



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.

BM #1 ELEV = 674.00
SET SPIKE W SIDE UTILITY POLE N OF EVANSTON AVE, 75' OF MAPLE ISLAND RD.

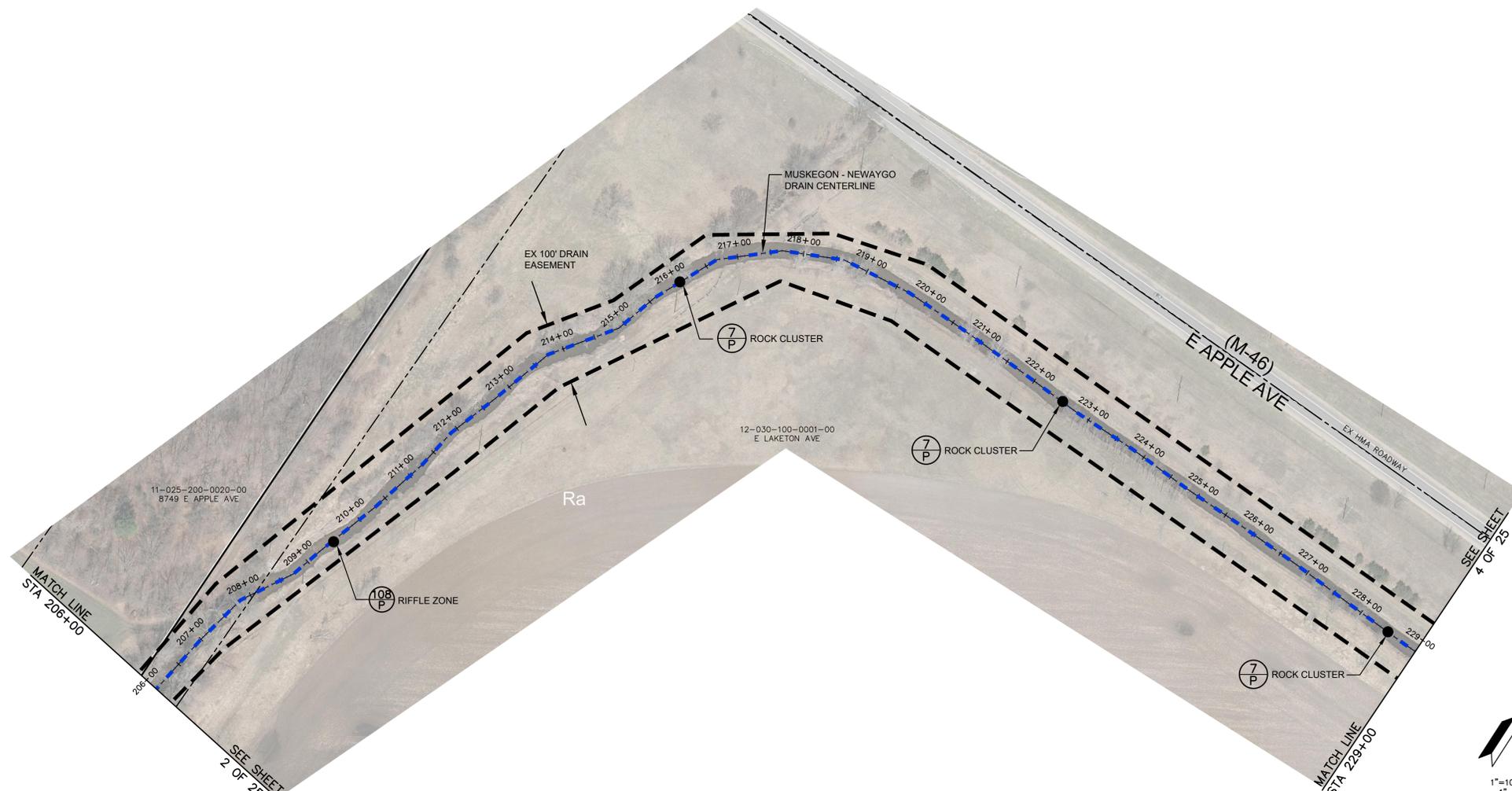
BM #2 ELEV = 672.91
SET SPIKE E SIDE UTILITY POLE N OF EVANSTON AVE, E OF DRIVE WAY 7360

- GENERAL NOTES:
- ALL TREES MUST BE MARKED BY ENGINEER PRIOR TO REMOVAL.
 - FOR ACCESS CLEARING, ALL TREES REMOVED MUST BE CHIPPED OR HAVE LOGS STACKED WITHIN THE EASEMENT LIMITS. ALL OTHER WOODY MATERIAL MUST BE CHIPPED, BURIED ON-SITE OR REMOVED FROM SITE. ALL TREES REMOVED FROM DITCH BOTTOM OR SIDES MUST BE CUT FLUSH.
 - SPOILS TO BE PLACED AND LEVELED ALONG THE WORKING SIDE OF THE DRAIN, SO AS NOT TO AFFECT THE EXISTING DRAINAGE PATTERNS.
 - LEVEL, MULCH AND SEED SPOILS WITH OPEN CHANNEL SEED MIX. SPOILS SHALL NOT BE GREATER THAN 8-INCH IN HEIGHT IN ANY GIVEN AREA.
 - PROPERTY OWNERS MUST BE NOTIFIED 7 DAYS PRIOR TO ANY ACCESS AND TREE REMOVALS ON THEIR PROPERTY.
 - SITE ACCESS IS RESTRICTED TO EXISTING DRAIN EASEMENTS, TEMPORARY ACCESS EASEMENTS, AND PUBLIC RIGHTS OF WAY SHOWN ON DRAWINGS. ALL OTHER ACCESS TO THE SITE SHALL BE APPROVED BY THE OWNER.
 - TEMPORARY SESC MEASURES MUST BE IN PLACE AT 500 FT INCREMENTS TO CONTROL SEDIMENT TRANSPORT.

| SOIL TYPES AND ABBREVIATIONS TO CONTROL | |
|---|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PifabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
| PifabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

LEGEND

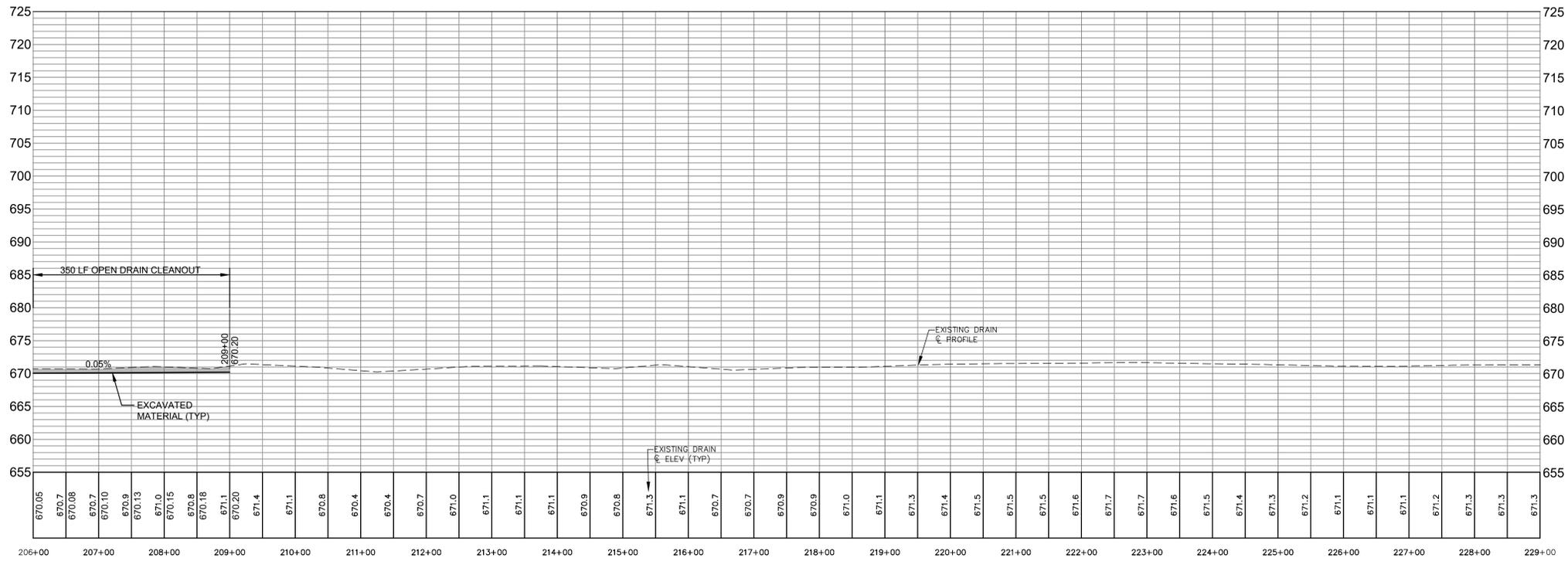
- = PROPERTY LINE OR R.O.W. LINE
- = EDGE OF PAVEMENT
- - - - - = FENCE
- - - - - = EXISTING GUARDRAIL
- WETLANDS (AS MARKED BY OTHERS)
- +560 = EXISTING SPOT ELEVATION
- +660 = EXISTING CONTOUR ELEVATION
- = EDGE OF WOODS
- = DECIDUOUS TREE
- = CONIFEROUS TREE
- = BUSH
- = STUMP
- = EXISTING GAS LINE
- = EXISTING STORM SEWER
- = EXISTING SANITARY SEWER
- = EXISTING MANHOLE
- ⊕ = EXISTING STORM CATCH BASIN
- ⊙ = EXISTING WELL LOCATION
- ⊕ = EXISTING WATER VALVE
- ⊙ = EXISTING CURB STOP / METER
- ⊕ = EXISTING CATCH BASIN
- BM = BENCH MARK LOCATION
- △ = EXISTING SIGN
- ⊕ = EXISTING MAILBOX
- ⊕ = EXISTING LIGHT POLE
- ⊕ = EXISTING GUY ANCHOR
- ⊕ = EXISTING UTILITY POLE
- ⊕ = EXISTING TELEPHONE PEDESTAL
- = EXISTING DRAIN EASEMENT
- = EXISTING DRAIN
- = PROPOSED DRAIN
- = PROPOSED TOP OF BANK
- = PROPOSED TOE OF BANK
- La = SOIL TYPE
- XX P = PERMANENT SOIL EROSION CONTROL MEASURE OR RESTORATION DETAIL
- XX T = TEMPORARY SOIL EROSION CONTROL MEASURE



| WORK ITEM | LOCATION | QUANTITY |
|--|--|----------|
| OPEN DRAIN CLEANOUT | STA 206+00 TO 209+50 | 350 LF |
| STREAM RESTORATION DETAIL-RIFFLE ZONE | STA 209+50 | 1 EA |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 216+00 STA 222+50 STA 228+50 | 3 EA |

MUSKEGON - NEWAYGO DRAIN

- SHEET SPECIFIC NOTES:
- WORK FROM THE WEST AND NORTH SIDE OF THE DRAIN THIS SHEET
 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 2 TO 9 FT



PLAN AND PROFILE
MUSKEGON - NEWAYGO DRAIN
STA 206+00 TO STA 229+00

| NO. | DATE | BY | REVISIONS |
|-----|------|----|-----------|
| | | | |

4063 Grand Oak Drive Suite A109
Lansing, MI 48911
517.887.1100

16930 Robbins Road Suite 105
Grand Haven, MI 49417
616.743.7070
engdot.com



BRENDA M. MOORE
MUSKEGON COUNTY DRAIN COMMISSIONER

STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
DIVISION 5
3 OF 25

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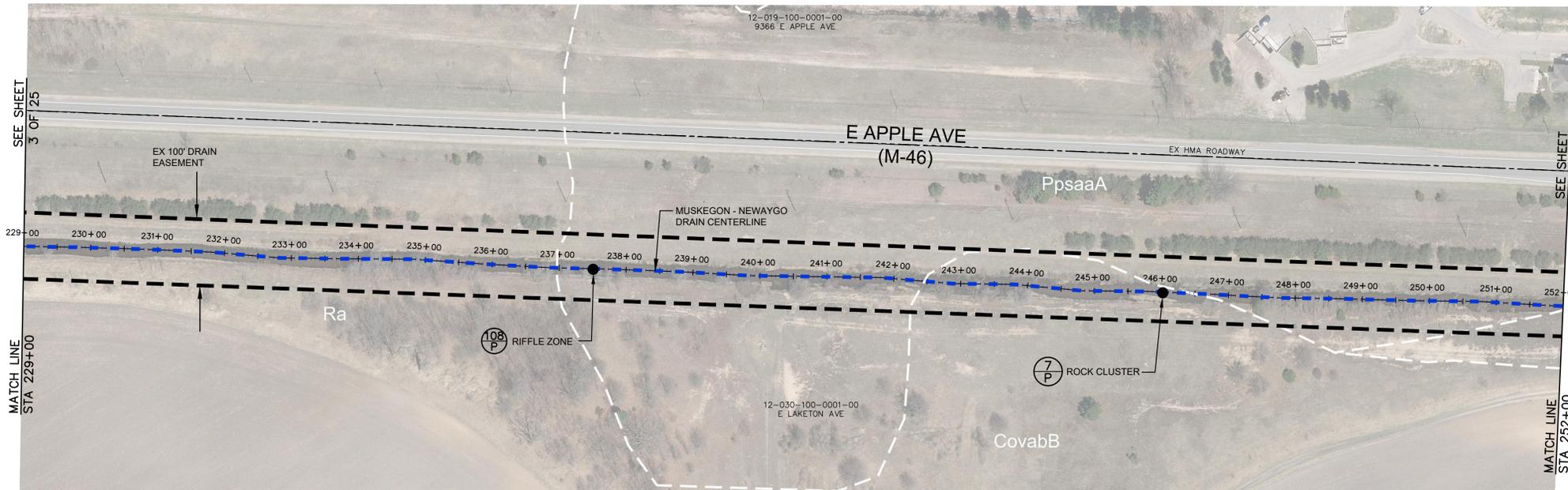
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BM #1 ELEV = 674.00
SET SPIKE W SIDE UTILITY POLE N OF EVANSTON AVE, 75' OF MAPLE ISLAND RD.

BM #2 ELEV = 672.91
SET SPIKE E SIDE UTILITY POLE N OF EVANSTON AVE, E OF DRIVE WAY 7360

| NO. | REVISIONS | DATE | BY | DATE | BY |
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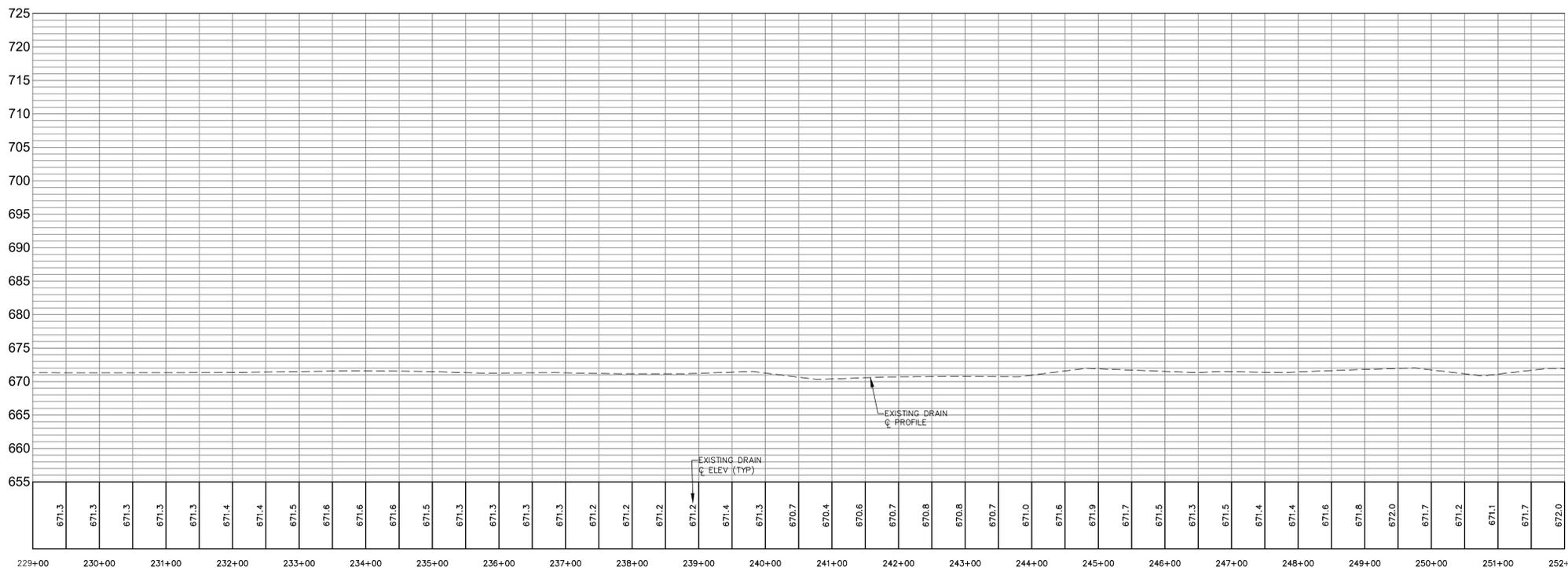


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- SHEET SPECIFIC NOTES:**
- WORK FROM THE WEST AND NORTH SIDE OF THE DRAIN THIS SHEET.
 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 7 TO 11 FT.

