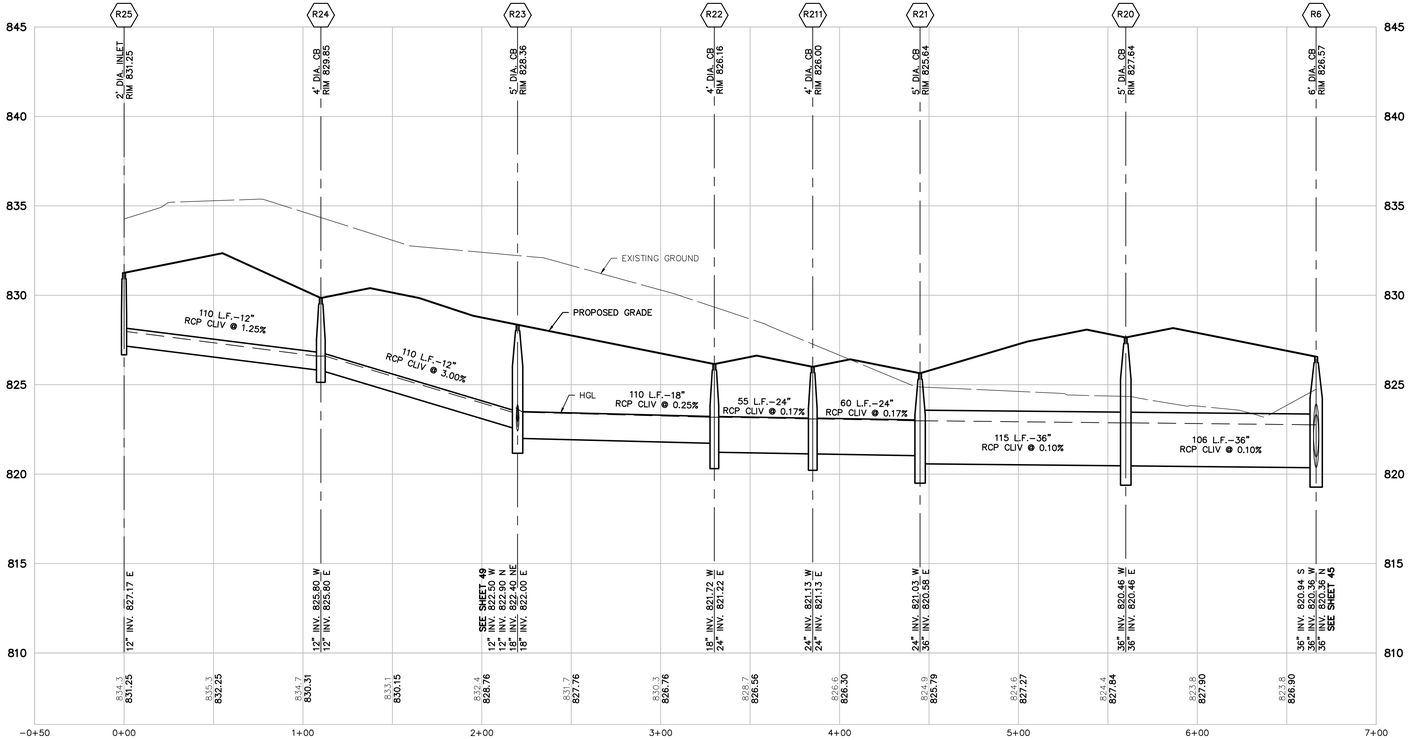
SCALE 0 20 40
SCALE: 1" = 40'

DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 47



KEYMAP
1" = 500'




R25–R6
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 4

DATE
NOVEMBER 5, 2015

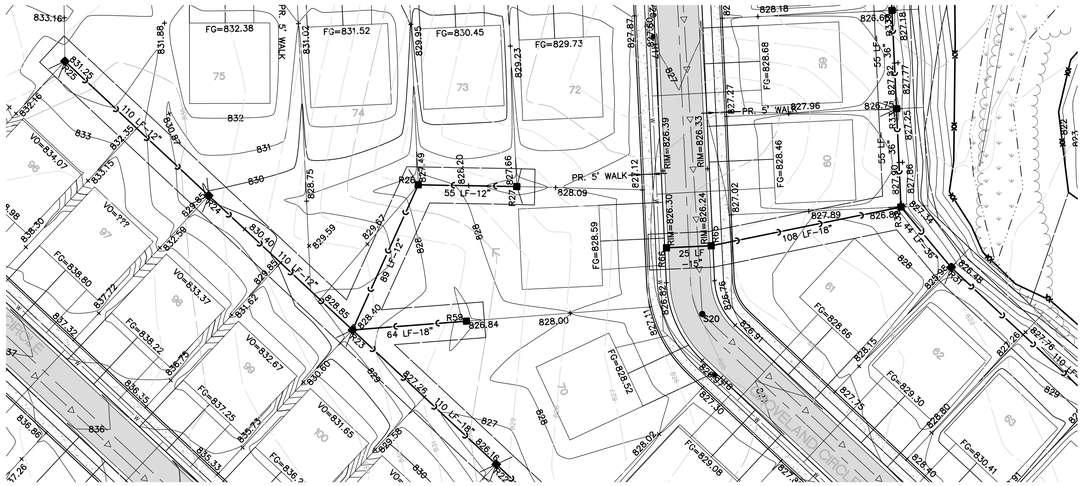
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

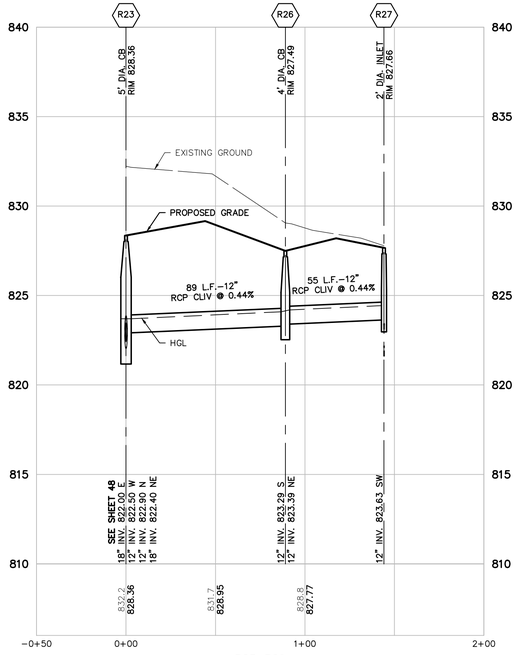
SCALE 0 20 40
SCALE: 1" = 40'

DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO.
48

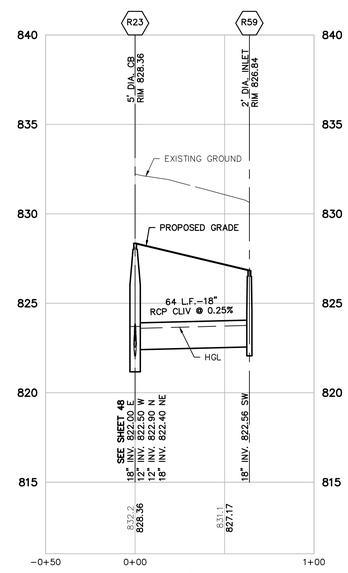
I:\13001886\DWG\PLAN SETS\FINAL SITE PLAN\13001886SP-48-STW WETLAND 2-9-2016 2:45 PM MICHAEL MORGA



KEYMAP
1" = 500'




R23–R29
VERT: 1"=4'
HORZ: 1"=40'




R23–59
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
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- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- PROPOSED RIP-RAP
- PROPOSED CATCH BASIN/INLET
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- PROPOSED MANHOLE
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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND
PROFILE 5

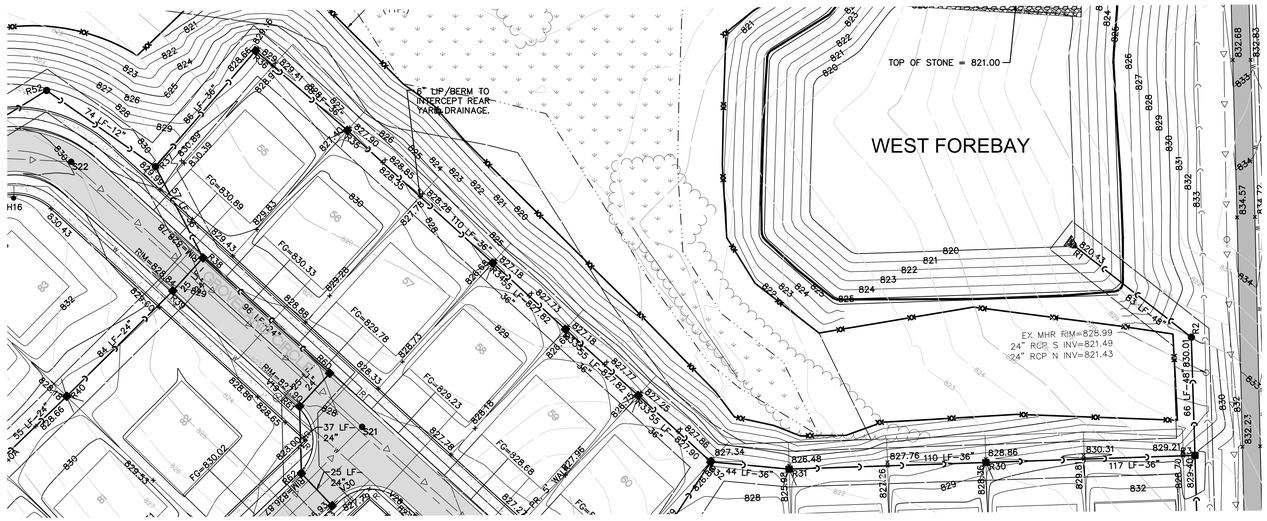
DATE
NOVEMBER 5, 2015

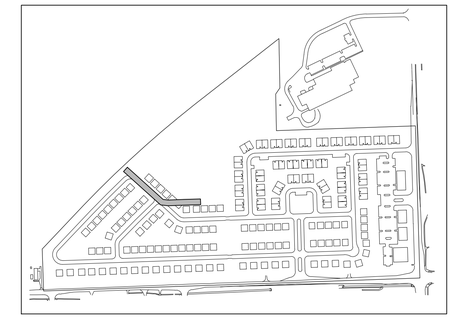
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

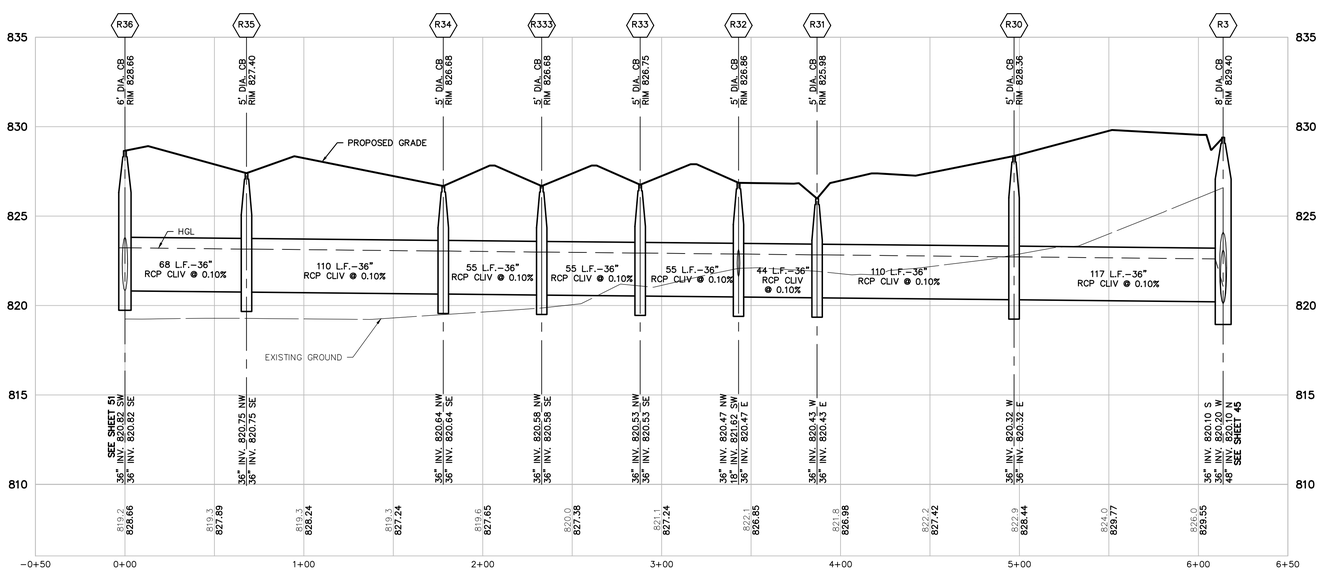
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 49 | |



KEYMAP
1" = 500'




R3–R36
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
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- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- PROPOSED RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 6

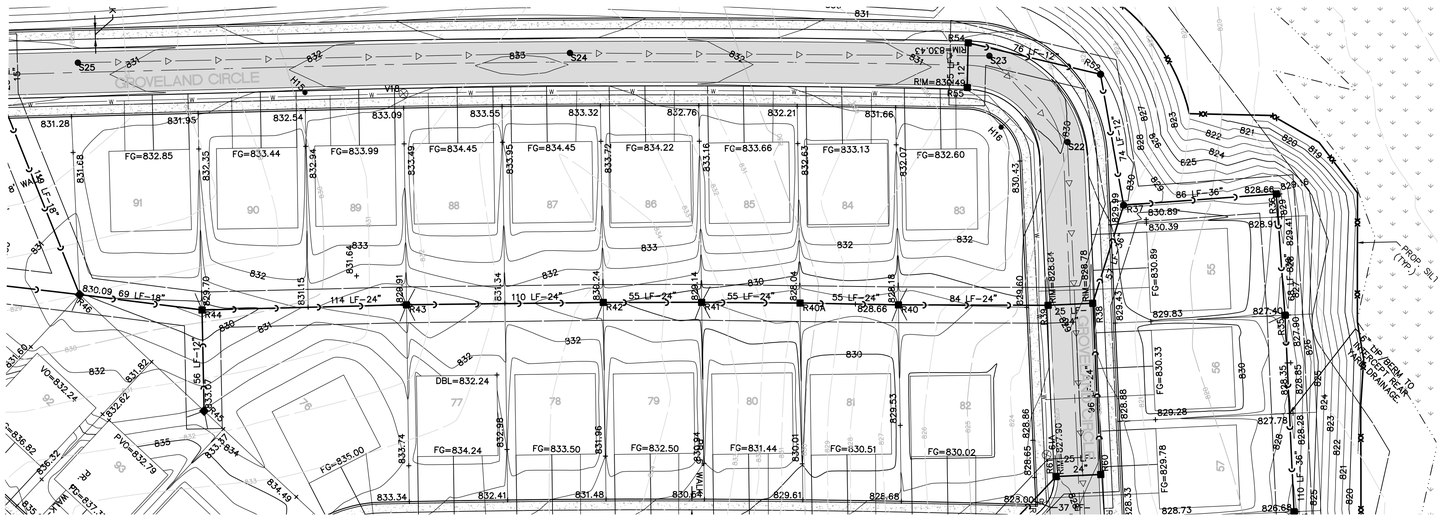
DATE
NOVEMBER 5, 2015

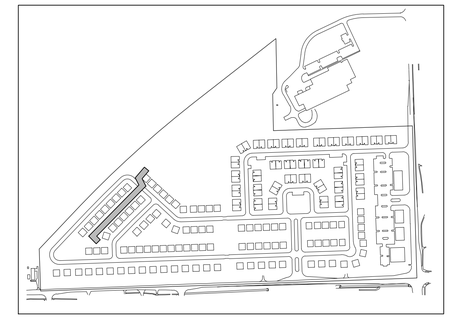
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

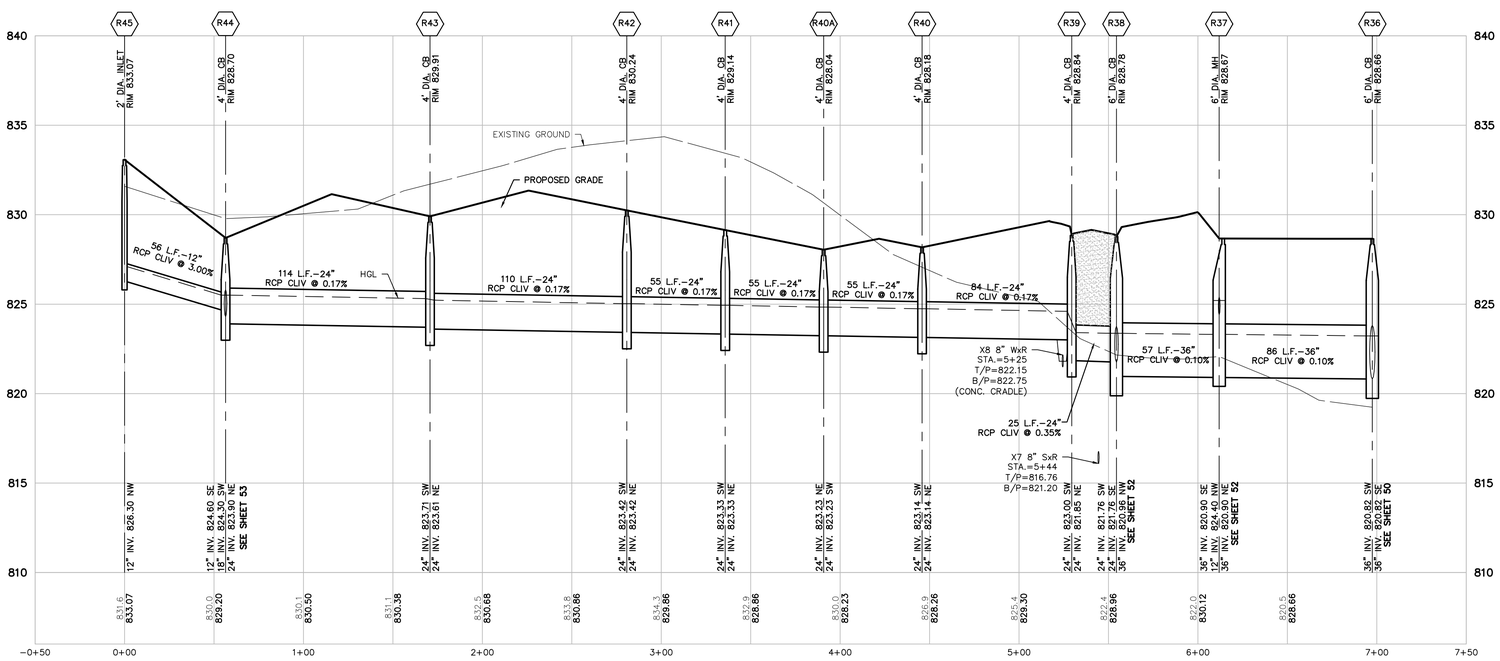
SCALE 0 20 40
SCALE: 1" = 40'

DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 50



KEYMAP
1" = 500'




R45–R36
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| D | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| D | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 7

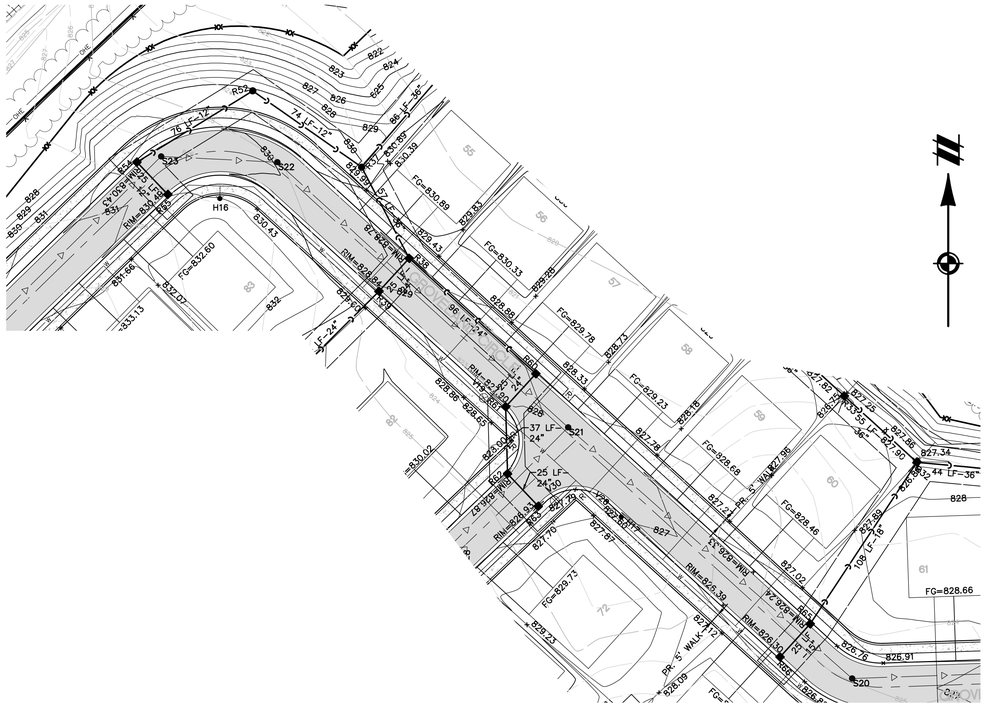
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP., WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

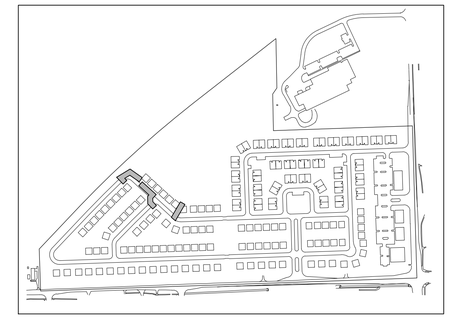
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 51 | |




R37–R55
VERT: 1"=4'
HORZ: 1"=40'

R38–R63
VERT: 1"=4'
HORZ: 1"=40'

R32–R66
VERT: 1"=4'
HORZ: 1"=40'



KEYMAP
1" = 500'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
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INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 8

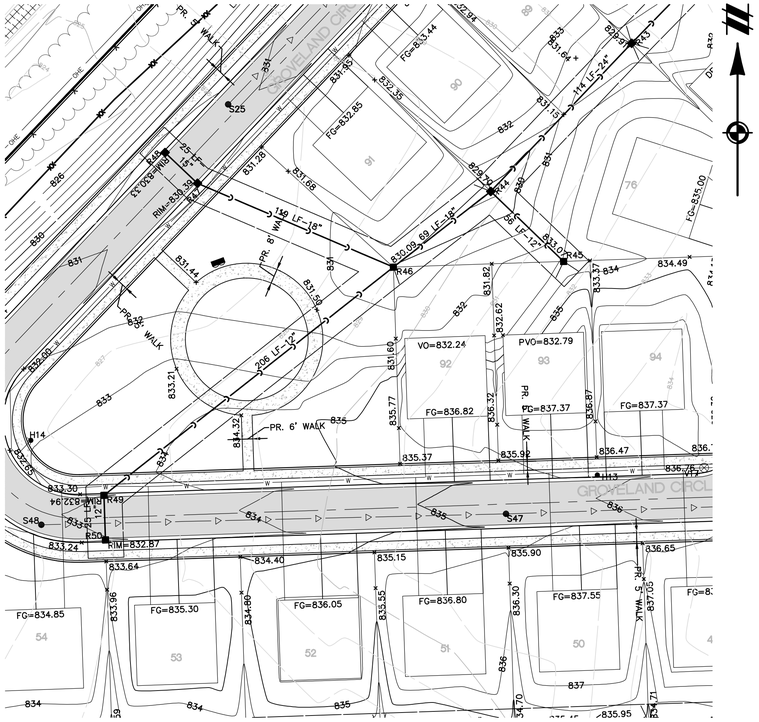
DATE
NOVEMBER 5, 2015

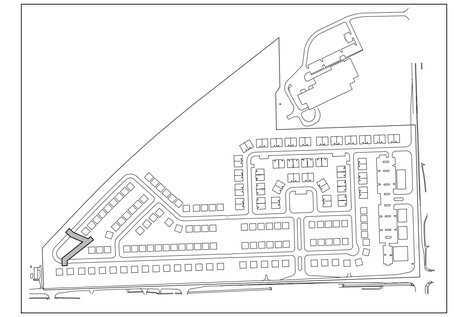
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

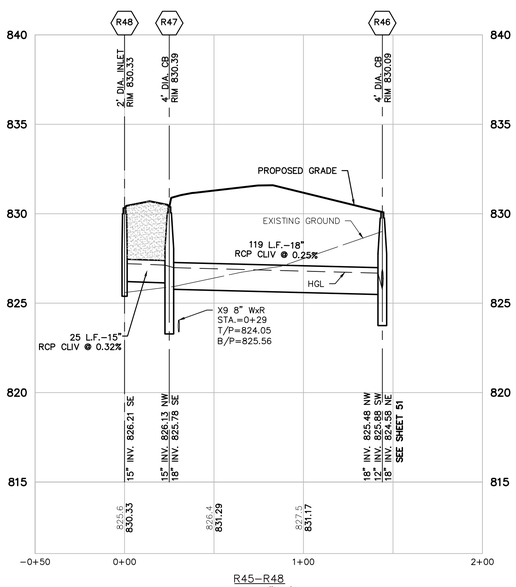
SCALE 0 20 40
SCALE: 1" = 40'

| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |
| SHEET NO. | 52 | | |

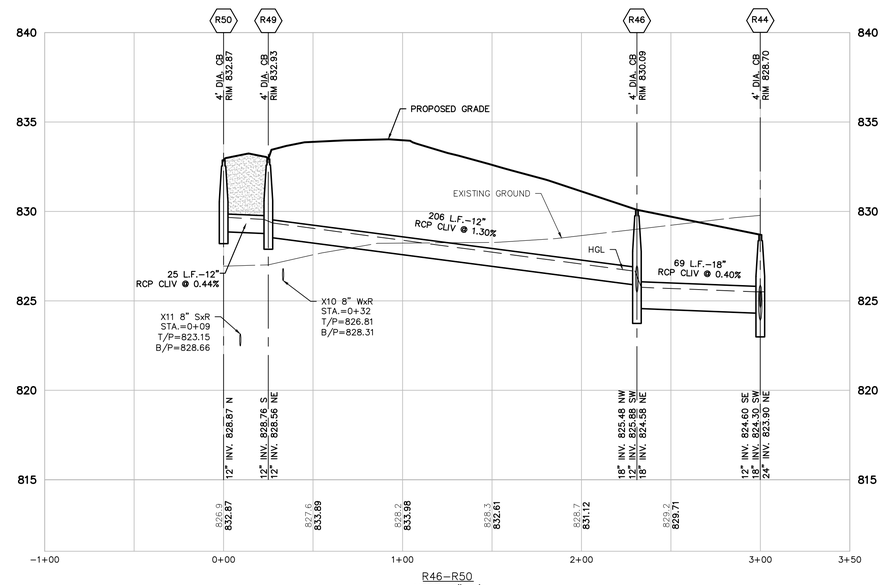


KEYMAP
1" = 500'




R45-R48
VERT: 1"=4'
HORZ: 1"=40'




R46-R50
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 9

DATE
NOVEMBER 5, 2015

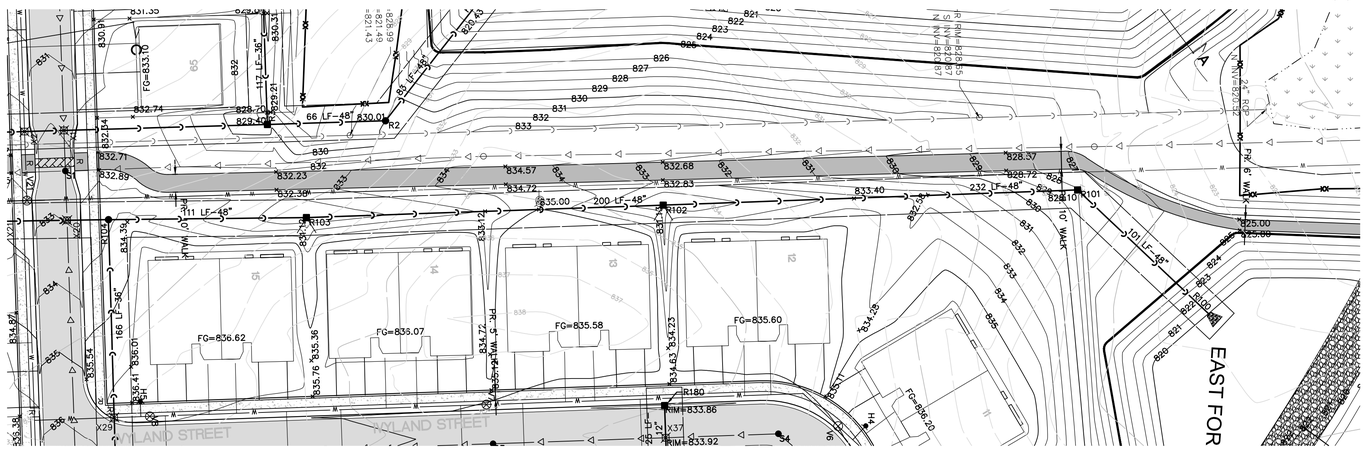
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

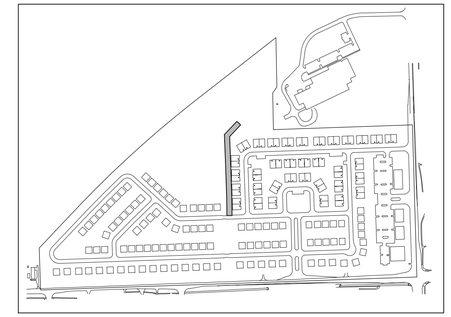
REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

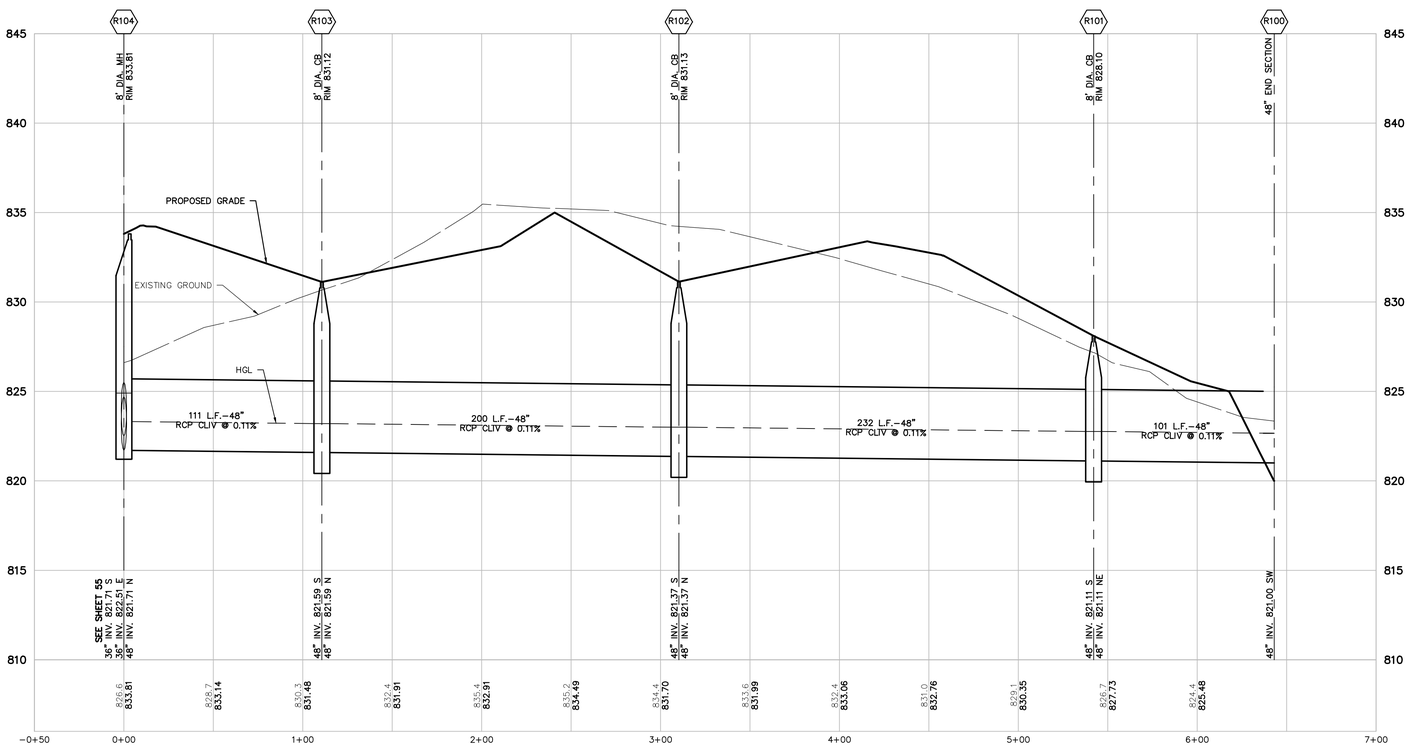
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 53 | |

G:\13001886\DWG\CAD_SITE\FINAL SITE PLAN\13001886SP-L6-1-STM WSTTWC 2/9/2016 2:44 PM MICHAEL HORCH



KEYMAP
1" = 500'




R100–R104
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 10

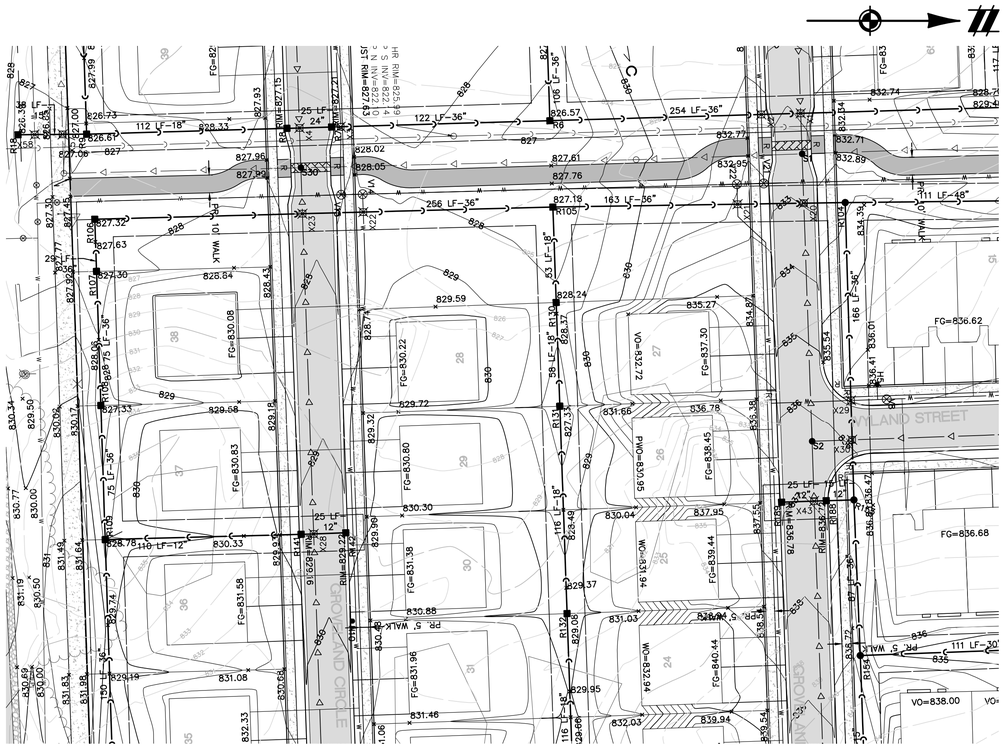
DATE
NOVEMBER 5, 2015

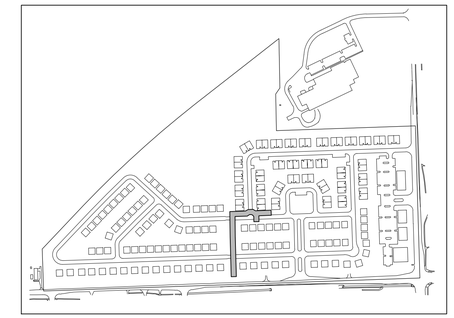
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

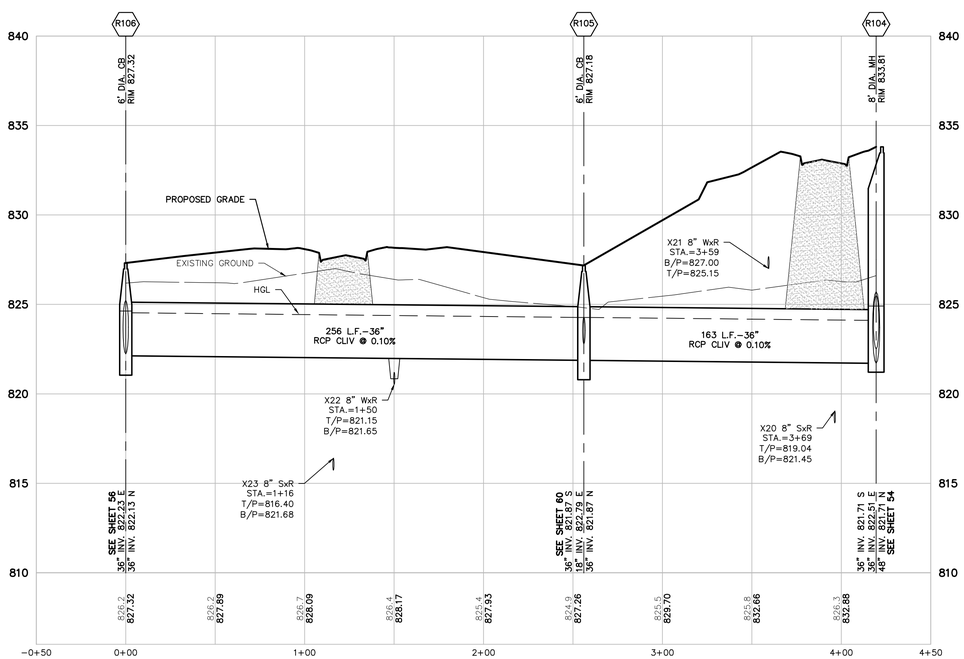
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 54 | |

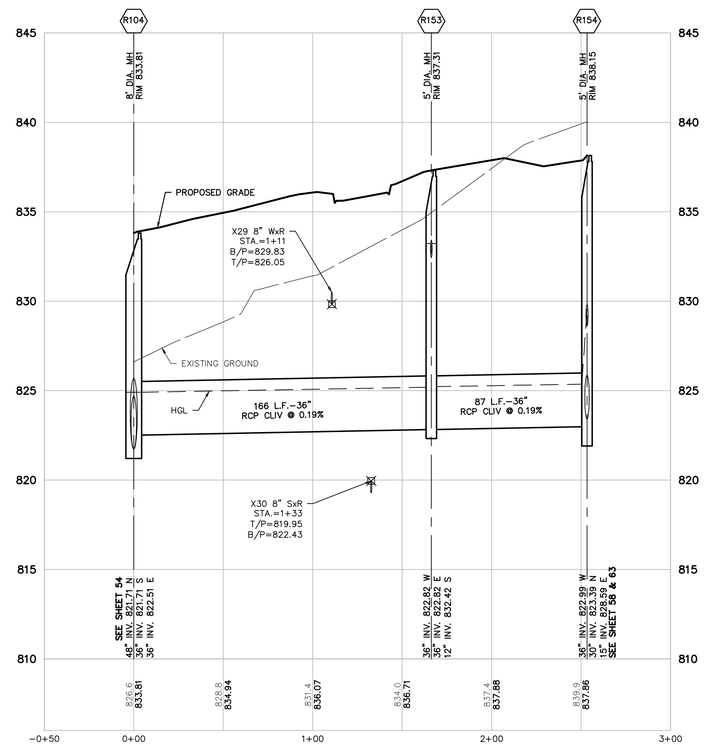


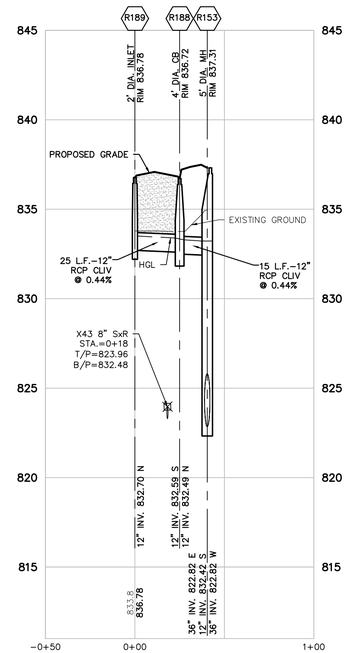
KEYMAP
1" = 500'




R104–R106
VERT: 1"=4'
HORZ: 1"=40'




R104–R154
VERT: 1"=4'
HORZ: 1"=40'




R154–R189
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP–RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
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FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 11

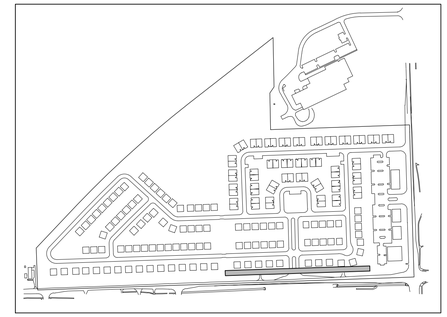
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

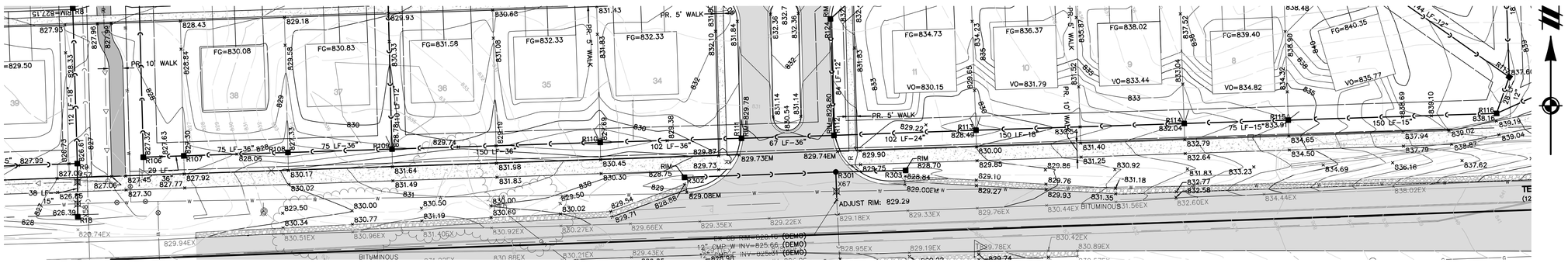
REVISIONS

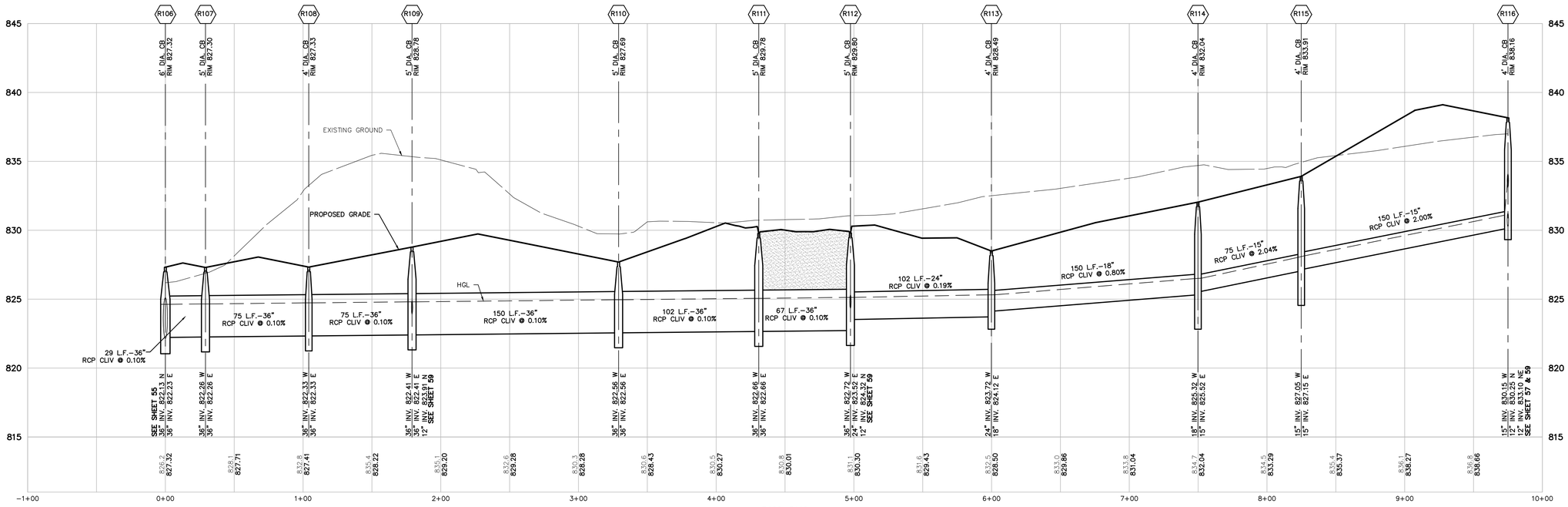
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 55 | |



KEYMAP
1" = 500'




R106–R116
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | | | |
|---|---|---|---|
| EXISTING WETLAND LINE | PROPOSED BACK/EDGE CURB | | PROPOSED CATCH BASIN/INLET |
| BOUNDARY LINE | PROPOSED CENTERLINE | | PROPOSED OUTLET |
| EXISTING STORM | PROPOSED ELEVATION | | PROPOSED MANHOLE |
| EXISTING WATER MAIN | | EXISTING SANITARY MANHOLE | PROPOSED WATER VALVE IN WELL |
| EXISTING SANITARY | | EXISTING CATCH BASIN/INLET | PROPOSED FIRE HYDRANT |
| EXISTING GAS | | EXISTING WATER MANHOLE | EXISTING WETLAND |
| EXISTING RAILROAD | | EXISTING 1' CONTOUR | PROPOSED RIP-RAP |
| PROPOSED STORM SEWER | | EXISTING 5' CONTOUR | |
| PROPOSED SANITARY | | PROPOSED 1' CONTOUR | |
| PROPOSED WATER MAIN | | PROPOSED 5' CONTOUR | |
| PROPOSED LOT | | | |
| PROPOSED EASEMENT | | | |
| PROPOSED R.O.W. | | | |

811
Know what's **below.**
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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 12

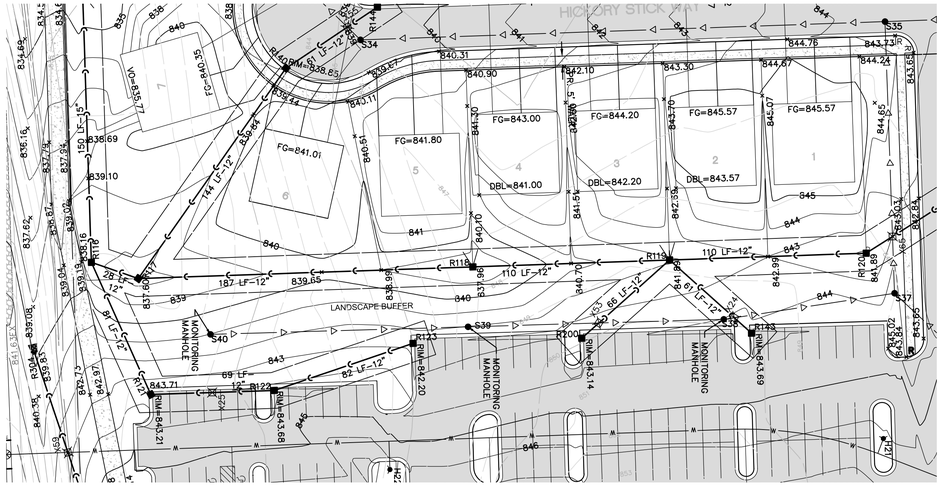
DATE
NOVEMBER 5, 2015

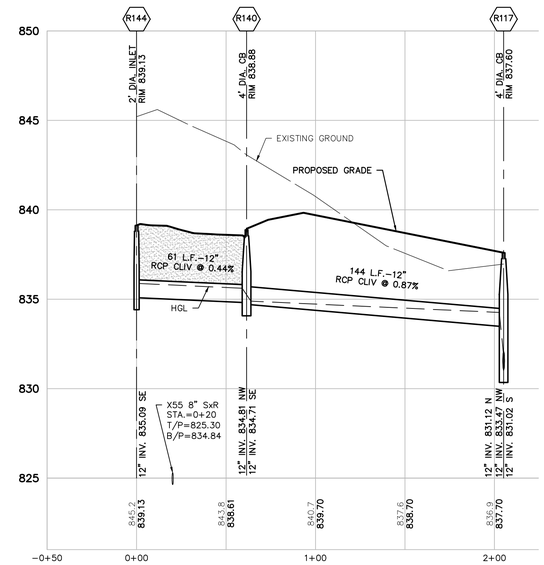
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

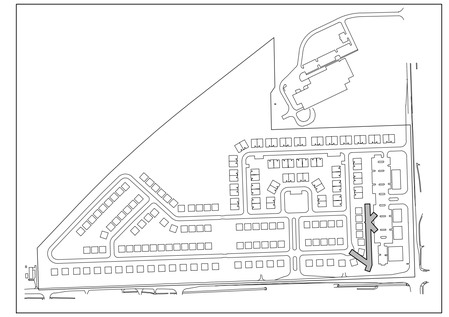
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 56 | |

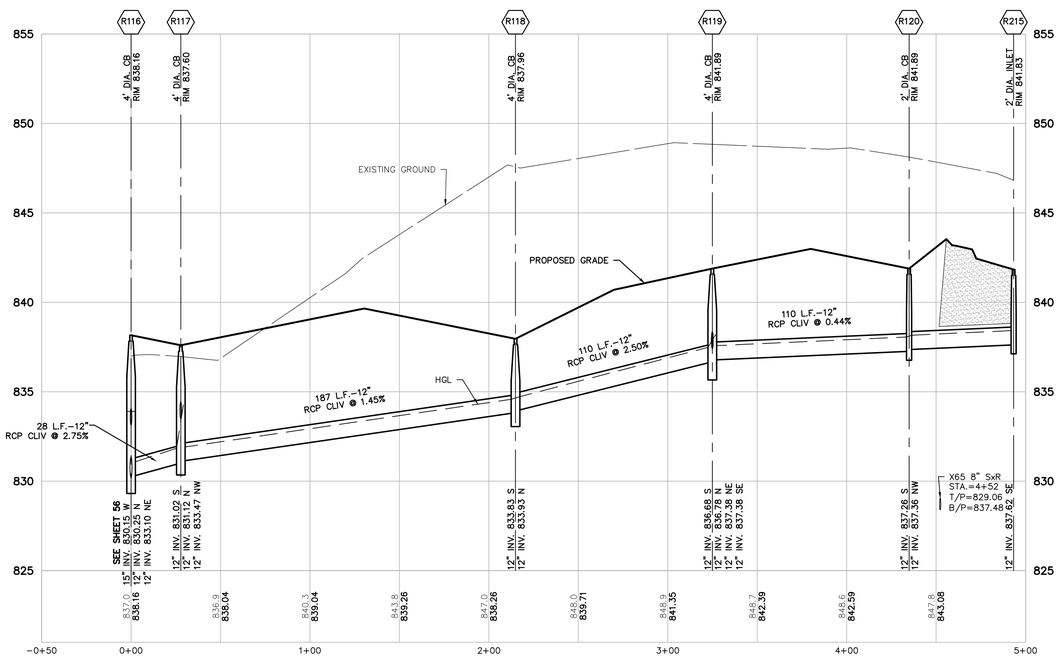


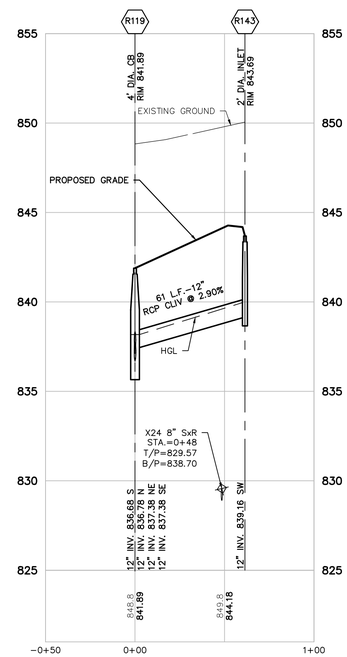

R117–R140
VERT: 1"=4'
HORZ: 1"=40'



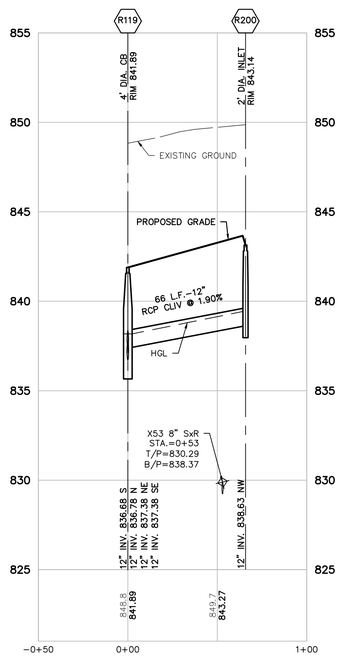
KEYMAP
1" = 500'




R116–R120
VERT: 1"=4'
HORZ: 1"=40'




R119–R143
VERT: 1"=4'
HORZ: 1"=40'




R119–R200
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT
- EXISTING WETLAND
- PROPOSED RIP-RAP

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INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 13