MUSKEGON - NEWAYGO DRAIN

| WORK ITEM | LOCATION | QUANTITY |
|--|------------|----------|
| STREAM RESTORATION DETAIL-RIFLE ZONE | STA 237+50 | 1 EA |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 246+00 | 1 EA |

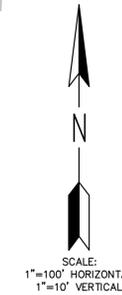


SOIL TYPES AND ABBREVIATIONS

| | |
|--------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PifabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
| PifabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

LEGEND

- = PROPERTY LINE OR R.O.W. LINE
- = EDGE OF PAVEMENT
- x-x-x-x-x- = FENCE
- - - - - = EXISTING GUARDRAIL
- ⊕ = WETLANDS (AS MARKED BY OTHERS)
- ⊕ = EXISTING SPOT ELEVATION
- ⊕ = EXISTING CONTOUR ELEVATION
- ⊕ = EDGE OF WOODS
- ⊕ = DECIDUOUS TREE
- ⊕ = CONIFEROUS TREE
- ⊕ = BUSH
- ⊕ = STUMP
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- ⊕ = EXISTING STORM CATCH BASIN
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- ⊕ = EXISTING CATCH BASIN
- ⊕ = BENCH MARK LOCATION
- ⊕ = EXISTING SIGN
- ⊕ = EXISTING MAILBOX
- ⊕ = EXISTING LIGHT POLE
- ⊕ = EXISTING GUY ANCHOR
- ⊕ = EXISTING UTILITY POLE
- ⊕ = EXISTING TELEPHONE PEDESTAL
- = EXISTING DRAIN EASEMENT
- = EXISTING DRAIN
- = PROPOSED DRAIN
- = PROPOSED TOP OF BANK
- = PROPOSED TOE OF BANK
- La = SOIL TYPE
- ⊕ = PERMANENT SOIL EROSION CONTROL MEASURE OR RESTORATION DETAIL
- ⊕ = TEMPORARY SOIL EROSION CONTROL MEASURE



**PLAN AND PROFILE
MUSKEGON - NEWAYGO DRAIN
STA 229+00 TO STA 252+00**

4063 Grand Oak Drive Suite A109
Lansing, MI 48911
517.887.1100

16930 Robbins Road Suite 105
Grand Haven, MI 49417
616.743.7070
engdot.com



BRENDA M. MOORE
MUSKEGON COUNTY DRAIN COMMISSIONER

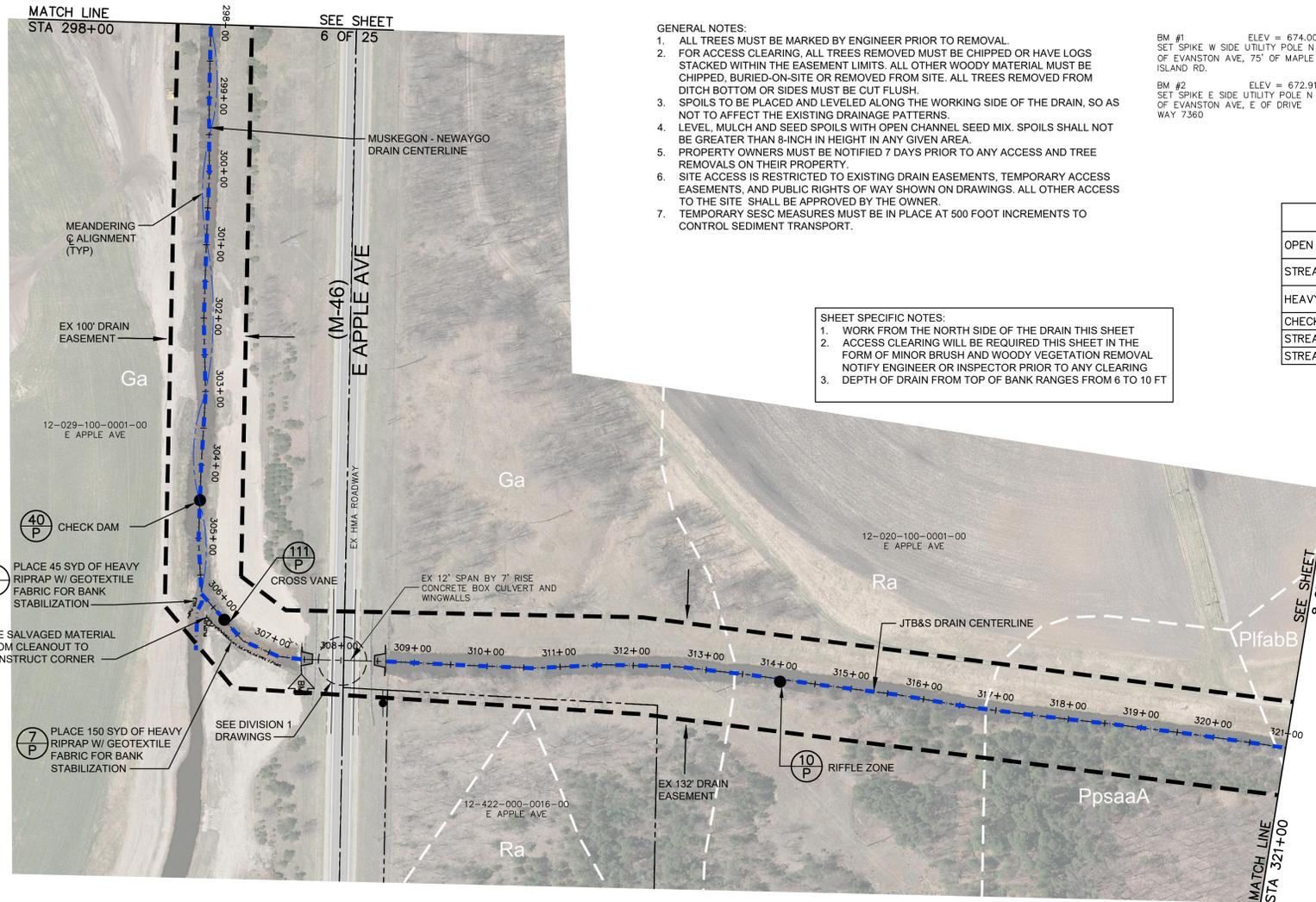
STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
4 OF 25

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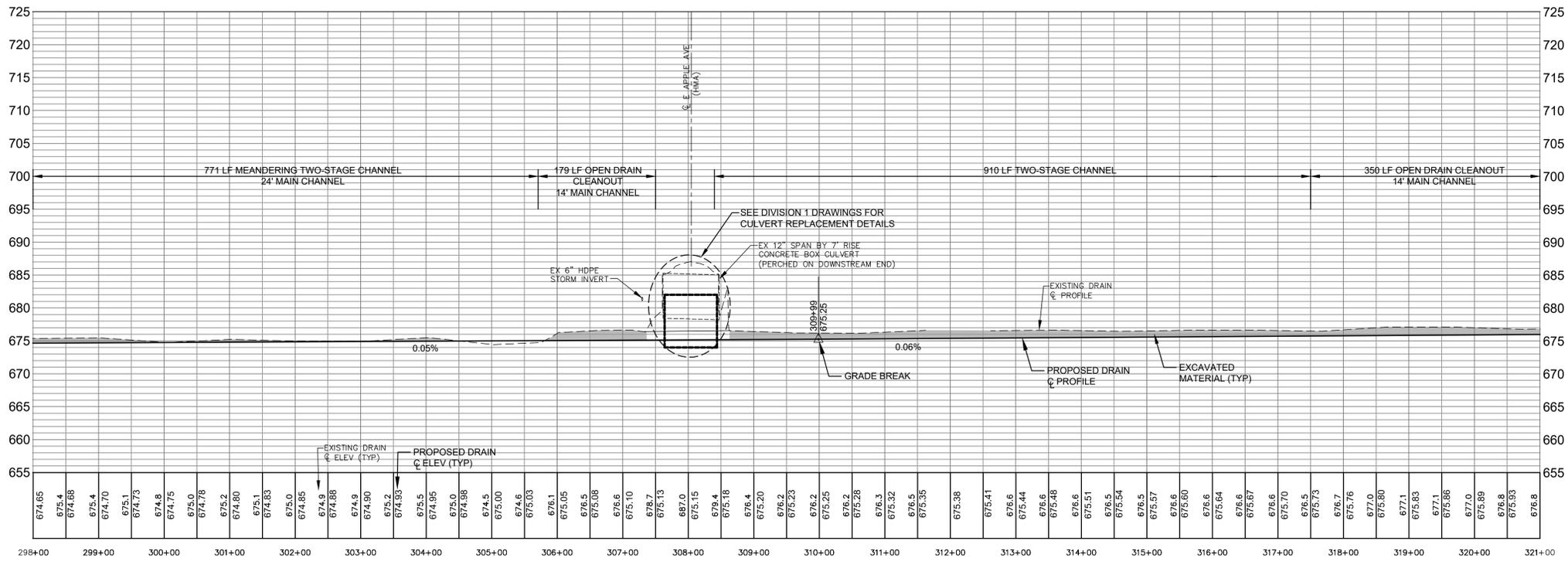
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| WORK ITEM | LOCATION | QUANTITY |
|---------------------------------------|--|----------|
| OPEN DRAIN CLEANOUT | STA 305+80 TO 307+59 STA 317+50 TO 321+00 | 529 LF |
| STREAM RESTORATION, TWO-STAGE CHANNEL | STA 298+00 TO 305+71 STA 308+40 TO 317+50 | 1681 LF |
| HEAVY RIPRAP ON GEOTEXTILE FABRIC | STA 305+50 STA 306+00 TO 307+59 | 195 SYD |
| CHECK DAM | STA 304+50 | 1 EA |
| STREAM RESTORATION DETAIL-CROSS VANE | STA 306+25 | 1 EA |
| STREAM RESTORATION DETAIL-RIFLE ZONE | STA 314+00 | 1 EA |

| SOIL TYPES AND ABBREVIATIONS | |
|------------------------------|--|
| CovabB | Covert-Pipstone sands, 0 to 6 percent slopes |
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| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

LEGEND

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- = EDGE OF PAVEMENT
- - - - - = FENCE
- = EXISTING GUARDRAIL
- Wetland symbols = WETLANDS (AS MARKED BY OTHERS)
- +860 = EXISTING SPOT ELEVATION
- = EXISTING CONTOUR ELEVATION
- = EDGE OF WOODS
- = DECIDUOUS TREE
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REVISIONS

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Eng
Engineering & Surveying

BRENDA M. MOORE
MUSKEGON COUNTY DRAIN COMMISSIONER

STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO. 16041

SHEET NO. 7 OF 25



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BM #3 ELEV = 707.92
NE CORNER OF CONCRETE PARKING,
230'± S OF BAILEY E, 860'± W OF
N ADAMS RD E.

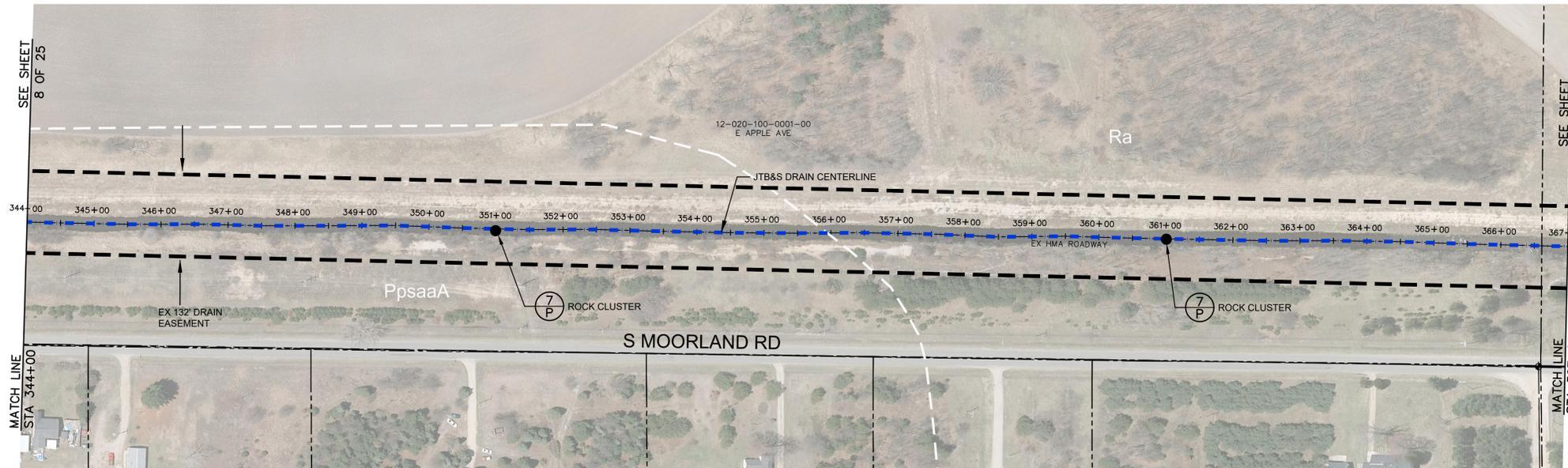
BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10" POPLAR,
75'± N OF CROSSING, 660'± N OF
BAILEY AT EXTENSION OF RAVENNA
RD.

- GENERAL NOTES:
- ALL TREES MUST BE MARKED BY ENGINEER PRIOR TO REMOVAL.
 - FOR ACCESS CLEARING, ALL TREES REMOVED MUST BE CHIPPED OR HAVE LOGS STACKED WITHIN THE EASEMENT LIMITS. ALL OTHER WOODY MATERIAL MUST BE CHIPPED, BURIED-ON-SITE OR REMOVED FROM SITE. ALL TREES REMOVED FROM DITCH BOTTOM OR SIDES MUST BE CUT FLUSH.
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| SOIL TYPES AND ABBREVIATIONS | |
|------------------------------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
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LEGEND

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- - - = FENCE
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- ☒ = WETLANDS (AS MARKED BY OTHERS)
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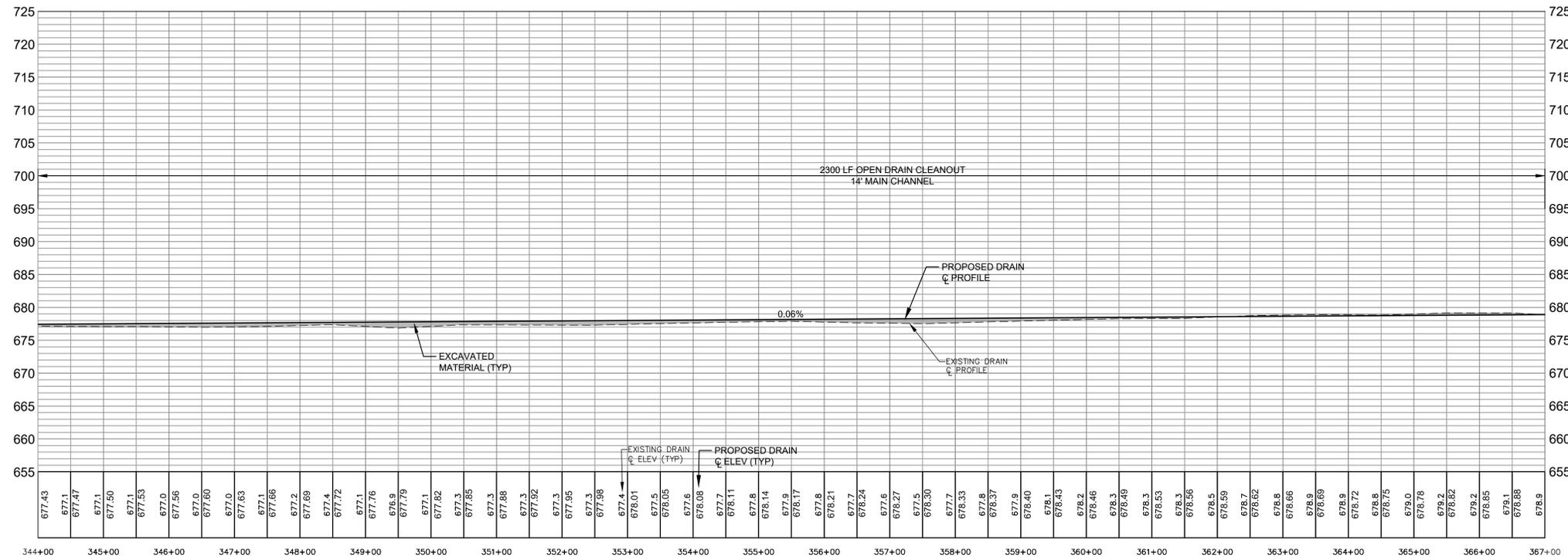
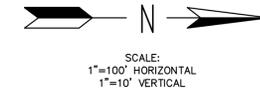


SHEET SPECIFIC NOTES:

- WORK FROM THE WEST SIDE OF THE DRAIN THIS SHEET
- ACCESS CLEARING WILL BE REQUIRED THIS SHEET IN THE FORM OF MINOR BRUSH AND WOODY VEGETATION REMOVAL NOTIFY ENGINEER OR INSPECTOR PRIOR TO ANY CLEARING
- DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 8 TO 12 FT

| WORK ITEM | LOCATION | QUANTITY |
|--|--------------------------|----------|
| OPEN DRAIN CLEANOUT | STA 344+00 TO 367+00 | 2300 LF |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 357+00 STA 361+00 | 2 EA |

JTB&S DRAIN



**PLAN AND PROFILE
JTB&S DRAIN
STA 344+00 TO STA 367+00**

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PROJECT NO.
16041

SHEET NO.
9 OF 25

DIVISION 5

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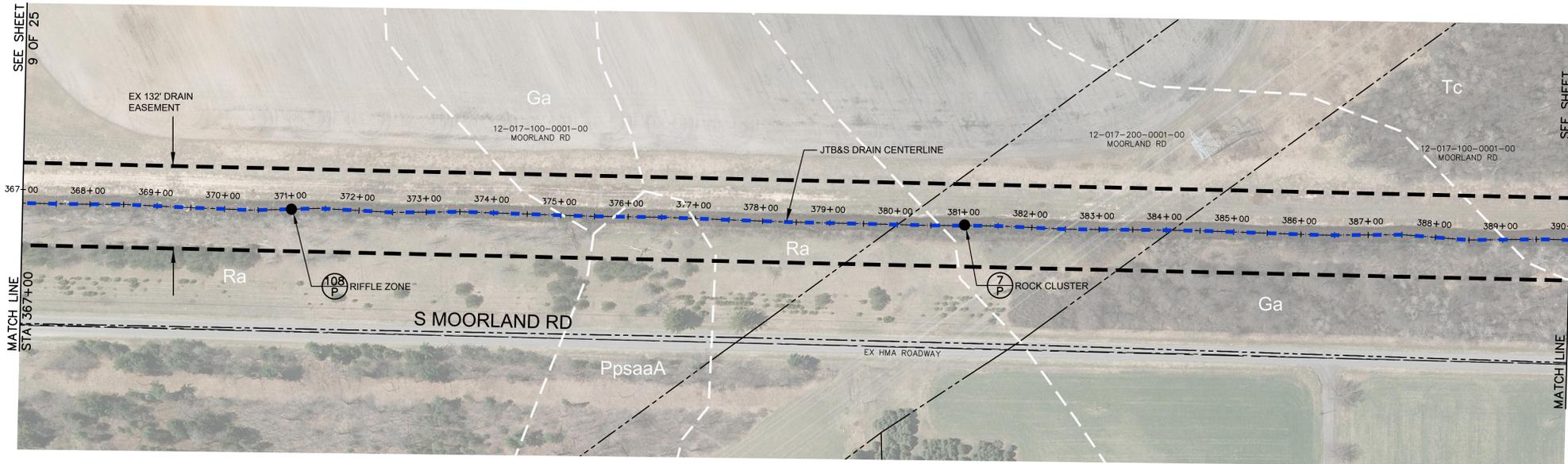
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250'± S OF BAILEY E, 860'± W OF
N ADAMS RD E.

BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10" POPLAR,
75'± N OF CROSSING, 660'± N OF
BAILEY AT EXEMPTING OF RAVENNA
RD.

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| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |
| Tc | Tawas and Carlisle mucks |



- SHEET SPECIFIC NOTES:
- WORK FROM THE WEST SIDE OF THE DRAIN THIS SHEET
 - ACCESS CLEARING WILL BE REQUIRED THIS SHEET IN THE FORM OF MINOR BRUSH AND WOODY VEGETATION REMOVAL NOTIFY ENGINEER OR INSPECTOR PRIOR TO ANY CLEARING
 - EXISTING DRAIN BANKS RANGE IN HEIGHT FROM 8-10 FEET

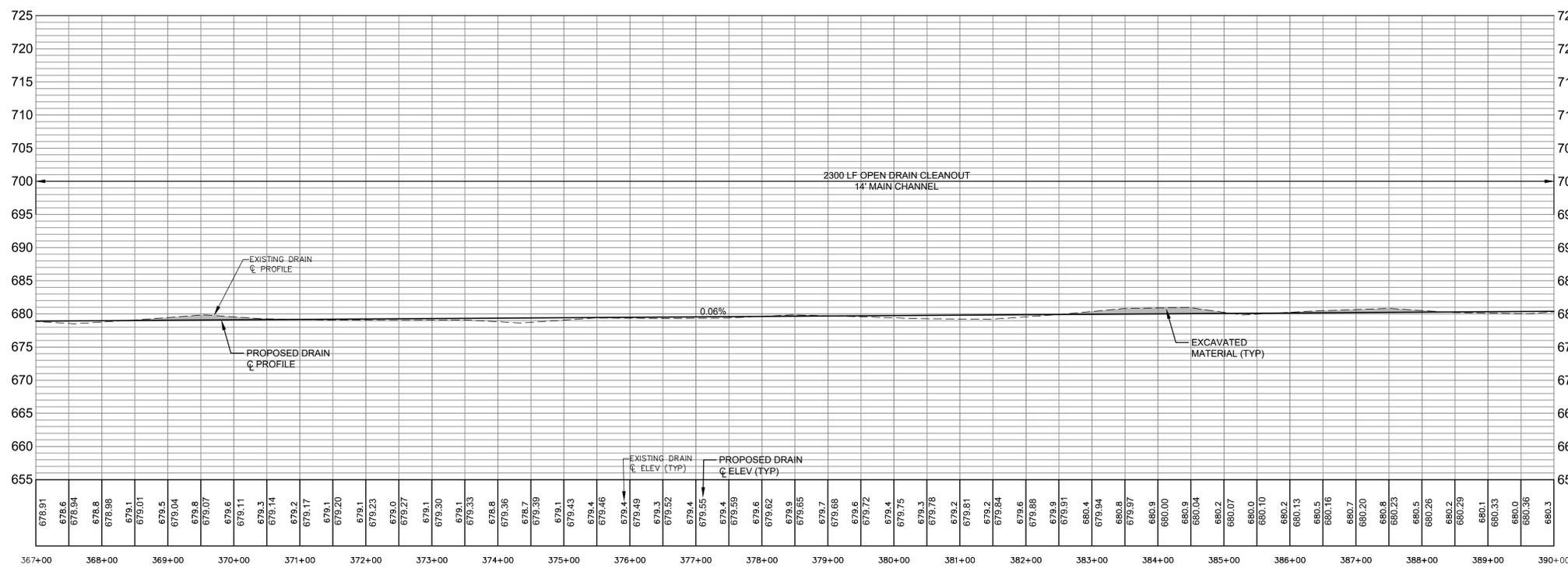
| WORK ITEM | LOCATION | QUANTITY |
|--|----------------------|----------|
| OPEN DRAIN CLEANOUT | STA 367+00 TO 390+00 | 2300 LF |
| STREAM RESTORATION DETAIL-RIFFLE ZONE | STA 371+00 | 1 EA |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 381+00 | 1 EA |

JTB&S DRAIN



LEGEND

- PROPERTY LINE OR R.O.W. LINE
- EDGE OF PAVEMENT
- - - - - FENCE
- - - - - EXISTING GUARDRAIL
- WETLANDS (AS MARKED BY OTHERS)
- EXISTING SPOT ELEVATION
- EXISTING CONTOUR ELEVATION
- EDGE OF WOODS
- DECIDUOUS TREE
- CONIFEROUS TREE
- BUSH
- STUMP
- EXISTING GAS LINE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING MANHOLE
- ⊕ EXISTING STORM CATCH BASIN
- ⊙ EXISTING WELL LOCATION
- ⊗ EXISTING WATER VALVE
- EXISTING CURB STOP / METER
- ⊞ EXISTING CATCH BASIN
- ⊠ EXISTING BENCH MARK LOCATION
- △ EXISTING SIGN
- ⊞ EXISTING MAILBOX
- * EXISTING LIGHT POLE
- < EXISTING GUY ANCHOR
- EXISTING UTILITY POLE
- ⊕ EXISTING TELEPHONE PEDESTAL
- EXISTING DRAIN EASEMENT
- EXISTING DRAIN E
- PROPOSED DRAIN E
- PROPOSED TOP OF BANK
- PROPOSED TOE OF BANK
- SOIL TYPE
- ⊗ PERMANENT SOIL EROSION CONTROL MEASURE OR RESTORATION DETAIL
- ⊗ TEMPORARY SOIL EROSION CONTROL MEASURE



PLAN AND PROFILE
JTB&S DRAIN
STA 367+00 TO STA 390+00

| NO. | REVISIONS | DATE | BY |
|-----|-----------|------|----|
| | | | |

4063 Grand Oak Drive Suite A109
Lansing, MI 48911
517.887.1100

16930 Robbins Road Suite 105
Grand Haven, MI 49417
616.743.7070
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BRENDA M. MOORE
MUSKEGON COUNTY DRAIN COMMISSIONER

STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
10 OF 25

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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.

BM #3 ELEV = 707.92
NE CORNER OF CONCRETE PARKING
250'± S OF BAILEY & 860'± W OF
N ADAMS RD &

BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10" POPLAR
75'± N OF CROSSING, 660'± N OF
BAILEY AT EXTENSION OF RAVENNA RD



- GENERAL NOTES:
- ALL TREES MUST BE MARKED BY ENGINEER PRIOR TO REMOVAL.
 - FOR ACCESS CLEARING, ALL TREES REMOVED MUST BE CHIPPED OR HAVE LOGS STACKED WITHIN THE EASEMENT LIMITS. ALL OTHER WOODY MATERIAL MUST BE CHIPPED, BURIED-ON-SITE OR REMOVED FROM SITE. ALL TREES REMOVED FROM DITCH BOTTOM OR SIDES MUST BE CUT FLUSH.
 - SPOILS TO BE PLACED AND LEVELED ALONG THE WORKING SIDE OF THE DRAIN, SO AS NOT TO AFFECT THE EXISTING DRAINAGE PATTERNS.
 - LEVEL, MULCH AND SEED SPOILS WITH OPEN CHANNEL SEED MIX. SPOILS SHALL NOT BE GREATER THAN 8-INCH IN HEIGHT IN ANY GIVEN AREA.
 - PROPERTY OWNERS MUST BE NOTIFIED 7 DAYS PRIOR TO ANY ACCESS AND TREE REMOVALS ON THEIR PROPERTY.
 - SITE ACCESS IS RESTRICTED TO EXISTING DRAIN EASEMENTS, TEMPORARY ACCESS EASEMENTS, AND PUBLIC RIGHTS OF WAY SHOWN ON DRAWINGS. ALL OTHER ACCESS TO THE SITE SHALL BE APPROVED BY THE OWNER.
 - TEMPORARY SECC MEASURES MUST BE IN PLACE AT 500 FOOT INCREMENTS TO CONTROL SEDIMENT TRANSPORT.

| SOIL TYPES AND ABBREVIATIONS | |
|------------------------------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PfabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
| PfabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

LEGEND

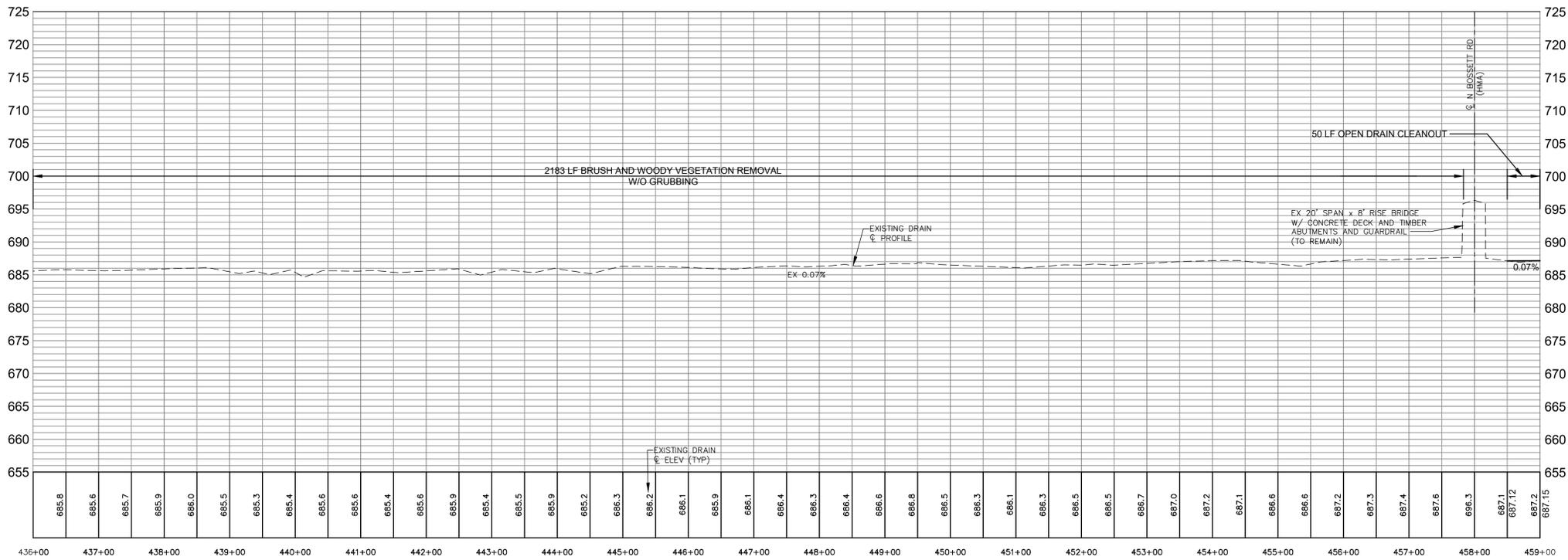
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- = SOIL TYPE
- ⊗ = PERMANENT SOIL EROSION CONTROL MEASURE OR RESTORATION DETAIL
- ⊗ = TEMPORARY SOIL EROSION CONTROL MEASURE

* INDICATES MISCELLANEOUS ITEM

| WORK ITEM | LOCATION | QUANTITY |
|---|--|----------|
| BRUSH AND WOODY VEGETATION REMOVAL W/O GRUBBING | STA 436+00 TO 457+83 STA 458+18 TO 459+00 | 2265 LF |
| HEAVY RIPRAP ON GEOTEXTILE FABRIC | STA 457+75 NORTH STA 457+75 SOUTH STA 458+25 NORTH STA 458+25 SOUTH | 20 SYD |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 439+25 STA 456+50 | 2 EA |
| STREAM RESTORATION DETAIL-RIFFLE ZONE | STA 447+00 | 1 EA |
| OPEN DRAIN CLEANOUT | STA 458+50 TO 459+00 | 50 LF |
| * BANK STABILIZATION | VARIOUS | 200 LF |
| * COIR LOGS | VARIOUS | 1000 LF |

JTB&S DRAIN

- SHEET SPECIFIC NOTES:**
- WORK FROM EITHER SIDE OF THE DRAIN THIS SHEET AND WHICH PRESENTS THE LEAST ENVIRONMENTAL IMPACT
 - ACCESS CLEARING WILL BE REQUIRED THIS SHEET IN THE FORM OF MINOR BRUSH AND WOODY VEGETATION REMOVAL. NOTIFY ENGINEER OR INSPECTOR PRIOR TO ANY CLEARING
 - MISCELLANEOUS ITEMS OF WORK WILL BE PERFORMED AT THE DIRECTION OF THE ENGINEER
 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 5 TO 9 FEET



**PLAN AND PROFILE
JTB&S DRAIN
STA 436+00 TO STA 459+00**

REVISIONS

| NO. | DATE | BY | DATE | BY |
|-----|------|-----|----------|----|
| | | GTO | | |
| | | | 02/21/17 | |
| | | | | |

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PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
13 OF 25

BM #3 ELEV = 707.92
NE CORNER OF CONCRETE PARKING,
250'± S OF BAILEY ☉, 860'± W OF
N ADAMS RD ☉

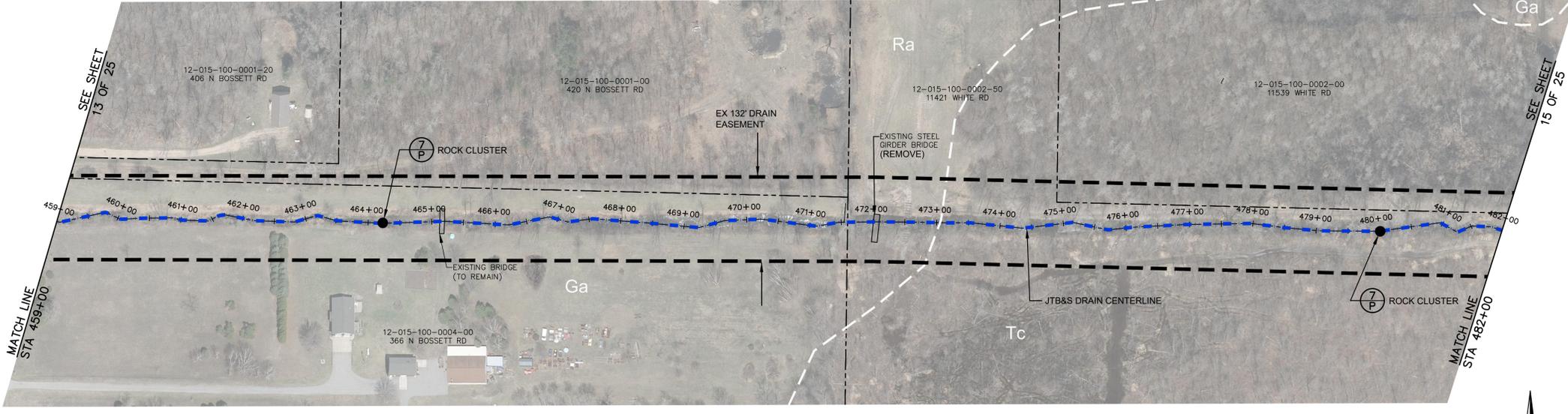
BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10" POPULAR,
75'± N OF CROSSING, 660'± N OF
BAILEY AT EXTENSION OF RAVENNA RD



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| | | 02/21/17 | |
| | | | |



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 - TEMPORARY SESC MEASURES MUST BE IN PLACE AT 500 FOOT INCREMENTS TO CONTROL SEDIMENT TRANSPORT.

| SOIL TYPES AND ABBREVIATIONS | |
|------------------------------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PifabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
| PifabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |
| Tc | Tawas and Carlisle mucks |