DATE
NOVEMBER 5, 2015

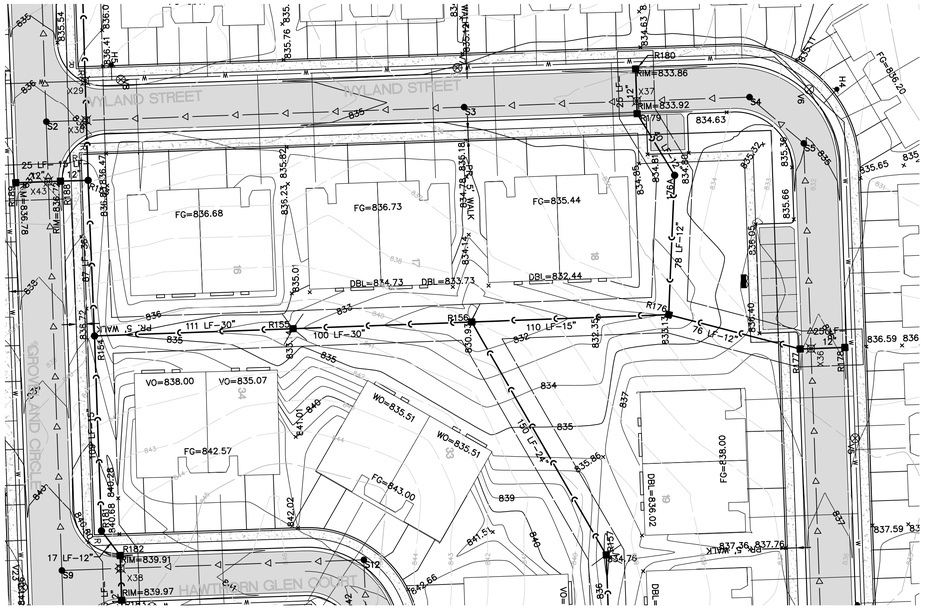
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

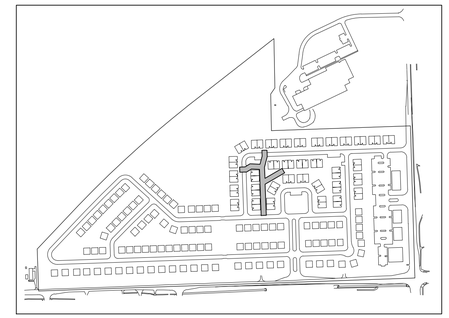
REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

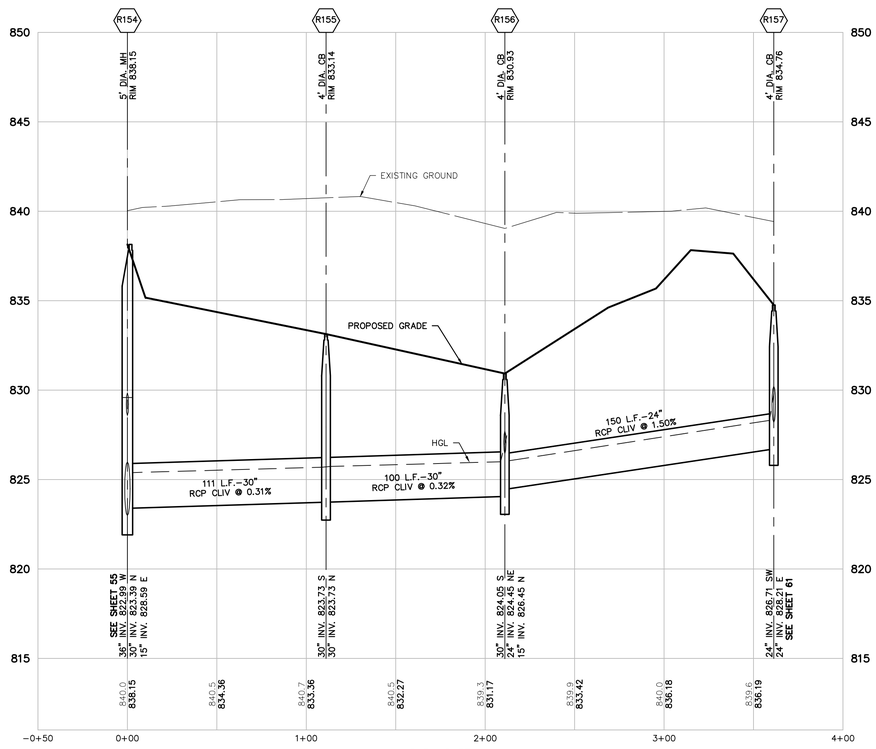
DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 57

I:\13001886\DWG\PLAN SETS\FINAL SITE PLAN\13001886SP-18-2-SW EXISTDWG 2/9/2016 2:55 PM MICHAEL MORGA

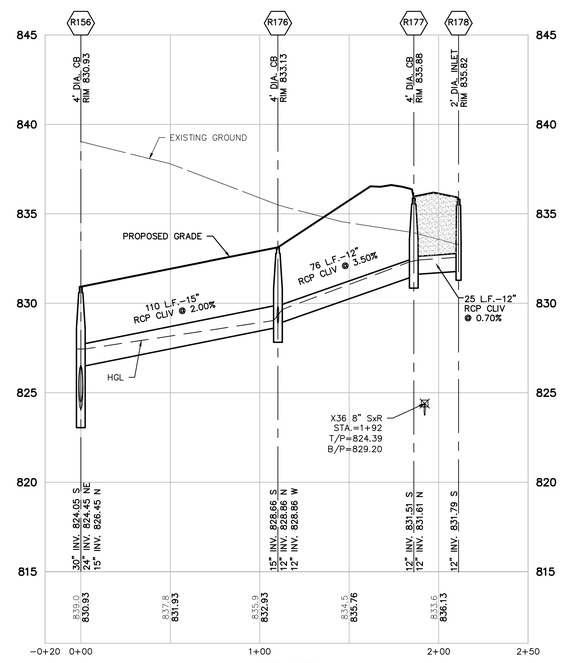


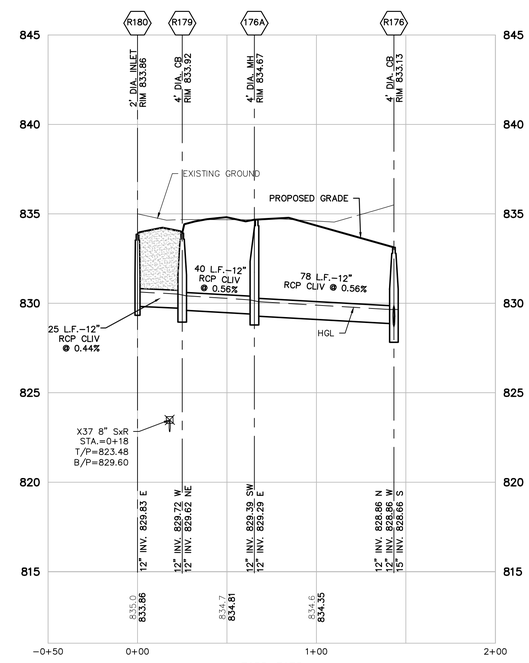
KEYMAP
1" = 500'




R154–R157
VERT: 1"=4'
HORZ: 1"=40'




R156–R178
VERT: 1"=4'
HORZ: 1"=40'




R180–R176
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | | | |
|---|---|---|---|
| EXISTING WETLAND LINE | PROPOSED BACK/EDGE CURB | | PROPOSED CATCH BASIN/INLET |
| BOUNDARY LINE | PROPOSED CENTERLINE | | PROPOSED OUTLET |
| EXISTING STORM | PROPOSED ELEVATION | | PROPOSED MANHOLE |
| EXISTING WATER MAIN | EXISTING SANITARY MANHOLE | | PROPOSED WATER VALVE IN WELL |
| EXISTING SANITARY | EXISTING CATCH BASIN/INLET | | PROPOSED FIRE HYDRANT |
| EXISTING GAS | EXISTING WATER MANHOLE | | EXISTING WETLAND |
| EXISTING RAILROAD | EXISTING 1' CONTOUR | | PROPOSED RIP-RAP |
| PROPOSED STORM SEWER | EXISTING 5' CONTOUR | | |
| PROPOSED SANITARY | PROPOSED 1' CONTOUR | | |
| PROPOSED WATER MAIN | PROPOSED 5' CONTOUR | | |
| PROPOSED LOT | | | |
| PROPOSED EASEMENT | | | |
| PROPOSED R.O.W. | | | |

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INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 14

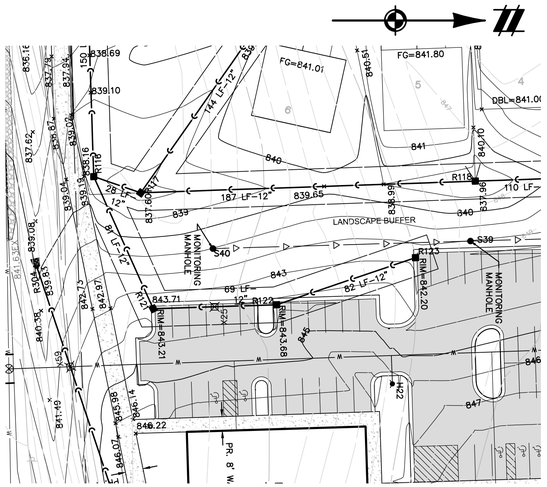
DATE
NOVEMBER 5, 2015

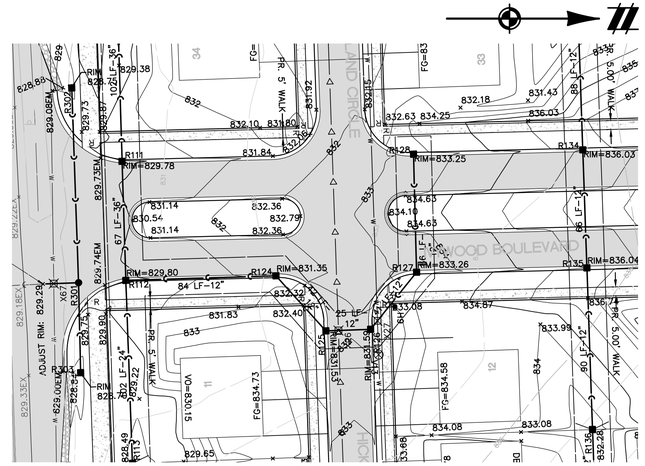
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

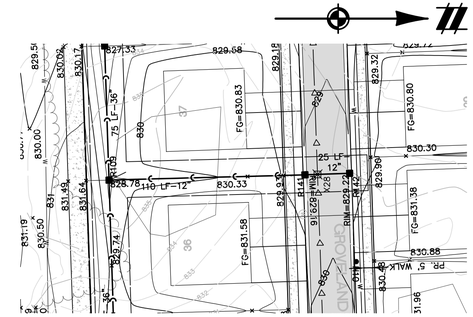
REVISIONS

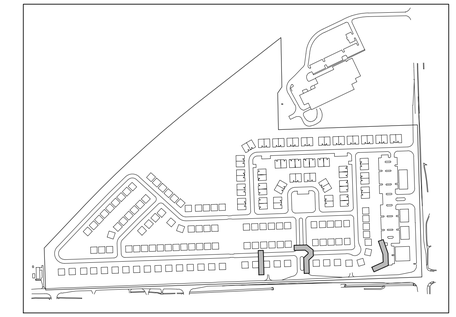
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 58 | |

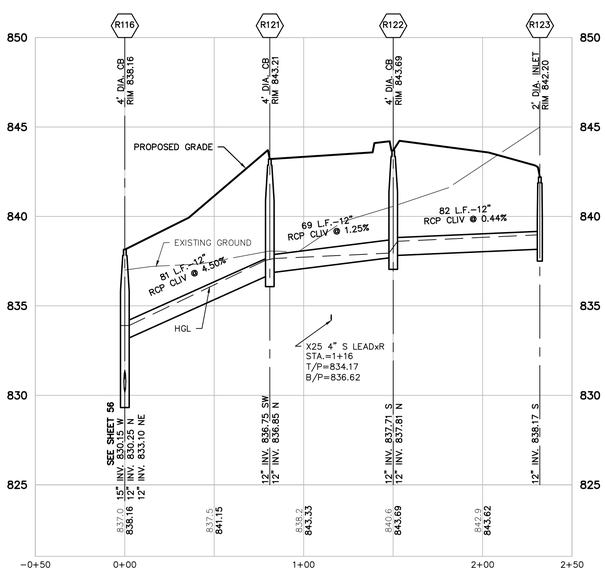


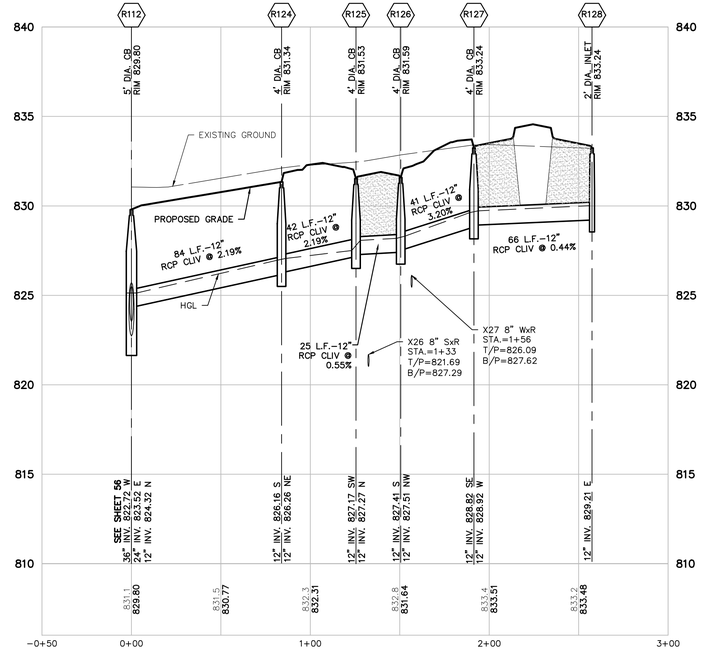



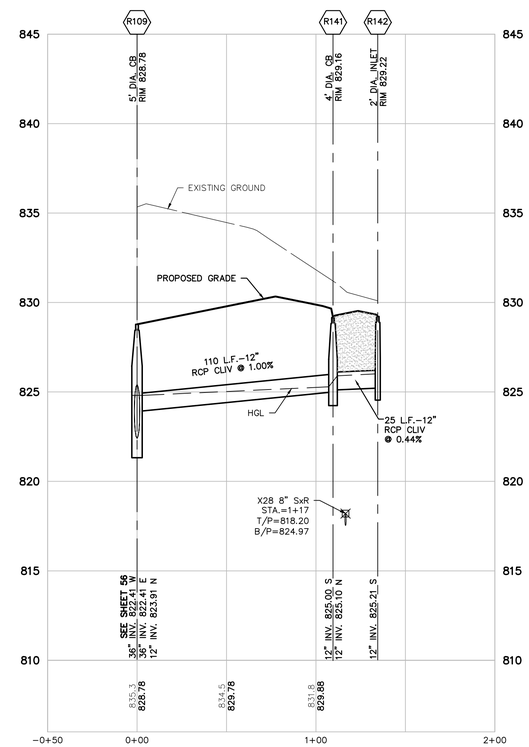
KEYMAP
1" = 500'




R116-R123
VERT: 1"=4'
HORZ: 1"=40'




R112-R128
VERT: 1"=4'
HORZ: 1"=40'




R109-R142
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER PLAN AND PROFILE 15

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 59 | |

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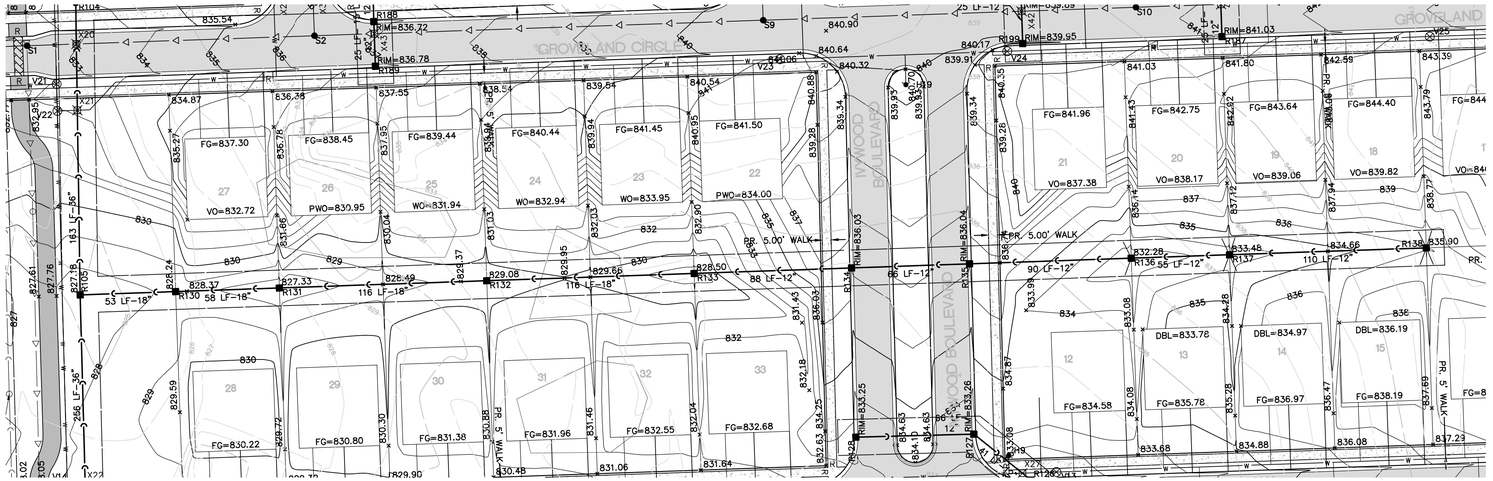
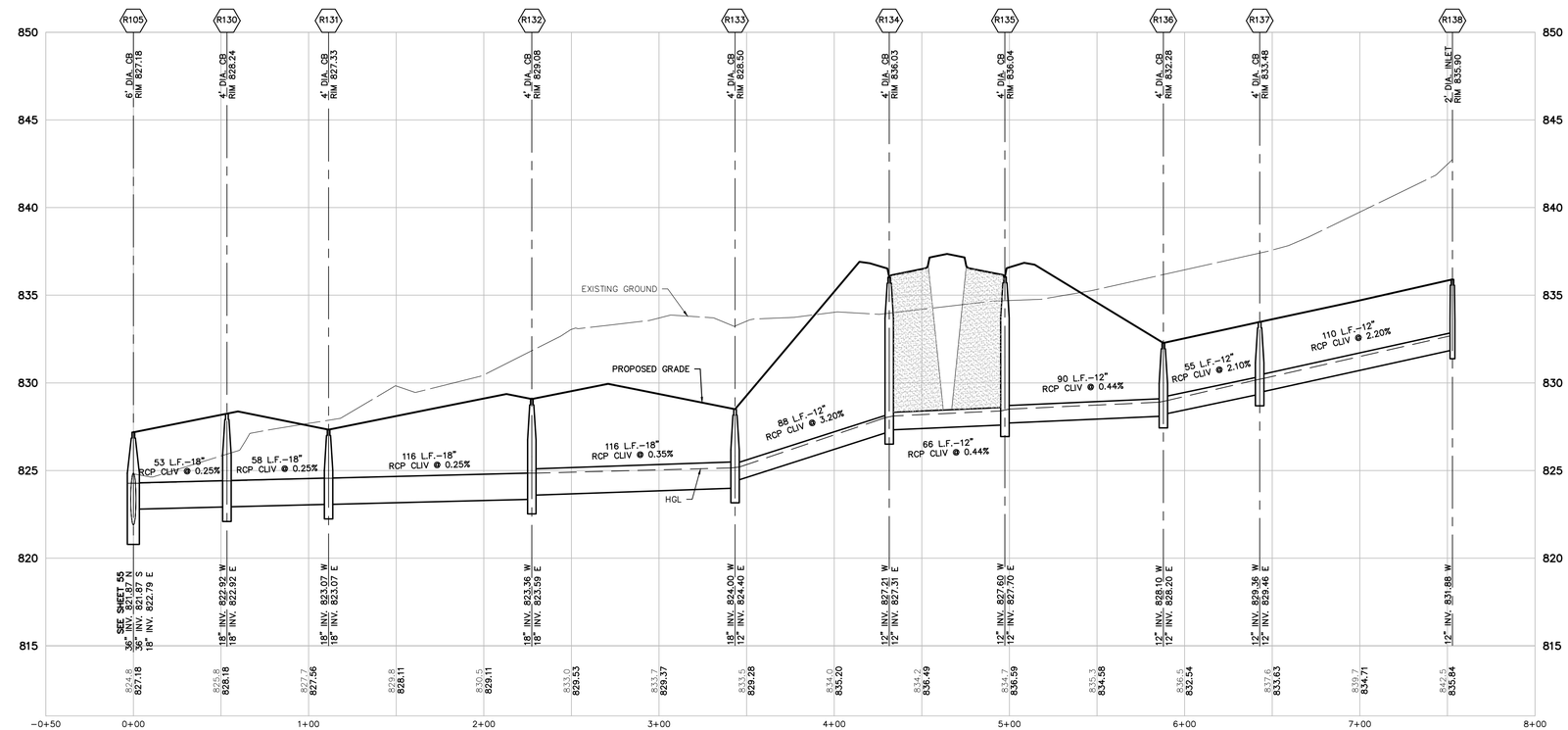
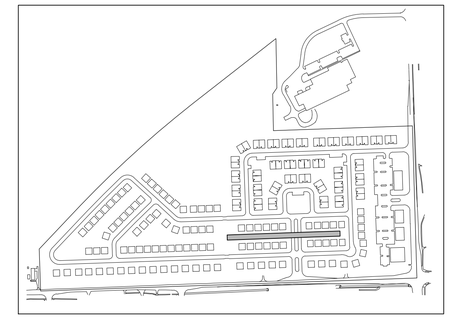



R105–R138
VERT: 1"=4'
HORZ: 1"=40'



KEYMAP
1" = 500'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| S | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| S | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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STORMWATER PLAN AND PROFILE 16

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 60 | |

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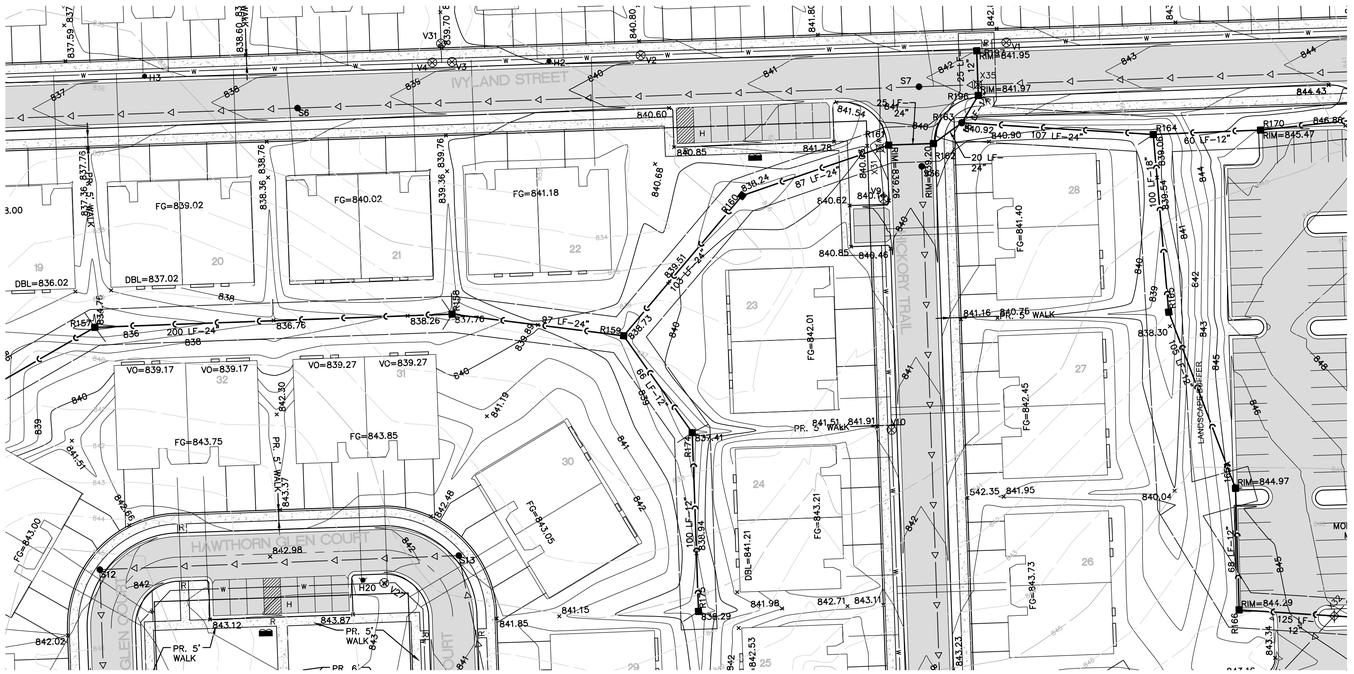
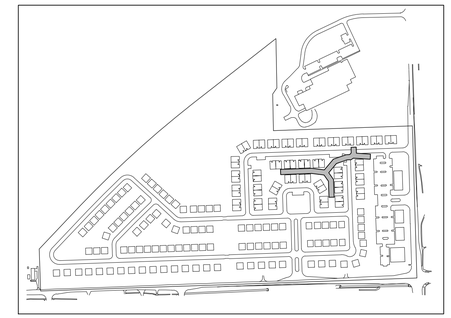
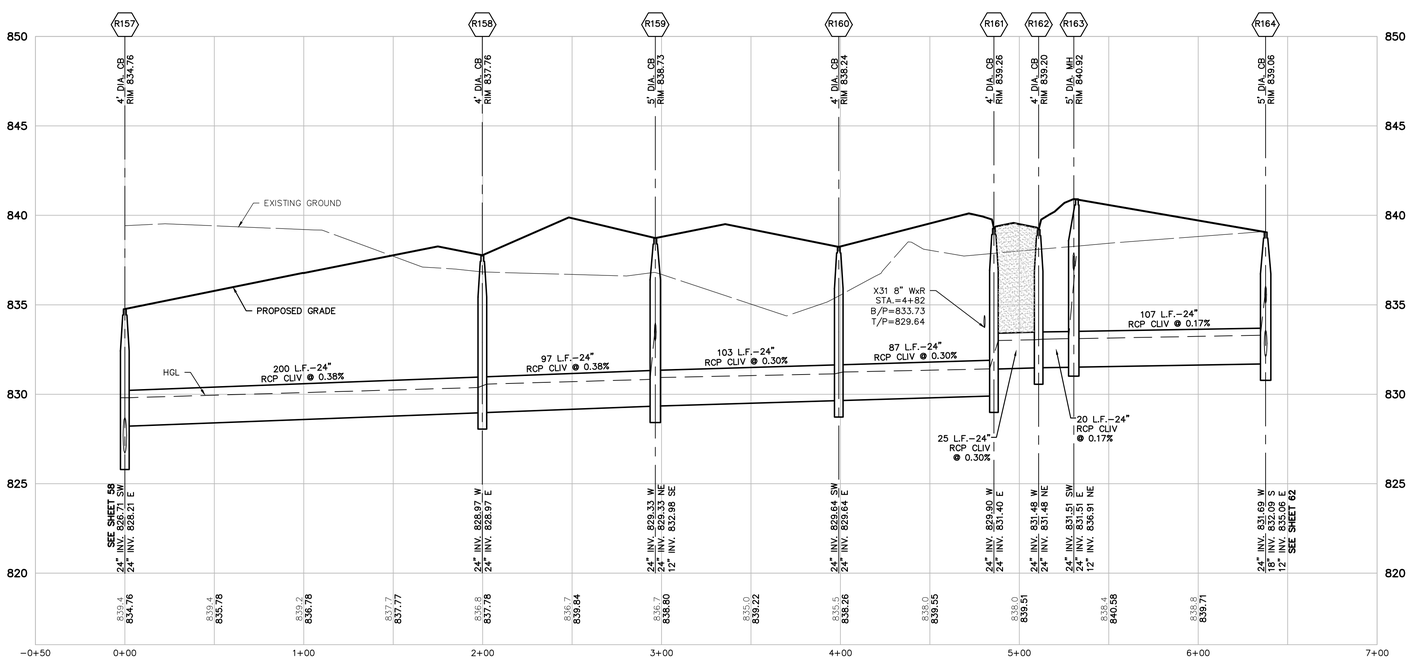
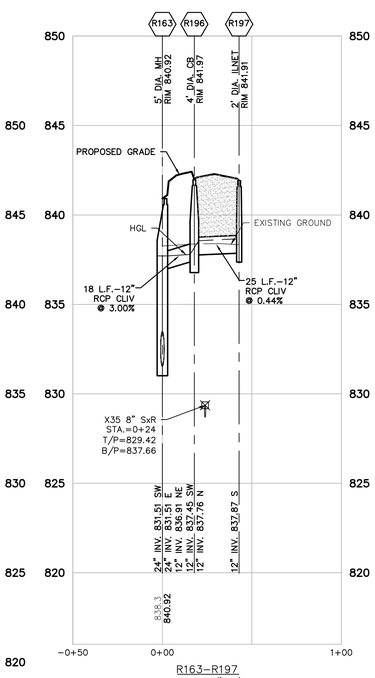


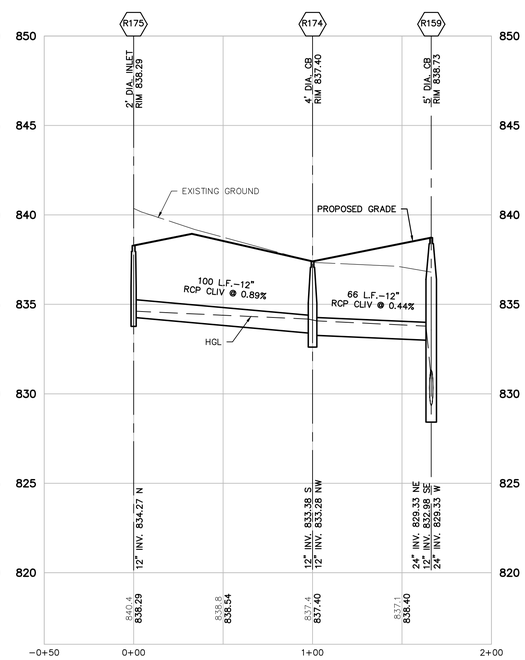
KEYMAP
1" = 500'




R157–R164
VERT: 1"=4'
HORZ: 1"=40'




R163–R197
VERT: 1"=4'
HORZ: 1"=40'




R159–R175
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT
- EXISTING WETLAND
- PROPOSED RIP-RAP

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STORMWATER PLAN AND PROFILE 17

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

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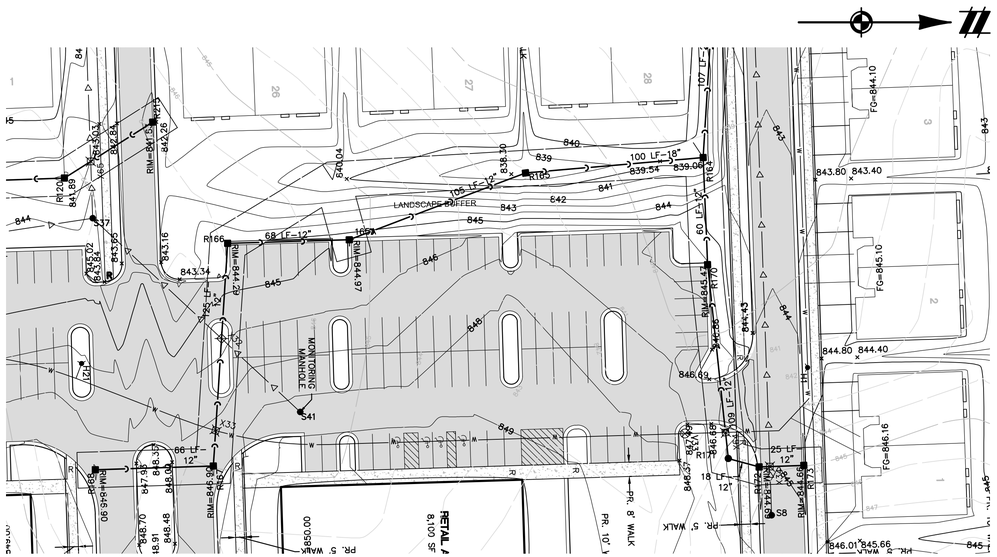
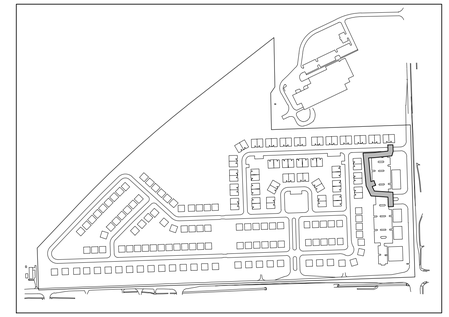
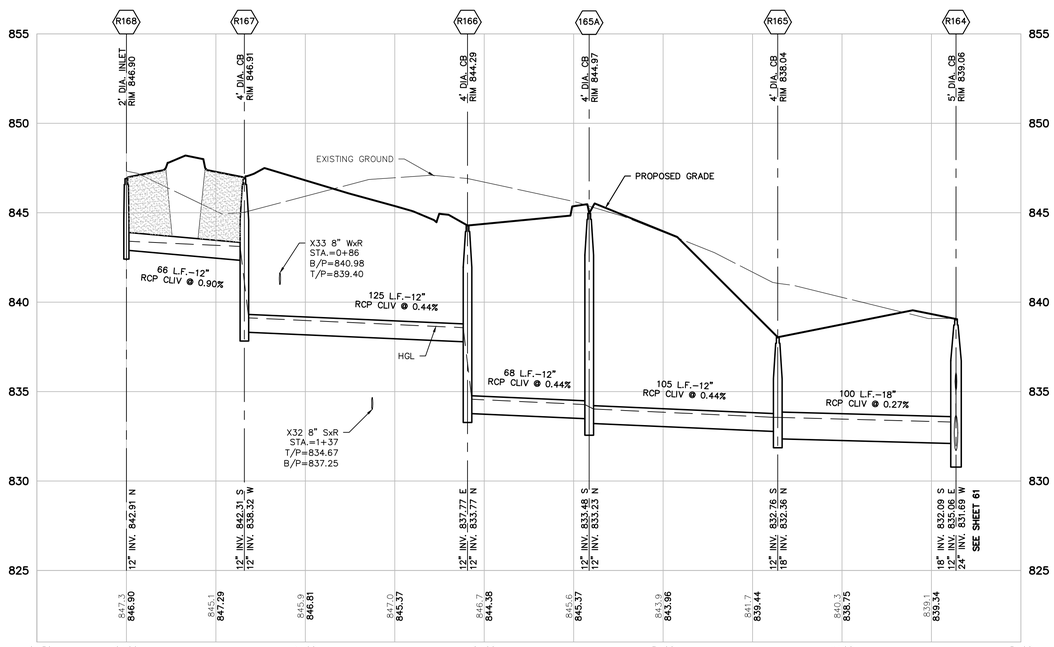
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 61

I:\13001886\CAD\PLAN SET\FINAL SITE PLAN\13001886SP-A1.2-STM PROFILES.dwg 2/9/2016 2:55 PM MICHAEL KOBICA

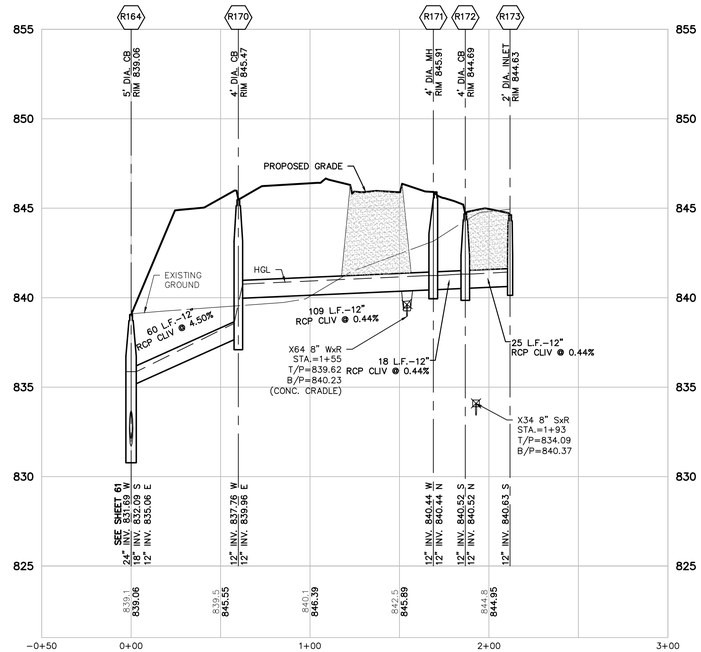


KEYMAP
1" = 500'




R168–R164
VERT: 1"=4'
HORZ: 1"=40'




R164–R173
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT
- EXISTING WETLAND
- PROPOSED RIP-RAP

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STORMWATER PLAN AND PROFILE 18

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
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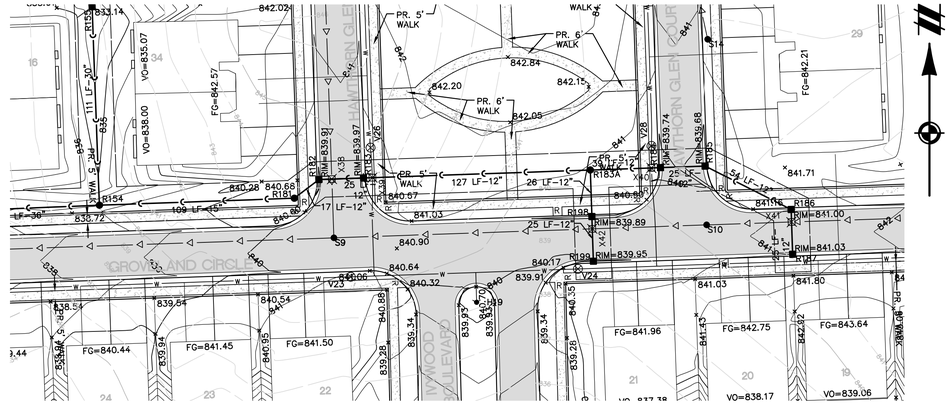
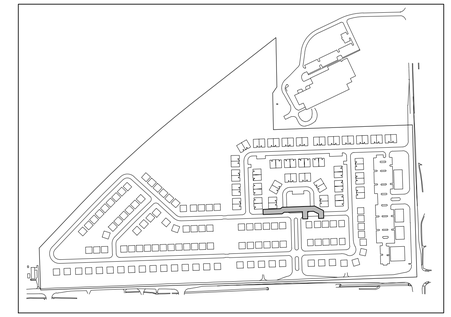
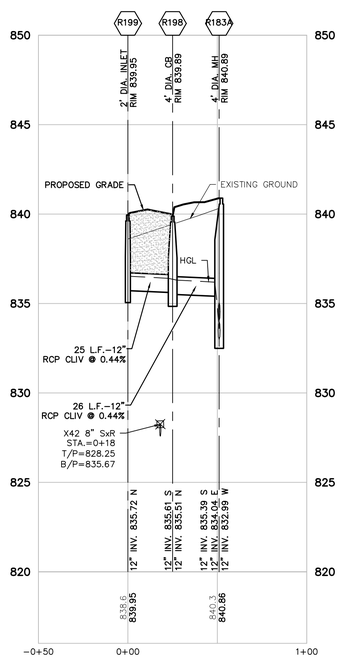
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 62 | |

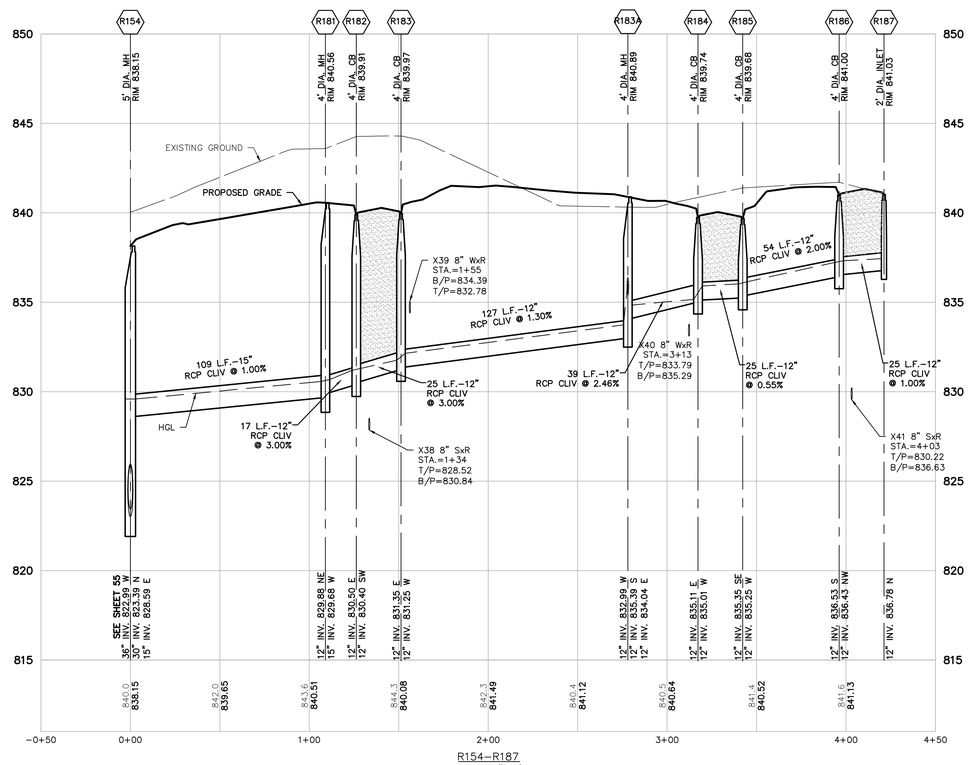


KEYMAP
1" = 500'




R183A–R199
VERT: 1"=4'
HORZ: 1"=40'




R154–R187
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- PROPOSED RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT

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# STORMWATER PLAN AND PROFILE 19

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
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| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 63 | |

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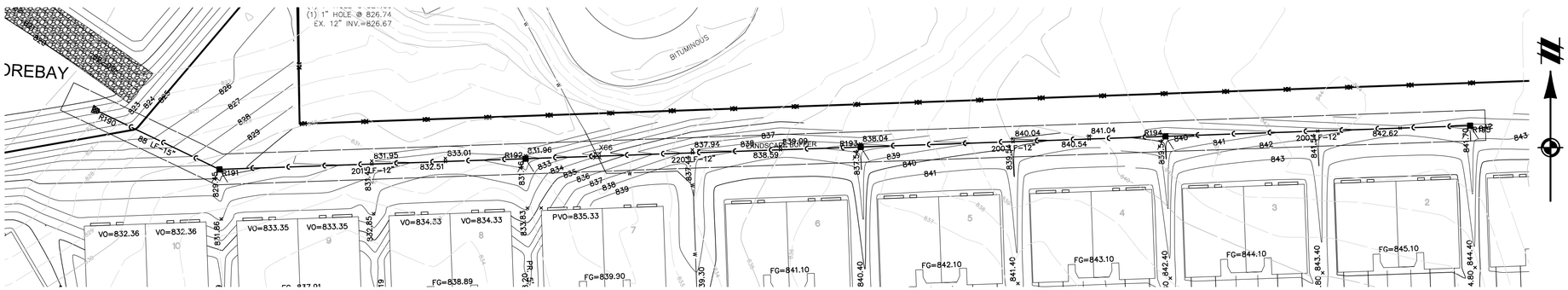


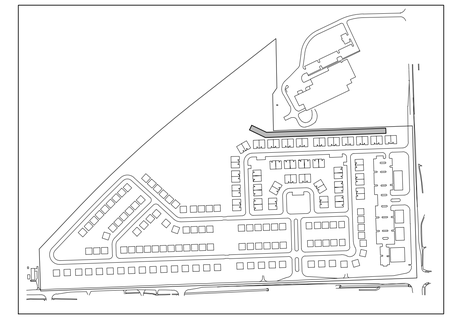

KEYMAP
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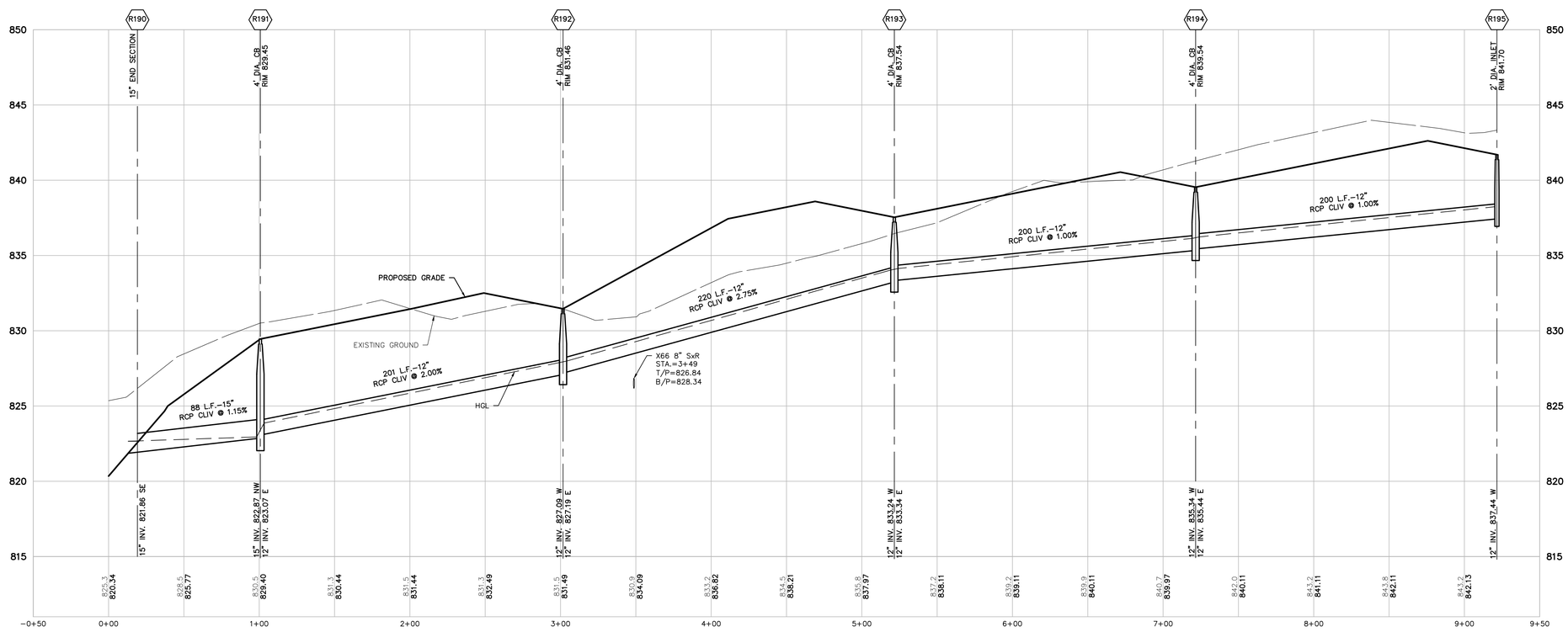


R190–R195
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

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STORMWATER PLAN AND PROFILE 20

DATE
NOVEMBER 5, 2015

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REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

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SHEET NO.
64

## W1 Determining Post-Development Cover Types, Areas, Curve Numbers and runoff coefficients

Total Contributing Drainage Area = 20.8 Acres

**Rational Method Variables**

| Cover Type | Soil Type | Area (sf) | Area (ac) | Runoff Coef | (c)(Area) |
|---|---|---|---|---|---|
| Paved Parking Lots, roofs, driveways | C | 339,684 | 7.8 | 0.95 | 322,700 |
| Water Surfaces | C | 65,340 | 1.5 | 1.00 | 65,340 |
| Developed Open Space, Good Condition | C | 500,201 | 11.5 | 0.35 | 175,070 |
| | | | | Total - Sum (c)(Area) = | 563,110 |
| | | | | Area Total (sf)= | 905,225 |
| | | | | Weighted C-Sum(c)(Area)/Sum(ac) or Sum(sf)= | **0.62** |

**NRCS Variables**

| Pervious Cover Type | Soil Type | Area (sf) | Area (ac) | Curve Number | (CN)(Area) |
|---|---|---|---|---|---|
| Developed Open Space, Good Condition | C | 500,201 | 11.5 | 71 | 35,514,271 |
| | | | 0.0 | | 0 |
| | | | 0.0 | | 0 |
| | Total - Sum (CN)(Area) = | | | | 35,514,271 |
| | Area Total - Sum(ac) of Sum(sf)= | | | | 500,201 |
| | Weighted CN-Sum(CN)(Area)/Sum(ac) or Sum(sf)= | | | | **71** |

| Impervious Cover Type | Soil Type | Area (sf) | Area (ac) | Curve Number | (CN)(Area) |
|---|---|---|---|---|---|
| Paved Parking Lots, roofs, driveways | C | 339,684 | 7.8 | 98 | 33,289,032 |
| Impervious, Ponds | C | 65,340 | 1.5 | 98 | 6,403,320 |
| | | | 0.0 | | 0 |
| | Total - Sum (CN)(Area) = | | | | 39,692,352 |
| | Area Total - Sum(ac) of Sum(sf)= | | | | 405,024 |
| | Weighted CN-Sum(CN)(Area)/Sum(ac) or Sum(sf)= | | | | **98** |

## W2 First Flush Runoff Calculations (Vff)

| | | | | |
|---|---|---|---|---|
| A. | Vff = (1") (1/12) (43560/1) (C) AC = | | **46,812** | cf |

## W3 Predevelopment Bankfull Runoff Calculations (Vbf-pre)

| | | | | |
|---|---|---|---|---|
| A. | 2 year/24 hour storm event | P = | 2.35 | in |
| B. | Pervious Cover CN *(pasture, grassland or range, fair)* | CN = | 71 | |
| C. | S = (1000/CN )-10 | S = | 4.08 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 0.42 | in |
| E. | Pervious Cover Area | Area = | 905,225 | sf |
| F. | $V_{bf\text{-}pre}$ = Q(1/12)Area | $V_{bf\text{-}pre}$ = | **31,562** | cf |

## W4 Pervious Cover Post-development Bankfull Runoff Calculations (Vbf-per-post)

| | | | | |
|---|---|---|---|---|
| A. | 2 year/24 hour storm event | P = | 2.35 | in |
| B. | Pervious Cover CN | CN = | 71 | |
| C. | S = (1000/CN )-10 | S = | 4.08 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 0.42 | in |
| E. | Pervious Cover Area | Area = | 500,201 | sf |
| F. | $V_{bf\text{-}per\text{-}post}$ = Q(1/12)Area | $V_{bf\text{-}per\text{-}post}$ = | **17,440** | cf |

## W5 Impervious Cover Post-development Bankfull Runoff Calculations (Vbf-imp-post)

| | | | | |
|---|---|---|---|---|
| A. | 2 year/24 hour storm event | P = | 2.35 | in |
| B. | Impervious Cover CN | CN = | 98 | |
| C. | S = (1000/CN )-10 | S = | 0.20 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 2.12 | in |
| E. | Pervious Cover Area | Area = | 405,024 | sf |
| F. | $V_{bf\text{-}imp\text{-}post}$ = Q(1/12)Area | $V_{bf\text{-}imp\text{-}post}$ = | **71,611** | cf |

## W6 Pervious Cover Post-development 100-year Storm Runoff Calculations (V100-per-post)

| | | | | |
|---|---|---|---|---|
| A. | 100 year storm event | P = | 5.11 | in |
| B. | Pervious Cover CN | CN = | 71 | |
| C. | S = (1000/CN )-10 | S = | 4.08 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 2.20 | in |
| E. | Pervious Cover Area | Area = | 500,201 | sf |
| F. | $V_{100\text{-}imp\text{-}post}$ = Q(1/12)Area | $V_{100\text{-}imp\text{-}post}$ = | **91,703** | cf |

## W7 Impervious Cover Post-development 100-year Storm Runoff Calculations (V100-imp-post)

| | | | | |
|---|---|---|---|---|
| A. | 100 year storm event | P = | 5.11 | in |
| B. | Pervious Cover CN | CN = | 98 | |
| C. | S = (1000/CN )-10 | S = | 0.20 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 4.87 | in |
| E. | Pervious Cover Area | Area = | 405,024 | sf |
| F. | $V_{100\text{-}imp\text{-}post}$ = Q(1/12)Area | $V_{100\text{-}imp\text{-}post}$ = | **164,474** | cf |

## W8 Determine Time of Concentration (Tc-hrs)

User specified; assume 15 minutes

Total Time of Concentration (hrs) = 0.25

## W9 Runoff Summary & Onsite Infiltration Requirement

A. Runoff Summary from Previous Worksheets

| | | | | |
|---|---|---|---|---|
| $V_{ff}$ = | **46,812** | cf* | | |
| $V_{bf\text{-}pre}$ = | 31,562 | cf | | |
| $V_{bf\text{-}per\text{-}post}$ = | 17,440 | cf | **Total BF Volume ($V_{bf\text{-}post}$)** | |
| $V_{bf\text{-}imp\text{-}post}$ = | 71,611 | cf | 89,051 | cf |
| $V_{100\text{-}per\text{-}post}$ = | 91,703 | cf | **Total 100-year Volume ($V_{100}$)** | |
| $V_{100\text{-}imp\text{-}post}$ = | 164,474 | cf | 256,177 | cf |

B. Determine Onsite Infiltration Requirement

| | | |
|---|---|---|
| $V_{bf\text{-}post}$ = | 89,051 | cf |
| $V_{bf\text{-}pre}$ = | 31,562 | cf |
| Bankfull Volume Difference = | **57,489** | **cf*** |

Onsite Infiltration Requirement ($V_{inf}$) = **57,489** cf

## W10 Detention / Retention Requirement

| | | | |
|---|---|---|---|
| A. | $Q_o$ = 238.6 ($T_c$) ^ -0.82 | 743.63 | cfs/in-mi^2 |
| B. | Total Site Area | 20.8 | ac |
| C. | $Q_{100}$ = $Q_{100\text{-}per}$ + $Q_{100\text{-}imp}$ | 7.07 | in |
| D. | Peak Flow (PF) = ($Q_o$*$Q_{100}$*A)/640 | 170.941 | cfs |
| E. | Delta = PF - 0.15A | 167.821 | cfs |
| F. | $V_{det}$ = (Delta/PF) x $V_{100}$ | **251,501** | cf |

## W11 Determine Applicable BMPs and Associated Volume Credits

| Proposed BMP | Area (ft²) | Storage Depth (ft) | Storage Volume (ft³) | Ave. Design Infil. Rate (in/hr) | Infil. During Storm (ft³) | Total Volume Reduction (ft³) |
|---|---|---|---|---|---|---|
| Infiltration Basin | 23,271 | 3.0 | 69,814 | 6.4 | 74,468 | 144,282 |

Total Volume Reduction Credit by Proposed Structural BMPs (Vinf) = **144,282** cf

| Proposed BMP | Ave. Design Infil. Rate (ft/hr)* | Volume Rate (cf/hr) | Estimated Drawdown Time (hrs) |
|---|---|---|---|
| Infiltration Basin | 0.5333 | 12,411 | 5.63 |

## W12 Infiltration / Detention Summary

| | | |
|---|---|---|
| Total Infiltration Required per WCWRC Rules: | 57,489 | cf |
| Total Infiltration Provided: | 144,282 | cf |
| Difference: | 86,793 | cf |
| % Deficiency: | 0.0% | |
| Pro-Rated 20% Detention Penalty: | **0.0%** | |
| Total Detention Required | 107,219 | cf |
| Total Detention Required w/ Pro-Rated Penalty | **107,219** | cf |

Basin Stage-Storage Summary:

| Elev. | Area | Avg. Area | Depth | Volume | |
|---|---|---|---|---|---|
| 825.0 | 79,435 | 76,276 | 1.0 | 359,258 | |
| 824.0 | 73,116 | 70,058 | 1.0 | 282,982 | |
| 823.0 | 66,999 | 64,030 | 1.0 | 212,925 | |
| 822.0 | 61,060 | 58,180 | 1.0 | 148,895 | |
| 821.0 | 55,300 | 52,523 | 1.0 | 90,715 | |
| 820.0 | 49,745 | 38,193 | 1.0 | 38,193 | Detention |
| 819.0 | 26,640 | | | 0 | Infiltration |
| 818.0 | 23,210 | | | 0 | |
| 817.0 | 19,964 | | | 0 | |

| | | |
|---|---|---|
| Total Detention Provided: | **359,258** | cf |
| Vff Elev.= | 820.16 | |
| Vbf Elev.= | 820.97 | |
| Vprovided Elev.= | 824.00 | (1' freeboard) |

### Forebay Sizing

Required Volume (Vfb)=0.05*V100 **12,809 cf**

Forebay Stage-Storage Summary:

| Elev. | Area | Avg. Area | Depth | Volume |
|---|---|---|---|---|
| 821.0 | 20,806 | 19,508 | 1.0 | 19,508 |
| 820.0 | 18,209 | | | |

### Outlet Control Structure Sizing

**1. Standpipe outlet holes sizing - "first flush" runoff**
*First Flush discharge should be released from in 24 hours*

| | | | | |
|---|---|---|---|---|
| Qff = Vff / 24 hrs / 3600 sec | Qff= | 0.542 | cfs | |
| hff(ave) = 2/3 x (Xff - Xo) | hff(ave) = | 0.109 | ft | |
| Aff(required) = Qff / 0.62 x sqrt(2*32.2*h) | A(required) = | 0.329 | sf | |
| Selected Orifice Diameter = | | **1.75** | **in** | |
| Area of each orifice = | | 0.017 | sf | |
| Number of orifice holes required = | = | **17** | **holes at elev.** | **820.00** |

*Check First Flush discharge release time*

| | | | |
|---|---|---|---|
| Aff(actual) = | 0.2840 | ft² | |
| Qff = A x 0.62 x sqrt(2*32.2*h) = | 0.4673 | cfs | |
| Tff = Vff / (Qff x 3600) | 27.8 | hrs | O.K. |

**2. Standpipe outlet holes sizing - "Bankfull flood" discharge**
*Bankfull should discharge within 36 to 48 hours*

*Check release from first flush holes only*

| | | | |
|---|---|---|---|
| hbf(ave) = 2/3 x (Xbf - Xo) | hbf(ave) = | 0.646 | ft |
| Qbf = A x 0.62 x sqrt(2*32.2*h) = | Qbf = | 1.135 | cfs |
| Tbf = Vbf / (Qbf x 3600) = | Tbf = | 21.8 | hrs |

*Add holes at to decrease storage time*

| | | | | |
|---|---|---|---|---|
| The first flush volume will discharge in Tff | = | 27.8 | hrs | |
| Additional volume between Xbf and Xff = Vbf - Vf | = | 42,239 | cf | |
| Target Bankfull Discharge Time = | | 36.0 | hrs | |
| Vbf = Target Discharge Time - Tff | = | 8.2 | hrs | |
| Qbf - Qff = (Vbf - Vff) / ((42-Tff) x 3600) | = | 1.44 | cfs | |
| Hff=(2/3)(Xbf-Xff)+(Xff-Xo) | = | 0.70 | ft | |
| $Q_1$=$A_{ff}$(.62)(SQRT(2gh) | = | 1.18 | cfs | |
| $V_1$=$T_{rem}Q_1$ | = | 34,798 | cf | |
| $V_2$=$V_{rem}$-$V_1$ | = | 7,441 | | |
| $Q_2$=$V_2/T_{rem}$ | = | 0.25 | cfs | |
| $H_{bf}$=(2/3)($X_{bf}$-$X_{ff}$) | = | 0.54 | | |
| $A_{bf}$(required) | = | 0.069 | sf | |
| Selected Orifice Diameter = | | **1** | **in** | |
| Area of each orifice = | | 0.0055 | sf | |
| Number of orifice holes required = | = | **0** | **holes at elev.** | **820.16** |

**3. Standpipe outlet holes sizing - "100-yr flood" discharge**

| | | | | |
|---|---|---|---|---|
| Q100 = Qa = 0.15 x Drainage Area | Q100 = | 3.120 | cfs | |
| Release from above holes | | | | |
| hff = (Xprovided-Xo) | hff = | 4.000 | ft | |
| hbf = (Xprovided-Xff) | hbf = | 3.836 | ft | |
| Q = A x 0.62 x sqrt(64.4*hff) + A x 0.62 x sqrt(64.4*hbf) = | | 2.826 | cfs | |
| Remaining flow = | Q100-Q= | 0.294 | cfs | |
| A = Q100 /( .62 x sqrt(2*32.2*h)) | A(required) = | 0.030 | sf | |
| Selected Orifice Diameter = | | **1** | **in** | |
| Area of each orifice = | | 0.0055 | sf | |
| Number of orifice holes required = | = | **5** | **holes at elev.** | **820.97** |

**4. Riser Outlet Pipe Design**
*Outlet pipe designed to handle the 100-year restricted flow*

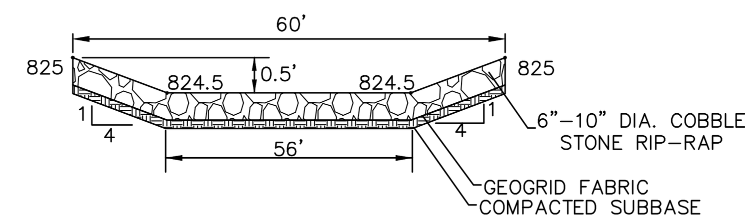
| | | | |
|---|---|---|---|
| 100-year restricted flow = | Q = | 3.12 | cfs |
| Choose outflow pipe diameter = | d = | **15** | **in** |
| Choose outflow pipe slope = | S = | **0.24** | **%** |
| Assume roughness factor | n = | 0.013 | |
| Flow velocity at 100-yr restricted flow (Mannings | V = | 2.58 | fps |
| Design Pipe Capacity = | = | 3.17 | cfs |

### Basin Overflow Weir

| | | | |
|---|---|---|---|
| Drainage Area, A = | 20.8 | ac | |
| C-Factor (C) = | 0.62 | | |
| Time of Conc. (T) = | 29.1 | min | |
| Intensity (I) | 5.08 | in/hr | I = 275/(T+25) |
| Design Flow (Q) = | 65.55 | cfs | C x I x A |
| Weir Coef (C)= | 3.367 | | |
| Invert of Weir = | **824.5** | ft | |
| Height of Weir (H) = | 0.5 | ft | |
| Min. Width of Weir (B) = | **55.1** | **ft** | |
| L = Q/(C x H^(3/2)) | | | |

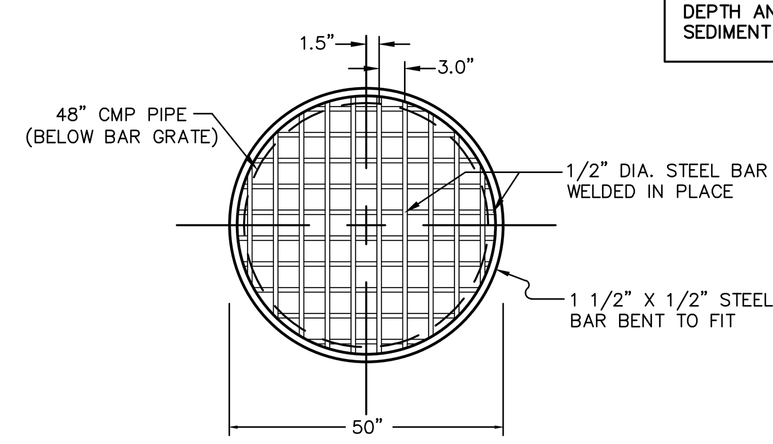
## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED ELEVATION
- PROPOSED SILT FENCE
- EXISTING CATCH BASIN/INLET
- EXISTING WETLAND
- PROPOSED RIP-RAP



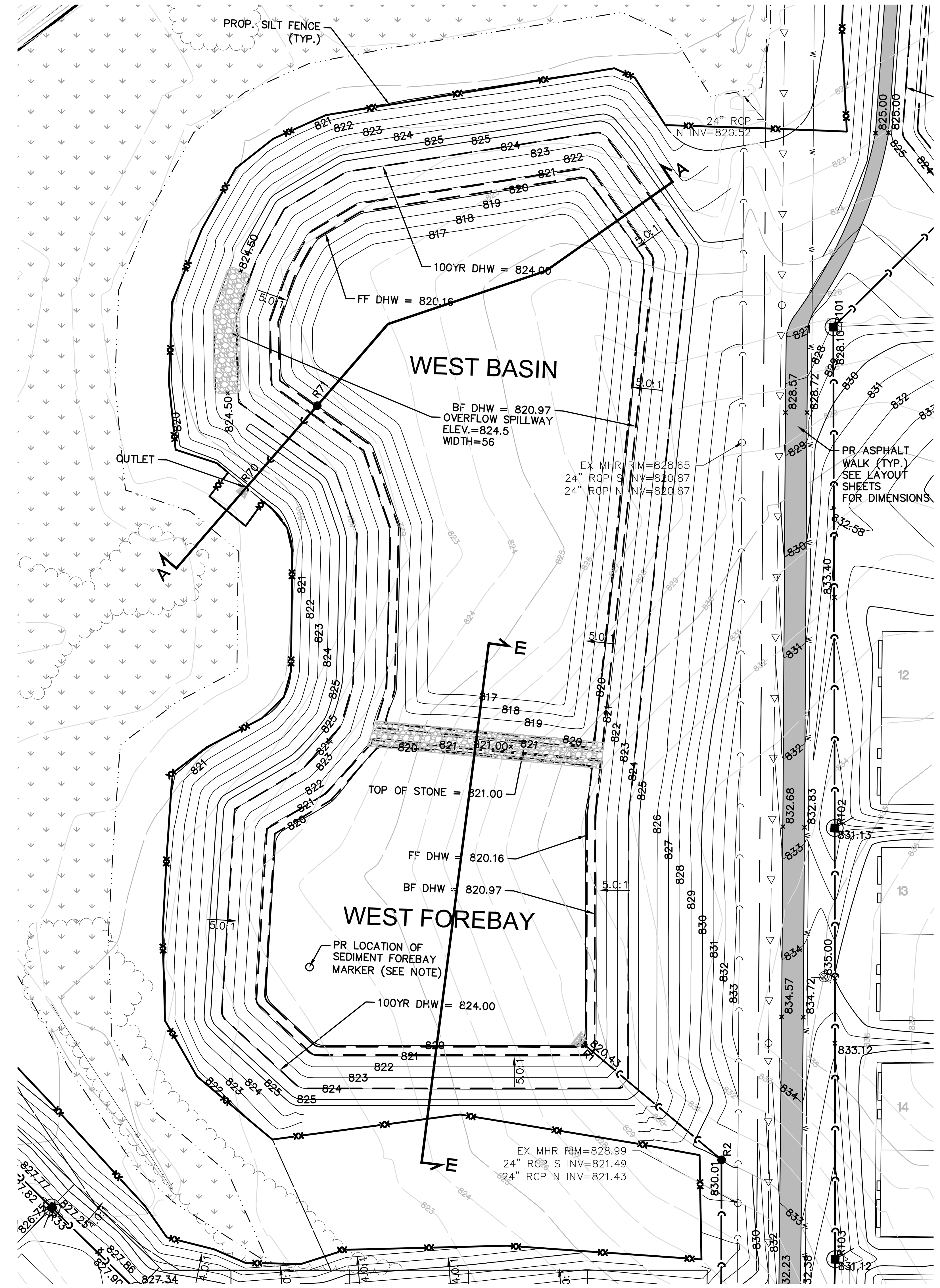

**ARMORED BASIN OVERFLOW WEIR**
NO SCALE

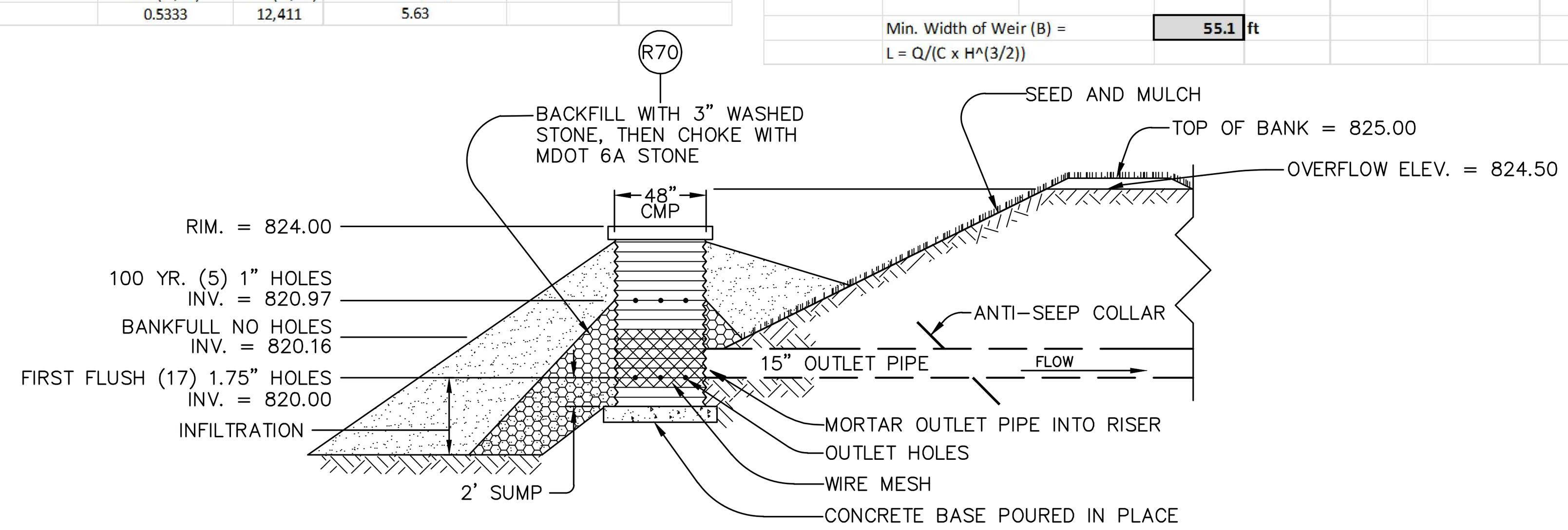
NOTE:
PROVIDE PERMANENT VERTICAL DEPTH MARKER (NON-CORROSIVE) TO MEASURE SEDIMENT DEPOSITION WITHIN FOREBAY. PLACE HORIZONTAL MARKING AT ELEV. 820.7 (LESSER OF 12-INCH DEPTH AND 5% STORAGE VOLUME) TO INDICATE SEDIMENT REMOVAL IS NECESSARY.



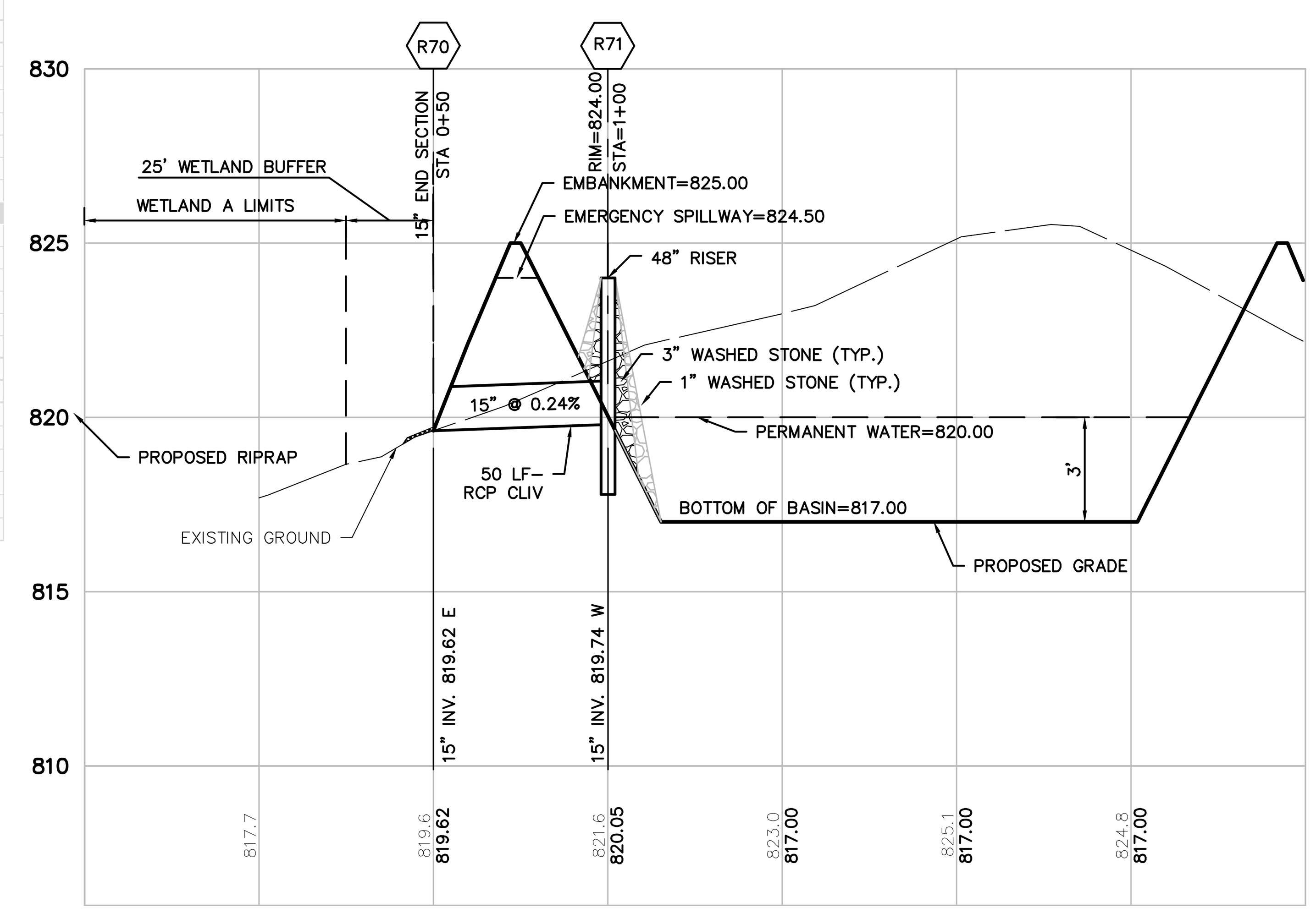

NOTE:
1. BAR GRATE IS TO BE REMOVABLE
2. APPROXIMATE WEIGHT OF GRATE IS 70 LBS.

**BAR GRATE DETAIL**
NO SCALE

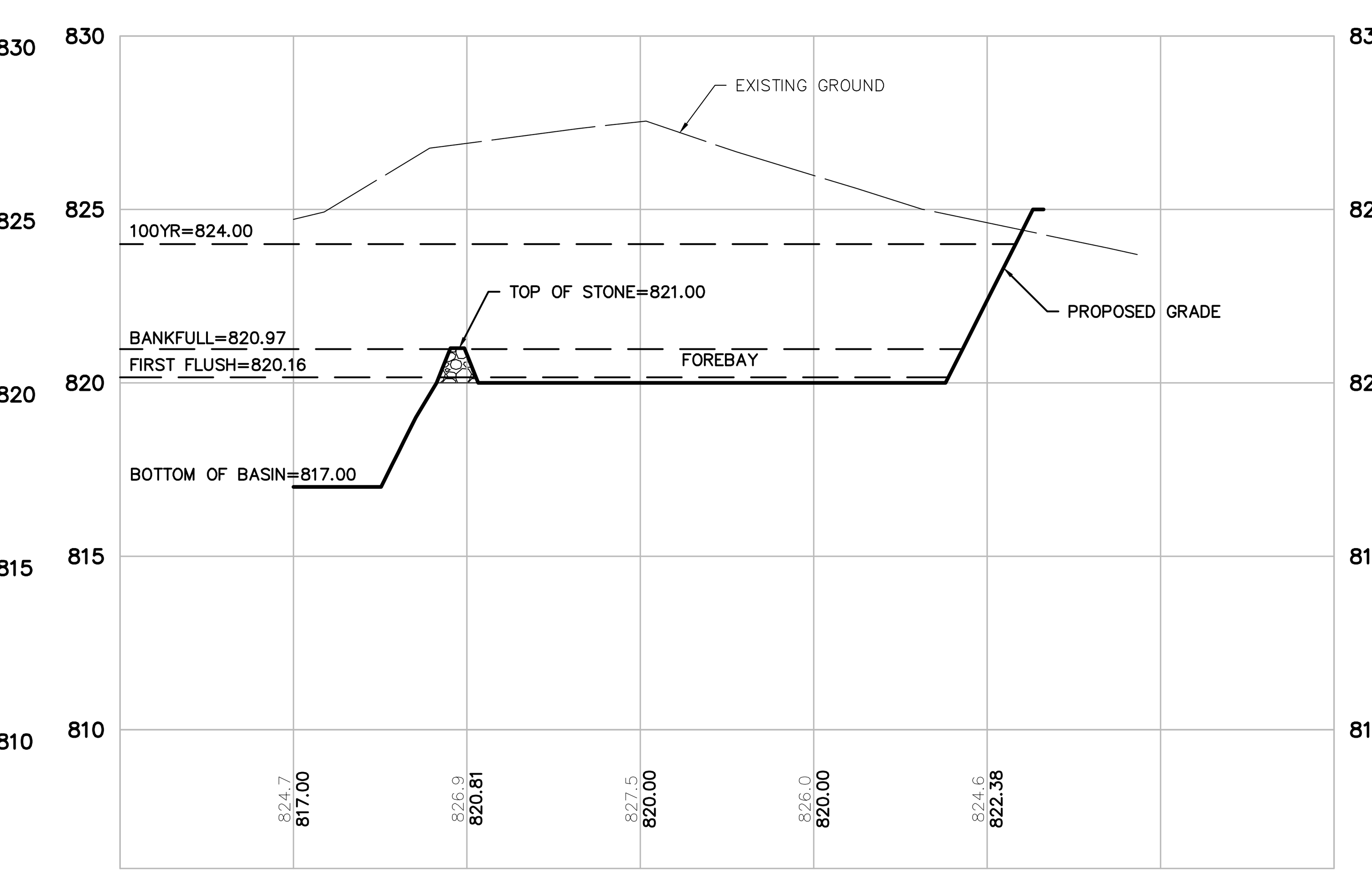



**WEST BASIN OUTLET SCHEMATIC**
NO SCALE




SECTION A-A
VERT: 1"=4'
HORZ: 1"=40'




SECTION E-E
VERT: 1"=4'
HORZ: 1"=40'

Know what's **below.** **Call** before you dig.

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER WEST
BASIN GRADING

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO.
65

K:\13001886\DWG\PLAN SETS\FINAL SITE PLAN\13001886SF-10-G.DWG 2/9/2016 3:00 PM MICHAEL NORCIA

## W1 Determining Post-Development Cover Types, Areas, Curve Numbers and runoff coefficients

Total Contributing Drainage Area = 28.7 Acres

**Rational Method Variables**

| Cover Type | Soil Type | Area (sf) | Area (ac) | Runoff Coef | (c)(Area) |
|---|---|---|---|---|---|
| Paved Parking Lots, roofs, driveways | C | 579,055 | 13.3 | 0.95 | 550,102 |
| Water Surfaces | C | 74,052 | 1.7 | 1.00 | 74,052 |
| Developed Open Space, Good Condition | C | 598,780 | 13.7 | 0.35 | 209,573 |
| Total - Sum (c)(Area) = | | | | | 833,727 |
| Area Total (sf)= | | | | | 1,251,887 |
| Weighted C-Sum(c)(Area)/Sum(ac) or Sum(sf)= | | | | | **0.67** |

**NRCS Variables**

| Pervious Cover Type | Soil Type | Area (sf) | Area (ac) | Curve Number | (CN)(Area) |
|---|---|---|---|---|---|
| Developed Open Space, Good Condition | C | 598,780 | 13.7 | 71 | 42,513,380 |
| | | | 0.0 | | 0 |
| | | | 0.0 | | 0 |
| Total - Sum (CN)(Area) = | | | | | 42,513,380 |
| Area Total - Sum(ac) of Sum(sf)= | | | | | 598,780 |
| Weighted CN-Sum(CN)(Area)/Sum(ac) or Sum(sf)= | | | | | **71** |

| Impervious Cover Type | Soil Type | Area (sf) | Area (ac) | Curve Number | (CN)(Area) |
|---|---|---|---|---|---|
| Paved Parking Lots, roofs, driveways | C | 579,055 | 13.3 | 98 | 56,747,390 |
| Impervious, Ponds | C | 74,052 | 1.7 | 98 | 7,257,096 |
| | | | 0.0 | | 0 |
| Total - Sum (CN)(Area) = | | | | | 64,004,486 |
| Area Total - Sum(ac) of Sum(sf)= | | | | | 653,107 |
| Weighted CN-Sum(CN)(Area)/Sum(ac) or Sum(sf)= | | | | | **98** |

## W2 First Flush Runoff Calculations (Vff)

| | | | | |
|---|---|---|---|---|
| A. | Vff = (1") (1/12) (43560/1) (C) AC = | | **69,801** | cf |

## W3 Predevelopment Bankfull Runoff Calculations (Vbf-pre)

| | | | | |
|---|---|---|---|---|
| A. | 2 year/24 hour storm event | P = | 2.35 | in |
| B. | Pervious Cover CN *(pasture, grassland or range, fair)* | CN = | 71 | |
| C. | S = (1000/CN )-10 | S = | 4.08 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 0.42 | in |
| E. | Pervious Cover Area | Area = | 1,251,887 | sf |
| F. | $V_{bf\text{-}pre}$ = Q(1/12)Area | $V_{bf\text{-}pre}$ = | **43,649** | cf |

## W4 Pervious Cover Post-development Bankfull Runoff Calculations (Vbf-per-post)

| | | | | |
|---|---|---|---|---|
| A. | 2 year/24 hour storm event | P = | 2.35 | in |
| B. | Pervious Cover CN | CN = | 71 | |
| C. | S = (1000/CN )-10 | S = | 4.08 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 0.42 | in |
| E. | Pervious Cover Area | Area = | 598,780 | sf |
| F. | $V_{bf\text{-}per\text{-}post}$ = Q(1/12)Area | $V_{bf\text{-}per\text{-}post}$ = | **20,877** | cf |

## W5 Impervious Cover Post-development Bankfull Runoff Calculations (Vbf-imp-post)

| | | | | |
|---|---|---|---|---|
| A. | 2 year/24 hour storm event | P = | 2.35 | in |
| B. | Impervious Cover CN | CN = | 98 | |
| C. | S = (1000/CN )-10 | S = | 0.20 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 2.12 | in |
| E. | Pervious Cover Area | Area = | 653,107 | sf |
| F. | $V_{bf\text{-}imp\text{-}post}$ = Q(1/12)Area | $V_{bf\text{-}imp\text{-}post}$ = | **115,473** | cf |

## W6 Pervious Cover Post-development 100-year Storm Runoff Calculations (V100-per-post)

| | | | | |
|---|---|---|---|---|
| A. | 100 year storm event | P = | 5.11 | in |
| B. | Pervious Cover CN | CN = | 71 | |
| C. | S = (1000/CN )-10 | S = | 4.08 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 2.20 | in |
| E. | Pervious Cover Area | Area = | 598,780 | sf |
| F. | $V_{100\text{-}imp\text{-}post}$ = Q(1/12)Area | $V_{100\text{-}imp\text{-}post}$ = | **109,776** | cf |

## W7 Impervious Cover Post-development 100-year Storm Runoff Calculations (V100-imp-post)

| | | | | |
|---|---|---|---|---|
| A. | 100 year storm event | P = | 5.11 | in |
| B. | Pervious Cover CN | CN = | 98 | |
| C. | S = (1000/CN )-10 | S = | 0.20 | in |
| D. | Q = (P-0.2S)^2/(P+0.8S) | Q = | 4.87 | in |
| E. | Pervious Cover Area | Area = | 653,107 | sf |
| F. | $V_{100\text{-}imp\text{-}post}$ = Q(1/12)Area | $V_{100\text{-}imp\text{-}post}$ = | **265,216** | cf |

## W8 Determine Time of Concentration (Tc-hrs)

User specified; assume 15 minutes

Total Time of Concentration (hrs) = 0.25

## W9 Runoff Summary & Onsite Infiltration Requirement

A. Runoff Summary from Previous Worksheets

| | | | | |
|---|---|---|---|---|
| $V_{ff}$ = | **69,801** | cf* | | |
| $V_{bf\text{-}pre}$ = | 43,649 | cf | | |
| $V_{bf\text{-}per\text{-}post}$ = | 20,877 | cf | **Total BF Volume ($V_{bf\text{-}post}$)** | |
| $V_{bf\text{-}imp\text{-}post}$ = | 115,473 | cf | 136,351 | cf |
| $V_{100\text{-}per\text{-}post}$ = | 109,776 | cf | **Total 100-year Volume ($V_{100}$)** | |
| $V_{100\text{-}imp\text{-}post}$ = | 265,216 | cf | 374,992 | cf |

B. Determine Onsite Infiltration Requirement

| | | |
|---|---|---|
| $V_{bf\text{-}post}$ = | 136,351 | cf |
| $V_{bf\text{-}pre}$ = | 43,649 | cf |
| Bankfull Volume Difference = | **92,702** | cf* |

Onsite Infiltration Requirement ($V_{inf}$) = **92,702** cf

## W10 Detention / Retention Requirement

| | | | |
|---|---|---|---|
| A. | $Q_p$ = 238.6 ($T_c$) ^ -0.82 | 743.63 | cfs/in-mi^2 |
| B. | Total Site Area | 28.7 | ac |
| C. | $Q_{100} = Q_{100\text{-}per} + Q_{100\text{-}imp}$ | 7.07 | in |
| D. | Peak Flow (PF) = ($Q_p$*$Q_{100}$*A)/640 | 235.866 | cfs |
| E. | Delta = PF - 0.15A | 231.561 | cfs |
| F. | $V_{det}$ = (Delta/PF) x $V_{100}$ - $V_{inf}$* | **368,148** | cf |

* $V_{inf}$ refers to total infiltration provided per worksheet W11

## W11 Determine Applicable BMPs and Associated Volume Credits

| Proposed BMP | Area (ft²) | Storage Depth (ft) | Storage Volume (ft³) | Ave. Design Infil. Rate (in/hr) | Infil. During Storm (ft³) | Total Volume Reduction (ft³) |
|---|---|---|---|---|---|---|
| Infiltration Basin | 29,353 | 2.0 | 58,706 | 23.5 * | 344,898 | 403,604 |

Total Volume Reduction Credit by Proposed Structural BMPs (Vinf) = **403,604** cf

* Per Geotechnical investigation, includes a factor of safety of 2. Another factor of safety of 2 added due to high rate.

| Proposed BMP | Ave. Design Infil. Rate (ft/hr)* | Volume Rate (cf/hr) | Estimated Drawdown Time (hrs) |
|---|---|---|---|
| Infiltration Basin | 1.9583 | 57,483 | 1.02 |

## W12 Infiltration / Detention Summary

| | | |
|---|---|---|
| Total Infiltration Required per WCWRC Rules: | 92,702 | cf |
| Total Infiltration Provided: | 403,604 | cf |
| Difference: | 310,902 | cf |
| % Deficiency: | 0.0% | |
| Pro-Rated 20% Detention Penalty: | **0.0%** | |
| Total Detention Required | 0 | cf |
| Total Detention Required w/ Pro-Rated Penalty | **0** | cf |

Basin Stage-Storage Summary:

| Elev. | Area | Avg. Area | Depth | Volume | |
|---|---|---|---|---|---|
| 825.0 | 70,815 | 68,311 | 1.0 | 293,125 | |
| 824.0 | 65,807 | 63,436 | 1.0 | 224,814 | |
| 823.0 | 61,065 | 51,687 | 1.0 | 161,378 | |
| 822.0 | 42,308 | 40,346 | 1.0 | 109,691 | |
| 821.0 | 38,384 | 36,506 | 1.0 | 69,345 | |
| 820.0 | 34,628 | 32,839 | 1.0 | 32,839 | Detention |
| 819.0 | 31,050 | 0 | 0.0 | | Infiltration |
| 818.0 | 27,656 | 0 | 0.0 | | |

| | | |
|---|---|---|
| Total Detention Provided: | **293,125** | cf |
| Vff Elev.= | 821.01 | |
| Vbf Elev.= | 822.66 | |
| Vprovided Elev.= | 824.00 | (1' freeboard) |

### Forebay Sizing

Required Volume (Vfb)=0.05*V100 **18,750 cf**

Forebay Stage-Storage Summary:

| Elev. | Area | Avg. Area | Depth | Volume |
|---|---|---|---|---|
| 822.0 | 13,093 | 11,878 | 1.0 | 21,428 |
| 821.0 | 10,662 | 9,550 | 1.0 | 9,550 |
| 820.0 | 8,438 | | | |

Vfb Elev.= 821.77

### Outlet Control Structure Sizing

**1. Standpipe outlet holes sizing - "first flush" runoff**
*First Flush discharge should be released from in 24 hours*

| | | | | |
|---|---|---|---|---|
| Qff = Vff / 24 hrs / 3600 sec | Qff= | 0.808 | cfs | |
| hff(ave) = 2/3 x (Xff - Xo) | hff(ave) = | 0.675 | ft | |
| Aff(required) = Qff / 0.62 x sqrt(2*32.2*h) | A(required) = | 0.198 | sf | |
| Selected Orifice Diameter = | | **1.75** | in | |
| Area of each orifice = | | 0.017 | sf | |
| Number of orifice holes required = | | **11** | holes at elev. | 820.00 |

*Check First Flush discharge release time*

| | | | |
|---|---|---|---|
| Aff(actual) = | 0.1837 | ft² | |
| Qff = A x 0.62 x sqrt(2*32.2*h) = | 0.7511 | cfs | |
| Tff = Vff / (Qff x 3600) | 25.8 | hrs | O.K. |

**2. Standpipe outlet holes sizing - "Bankfull flood" discharge**
*Bankfull should discharge within 36 to 48 hours*

*Check release from first flush holes only*

| | | | |
|---|---|---|---|
| hbf(ave) = 2/3 x (Xbf - Xo) | hbf(ave) = | 1.774 | ft |
| Qbf = A x 0.62 x sqrt(2*32.2*h) = | Qbf = | 1.218 | cfs |
| Tbf = Vbf / (Qbf x 3600) = | Tbf = | 31.1 | hrs |

*Add holes at to decrease storage time*

| | | | | |
|---|---|---|---|---|
| The first flush volume will discharge in Tff | = | 25.8 | hrs | |
| Additional volume between Xbf and Xff = Vbf - Vff | = | 66,550 | cf | |
| Target Bankfull Discharge Time = | | 42.0 | hrs | |
| Vbf = Target Discharge Time - Tff | = | 16.2 | hrs | |
| Qbf - Qff = (Vbf - Vff) / ((42-Tff) x 3600) | = | 1.14 | cfs | |
| Hff=(2/3)(Xbf-Xff)+(Xff-Xo) | = | 2.11 | ft | |
| $Q_1$=$A_{ff}$(.62)(SQRT(2gh) | = | 1.33 | cfs | |
| $V_1$=$T_{rem}Q_1$ | = | 77,406 | cf | |
| $V_2$=$V_{rem}$-$V_1$ | = | (10,856) | | |
| $Q_2$=$V_2$/$T_{rem}$ | = | (0.19) | cfs | |
| $H_{bf}$=(2/3)($X_{bf}$-$X_{ff}$) | = | 1.10 | | |
| $A_{bf}$(required) | = | (0.036) | sf | |
| Selected Orifice Diameter = | | **0.75** | in | |
| Area of each orifice = | | 0.0031 | sf | |
| Number of orifice holes required = | = | **0** | holes at elev. | 821.01 |

**3. Standpipe outlet holes sizing - "100-yr flood" discharge**

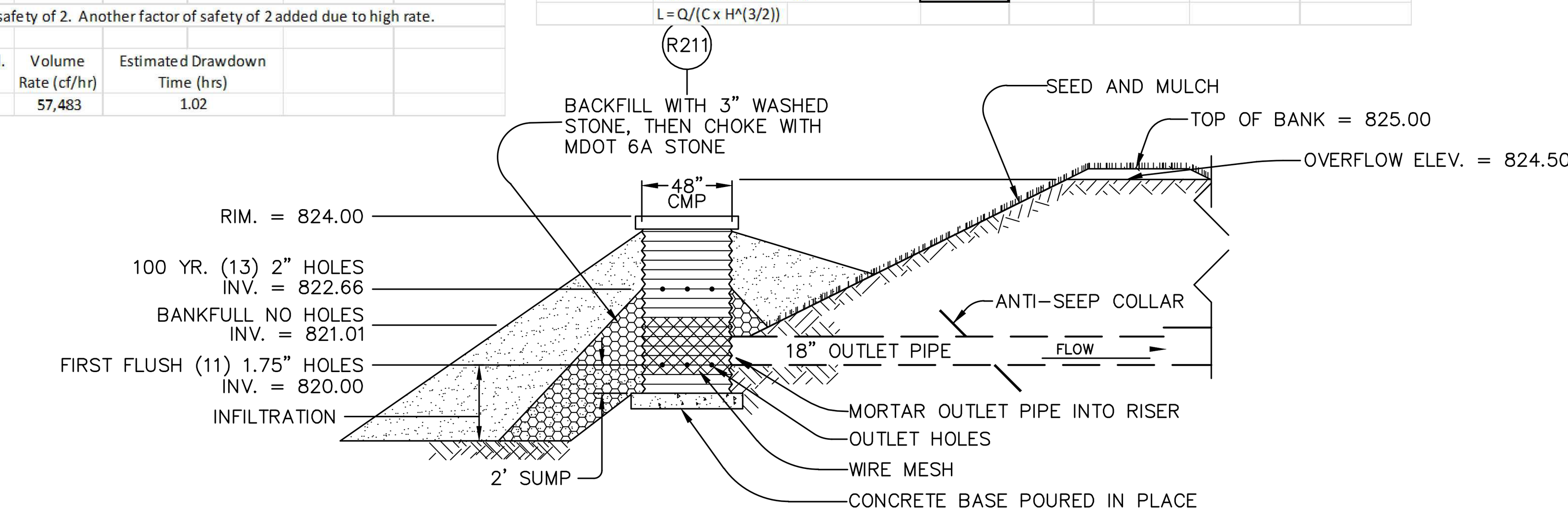
| | | | | |
|---|---|---|---|---|
| Q100 = Qa | Q100 = | 4.305 | cfs | |
| Release from above holes | | | | |
| hff = ( X100-Xo) | hff = | 4.000 | ft | |
| hbf = (X100-Xff) | hbf = | 2.988 | ft | |
| Q = A x 0.62 x sqrt(64.4*hff) + A x 0.62 x sqrt(64.4*hbf) = | | 1.828 | cfs | |
| Remaining flow = | Q100-Q= | 2.477 | cfs | |
| A = Q100 /( .62 x sqrt(2*32.2*h)) | A(required) = | 0.288 | sf | |
| Selected Orifice Diameter = | | **2** | in | |
| Area of each orifice = | | 0.0218 | sf | |
| Number of orifice holes required = | = | **13** | holes at elev. | 822.66 |

**4. Riser Outlet Pipe Design**
*Outlet pipe designed to handle the 100-year restricted flow*

| | | | |
|---|---|---|---|
| 100-year restricted flow = | Q = | 4.31 | cfs |
| Choose outflow pipe diameter = | d = | **18** | in |
| Choose outflow pipe slope = | S = | **0.18** | % |
| Assume roughness factor | n = | 0.013 | |
| Flow velocity at 100-yr restricted flow (Mannings) = | V = | 2.52 | fps |
| Design Pipe Capacity = | = | 4.46 | cfs |

### Basin Overflow Weir

| | | | |
|---|---|---|---|
| Drainage Area, A = | 28.7 | | |
| C-Factor (C) = | 0.67 | | |
| Time of Conc. (T) = | 31 | min | |
| Intensity (I) | 4.91 | in/hr | I = 275/(T+25) |
| Design Flow (Q) = | 94.43 | cfs | C x I x A |
| Weir Coef (C)= | 3.367 | | |
| Invert of Weir = | **824.5** | | |
| Height of Weir (H) = | 0.5 | | |
| Min. Width of Weir (B) = | **79.3** | ft | |
| L = Q/(C x H^(3/2)) | | | |

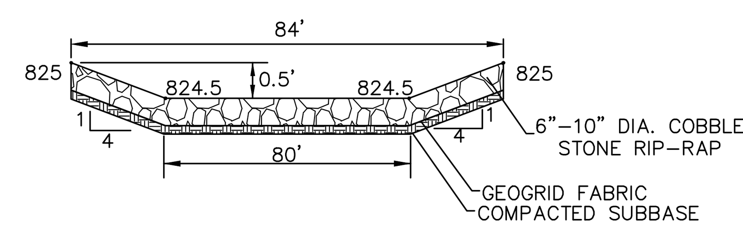



**EAST BASIN OUTLET SCHEMATIC**
NO SCALE

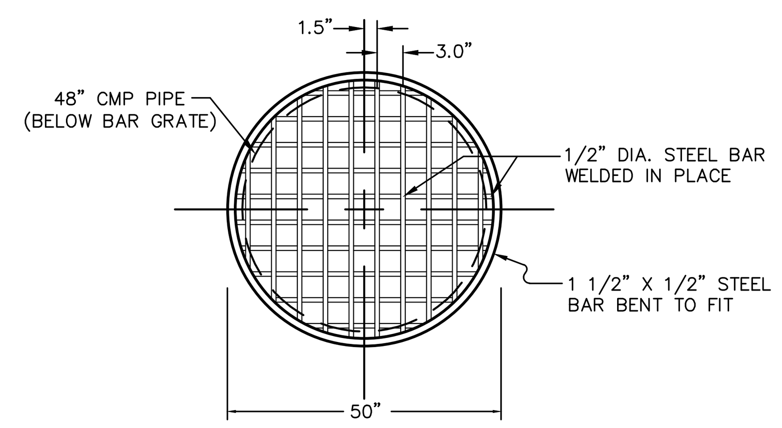
### LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED ELEVATION
- PROPOSED SILT FENCE
- EXISTING CATCH BASIN/INLET
- EXISTING WETLAND
- PROPOSED RIP-RAP

NOTE:
PROVIDE PERMANENT VERTICAL DEPTH MARKER (NON-CORROSIVE) TO MEASURE SEDIMENT DEPOSITION WITHIN FOREBAY. PLACE HORIZONTAL MARKING AT EL 821.0 (LESSER OF 12-INCHES AND FOREBAY VOLUME ELEVATION) TO INDICATE SEDIMENT REMOVAL IS NECESSARY.

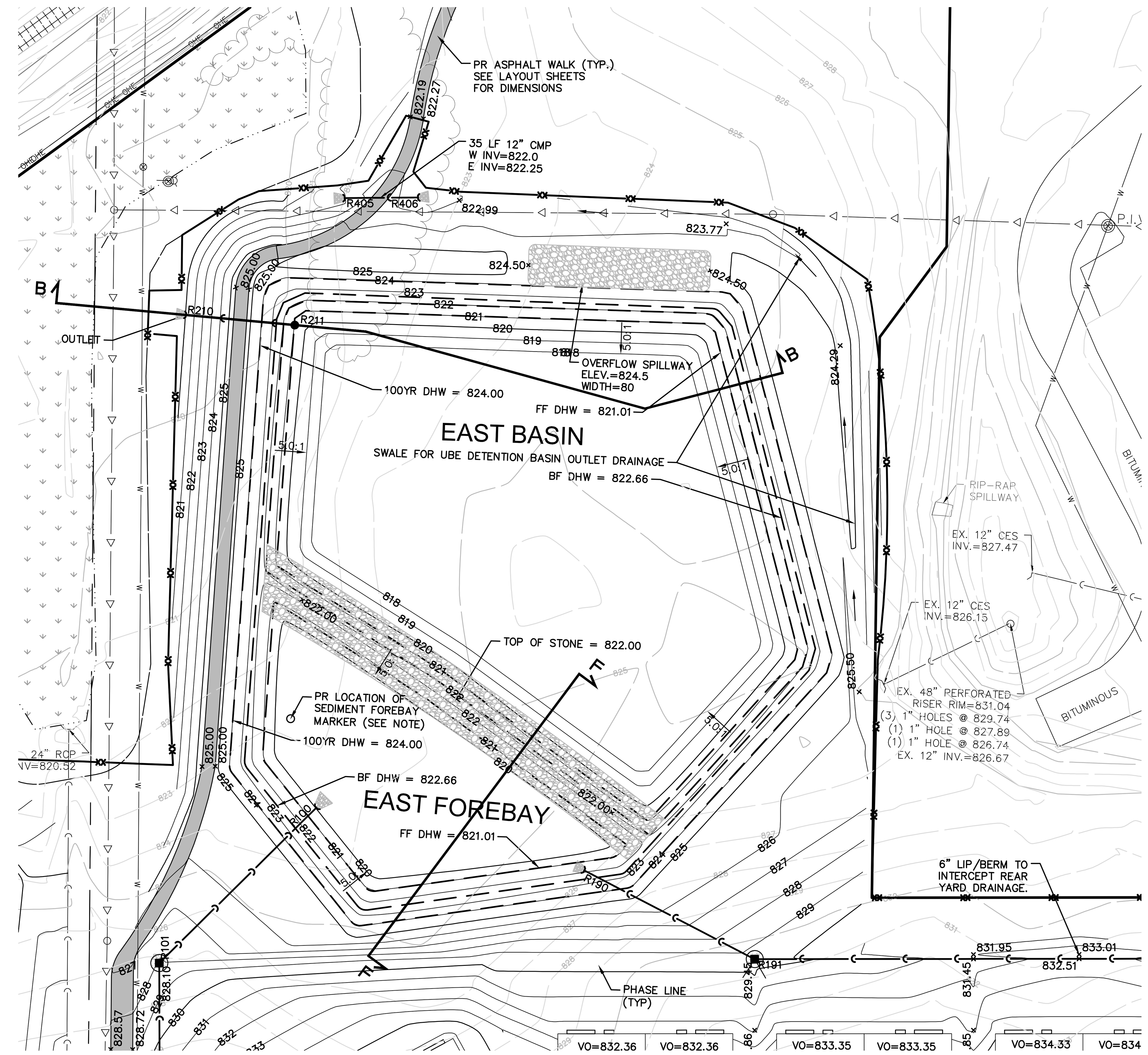


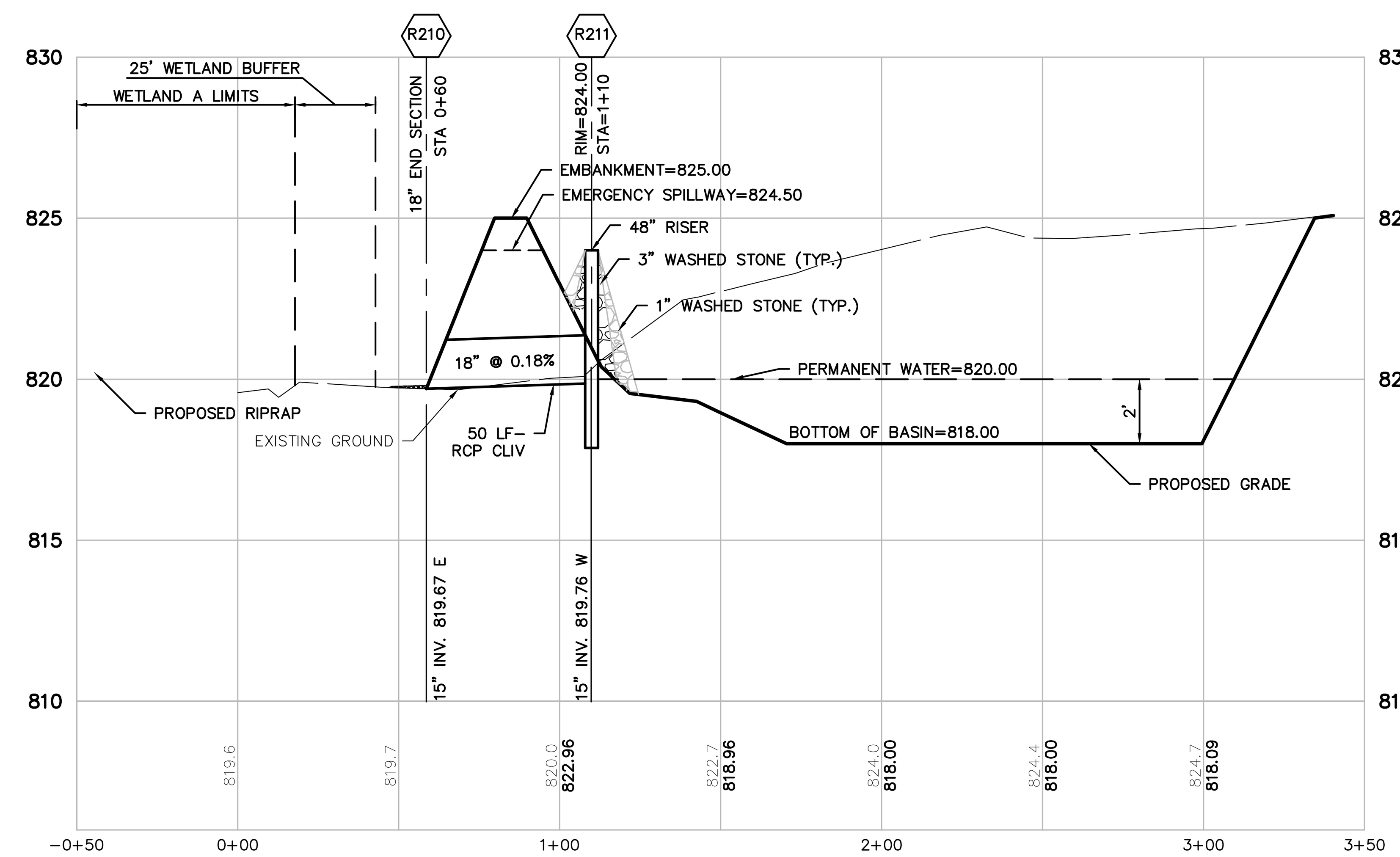

**ARMORED BASIN OVERFLOW WEIR**
NO SCALE



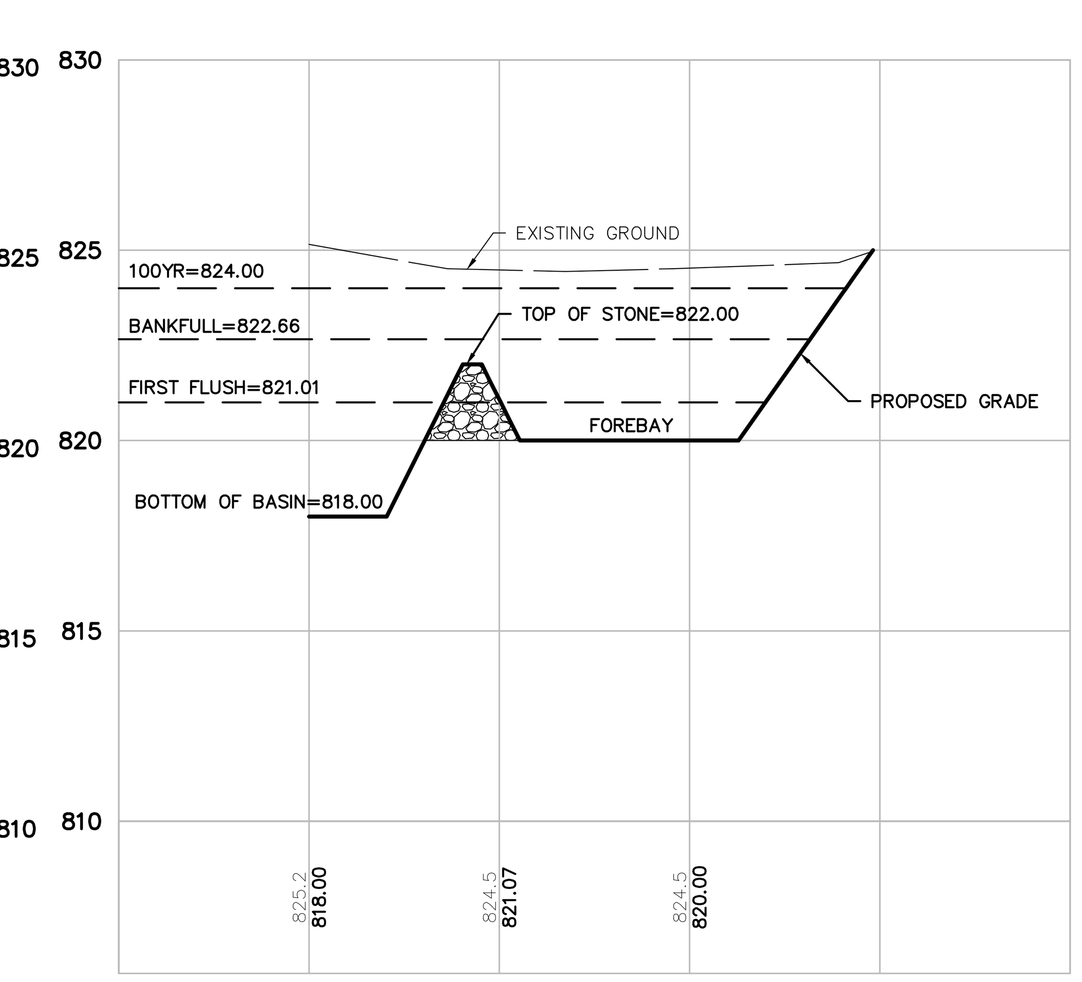

NOTE:
1. BAR GRATE IS TO BE REMOVABLE
2. APPROXIMATE WEIGHT OF GRATE IS 70 LBS.