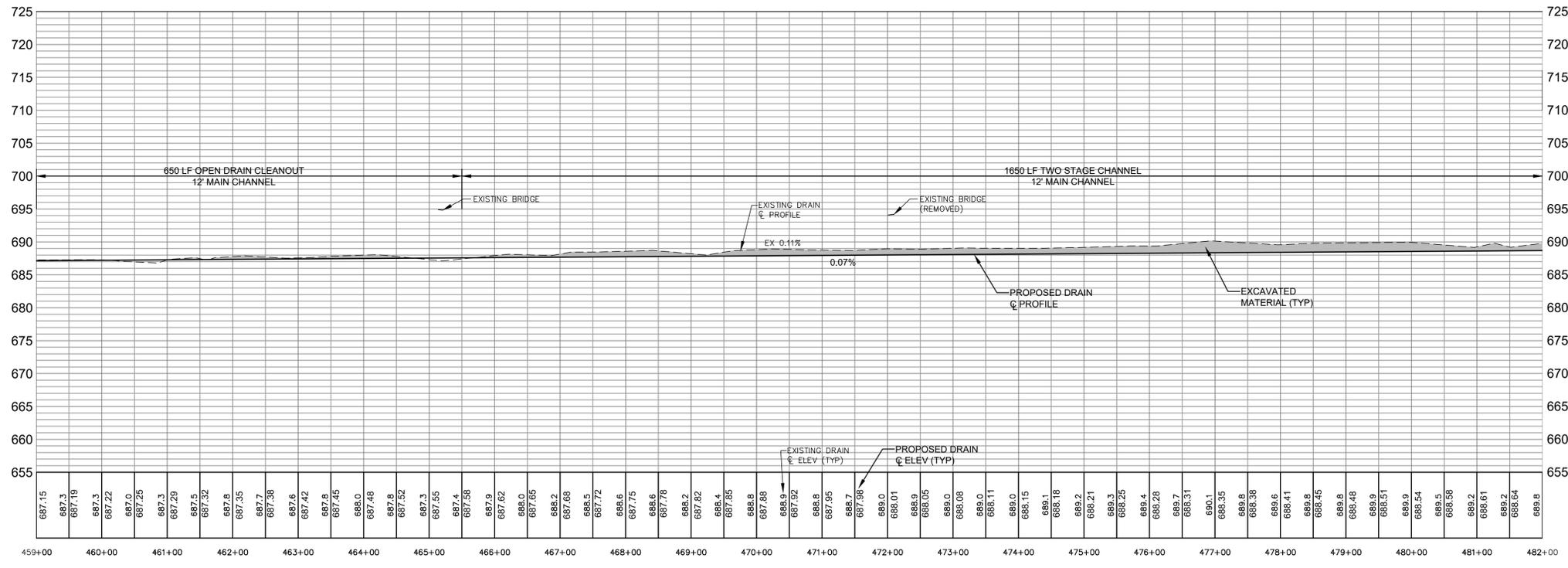
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| WORK ITEM | LOCATION | QUANTITY |
|--|--------------------------|----------|
| OPEN DRAIN CLEANOUT | STAT 459+00 TO 465+50 | 650 LF |
| STREAM RESTORATION-TWO STAGE CHANNEL | STA 465+50 TO 482+00 | 1650 LF |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 464+25 STA 480+00 | 2 EA |
| BRIDGE REMOVAL | 472+00 | 1 EA |

JTB&S DRAIN

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 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 4 TO 8 FEET
 - SPOILS CAN BE USED TO FORM TWO STAGE CHANNEL WHERE MAIN CHANNEL EXCEEDS 12' WIDTH, DEPTH OF TWO STAGE CHANNEL SHALL BE 12 INCHES



PLAN AND PROFILE
JTB&S DRAIN
STA 459+00 TO STA 482+00

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Eng
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BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
14 OF 25

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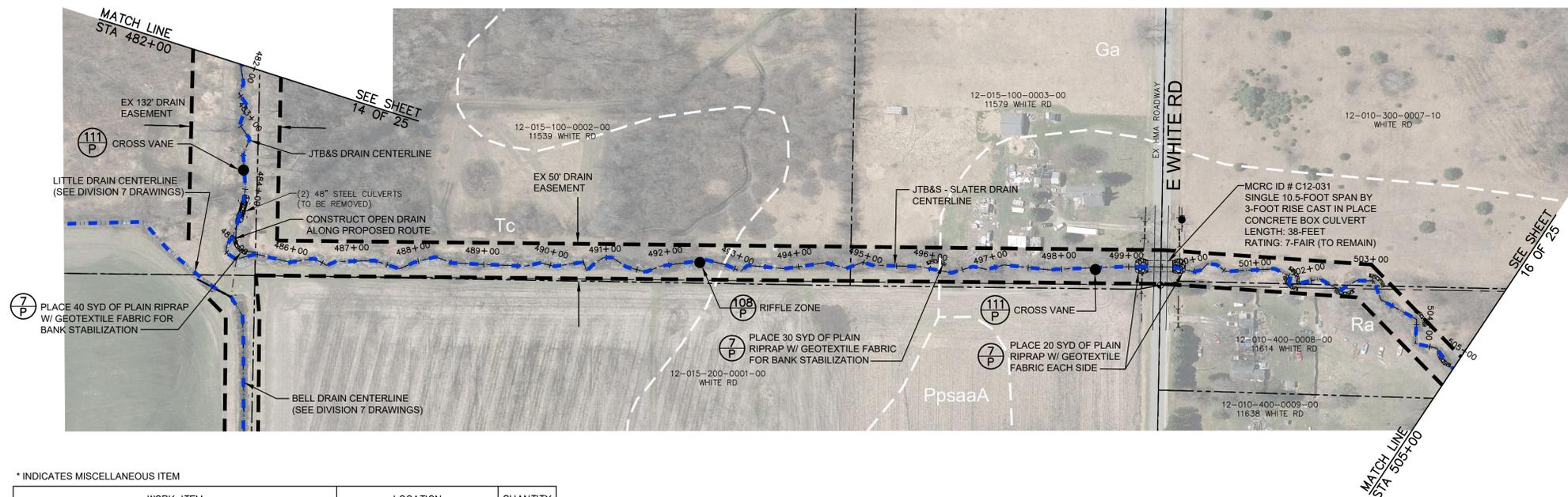


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BM #3 ELEV = 707.92
NE CORNER OF CONCRETE PARKING,
250'± S OF BAILEY C, 860'± W OF
N ADAMS RD C

BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10' POPLAR,
75'± N OF CROSSING, 660'± N OF
BAILEY AT EXTENSION OF RAVENNA RD



- GENERAL NOTES:
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 7. TEMPORARY SESS MEASURES MUST BE IN PLACE AT 500 FOOT INCREMENTS TO CONTROL SEDIMENT TRANSPORT.

| SOIL TYPES AND ABBREVIATIONS | |
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| Sa | Saranac loam |
| Tc | Tawas and Carlisle mucks |

* INDICATES MISCELLANEOUS ITEM

| WORK ITEM | LOCATION | QUANTITY |
|---|--|----------|
| CULVERT REMOVAL, 36-INCH DIA AND LARGER | STA 484+24 TO 484+36 | 24 LF |
| OPEN DRAIN CLEANOUT | STA 482+00 TO 484+11 STA 485+81 TO 499+29 STA 500+00 TO 505+00 | 2060 LF |
| OPEN DRAIN CONSTRUCTION | STA 484+36 TO 485+81 | 140 LF |
| BANK STABILIZATION | STA 500+00 TO 505+00 | 500 LF |
| 117-INCH BY 79-INCH CSP ARCH CULVERT | STA 484+16 TO 484+36 | 30 LF |
| PLAIN RIPRAP ON GEOTEXTILE FABRIC | STA 484+20 TO 484+50 STA 485+00 TO 496+00 STA 499+25 TO 499+75 | 160 SYD |
| STREAM RESTORATION DETAIL-RIFFLE ZONE | STA 492+50 | 1 EA |
| STREAM RESTORATION DETAIL-CROSS VANE | STA 483+75 STA 498+50 | 2 EA |
| * COIR LOGS | VARIOUS | 500 LF |

CRITICAL BANK STABILIZATION LOCATIONS:

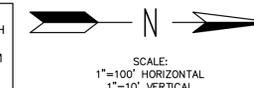
| | |
|------------|------------|
| STA 501+50 | STA 503+00 |
| STA 501+60 | STA 503+95 |
| STA 502+50 | STA 504+25 |

* ANTICIPATE 25 LF OF STABILIZATION AT EACH LOCATION

JTB&S - SLATER DRAIN

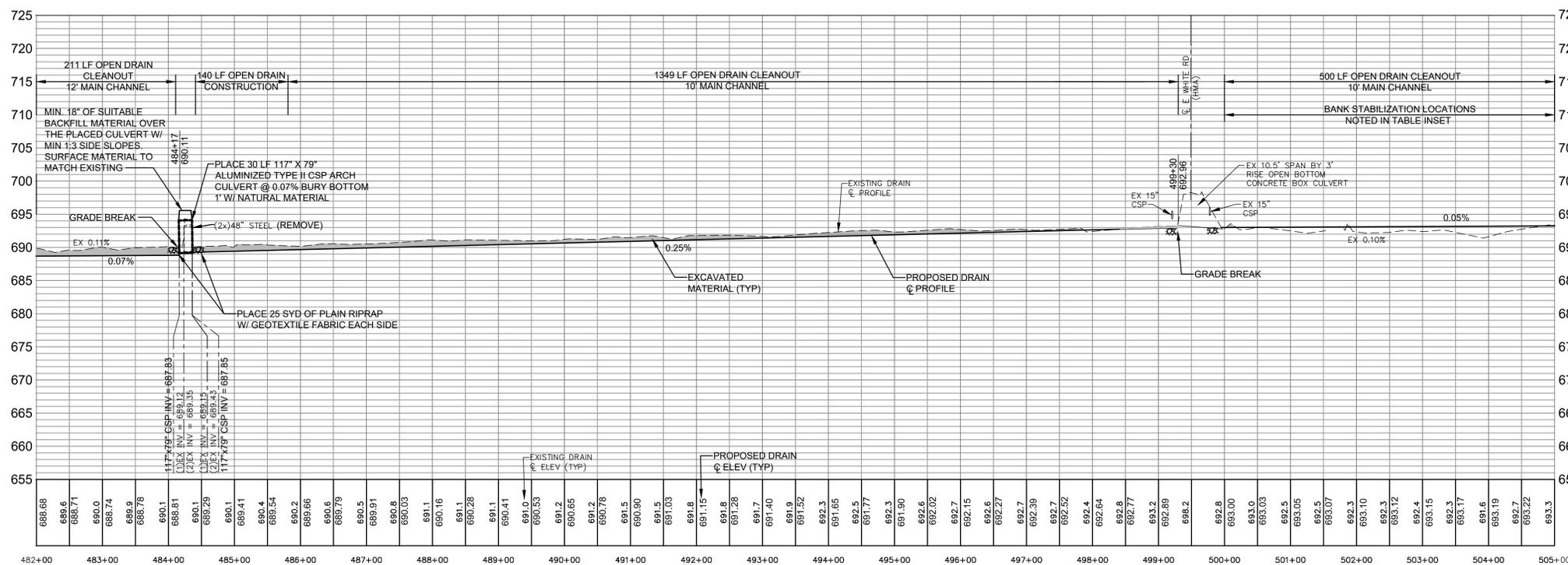
SHEET SPECIFIC NOTES:

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3. DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 3 TO 5 FEET.
4. SPOILS CAN BE USED TO FORM TWO STAGE CHANNEL WHERE MAIN CHANNEL EXCEEDS 10' WIDTH. DEPTH OF TWO STAGE CHANNEL SHALL BE 12 INCHES.



LEGEND

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PROJECT NO.
16041

SHEET NO.
DIVISION 5
15 OF 25

PLAN AND PROFILE
JTB&S - SLATER DRAIN
STA 482+00 TO STA 505+00

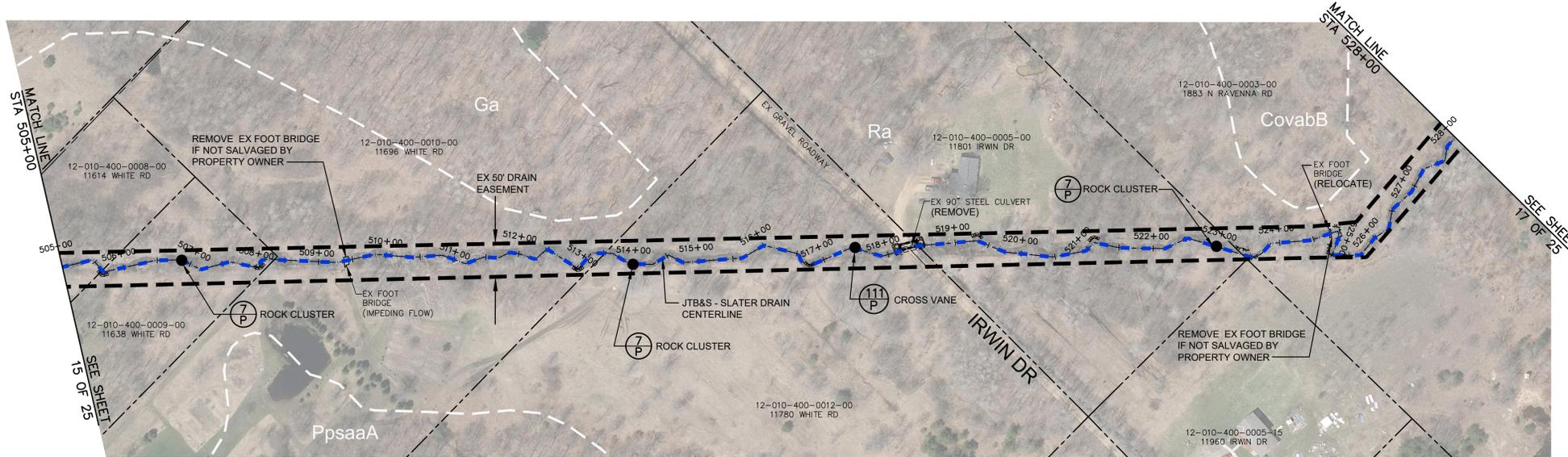


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BM #3 ELEV = 707.92
NE CORNER OF CONCRETE PARKING,
250' ± S OF BAILEY E, 860' ± W OF
N ADAMS RD E

BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10" POPLAR,
75' ± N OF CROSSING, 660' ± N OF
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| SOIL TYPES AND ABBREVIATIONS | |
|------------------------------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PifabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
| PifabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

LEGEND

- = PROPERTY LINE OR R.O.W. LINE
- = EDGE OF PAVEMENT
- - - - - = FENCE
- · - · - · = EXISTING GUARDRAIL
- WETLANDS (AS MARKED BY OTHERS)
- +860 = EXISTING SPOT ELEVATION
- 860 = EXISTING CONTOUR ELEVATION
- = EDGE OF WOODS
- = DECIDUOUS TREE
- = CONIFEROUS TREE
- = BUSH
- = STUMP
- = EXISTING GAS LINE
- = EXISTING STORM SEWER
- = EXISTING SANITARY SEWER
- = EXISTING MANHOLE
- ⊕ = EXISTING STORM CATCH BASIN
- ⊙ = EXISTING WELL LOCATION
- ⊗ = EXISTING WATER VALVE
- ⊙ = EXISTING CURB STOP / METER
- ⊕ = EXISTING CATCH BASIN
- BM = BENCH MARK LOCATION
- △ = EXISTING SIGN
- ⊗ = EXISTING MAILBOX
- ⊗ = EXISTING LIGHT POLE
- < = EXISTING GUY ANCHOR
- ⊙ = EXISTING UTILITY POLE
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- = EXISTING DRAIN EASEMENT
- = EXISTING DRAIN E
- = PROPOSED DRAIN E
- = PROPOSED TOP OF BANK
- = PROPOSED TOE OF BANK
- = SOIL TYPE
- XX P = PERMANENT SOIL EROSION CONTROL MEASURE OR RESTORATION DETAIL
- XX T = TEMPORARY SOIL EROSION CONTROL MEASURE

- SHEET SPECIFIC NOTES:**
- WORK FROM EITHER SIDE OF THE DRAIN THIS SHEET AND WHICH PRESENTS THE LEAST ENVIRONMENTAL IMPACT
 - ACCESS CLEARING WILL BE REQUIRED THIS SHEET IN THE FORM OF MINOR BRUSH AND WOODY VEGETATION REMOVAL. NOTIFY ENGINEER OR INSPECTOR PRIOR TO ANY CLEARING
 - MISCELLANEOUS ITEMS OF WORK WILL BE PERFORMED AT THE DIRECTION OF THE ENGINEER
 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 4 TO 6 FT



JTB&S - SLATER DRAIN

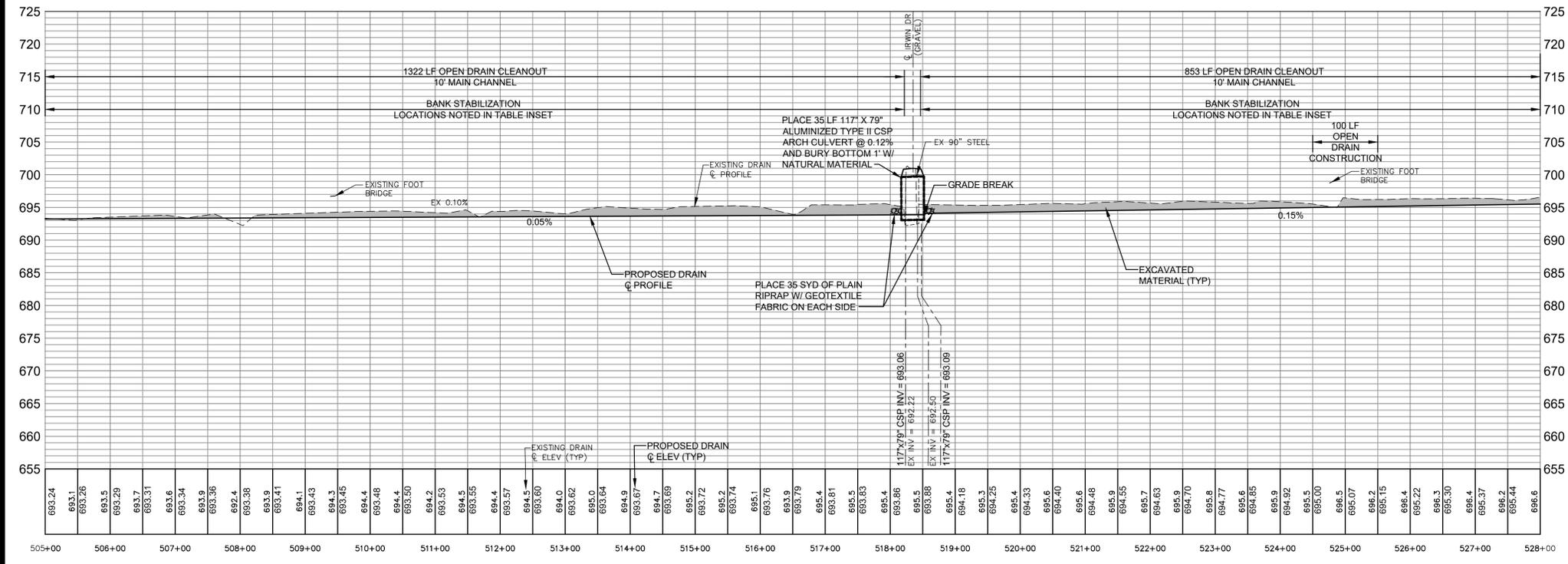
* INDICATES MISCELLANEOUS ITEM

| WORK ITEM | LOCATION | QUANTITY |
|--|--|----------|
| CULVERT REMOVAL, 36-INCH AND LARGER | STA 518+50 | 30 LF |
| FOOT BRIDGE REMOVAL | STA 509+45 STA 524+75 | 2 EA |
| OPEN DRAIN CLEANOUT | STA 505+00 TO 518+22 STA 518+47 TO 528+00 | 2175 LF |
| OPEN DRAIN CONSTRUCTION | STA 524+50 TO 525+50 | 100 LF |
| BANK STABILIZATION | STA 505+00 TO 518+22 STA 518+47 TO 528+00 | 250 LF |
| 117-INCH BY 79-INCH CSP ARCH CULVERT | STA 518+22 TO 518+47 | 35 LF |
| PLAIN RIPRAP ON GEOTEXTILE FABRIC | STA 518+22 STA 518+47 | 70 SYD |
| STREAM RESTORATION DETAIL—ROCK CLUSTER | STA 506+90 STA 514+00 STA 523+00 | 3 EA |
| STREAM RESTORATION DETAIL—CROSS VANE | STA 517+50 | 1 EA |
| GRAVEL ROADWAY REPLACEMENT | STA 518+50 AT IRWIN DR | 45 SYD |
| * BANK STABILIZATION | VARIOUS | 200 LF |
| * COIR LOGS | VARIOUS | 500 LF |

CRITICAL BANK STABILIZATION LOCATIONS:

| | |
|------------|------------|
| STA 505+70 | STA 521+20 |
| STA 508+04 | STA 523+35 |
| STA 513+00 | STA 523+50 |
| STA 516+75 | STA 524+70 |
| STA 519+45 | STA 525+50 |

* ANTICIPATE 25 LF OF STABILIZATION AT EACH LOCATION



**PLAN AND PROFILE
JTB&S - SLATER DRAIN
STA 505+00 TO STA 528+00**

Drawn By: GTO
Date: 6/23/17
Approved By: [Signature]
Date: [Blank]

REVISIONS

| NO. | DATE | DESCRIPTION |
|-----|------|-------------|
| | | |
| | | |
| | | |
| | | |

4063 Grand Oak Drive Suite A109
Lansing, MI 48911
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16930 Robbins Road Suite 105
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BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO. 16041
SHEET NO. 16 OF 25



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

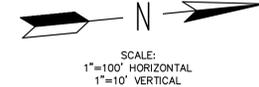
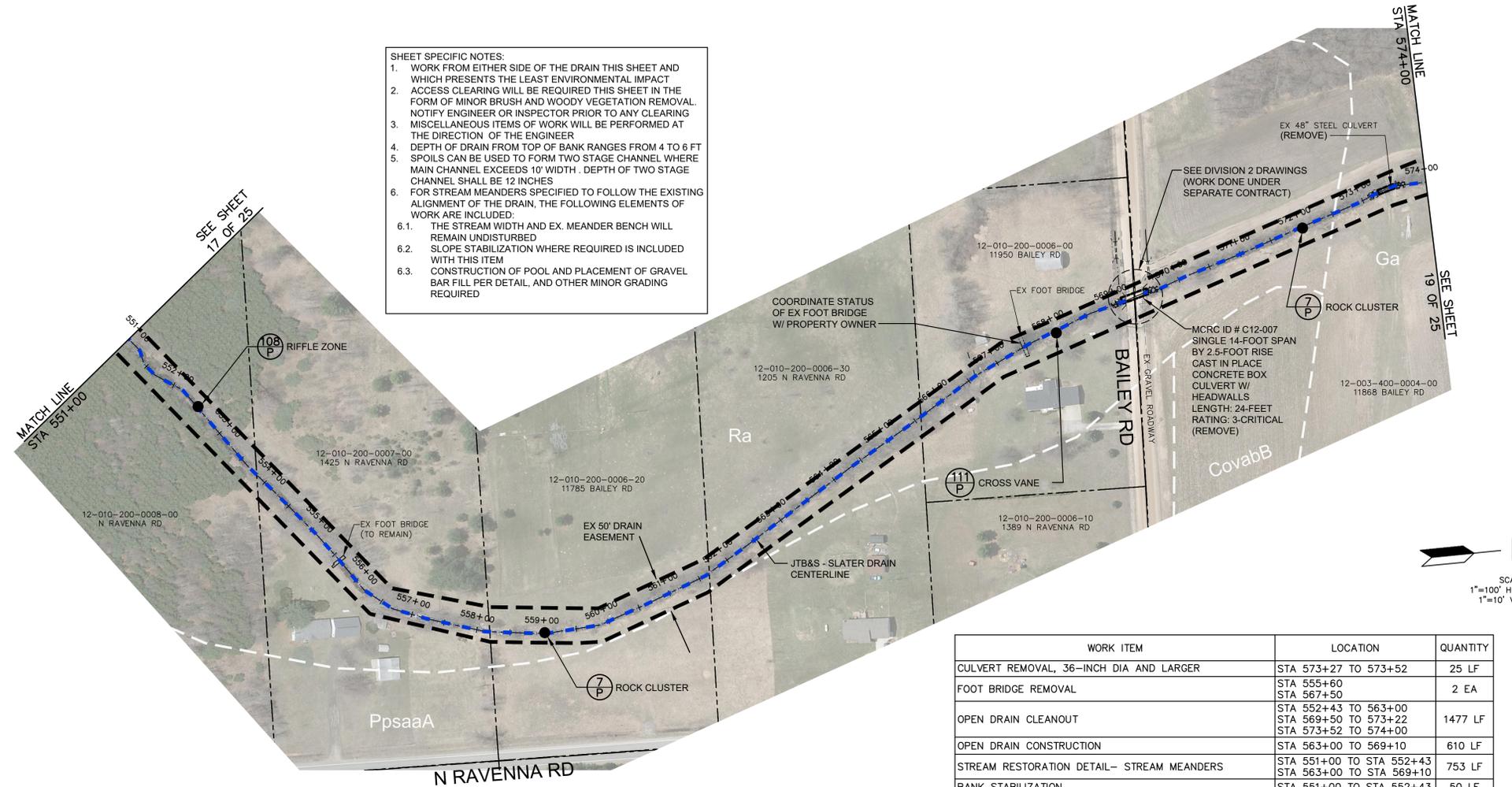
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BM #3 ELEV = 707.92
NE CORNER OF CONCRETE PARKING,
250' S OF BAILEY E, 860' W OF
N ADAMS RD E

BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10' POPLAR,
75' N OF CROSSING, 660' N OF
BAILEY AT EXTENSION OF RAVENNA RD

- GENERAL NOTES:
- ALL TREES MUST BE MARKED BY ENGINEER PRIOR TO REMOVAL.
 - FOR ACCESS CLEARING, ALL TREES REMOVED MUST BE CHIPPED OR HAVE LOGS STACKED WITHIN THE EASEMENT LIMITS. ALL OTHER WOODY MATERIAL MUST BE CHIPPED, BURIED-ON-SITE OR REMOVED FROM SITE. ALL TREES REMOVED FROM DITCH BOTTOM OR SIDES MUST BE CUT FLUSH.
 - SPOILS TO BE PLACED AND LEVELED ALONG THE WORKING SIDE OF THE DRAIN, SO AS NOT TO AFFECT THE EXISTING DRAINAGE PATTERNS.
 - LEVEL MULCH AND SEED SPOILS WITH OPEN CHANNEL SEED MIX. SPOILS SHALL NOT BE GREATER THAN 8-INCH IN HEIGHT IN ANY GIVEN AREA.
 - PROPERTY OWNERS MUST BE NOTIFIED 7 DAYS PRIOR TO ANY ACCESS AND TREE REMOVALS ON THEIR PROPERTY.
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- SHEET SPECIFIC NOTES:
- WORK FROM EITHER SIDE OF THE DRAIN THIS SHEET AND WHICH PRESENTS THE LEAST ENVIRONMENTAL IMPACT ACCESS CLEARING WILL BE REQUIRED THIS SHEET IN THE FORM OF MINOR BRUSH AND WOODY VEGETATION REMOVAL. NOTIFY ENGINEER OR INSPECTOR PRIOR TO ANY CLEARING.
 - MISCELLANEOUS ITEMS OF WORK WILL BE PERFORMED AT THE DIRECTION OF THE ENGINEER.
 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 4 TO 6 FT. SPOILS CAN BE USED TO FORM TWO STAGE CHANNEL WHERE MAIN CHANNEL EXCEEDS 10' WIDTH. DEPTH OF TWO STAGE CHANNEL SHALL BE 12 INCHES.
 - FOR STREAM MEANDERS SPECIFIED TO FOLLOW THE EXISTING ALIGNMENT OF THE DRAIN, THE FOLLOWING ELEMENTS OF WORK ARE INCLUDED:
 - THE STREAM WIDTH AND EX. MEANDER BENCH WILL REMAIN UNDISTURBED.
 - SLOPE STABILIZATION WHERE REQUIRED IS INCLUDED WITH THIS ITEM.
 - CONSTRUCTION OF POOL AND PLACEMENT OF GRAVEL BAR FILL PER DETAIL, AND OTHER MINOR GRADING REQUIRED.



| SOIL TYPES AND ABBREVIATIONS | |
|------------------------------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PfabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
| PfabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

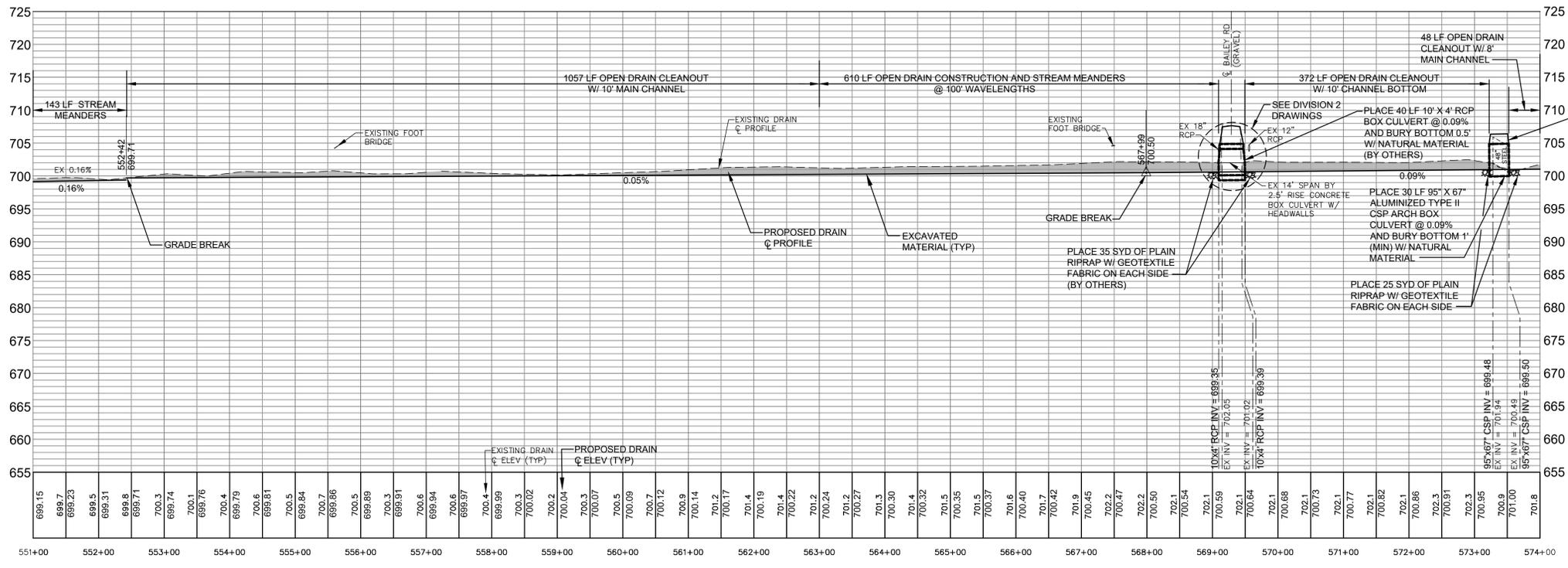
- LEGEND**
- = PROPERTY LINE OR R.O.W. LINE
 - = EDGE OF PAVEMENT
 - - - - - = FENCE
 - - - - - = EXISTING GUARDRAIL
 - W (with elevation) = WETLANDS (AS MARKED BY OTHERS)
 - (with elevation) = EXISTING SPOT ELEVATION
 - (with elevation) = EXISTING CONTOUR ELEVATION
 - (with elevation) = EDGE OF WOODS
 - ☀ = DECIDUOUS TREE
 - ☀ = CONIFEROUS TREE
 - ☀ = BUSH
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 - = PROPOSED TOP OF BANK
 - = PROPOSED TOE OF BANK
 - La = SOIL TYPE
 - XX P = PERMANENT SOIL EROSION CONTROL MEASURE OR RESTORATION DETAIL
 - XX T = TEMPORARY SOIL EROSION CONTROL MEASURE

| WORK ITEM | LOCATION | QUANTITY |
|--|--|----------|
| CULVERT REMOVAL, 36-INCH DIA AND LARGER | STA 573+27 TO 573+52 | 25 LF |
| FOOT BRIDGE REMOVAL | STA 555+60 TO 567+50 | 2 EA |
| OPEN DRAIN CLEANOUT | STA 552+43 TO 563+00 STA 569+50 TO 573+22 STA 573+52 TO 574+00 | 1477 LF |
| OPEN DRAIN CONSTRUCTION | STA 563+00 TO 569+10 | 610 LF |
| STREAM RESTORATION DETAIL- STREAM MEANDERS | STA 551+00 TO STA 552+43 STA 563+00 TO STA 569+10 | 753 LF |
| BANK STABILIZATION | STA 551+00 TO STA 552+43 | 50 LF |
| 95-INCH BY 67-INCH CSP ARCH CULVERT | STA 573+27 TO 573+52 | 30 LF |
| PLAIN RIPRAP ON GEOTEXTILE FABRIC | STA 569+10 TO 569+50 STA 573+27 TO 573+52 | 120 SYD |
| STREAM RESTORATION DETAIL-RIFFLE ZONE | STA 552+50 | 1 EA |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 559+00 TO 572+00 | 2 EA |
| STREAM RESTORATION DETAIL-CROSS VANE | STA 568+00 | 1 EA |

CRITICAL BANK STABILIZATION LOCATIONS:
STA 551+35 STA 552+00

* ANTICIPATE 25 LF OF STABILIZATION AT EACH LOCATION

JTB&S - SLATER DRAIN



MIN. 18" OF SUITABLE BACKFILL MATERIAL OVER THE PLACED CULVERT W/ MIN 1:3 SIDE SLOPES. SURFACE MATERIAL TO MATCH EXISTING

4063 Grand Oak Drive Suite A109
Lansing, MI 48911
517.887.1100

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PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO. 16041