**BAR GRATE DETAIL**
NO SCALE




SECTION B-B
VERT: 1"=4'
HORZ: 1"=40'




SECTION F-F
VERT: 1"=4'
HORZ: 1"=40'

Know what's **below.** **Call** before you dig.

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER EAST
BASIN GRADING

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

DR. SK | CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. **66**

K:\13001886\DWG\PLAN SETS\FINAL SITE PLAN\13001886SF-10-G.DWG 2/9/2016 3:00 PM MICHAEL NORCIA

# STORMWATER SEWER CONVEYANCE SYSTEM DESIGN

## WEST BASIN

I = B/(T+D)^E B = 175.0 D = 25.0 E = 1
C = varies
T = 20 (min.)

| FROM MH INPUT | TO MH | INCRE-MENT ACRES (A) | C | EQUIV. AREA 100% ACRES CA | TOTAL AREA 100% ACRES SUM CA | T TIME (MIN.) | I (IN PER HOUR) | Q=CIA C.F.S. FLOW | CAPAC-ITY OF SEWER (C.F.S.) | DIAM. OF PIPE (IN.) | LENGTH OF LINE (FT.) | SLOPE OF PIPE (%) | MIN HG BASED ON "Q" (%) | HG FOR 3.0 FPS GIVEN "D" (%) | ACTUAL HG (%) | VEL. FLOW FULL (FT./SEC.) | TIME OF FLOW (MIN.) | H.G.L. ELEV. UPPER END | H.G.L. ELEV. LOWER END | GROUND ELEV. UPPER END | GROUND ELEV. LOWER END | INVERT ELEV. UPPER END | INVERT ELEV. LOWER END |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WEST STORM WATER BASIN | | | | | | | | | | | | | | | | | | | | | | | |
| R66 | R65 | 0.93 | 0.69 | 0.65 | 0.65 | 20.00 | 3.89 | 2.52 | 3.65 | 15 | 25 | 0.32 | 0.15 | 0.32 | 0.32 | 3.0 | 0.1 | 823.23 | 823.15 | 826.30 | 826.24 | 822.18 | 822.10 |
| R65 | R32 | 1.02 | 0.68 | 0.70 | 1.34 | 20.10 | 3.88 | 5.21 | 5.25 | 18 | 108 | 0.25 | 0.25 | 0.25 | 0.25 | 3.0 | 0.6 | 823.15 | 822.88 | 826.24 | 826.86 | 821.90 | 821.62 |
| R63 | R62 | 0.66 | 0.61 | 0.40 | 0.40 | 20.00 | 3.89 | 1.57 | 9.33 | 24 | 25 | 0.17 | 0.00 | 0.17 | 0.17 | 3.0 | 0.1 | 823.97 | 823.93 | 826.93 | 826.87 | 822.37 | 822.33 |
| R62 | R61 | 0.74 | 0.67 | 0.50 | 0.90 | 20.10 | 3.88 | 3.49 | 9.33 | 24 | 37 | 0.17 | 0.02 | 0.17 | 0.17 | 3.0 | 0.2 | 823.83 | 823.77 | 826.87 | 827.88 | 822.23 | 822.17 |
| R61 | R60 | 0.11 | 0.64 | 0.07 | 0.97 | 20.30 | 3.86 | 3.73 | 9.33 | 24 | 25 | 0.17 | 0.03 | 0.17 | 0.17 | 3.0 | 0.1 | 823.67 | 823.62 | 827.88 | 827.82 | 822.07 | 822.02 |
| R60 | R38 | 0.14 | 0.74 | 0.10 | 1.07 | 20.40 | 3.85 | 4.13 | 9.33 | 24 | 96 | 0.17 | 0.03 | 0.17 | 0.17 | 3.0 | 0.5 | 823.54 | 823.37 | 827.82 | 828.78 | 821.92 | 821.76 |
| R59 | R23 | 0.21 | 0.29 | 0.06 | 0.06 | 20.00 | 3.89 | 0.24 | 5.25 | 18 | 64 | 0.25 | 0.00 | 0.25 | 0.25 | 3.0 | 0.4 | 823.76 | 823.60 | 826.84 | 828.36 | 822.56 | 822.40 |
| R55 | R54 | 0.36 | 0.81 | 0.29 | 0.29 | 20.00 | 3.89 | 1.14 | 2.36 | 12 | 25 | 0.44 | 0.10 | 0.44 | 0.44 | 3.0 | 0.1 | 827.22 | 827.11 | 830.49 | 830.43 | 826.42 | 826.31 |
| R54 | R52 | 0.15 | 0.75 | 0.11 | 0.40 | 20.10 | 3.88 | 1.57 | 2.36 | 12 | 76 | 0.44 | 0.19 | 0.44 | 0.44 | 3.0 | 0.4 | 827.01 | 826.68 | 830.43 | 830.29 | 826.21 | 825.88 |
| R52 | R37 | 0.00 | 0.00 | 0.00 | 0.40 | 20.50 | 3.85 | 1.57 | 4.85 | 12 | 74 | 1.85 | 0.19 | 0.44 | 0.44 | 6.2 | 0.2 | 826.58 | 825.20 | 830.29 | 828.67 | 825.78 | 824.40 |
| R50 | R49 | 0.68 | 0.68 | 0.46 | 0.46 | 20.00 | 3.89 | 1.78 | 2.36 | 12 | 25 | 0.44 | 0.25 | 0.44 | 0.44 | 3.0 | 0.1 | 829.67 | 829.56 | 832.87 | 832.93 | 828.87 | 828.76 |
| R49 | R46 | 0.36 | 0.69 | 0.25 | 0.71 | 20.10 | 3.88 | 2.75 | 4.06 | 12 | 206 | 1.30 | 0.59 | 0.44 | 0.59 | 5.2 | 0.7 | 829.36 | 826.68 | 832.93 | 830.09 | 828.56 | 825.88 |
| R45 | R44 | 0.13 | 0.44 | 0.06 | 0.06 | 20.00 | 3.89 | 0.22 | 6.17 | 12 | 56 | 3.00 | 0.00 | 0.44 | 0.44 | 7.9 | 0.1 | 827.10 | 825.51 | 833.07 | 828.70 | 826.30 | 824.60 |
| R48 | R47 | 0.44 | 0.69 | 0.30 | 0.30 | 20.00 | 3.89 | 1.18 | 3.65 | 15 | 25 | 0.32 | 0.03 | 0.32 | 0.32 | 3.0 | 0.1 | 827.21 | 827.13 | 830.33 | 830.39 | 826.21 | 826.13 |
| R47 | R46 | 0.66 | 0.66 | 0.43 | 0.74 | 20.10 | 3.88 | 2.86 | 5.25 | 18 | 119 | 0.25 | 0.07 | 0.25 | 0.25 | 3.0 | 0.7 | 826.98 | 826.68 | 830.39 | 830.09 | 825.78 | 825.48 |
| R46 | R44 | 0.60 | 0.36 | 0.22 | 1.66 | 20.80 | 3.82 | 6.36 | 6.64 | 18 | 69 | 0.40 | 0.37 | 0.25 | 0.37 | 3.8 | 0.3 | 825.76 | 825.51 | 830.09 | 828.70 | 824.58 | 824.30 |
| R44 | R43 | 0.34 | 0.39 | 0.13 | 1.85 | 21.10 | 3.80 | 7.04 | 9.33 | 24 | 114 | 0.17 | 0.10 | 0.17 | 0.17 | 3.0 | 0.6 | 825.51 | 825.31 | 828.70 | 829.91 | 823.90 | 823.71 |
| R43 | R42 | 0.33 | 0.40 | 0.13 | 1.98 | 21.70 | 3.75 | 7.44 | 9.33 | 24 | 110 | 0.17 | 0.11 | 0.17 | 0.17 | 3.0 | 0.6 | 825.22 | 825.03 | 829.91 | 830.24 | 823.61 | 823.42 |
| R42 | R41 | 0.18 | 0.43 | 0.08 | 2.06 | 22.30 | 3.70 | 7.63 | 9.33 | 24 | 55 | 0.17 | 0.11 | 0.17 | 0.17 | 3.0 | 0.3 | 825.03 | 824.93 | 830.24 | 829.14 | 823.42 | 823.33 |
| R41 | R40A | 0.27 | 0.37 | 0.10 | 2.16 | 22.60 | 3.68 | 7.94 | 9.33 | 24 | 55 | 0.17 | 0.12 | 0.17 | 0.17 | 3.0 | 0.3 | 824.93 | 824.84 | 829.14 | 828.04 | 823.33 | 823.23 |
| R40A | R40 | 0.17 | 0.53 | 0.09 | 2.25 | 22.90 | 3.65 | 8.23 | 9.33 | 24 | 55 | 0.17 | 0.13 | 0.17 | 0.17 | 3.0 | 0.3 | 824.84 | 824.74 | 828.04 | 828.18 | 823.23 | 823.14 |
| R40 | R39 | 0.25 | 0.45 | 0.11 | 2.36 | 23.20 | 3.63 | 8.58 | 9.33 | 24 | 84 | 0.17 | 0.14 | 0.17 | 0.17 | 3.0 | 0.5 | 824.74 | 824.60 | 828.18 | 828.84 | 823.14 | 823.00 |
| R39 | R38 | 0.12 | 0.64 | 0.08 | 2.44 | 23.70 | 3.59 | 8.78 | 13.38 | 24 | 25 | 0.35 | 0.15 | 0.17 | 0.17 | 4.3 | 0.1 | 823.41 | 823.37 | 828.84 | 828.78 | 821.85 | 821.76 |
| R38 | R37 | 0.15 | 0.73 | 0.11 | 3.62 | 23.80 | 3.59 | 13.00 | 21.09 | 36 | 57 | 0.10 | 0.04 | 0.10 | 0.10 | 3.0 | 0.3 | 823.37 | 823.31 | 828.78 | 828.67 | 820.96 | 820.90 |
| R37 | R36 | 0.00 | 0.00 | 0.00 | 4.03 | 24.10 | 3.56 | 14.36 | 21.09 | 36 | 86 | 0.10 | 0.05 | 0.10 | 0.10 | 3.0 | 0.5 | 823.31 | 823.22 | 828.67 | 828.66 | 820.90 | 820.82 |
| R36 | R35 | 0.03 | 0.25 | 0.01 | 4.04 | 24.60 | 3.53 | 14.36 | 21.09 | 36 | 68 | 0.10 | 0.05 | 0.10 | 0.10 | 3.0 | 0.4 | 823.22 | 823.16 | 828.66 | 827.40 | 820.82 | 820.75 |
| R35 | R34 | 0.11 | 0.47 | 0.05 | 4.09 | 25.00 | 3.50 | 14.31 | 21.09 | 36 | 110 | 0.10 | 0.05 | 0.10 | 0.10 | 3.0 | 0.6 | 823.16 | 823.04 | 827.40 | 826.68 | 820.75 | 820.64 |
| R34 | R333 | 0.16 | 0.45 | 0.07 | 4.16 | 25.60 | 3.46 | 14.39 | 21.09 | 36 | 55 | 0.10 | 0.05 | 0.10 | 0.10 | 3.0 | 0.3 | 823.04 | 822.99 | 826.68 | 826.68 | 820.64 | 820.58 |
| R333 | R33 | 0.08 | 0.45 | 0.04 | 4.20 | 25.90 | 3.44 | 14.43 | 21.09 | 36 | 55 | 0.10 | 0.05 | 0.10 | 0.10 | 3.0 | 0.3 | 822.99 | 822.93 | 826.68 | 826.75 | 820.58 | 820.53 |
| R33 | R32 | 0.08 | 0.45 | 0.04 | 4.23 | 26.20 | 3.42 | 14.47 | 21.09 | 36 | 55 | 0.10 | 0.05 | 0.10 | 0.10 | 3.0 | 0.3 | 822.93 | 822.88 | 826.75 | 826.86 | 820.53 | 820.47 |
| R32 | R31 | 0.04 | 0.47 | 0.02 | 5.60 | 26.50 | 3.40 | 19.01 | 21.09 | 36 | 44 | 0.10 | 0.08 | 0.10 | 0.10 | 3.0 | 0.2 | 822.88 | 822.83 | 826.86 | 825.98 | 820.47 | 820.43 |
| R31 | R30 | 0.21 | 0.48 | 0.10 | 5.70 | 26.70 | 3.38 | 19.28 | 21.09 | 36 | 110 | 0.10 | 0.08 | 0.10 | 0.10 | 3.0 | 0.6 | 822.83 | 822.72 | 825.98 | 828.36 | 820.43 | 820.32 |
| R30 | R3 | 0.14 | 0.49 | 0.07 | 5.76 | 27.30 | 3.35 | 19.29 | 21.09 | 36 | 117 | 0.10 | 0.08 | 0.10 | 0.10 | 3.0 | 0.7 | 822.72 | 822.60 | 828.36 | 829.40 | 820.32 | 820.20 |
| R27 | R26 | 0.13 | 0.50 | 0.07 | 0.07 | 20.00 | 3.89 | 0.25 | 2.36 | 12 | 55 | 0.44 | 0.01 | 0.44 | 0.44 | 3.0 | 0.3 | 824.43 | 824.19 | 827.66 | 827.49 | 823.63 | 823.39 |
| R26 | R23 | 0.27 | 0.34 | 0.09 | 0.16 | 20.30 | 3.86 | 0.61 | 2.36 | 12 | 89 | 0.44 | 0.03 | 0.44 | 0.44 | 3.0 | 0.5 | 824.09 | 823.70 | 827.49 | 828.36 | 823.29 | 822.90 |
| R25 | R24 | 0.18 | 0.43 | 0.08 | 0.08 | 20.00 | 3.89 | 0.30 | 3.98 | 12 | 110 | 1.25 | 0.01 | 0.44 | 0.44 | 5.1 | 0.4 | 827.97 | 826.60 | 831.25 | 829.85 | 827.17 | 825.80 |
| R24 | R23 | 0.26 | 0.41 | 0.11 | 0.18 | 20.40 | 3.85 | 0.70 | 6.17 | 12 | 110 | 3.00 | 0.04 | 0.44 | 0.44 | 7.9 | 0.2 | 826.60 | 823.46 | 829.85 | 828.36 | 825.80 | 822.50 |
| R23 | R22 | 0.18 | 0.39 | 0.07 | 0.47 | 20.60 | 3.84 | 1.81 | 5.25 | 18 | 110 | 0.25 | 0.03 | 0.25 | 0.25 | 3.0 | 0.6 | 823.46 | 823.18 | 828.36 | 826.16 | 822.00 | 821.72 |
| R22 | R211 | 0.34 | 0.42 | 0.14 | 0.61 | 21.20 | 3.79 | 2.32 | 9.33 | 24 | 55 | 0.17 | 0.01 | 0.17 | 0.17 | 3.0 | 0.3 | 823.18 | 823.09 | 826.16 | 826.00 | 821.22 | 821.13 |
| R211 | R21 | 0.18 | 0.39 | 0.07 | 0.68 | 21.50 | 3.76 | 2.56 | 9.33 | 24 | 60 | 0.17 | 0.01 | 0.17 | 0.17 | 3.0 | 0.3 | 823.09 | 822.98 | 826.00 | 825.64 | 821.13 | 821.03 |
| R21 | R20 | 0.39 | 0.42 | 0.16 | 0.84 | 21.80 | 3.74 | 3.15 | 21.09 | 36 | 115 | 0.10 | 0.00 | 0.10 | 0.10 | 3.0 | 0.6 | 822.98 | 822.87 | 825.64 | 827.64 | 820.58 | 820.46 |
| R20 | R6 | 0.16 | 0.45 | 0.07 | 0.92 | 22.40 | 3.69 | 3.38 | 21.09 | 36 | 106 | 0.10 | 0.00 | 0.10 | 0.10 | 3.0 | 0.6 | 822.87 | 822.76 | 827.64 | 826.57 | 820.46 | 820.36 |
| R18 | R9 | 1.00 | 0.55 | 0.55 | 0.55 | 20.00 | 3.89 | 2.15 | 3.65 | 15 | 38 | 0.32 | 0.11 | 0.32 | 0.32 | 3.0 | 0.2 | 823.36 | 823.24 | 826.39 | 826.61 | 822.22 | 822.10 |
| R17 | R16 | 0.34 | 0.37 | 0.12 | 0.12 | 20.00 | 3.89 | 0.48 | 2.36 | 12 | 150 | 0.44 | 0.02 | 0.44 | 0.44 | 3.0 | 0.8 | 828.33 | 827.67 | 831.59 | 833.20 | 827.53 | 826.87 |
| R16 | R15 | 0.24 | 0.38 | 0.09 | 0.22 | 20.80 | 3.82 | 0.83 | 2.36 | 12 | 150 | 0.44 | 0.05 | 0.44 | 0.44 | 3.0 | 0.8 | 827.67 | 827.01 | 833.20 | 834.70 | 826.87 | 826.21 |
| R15 | R14 | 0.19 | 0.47 | 0.09 | 0.31 | 21.60 | 3.76 | 1.15 | 2.36 | 12 | 150 | 0.44 | 0.10 | 0.44 | 0.44 | 3.0 | 0.8 | 827.01 | 826.35 | 834.70 | 834.70 | 826.21 | 825.55 |
| R14 | R13 | 0.25 | 0.38 | 0.09 | 0.40 | 22.40 | 3.69 | 1.48 | 2.36 | 12 | 150 | 0.44 | 0.17 | 0.44 | 0.44 | 3.0 | 0.8 | 826.35 | 825.69 | 834.70 | 835.13 | 825.55 | 824.89 |
| R13 | R12 | 0.15 | 0.36 | 0.05 | 0.45 | 23.20 | 3.63 | 1.64 | 2.36 | 12 | 150 | 0.44 | 0.21 | 0.44 | 0.44 | 3.0 | 0.8 | 825.69 | 825.03 | 835.13 | 832.13 | 824.89 | 824.23 |
| R12 | R11 | 0.25 | 0.38 | 0.09 | 0.55 | 24.00 | 3.57 | 1.96 | 2.36 | 12 | 150 | 0.44 | 0.30 | 0.44 | 0.44 | 3.0 | 0.8 | 825.03 | 824.37 | 832.13 | 829.13 | 824.23 | 823.57 |
| R11 | R10 | 0.28 | 0.39 | 0.11 | 0.66 | 24.80 | 3.51 | 2.32 | 2.36 | 12 | 150 | 0.44 | 0.42 | 0.44 | 0.44 | 3.0 | 0.8 | 824.37 | 823.71 | 829.13 | 827.22 | 823.57 | 822.91 |
| R10 | R9 | 0.26 | 0.38 | 0.10 | 0.76 | 25.60 | 3.46 | 2.62 | 3.65 | 15 | 81 | 0.32 | 0.16 | 0.32 | 0.32 | 3.0 | 0.5 | 823.71 | 823.45 | 827.22 | 826.61 | 822.71 | 822.45 |
| R9 | R8 | 0.16 | 0.41 | 0.07 | 1.37 | 26.10 | 3.42 | 4.71 | 5.25 | 18 | 112 | 0.25 | 0.20 | 0.25 | 0.25 | 3.0 | 0.6 | 823.24 | 822.95 | 826.61 | 827.15 | 821.90 | 821.62 |
| R8 | R7 | 1.23 | 0.69 | 0.84 | 2.22 | 26.70 | 3.38 | 7.50 | 11.08 | 24 | 25 | 0.24 | 0.11 | 0.17 | 0.17 | 3.5 | 0.1 | 822.95 | 822.91 | 827.15 | 827.21 | 821.37 | 821.31 |
| R7 | R6 | 1.23 | 0.72 | 0.89 | 3.11 | 26.80 | 3.38 | 10.49 | 21.09 | 36 | 122 | 0.10 | 0.02 | 0.10 | 0.10 | 3.0 | 0.7 | 822.88 | 822.76 | 827.21 | 826.57 | 821.06 | 820.94 |
| R6 | R3 | 0.57 | 0.32 | 0.18 | 4.21 | 27.50 | 3.33 | 14.02 | 21.09 | 36 | 254 | 0.10 | 0.04 | 0.10 | 0.10 | 3.0 | 1.4 | 822.76 | 822.50 | 826.57 | 829.40 | 820.36 | 820.10 |
| R3 | R2 | 0.11 | 0.39 | 0.04 | 10.01 | 28.90 | 3.25 | 32.51 | 38.00 | 48 | 66 | 0.07 | 0.05 | 0.07 | 0.07 | 3.0 | 0.4 | 821.07 | 821.03 | 829.40 | 830.01 | 820.10 | 820.06 |
| R2 | R1 | 0.00 | 0.00 | 0.00 | 10.01 | 29.30 | 3.22 | 32.51 | 38.00 | 48 | 83 | 0.07 | 0.05 | 0.07 | 0.07 | 3.0 | 0.5 | 821.03 | 820.97 | 830.01 | 824.75 | 820.06 | 820.00 |

ELLIPTICAL 29"x45" (EQUIVALENT 36" ROUND) TO BE INSTALLED TO REDUCE COVER ON WATER MAIN (SEE SHEET 45)

## TEXTILE ROAD FRONTAGE

I = B/(T+D)^E B = 175.0 D = 25.0 E = 1
C = varies
T = 20 (min.)

| FROM MH INPUT | TO MH | INCRE-MENT ACRES (A) | C | EQUIV. AREA 100% ACRES CA | TOTAL AREA 100% ACRES SUM CA | T TIME (MIN.) | I (IN PER HOUR) | Q=CIA C.F.S. FLOW | CAPAC-ITY OF SEWER (C.F.S.) | DIAM. OF PIPE (IN.) | LENGTH OF LINE (FT.) | SLOPE OF PIPE (%) | MIN HG BASED ON "Q" (%) | HG FOR 3.0 FPS GIVEN "D" (%) | ACTUAL HG (%) | VEL. FLOW FULL (FT./SEC.) | TIME OF FLOW (MIN.) | H.G.L. ELEV. UPPER END | H.G.L. ELEV. LOWER END | GROUND ELEV. UPPER END | GROUND ELEV. LOWER END | INVERT ELEV. UPPER END | INVERT ELEV. LOWER END |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FRONTAGE | | | | | | | | | | | | | | | | | | | | | | | |
| R303 | R301 | 1.27 | 0.66 | 0.84 | 0.84 | 20.00 | 3.89 | 3.27 | 3.65 | 15 | 50 | 0.32 | 0.26 | 0.32 | 0.32 | 3.0 | 0.3 | 827.37 | 827.21 | 828.70 | 829.54 | 825.87 | 825.71 |
| R302 | R301 | 0.36 | 0.65 | 0.23 | 0.23 | 20.00 | 3.89 | 0.91 | 2.36 | 12 | 109 | 0.44 | 0.07 | 0.44 | 0.44 | 3.0 | 0.6 | 827.69 | 827.21 | 828.75 | 829.54 | 826.19 | 825.71 |
| R301 | EXR1 | 0.00 | 0.00 | 0.00 | 1.07 | 20.60 | 3.84 | 4.12 | 5.25 | 18 | 20 | 0.25 | 0.15 | 0.25 | 0.25 | 3.0 | 0.1 | 827.21 | 827.16 | 829.54 | 826.73 | 825.71 | 825.66 |
| R306 | R305 | 0.00 | 0.00 | 0.00 | 0.00 | 20.00 | 3.89 | 0.00 | 6.55 | 12 | 50 | 3.38 | 0.00 | 0.44 | 0.44 | 8.3 | 0.1 | 843.25 | 841.64 | 843.96 | 846.16 | 842.45 | 840.76 |
| R305 | R304 | 0.00 | 0.00 | 0.00 | 0.00 | 20.10 | 3.88 | 0.00 | 2.52 | 12 | 186 | 0.50 | 0.00 | 0.44 | 0.44 | 3.2 | 1.0 | 841.64 | 840.83 | 846.16 | 841.08 | 840.76 | 839.83 |
| R309 | R308 | 0.00 | 0.00 | 0.00 | 0.00 | 20.00 | 3.89 | 0.00 | 2.36 | 12 | 29 | 0.44 | 0.00 | 0.44 | 0.44 | 3.0 | 0.2 | 844.71 | 844.58 | 846.19 | 846.19 | 843.71 | 843.58 |
| R308 | R307 | 0.00 | 0.00 | 0.00 | 0.00 | 20.20 | 3.87 | 0.00 | 2.36 | 12 | 18 | 0.44 | 0.00 | 0.44 | 0.44 | 3.0 | 0.1 | 844.58 | 844.50 | 846.19 | 844.75 | 843.58 | 843.50 |

## EAST BASIN

I = B/(T+D)^E B = 175.0 D = 25.0 E = 1
C = varies
T = 20 (min.)

| FROM MH INPUT | TO MH | INCRE-MENT ACRES (A) | C | EQUIV. AREA 100% ACRES CA | TOTAL AREA 100% ACRES SUM CA | T TIME (MIN.) | I (IN PER HOUR) | Q=CIA C.F.S. FLOW | CAPAC-ITY OF SEWER (C.F.S.) | DIAM. OF PIPE (IN.) | LENGTH OF LINE (FT.) | SLOPE OF PIPE (%) | MIN HG BASED ON "Q" (%) | HG FOR 3.0 FPS GIVEN "D" (%) | ACTUAL HG (%) | VEL. FLOW FULL (FT./SEC.) | TIME OF FLOW (MIN.) | H.G.L. ELEV. UPPER END | H.G.L. ELEV. LOWER END | GROUND ELEV. UPPER END | GROUND ELEV. LOWER END | INVERT ELEV. UPPER END | INVERT ELEV. LOWER END |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EAST STORM BASIN 1 | | | | | | | | | | | | | | | | | | | | | | | |
| R195 | R194 | 0.39 | 0.40 | 0.16 | 0.16 | 20.00 | 3.89 | 0.61 | 3.56 | 12 | 200 | 1.00 | 0.03 | 0.44 | 0.44 | 4.5 | 0.7 | 838.24 | 836.24 | 841.70 | 839.54 | 837.44 | 835.44 |
| R194 | R193 | 0.47 | 0.41 | 0.20 | 0.35 | 20.70 | 3.83 | 1.34 | 3.56 | 12 | 200 | 1.00 | 0.14 | 0.44 | 0.44 | 4.5 | 0.7 | 836.14 | 834.14 | 839.54 | 837.54 | 835.34 | 833.34 |
| R193 | R192 | 0.45 | 0.42 | 0.19 | 0.54 | 21.40 | 3.77 | 2.04 | 5.91 | 12 | 220 | 2.75 | 0.33 | 0.44 | 0.44 | 7.5 | 0.5 | 834.04 | 827.99 | 837.54 | 831.46 | 833.24 | 827.19 |
| R192 | R191 | 0.39 | 0.45 | 0.18 | 0.72 | 21.90 | 3.73 | 2.68 | 5.04 | 12 | 201 | 2.00 | 0.56 | 0.44 | 0.56 | 6.4 | 0.5 | 827.89 | 823.87 | 831.46 | 829.45 | 827.09 | 823.07 |
| R191 | R190 | 0.34 | 0.47 | 0.16 | 0.88 | 22.40 | 3.69 | 3.25 | 6.93 | 15 | 88 | 1.15 | 0.25 | 0.32 | 0.32 | 5.6 | 0.3 | 822.95 | 822.66 | 829.45 | 824.92 | 822.87 | 821.86 |
| EAST STORM BASIN 2 | | | | | | | | | | | | | | | | | | | | | | | |
| R197 | R196 | 0.44 | 0.77 | 0.34 | 0.34 | 20.00 | 3.89 | 1.31 | 2.36 | 12 | 25 | 0.44 | 0.13 | 0.44 | 0.44 | 3.0 | 0.1 | 838.67 | 838.56 | 841.91 | 841.97 | 837.87 | 837.76 |
| R196 | R163 | 0.24 | 0.65 | 0.15 | 0.49 | 20.10 | 3.88 | 1.90 | 6.17 | 12 | 18 | 3.00 | 0.28 | 0.44 | 0.44 | 7.9 | 0.0 | 837.79 | 837.71 | 841.97 | 840.92 | 837.45 | 836.91 |
| R189 | R188 | 0.35 | 0.59 | 0.20 | 0.20 | 20.00 | 3.89 | 0.80 | 2.36 | 12 | 25 | 0.44 | 0.05 | 0.44 | 0.44 | 3.0 | 0.1 | 833.50 | 833.39 | 836.78 | 836.72 | 832.70 | 832.59 |
| R188 | R153 | 0.13 | 0.58 | 0.07 | 0.28 | 20.10 | 3.88 | 1.08 | 2.36 | 12 | 15 | 0.44 | 0.09 | 0.44 | 0.44 | 3.0 | 0.1 | 833.29 | 833.22 | 836.72 | 837.31 | 832.49 | 832.42 |
| R199 | R198 | 0.17 | 0.75 | 0.12 | 0.12 | 20.00 | 3.89 | 0.48 | 2.36 | 12 | 25 | 0.44 | 0.02 | 0.44 | 0.44 | 3.0 | 0.1 | 836.52 | 836.41 | 839.95 | 839.89 | 835.72 | 835.61 |
| R198 | R183A | 0.11 | 0.79 | 0.08 | 0.21 | 20.10 | 3.88 | 0.80 | 2.36 | 12 | 26 | 0.44 | 0.05 | 0.44 | 0.44 | 3.0 | 0.1 | 836.31 | 836.19 | 839.89 | 840.89 | 835.51 | 835.39 |
| R187 | R186 | 0.27 | 0.60 | 0.16 | 0.16 | 20.00 | 3.89 | 0.63 | 3.56 | 12 | 25 | 1.00 | 0.03 | 0.44 | 0.44 | 4.5 | 0.1 | 837.44 | 837.33 | 841.03 | 841.00 | 836.78 | 836.53 |
| R186 | R185 | 0.12 | 0.63 | 0.07 | 0.24 | 20.10 | 3.88 | 0.91 | 5.04 | 12 | 54 | 2.00 | 0.07 | 0.44 | 0.44 | 6.4 | 0.1 | 837.23 | 836.15 | 841.00 | 839.68 | 836.43 | 835.35 |
| R185 | R184 | 0.52 | 0.75 | 0.39 | 0.63 | 20.20 | 3.87 | 2.43 | 2.64 | 12 | 25 | 0.55 | 0.47 | 0.44 | 0.47 | 3.4 | 0.1 | 836.03 | 835.91 | 839.68 | 839.74 | 835.25 | 835.11 |
| R184 | R183A | 0.35 | 0.57 | 0.20 | 0.83 | 20.30 | 3.86 | 3.20 | 5.59 | 12 | 39 | 2.46 | 0.81 | 0.44 | 0.81 | 7.1 | 0.1 | 835.16 | 834.84 | 839.74 | 840.89 | 835.01 | 834.04 |
| R183A | R183 | 0.00 | 0.00 | 0.00 | 1.04 | 20.40 | 3.85 | 3.99 | 4.06 | 12 | 127 | 1.30 | 1.25 | 0.44 | 1.25 | 5.2 | 0.4 | 833.74 | 832.15 | 840.89 | 839.97 | 832.99 | 831.35 |
| R183 | R182 | 0.31 | 0.75 | 0.23 | 1.27 | 20.80 | 3.82 | 4.83 | 6.17 | 12 | 25 | 3.00 | 1.84 | 0.44 | 1.84 | 7.9 | 0.1 | 831.76 | 831.30 | 839.97 | 839.91 | 831.25 | 830.50 |
| R182 | R181 | 0.48 | 0.72 | 0.35 | 1.61 | 20.90 | 3.81 | 6.14 | 6.17 | 12 | 17 | 3.00 | 2.97 | 0.44 | 2.97 | 7.9 | 0.0 | 831.19 | 830.68 | 839.91 | 840.56 | 830.40 | 829.88 |
| R181 | R154 | 0.00 | 0.00 | 0.00 | 1.61 | 20.90 | 3.81 | 6.14 | 6.46 | 15 | 109 | 1.00 | 0.90 | 0.32 | 0.90 | 5.3 | 0.3 | 830.57 | 829.59 | 840.56 | 838.15 | 829.68 | 828.59 |
| R180 | R179 | 0.90 | 0.49 | 0.44 | 0.44 | 20.00 | 3.89 | 1.71 | 2.36 | 12 | 25 | 0.44 | 0.23 | 0.44 | 0.44 | 3.0 | 0.1 | 830.63 | 830.52 | 833.86 | 833.92 | 829.83 | 829.72 |
| R179 | 176A | 0.64 | 0.39 | 0.25 | 0.69 | 20.10 | 3.88 | 2.66 | 2.67 | 12 | 40 | 0.56 | 0.56 | 0.44 | 0.56 | 3.4 | 0.2 | 830.42 | 830.19 | 833.92 | 834.67 | 829.62 | 829.39 |
| 176A | R176 | 0.00 | 0.00 | 0.00 | 0.69 | 20.30 | 3.86 | 2.66 | 2.67 | 12 | 78 | 0.56 | 0.56 | 0.44 | 0.56 | 3.4 | 0.4 | 830.09 | 829.66 | 834.67 | 833.13 | 829.29 | 828.86 |
| R178 | R177 | 0.95 | 0.76 | 0.72 | 0.72 | 20.00 | 3.89 | 2.79 | 2.98 | 12 | 25 | 0.70 | 0.61 | 0.44 | 0.61 | 3.8 | 0.1 | 832.57 | 832.41 | 835.82 | 835.88 | 831.79 | 831.61 |
| R177 | R176 | 0.72 | 0.76 | 0.55 | 1.27 | 20.10 | 3.88 | 4.91 | 6.67 | 12 | 76 | 3.50 | 1.90 | 0.44 | 1.90 | 8.5 | 0.1 | 832.31 | 829.66 | 835.88 | 833.13 | 831.51 | 828.86 |
| R176 | R156 | 0.16 | 0.30 | 0.05 | 2.00 | 20.20 | 3.87 | 7.75 | 9.14 | 15 | 110 | 2.00 | 1.44 | 0.32 | 1.44 | 7.4 | 0.2 | 829.04 | 827.45 | 833.13 | 830.93 | 828.66 | 826.45 |
| R175 | R174 | 0.45 | 0.47 | 0.21 | 0.21 | 20.00 | 3.89 | 0.81 | 3.36 | 12 | 100 | 0.89 | 0.05 | 0.44 | 0.44 | 4.3 | 0.4 | 834.61 | 834.18 | 838.29 | 837.40 | 834.27 | 833.38 |
| R174 | R159 | 0.41 | 0.53 | 0.22 | 0.43 | 20.40 | 3.85 | 1.65 | 2.36 | 12 | 66 | 0.44 | 0.21 | 0.44 | 0.44 | 3.0 | 0.4 | 834.07 | 833.78 | 837.40 | 838.73 | 833.28 | 832.98 |
| R173 | R172 | 0.05 | 0.80 | 0.04 | 0.04 | 20.00 | 3.89 | 0.17 | 2.36 | 12 | 25 | 0.44 | 0.00 | 0.44 | 0.44 | 3.0 | 0.1 | 841.43 | 841.32 | 844.63 | 844.69 | 840.63 | 840.52 |
| R172 | R171 | 0.18 | 0.40 | 0.07 | 0.12 | 20.10 | 3.88 | 0.45 | 2.36 | 12 | 18 | 0.44 | 0.02 | 0.44 | 0.44 | 3.0 | 0.1 | 841.32 | 841.24 | 844.69 | 845.91 | 840.52 | 840.44 |
| R171 | R170 | 0.00 | 0.00 | 0.00 | 0.12 | 20.20 | 3.87 | 0.45 | 2.36 | 12 | 109 | 0.44 | 0.02 | 0.44 | 0.44 | 3.0 | 0.6 | 841.24 | 840.76 | 845.91 | 845.47 | 840.44 | 839.96 |
| R170 | R164 | 0.35 | 0.93 | 0.32 | 0.44 | 20.80 | 3.82 | 1.67 | 7.56 | 12 | 60 | 4.50 | 0.22 | 0.44 | 0.44 | 9.6 | 0.1 | 838.56 | 835.86 | 845.47 | 839.06 | 837.76 | 835.06 |
| R168 | R167 | 0.22 | 0.93 | 0.21 | 0.21 | 20.00 | 3.89 | 0.80 | 3.38 | 12 | 66 | 0.90 | 0.05 | 0.44 | 0.44 | 4.3 | 0.3 | 843.40 | 843.11 | 846.90 | 846.91 | 842.91 | 842.31 |
| R167 | R166 | 0.31 | 0.69 | 0.22 | 0.42 | 20.30 | 3.86 | 1.63 | 2.36 | 12 | 125 | 0.44 | 0.21 | 0.44 | 0.44 | 3.0 | 0.7 | 839.12 | 838.57 | 846.91 | 844.29 | 838.32 | 837.77 |
| R166 | 165A | 0.22 | 0.90 | 0.20 | 0.62 | 21.00 | 3.80 | 2.36 | 2.36 | 12 | 68 | 0.44 | 0.44 | 0.44 | 0.44 | 3.0 | 0.4 | 834.57 | 834.28 | 844.29 | 844.97 | 833.77 | 833.48 |
| 165A | R165 | 0.00 | 0.00 | 0.00 | 0.62 | 21.40 | 3.77 | 2.36 | 2.36 | 12 | 105 | 0.44 | 0.44 | 0.44 | 0.44 | 3.0 | 0.6 | 834.02 | 833.56 | 844.97 | 838.04 | 833.23 | 832.76 |
| R165 | R164 | 0.63 | 0.50 | 0.32 | 0.93 | 22.00 | 3.72 | 3.48 | 5.46 | 18 | 100 | 0.27 | 0.11 | 0.25 | 0.25 | 3.1 | 0.5 | 833.55 | 833.30 | 838.04 | 839.06 | 832.36 | 832.09 |
| R164 | R163 | 0.13 | 0.40 | 0.05 | 1.43 | 22.50 | 3.68 | 5.25 | 9.33 | 24 | 107 | 0.17 | 0.05 | 0.17 | 0.17 | 3.0 | 0.6 | 833.30 | 833.11 | 839.06 | 840.92 | 831.69 | 831.51 |
| R163 | R162 | 0.00 | 0.00 | 0.00 | 1.91 | 23.10 | 3.64 | 6.97 | 9.33 | 24 | 20 | 0.17 | 0.09 | 0.17 | 0.17 | 3.0 | 0.1 | 833.11 | 833.08 | 840.92 | 839.20 | 831.51 | 831.48 |
| R162 | R161 | 0.60 | 0.75 | 0.45 | 2.37 | 23.20 | 3.63 | 8.59 | 12.39 | 24 | 25 | 0.30 | 0.14 | 0.17 | 0.17 | 3.9 | 0.1 | 833.05 | 833.00 | 839.20 | 839.26 | 831.48 | 831.40 |
| R161 | R160 | 0.57 | 0.76 | 0.43 | 2.79 | 23.30 | 3.62 | 10.12 | 12.39 | 24 | 87 | 0.30 | 0.20 | 0.17 | 0.20 | 3.9 | 0.4 | 831.42 | 831.24 | 839.26 | 838.24 | 829.90 | 829.64 |
| R160 | R159 | 0.12 | 0.25 | 0.03 | 2.82 | 23.70 | 3.59 | 10.15 | 12.39 | 24 | 103 | 0.30 | 0.20 | 0.17 | 0.20 | 3.9 | 0.4 | 831.14 | 830.93 | 838.24 | 838.73 | 829.64 | 829.33 |
| R159 | R158 | 0.16 | 0.37 | 0.06 | 3.31 | 24.10 | 3.56 | 11.80 | 13.94 | 24 | 97 | 0.38 | 0.27 | 0.17 | 0.27 | 4.4 | 0.4 | 830.83 | 830.57 | 838.73 | 837.76 | 829.33 | 828.97 |
| R158 | R157 | 0.25 | 0.40 | 0.10 | 3.41 | 24.50 | 3.54 | 12.06 | 13.94 | 24 | 200 | 0.38 | 0.28 | 0.17 | 0.28 | 4.4 | 0.7 | 830.38 | 829.81 | 837.76 | 834.76 | 828.97 | 828.21 |
| R157 | R156 | 0.60 | 0.54 | 0.32 | 3.73 | 25.20 | 3.49 | 13.02 | 27.71 | 24 | 150 | 1.50 | 0.33 | 0.17 | 0.33 | 8.8 | 0.3 | 828.31 | 826.05 | 834.76 | 830.93 | 826.71 | 824.45 |
| R156 | R155 | 0.63 | 0.46 | 0.29 | 6.03 | 25.50 | 3.47 | 20.90 | 23.20 | 30 | 100 | 0.32 | 0.26 | 0.13 | 0.26 | 4.7 | 0.4 | 825.99 | 825.73 | 830.93 | 833.14 | 824.05 | 823.73 |
| R155 | R154 | 0.38 | 0.46 | 0.17 | 6.20 | 25.90 | 3.44 | 21.32 | 22.84 | 30 | 111 | 0.31 | 0.27 | 0.13 | 0.27 | 4.7 | 0.4 | 825.69 | 825.39 | 833.14 | 838.15 | 823.73 | 823.39 |
| R154 | R153 | 0.00 | 0.00 | 0.00 | 7.81 | 26.30 | 3.41 | 26.65 | 29.07 | 36 | 87 | 0.19 | 0.16 | 0.10 | 0.16 | 4.1 | 0.4 | 825.36 | 825.22 | 838.15 | 837.31 | 822.99 | 822.82 |
| R153 | R104 | 0.00 | 0.00 | 0.00 | 8.09 | 26.70 | 3.38 | 27.38 | 29.07 | 36 | 166 | 0.19 | 0.17 | 0.10 | 0.17 | 4.1 | 0.7 | 825.19 | 824.91 | 837.31 | 833.81 | 822.82 | 822.51 |
| R138 | R137 | 0.18 | 0.43 | 0.08 | 0.08 | 20.00 | 3.89 | 0.30 | 5.28 | 12 | 110 | 2.20 | 0.01 | 0.44 | 0.44 | 6.7 | 0.3 | 832.68 | 830.26 | 835.90 | 833.48 | 831.88 | 829.46 |
| R137 | R136 | 0.37 | 0.42 | 0.16 | 0.24 | 20.30 | 3.86 | 0.91 | 5.16 | 12 | 55 | 2.10 | 0.07 | 0.44 | 0.44 | 6.6 | 0.1 | 830.16 | 829.00 | 833.48 | 832.28 | 829.36 | 828.20 |
| R136 | R135 | 0.34 | 0.44 | 0.15 | 0.39 | 20.40 | 3.85 | 1.49 | 2.36 | 12 | 90 | 0.44 | 0.18 | 0.44 | 0.44 | 3.0 | 0.5 | 828.90 | 828.50 | 832.28 | 836.04 | 828.10 | 827.70 |
| R135 | R134 | 0.20 | 0.63 | 0.13 | 0.51 | 20.90 | 3.81 | 1.96 | 2.36 | 12 | 66 | 0.44 | 0.30 | 0.44 | 0.44 | 3.0 | 0.4 | 828.40 | 828.11 | 836.04 | 836.03 | 827.60 | 827.31 |
| R134 | R133 | 0.20 | 0.64 | 0.13 | 0.64 | 21.30 | 3.78 | 2.43 | 6.37 | 12 | 88 | 3.20 | 0.46 | 0.44 | 0.46 | 8.1 | 0.2 | 828.01 | 825.20 | 836.03 | 828.50 | 827.21 | 824.40 |
| R133 | R132 | 0.46 | 0.43 | 0.20 | 0.84 | 21.50 | 3.76 | 3.15 | 6.21 | 18 | 116 | 0.35 | 0.09 | 0.25 | 0.25 | 3.5 | 0.5 | 825.15 | 824.85 | 828.50 | 829.08 | 824.00 | 823.59 |
| R132 | R131 | 0.19 | 0.42 | 0.08 | 0.92 | 22.00 | 3.72 | 3.41 | 5.25 | 18 | 116 | 0.25 | 0.11 | 0.25 | 0.25 | 3.0 | 0.7 | 824.85 | 824.56 | 829.08 | 827.33 | 823.36 | 823.07 |
| R131 | R130 | 0.41 | 0.41 | 0.17 | 1.08 | 22.70 | 3.67 | 3.98 | 5.25 | 18 | 58 | 0.25 | 0.14 | 0.25 | 0.25 | 3.0 | 0.3 | 824.56 | 824.41 | 827.33 | 828.24 | 823.07 | 822.92 |
| R130 | R105 | 0.12 | 0.38 | 0.05 | 1.13 | 23.00 | 3.65 | 4.12 | 5.25 | 18 | 53 | 0.25 | 0.15 | 0.25 | 0.25 | 3.0 | 0.3 | 824.41 | 824.27 | 828.24 | 827.18 | 822.92 | 822.79 |
| R142 | R141 | 0.39 | 0.72 | 0.28 | 0.28 | 20.00 | 3.89 | 1.09 | 2.36 | 12 | 25 | 0.44 | 0.09 | 0.44 | 0.44 | 3.0 | 0.1 | 826.01 | 825.90 | 829.22 | 829.16 | 825.21 | 825.10 |
| R141 | R109 | 0.33 | 0.75 | 0.25 | 0.53 | 20.10 | 3.88 | 2.06 | 3.56 | 12 | 110 | 1.00 | 0.33 | 0.44 | 0.44 | 4.5 | 0.4 | 825.29 | 824.81 | 829.16 | 828.78 | 825.00 | 823.91 |
| R128 | R127 | 0.11 | 0.80 | 0.09 | 0.09 | 20.00 | 3.89 | 0.34 | 2.36 | 12 | 66 | 0.44 | 0.01 | 0.44 | 0.44 | 3.0 | 0.4 | 830.01 | 829.72 | 833.24 | 833.24 | 829.21 | 828.92 |
| R127 | R126 | 0.15 | 0.74 | 0.11 | 0.19 | 20.40 | 3.85 | 0.75 | 6.37 | 12 | 41 | 3.20 | 0.04 | 0.44 | 0.44 | 8.1 | 0.1 | 829.62 | 828.31 | 833.24 | 831.59 | 828.82 | 827.51 |
| R126 | R125 | 0.50 | 0.74 | 0.37 | 0.57 | 20.50 | 3.85 | 2.18 | 2.64 | 12 | 25 | 0.55 | 0.37 | 0.44 | 0.44 | 3.4 | 0.1 | 828.18 | 828.07 | 831.59 | 831.53 | 827.41 | 827.27 |
| R125 | R124 | 0.58 | 0.67 | 0.39 | 0.96 | 20.60 | 3.84 | 3.67 | 5.27 | 12 | 42 | 2.19 | 1.06 | 0.44 | 1.06 | 6.7 | 0.1 | 827.50 | 827.06 | 831.53 | 831.34 | 827.17 | 826.26 |
| R124 | R112 | 0.01 | 0.25 | 0.00 | 0.96 | 20.70 | 3.83 | 3.68 | 5.27 | 12 | 84 | 2.19 | 1.06 | 0.44 | 1.06 | 6.7 | 0.2 | 826.96 | 825.13 | 831.34 | 829.80 | 826.16 | 824.32 |
| R144 | R140 | 0.14 | 0.71 | 0.10 | 0.10 | 20.00 | 3.89 | 0.40 | 2.36 | 12 | 61 | 0.44 | 0.01 | 0.44 | 0.44 | 3.0 | 0.3 | 835.88 | 835.61 | 839.13 | 838.88 | 835.09 | 834.81 |
| R140 | R117 | 0.45 | 0.58 | 0.26 | 0.36 | 20.30 | 3.86 | 1.41 | 3.32 | 12 | 144 | 0.87 | 0.16 | 0.44 | 0.44 | 4.2 | 0.6 | 834.89 | 834.27 | 838.88 | 837.60 | 834.71 | 833.47 |
| R143 | R119 | 0.36 | 0.79 | 0.28 | 0.28 | 20.00 | 3.89 | 1.09 | 6.07 | 12 | 61 | 2.90 | 0.09 | 0.44 | 0.44 | 7.7 | 0.1 | 839.96 | 838.18 | 843.69 | 841.89 | 839.16 | 837.38 |
| R200 | R119 | 0.42 | 0.94 | 0.40 | 0.40 | 20.00 | 3.89 | 1.55 | 4.91 | 12 | 66 | 1.90 | 0.19 | 0.44 | 0.44 | 6.3 | 0.2 | 839.43 | 838.18 | 843.14 | 841.89 | 838.63 | 837.38 |
| R123 | R122 | 0.41 | 0.86 | 0.35 | 0.35 | 20.00 | 3.89 | 1.37 | 2.36 | 12 | 82 | 0.44 | 0.15 | 0.44 | 0.44 | 3.0 | 0.5 | 838.97 | 838.61 | 842.20 | 843.69 | 838.17 | 837.81 |
| R122 | R121 | 0.32 | 0.78 | 0.25 | 0.60 | 20.50 | 3.85 | 2.31 | 3.98 | 12 | 69 | 1.25 | 0.42 | 0.44 | 0.44 | 5.1 | 0.2 | 837.95 | 837.65 | 843.69 | 843.21 | 837.71 | 836.85 |
| R121 | R116 | 0.25 | 0.82 | 0.21 | 0.81 | 20.70 | 3.83 | 3.09 | 7.56 | 12 | 81 | 4.50 | 0.75 | 0.44 | 0.75 | 9.6 | 0.1 | 837.55 | 833.90 | 843.21 | 838.16 | 836.75 | 833.10 |
| R215 | R120 | 0.19 | 0.72 | 0.14 | 0.14 | 20.00 | 3.89 | 0.53 | 2.36 | 12 | 58 | 0.44 | 0.02 | 0.44 | 0.44 | 3.0 | 0.3 | 838.42 | 838.16 | 841.83 | 841.89 | 837.62 | 837.36 |
| R120 | R119 | 0.21 | 0.33 | 0.07 | 0.21 | 20.00 | 3.89 | 0.80 | 2.36 | 12 | 110 | 0.44 | 0.05 | 0.44 | 0.44 | 3.0 | 0.6 | 838.06 | 837.58 | 841.89 | 841.89 | 837.26 | 836.78 |
| R119 | R118 | 0.13 | 0.37 | 0.05 | 0.94 | 20.60 | 3.84 | 3.59 | 5.63 | 12 | 110 | 2.50 | 1.02 | 0.44 | 1.02 | 7.2 | 0.3 | 837.48 | 834.73 | 841.89 | 837.96 | 836.68 | 833.93 |
| R118 | R117 | 0.52 | 0.34 | 0.18 | 1.12 | 20.90 | 3.81 | 4.25 | 4.29 | 12 | 187 | 1.45 | 1.42 | 0.44 | 1.42 | 5.5 | 0.6 | 834.58 | 831.92 | 837.96 | 837.60 | 833.83 | 831.12 |
| R117 | R116 | 0.25 | 0.32 | 0.08 | 1.56 | 21.50 | 3.76 | 5.86 | 5.91 | 12 | 28 | 2.75 | 2.71 | 0.44 | 2.71 | 7.5 | 0.1 | 831.84 | 831.09 | 837.60 | 838.16 | 831.02 | 830.25 |
| R116 | R115 | 0.18 | 0.25 | 0.04 | 2.41 | 21.60 | 3.76 | 9.04 | 9.14 | 15 | 150 | 2.00 | 1.96 | 0.32 | 1.96 | 7.4 | 0.3 | 831.09 | 828.15 | 838.16 | 833.91 | 830.15 | 827.15 |
| R115 | R114 | 0.14 | 0.37 | 0.05 | 2.46 | 21.90 | 3.73 | 9.17 | 9.23 | 15 | 75 | 2.04 | 2.02 | 0.32 | 2.02 | 7.5 | 0.2 | 828.03 | 826.52 | 833.91 | 832.04 | 827.05 | 825.52 |
| R114 | R113 | 0.11 | 0.39 | 0.04 | 2.50 | 22.10 | 3.72 | 9.30 | 9.40 | 18 | 150 | 0.80 | 0.78 | 0.25 | 0.78 | 5.3 | 0.5 | 826.49 | 825.32 | 832.04 | 828.49 | 825.32 | 824.12 |
| R113 | R112 | 0.34 | 0.39 | 0.13 | 2.64 | 22.60 | 3.68 | 9.69 | 9.86 | 24 | 102 | 0.19 | 0.18 | 0.17 | 0.18 | 3.1 | 0.5 | 825.32 | 825.13 | 828.49 | 829.80 | 823.72 | 823.52 |
| R112 | R111 | 0.17 | 0.61 | 0.10 | 3.70 | 23.10 | 3.64 | 13.45 | 21.09 | 36 | 67 | 0.10 | 0.04 | 0.10 | 0.10 | 3.0 | 0.4 | 825.13 | 825.06 | 829.80 | 829.78 | 822.72 | 822.66 |
| R111 | R110 | 0.18 | 0.58 | 0.10 | 3.80 | 23.50 | 3.61 | 13.72 | 21.09 | 36 | 102 | 0.10 | 0.04 | 0.10 | 0.10 | 3.0 | 0.6 | 825.06 | 824.96 | 829.78 | 827.69 | 822.66 | 822.56 |
| R110 | R109 | 0.27 | 0.37 | 0.10 | 3.90 | 24.10 | 3.56 | 13.91 | 21.09 | 36 | 150 | 0.10 | 0.04 | 0.10 | 0.10 | 3.0 | 0.8 | 824.96 | 824.81 | 827.69 | 828.78 | 822.56 | 822.41 |
| R109 | R108 | 0.09 | 0.44 | 0.04 | 4.47 | 24.90 | 3.51 | 15.68 | 21.09 | 36 | 75 | 0.10 | 0.06 | 0.10 | 0.10 | 3.0 | 0.4 | 824.81 | 824.73 | 828.78 | 827.33 | 822.41 | 822.33 |
| R108 | R107 | 0.20 | 0.41 | 0.08 | 4.55 | 25.30 | 3.48 | 15.84 | 21.09 | 36 | 75 | 0.10 | 0.06 | 0.10 | 0.10 | 3.0 | 0.4 | 824.73 | 824.66 | 827.33 | 827.30 | 822.33 | 822.26 |
| R107 | R106 | 0.10 | 0.41 | 0.04 | 4.59 | 25.70 | 3.45 | 15.86 | 21.09 | 36 | 29 | 0.10 | 0.06 | 0.10 | 0.10 | 3.0 | 0.2 | 824.66 | 824.63 | 827.30 | 827.32 | 822.26 | 822.23 |
| R106 | R105 | 0.06 | 0.25 | 0.02 | 4.61 | 25.90 | 3.44 | 15.86 | 21.09 | 36 | 256 | 0.10 | 0.06 | 0.10 | 0.10 | 3.0 | 1.4 | 824.53 | 824.27 | 827.32 | 827.18 | 822.13 | 821.87 |
| R105 | R104 | 0.15 | 0.32 | 0.05 | 5.79 | 27.30 | 3.35 | 19.37 | 21.09 | 36 | 163 | 0.10 | 0.08 | 0.10 | 0.10 | 3.0 | 0.9 | 824.27 | 824.11 | 827.18 | 833.81 | 821.87 | 821.71 |
| R104 | R103 | 0.00 | 0.00 | 0.00 | 13.88 | 28.20 | 3.29 | 45.65 | 47.64 | 48 | 111 | 0.11 | 0.10 | 0.07 | 0.10 | 3.8 | 0.5 | 823.31 | 823.20 | 833.81 | 831.12 | 821.71 | 821.59 |
| R103 | R102 | 0.39 | 0.50 | 0.19 | 14.07 | 28.70 | 3.26 | 45.86 | 47.64 | 48 | 200 | 0.11 | 0.10 | 0.07 | 0.10 | 3.8 | 0.9 | 823.20 | 823.00 | 831.12 | 831.13 | 821.59 | 821.37 |
| R102 | R101 | 0.22 | 0.52 | 0.11 | 14.18 | 29.60 | 3.21 | 45.86 | 47.64 | 48 | 232 | 0.11 | 0.10 | 0.07 | 0.10 | 3.8 | 1.0 | 823.00 | 822.76 | 831.13 | 828.10 | 821.37 | 821.11 |
| R101 | R100 | 0.15 | 0.25 | 0.04 | 14.22 | 30.60 | 3.15 | 45.86 | 47.64 | 48 | 101 | 0.11 | 0.10 | 0.07 | 0.10 | 3.8 | 0.4 | 822.76 | 822.66 | 828.10 | | 821.11 | 821.00 |

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STORMWATER CONVEYANCE CALCULATIONS

DATE
NOVEMBER 5, 2015

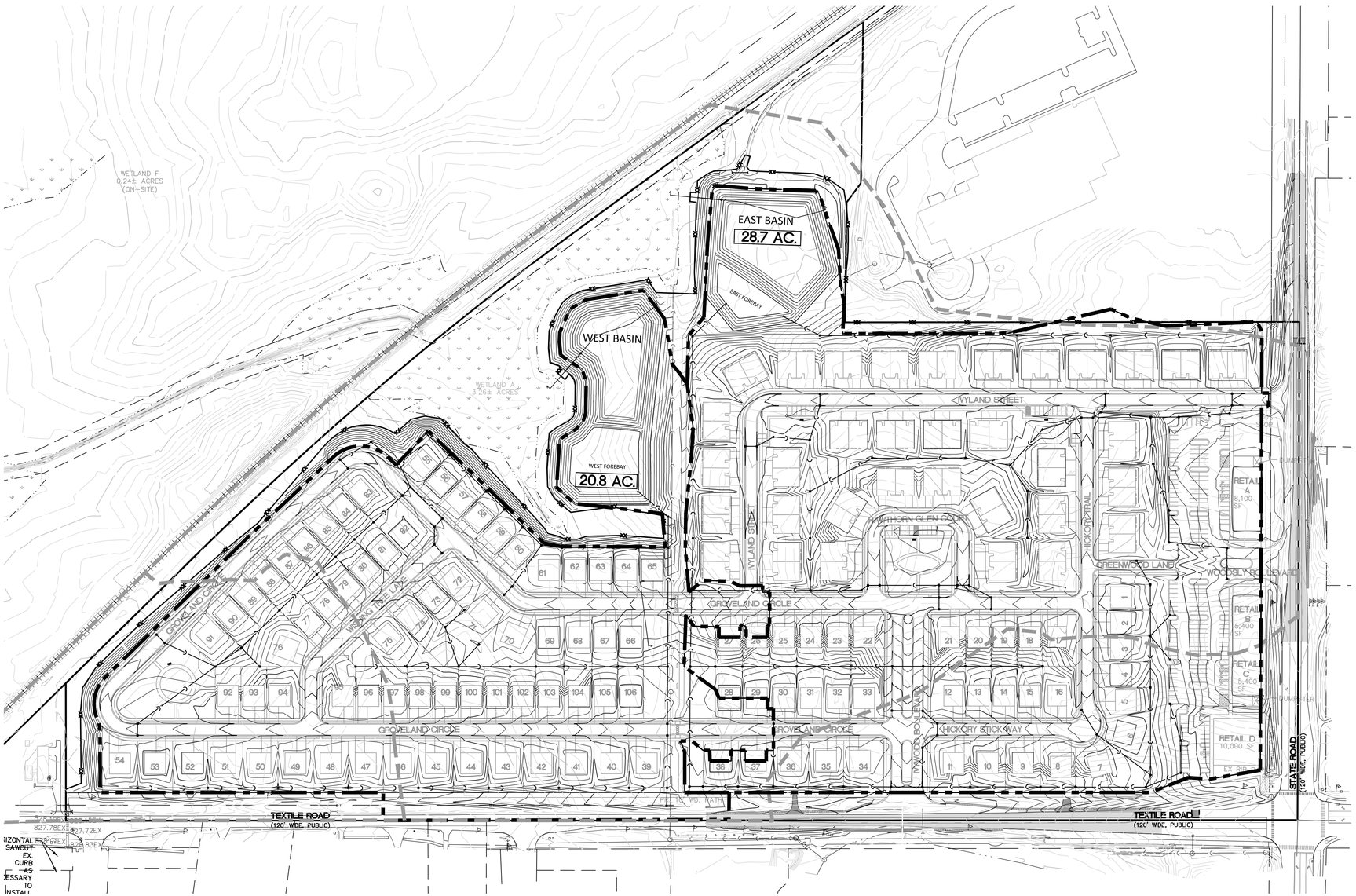
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0
NO SCALE

DR. SK | CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO.
67

K:\13001886\DWG\PLAN SETS\FINAL SITE PLAN\13001886SF-10-G.DWG 2/9/2016 3:01 PM MICHAEL NORCIA




## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED BASIN DRAINAGE AREA
- EXISTING DRAINAGE AREA
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET

## STORM DRAINAGE NARRATIVE

**EXISTING CONDITIONS**

The site is site is predominantly open farm fields with areas of pocket wetlands. The terrain generally falls from the east and south towards a wetland complex and the Pittsfield Junction Drain that runs along the existing railroad to the northwest of the subject site.