SHEET NO. 18 OF 25

DIVISION 5

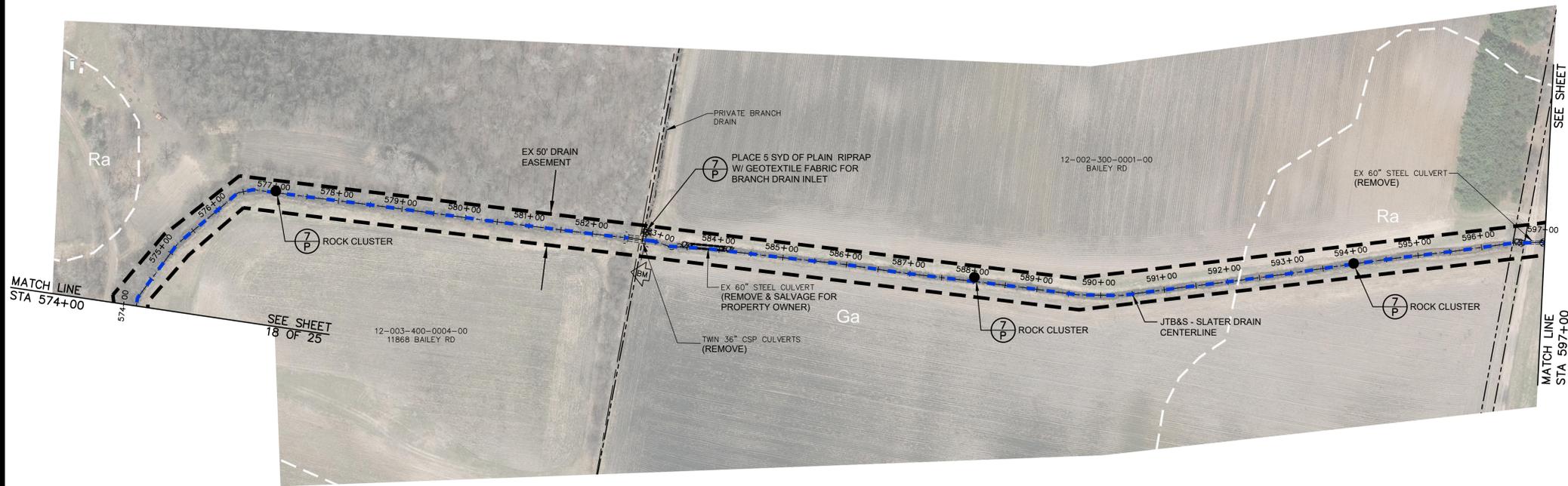
BM #3 ELEV = 707.92
NE CORNER OF CONCRETE PARKING,
250' ± S OF BAILEY ☐, 860' ± W OF
N ADAMS RD ☐

BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10" POPLAR,
75' ± N OF CROSSING, 660' ± N OF
BAILEY AT EXTENSION OF RAVENNA RD



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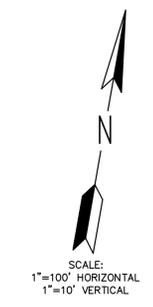
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| SOIL TYPES AND ABBREVIATIONS | |
|------------------------------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PifabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
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| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

| WORK ITEM | LOCATION | QUANTITY |
|---|--|----------|
| CULVERT REMOVAL, 36-INCH DIA AND LARGER | STA 582+56 TO 582+84 STA 583+58 TO 584+08 | 78 LF |
| OPEN DRAIN CLEANOUT | STA 574+00 TO 583+58 STA 584+08 TO 597+00 | 2250 LF |
| 95-INCH BY 67-INCH CSP ARCH CULVERT | STA 583+58 TO 584+08 STA 596+64 TO 596+94 | 80 LF |
| PLAIN RIPRAP ON GEOTEXTILE FABRIC | STA 583+58 TO 584+08 STA 584+08 TO 584+67 STA 596+67 TO 596+93 | 85 SYD |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 577+00 TO 588+00 STA 594+00 TO 594+00 | 3 EA |

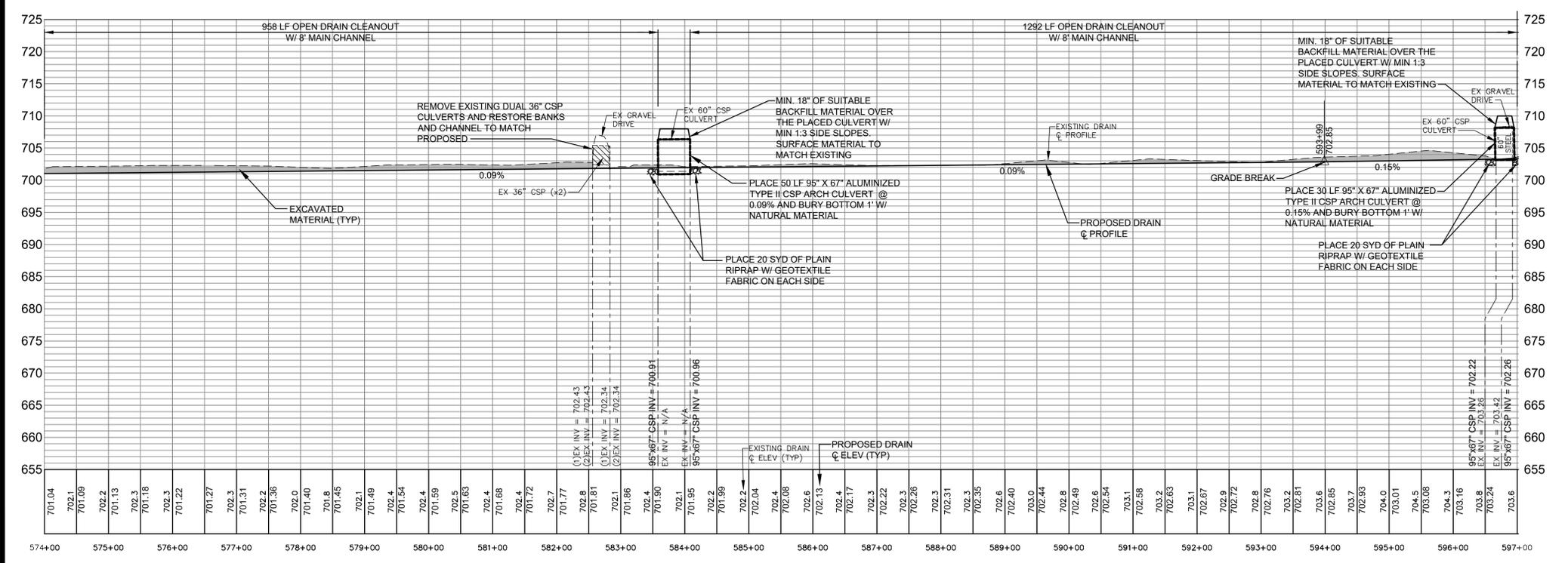
JTB&S - SLATER DRAIN

- SHEET SPECIFIC NOTES:
- WORK FROM SOUTH SIDE OF THE DRAIN THIS SHEET
 - ACCESS CLEARING WILL BE REQUIRED THIS SHEET IN THE FORM OF MINOR BRUSH AND WOODY VEGETATION REMOVAL. NOTIFY ENGINEER OR INSPECTOR PRIOR TO ANY CLEARING
 - MISCELLANEOUS ITEMS OF WORK WILL BE PERFORMED AT THE DIRECTION OF THE ENGINEER
 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 4 TO 5 FEET
 - SPOILS CAN BE USED TO FORM TWO STAGE CHANNEL WHERE MAIN CHANNEL EXCEEDS 10' WIDTH. DEPTH OF TWO STAGE CHANNEL SHALL BE 12 INCHES



LEGEND

- PROPERTY LINE OR R.O.W. LINE
- EDGE OF PAVEMENT
- - - - - FENCE
- - - - - EXISTING GUARDRAIL
- WETLANDS (AS MARKED BY OTHERS)
- EXISTING SPOT ELEVATION
- EXISTING CONTOUR ELEVATION
- EDGE OF WOODS
- DECIDUOUS TREE
- CONIFEROUS TREE
- BUSH
- STUMP
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- EXISTING STORM SEWER
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- EXISTING MANHOLE
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- EXISTING LIGHT POLE
- EXISTING GUY ANCHOR
- EXISTING UTILITY POLE
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- PROPOSED TOE OF BANK
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REVISIONS

| NO. | DATE | BY | DATE | BY |
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MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
19 OF 25

DIVISION 5

**PLAN AND PROFILE
JTB&S - SLATER DRAIN
STA 574+00 TO STA 597+00**

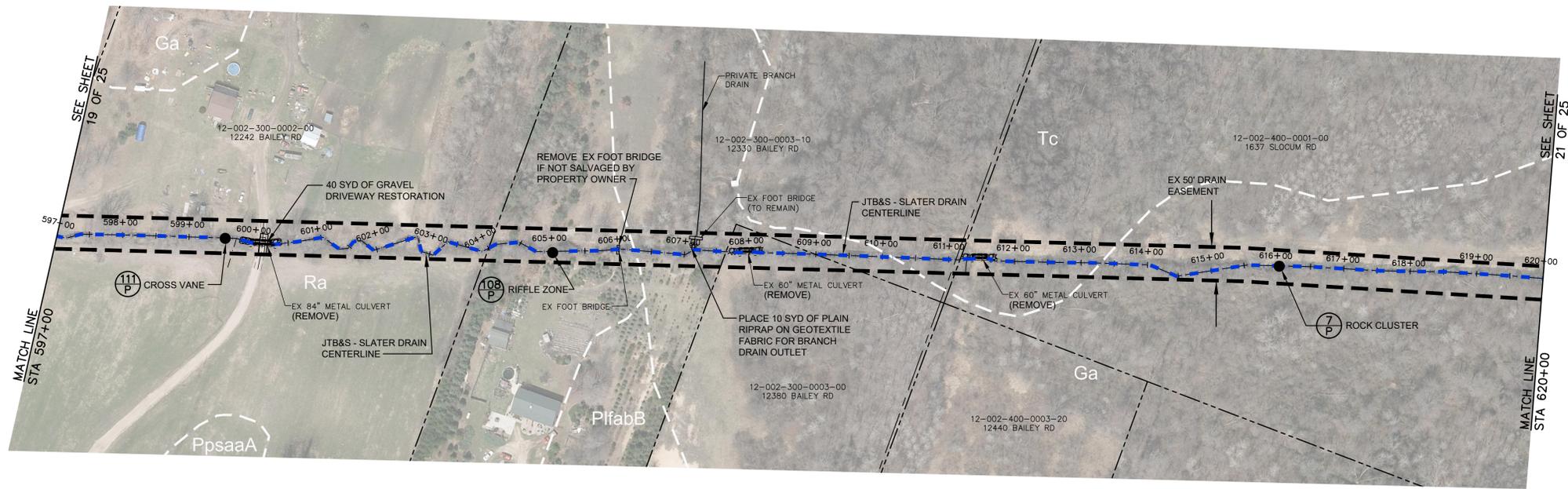
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NE CORNER OF CONCRETE PARKING,
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SET SPIKE SW SIDE 10" POPLAR,
75'± N OF CROSSING, 660'± N OF
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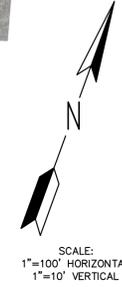
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| PfabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
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| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

| WORK ITEM | LOCATION | QUANTITY |
|---|--|----------|
| CULVERT REMOVAL, 36-INCH DIA AND LARGER | STA 599+98 TO 600+28 STA 607+88 TO 608+08 STA 611+40 TO 611+60 | 70 LF |
| FOOT BRIDGE REMOVAL | STA 606+00 | 1 EA |
| OPEN DRAIN CLEANOUT | STA 597+00 TO 599+98 STA 605+11 TO 607+88 STA 608+08 TO 611+40 STA 611+60 TO 620+00 | 1747 LF |
| STREAM MEANDERS | STA 600+38 TO 605+11 | 473 LF |
| 95-INCH BY 67-INCH CSP ARCH CULVERT | STA 599+98 TO 600+38 | 40 LF |
| 60-INCH CSP CULVERT | STA 607+88 TO 608+08 STA 611+40 TO 611+60 | 40 LF |
| 60-INCH CSP FLARED END SECTION | STA 599+98 STA 607+88 STA 611+40 STA 600+28 STA 608+08 STA 611+60 | 6 EA |
| PLAIN RIPRAP ON GEOTEXTILE FABRIC | STA 599+98 STA 600+38 STA 611+40 STA 607+88 STA 608+08 STA 611+60 | 100 SYD |
| STREAM RESTORATION DETAIL-RIFFLE ZONE | STA 605+00 | 1 EA |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 605+00 | 1 EA |
| STREAM RESTORATION DETAIL-CROSS VANE | STA 599+50 | 1 EA |
| GRAVEL DRIVEWAY RESTORATION | STA 600+13 | 40 SYD |

JTB&S - SLATER DRAIN

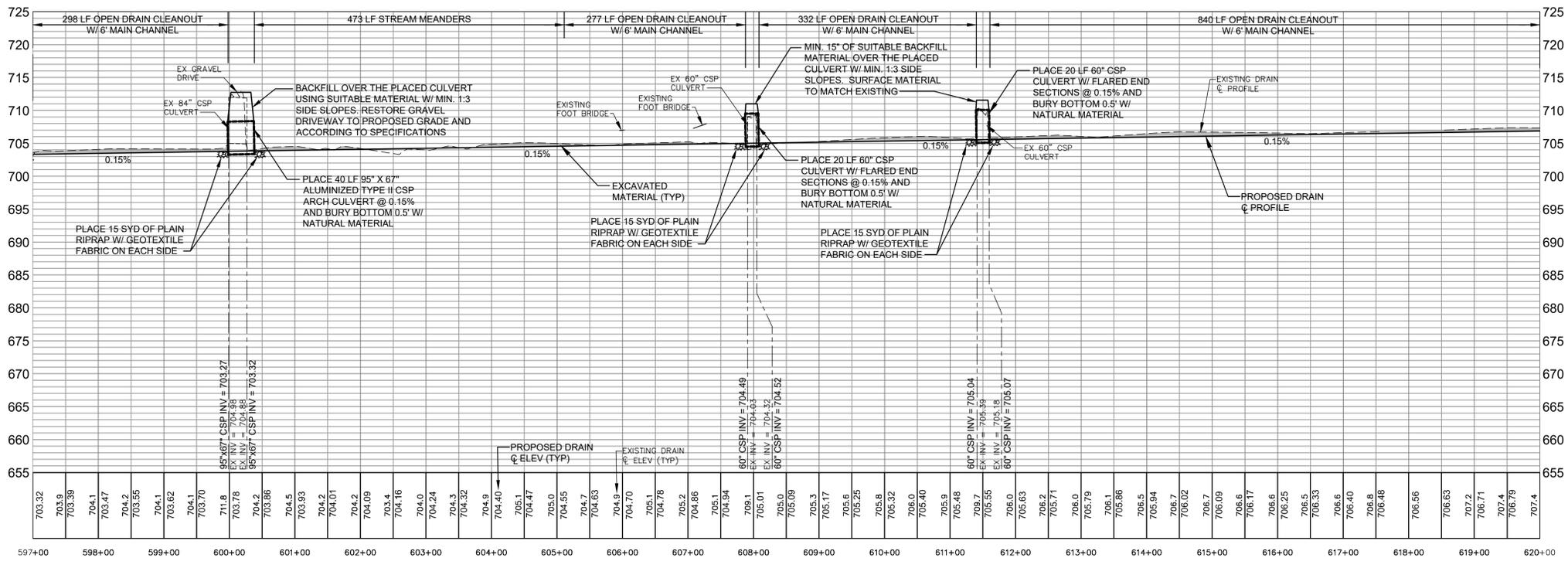
CRITICAL BANK STABILIZATION LOCATIONS:
STA 602+10 STA 602+95
STA 602+60 STA 603+40
* ANTICIPATE 25 LF OF STABILIZATION AT EACH LOCATION

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 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 4 TO 5 FEET.
 - SPOILS CAN BE USED TO FORM TWO STAGE CHANNEL WHERE MAIN CHANNEL EXCEEDS 10' WIDTH. DEPTH OF TWO STAGE CHANNEL SHALL BE 12 INCHES.
 - FOR STREAM MEANDERS SPECIFIED TO FOLLOW THE EXISTING ALIGNMENT OF THE DRAIN, THE FOLLOWING ELEMENTS OR WORK ARE INCLUDED:
 - THE STREAM WIDTH AND EX. MEANDER BENCH WILL REMAIN UNDISTURBED.
 - SLOPE STABILIZATION WHERE REQUIRED IS INCLUDE WITH THIS ITEM.
 - CONSTRUCTION OF POOL AND PLACEMENT OF GRAVEL BAR FILL PER DETAIL, AND OTHER MINOR GRADING REQUIRED.



LEGEND

- PROPERTY LINE OR R.O.W. LINE
- EDGE OF PAVEMENT
- - - - - FENCE
- - - - - EXISTING GUARDRAIL
- WETLANDS (AS MARKED BY OTHERS)
- EXISTING SPOT ELEVATION
- EXISTING CONTOUR ELEVATION
- EDGE OF WOODS
- DECIDUOUS TREE
- CONIFEROUS TREE
- BUSH
- STUMP
- EXISTING GAS LINE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING MANHOLE
- EXISTING STORM CATCH BASIN
- EXISTING WELL LOCATION
- EXISTING WATER VALVE
- EXISTING CURB STOP / METER
- EXISTING CATCH BASIN
- BENCH MARK LOCATION
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING LIGHT POLE
- EXISTING GUY ANCHOR
- EXISTING UTILITY POLE
- EXISTING TELEPHONE PEDESTAL
- EXISTING DRAIN EASEMENT
- EXISTING DRAIN E
- PROPOSED DRAIN E
- PROPOSED TOP OF BANK
- PROPOSED TOE OF BANK
- SOIL TYPE
- PERMANENT SOIL EROSION CONTROL MEASURE OR RESTORATION DETAIL
- TEMPORARY SOIL EROSION CONTROL MEASURE



**PLAN AND PROFILE
JTB&S - SLATER DRAIN
STA 597+00 TO STA 620+00**

Drawn by: GTO
Date: 6/23/17
Approved by: [Signature]
Date: [Blank]

REVISIONS

| NO. | DATE | DESCRIPTION |
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| | | |

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BRENDA M. MOORE
MUSKEGON COUNTY DRAIN COMMISSIONER

STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
**DIVISION 5
20 OF 25**

BM #3 ELEV = 707.92
NE CORNER OF CONCRETE PARKING,
250'± S OF BAILEY C, 860'± W OF
N ADAMS RD C

BM #4 ELEV = 707.74
SET SPIKE SW SIDE 10" POPLAR,
75'± N OF CROSSING, 660'± N OF
BAILEY AT EXTENSION OF RAVENNA RD



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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.

| NO | DATE | BY | REVISIONS |
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| | | GTO | |
| | 02/21/17 | | |
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PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

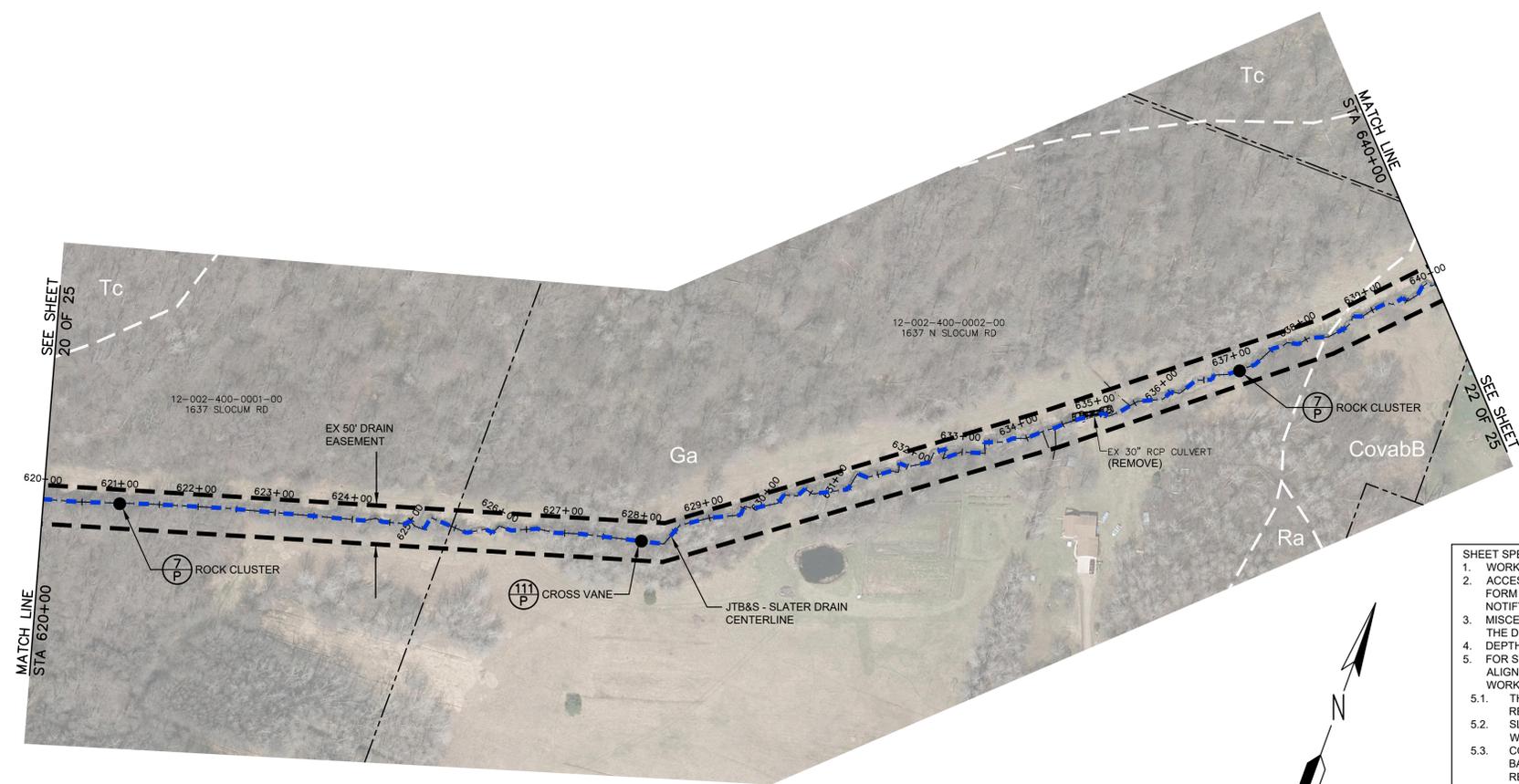
PROJECT NO.
16041

SHEET NO.
21 OF 25

- GENERAL NOTES:
- ALL TREES MUST BE MARKED BY ENGINEER PRIOR TO REMOVAL.
 - FOR ACCESS CLEARING, ALL TREES REMOVED MUST BE CHIPPED OR HAVE LOGS STACKED WITHIN THE EASEMENT LIMITS. ALL OTHER WOODY MATERIAL MUST BE CHIPPED, BURIED-ON-SITE OR REMOVED FROM SITE. ALL TREES REMOVED FROM DITCH BOTTOM OR SIDES MUST BE CUT FLUSH.
 - SPOILS TO BE PLACED AND LEVELED ALONG THE WORKING SIDE OF THE DRAIN, SO AS NOT TO AFFECT THE EXISTING DRAINAGE PATTERNS.
 - LEVEL, MULCH AND SEED SPOILS WITH OPEN CHANNEL SEED MIX. SPOILS SHALL NOT BE GREATER THAN 8-INCH IN HEIGHT IN ANY GIVEN AREA.
 - PROPERTY OWNERS MUST BE NOTIFIED 7 DAYS PRIOR TO ANY ACCESS AND TREE REMOVALS ON THEIR PROPERTY.
 - SITE ACCESS IS RESTRICTED TO EXISTING DRAIN EASEMENTS, TEMPORARY ACCESS EASEMENTS, AND PUBLIC RIGHTS OF WAY SHOWN ON DRAWINGS. ALL OTHER ACCESS TO THE SITE SHALL BE APPROVED BY THE OWNER.
 - TEMPORARY SESC MEASURES MUST BE IN PLACE AT 500 FOOT INCREMENTS TO CONTROL SEDIMENT TRANSPORT.

| SOIL TYPES AND ABBREVIATIONS | |
|------------------------------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PifabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
| PifabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |

- LEGEND**
- = PROPERTY LINE OR R.O.W. LINE
 - = EDGE OF PAVEMENT
 - - - - - = FENCE
 - - - - - = EXISTING GUARDRAIL
 - WETLANDS (AS MARKED BY OTHERS)
 - +860 = EXISTING SPOT ELEVATION
 - 860 = EXISTING CONTOUR ELEVATION
 - EDGE OF WOODS
 - DECIDUOUS TREE
 - CONIFEROUS TREE
 - BUSH
 - STUMP
 - EXISTING GAS LINE
 - EXISTING STORM SEWER
 - EXISTING SANITARY SEWER
 - EXISTING MANHOLE
 - EXISTING STORM CATCH BASIN
 - EXISTING WELL LOCATION
 - EXISTING WATER VALVE
 - EXISTING CURB STOP / METER
 - EXISTING CATCH BASIN
 - BENCH MARK LOCATION
 - EXISTING SIGN
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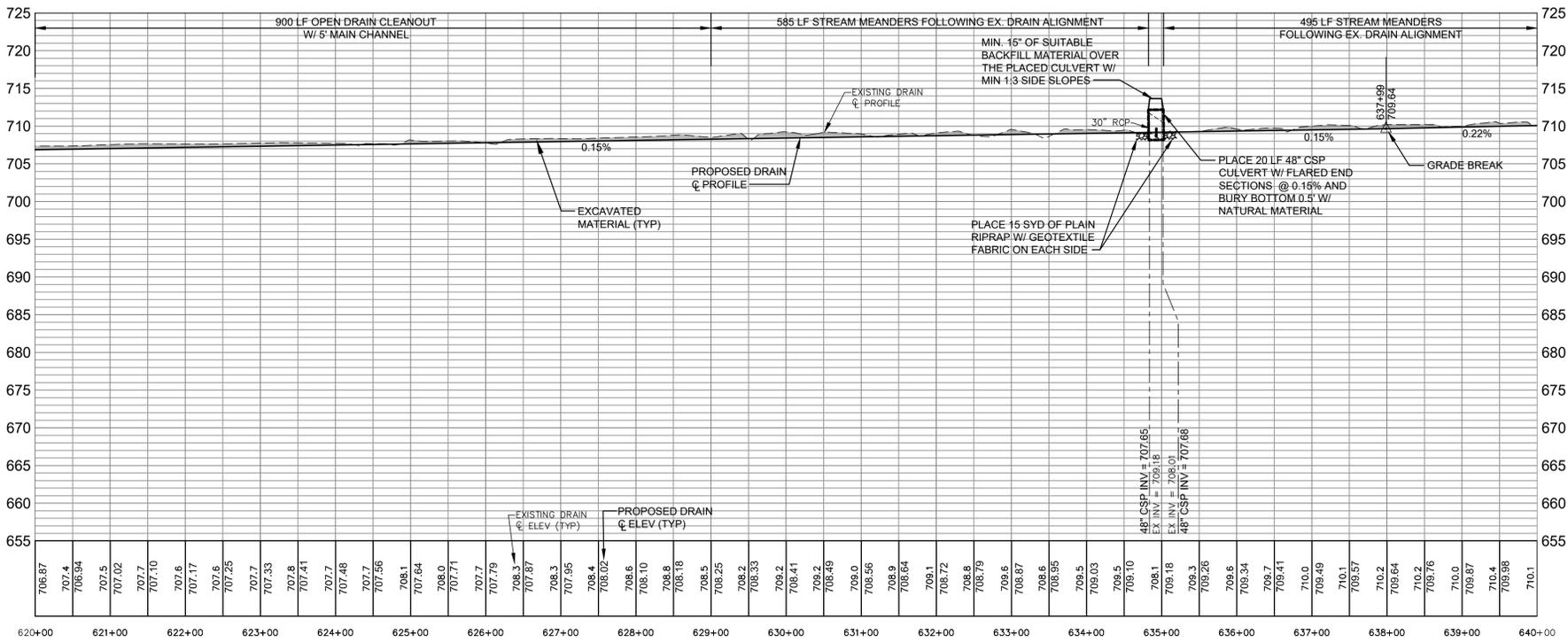


- SHEET SPECIFIC NOTES:**
- WORK FROM NORTH SIDE OF THE DRAIN THIS SHEET
 - ACCESS CLEARING WILL BE REQUIRED THIS SHEET IN THE FORM OF MINOR BRUSH AND WOODY VEGETATION REMOVAL. NOTIFY ENGINEER OR INSPECTOR PRIOR TO ANY CLEARING.
 - MISCELLANEOUS ITEMS OF WORK WILL BE PERFORMED AT THE DIRECTION OF THE ENGINEER
 - DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 4 TO 8 FT
 - FOR STREAM MEANDERS SPECIFIED TO FOLLOW THE EXISTING ALIGNMENT OF THE DRAIN, THE FOLLOWING ELEMENTS OF WORK ARE INCLUDED:
 - THE STREAM WIDTH AND EX. MEANDER BENCH WILL REMAIN UNDISTURBED
 - SLOPE STABILIZATION WHERE REQUIRED IS INCLUDED WITH THIS ITEM
 - CONSTRUCTION OF POOL AND PLACEMENT OF GRAVEL BAR FILL PER DETAIL, AND OTHER MINOR GRADING REQUIRED

SCALE:
1"=100' HORIZONTAL
1"=10' VERTICAL

JTB&S - SLATER DRAIN

| WORK ITEM | LOCATION | QUANTITY |
|---|--|----------|
| CULVERT REMOVAL, LESS THAN 36-INCH DIAMETER | STA 634+84 TO 635+02 | 18 LF |
| OPEN DRAIN CLEANOUT | STA 620+00 TO 629+00 | 900 LF |
| STREAM RESTORATION DETAIL-STREAM MEANDERS | STA 629+00 TO 634+85 STA 635+05 TO 640+00 | 1080 LF |
| 48-INCH DIAMETER CSP CULVERT | STA 634+83 TO 635+03 | 2 LF |
| 48-INCH DIAMETER CSP END SECTION | STA 634+83 STA 635+03 | 2 EA |
| PLAIN RIPRAP ON GEOTEXTILE FABRIC | STA 634+83 STA 635+03 | 30 SYD |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 621+00 STA 637+00 | 2 EA |
| STREAM RESTORATION DETAIL-CROSS VANE | STA 628+00 | 1 EA |



PLAN AND PROFILE
JTB&S - SLATER DRAIN
STA 620+00 TO STA 640+00

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BM #3 ELEV = 707.92
 NE CORNER OF CONCRETE PARKING,
 250'± S OF BAILEY ☐, 860'± W OF
 N ADAMS RD ☐

BM #4 ELEV = 707.74
 SET SPIKE SW SIDE 10" POPLAR,
 75'± N OF CROSSING, 660'± N OF
 BAILEY AT EXTENSION OF RAVENNA RD

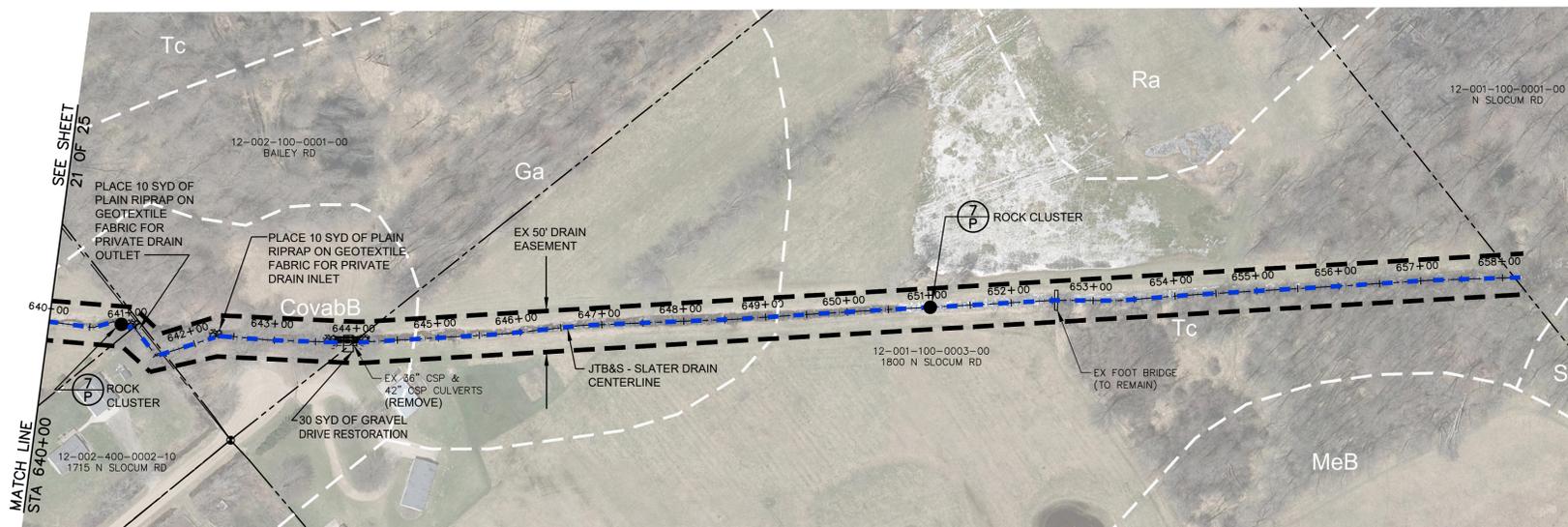


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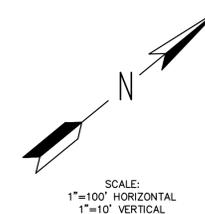
- SHEET SPECIFIC NOTES:**
1. WORK FROM NORTH SIDE OF THE DRAIN THIS SHEET
 2. ACCESS CLEARING WILL BE REQUIRED THIS SHEET IN THE FORM OF MINOR BRUSH AND WOODY VEGETATION REMOVAL. NOTIFY ENGINEER OR INSPECTOR PRIOR TO ANY CLEARING
 3. MISCELLANEOUS ITEMS OF WORK WILL BE PERFORMED AT THE DIRECTION OF THE ENGINEER
 4. DEPTH OF DRAIN FROM TOP OF BANK RANGES FROM 7 TO 11 FT

- GENERAL NOTES:**
1. ALL TREES MUST BE MARKED BY ENGINEER PRIOR TO REMOVAL. FOR ACCESS CLEARING, ALL TREES REMOVED MUST BE CHIPPED OR HAVE LOGS STACKED WITHIN THE EASEMENT LIMITS. ALL OTHER WOODY MATERIAL MUST BE CHIPPED, BURIED-ON-SITE OR REMOVED FROM SITE. ALL TREES REMOVED FROM DITCH BOTTOM OR SIDES MUST BE CUT FLUSH.
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 6. TEMPORARY SECC MEASURES MUST BE IN PLACE AT 500 FOOT INCREMENTS TO CONTROL SEDIMENT TRANSPORT.



| WORK ITEM | LOCATION | QUANTITY |
|--|--|----------|
| CULVERT REMOVAL, 36-INCH AND LARGER | STA 643+77 TO 644+02 STA 643+77 TO 644+05 | 53 LF |
| OPEN DRAIN CLEANOUT | STA 640+00 TO 643+77 STA 64402 TO 651+00 | 1125 LF |
| 48-INCH DIAMETER CSP CULVERT | STA 643+77 TO 644+02 | 25 LF |
| 48-INCH DIAMETER CSP END SECTION | STA 643+77 STA 644+02 | 2 EA |
| PLAIN RIPRAP ON GEOTEXTILE FABRIC | STA 641+10 STA 642+27 STA 643+77 STA 644+02 | 50 SYD |
| STREAM RESTORATION DETAIL-ROCK CLUSTER | STA 640+90 STA 651+00 | 2 EA |
| GRAVEL DRIVEWAY RESTORATION | STA 643+89 | 30 SYD |