The storm water runoff from the site drains via overland flow to the Pittsfield Junction Drain which flows east to west along the northwestern side of the site. This drain is the immediate receiving body for the site runoff. This drain eventually adjoins the Wood Outlet Drain downstream of the site to the southwest.

Per recent discussions with the WCWRC, it is understood that historically the culvert outlet under the railroad within the Pittsfield Junction Dain was impaired or buried, which caused ponding on the subject property. The WCWRC has stated that they have uncovered and cleared the channel downstream of the culvert, but believe the culvert is still blocked. As such, the property owner worked with the railroad owner and contractors to facilitate the cleanout of the existing culvert under the railroad within the Pittsfield Junction Drain. On January 8, 2016 representatives from the WCWRC were in the field to witness the cleanout of the culvert and confirm its functionality.

It was also discussed that the enclosed "Sweetwater" storm water outlet pipe that runs from the south, bisects the property within an existing utility corridor, and outlets to the existing wetland complex on site, cannot have any proposed connections to it. There are no proposed connections to this enclosed storm sewer.

Refer to the drain map and the existing conditions plan for additional details.

**PROPOSED STORM DRANAGE SYSTEM DESIGN**

In conjunction with the development of the site, the storm water management facility improvements are to comply with the current Rules of the Washtenaw County Water Resource Commissioner (WCWRC). The proposed storm water runoff will be collected and conveyed via storm sewer to one of two detention basins proposed on the site. These basins will be sized using the WCWRC method to treat, infiltrate the required storm water in the bottom of the ponds, and detain for a 100-year storm event. A flow restrictor will be provided via a perforated riser outlet structures in order to regulate the rate of discharge at or below the allowable bank full and 100-year rates. Stone wall fore-bays will be provided within the basins to promote settling of suspended solids and sediment for the more frequent rain events.

The outlets from the basins will be discharging at restricted rates to the existing wetland complex directly adjacent to and associated with the drain. Refer to the plans for additional details.

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

OVERALL DRAINAGE AREA PLAN

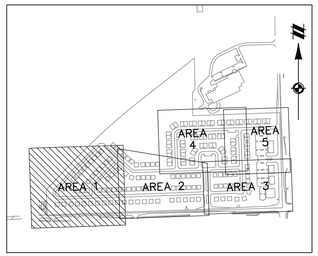
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 60 120
SCALE: 1" = 120'

| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |
| SHEET NO. | 68 | | |




KEYMAP
1" = 800'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| | EXISTING STORM |
| | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| | PROPOSED STORM SEWER |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED CATCH BASIN DRAINAGE AREA |
| | EXISTING WETLAND |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

# INGLEWOOD PARK
## FINAL SITE PLAN
## DRAINAGE AREA PLAN – AREA 1

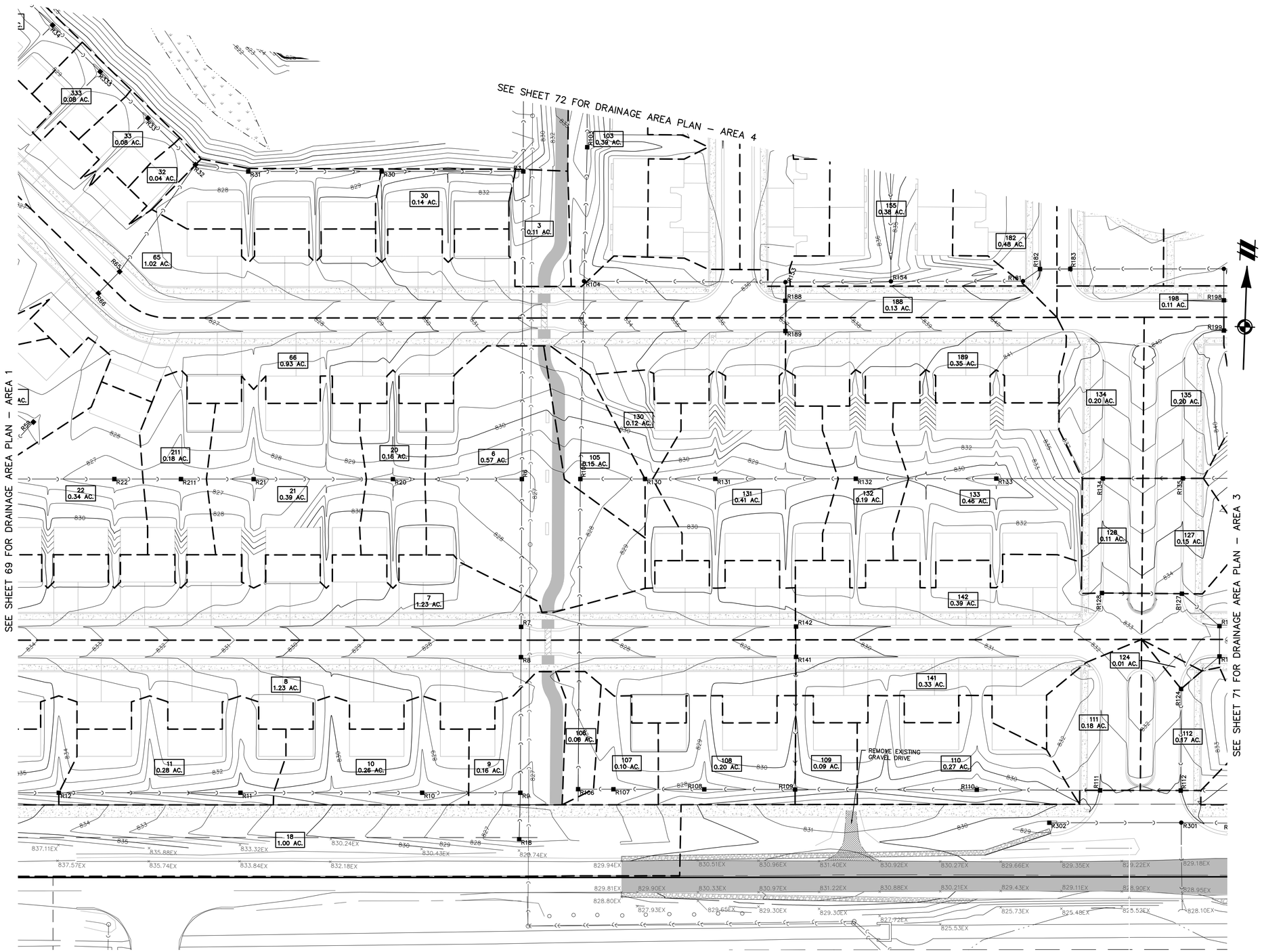
DATE
NOVEMBER 5, 2015

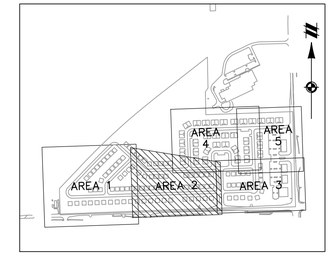
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 69 | |




KEYMAP
1" = 800'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
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- PROPOSED LOT
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED CATCH BASIN DRAINAGE AREA
- EXISTING WETLAND
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET

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WASHTENAW COUNTY, MICHIGAN

CLIENT
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INGLEWOOD PARK
FINAL SITE PLAN

DRAINAGE AREA PLAN – AREA 2

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

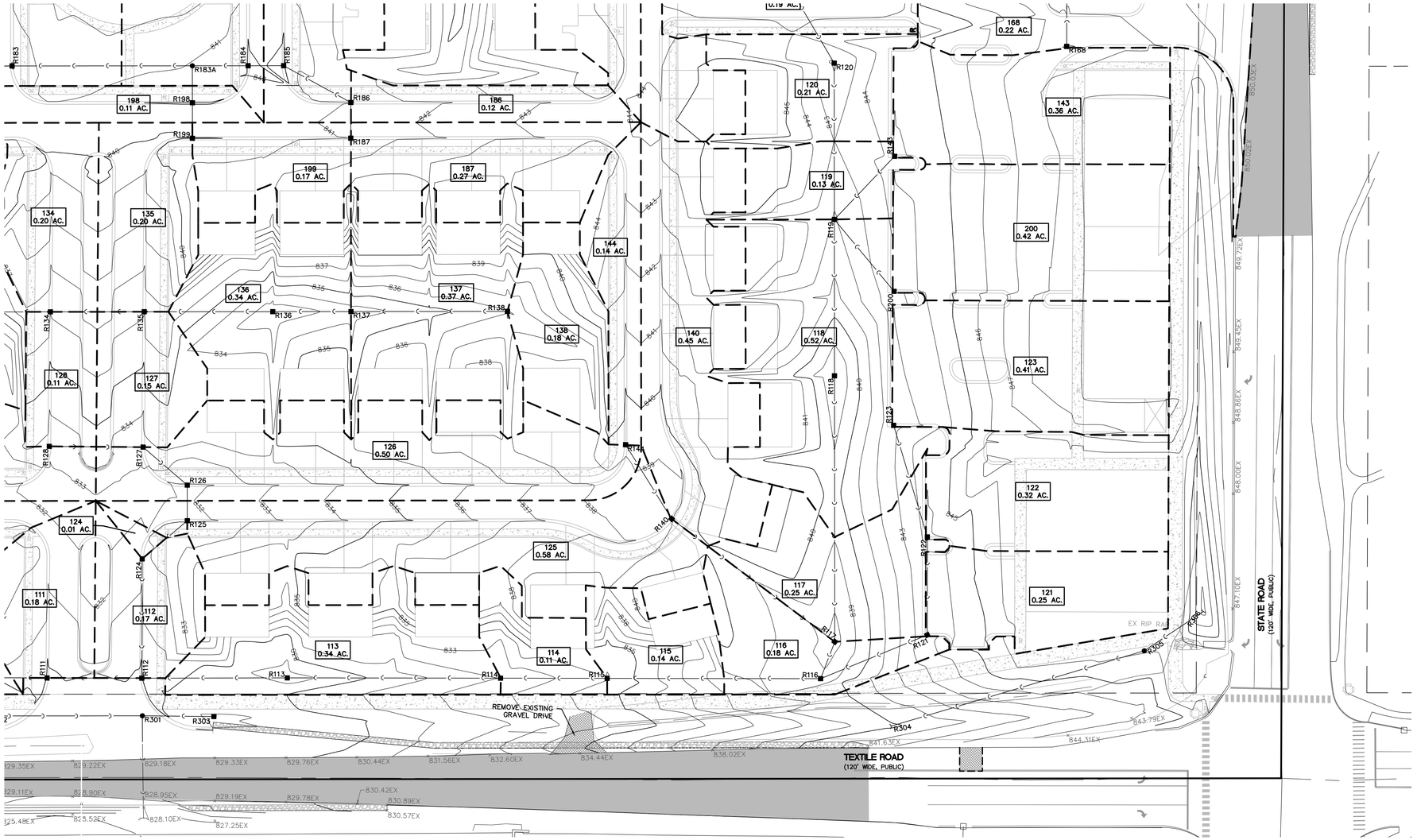
REVISIONS

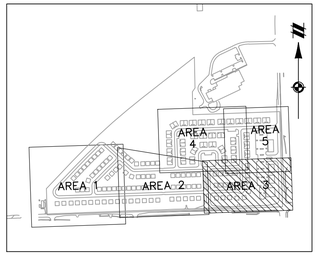
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 70 | |

SEE SHEET 72 FOR LANDSCAPING PLAN – AREA 4

SEE SHEET 70 FOR DRAINAGE AREA PLAN – AREA 2




KEYMAP
1" = 800'

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| | |
|---|---|
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| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| S | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
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| C | PROPOSED STORM SEWER |
| | PROPOSED LOT |
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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# DRAINAGE AREA PLAN – AREA 3

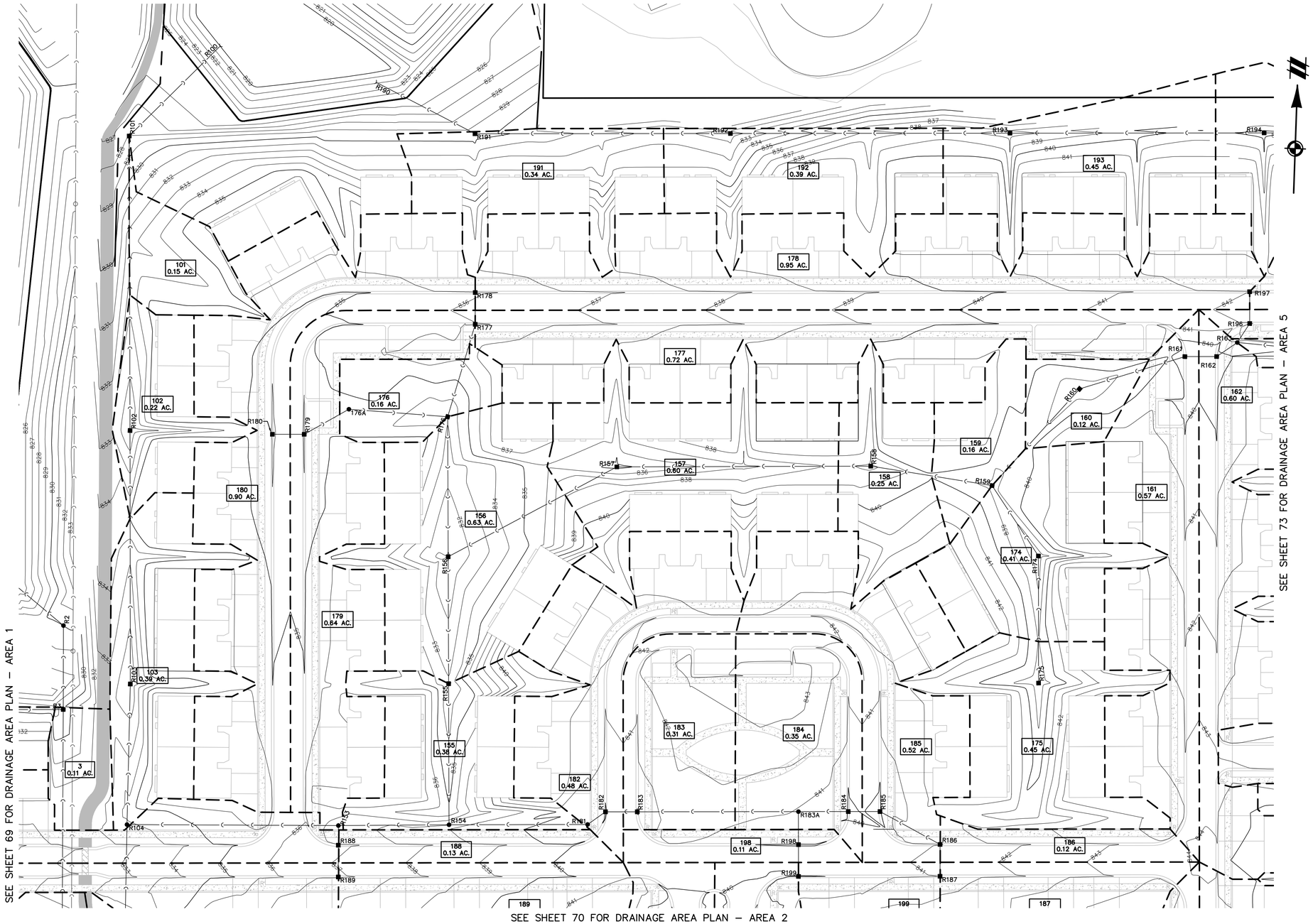
DATE
NOVEMBER 5, 2015

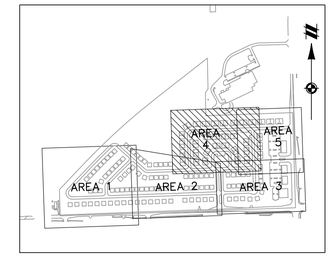
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 71 | |




KEYMAP
1" = 800'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| | PROPOSED STORM SEWER |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED CATCH BASIN DRAINAGE AREA |
| | EXISTING WETLAND |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |

811
Know what's **below.**
**Call** before you dig.

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

DRAINAGE AREA PLAN – AREA 4

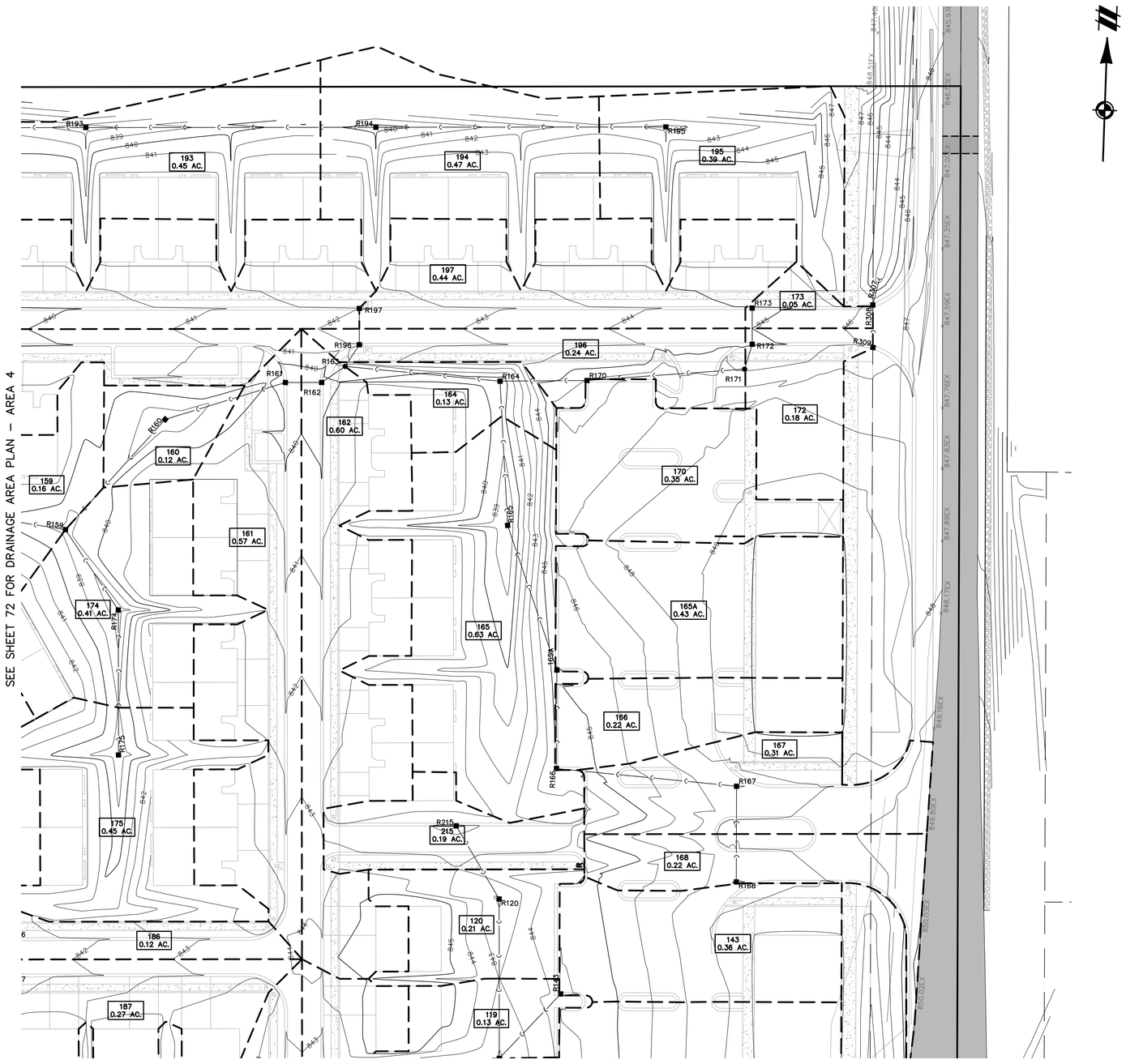
DATE
NOVEMBER 5, 2015

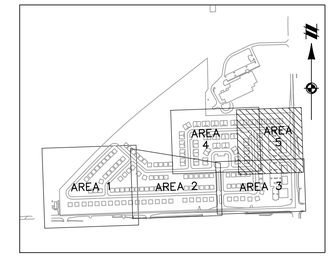
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 72 | |




KEYMAP
1" = 800'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| S | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED CATCH BASIN DRAINAGE AREA |
| | EXISTING WETLAND |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

DRAINAGE AREA PLAN – AREA 5

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

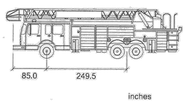
SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 73 | |

J:\13001886\SURVEY\PLAN SET\FINAL SITE PLAN\13001886SP-11-1.DWG 2/9/2016 3:04 PM MICHAEL WORCH

## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED STORM SEWER
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING WELL
- EXISTING SIGN
- U.P. EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- AREAS OF ON-STREET PARKING
- PROPOSED HYDRANT COVER
- PROPOSED SIGNS (SEE PLAN)
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT




inches

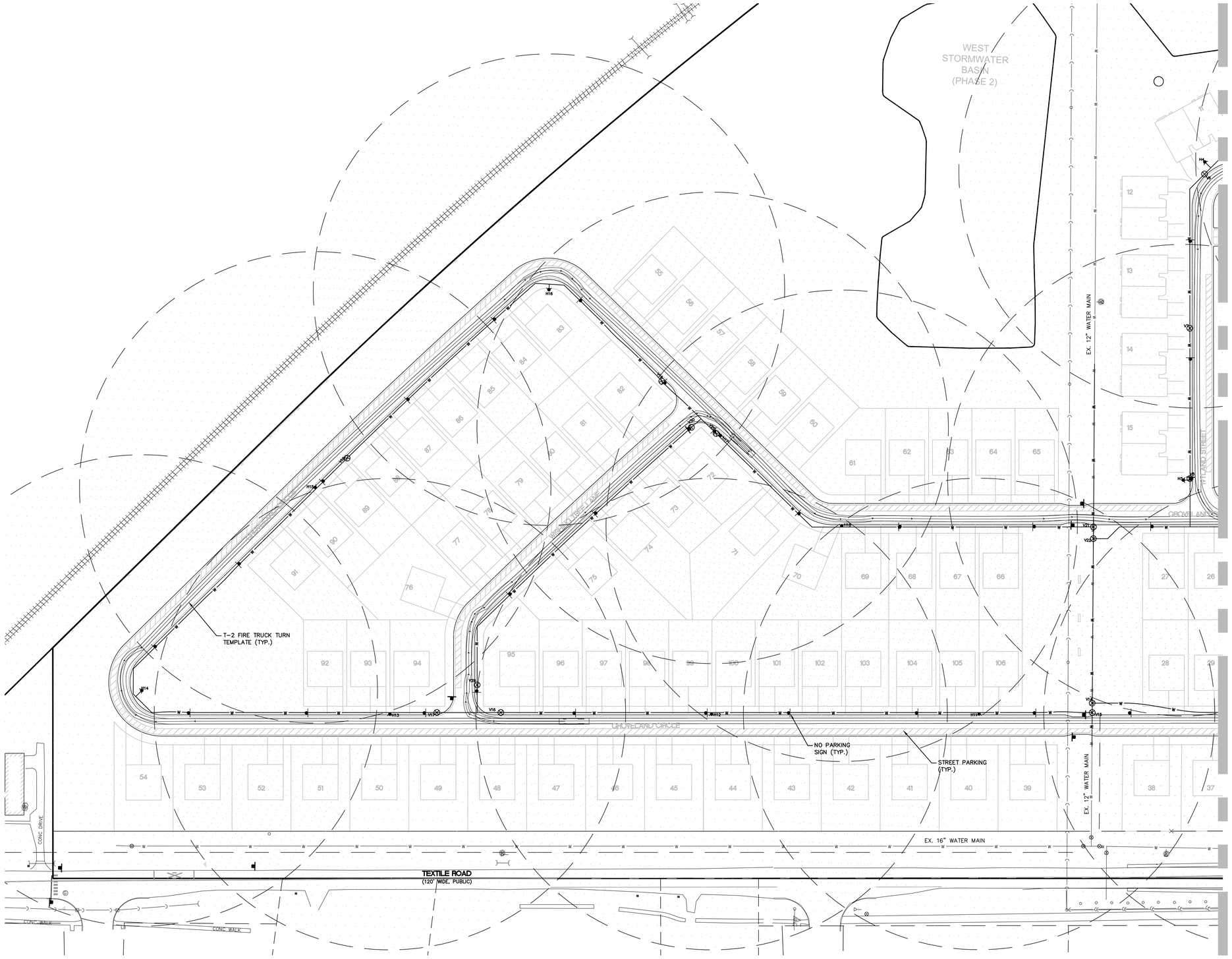
| | |
|---|---|
| Track | : 82.9 |
| Lock to Lock Time | : 6.0 |
| Steering Angle | : 45.0 |

**T-2 FIRE TRUCK DETAIL**

NO SCALE

## NOTES:

1. PROPOSED WATER MAIN IS 8-INCH DIAMETER UNLESS OTHERWISE NOTED.




**T-2 FIRETRUCK DETAIL**

NO SCALE

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# FIRE PROTECTION PLAN WEST

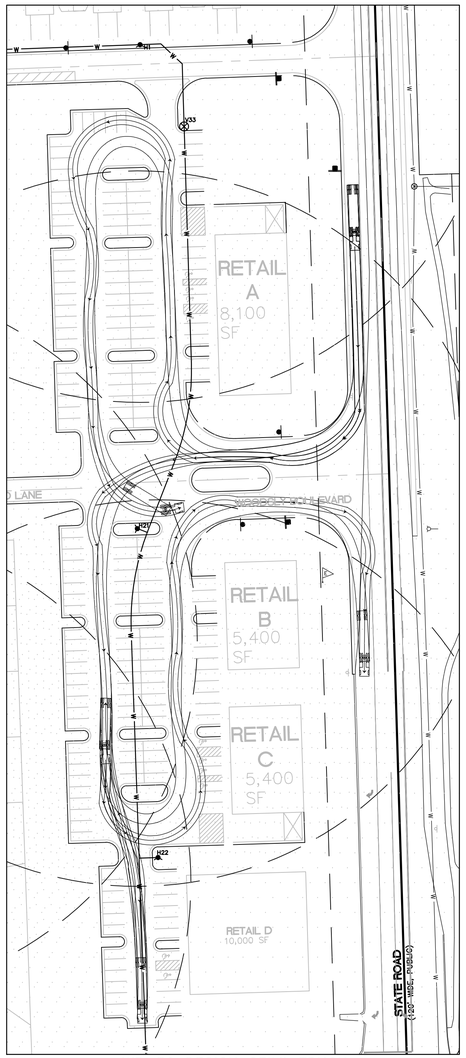
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 30 60
SCALE: 1" = 60'

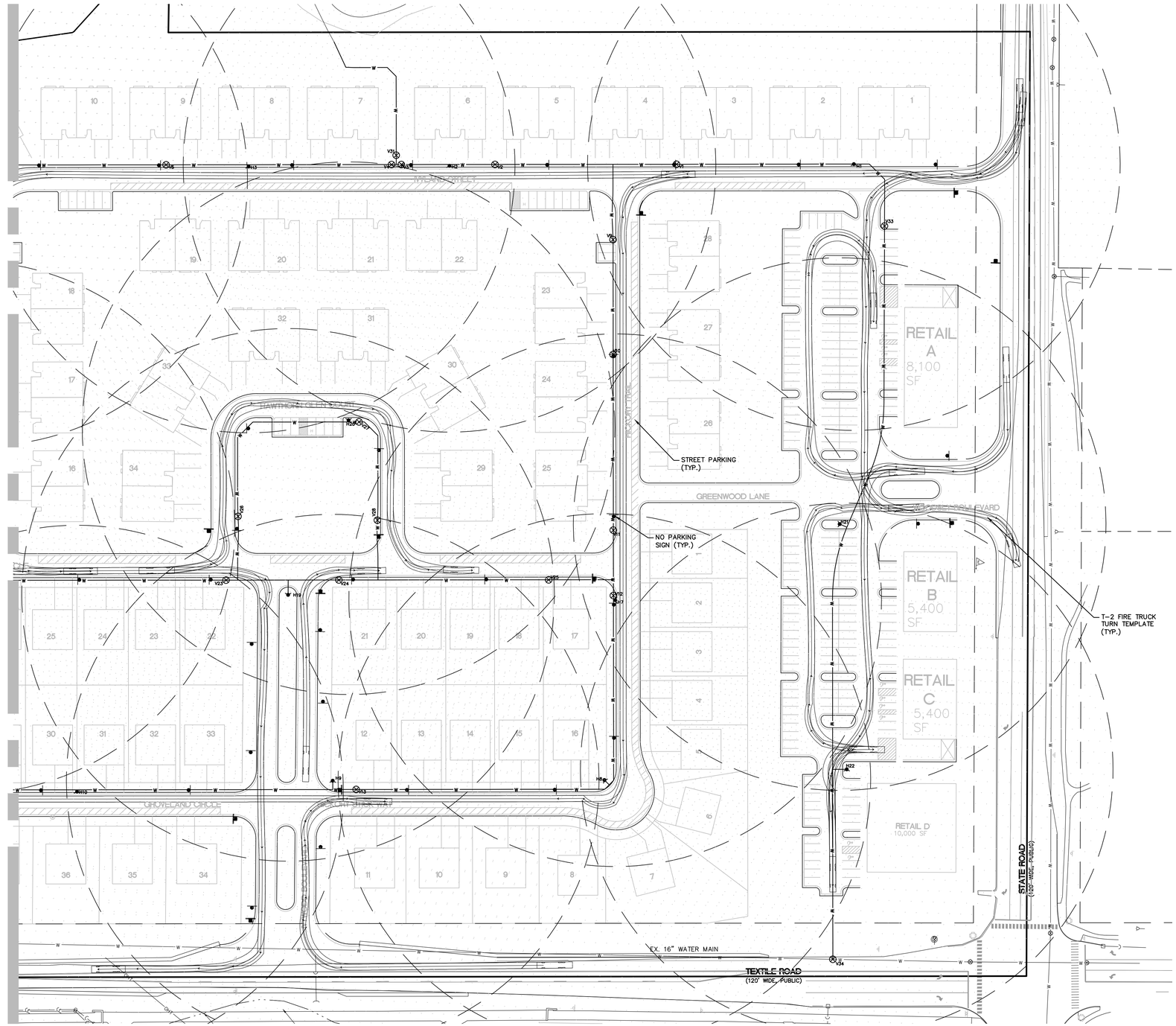
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 74 | |




## WB-50 DESIGN SEIMI-TRUCK CIRCULATION DETAIL

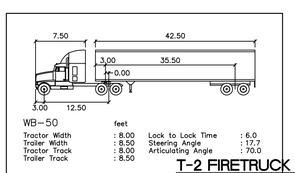
SCALE: 1" = 60'

SEE SHEET 74




## LEGEND

- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- AREAS OF ON-STREET PARKING
- PROPOSED HYDRANT COVER
- PROPOSED SIGNS (SEE PLAN)
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT

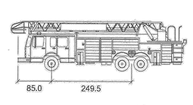



## T-2 FIRETRUCK DETAIL

NO SCALE

## WB-50 SEMI-TRUCK DETAIL

NO SCALE




## T-2 FIRE TRUCK DETAIL

NO SCALE

## NOTES:

1. PROPOSED WATER MAIN IS 8-INCH DIAMETER UNLESS OTHERWISE NOTED.
2. THE FOLLOWING INFORMATION WILL BE PROVIDED FOR THE PROPOSED RETAIL BUILDINGS WHEN ACTUAL BUILDING USES ARE DETERMINED:
   - 2.1. SIZE FOR COMMERCIAL SERVICE LEADS (TO BE IN CONFORMANCE WITH TOWNSHIP REQUIREMENTS)
   - 2.2. PROPOSED BUILDING HEIGHTS
   - 2.3. DOMESTIC AND FIRE SERVICE LEADS (SIZE AND LOCATION)
   - 2.4. PIV LOCATIONS
   - 2.5. FDC (FIRE DEPT. CONNECTION) LOCATIONS
   - 2.6. METER ROOM LOCATIONS

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# FIRE PROTECTION PLAN EAST

DATE
NOVEMBER 5, 2015

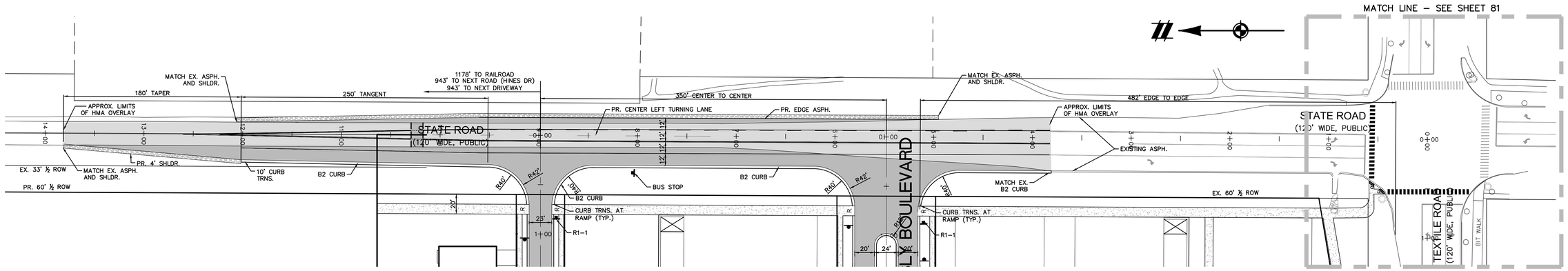
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

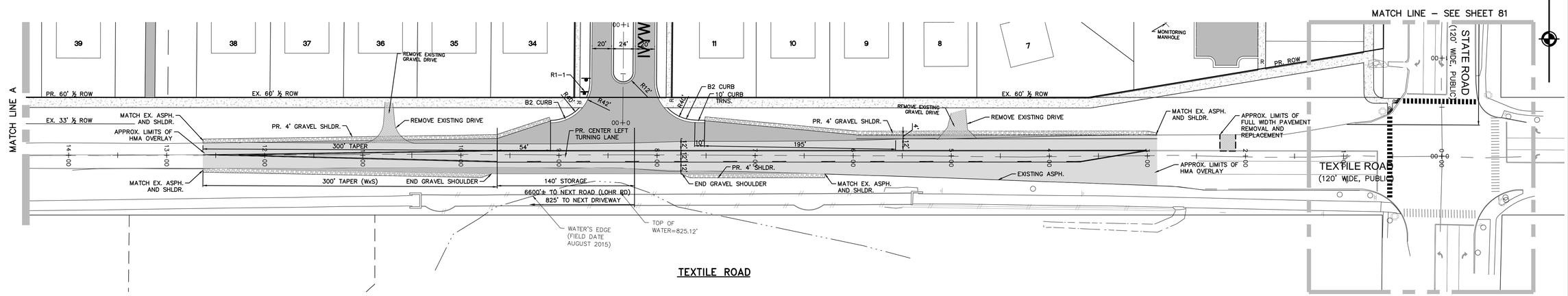
SCALE 0 30 60
SCALE: 1" = 60'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 75 | |

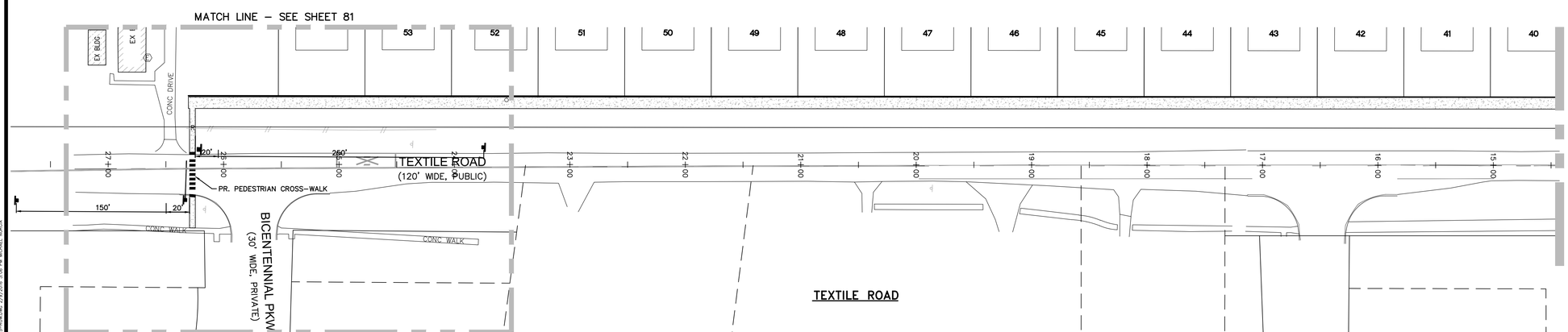
A:\13001886\DWG\FP\AR SETS\FINAL SITE PLAN\13001886SP-12-FP.DWG 2/9/2016 3:55 PM MICHAEL NORDA




STATE ROAD




TEXTILE ROAD




TEXTILE ROAD

## LEGEND

- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING RAILROAD
- PR. LOT
- PR. SETBACK
- PR. R.O.W.
- PR. BACK/EDGE CURB
- PR. CENTERLINE
- EXISTING SIGN
- SECTION CORNER
- PR. SIGN
- PR. GRAVEL SHLDR.
- PR. WALK
- PR. ASPHALT
- PR. ASPHALT OVERLAY (AS DIRECTED BY WCRC)
- PR. DEMOLITION

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STATE AND TEXTILE IMPROVEMENTS PLAN

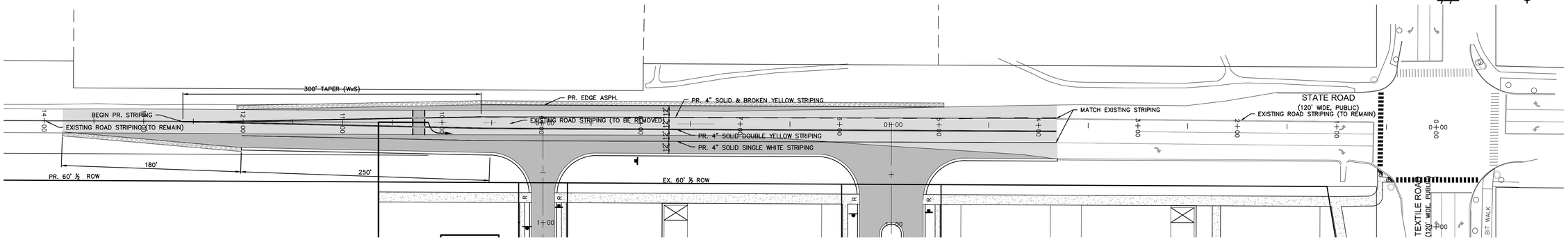
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

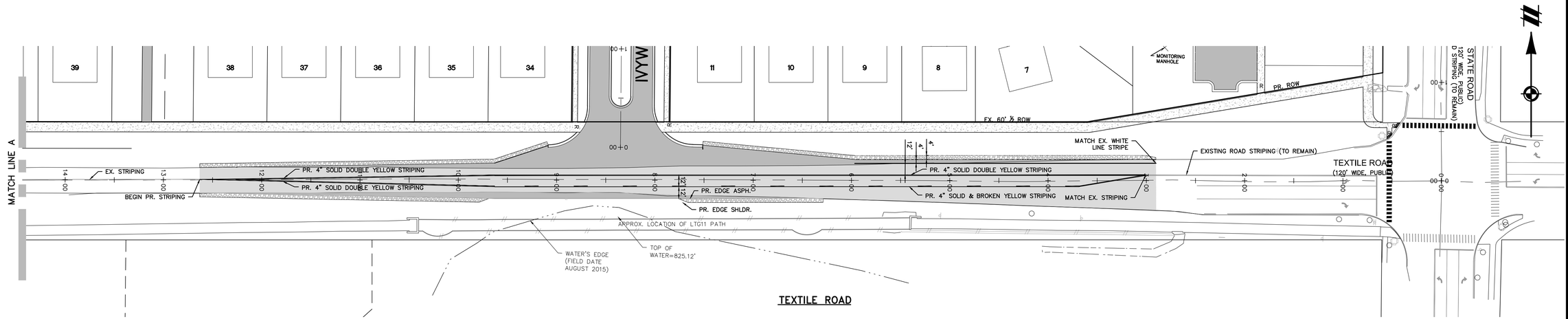
REVISIONS

SCALE 0 25 50
SCALE: 1" = 50'

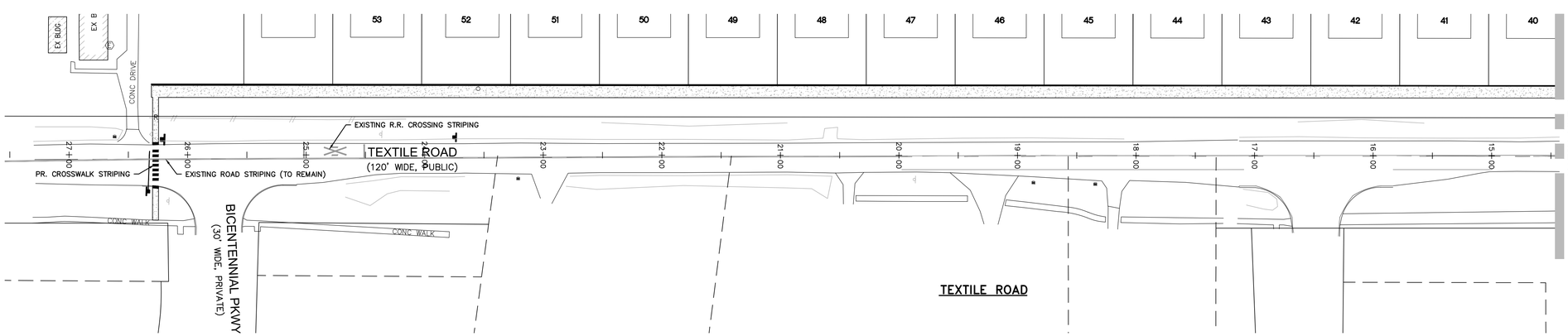
| | | | |
|---|---|---|---|
| DR. | SK | CH. | SS |
| P.M. | MB | | |
| BOOK | | | |
| JOB | 13001886.10 | | |
| SHEET NO. | 76 | | |




STATE ROAD




TEXTILE ROAD




TEXTILE ROAD

## LEGEND

- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING RAILROAD
- PR. LOT
- PR. SETBACK
- PR. R.O.W.
- PR. BACK/EDGE CURB
- PR. CENTERLINE
- EXISTING SIGN
- SECTION CORNER
- PR. SIGN
- PR. GRAVEL SHLDR.
- PR. WALK
- PR. ASPHALT
- PR. ASPHALT OVERLAY (AS DIRECTED BY WCRC)

**NOTES:**

1. ALL PAVEMENT MARKINGS AND ROAD STRIPING SHALL BE PER 2011 MICHIGAN MANUAL TRAFFIC CONTROL DEVICES (AS UPDATED)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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

STATE AND TEXTILE
STRIPING PLAN

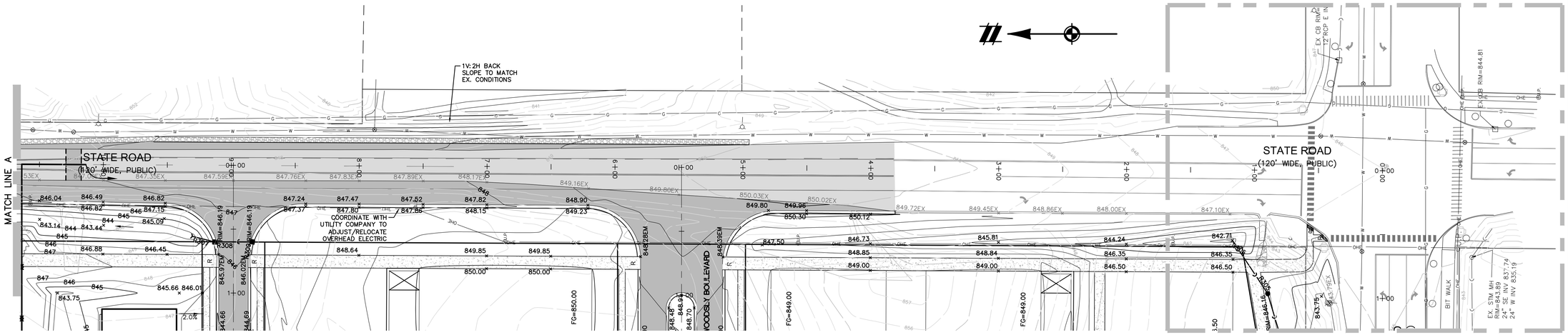
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

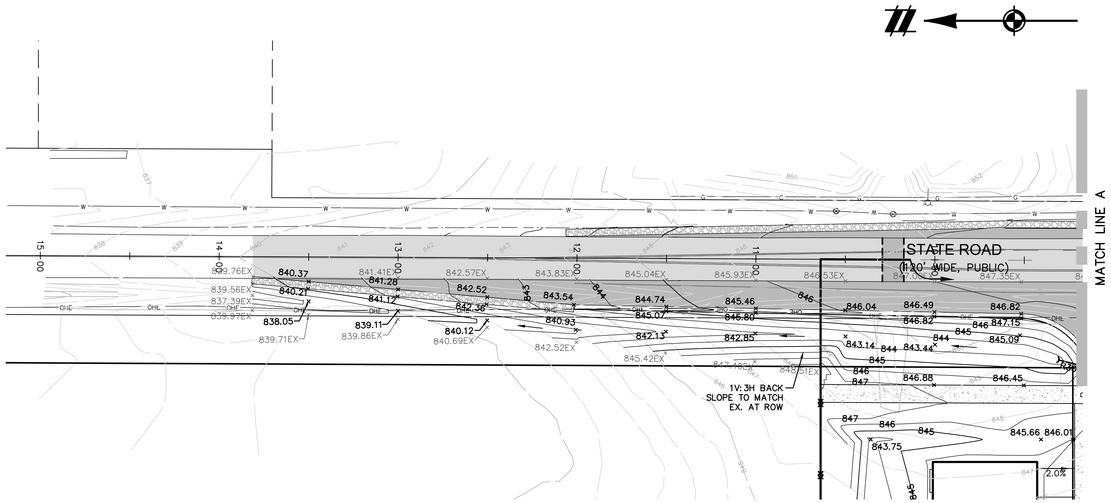
REVISIONS

SCALE 0 25 50
SCALE: 1" = 50'

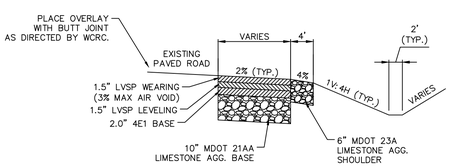
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 77 | |




STATE ROAD




STATE ROAD




NOTES:

1. REFER TO CURRENTLY APPROVED WCRC HMA MIX DESIGNS AND BINDER REQUIREMENTS
2. ALL HMA SHALL LIMIT RAP TO 25%

TYPICAL WIDENING PAVEMENT CROSS-SECTION

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| | PR. LOT |
| | PR. SETBACK |
| | PR. R.O.W. |
| | PR. BACK/EDGE CURB |
| | PR. CENTERLINE |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PR. GRAVEL SHLDR. |
| | PR. WALK |
| | PR. STRIPING |

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STATE ROAD GRADING PLAN

DATE
NOVEMBER 5, 2015

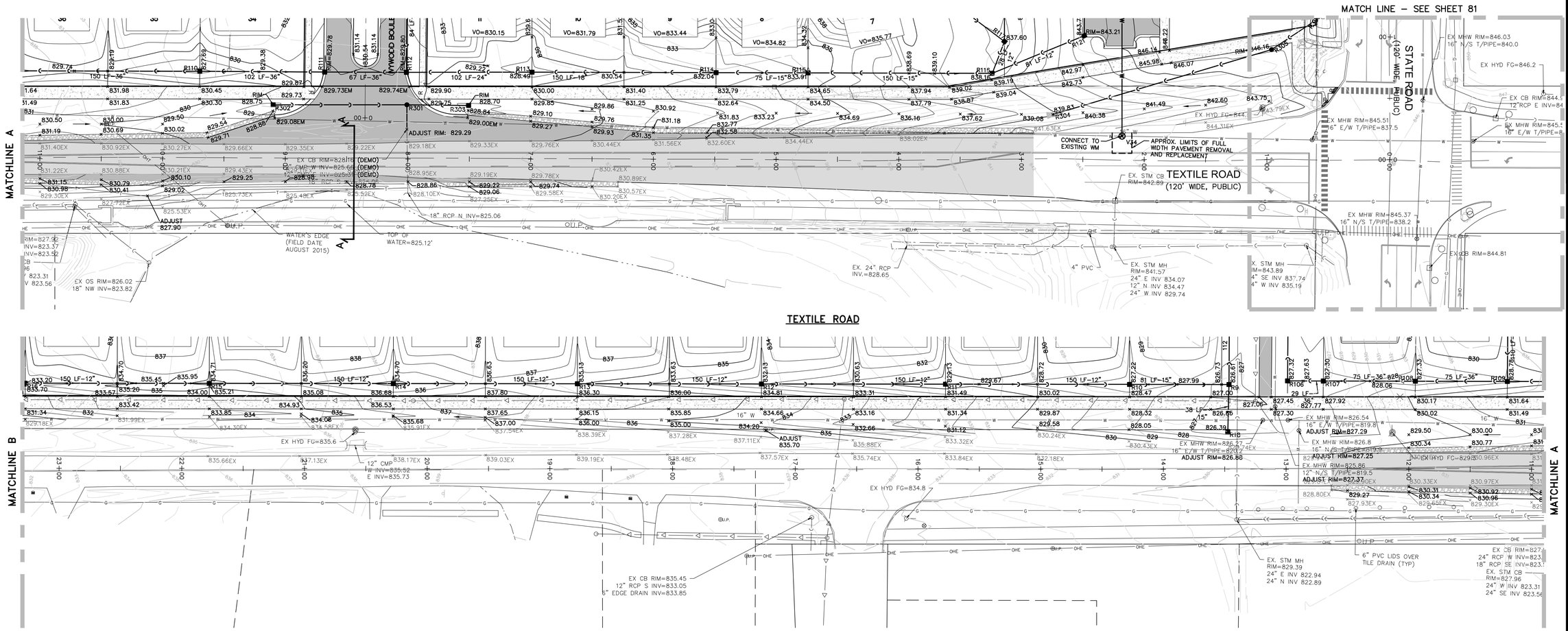
11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 78 | |

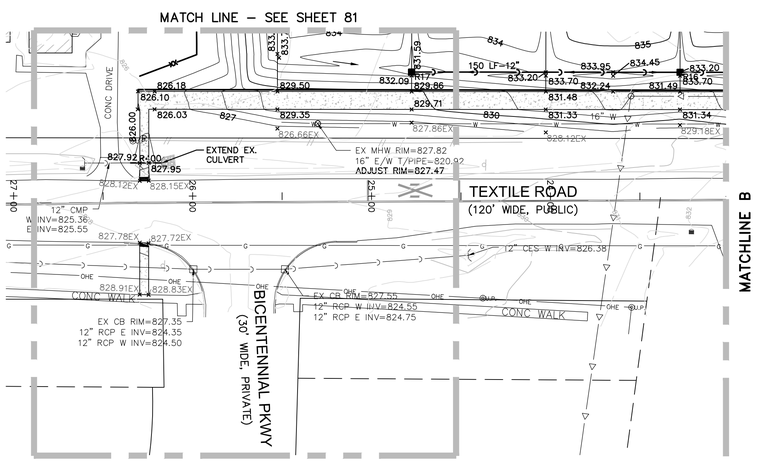
J:\13001886\DWG\PLAN\SITE\FINAL SITE PLAN\13001886SP-C5-RoadGrd 2/9/2016 3:07 PM MICHAEL NOSKA



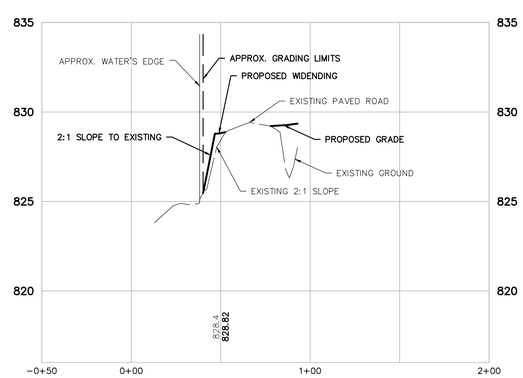

TEXTILE ROAD




TEXTILE ROAD




TEXTILE ROAD




ROAD WIDENING CROSS–SECTION
VERT: 1"=4'
HORZ: 1"=40'

SECTION A–A

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| | PR. LOT |
| | PR. SETBACK |
| | PR. R.O.W. |
| | PR. BACK/EDGE CURB |
| | PR. CENTERLINE |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PR. GRAVEL SHLDR. |
| | PR. WALK |
| | PR. STRIPING |

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

TEXTILE ROAD GRADING PLAN

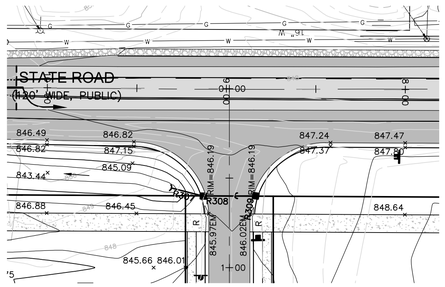
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

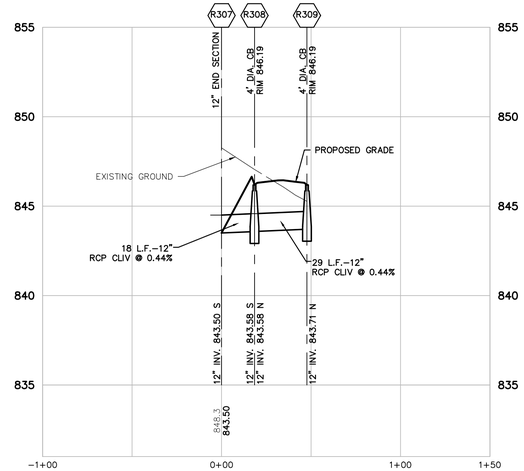
REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

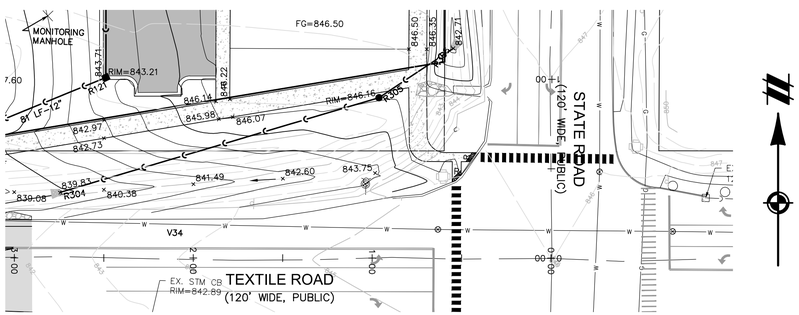
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 79 | |



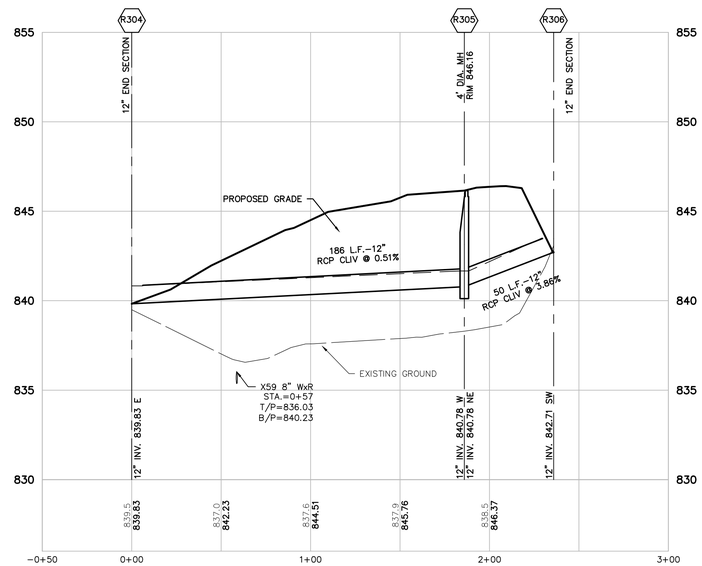

STATE ROAD STORM SEWER PLAN



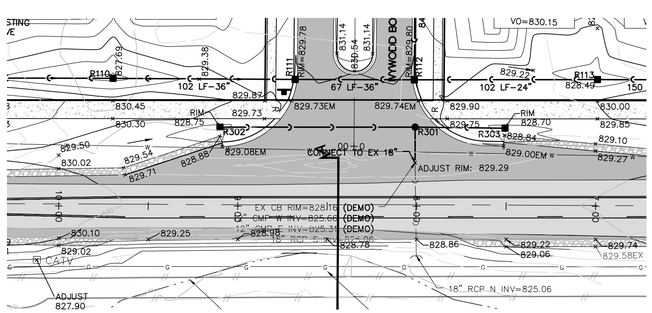

R309-R307
VERT: 1"=4'
HORZ: 1"=40'



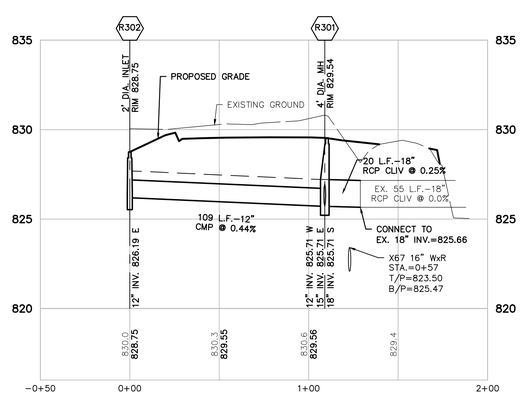

STATE AND TEXTILE ROAD STORM SEWER PLAN



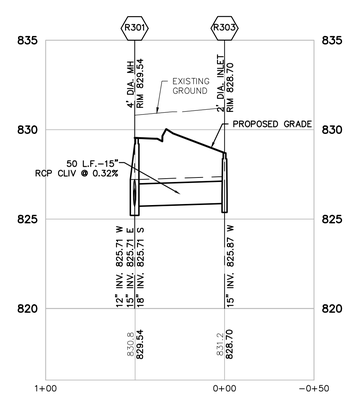

STATE AND TEXTILE CULVERT
VERT: 1"=4'
HORZ: 1"=40'




TEXTILE ROAD STORM SEWER PLAN




R302-EXR1
VERT: 1"=4'
HORZ: 1"=40'




R303-R301
VERT: 1"=4'
HORZ: 1"=40'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| | PR. LOT |
| | PR. SETBACK |
| | PR. R.O.W. |
| | PR. BACK/EDGE CURB |
| | PR. CENTERLINE |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PR. GRAVEL SHLDR. |
| | PR. WALK |
| | PR. STRIPING |

* SEE SHEET 67 FOR FRONTAGE STORM SEWER CONVEYANCE CALCULATIONS

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STATE AND TEXTILE STORM PLAN AND PROFILE

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 25 50
SCALE: 1" = 50'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 80 | |

TYPICAL CONFIGURATION – DOWNLIT PEDESTRIAN CROSSING SIGN HUNG FROM MAST ARM WITH RECTANGULAR RAPID FLASHING BEACON

NO SCALE

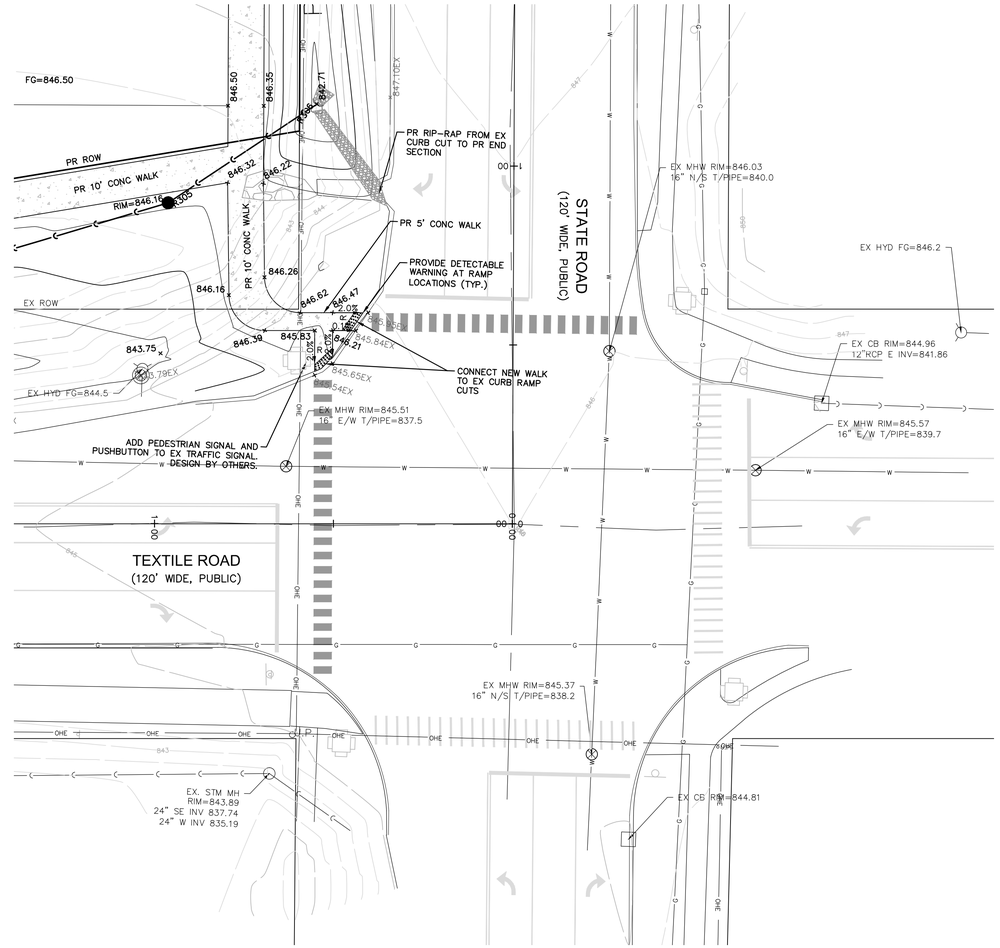
PEDESTRIAN CROSSING SIGNAL WITH RECTANGULAR RAPID FLASHING BEACON

NO SCALE

W11-2 SIGN DETAIL

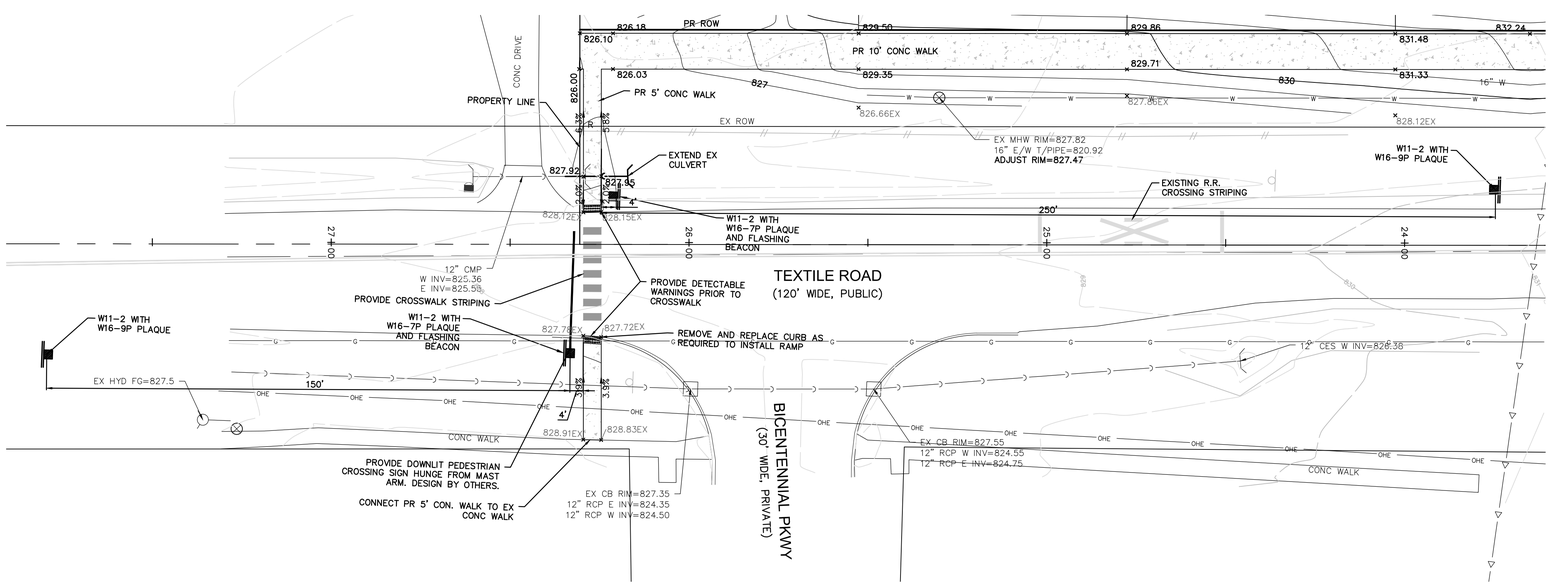
W16-9P SIGN DETAIL

W11-7P SIGN DETAIL




STATE AND TEXTILE INTERSECTION IMPROVEMENT PLAN

SCALE: 1" = 20 FEET




TEXTILE AND BICENTENNAL INTERSECTION IMPROVEMENT PLAN

SCALE: 1" = 20 FEET

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| | PR. LOT |
| | PR. SETBACK |
| | PR. R.O.W. |
| | PR. BACK/EDGE CURB |
| | PR. CENTERLINE |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | PR. GRAVEL SHLDR. |
| | PR. WALK |
| | PR. STRIPING |

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC

INGLEWOOD PARK
FINAL SITE PLAN

TEXTILE AND STATE ROAD
PEDESTRIAN CROSSING PLAN

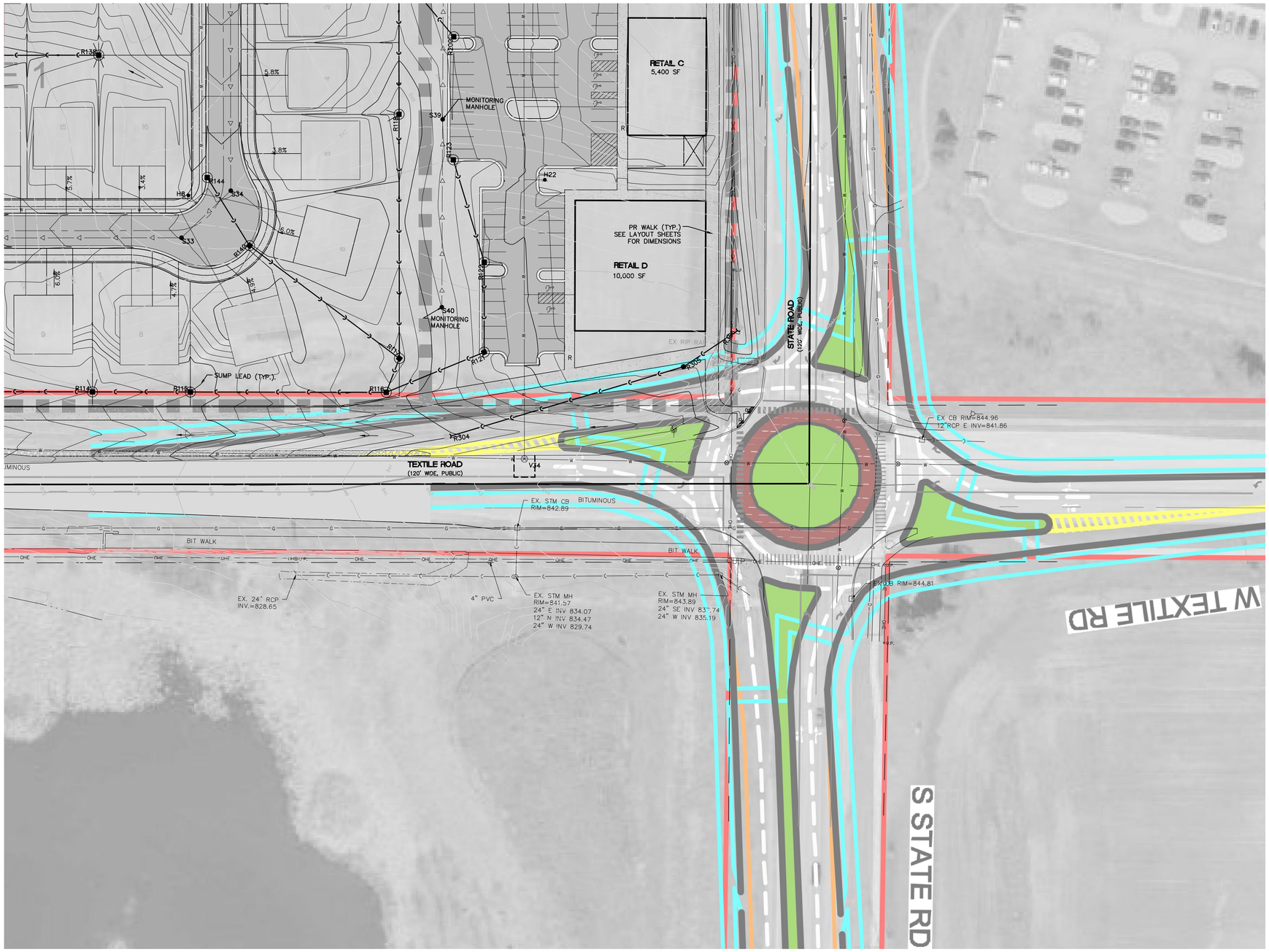
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 10 20
SCALE: 1" = 20'

DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 81




FUTURE STATE AND TEXTILE ROAD ROUNABOUT OVERLAY

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| 890 | PROPOSED CONTOUR |
| | PROPOSED SILT FENCE |
| W | EXISTING WELL |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WETLAND |
| | PROPOSED RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |
| | PROPOSED INLET FILTER |
| | PROPOSED MUD MAT |

811
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**Call** before you dig.

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STATE AND TEXTILE ROAD
ROUNABOUT OVERLAY

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

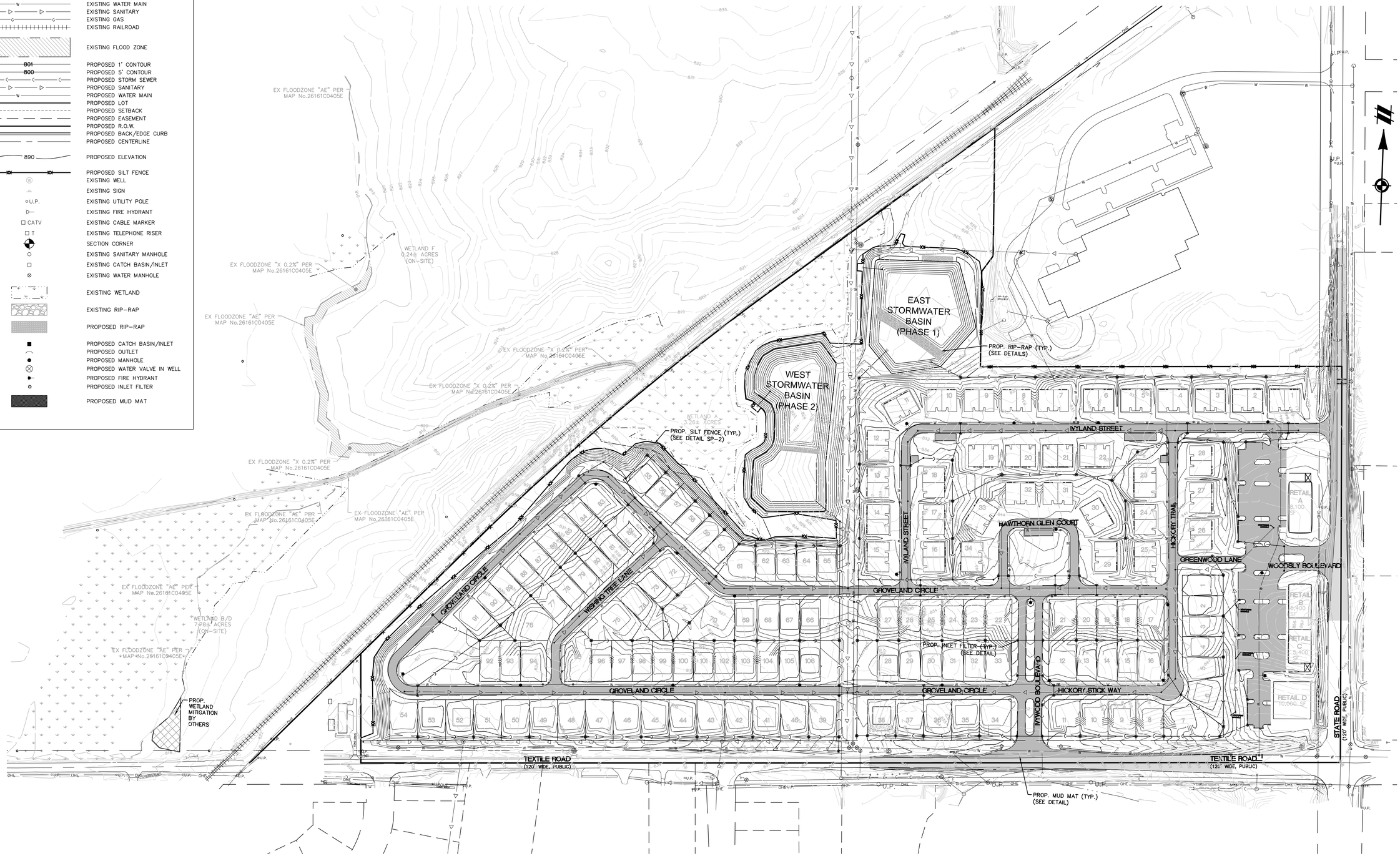
REVISIONS

SCALE 0 20 40
SCALE: 1" = 40'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 82 | |

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
- EXISTING FLOOD ZONE
- PROPOSED 1' CONTOUR
- PROPOSED 5' CONTOUR
- PROPOSED STORM SEWER
- PROPOSED SANITARY
- PROPOSED WATER MAIN
- PROPOSED LOT
- PROPOSED SETBACK
- PROPOSED EASEMENT
- PROPOSED R.O.W.
- PROPOSED BACK/EDGE CURB
- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- PROPOSED SILT FENCE
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP-RAP
- PROPOSED RIP-RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT
- PROPOSED INLET FILTER
- PROPOSED MUD MAT




**811**

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WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# SOIL EROSION AND SEDIMENT CONTROL PLAN

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

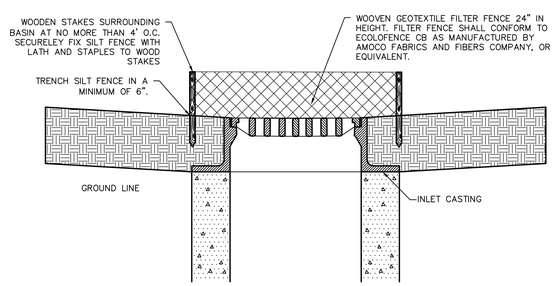
REVISIONS

SCALE 0 60 120
SCALE: 1" = 120'

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 83 | |

## SESC AND MAINTENANCE NOTES

1. ALL EROSION AND SEDIMENTATION CONTROL WORK SHALL CONFORM TO THE STANDARDS AND SPECIFICATIONS OF THE TOWNSHIP AND COUNTY.
2. EROSION AND ANY SEDIMENTATION FROM WORK ON THIS SITE SHALL BE CONTAINED ON THE SITE AND NOT ALLOWED TO COLLECT ON ANY OFF SITE AREAS OR IN WATERWAYS. WATERWAYS INCLUDE NATURAL AND MAN-MADE OPEN DITCHES, STREAMS, STORM DRAINS, LAKES AND PONDS.
3. STAGING OF THE WORK WILL BE DONE BY THE LANDOWNER OR LANDOWNER'S REPRESENTATIVE AS DIRECTED IN THESE PLANS, AND AS REQUIRED TO ENSURE PROGRESSIVE STABILIZATION OF DISTURBED EARTH CHANGE.
4. THE LANDOWNER OR LANDOWNER'S REPRESENTATIVE SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF SOIL EROSION AND SEDIMENTATION CONTROL DEVICES.
5. THE LANDOWNER OR LANDOWNER'S REPRESENTATIVE SHALL IMPLEMENT AND MAINTAIN THE SOIL EROSION CONTROL MEASURES AS SHOWN ON THE PLANS BEFORE, AND AT ALL TIMES DURING CONSTRUCTION ON THIS PROJECT. ANY MODIFICATIONS OR ADDITIONS TO SOIL EROSION CONTROL MEASURES DUE TO CONSTRUCTION OR CHANGED CONDITIONS SHALL BE COMPLIED WITH AS REQUIRED OR DIRECTED BY THE TOWNSHIP AND COUNTY.
6. INSTALL A CRUSHED CONCRETE ACCESS DRIVE PLACED ON GEOTEXTILE FABRIC AS INDICATED ON THE PLAN.
9. INSTALL SILT FENCE AS INDICATED ON THE PLAN AND AT ADDITIONAL AREAS AS NECESSARY.
   A. SILT FENCE SHALL BE INSTALLED PER DETAIL.
   B. BUILD UP OF SEDIMENT SHALL BE REMOVED WHEN SEDIMENT ACCUMULATES TO 1-1/3 TO 1-1/2 OF THE HEIGHT OF THE SILT FENCE.
   C. IF SILT FENCE FABRIC DECOMPOSES OR BECOMES INEFFECTIVE PRIOR TO THE END OF ITS EXPECTED USABLE LIFE AND THE BARRIER IS STILL REQUIRED, THE SILT FENCE SHALL BE REPLACED PROMPTLY.
   D. SILT FENCE SHALL BE INSPECTED WEEKLY UNDER NORMAL CONDITIONS, WITHIN 24 HOURS OF RAINFALL AND DAILY DURING A PROLONGED RAIN EVENT. REQUIRED MAINTENANCE SHALL BE PROVIDED PROMPTLY.
10. INSTALL INLET FILTERS ON ALL PAVEMENT CATCH BASINS PER DETAIL.
   A. INLET FILTERS SHALL BE INSPECTED WEEKLY UNDER NORMAL CONDITIONS, WITHIN 24 HOURS OF A RAINFALL AND DAILY DURING A PROLONGED RAIN EVENT.
   B. BUILDUP OF SEDIMENT AND DEBRIS SHALL BE REMOVED PROMPTLY.
   C. IF FABRIC DECOMPOSES OR BECOMES INEFFECTIVE PRIOR TO THE END OF ITS EXPECTED USABLE LIFE AND THE BARRIER IS STILL REQUIRED, THE FABRIC SHALL BE REPLACED PROMPTLY.
11. INSTALL DRAIN GUARD ON ALL CATCH BASINS PER DETAIL, SEED OR SOD THE AREA BETWEEN THE SILT FENCE AND THE INLET.
   A. DRAIN GUARDS SHALL BE INSPECTED WEEKLY UNDER NORMAL CONDITIONS, WITHIN 24 HOURS OF RAINFALL AND DURING A PROLONGED RAIN EVENT.
   B. BUILDUP OF SEDIMENT SHALL BE REMOVED WHEN SEDIMENT ACCUMULATES TO 1-1/3 TO 1-1/2 OF THE HEIGHT OF THE SILT FENCE
   C. IF FABRIC DECOMPOSES OR BECOMES INEFFECTIVE PRIOR TO THE END OF ITS EXPECTED USABLE LIFE AND THE BARRIER IS STILL REQUIRED, THE SILT FENCE SHALL BE REPLACED PROMPTLY.
12. INSTALL A DESIGNATED CONCRETE WASHOUT CONTAINMENT AREA AS NECESSARY.
13. INLET SEDIMENT TRAPS AND ALL DITCH SEDIMENT TRAPS SHALL BE INSPECTED DAILY. THE SEDIMENT PITS SHALL BE CLEANED OUT WHEN HALF FULL, OR AS DIRECTED BY THE MACOMB COUNTY PUBLIC WORKS OFFICE.
14. DETENTION /RETENTION /SILTATION PONDS.
   A. INSTALL SILT FENCE AROUND TOP OF BANK OF DETENTION POND.
   B. SEED/MULCH BANKS OF POND USING MULCH BLANKET IMMEDIATELY AFTER EXCAVATION. ALL PONDS MUST BE STABILIZED PRIOR TO BEING PLACED IN SERVICE.
   C. THE POND MUST BE CLEANED OF SEDIMENT AND OTHER DEBRIS PRIOR TO FINALIZATION OF THE PERMIT. ANY AREAS LACKING VEGETATION MUST BE REPAIRED BEFORE FINAL APPROVAL FOR THE PROJECT IS GRANTED.
15. UTILITIES
   A. THE ROAD RIGHT OF WAY MUST BE SEEDED AND MULCHED WITHIN 5 CALENDAR DAYS AFTER UTILITIES HAVE BEEN INSTALLED. IF THIS IS NOT POSSIBLE, ALL SESC MEASURES MUST STAY IN PLACE AND MUST BE MAINTAINED UNTIL PERMANENT STABILIZATION IS COMPLETED.
16. ALL STOCKPILED SOILS SHALL BE MAINTAINED IN SUCH A WAY AS TO PREVENT EROSION FROM LEAVING THE SITE. IF THE STOCKPILE WILL BE ON SITE FOR MORE THAN 30 DAYS, THEN THE STOCKPILE MUST BE SEEDED. SILT FENCE MUST BE INSTALLED AROUND THE PERIMETER OF THE STOCKPILE.
17. IMMEDIATELY AFTER SEEDING, MULCH ALL SEEDED AREAS WITH UN-WEATHERED SMALL GRAIN STRAW, SPREAD UNIFORMLY AT THE RATE OF 1 TO 2 TONS PER ACRE OR 100 POUNDS (2-3 BALES) PER 1,000 SQUARE FEET. THIS MULCH SHOULD BE ANCHORED WITH DISC TYPE MULCH ANCHORING TOOL OR OTHER MEANS AS APPROVED BY THE MACOMB COUNTY PUBLIC WORKS OFFICE. MULCH MATTING MAY BE USED IN LIEU OF LOOSE MULCH.
18. IF ANY DEWATERING IS NEEDED, IT SHALL BE DISCHARGED THROUGH A FILTER BAG OVER A WELL-VEGETATED AREA. THE PUMP MUST DISCHARGE AT A NON-EROSIVE VELOCITY AND PREFERABLY DIRECTLY TO A SEDIMENT POND. IF NECESSARY, AN APPROVED ENERGY DISSIPATER MAY BE USED. CONTRACTOR SHALL NOT PUMP SEDIMENT-LADEN WATER DIRECTLY TO LAKES, STREAMS, COUNTY DRAINS, STORM DRAINS, WETLANDS, OR OTHER ENVIRONMENTALLY SENSITIVE AREA.
19. ALL DIRT TRACKED ONTO ANY ROADWAY SHALL BE REMOVED IMMEDIATELY.
20. STREETS AND OR PARKING AREAS WILL BE SCRAPED ON A DAILY BASIS AND SWEPT AT A MINIMUM OF ONCE PER WEEK BY THE LANDOWNER OR LANDOWNER'S REPRESENTATIVE. DURING DRY PERIODS, ALL DISTURBED AREAS SHALL BE WATERED FOR DUST CONTROL.
21. PERMANENT SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, AND/OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN 5 CALENDAR DAYS AFTER FINAL GRADING, OR THE FINAL EARTH CHANGE HAS BEEN COMPLETED. WHEN IT IS NOT POSSIBLE TO PERMANENTLY STABILIZE A DISTURBED AREA AFTER EARTH CHANGE ACTIVITY CEASES, TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE IMPLEMENTED IMMEDIATELY. ALL TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED. ALL PERMANENT SOIL EROSION CONTROL MEASURES WILL BE IMPLEMENTED AND ESTABLISHED BEFORE A CERTIFICATE OF COMPLIANCE IS ISSUED.
22. FINAL GRADE, ESTABLISH VEGETATION AND OR LANDSCAPE ALL DISTURBED AREAS NOT BUILT OR PAVED UPON.
23. REMOVE ALL TEMPORARY SOIL EROSION DEVICES AFTER PERMANENT STABILIZATION IS ESTABLISHED.
24. SEE SHEET 92 FOR ADDITIONAL S.E.S.C. DETAILS AND REQUIREMENTS.
25. A PERMANENT VERTICAL DEPTH MARKER SHALL BE INSTALLED IN THE FOREBAY TO MEASURE SEDIMENT DEPOSITION OVER TIME, WITH ANNUAL DOCUMENTATION. SEDIMENT TO BE REMOVED WHEN SEDIMENT REACHES A DEPTH OF EQUAL TO 50% OF THE DEPTH OF THE FOREBAY OR 12 INCHES, WHICHEVER IS LESS.




**REAR YARD STORM SEWER INLET FILTER**
NO SCALE

## SOIL EROSION CONTROL MAINTENANCE TASKS AND SCHEDULE

### DURING CONSTRUCTION
TO BE PERFORMED BY CONTRACTOR

| COMPONENTS | PAVED AREAS | PERVIOUS AREAS | RIP-RAP/SILT FENCE | STORM DRAINAGE SYSTEM | OUTLET STRUCTURE | SEDIMENT FOREBAY | DETENTION AREA | | | SCHEDULE |
|---|---|---|---|---|---|---|---|---|---|---|
| INSPECT FOR SEDIMENT ACCUMULATION | X | | X | X | X | X | X | | | WEEKLY |
| REMOVAL OF SEDIMENT ACCUMULATION | X | | X | X | X | X | X | | | AS NEEDED* AND PRIOR TO TURNOVER |
| INSPECT FOR FLOATABLES AND DEBRIS | | | | X | X | X | X | | | QUARTERLY |
| CLEANING FOR FLOATABLES AND DEBRIS | | | | X | X | X | X | | | QUARTERLY AND AT TURNOVER |
| INSPECTION FOR EROSION | | X | X | | | | | | | WEEKLY |
| REESTABLISH PERMANENT VEGETATION ON ERODED SLOPES | | X | | | | | | | | AS NEEDED* AND PRIOR TO TURNOVER |
| CLEAN DRIVES AND PARKING LOTS | X | | | | | | | | | WEEKLY OR AS DETERMINED BY PERMITTING AGENCY |
| WATER DISTURBED AREAS TO PROVIDE DUST CONTROL | ALL DISTURBED AREAS OF SITE | | | | | | | | | AS NEEDED |
| INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND COMPARE TO AS-BUILT PLANS (BY A PROFESSIONAL ENGINEER REPORTING TO THE OWNER) | | | X | X | | | X | X | X | ANNUALLY AND AT TURNOVER |
| MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED | | | X | X | | | X | X | X | AS NEEDED |

• "AS NEEDED" MEANS WHEN SEDIMENT HAS ACCUMULATED TO A MAXIMUM OF ONE FOOT DEPTH

### LONG TERM STORM WATER & BUDGET

1. THE CONDOMINIUM ASSOCIATION SHALL BE FIRST IN LINE OF RESPONSIBILITY FOR MAINTAINING ALL OF ROAD STORM SEWERS AND DETENTION BASINS
2. A CHAPTER 18 DRAINAGE DISTRICT WILL BE ESTABLISHED FOR THE ENTIRE PROJECT GIVING THE WCWRC STATUTORY RESPONSIBILITY FOR ULTIMATE RESPONSIBILITY

| TASKS / COMPONENTS | PAVED AREAS | PERVIOUS AREAS | RIP-RAP | STORM DRAINAGE SYSTEM | SEDIMENT FOREBAYS | INFILTRATION BASINS | OUTLET CONTROL STR | INFILTRATION TRENCHES | | | SCHEDULE | ANNUAL COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INSPECT FOR SEDIMENT ACCUMULATION | X | | X | X | X | X | X | X | | | SEMI-ANUALLY/AS NEEDED* | $100.00 |
| REMOVAL OF SEDIMENT ACCUMULATION | X | | X | X | X | X | X | X | | | 5-10 YRS/AS NEEDED* | $200.00 |
| INSPECT FOR FLOATABLES AND DEBRIS | | | | X | X | X | X | | | | ANNUALLY | $100.00 |
| CLEANING FOR FLOATABLES AND DEBRIS | | | | X | X | X | X | | | | ANNUALLY | $300.00 |
| INSPECTION FOR EROSION | | X | X | | | X | | X | | | ANNUALLY/AFTER MAJOR STORMS | $100.00 |
| REESTABLISH PERMANENT VEGETATION ON ERODED SLOPES | | X | | | | X | | | | | AS NEEDED | $300.00 |
| CLEAN DRIVES AND PARKING LOTS | X | | | | | | | | | | ANNUALLY | $500.00 |
| MOWING | | X | | | | | | X | | | 0-2 TIMES PER YEAR | $400.00 |
| INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND COMPARE TO AS-BUILT PLANS (BY A PROFESSIONAL ENGINEER REPORTING TO THE OWNER) | | | X | X | X | X | X | X | | | ANNUALLY | $100.00 |
| MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED BY ANNUAL WET WEATHER INSPECTION | | | X | X | X | X | X | X | | | AS NEEDED | $100.00 |
| KEEP RECORDS OF ALL INSPECTIONS AND MAINTENANCE ACTIVITIES AND REPORT TO PROPERTY OWNER | | | | | | | | | | | ANNUALLY | $50.00 |
| KEEP RECORDS OF ALL COSTS FOR INSPECTIONS, MAINTENANCE AND REPAIRS. REPORT TO PROPERTY OWNER | | | | | | | | | | | ANNUALLY | $50.00 |
| PROPERTY OWNER REVIEWS COST EFFECTIVENESS OF THE PREVENTATIVE MAINTENANCE PROGRAM AND MAKES NECESSARY ADJUSTMENTS | | | | | | | | | | | ANNUALLY | $50.00 |
| OWNER TO HAVE A PROFESSIONAL ENGINEER CARRY OUT EMERGENCY INSPECTIONS UPON IDENTIFICATION OF SEVERE PROBLEMS | | | | | | | | | | | AS NEEDED | $150.00 |

* "AS NEEDED" MEANS WHEN SEDIMENT HAS ACCUMULATED TO A MAXIMUM OF ONE FOOT DEPTH

### MAINTENANCE TASKS AND SCHEDULE DURING CONSTRUCTION

| TASKS | COMPONENTS: Storm Sewer System | Catch Basin Sumps | Catch Basin Inlet Casings | Ditches and Swales | Outflow Control Structure | Rip-Rap | Filtration Basins | Storm Detention Areas | Wetlands | Emergency Overflow | SCHEDULE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Inspect for sediment accumulation | X | X | X | X | X | X | X | X | X | X | Weekly |
| Removal of sediment accumulation | X | X | X | X | X | X | X | X | X | X | As needed* & prior to turnover |
| Inspect for floatables and debris | | X | | X | X | | X | X | | | Quarterly |
| Cleaning of floatables and debris | | X | | X | X | | X | X | | | Quarterly & at turnover |
| Inspection for erosion | | | | X | X | X | X | X | | | Weekly |
| Re-establish permanent vegetation on eroded slopes | | | | X | X | | X | X | | | As needed & at turnover |
| Replacement of Stone | | | | | X | X | | | | | As needed* & prior to turnover |
| Mowing | | | | X | | | X | X | | | 0 to 2 times per year |
| Inspect Stormwater system components during wet weather and compare to as-built plans | | | | X | X | X | X | X | | | Annually and at turnover |
| Make adjustments as determined by annual wet weather inspection | | | | X | X | X | X | X | | | As needed |
| *as needed means when sediment has accumulated to a maximum of one foot depth* | | | | | | | | | | | |

NOTE: A 433 DRAINAGE DISTRICT WILL BE REQUIRED.

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SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

SOIL EROSION AND SEDIMENT CONTROL PLAN

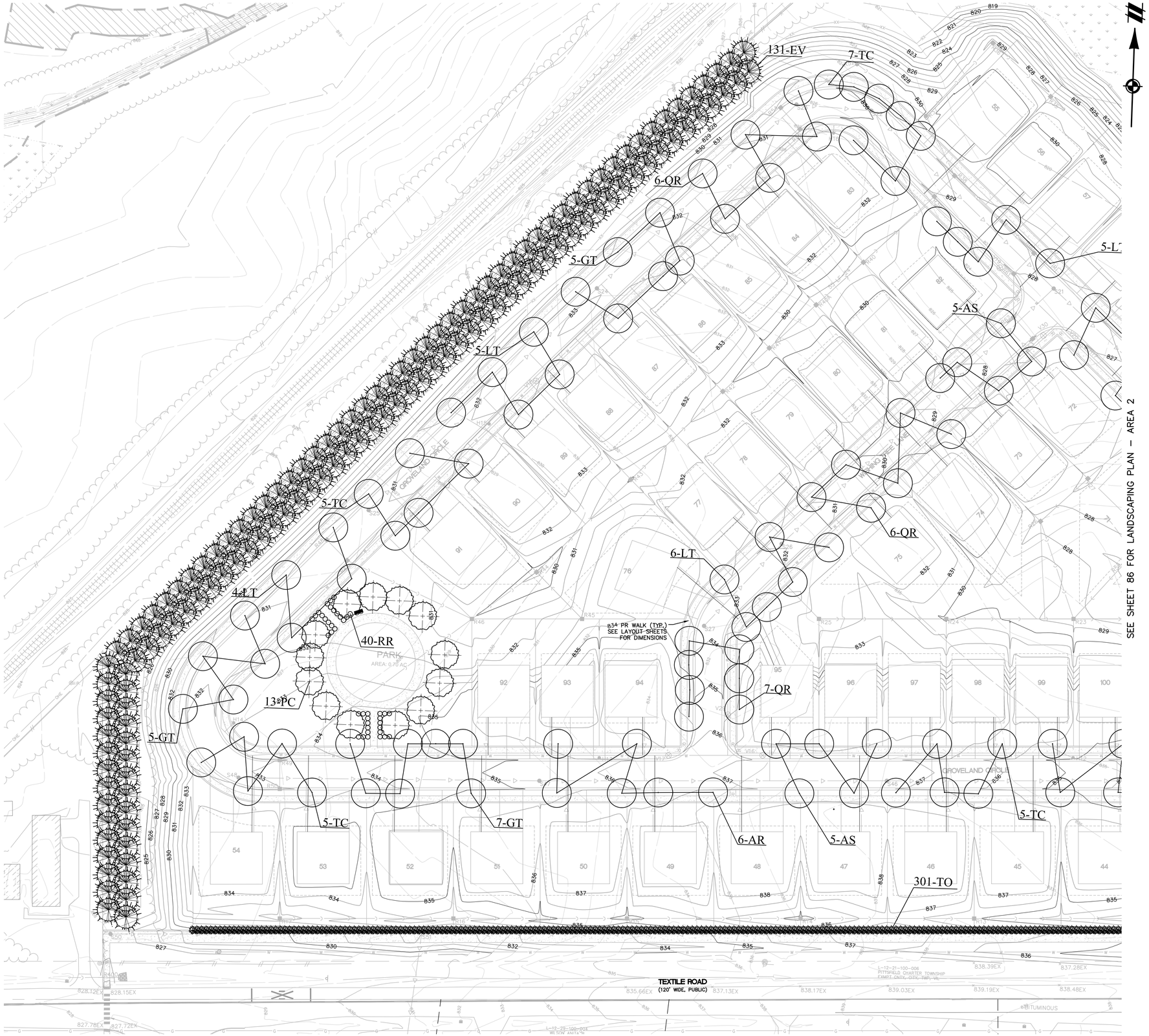
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

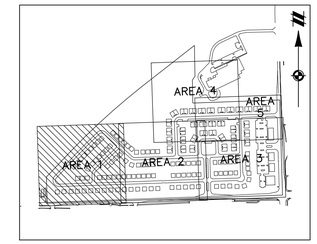
REVISIONS

SCALE 0 — — —
NO SCALE

DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 84




SEE SHEET 86 FOR LANDSCAPING PLAN – AREA 2




**KEYMAP**
1" = 800'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | EXISTING EASEMENT |
| | SECTION LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| S | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| | EXISTING FLOOD ZONE |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| S | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED SETBACK |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING WELL |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

811
Know what's **below.**
**Call** before you dig.

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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

# LANDSCAPING PLAN – AREA 1

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

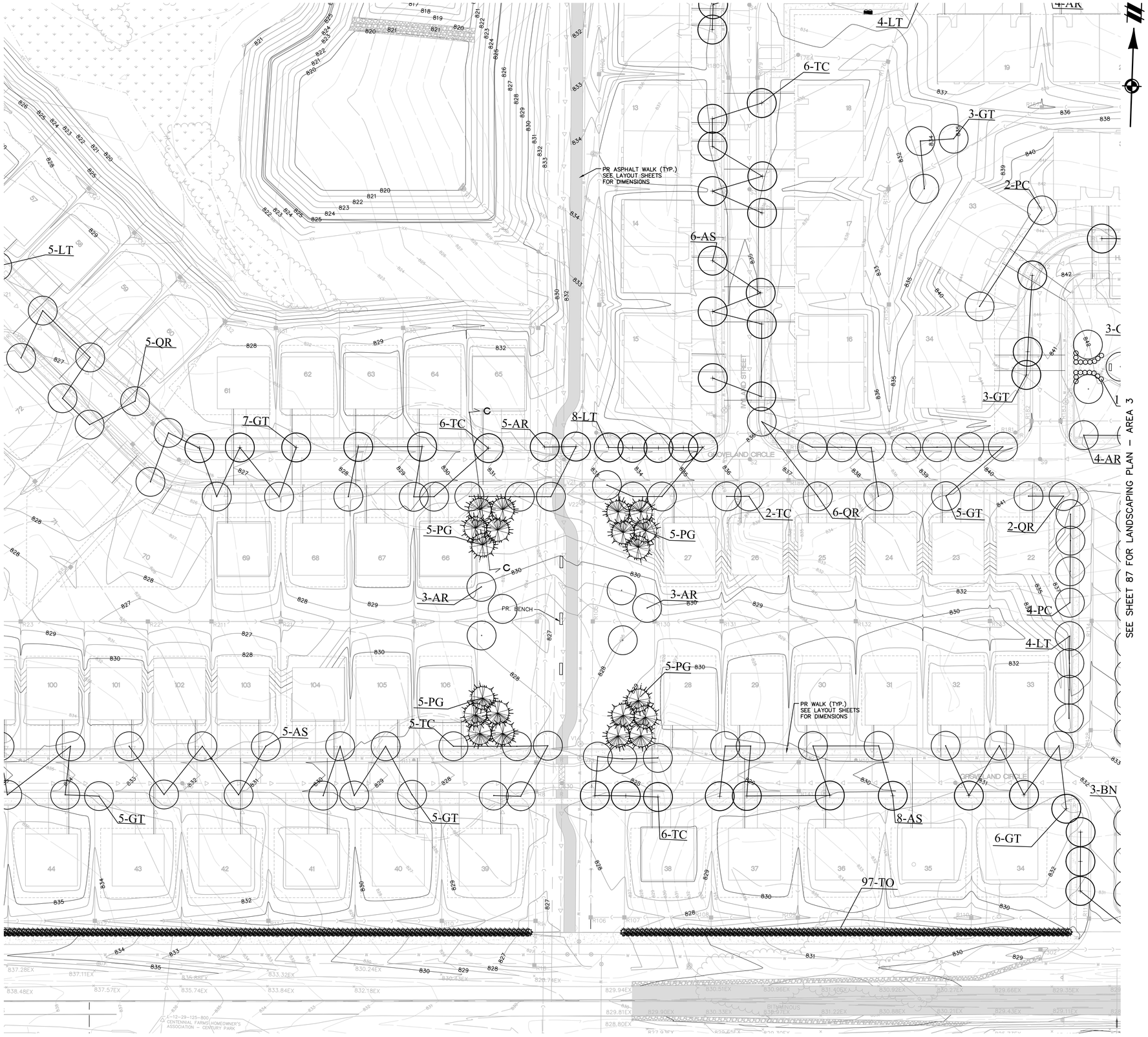
SCALE 0 20 40
1" = 40 FEET

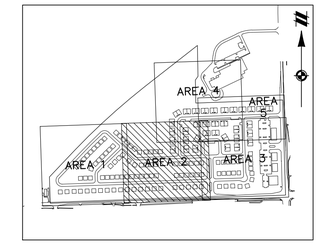
| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 85 | |

SEE SHEET 88 FOR LANDSCAPING PLAN – AREA 4

SEE SHEET 85 FOR LANDSCAPING PLAN – AREA 1

SEE SHEET 87 FOR LANDSCAPING PLAN – AREA 3




KEYMAP
1" = 800'

## LEGEND

- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- EXISTING WETLAND LINE
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING OVERHEAD TELEPHONE LINE
- EXISTING FENCE
- EXISTING CURB AND GUTTER
- EXISTING EASEMENT
- SECTION LINE
- BOUNDARY LINE
- EXISTING STORM
- EXISTING WATER MAIN
- EXISTING SANITARY
- EXISTING GAS
- EXISTING RAILROAD
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- PROPOSED CENTERLINE
- PROPOSED ELEVATION
- EXISTING WELL
- EXISTING SIGN
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- EXISTING CABLE MARKER
- EXISTING TELEPHONE RISER
- SECTION CORNER
- EXISTING SANITARY MANHOLE
- EXISTING CATCH BASIN/INLET
- EXISTING WATER MANHOLE
- EXISTING WETLAND
- EXISTING RIP–RAP
- PROPOSED CATCH BASIN/INLET
- PROPOSED OUTLET
- PROPOSED MANHOLE
- PROPOSED WATER VALVE IN WELL
- PROPOSED FIRE HYDRANT

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| DR. SK | CH. SS |
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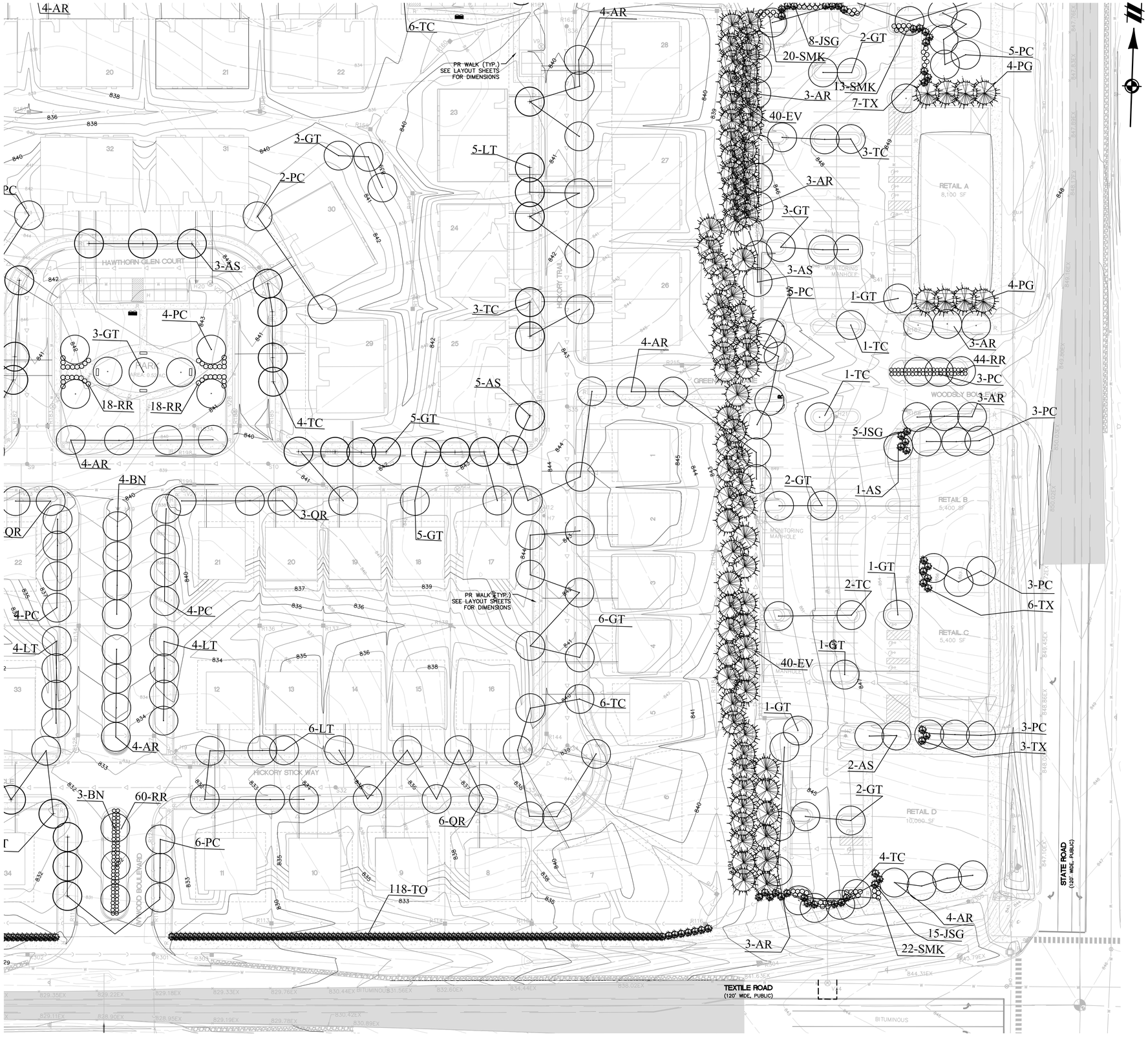
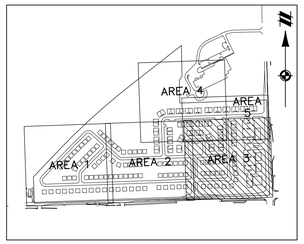
| JOB 13001886.10 | |
| SHEET NO. 86 | |

SEE SHEET 89 FOR LANDSCAPING PLAN – AREA 5

SEE SHEET 86 FOR LANDSCAPING PLAN – AREA 2

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| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
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| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | EXISTING EASEMENT |
| | SECTION LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| S | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| | EXISTING FLOOD ZONE |
| 801 | PROPOSED 1' CONTOUR |
| 800 | PROPOSED 5' CONTOUR |
| C | PROPOSED STORM SEWER |
| S | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED SETBACK |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING WELL |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
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PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

LANDSCAPING PLAN – AREA 3

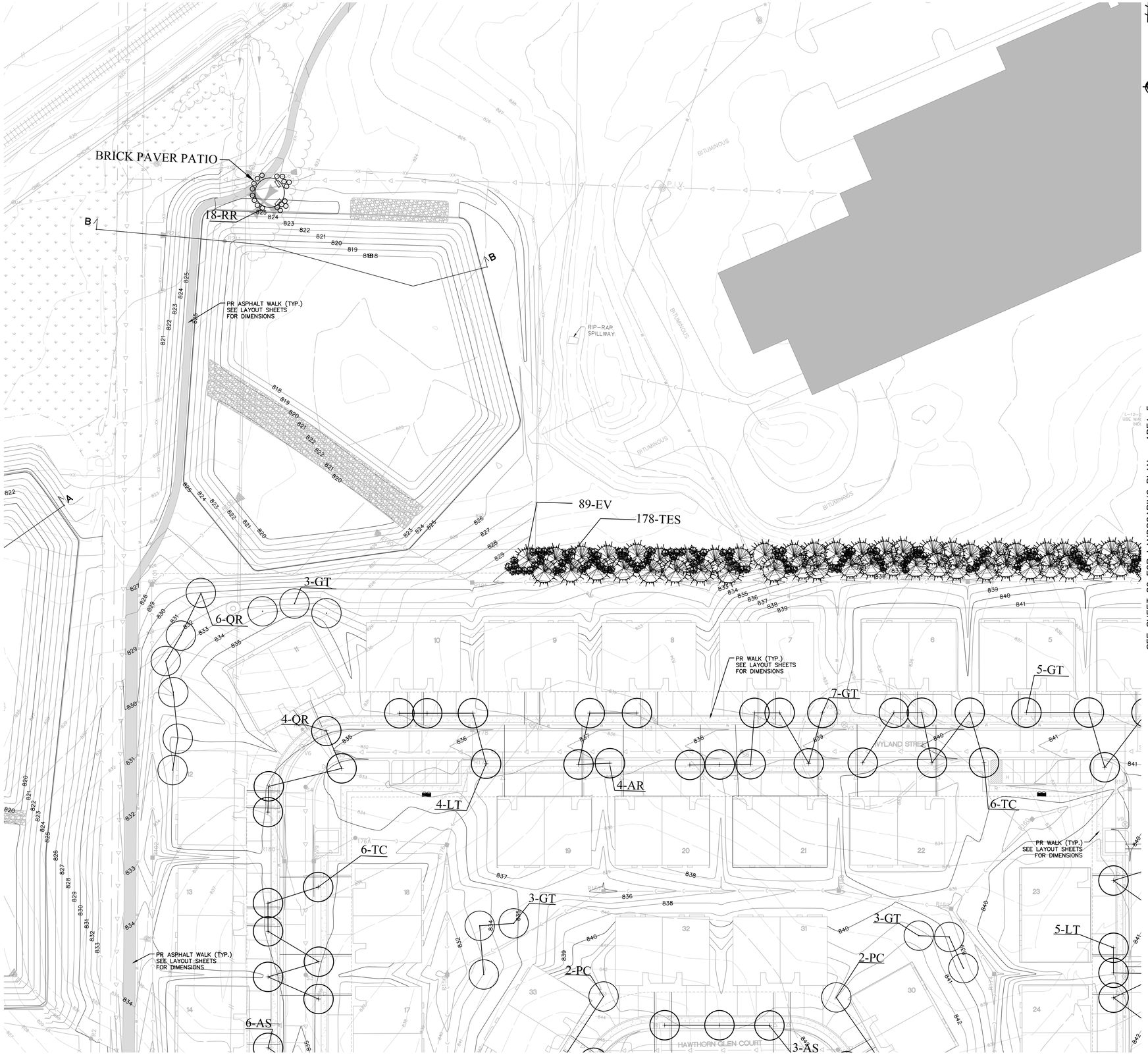
DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP. WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

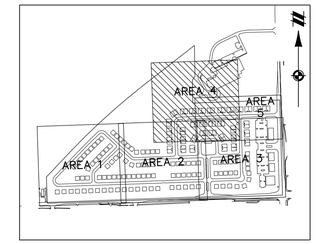
SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
| P.M. MB | |
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 87 | |




SEE SHEET 89 FOR LANDSCAPING PLAN – AREA 5

SEE SHEET 86 FOR LANDSCAPING PLAN – AREA 2




KEYMAP
1" = 800'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE | EXISTING OVERHEAD ELECTRICAL LINE |
| OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | EXISTING EASEMENT |
| | SECTION LINE |
| | BOUNDARY LINE |
| | EXISTING STORM |
| W | EXISTING WATER MAIN |
| | EXISTING SANITARY |
| G | EXISTING GAS |
| | EXISTING RAILROAD |
| | EXISTING FLOOD ZONE |
| 801 | PROPOSED 1' CONTOUR |
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| | PROPOSED STORM SEWER |
| | PROPOSED SANITARY |
| W | PROPOSED WATER MAIN |
| | PROPOSED LOT |
| | PROPOSED SETBACK |
| | PROPOSED EASEMENT |
| | PROPOSED R.O.W. |
| | PROPOSED BACK/EDGE CURB |
| | PROPOSED CENTERLINE |
| | PROPOSED ELEVATION |
| | EXISTING WELL |
| | EXISTING SIGN |
| U.P. | EXISTING UTILITY POLE |
| | EXISTING FIRE HYDRANT |
| CATV | EXISTING CABLE MARKER |
| T | EXISTING TELEPHONE RISER |
| | SECTION CORNER |
| | EXISTING SANITARY MANHOLE |
| | EXISTING CATCH BASIN/INLET |
| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
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FINAL SITE PLAN

LANDSCAPING PLAN – AREA 4

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP, WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 20 40
1" = 40 FEET

| | |
|---|---|
| DR. SK | CH. SS |
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| BOOK | |
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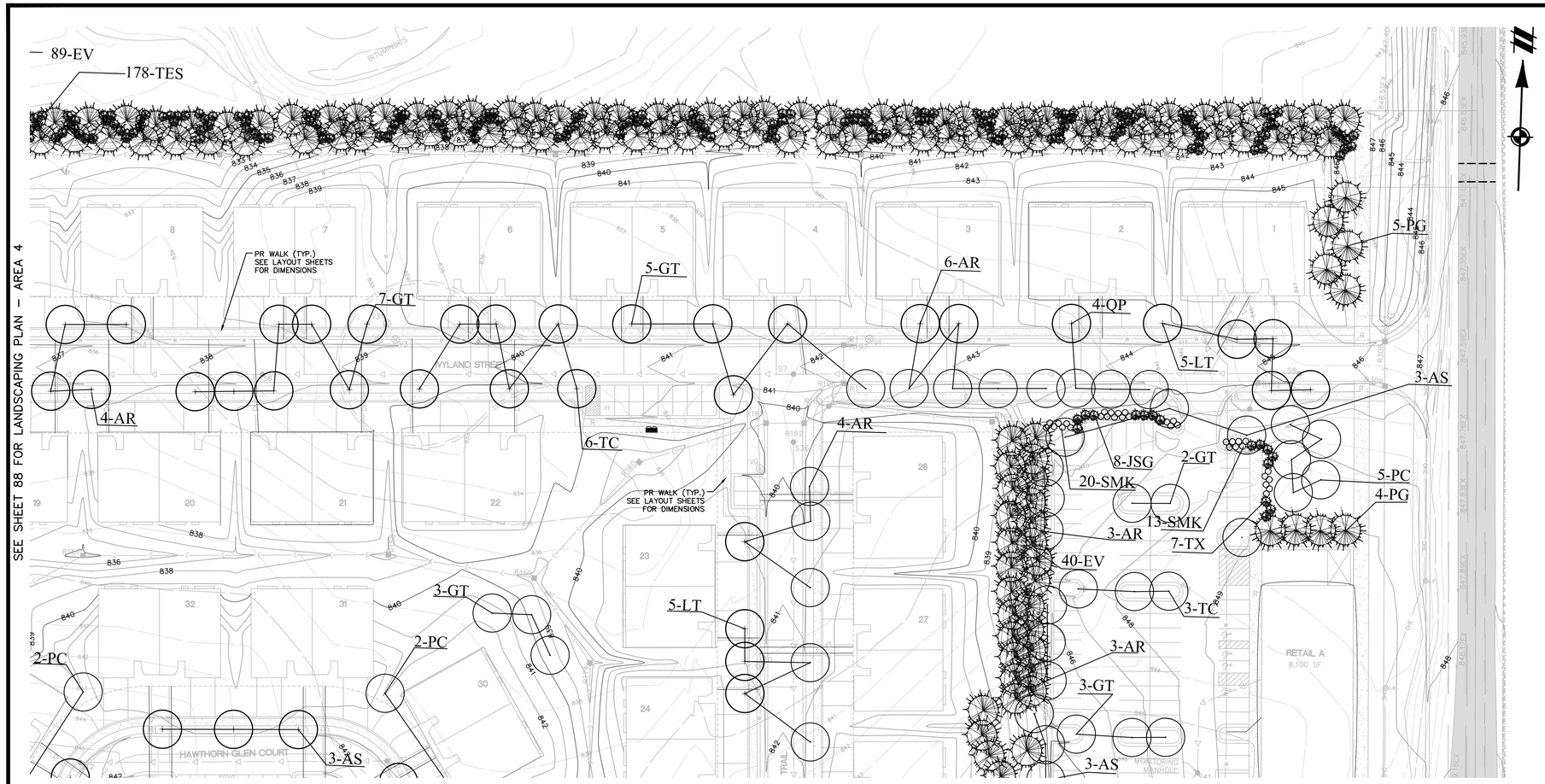
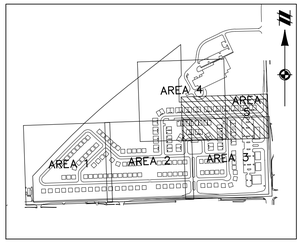



SEE SHEET 87 FOR LANDSCAPING PLAN – AREA 3




KEYMAP
1" = 800'

## LEGEND

| | |
|---|---|
| 801 | EXISTING 1' CONTOUR |
| 800 | EXISTING 5' CONTOUR |
| | EXISTING WETLAND LINE |
| OHE / OHT | EXISTING OVERHEAD ELECTRICAL LINE / EXISTING OVERHEAD TELEPHONE LINE |
| | EXISTING FENCE |
| | EXISTING CURB AND GUTTER |
| | EXISTING EASEMENT |
| | SECTION LINE |
| | BOUNDARY LINE |
| C | EXISTING STORM |
| W | EXISTING WATER MAIN |
| S | EXISTING SANITARY |
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| | EXISTING WATER MANHOLE |
| | EXISTING WETLAND |
| | EXISTING RIP-RAP |
| | PROPOSED CATCH BASIN/INLET |
| | PROPOSED OUTLET |
| | PROPOSED MANHOLE |
| | PROPOSED WATER VALVE IN WELL |
| | PROPOSED FIRE HYDRANT |

## PLANT LIST & LANDSCAPING

### CANOPY TREES

| QTY | KEY | BOTANICAL NAME | COMMON NAME | SIZE | NOTES |
|---|---|---|---|---|---|
| 71 | AR | ACER RUBRUM | RED MAPLE | 2.5" CAL. | B & B |
| 10 | BN | BETULA NIGRA 'HERITAGE' | HERITAGE RIVER BIRCH | 2.5" CAL | B & B |
| 40 | AS | ACER SCCHARUM 'LEGACY' | LEGACY SUGAR MAPLE | 2.5" CAL. | B & B |
| 57 | PC | PYRUS CALLERYANA 'CHANTICLEER' | CHANTICLEER PEAR | 2.5" CAL. | B & B |
| 4 | QP | QUERCUS PALUSTRIS | PIN OAK | 2.5" CAL. | B & B |
| 45 | QR | QUERCUS RUBRUM | RED OAK | 2.5" CAL. | B & B |
| 83 | TC | TILIA CORDATA | LITTLELEAF LINDEN | 2.5" CAL. | B & B |
| 56 | LT | LIRIODENDRON TULIPIFERA | TULIP TREE | 2.5" CAL. | B & B |
| 92 | GT | GLEDITSIA TRIACANTHOS VINERMIS | HONEY LOCUST | 2.5" CAL. | B & B |

### EVERGREEN TREES

| QTY | KEY | BOTANICAL NAME | COMMON NAME | SIZE | NOTES |
|---|---|---|---|---|---|
| 33 | PG | PICEA GLUACA | WHITE SPRUCE | 6–7' HT. | B&B |
| 340 | EV | EVERGREEN TREES (SEE NOTE 4) | MIX OF SPECIES | 6–7' HT. | B&B |
| ≤120 | | PICEA PUNGENS | COLORADO SPRUCE | | |
| ≤120 | | PICEA PUNGENS 'GLUACA' | BLUE SPRUCE | | |
| ≤120 | | PICEA ABIES | NORWAY SPRUCE | | |
| ≤120 | | PINUS STROBUS | WHITE PINE | | |
| ≤120 | | PINUS NIGRA | AUSTRIAN PINE | | |
| 178 | TES | NARROW EVERGREEN TREES (SEE NOTE 4) | MIX OF SPECIES | 4'HT. | 5 GAL CONT. |
| ≤60 | | THUJA OCCIDENTALIS 'EMERALD GREEN' | EMERALD GREEN ARBORVITAE | | |
| ≤60 | | THUJA PLICATA ' GREEN GIANT' | GREEN GIANT WESTERN CEDAR | | |
| ≤60 | | JUNIPERUS VIRGINIANA 'BURKII' | BURK'S EASTERN CEDAR | | |
| ≤60 | | JUNIPERUS SCOPULORUM 'SUTHERLAND' | SUTHERLAND COLORADO RED CEDAR | | |
| 516 | TO | THUJA OCCIDENTALIS 'EMERALD' | EMERALD ARBORVITAE | 4'HT. | 5 GAL CONT. |

### SHRUBS

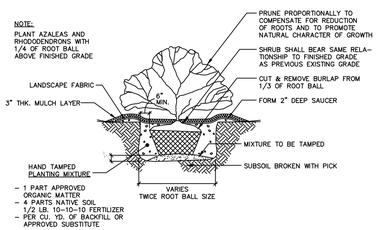
| QTY | KEY | BOTANICAL NAME | COMMON NAME | SIZE | NOTES |
|---|---|---|---|---|---|
| 28 | JSG | JUNIPERUS 'SEA GREEN' | SEA GREEN JUNIPER | 24" HT. | 5 GAL CONT. |
| 16 | TX | TAXUS X MEDIA 'WARDII' | WARD'S YEW | 24" HT. | B&B |
| 83 | SMK | SYRINGA 'MISS KIM' | MISS KIM LILAC | 24" HT. | 5 GAL CONT. |
| 198 | RR | ROSA RADRAZZ | KNOCKOUT ROSE | 24" O.C. | CONT. |

## OVERALL LANDSCAPING REQUIREMENT CALCULATIONS

| TYPE | REQUIREMENT | CALCULATION | AMOUNT REQUIRED | AMOUNT PROPOSED |
|---|---|---|---|---|
| CANOPY TREES | 1/8 PARKING SPACES | 159 SPACES/8 | 20 TREES | 26 TREES |
| STREET TREES | 1/50LF RES. FRONTAGE | 17170 LF/50 | 344 TREES | 344 TREES RESIDENTIAL FRONTAGE |
| LANDSCAPE SCREEN (INTERNAL RESIDENTIAL & COMMERCIAL) | | 814 LF/10 | 82 TRESS | 91 TREES |
| LANDSCAPE SCREEN (NORTHERN BOUNDARY) | 1EV TREE/10LF<br>1 NARROW EV TREE/5LF | 1160 LF/10<br>1160 LF/5 | 117 TREES<br>232 TREES | 145 TREES<br>0 TREES |

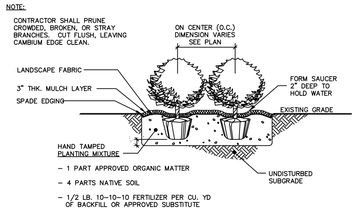
## LANDSCAPE NOTES

1. CONTRACTOR SHALL VERIFY ALL EXISTING AND PROPOSED SITE ELEMENTS AND NOTIFY ARCHITECT OF ANY DISCREPANCIES. SURVEY DATA OF EXISTING CONDITIONS WAS SUPPLIED BY OTHERS.
2. CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND UTILITIES AND NOTIFY ARCHITECT OF ANY CONFLICTS. CONTRACTOR SHALL EXERCISE CAUTION WHEN WORKING IN THE VICINITY OF UNDERGROUND UTILITIES.
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED LANDSCAPE AND IRRIGATION PERMITS.
4. EV EVERGREEN TREES AND TES SHALL BE A MIX OF SPECIES LISTED WITH NO SINGLE SPECIES EXCEEDING $\frac{1}{3}$ OF THE TOTAL AND PLANTED IN GROUPINGS WITH AVERAGE OF 5 TO 7 SPECIES TYPE PER GROUPING.
5. ANTICIPATED PLANTING SCHEDULE: FALL 2017 (BETWEEN SEPT. 1 AND OCT. 31).
6. MAINTENANCE SCHEDULE: LANDSCAPING IS TO BE KEPT IN A NEAT, HEALTHY, RELATIVELY WEED FREE CONDITION IN ACCORDANCE WITH CURRENT INDUSTRY STANDARDS AND PITTSFIELD TOWNSHIP CODE.
   - MULCH: AT INSTALLATION AND AS NEEDED THEREAFTER
   - WEEDS: AT INSTALLATION AND AS NEEDED THEREAFTER
   - PRUNING: AT INSTALLATION AND AS NEEDED THEREAFTER
   - FERTILIZER: AT INSTALLATION AND AS NEEDED THEREAFTER
   - PLANT MATERIAL: DEAD OR DAMAGED (OVER 50%) TO BE REPLACED BY THE END OF THE GROWING SEASON OR THE END OF THE NEXT SEASON IF DEAD/DAMAGED AFTER NOVEMBER 1.
   - MOWING: AS NEEDED



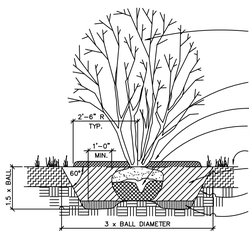

BALLED AND BURLAPPED SHRUB PLANTING DETAIL

SCALE: NTS




CONTAINER SHRUB PLANTING DETAIL

SCALE: NTS

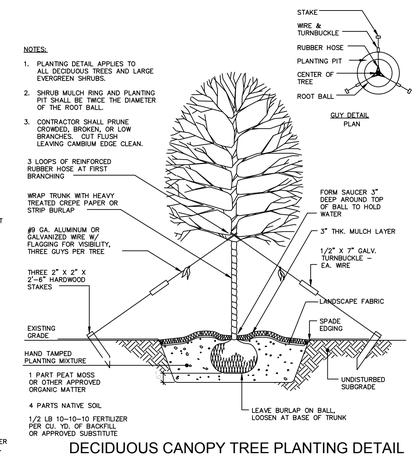



GENERAL NOTES:

IF ROOTBALL IS WRAPPED IN NON–BIODEGRADEABLE BURLAP, REMOVE ENTIRE WRAP AFTER PLACED IN PIT.
WHEN BACKFILLING PLANT PIT, PLACE PLANTING SOIL IN TWO LIFTS. AFTER FIRST LIFT, PUDDLE SOIL IN WITH WATER TO REMOVE ALL AIR POCKETS. PLACE SECOND LIFT AND REPEAT. CONTINUE TO PUDDLE AND FILL AS NECCESSARY.

MULTI-STEMMED TREE PLANTING DETAIL

SCALE: NTS




DECIDUOUS CANOPY TREE PLANTING DETAIL
(2" cal. or greater)

SCALE: NTS

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1" = 40 FEET

| | |
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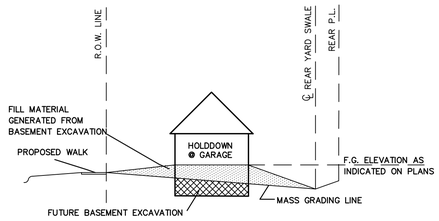
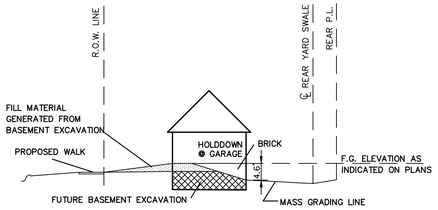
| BOOK | |
| JOB 13001886.10 | |
| SHEET NO. 89 | |



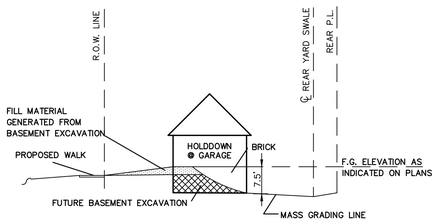

## TYPICAL LOT MASS GRADING SCHEMATIC

NO SCALE



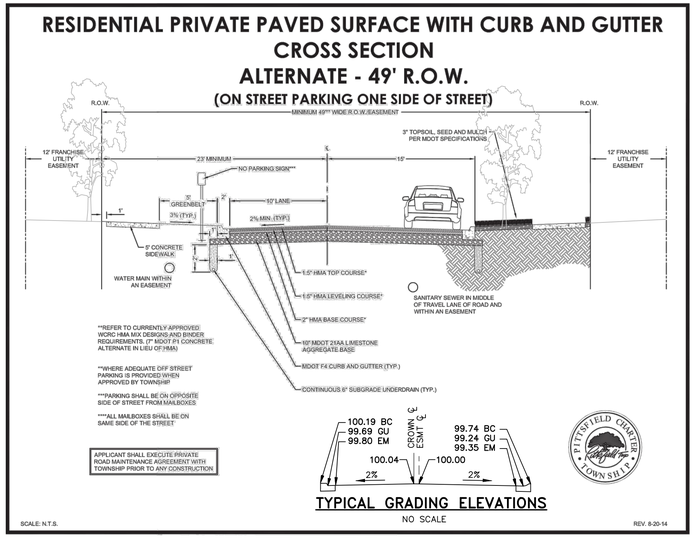

## VIEW OUT (VO) MASS GRADING SCHEMATIC

NO SCALE




## WALK OUT (WO) MASS GRADING SCHEMATIC

NO SCALE

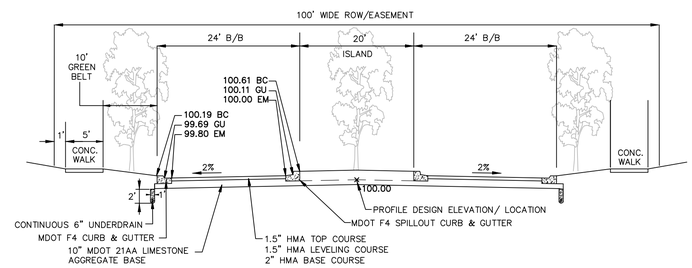



## TYPICAL GRADING ELEVATIONS

NO SCALE

## TYPICAL 49-FT PRIVATE ROAD CROSS SECTION

NO SCALE




## TYPICAL 100-FT WIDE BOULEVARD CROSS SECTION

NO SCALE

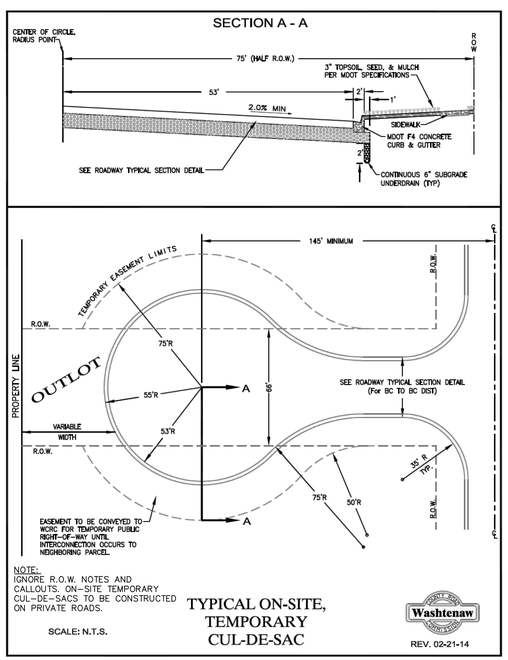
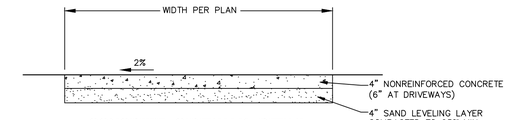
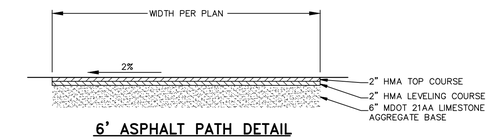



Figure 7: Typical On-site Temporary Cul-de-sac



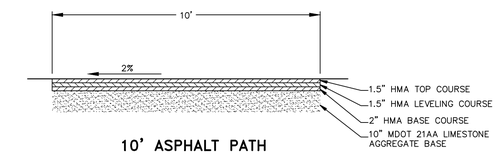

## CONCRETE SIDEWALK DETAIL

NO SCALE



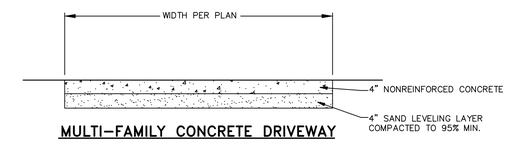

## 6' ASPHALT PATH DETAIL
## 8' ASPHALT PATH DETAIL
## 10' ASPHALT PATH (OUTSIDE SEWER AND WATER)

NO SCALE



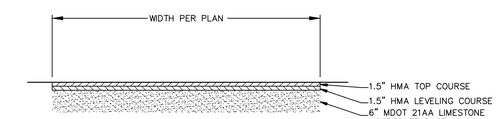

## 10' ASPHALT PATH (ALONG SEWER AND WATER)

NO SCALE



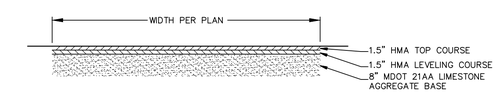

## MULTI-FAMILY CONCRETE DRIVEWAY

NO SCALE



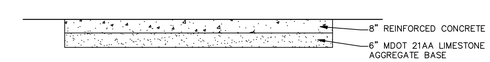

## MULTI-FAMILY ASPHALT DRIVEWAY

NO SCALE




## RETAIL PARKING LOT PAVEMENT SECTION

NO SCALE




## RETAIL CONCRETE PAVEMENT SECTION (DUMPSTER DRIVEWAYS)

NO SCALE

## SP-2 SIGN DETAIL

NO SCALE

## R1-1 SIGN DETAIL

NO SCALE

## W11-2 & W11-7P SIGN DETAIL

NO SCALE

## W16-9P SIGN DETAIL

NO SCALE

811 Know what's below. Call before you dig.

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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866.850.4200 www.atwell-group.com
311 N. MAIN ST.
ANN ARBOR, MI 48104
734.994.4000

SECTION 20 & 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK
FINAL SITE PLAN

STANDARD DETAILS

DATE
NOVEMBER 5, 2015

11/19/2015: WCRC SUBMITTAL
1/18/2016: TWP., WETLAND REVIEW
2/9/2016: TWP/WCWRC/WCRC

REVISIONS

SCALE 0 — — —
NO SCALE

| | |
|---|---|
| DR. | SK |
| CH. | SS |
| P.M. | MB |
| BOOK | |
| JOB | 13001886.10 |
| SHEET NO. | 90 |

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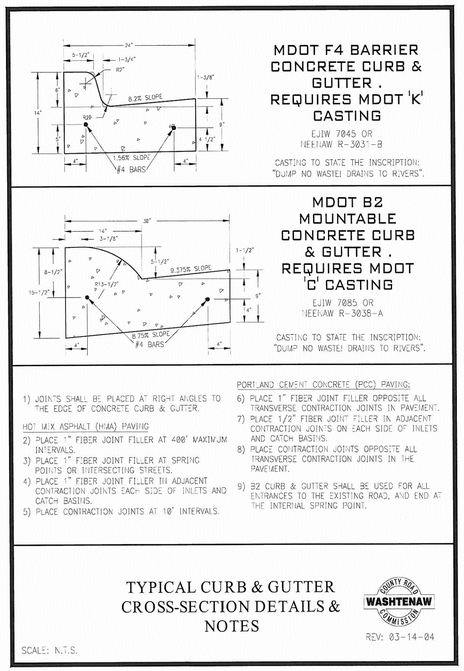
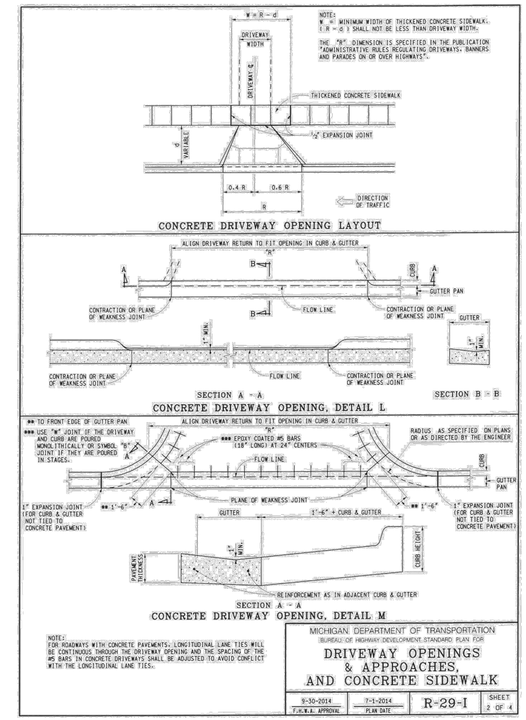
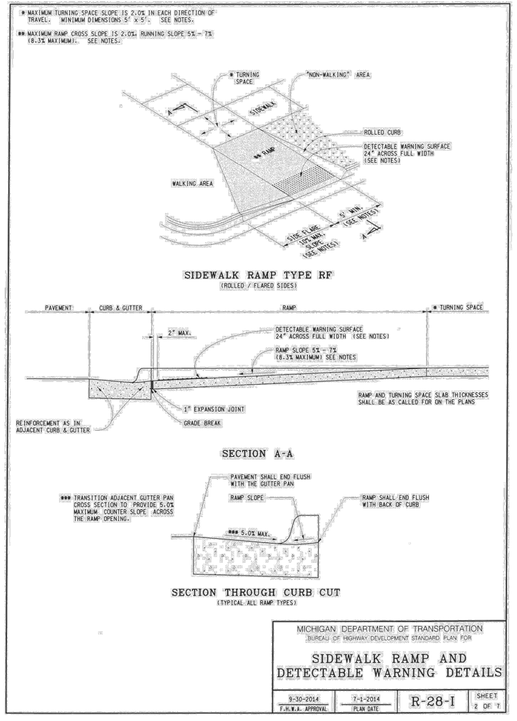
BOARD–ON–BOARD FENCE TYPICAL DETAIL

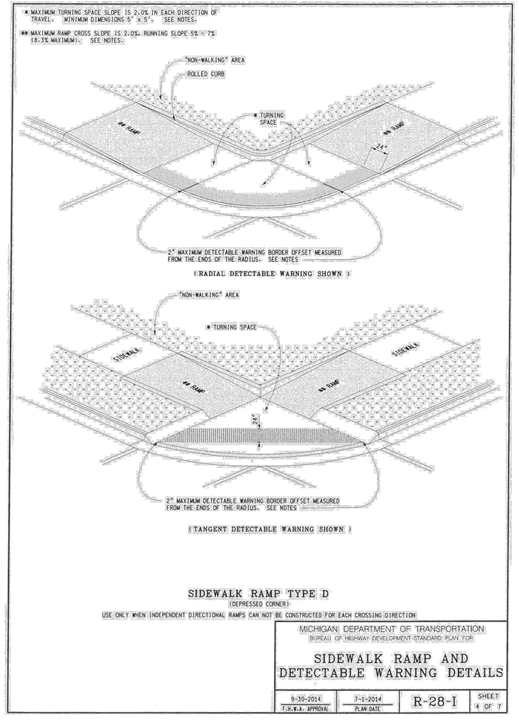
PARK BENCH TYPICAL DETAIL

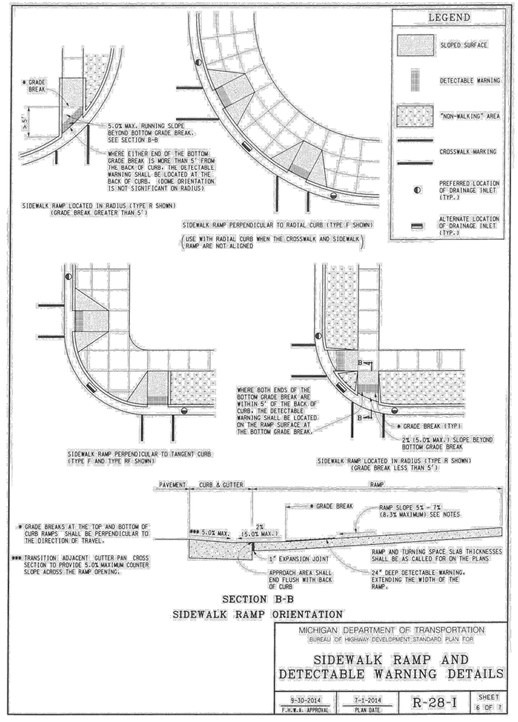



MDOT TYPE F4 CURB & GUTTER



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REVISIONS

SCALE 0 — — —
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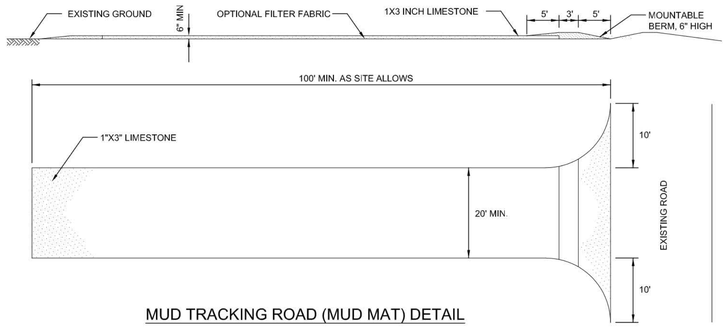
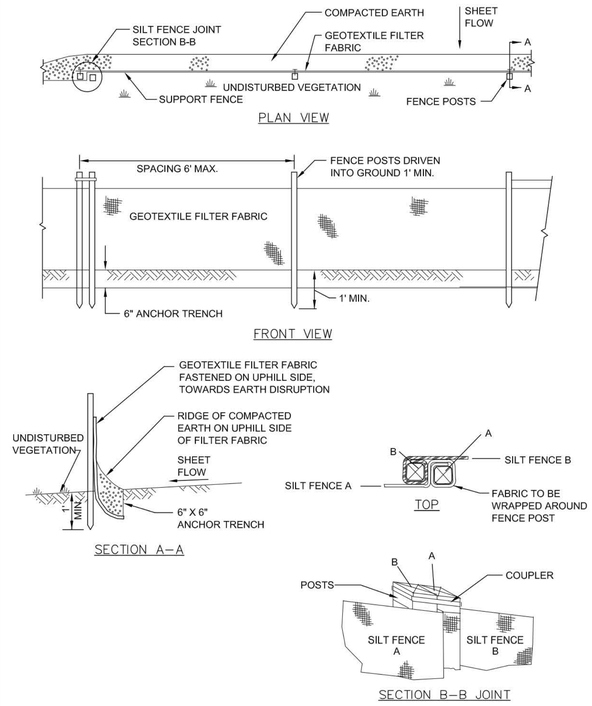
DR. SK CH. SS
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 91

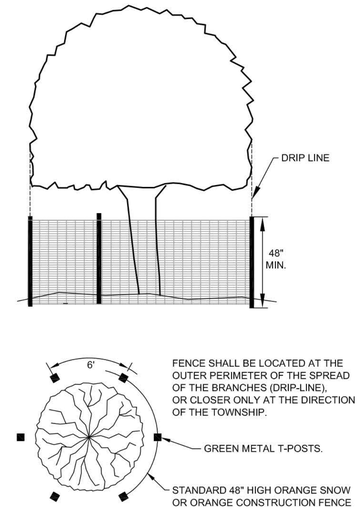



MUD TRACKING ROAD (MUD MAT) DETAIL




SILT FENCE

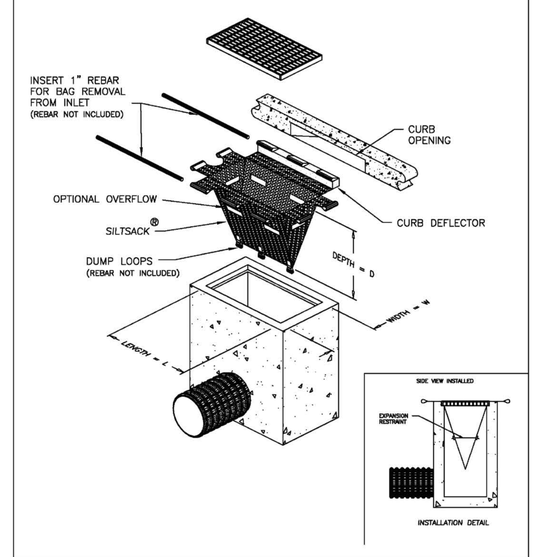
NOT TO SCALE




NOTES:
1. ALL TREES TO BE REMOVED WILL BE IDENTIFIED BY RED FLAGGING.
2. 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.
3. 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.

TREE PROTECTION FENCE DETAIL

NOT TO SCALE




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

**Environmental**
Your Complete Source for Geosynthetic Solutions

ACF Environmental, Inc.
2831 Cardwell 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-4833 | 120 LBS |
| MULLEN BURST | ASTM D-3786 | 800 PSI |
| TRAPEZOID TEAR | ASTM D-4533 | 120 LBS |
| UV RESISTANCE | ASTM D-4355 | 80 % |
| APPARENT OPENING SIZE | ASTM D-4751 | 40 US SIEVE |
| FLOW RATE | ASTM D-4491 | 40 GAL/MIN/SQ 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-4833 | 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 | 20 US SIEVE |
| FLOW RATE | ASTM D-4491 | 200 GAL/MIN/SQ 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 PILLOW INSERT OR, MADE COMPLETELY FROM AN OIL-ABSORBANT SILTSACK® WITH A WOVEN PILLOW 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
29165 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**
**SOIL EROSION AND SEDIMENTATION CONTROL NOTES**

**GENERAL**

1. 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.
2. All soil erosion and sedimentation control work shall conform to the permit requirements of Pittsfield Township and the laws of the State of Michigan.
3. A NPDES construction activity permit is required for all sites greater than 5 acres.
4. 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.
5. 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.
6. All mud/dirt tracked onto roads from the site due to construction, shall be promptly removed by the contractor.
7. 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.
8. 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.
9. Special precautions will be taken in the use of construction equipment to prevent situations that promote erosion.
10. Proper dust control shall be maintained during construction by use of water trucks and/or chloride as required.
11. 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.
12. 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.
13. Tree protection fencing must remain intact until restoration of the site is complete.

**SEQUENCE OF CONSTRUCTION**

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

**SEEDING/SOD**

1. Seed or sod in accordance with project specifications.
2. All areas of disturbed earth that are not to be paved or sodded shall have 4 inches of topsoil, seed, fertilizer and mulch.
3. Immediately after seeding, mulch all seeded areas with unweathered small grain straw (preferably wheat) or hay spread. Spread uniformly at the rate of 1 ½ 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.
4. 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.
5. 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.
6. Drainage ditches and slopes steeper than 1:4 (25%) shall be stabilized with erosion control blankets.
7. Steep slopes that do not take upon initial seeding must be re-seeded and stabilized with erosion control blankets.
8. 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**

1. Protect storm sewer catch basins with Siltsack. or approved equivalent as follows:

**ROADS**

1. 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.
2. During construction of any portion of the project, roads shall be maintained free of dirt, silt and construction debris.

Pittsfield SEC 9/22/2009


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 | 07.10.01 |
| | Dwn. | Chkd. | Dsgn. YY.MM.DD |

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SOIL EROSION DETAILS AND NOTES

Project No. 2075001300

Scale **NOT TO SCALE**

Revision

# STORM SEWER AND DRAINAGE STRUCTURES

**1.00 GENERAL**

**1.01 DESCRIPTION**

A. Furnish all labor, tools, equipment and materials to construct all storm sewers, and drainage structures as herein specified. No sewers shall be accepted until the sewer system has passed the system acceptance tests.

**1.02 TESTING**

A. General

1. The CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER. No acceptance tests shall be conducted until the entire sewer system is constructed or just prior to placing the line in service providing the sewer pipe has been installed for not less than 30 days.

B. Test for Alignment

1. All sewers shall be laid accurately to the line and grade designed by the ENGINEER. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next shall be corrected to the satisfaction of the ENGINEER to pass this test.

C. Material Tests

1. The CONTRACTOR shall have tests of pipe strength made by an independent testing laboratory. Tests of up to 4 lengths of sewer pipe 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.

D. Submittals

1. The CONTRACTOR shall submit shop drawings, or data sheets for all castings, steps and manholes.

2. The CONTRACTOR shall submit certification letters for all pipes. All letters must contain the following: Contractors name, project name, township name, current date, certification of pipe provided and letterhead of the certifying company.

**2.00 PRODUCTS**

**2.01 PIPE**

A. Reinforced concrete pipe and manhole tees shall be no less than the latest revision of ASTM C76, with the class designation as shown on the Plans or in the Proposal.

B. Concrete pipe shall have tongue and groove gasketed premium joints.

C. Corrugated steel pipe shall meet the requirements of AASHO M-190 for coated pipe latest revision. Minimum gage thickness shall be as shown on the Plans.

**2.02 REINFORCED CONCRETE MANHOLES**

A. Manholes shall conform to the current ASTM Specifications for precast reinforced concrete Manhole Sections, serial designation C478. Manhole section joints shall conform to ASTM Designation C990. All cones shall be eccentric with an offset step configuration. Concrete adjustment rings or riser rings shall not be used for adjusting the height of the structure.

B. All manhole component parts shall have the name of the manufacturer stenciled on the inside. The lettering or logo shall be a minimum of 4 inches high.

**2.03 MORTAR FOR MANHOLES**

A. Mortar for plastering manholes and drainage structures shall be made of one part Portland cement and two parts fine aggregate.

**2.04 BRICK AND BLOCK**

A. Brick for brick and mortar structures shall conform to the current ASTM Specification C32. Block for block and mortar structures shall conform to the current ASTM Specification C135.

B. The concrete block masonry used to construct manhole and catch basin walls shall be solid curved blocks with the inside and outside surfaces curved to the required radii. The blocks shall have tongue and groove or other approved type of joint at the ends so that the units interlock to form a strong, rigid structure. Curved blocks shall have the inside and outside surfaces parallel.

C. The block shall not exceed 18 inches in length or 8 inches in depth (height). No block shall be less than 6 inches in width (thickness). All blocks in one structure shall be of the same height dimension. The blocks shall be designed for length so that only full-length or half-length blocks are required to lay the circular wall of any one course.

D. Blocks intended for use in the cones or tops of manholes and catch basins shall have such shape as may be required to form the structure as shown on the Plans with inside and outside joint not to exceed 1/4-inch in thickness.

**2.05 STRUCTURE FRAMES AND COVERS**

A. Structures frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitably notched for convenient removal of the cover. Each solid manhole cover shall be marked Storm Sewer with letters integrally cast into the cover.

B. Frames and Covers shall be as follows:

1. For use on manholes: East Jordan 1040Z, with Type B cover lettered "STORM SEWER", or equal. Structures 24-inches in diameter shall have the 1045 Z frame.
2. For use on drainage structures in paved areas: East Jordan 1040Z, with Type M1 cover, with "DUMP NO WASTE" lettering and trout logo.
3. For use on drainage structures in curbed areas: East Jordan 7045 or 7065, with "DUMP NO WASTE" lettering and trout logo.
4. For use on drainage structures in landscaped areas: East Jordan 1040Z, with 1040 N 7", with "DUMP NO WASTE" lettering and trout logo.

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

D. All covers for drainage structures shall have storm drain markers affixed to the nearest available flat surface. The storm drain markers shall be manufactured by Das Manufacturing and shall be #SDR "No Dumping, Drains to River." The storm drain markers shall be installed per the manufacturer's recommendations.

**2.06 MANHOLE STEPS**

A. Steps shall be plastic coated steel. They shall be M.A. Industries PS1-PF for precast manholes, PS1-B for block manholes, or equal.

**2.07 DRAINAGE STRUCTURES**

A. All manholes and catch basins shall be precast unless otherwise specified.

B. Manhole and catch basin bottoms shall be concrete and top of slab shall have a troweled finish.

C. Upon approval by the ENGINEER, the manhole and catch basin walls may be constructed of concrete block masonry or concrete manhole pipe conforming to the requirements of the specifications previously listed. Construction shall be in accordance with the details for Catch Basin and Storm Sewer Manhole shown on the Plans.

D. A plaster coat of mortar 1/2-inch in thickness shall be applied to the inside and outside surface of all manholes and catch basins constructed with concrete block masonry or sewer brick. The inside coat of mortar shall be applied in a smooth, neat workmanlike manner.

E. Final adjustment of the top of manholes and catch basins, so that the manhole or catch basin cover is at finished elevations as shown on the Plans or meets the finished surface, may be accomplished with sewer brick conforming to the previously listed Specifications. The total height of brick for this purpose shall not exceed 9 inches. The total chimney height shall not exceed 18 inches.

F. All block and brick masonry units shall be laid in a full bed of mortar. The inside joints of the block masonry construction shall be tooled in a neat and workmanlike manner.

**3.00 EXECUTION**

**3.01 EXCAVATION AND BACKFILL**

A. All excavation and backfill 12 inches above the crown of pipe shall conform to Section 2.04, Earthwork of these specifications.

B. The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow and be completed to the top of the trench within four pipe lengths behind pipe laying.

**3.02 BEDDING**

A. Concrete pipe shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 4 inches. Where indicated on the Plans or required by the ENGINEER, concrete encasement or cradle shall be used.

B. For all pipes, compacted aggregate material shall be placed at the sides of the pipe in 12-inch lifts and cover not less than 12 inches above the crown of the pipe.

C. "Granular Material" shall be MDOT class II, placed in not more than 6-inch layers and compacted to not less than 90% standard density.

**3.03 PIPE INSTALLATION**

A. All pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress, shall be kept dry, and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with holes at each joint to receive bells. All pipe shall be laid with bells uphill.

B. The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by laser or other tools which shall be furnished by the CONTRACTOR at his expense. Each pipe shall be laid accurately to the line and grade as shown on the Plans and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sewers shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials of every description. Bulkheads shall be used to keep foreign materials out of the open end of the sewer when work is not in progress.

C. The location of the piping as shown on the Plans has been determined to avoid, insofar as possible, interference with trees or structures or fixtures above ground and other underground mains, services, utilities or structures. Any change in location or alignment of piping, which may be found more feasible or practicable as the work progresses, shall be made by the CONTRACTOR, as the ENGINEER may direct.

D. All pipe shall be carefully lowered and moved into position in trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining. An excessive amount of scratching on the surface of the concrete pipe will be considered cause for rejection.

E. All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine toothsaw, tubing cutter or similar tool may be used to cut concrete pipe. Cuts must be square. Ragged edges shall be removed with a cutting tool or file.

F. Breaks in pipe or joints shall be repaired to the satisfaction of the ENGINEER and at the expense of the CONTRACTOR.

**3.04 CONNECTIONS TO EXISTING MANHOLES**

A. When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cored into the manhole.

B. If the existing manhole is of brick construction, a single rowlock of brick shall be turned over the new pipe and the existing manhole brick work shall be cleaned, pointed and given a 1/2-inch mortar coat on the outside surface.

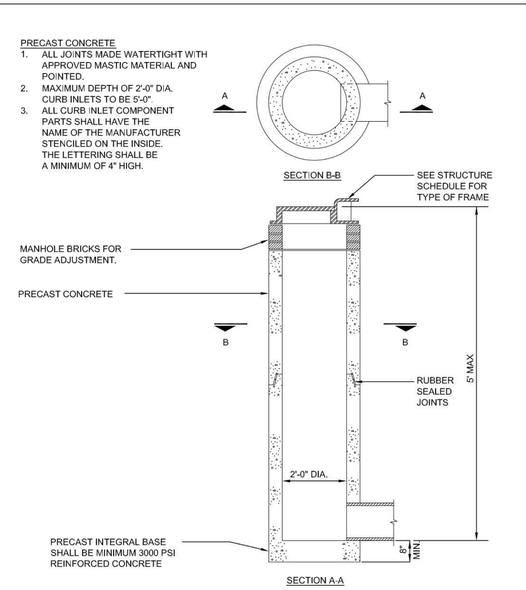
C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. Reinforcing steel shall not be cut out shall be bent and replaced in the area that is to be patched. A form shall be constructed over the area of pipe penetration. The formed area shall then be filled with concrete.

D. Closure of the manhole wall shall be made watertight using concrete.

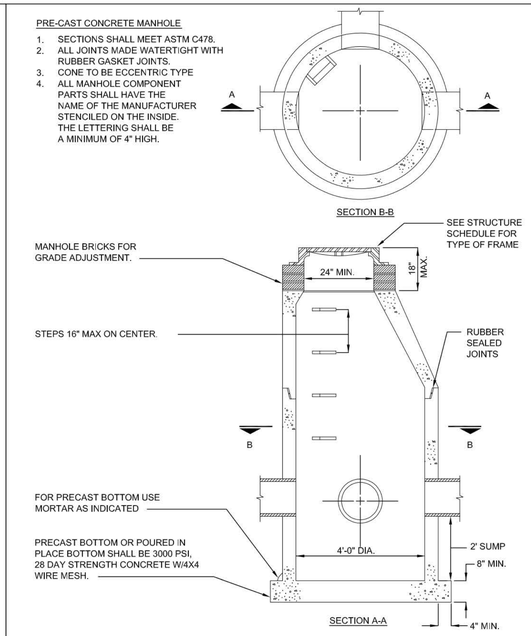
**3.05 ANIMAL GRATES**

A. Animal grates shall be required on all endsections greater than 12-inch diameter.

PCT February 2008



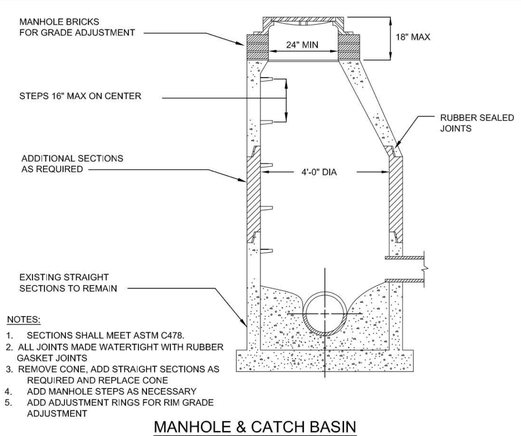

2' DIAMETER INLET




4' DIAMETER CATCH BASIN

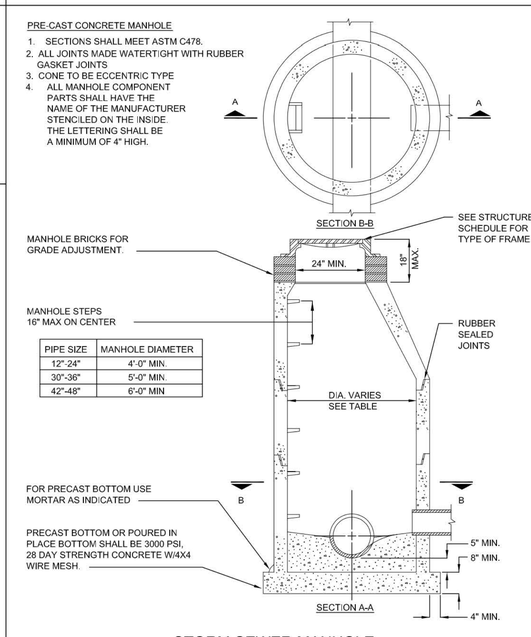
AFFIX TO SURFACE ON OR NEAR ALL DRAINAGE COVERS.

STORM DRAIN MARKER



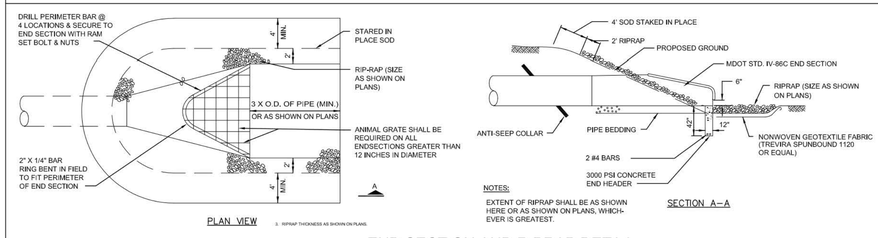

NOTES:
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. REMOVE CONE, ADD STRAIGHT SECTIONS AS REQUIRED AND REPLACE CONE
4. ADD MANHOLE STEPS AS NECESSARY
5. ADD ADJUSTMENT RINGS FOR RIM GRADE ADJUSTMENT

MANHOLE & CATCH BASIN RECONSTRUCTION DETAIL



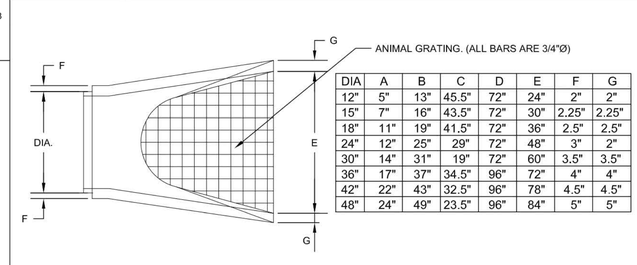

| PIPE SIZE | MANHOLE DIAMETER |
|---|---|
| 12"-24" | 4'-0" MIN. |
| 30"-36" | 5'-0" MIN. |
| 42"-48" | 6'-0" MIN |

STORM SEWER MANHOLE

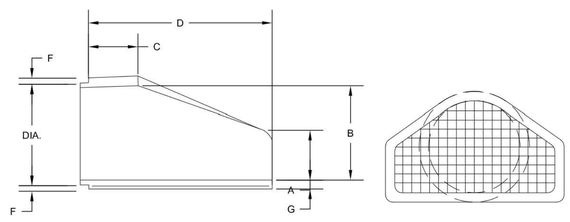



NOTES:
EXTENT OF RIPRAP SHALL BE AS SHOWN HERE OR AS SHOWN ON PLANS, WHICH-EVER IS GREATEST.

END SECTION AND RIPRAP DETAIL




| DIA | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 12" | 5" | 13" | 45.5" | 72" | 24" | 2" | 2" |
| 15" | 7" | 16" | 43.5" | 72" | 30" | 2.25" | 2.25" |
| 18" | 11" | 19" | 41.5" | 72" | 36" | 2.5" | 2.5" |
| 24" | 12" | 25" | 29" | 72" | 48" | 3" | 2" |
| 30" | 14" | 31" | 19" | 72" | 60" | 3.5" | 3.5" |
| 36" | 17" | 37" | 34.5" | 96" | 72" | 4" | 4" |
| 42" | 22" | 43" | 32.5" | 96" | 78" | 4.5" | 4.5" |
| 48" | 24" | 49" | 23.5" | 96" | 84" | 5" | 5" |




NOTE:
FLARED END SECTIONS SHALL BE MANUFACTURED TO THE CLASS SPECIFICATIONS AS THE PIPE ITSELF.

STANDARD END SECTIONS FOR PRECAST CONCRETE


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 |
|---|---|---|---|
| UPDATES | MRH | DRW | 14.01.24 |
| TWP REV | BWA | DRW | 12.08.09 |
| TWP REV | BWA | DRW | 11.04.27 |
| UPDATES | BWA | DRW | 10.10.25 |
| UPDATES | TTN | DRW | 10.01.20 |

| Issued | By | Appd. | YY.MM.DD |
|---|---|---|---|
| File Name: ST–01 | TTN | DRW | 07.10.01 |
| | Dwn. | Chkd. | Dsgn. YY.MM.DD |

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
STORM SEWER DETAILS AND SPECIFICATIONS

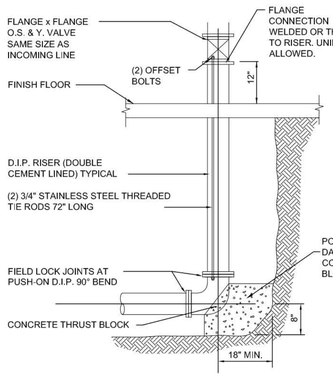
Project No. 2075001300

Scale **NOT TO SCALE**

Revision

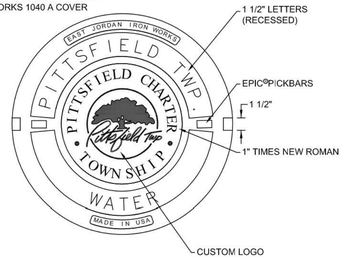
FIRST VALVE SHALL BE INSTALLED PRIOR TO FLUSHING

RISER TO BE A MAXIMUM 5 HORIZONTAL FEET FROM POINT WHERE PIPE ENTERS THE BUILDING.



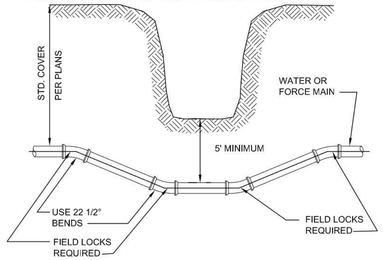

## FIRE PROTECTION RISER DETAIL

EAST JORDAN IRON WORKS 1040-1ZPT FRAME
EAST JORDAN IRON WORKS 1040 A COVER

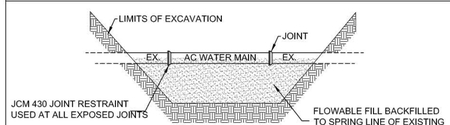



## COVER DETAIL

PIPES SHALL BE RESTRAINED PER DIPRA RESTRAINT REQUIREMENTS




## DITCH & STREAM CROSSING




## ASBESTOS CEMENT (AC) WATER MAIN

ELBOWS

| ELBOWS | | | | | |
|---|---|---|---|---|---|
| PIPE DIA. INCHES | | BEARING AREA SQUARE FEET | | | |
| | | 90° | 45° | 22 1/2° | 11 1/4° |
| 4 | | 2.1 | 1.1 | 0.6 | 0.3 |
| 6 | | 4.1 | 2.2 | 1.1 | 0.6 |
| 8 | | 6.8 | 3.7 | 1.9 | 0.9 |
| 10 | | 10.1 | 5.5 | 2.8 | 1.4 |
| 12 | | 14.1 | 7.6 | 3.9 | 2.0 |
| 16 | | 24.2 | 13.0 | 6.7 | 3.3 |
| 18 | | 30.0 | 16.3 | 8.3 | 4.2 |
| 20 | | 36.8 | 19.9 | 10.1 | 5.1 |

TEES, CROSSES & HYDRANTS

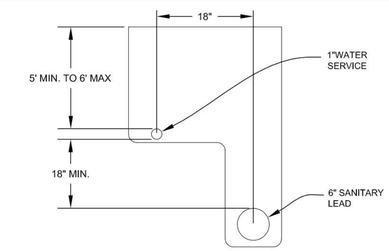
| TEES, CROSSES & HYDRANTS | | |
|---|---|---|
| PIPE DIA. INCHES | | BEARING AREA SQUARE FEET |
| 4 | | 1.5 |
| 6 | | 2.9 |
| 8 | | 4.8 |
| 10 | | 7.1 |
| 12 | | 10.0 |
| 16 | | 17.1 |
| 18 | | 21.0 |
| 20 | | 26.0 |

NOTES:
1. CONCRETE FOR ALL THRUST BLOCKS SHALL BE 3000 PSI, 28 DAY STRENGTH MIN.
2. ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH
3. BOLTS, FITTINGS & JOINTS SHALL BE KEPT CLEAR OF CONCRETE
4. A BEARING CAPACITY OF 2000# PER FOOT WAS USED IN DETERMINING THE MINIMUM "BEARING AREAS" IN THE ABOVE TABLE
5. THE CROSS SECTION OF THE THRUST BLOCKS SHALL BE SQUARE
6. IN ADDITION TO THRUST BLOCKS, ALL PIPE JOINTS SHALL BE RESTRAINED WITH LOCKING GASKETS PER DIPRA'S STANDARDS.

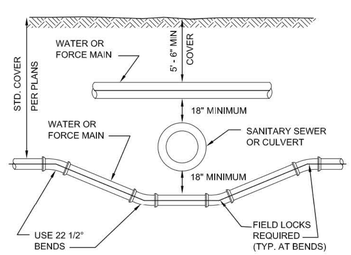
| SOIL CHARACTERISTICS | FACTOR |
|---|---|
| (A) LOOSE COARSE OR MEDIUM SAND; COMPACT FINE SAND; COMPACT SAND-CLAY SOILS; STIFF CLAY | 0.33 |
| (B) FIRM FINE SAND; COMPACT INORGANIC SILT; FIRM SAND-CLAY SOILS; MEDIUM CLAY | 0.50 |
| (C) LOOSE FINE SAND; FIRM INORGANIC SILT | 0.67 |
| (D) LOOSE SAND-CLAY SOILS; LOOSE INORGANIC SILT SOFT CLAY | 1.00 |

"BEARING AREA" x FACTOR = ACTUAL BEARING AREA
2.1 x .5 = 1.05 SQ. FT.
BASED UPON 150# TEST PRESSURE

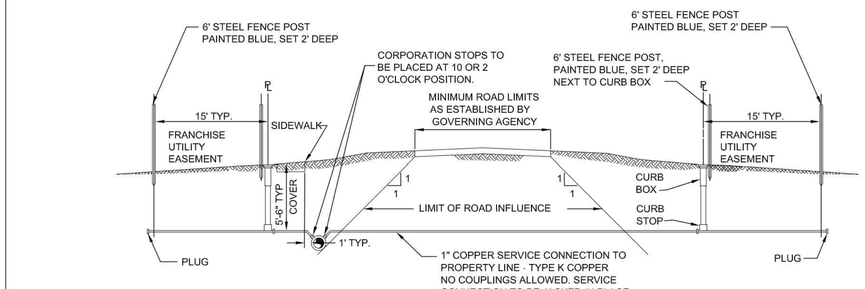
## THRUST BLOCK




## TYPICAL L TRENCH DETAIL HOUSE LEADS

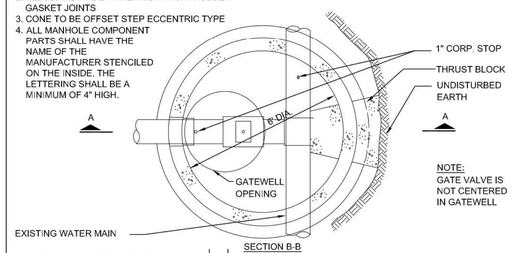


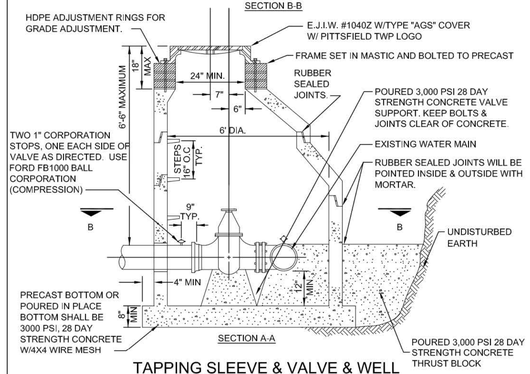

## SEWER OR CULVERT CROSSING



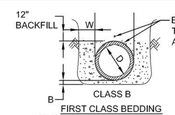

## WATER MAIN CONNECTION

PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP 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.




## TAPPING SLEEVE & VALVE & WELL



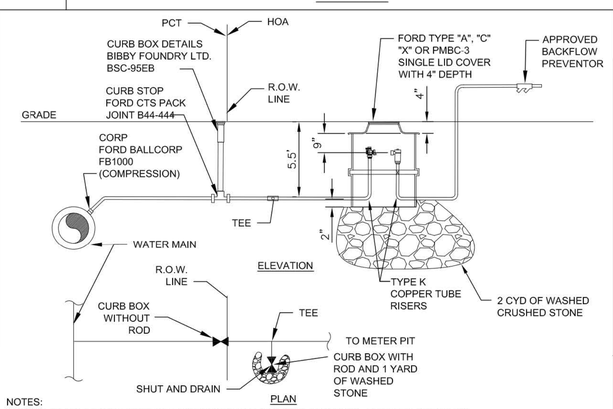

FIRST CLASS BEDDING
ALL BEDDING TO BE 2NS SAND

BLUE, 12 GAUGE SINGLE STRAND TRACER WIRE ATTACHED TO WATER MAIN PIPE MUST BE WRAPPED WITH POLLY WRAP AND SECURELY TAPED AT ENDS.

NOTES:
1. MINIMUM TRENCH WIDTH (SEE TABLE).
2. RECESS TRENCH TO RELIEVE THE BELL OF ALL LOAD. PIPE HAUNCHES SHALL BE COMPACTED.
3. 2NS BACKFILL TO DEPTH OF ONE FOOT ABOVE PIPE. TAMPED LAYERS NOT TO EXCEED 6" IN DEPTH. PLATE COMPACT ABOVE PIPE (ON 1st LIFT)
4. ALL PIPE TO BE PLACED AND JOINTED IN A DRY TRENCH AND LAID ACCURATELY TO LINE AND GRADE WITH BELLS UPHILL.
5. ALL CONCRETE ENCASEMENT AND CRADLING TO BE CLASS "A" CONCRETE.

| PIPE | D | W | B |
|---|---|---|---|
| PVC | 0"-12" | 12" MIN. 18" MAX. | 4" |
| A-C,V.C.P. | 0"-12" | 6" MIN. 12" MAX. | 4" |
| DIP | 0"-24" | 6" MIN. 12" MAX. | 4" |
| A-C,CONC. | 0"-24" | 6" MIN. 12" MAX. | 4" |
| CONC. DIP | 24" + | 6" MIN. 12" MAX. | 4" |

## BEDDING



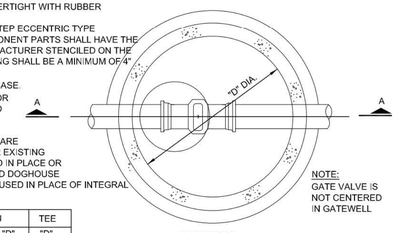

NOTES:
1. SADDLE MAY BE REQUIRED ON MAIN BASED ON LEAD SIZE, MAIN SIZE, AND MAIN PRESSURE
2. ALL WATER MAIN TAPS AND COMPONENT PARTS SHALL BE APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT PRIOR TO INSTALLATION.
3. INSTALLATION SHALL BE INSPECTED AND APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT.

## IRRIGATION METER PIT DETAIL

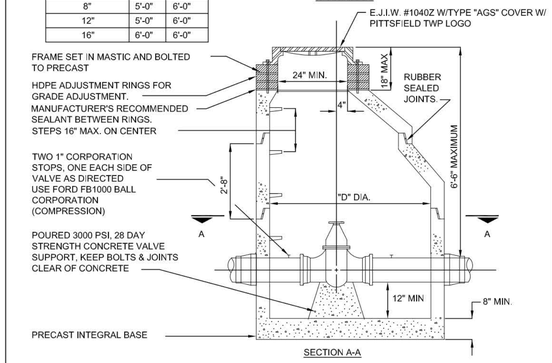
RED "REFLECTIVE" LETTERS WITH WHITE "REFLECTIVE" BACKGROUND. LETTERS WILL BE A MINIMUM OF 8" TALL BY 4" WIDE WITH 2" GIRTH, WITH AN 8" TALL 4" WIDE RED ARROW UNDER LETTERS POINTING DIRECTLY AT THE CONNECTION. TALLER BUILDINGS MAY REQUIRE LARGER LETTERING. SIGN SIZE AND LOCATION DETERMINED BY FIRE MARSHALL

## FIRE DEPARTMENT CONNECTION LABEL DETAIL

PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP 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.
6. KOR-N-SEAL BOOTS OR APPROVED EQUAL TO BE INSTALLED AT PIPE PENETRATIONS.
7. WHERE GATE WELLS ARE CONSTRUCTED OVER EXISTING WATERMAIN, POURED IN PLACE OR PRECAST COOKIE AND DOGHOUSE STRUCTURES MY BE USED IN PLACE OF INTEGRAL BASE.




| STRAIGHT THRU | | TEE |
|---|---|---|
| VALVE SIZE | "D" | "D" |
| 8" | 5'-0" | 6'-0" |
| 12" | 5'-0" | 6'-0" |
| 16" | 6'-0" | 6'-0" |




## STANDARD GATE VALVE & WELL

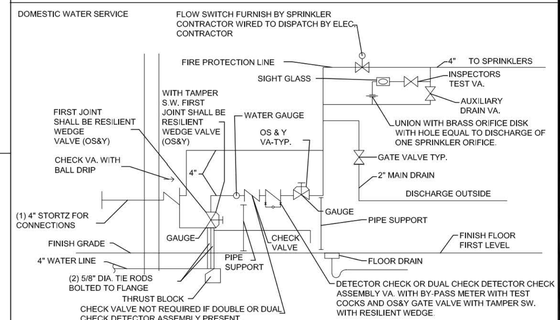
E.J.I.W. 5 BR-250 WITH 12" BARREL SECTION.

SAFETY FLANGE (GRADE LINE) ± 3" ON HYDRANT AND VALVE BOX WILL BE SET AS SHOWN ON PLANS, AT ORIGINAL GROUND SURFACE OR AS DIRECTED BY RESIDENT ENGINEER. ALL EXTENSIONS SHALL BE BELOW SAFETY FLANGE.

NOTES:
-PROVIDE ONE 4-INCH STORZ CONNECTION ON EACH HYDRANT ON THE LEFT NOZZLE WHEN FACING THE HYDRANT
-HYDRANTS SHALL FACE THE PARKING LOT OR DRIVEWAY OR AS DIRECTED BY THE FIRE MARSHALL




## STANDARD FIRE HYDRANT




## METER ROOM DETAIL

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 |
|---|---|---|---|
| UPDATES | MRH | DRW | 14.01.24 |
| FDC UPDATE | BWA | DRW | 11.09.13 |
| TWP REV | BWA | DRW | 11.04.27 |
| HYDRANT, MANHOLE UPDATE | BWA | DRW | 10.10.25 |
| UPDATES | TTN | DRW | 10.01.20 |

| Issued | By | Appd. | YY.MM.DD |
|---|---|---|---|
| File Name: W-01 | BWA | DRW | 07.10.01 |
| Permit-Seal | Dwn. | Chkd. | Dsgn. YY.MM.DD |

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
WATER MAIN DETAILS

Project No. 2075001300

Scale NOT TO SCALE

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 represent 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 manufacturers 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 tyton 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. Plugs, 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 6860 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.

**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 NPC, Kor-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 Trubolt 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" valve opening and 6" 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 Hydra-Storz (HIHS) adaptor. The HIHS shall meet the requirements of AWWA C502 regarding material and pressure testing. Stortz 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 adapter 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-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 extention, 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 Silfos. 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 cleanness 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 belt 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 undistributed 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 subsoil 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. Wherever 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 level to center of nozzle caps shall measure between 24 and 30 inches. A maximum of one hydrant barrel extension and one operating stem extension may be used to accommodate changes in grade. Under no conditions shall extended hydrant have more than one coupling in the operating stem. Pumper connections shall point toward the street.

B. Fire hydrants shall be installed with barrel vertical and properly based. Concrete thrust blocks shall be placed behind the hydrant, tee, and every bend. Care should be taken to insure the drain holes on the hydrant are not plugged by the thrust blocks. Hydrant shall be set in 1 yard of coarse gravel for drainage purposes. If ground water is encountered, the drain hole shall be plugged as directed by the manufacturer. The backfill shall be sand thoroughly tamped around the hydrant and valve box in 1 ft layers.

C. Fire hydrant and gate valve shall be set apart 24 inches. Gate valves and valve box shall be as specified under the valve paragraphs of this section.

D. Hydrant leads shall have a minimum of 5.5 feet of cover in all areas, including crossings through ditch sections.

E. Hydrants shall be carefully plumbed, braced and backfilled so they remain plumb.

F. All grade, facing, and vertical alignment adjustment of hydrants shall be completed prior to pressure testing and charging of the hydrants.

G. All hydrants shall be cleaned and painted with a rust inhibitive, oil base paint such as "rustoleum" or approved equal to the Township's color code prior to acceptance.

H. The lubricant reservoirs in all hydrants having such construction shall be filled with a lubricant acceptable to the Michigan Department of Environmental Quality and recommended by the hydrant manufacturer.

I. Backfilling around fire hydrants shall be carefully tamped sand in 12-inch layers from the centerline of the lead main to a height of 1-foot below finished grade.

J. CONTRACTOR shall place burlap sack or equivalent material over the hydrant nozzles after installation.

K. Fire hydrant nozzles shall be aligned as required by the Township Fire Marshal.

L. Fire hydrant extensions shall be provided as necessary so that the safety flange is located at or above surface grade.

**3.05 TRACER WIRE**

A. Tracer wire shall be installed along the top of all water mains. For directional drilling, the tracer wire shall be installed at the same time as the pipe. For open cut construction, the tracer wire shall be installed at a height of not more than 6 inches above the main line pipe or service leads. Wire shall be extended to all hydrants, blow-offs, dead ends, service leads and post indicator valves. Tracer wire shall be brought to grade, leaving enough excess material to avoid loss or damage to the wire during construction and subsequent activities. Wire shall be trimmed to finish grade following completion of the landscaping.

B. When tracer wire is to be run along short offsets (less than 20 feet), a loop of wire shall be utilized to loop to the end of the offset, bring the loop to grade and terminate it in an approved manner. For service leads and offsets of more than 20 feet in length, or installed by directional drilling method, a splice may be utilized to make the connection at the main. The tracer wire shall then be installed and terminated in an approved manner.

C. Tracer wire terminations shall be made by one of the following methods:

1. Tracer wire shall be terminated at hydrants by tying off the wire at the head flange, leaving excess material for future trimming following landscape activities.

2. Terminations at valve/curb boxes, post indicators, valves and blow-offs shall be made with 2 wraps of wire at grade around the box or pipe, leaving excess material for future trimming following landscaping.

3. Gatewell terminations shall be made by running the tracer wire through the pipe opening in the wall, down to and across the floor to the steps, up the wall and secure to the top step leaving the stub accessible at the casting. Wire shall be run through the gatewell such that it does not create a hazard.

4. Terminations at existing water mains without tracer wire shall be made at the nearest hydrant or gate well as outlined above. If no hydrant or gatewell is available, an upper section of valve box shall be installed with the tracer wire stubbed up inside

D. When connections are made to existing water mains which do not have tracer wire, the following method most applicable to field conditions shall be used.

1. When connection is made at/near a valve or hydrant, the connection shall be made in the same manner as the termination at said structures in Item C(2) above.

2. When connection takes place in a gatewell, the same procedure shall be used as in termination at a gatewell (see Item C(3) above).

3. If no valve or hydrant is available, the upper section only of a valve box shall be set with the tracer wire stubbed up inside.

**3.06 POLYETHYLENE ENCASEMENT**

A. The polyethylene encasement must be installed in accordance with the specifications and requirements of ANSI/AWWA C105/A21.5. For open cut applications a single wrap is required, and for directional drill applications a double wrap is required.

B. The polyethylene encasement must be taped and overlapped at pipe joints and must be taped in a spiral configuration along the length of the pipe.

**3.07 CONNECTION TO EXISTING MAINS**

A. All connections to existing water mains shall be made at the locations as shown on the plans.

B. All valves shall be operated by the Pittsfield Township Utilities Department.

C. Prior to beginning construction of the final connections, the CONTRACTOR shall provide sequence of all final connections to the existing system and coordinate a meeting between the ENGINEER, OWNER and CONTRACTOR in the field to review the procedure.

D. When making a dry connection to an existing main, the existing main to which a connection is to be made shall be isolated by the closing of the necessary existing valves, and the water from the existing main shall then be pumped out or removed by other means so the connection may be made in the dry. After the connection has been acceptably made, the portion of the new line to the nearest valve shall be satisfactorily tested and disinfected, along with the drained portion of the existing water main, before the isolated existing main is placed back in service, except as the ENGINEER may otherwise direct. In as much as residents served by this isolated main will be temporarily out of water during this period, the work shall be executed as rapidly as possible, and the time of, and the procedure in, making such connections shall be subject to the review of the ENGINEER. Such work may be required to be done at night in order to minimize inconvenience of water users. The CONTRACTOR shall not be entitled to any additional compensation because of night work or other special requirements in work under this section.

E. The CONTRACTOR shall make particular effort, prior to bidding, to ascertain whether or not valves in the existing mains to be connected to the new mains are so located as to provide isolation. If valves are not found to be adequate, then the CONTRACTOR shall utilize other means to make the connections with a minimum of interruption to service.

F. When making a wet tap connection to an existing main, a tapping sleeve designed for the type of pipe being tapped shall be utilized and the tap shall be made in accordance with the manufacturer of the tapping equipment.

G. Wherever adapters are required to properly connect the pipe with existing pipe or other material or manufacturer, the nominal I.D. of adapters shall be the same size as the nominal diameter of pipe connected thereto. Adapters shall also be furnished and used as required by the manufacturer for connection to fittings.

**3.08 BEDDING**

A. Ductile iron pipes shall be fully enclosed in polywrap and laid on a compacted sand cushion, 4 inches thick, Sand shall conform to fine aggregate 2NS as defined in 2003 MDOT, Section 902.

B. 2NS sand bedding material shall be placed around and above the main to a height of 12 inches above the main.

C. Sand shall be compacted on top of the 12-inches of sand above the pipe to not less than 95 percent of the maximum unit density as determined at optimum moisture content.

PITTSFIELD CHARTER TOWNSHIP

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| Revision | By | Appd. | YY.MM.DD |
|---|---|---|---|
| SPEC. UPDATES | MRH | DRW | 14.01.24 |
| TWP REV | BWA | DRW | 11.04.27 |
| SPEC. UPDATES | BWA | DRW | 10.10.25 |
| SPEC. UPDATES | TTN | DRW | 10.01.19 |

| Issued | By | Appd. | YY.MM.DD |
|---|---|---|---|
| File Name: W-02 | BWA | DRW | 07.10.01 |
| Permit-Seal | Dwn. | Chkd. | Dsgn. YY.MM.DD |

Client/Project
PITTSFIELD TOWNSHIP

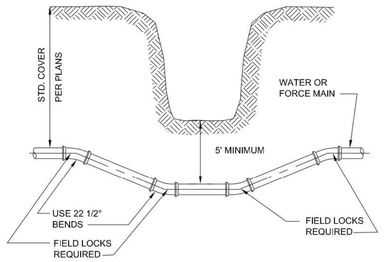
Pittsfield Township, Michigan

Title
WATER MAIN SPECIFICATIONS

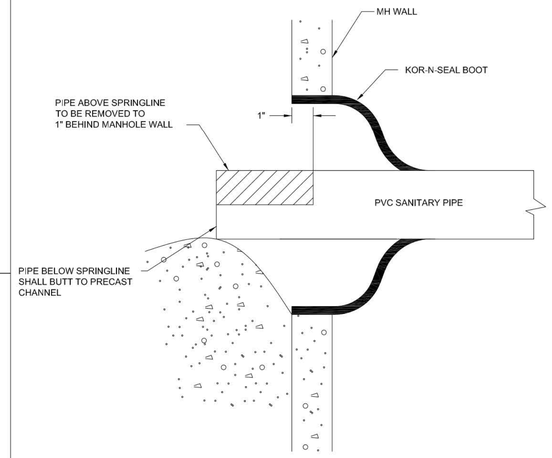
Project No.
2075001300

Scale

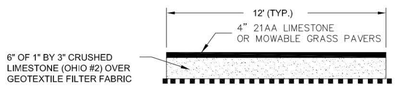
Revision




## DITCH & STREAM CROSSING



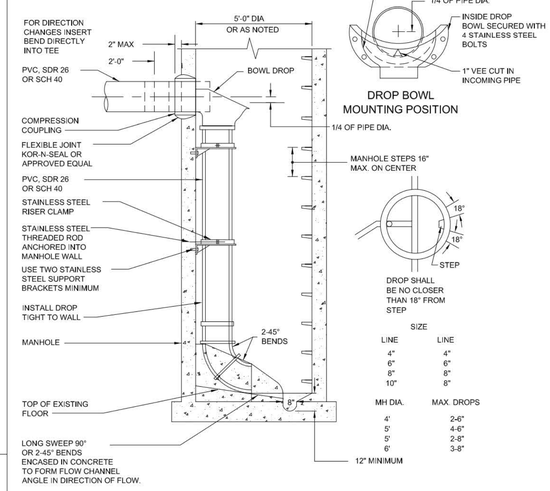

## SANITARY PIPE PENETRATION




## SANITARY SEWER ACCESS PATH

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 3/4" RAMSET/RED HEAD BOLTS HELD INPLACE WITH 2 STAGE EPOXY PASTE.




SIZE

| LINE | LINE |
|---|---|
| 4" | 4" |
| 6" | 6" |
| 8" | 8" |
| 10" | 8" |

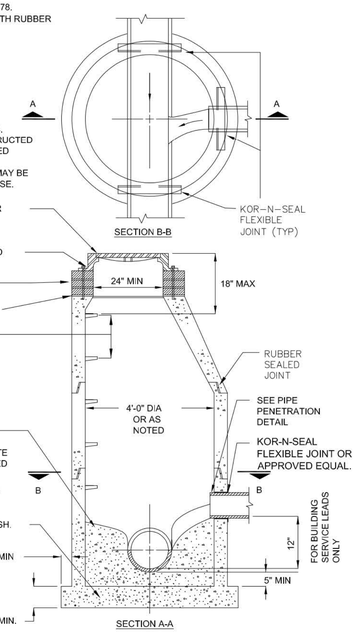
| MH DIA. | MAX. DROPS |
|---|---|
| 4' | 2-6" |
| 5' | 4-6" |
| 5' | 2-8" |
| 6' | 3-8" |

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

## INTERIOR DROP SANITARY MANHOLE

PRE-CAST CONCRETE MANHOLE

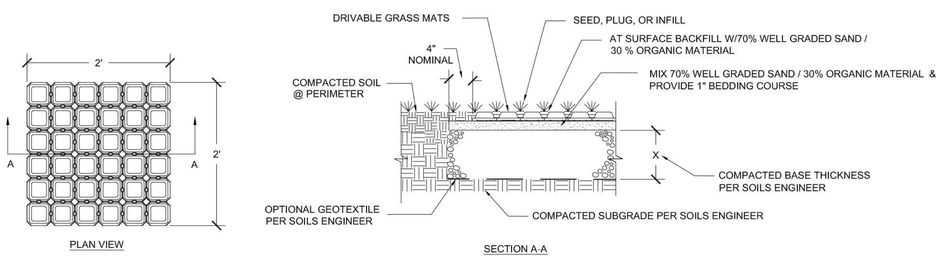
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5. PROVIDE INTEGRAL BASE WITH PRECAST CONCRETE 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.



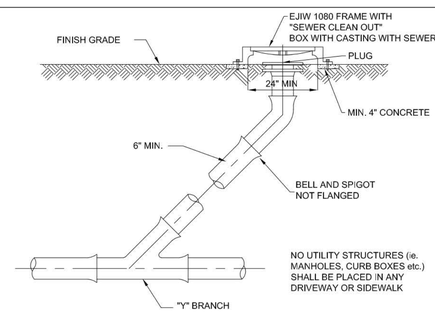

NO UTILITY STRUCTURES (ie. MANHOLES, CURB BOXES etc.) SHALL BE PLACED IN ANY DRIVEWAY OR SIDEWALK

## SANITARY MANHOLE

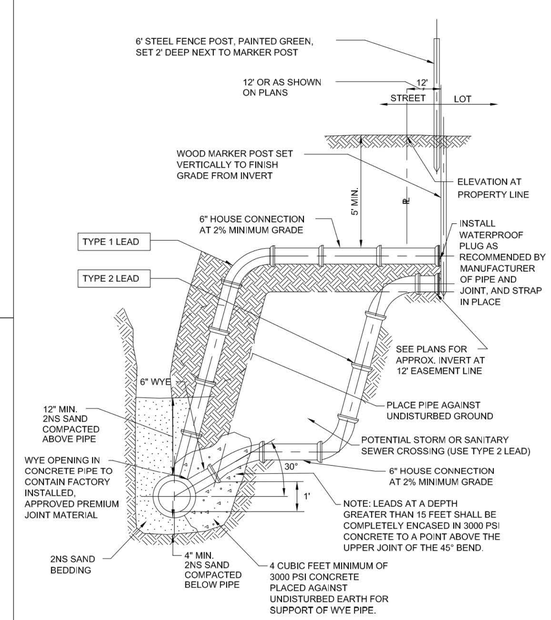
NOTE:
FOR STORMWATER MANAGEMENT APPLICATIONS INCLUDING STORAGE AND INFILTRATION, ALTERNATE INFILLS, BASE MATERIAL, AND DRAINAGE MAY BE REQUIRED



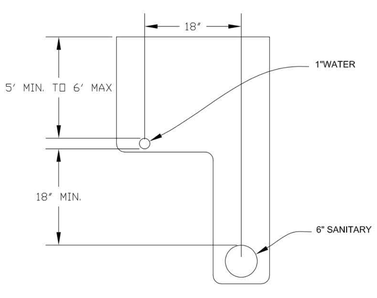

## TYPICAL HEAVY TRAFFIC DRIVABLE GRASS DETAIL



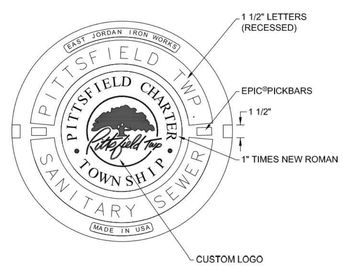

## SANITARY SEWER CLEANOUT




## SANITARY SEWER SERVICE & RISER CONNECTION DETAIL

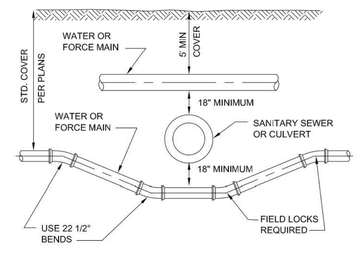



## TYPICAL L TRENCH DETAIL HOUSE LEADS




EAST JORDAN IRON WORKS 1040 Z BOLT DOWN FRAME
EAST JORDAN IRON WORKS 1040 AGS COVER

## COVER DETAIL




## SEWER OR CULVERT CROSSING

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

| Issued | By | Appd. | YY.MM.DD |
|---|---|---|---|
| File Name: SS-01 | BWA | 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

Revision

# SANITARY SEWER AND MANHOLES

**1.00 GENERAL**

**1.01 DESCRIPTION**

A. The CONTRACTOR shall furnish all labor, tools, equipment and materials to construct all sanitary sewers, manholes and necessary appurtenant work as herein specified. No sewers shall be accepted until the sewer system has passed the system acceptance tests.

**1.02 TESTING**

A. General

1. The CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER. No acceptance tests shall be conducted until the entire sewer system is constructed and has been installed for not less than 30 days.

2. The CONTRACTOR may desire to make an air test prior to backfill for his own purposes but the line acceptance tests shall be conducted after backfilling or extensions.

3. All sewer lines shall be televised while running enough water through the line to be visible at the next downstream manhole.

4. All sewer lines shall be checked for alignment.

5. All manholes shall be tested for leakage. All PVC lines shall be tested for deflection.

6. Sewer pipe 30 inches and smaller shall be air tested. Sewer pipe larger than 30 inches shall be tested by either infiltration or exfiltration and shall be tested in lengths of 1600 feet or less.

7. 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 rejected section and retest until it is within specified allowance.

B. Test for Leakage - Air Test

1. Section 33-95 (pg 30-6) 2004-Ten State Standards.

2. After a manhole-to-manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs inflated to 35 psig internal pressure. The design of the pneumatic plugs shall be such that they will hold against the line test pressure without requiring external blocking or bracing.

3. There shall be three (3) hose connections to the pneumatic plug. One hose shall be used only for inflation of the pneumatic plug. The second hose shall be used for continuously reading the air pressure rise in the sealed line. The third hose shall be used only for introducing low pressure air into the sealed line.

4. There shall be a 0-30 psig gauge for reading the internal pressure of the line being tested. Calibrations from the 1-10 psig range shall be in tenths of lbs (not ounces) and this 0-10 portion shall cover 90% of the complete dial range.

5. Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water pressure that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the third hose shall be disconnected.

6. The portion of line being tested shall be accepted if the portion under test meets the following conditions.

a. DI, and RCP Pipes

(1) The time requirement for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time given in the following table:

| Pipe | Min. Holding Time Seconds/100 ft. Pipe |
|---|---|
| 4-inch | 18 |
| 6-inch | 42 |
| 8-inch | 72 |
| 10-inch | 90 |
| 12-inch | 108 |
| 15-inch | 126 |
| 18-inch | 144 |
| 21-inch | 180 |
| 24-inch | 216 |
| 27-inch | 252 |
| 30-inch | 288 |

(2) In areas where ground water is known to exist, the CONTRACTOR shall install a 1/2-inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the line acceptance test, the ground water level shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of the height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the lbs of pressure that will be added to all readings. For example, if the height of water is 11-1/2 ft, then the added pressure will be 5 psig. This makes the 3.5 psig to be 8.5 psig, and the 2.5 psig to be 7.5 psig. The 1 lb allowable drop and the timing remains the same.

a. PVC Pipe

(1) The time requirement for the pressure to decrease from 3.5 to 3.O psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than that shown in the following table:

| Pipe Size (inches) | Holding Time (seconds) | Minimum Holding Time (seconds) |
|---|---|---|
| 4-inch | 0.190xL | 113 |
| 6-inch | 0.427xL | 170 |
| 8-inch | 0.760xL | 227 |
| 10-inch | 1.187xL | 283 |
| 12-inch | 1.709xL | 340 |
| 15-inch | 2.671xL | 425 |
| 18-inch | 3.846xL | 512 |

(2) If any section of the sewer fails to meet this requirement, the CONTRACTOR shall perform a television inspection of the faulty section and repair or replace at his own expense all defective materials and/or workmanship to the satisfaction of the ENGINEER. The test procedure shall be repeated until the results are acceptable.

C. Test for Infiltration

1. Sewer pipe over 18 inches shall be tested to measure the infiltration of ground water. If the measured leakage exceeds 100 gallons per inch diameter per mile of pipe per 24 hr period, the CONTRACTOR shall locate the points of excessive leakage and make the necessary repairs at his own expense.

2. In the event the line does not pass the infiltration test as stated above, the test shall be repeated after suitable repairs have been completed.

D. Test for Exfiltration

1. Where the ground water provides less than a 2 ft head on the sewer, an exfiltration test shall be conducted by filling the sewer with water to a 4 ft head or 4 ft above the ground water level, whichever is greater. The allowable water loss shall be 100 gal/in./mi/day as calculated above for infiltration.

2. After the sewer has been filled with water, 4 hrs time shall be allowed for water absorption by the pipe before exfiltration tests are initiated.

3. For the purpose of establishing the 4 ft test head, the head shall be measured from the center of the sewer pipe at the midpoint of the test section length. This procedure shall be used for both infiltration and exfiltration tests.

E. Test for Manhole Leakage

1. All manholes shall be tested for leakage by using plugs on inleting-outleting sewers, and filling the manholes with water to the top of the manhole. Four hours shall be allowed for water absorption by the manhole before testing is initiated. Allowable exfiltration for 48-inch diameter manholes shall be 2 gallons per foot of depth per day.

F. Test for Alignment

1. All sewers shall be laid accurately to the line and grade designed by the ENGINEER. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next shall be corrected to the satisfaction of the ENGINEER to pass this test.

G. Test for Deflection of PVC Pipe

1. PVC pipe sewers shall be installed in such a manner that the initial deflection of the conduit shall conform to the latest revision of ASTM D-3034.

2. Deflection of PVC pipe shall be tested by pulling a rigid pig or equivalent through the pipe. The pig shall be constructed in accordance with the following table of maximum outside diameters and shall be submitted to the ENGINEER for review before testing is initiated.

| Pipe I.D. | Pig O.D. |
|---|---|
| 6 inches | 5.33 inches |
| 8 inches | 7.11 inches |
| 10 inches | 8.87 inches |
| 12 inches | 10.55 inches |
| 15 inches | 12.90 inches |
| 18 inches | 15.74 inches |

3. The pig shall be drawn by hand through the pipe from manhole to manhole. Any portion of pipe through which the pig passes freely shall be deemed to have passed the deflection test. Sections of pipe through which the pig does not pass shall be located, uncovered and the pipe zone bedding improved and backfilled by the CONTRACTOR at his own expense. The pipe shall then be retested before acceptance is granted.

H. Material Tests

1. The CONTRACTOR shall have tests of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of sewer pipe 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.

**1.03 SUBMITTALS**

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, and valves. The Contractor shall submit 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.

**2.00 PRODUCTS**

**2.01 SEWER PIPE**

A. Pipe for sewer 24-inch diameter and smaller shall be polyvinyl chloride (PVC). Pipe for 30-inch diameter and larger shall be PVC truss pipe. Ductile Iron pipe and reinforced concrete pipe shall be used as specified by the ENGINEER.

B. Pipe for service leads 4 though 8 inches in diameter shall be polyvinyl chloride (PVC).

C. Reinforced concrete pipe shall be no less than the latest revision of ASTM C76, with the class designation as shown on the Plans or in the Proposal.

D. PVC pipe 4 inches through 15 inches in diameter shall meet or exceed all of the requirements of the current ASTM D-3034 SDR-26 polyvinyl chloride sewer pipe and fittings. 18-inch diameter PVC pipe shall meet or exceed all the requirements of the current ASTM F-794 SDR 26 polyvinyl chloride sewer pipe and fittings. Samples of pipe and physical and chemical data sheets shall be submitted to the ENGINEER for review. Approval shall be obtained before pipe is purchased.

E. If the sewer pipe is greater than 15 feet deep PVC pipe shall be SDR 21.

F. Truss pipe shall meet or exceed all of the requirements of the current ASTM D2680.

G. Ductile iron pipe shall meet or exceed all the requirements of ANSI A21.50 with a cement lining.

**2.02 SEWER PIPE FITTINGS**

A. Fittings shall be of the same material as the pipe, and in no case shall the walls be thinner than that of the pipe furnished.

B. Wye and tee fittings for PVC pipe shall be reviewed by the ENGINEER before purchasing.

C. The dry fit of all fittings must be snug. If the fit is such that it is loose, the pipe or fitting will be rejected as faulty and of improper size.

**2.03 SEWER PIPE JOINTS**

A. Concrete pipe joints shall be made of a resilient material conforming to the latest revision of ASTM Designation C443. Proper lubricant shall be furnished by the joint manufacturer.

B. Concrete pipe for use with rubber joints shall be smooth and precisely formed to provide a uniform annular space for joint materials.

C. PVC pipe shall be jointed with ring gusseted bell ends. (ASTM-D3212) Jointing materials shall be applied to the bell end of the pipe at the point of manufacture in such a manner that a tight uniform joint will be achieved and such that when the joint is made up in the field, the joint material will not roll or tear from the pipe. A proper joint lubricant shall be furnished by the pipe manufacturer.

**2.04 REINFORCED CONCRETE MANHOLES**

A. Manholes shall conform to the current ASTM specifications for precast reinforced concrete manhole sections, serial designation C478. Manhole section joints shall conform to ASTM C990-96. Cone sections shall be straight side type, with an offset step configuration.

B. All manhole component parts shall have the name of the manufacturer stenciled on the inside. The lettering or logo shall be a minimum of 4-inches high.

C. Manholes constructed over an existing sewer line shall have a doghouse mudded to an 8-inch thick cookie. The bottom of the existing pipe shall be the channel. All other manholes shall have precast integral base sections with pre-formed concrete channels.

D. All channels shall be constructed to the full flow depth of the pipe.

**2.05 MORTAR FOR MANHOLES**

A. Mortar for plastering manholes shall be made of one part Portland cement and two parts fine aggregate.

**2.06 MANHOLE FRAMES AND COVERS**

A. Manhole frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitably notched for convenient removal of the cover. Each cover shall be marked with the Pittsfield Township logo and the letters, PITTSFIELD TWP SANITARY SEWER integrally cast into the cover.

B. Covers shall be of the "self-sealing" design having a continuous gasket glued in a machined groove and a concealed pickhole. Frames and covers shall be East Jordan 1040Z, with Type AGS cover.

C. All manhole frames and covers shall be coated by the manufacturer with coal tar pitch varnish or other asphaltum coating reviewed by the ENGINEER.

**2.07 MANHOLE STEPS**

A. Steps shall be plastic coated steel. They shall be M.A. Industries PS1-PF or PS1-B, or approved equal.

**2.08 MANHOLE CONNECTIONS**

A. Sewer pipe (6-inch to 24-inch) to manhole connections shall be through: 1) a flexible rubber boot which shall be securely clamped into a core-drilled pipe port. Pipe ports shall be core-drilled at the point of manhole manufacturer and shall be accurately located within 1/2-inch of proposed sewer centerline (Kor-N-Seal); or, 2) a self-adjusting mechanical pipe to manhole seal which provides a resilient flexible and infiltration-proof joint (Res-seal); or, 3) a flexible rubber wedge firmly rammed into a rubber gasket which is cast into the manhole (Press Wedge II), or equal. All flexible pipe to manhole connections shall be installed per the manufacturers specifications.

B. Neoprene rubber for the manhole boot shall meet ASTM Specification C443 and shall have a minimum thickness of 3/8-inch. Pipe clamp bands shall be of corrosion-resistant steel.

C. Sewer pipe over 24 inches to manhole connections shall be in accordance with details shown on the Plan.

**2.09 SANITARY MANHOLE ADJUSTMENTS**

A. All final grade adjustment of manhole covers 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 as identified in ASTM Designation D 1248.

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 ¼ inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet ASTM specification C-990.

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 concrete anchors or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.

**2.10 MANHOLE DROPS**

A. Manhole drop connections shall be interior drops using the drop bowl as produced by Reliner-Duran Inc. or approved equal.

B. Drop bowl model A-4" shall be used for all lines up through full 6-inch inlets. Drop bowl model A-6" shall be used for all 8-inch inlets. Drop bowl model B-8" shall be used for all 10-inch inlets. Lines larger than 10 inches shall be as directed by the ENGINEER.

C. The force line hood shall be attached on models A-4" and A-6" when the incoming line is from a force main or the slope is 3 percent or greater.

D. The drop pipe shall be secured to the manhole wall with Reliner-Duran, Inc. stainless steel adjustable clamping brackets or approved equal.

E. The drop bowl and each clamping bracket shall be attached to the manhole wall with 3/8-inch x 3 3/4-inch bolts.

F. The incoming pipe shall be trimmed such that it protrudes 2 inches into the manhole.

G. A 1-inch V shaped notch shall be cut into the bottom edge of the incoming pipe.

**3.00 EXECUTION**

**3.01 EXCAVATION AND BACKFILL**

A. All excavation and backfill above a line 12 inches above the crown of the pipe shall conform to Section 2.04, Earthwork, of these Specifications.

**3.02 BEDDING**

A. Reference Section 33.83a of 10 State Standards.

B. Reference Section 33.83b of 10 State Standards.

C. Ductile Iron, and concrete pipes shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 3 inches for 24-inch and smaller pipe and not less than 4 inches for pipe larger than 24-inch conforming to Class B bedding as shown on the Plans. Where shown on the Plans or required by the ENGINEER, concrete encasement or concrete cradle shall be used.

D. PVC pipe shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 4 inches conforming to Class B bedding as shown on the Plans. Where shown on the Plans, or where the pipe passes under a road with less than 4 ft of cover, the pipes shall be encased.

E. For all pipes, compacted granular material shall be placed at the sides of the pipe and cover not less than 12 inches above the crown of the pipe.

F. "Granular Material" shall be class 2NS sand, pea gravel or crushed stone conforming to ASTM C33 Size No. 67 placed in not more than 6-inch layers and compacted to not less than 95% standard density for PVC and 90% standard density for reinforced concrete.

G. Pea gravel or crushed stone used for bedding shall be separated from the sand backfill with a non-woven geotextile fabric. The fabric shall be Amoco 4551, or approved equal.

**3.03 PIPE INSTALLATION**

A. Installation of PVC pipe shall be in conformance with ASTM D2321-89.

B. All pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress shall be kept dry; and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with holes at each joint to receive bells. All pipe shall be laid with bells uphill.

C. All joints shall be made up in accordance with the manufacturer's instructions using materials and equipment especially prepared for the type of joint to be used.

D. The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by levels, laser or other tools which shall be furnished by the CONTRACTOR at his expense. Each pipe shall be laid accurately to the line and grade as shown on the Plans and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sewers shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials of every description. Bulkheads shall be used to keep foreign materials out of the open end of the sewer when work is not in progress.

E. The location of the piping as shown on the Plans has been determined to avoid, insofar as possible, interference with trees or structures or fixtures above ground and other underground mains, services, utilities, or structures. Any change in location or alignment of piping which may be found more feasible or practicable as the work progresses shall be made by the CONTRACTOR, as the ENGINEER may direct.

F. All pipe and fittings shall be carefully lowered and moved into position in trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining. An excessive amount of scratching on the surface of the PVC pipe will be considered cause for rejection.

G. The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow and be completed to the top of the trench within two pipe lengths behind pipe laying.

H. All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine tooth saw, tubing cutter or similar tool may be used to cut PVC pipe. Cuts must be square. Ragged edges shall be removed with a cutting tool or file.

I. After cutting bell and spigot or socket pipe, a stop mark shall be made with a pencil or crayon using dimensions as shown by the manufacturer's instructions or by using another pipe in the field as a guide.

J. Breaks in pipe or joints shall be repaired to the satisfaction of the ENGINEER and at the expense of the CONTRACTOR.

**3.04 CONNECTIONS TO EXISTING MANHOLES AND OTHER RIGID STRUCTURES**

A. When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cut into the manhole.

B. If the existing manhole is of brick construction, a single rowlock of brick shall be turned over the new pipe and the existing manhole brick work shall be cleaned, pointed and given a 1/2-inch mortar coat on the outside surface.

C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. A Kor-N-Seal boot or engineer approved equal shall be clamped into the cored hole and used to make the connection.

D. For connections to existing fiberglass manholes, a hole shall be cored into the manhole wall to receive the pipe. A Kor-N-Seal boot or engineer approved equal shall be installed using fiberglass reinforced pipe stubout for Kor-N-Seal boot sealing surface.

**3.05 STREAM AND RIVER CROSSING**

A. Whenever a pipe is required to cross a stream or river, all work shall be in accordance with the provisions of Act 346, the Inland Lakes and Streams Act of 1962, and the rules and regulations promulgated thereunder. Stream crossings and all restoration required shall be completed within five days of the construction.

B. The CONTRACTOR shall utilize such construction methods as are feasible and practicable to divert or stop stream flow to lay the pipe in the dry. Pipe shall be ductile iron, mechanical joint, or compression gasket joint pipe with joints at transition to other types of sewer pipe encased with no less than 1 cu yd of concrete, placed at a minimum of 6 inches thickness around the pipe. After the sewer is properly laid, jointed and encased, the stream-channel shall be cleaned of dirt and debris resulting from the CONTRACTOR's operations.

C. After the crossing is made, heavy riprap and sodding shall be placed to protect the banks from corrosion as shown on the Plans.

PCT July 2008


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| Revision | By | Appd. | YY.MM.DD |
|---|---|---|---|
| TWP REV | BWA | DRW | 11.04.27 |
| UPDATES | BWA | DRW | 10.10.25 |
| UPDATES | TTN | DRW | 10.01.20 |

| Issued | By | Appd. | YY.MM.DD |
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| File Name: SS-02 | BWA | DRW | DRW | 07.10.01 |
|---|---|---|---|---|
| | Dwn. | Chkd. | Dsgn. | YY.MM.DD |

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SANITARY SEWER SPECIFICATIONS

Project No. 2075001300

Scale NOT TO SCALE

Revision 1

# 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 carrier pipe joints or couplings for carrier pipe less than 6 inches in diameter, and at least 4 inches greater than the largest outside diameter of the carrier pipe joints for carrier 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 solidly 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 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 of 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, highways and/or railroads and 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 pressure. 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.

1. 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.

2. 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. Walers and bracing shall be supplied and installed as required to complete the sheeting system. Walers and braces shall be of adequate strength for the load imposed. Splices in walers 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 timing 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 racing 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 tamps 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 such as 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 begin, the base shall be made firm and cleared of topsoil, sod 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 uncompactable 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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| TWP REV | BWA | DRW | 11.04.27 |
| UPDATES | TTN | DRW | 10.01.20 |
| Revision | By | Appd. | YY.MM.DD |
| Issued | By | Appd. | YY.MM.DD |
| File Name: SE-02 | TTN | DRW | DRW | 07.10.01 |
| | Dwn. | Chkd. | Dsgn. | YY.MM.DD |

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
EARTHWORK SPECIFICATIONS

Project No.
2075001300

Scale
NOT TO SCALE

Revision
1