JTB&S - SLATER DRAIN

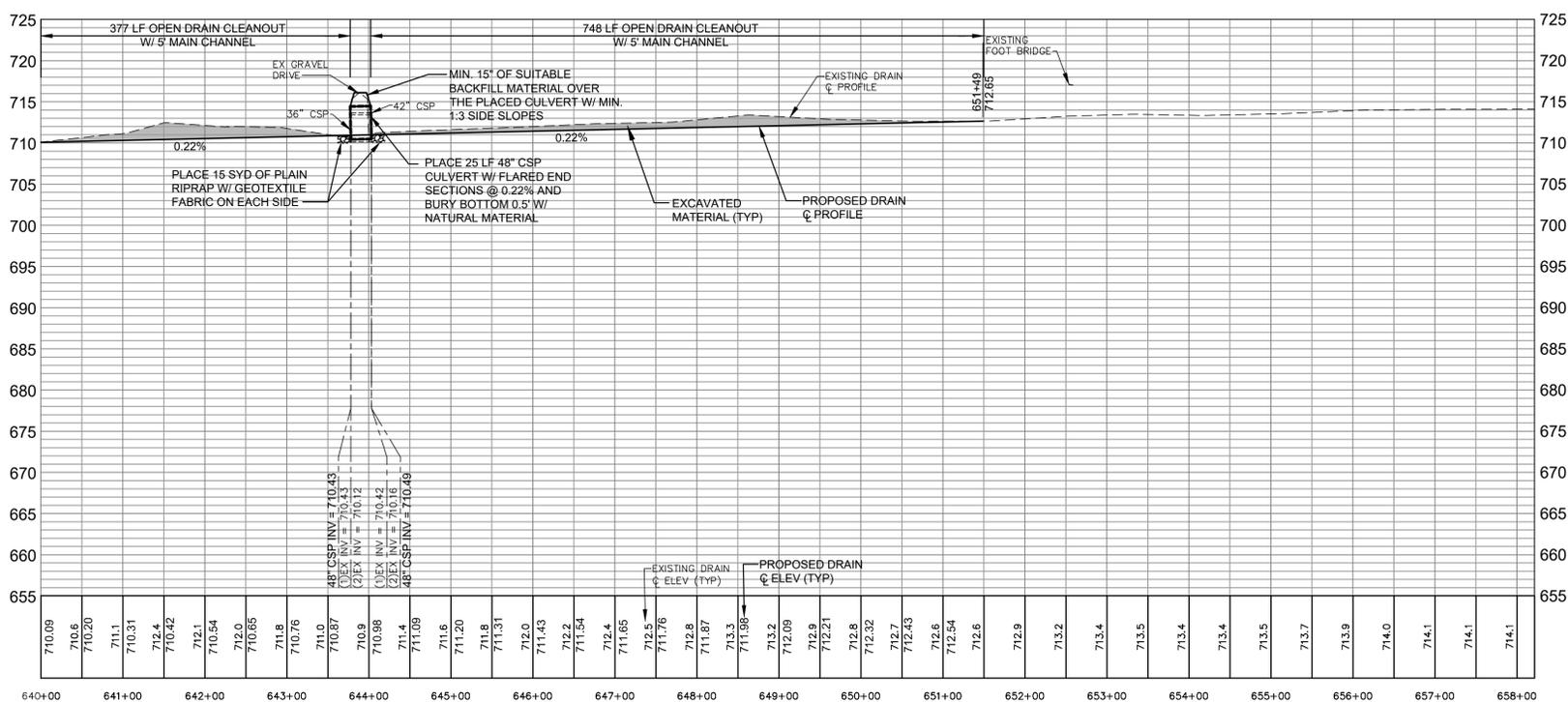


SOIL TYPES AND ABBREVIATIONS

| | |
|--------|---|
| CovabB | Covert-Pipestone sands, 0 to 6 percent slopes |
| Ga | Granby loamy sand |
| PifabB | Plainfield sand, lake plain, 0 to 6 percent slopes |
| PifabD | Plainfield sand, lake plain, 6 to 18 percent slopes |
| PpsaaA | Pipestone-Covert-Saugatuck sands, 0 to 3 percent slopes |
| Ra | Roscommon and Au Gres Sands |
| Sa | Saranac loam |
| Tc | Tawas and Carlisle mucks |
| So | Sloan Soils |

LEGEND

- = PROPERTY LINE OR R.O.W. LINE
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- ⊕ = EXISTING LIGHT POLE
- ⊕ = EXISTING GUY ANCHOR
- ⊕ = EXISTING UTILITY POLE
- ⊕ = EXISTING TELEPHONE PEDESTAL
- = EXISTING DRAIN EASEMENT
- = EXISTING DRAIN ☐
- = PROPOSED DRAIN ☐
- = PROPOSED TOP OF BANK
- = PROPOSED TOE OF BANK
- = SOIL TYPE
- ⊕ = PERMANENT SOIL EROSION CONTROL MEASURE OR RESTORATION DETAIL
- ⊕ = TEMPORARY SOIL EROSION CONTROL MEASURE



PLAN AND PROFILE
JTB&S - SLATER DRAIN
STA 640+00 TO STA 658+00

REVISIONS

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 MUSKEGON COUNTY DRAIN COMMISSIONER

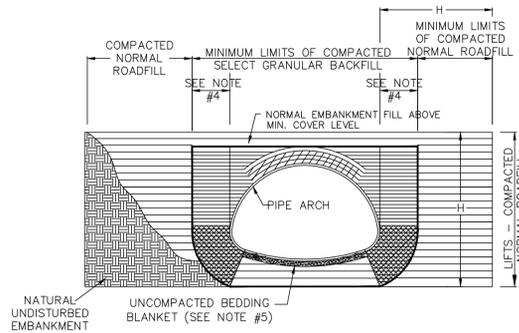
STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
 PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
 MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
22 OF 25

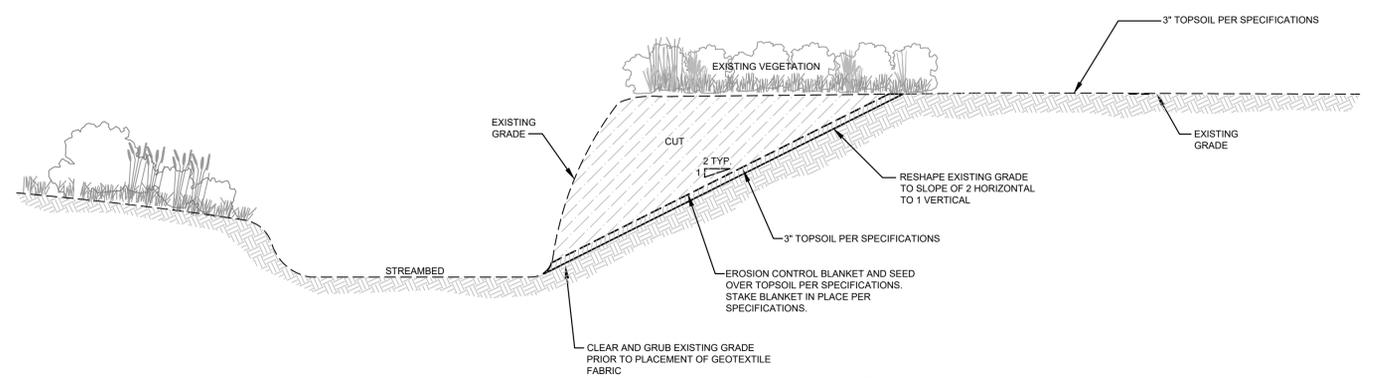
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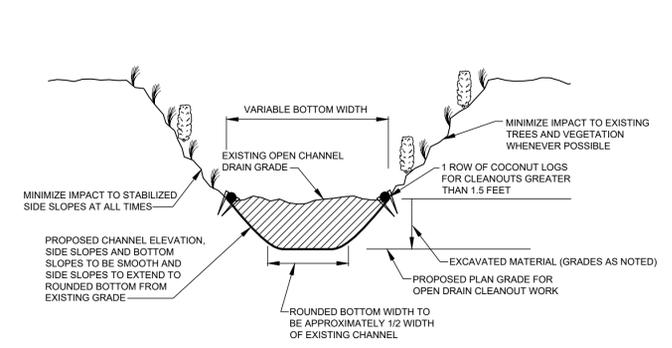
- SECTION**
- ⊗ CRITICAL BACKFILL ZONE, PRESSURE ON SOIL GREATEST HERE.
 - ▨ INITIAL LIFTS OVER CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH SMALL TRACTOR (D-4 OR SMALLER) DRAWN EQUIPMENT.
 - SELECT GRANULAR STRUCTURAL BACKFILL LIMITS.
- NOTES:**
1. ALL SELECT GRANULAR BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (6"-8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-150.
 2. COMPLETE AND REGULAR MONITORING OF THE CSP ARCH SHAPE IS NECESSARY DURING ALL BACKFILLING OF THE STRUCTURE.
 3. PREVENT EXCESSIVE DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
 4. THIS WIDTH SHOULD BE EQUAL TO 1/2 SPAN TO ONE SPAN WIDTH TYPICALLY. GREATER OR LESSER DISTANCE MAY BE REQUIRED. DISTANCE DEPENDS ON BEARING LOAD FOR ANY GIVEN LOADING, STRUCTURE SHAPE AND BACKFILL MATERIAL. THIS MUST BE EVALUATED BY THE PROJECT ENGINEER FOR EACH SPECIFIC SITUATION.
 5. SHAPED BED FOR A MINIMUM WIDTH OF SPAN/2. MINIMUM BEDDING THICKNESS IS TWICE THE CORRUGATION DEPTH.
 6. EMBANKMENT WIDTH H TO BE SUCH THAT A STABLE EMBANKMENT CAPABLE OF RESISTING SIDE PRESSURES FROM CSP PIPE-ARCH SHAPE WILL BE MAINTAINED THROUGHOUT THE LIFE OF INSTALLATION. THIS WIDTH TO BE DETERMINED BY THE PROJECT ENGINEER.



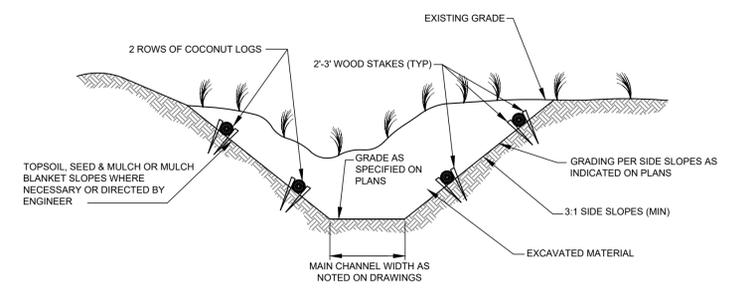
| | | | |
|--|-------------|------------|---|
| CORRUGATED METAL PIPE-ARCH TYPICAL BACKFILL SECTION | | | |
| DRAWN BY: CMD | REV. BY: XX | SCALE: N/A | |
| DATE: 4/20/04 | DATE: XX | | 1 |



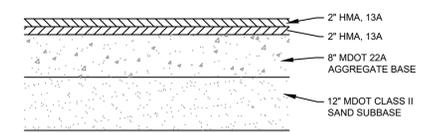
85 STREAM RESTORATION DETAIL
STREAMBANK TAPERING AND STABILIZATION
NO SCALE



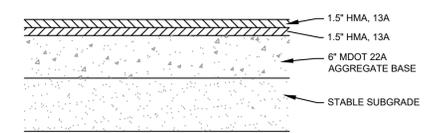
OPEN DRAIN CLEANOUT DETAIL
NO SCALE



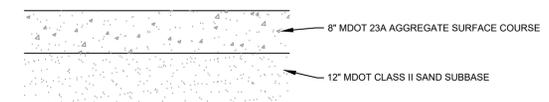
OPEN DRAIN CONSTRUCTION DETAIL
NO SCALE



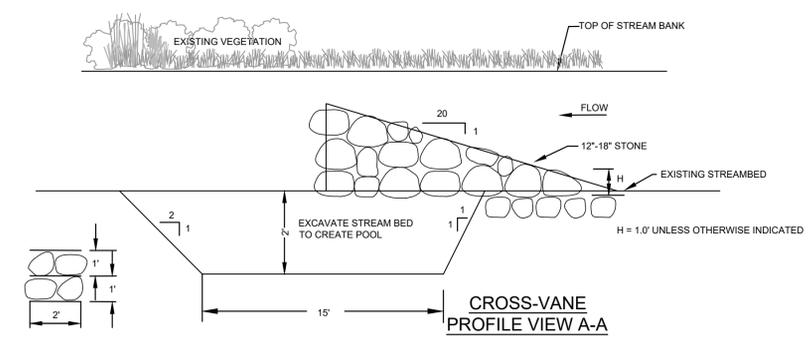
HMA ROADWAY RESTORATION PAVEMENT SECTION



HMA DRIVEWAY PAVEMENT SECTION

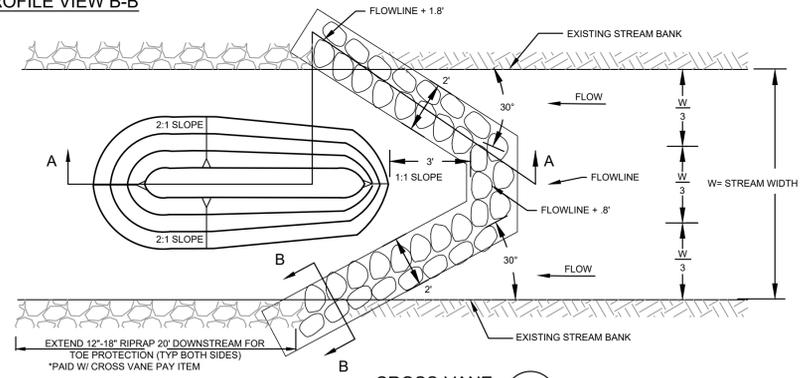


GRAVEL ROADWAY & DRIVEWAY RESTORATION PAVEMENT SECTION



CROSS-VANE PROFILE VIEW A-A

CROSS-VANE PROFILE VIEW B-B



CROSS-VANE PLAN VIEW

| NO. | REVISIONS | DATE | BY |
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BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGGLESTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
24 OF 25

DETAILS

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EROSION CONTROL MEASURES

| | | | |
|------|--|--|---|
| 1 | SEEDING | | When bare soil is exposed, temporarily or permanently, to erosive forces from wind and/or water on flat areas, mild slopes, grassed waterways and spillways, diversion ditches and dikes, borrow and stockpile areas, and spoil piles. |
| 2 | MULCH | | On fill areas, mild slopes, grassed waterways and spillways, diversion ditches and dikes, borrow and stockpile areas, and spoil piles when areas are subject to raindrop impact, and erosive forces from wind or water. When a temporary or permanent vegetative cover is necessary or desired to prevent soil erosion and filter sediment in residential, commercial or high traffic areas; or on steep slopes, auxiliary spillways, and grassed swales. |
| 3 | SODDING | | On disturbed slopes and stream or drain banks when site grading or construction activities result in grades that may cause increased erosive velocities or off-site sedimentation. |
| 4 | SLOPE ROUGHENING AND SCARIFICATION | | As a temporary measure to line a channel, cover stockpile areas or to provide immediate cover on exposed slopes. |
| 5 | PLASTIC SHEETING OR GEOTEXTILE COVER | | Over all exposed soil surfaces or prepared seed beds that need protection from precipitation impact, sheet flow, fill flow or wind prior to erosive force impact. |
| 6 | SOIL BINDING POLYMERS | | Along drain banks, shorelines, or where concentrated flows occur. Slows velocity, reduces erosion and sediment load. |
| 7 | RIPRAP | | Riprap and toe of slope protection is used in areas where velocities are causing drain bank erosion and are too high to stabilize using other methods. |
| 8 | RIPRAP TOE OF SLOPE | | In the stream or drain bank usually above the ordinary high water mark where an enclosed drain or tile discharges to an open drain. |
| 9 | OUTFALL STABILIZATION | | In a ditch or drain just upgradient from the discharge into a stream or open drain to prevent erosive velocities. |
| 10 | SIDE DITCH OUTLET | | In intermittent streams or drains and constructed ditches and drainage swales where flow velocities and channel grades do not warrant armoring the channel with riprap or cobble. |
| 11 | GRASSED WATERWAYS | | Where access to the opposite side of a drain is temporarily required and crossing the drain by fording will result in less damage than constructing a crossing. |
| 12.1 | TEMP CROSSING - FORD DRAIN | | Where access to the opposite side of a drain is temporarily required and the crossing location will be dredged and stabilized the same day. |
| 12.2 | TEMP CROSSING - NATIVE SOIL FORD | | Where access to the opposite side of a drain is temporarily required and the crossing location will be dredged and stabilized the same day. |
| 12.2 | TEMP CROSSING - NATIVE SOIL FORD | | Where access to the opposite side of a drain is temporarily required and timbers are available for use as a temporary crossing. |
| 12.3 | TEMP CROSSING - TIMBER FORD | | Where access to the opposite side of a drain is temporarily or permanently required and installation will require minimum bank excavation. |
| 12.4 | TEMP OR PERMANENT CROSSING - ROCK FORD | | Where access to the opposite side of a drain is temporarily required and the channel is narrow and can accommodate a culvert with minimum backfill. |
| 12.5 | TEMP CROSSING - TEMP CULVERT | | Where access to the opposite side of a drain is temporarily required and the banks are stable and can support a bridge deck. |
| 12.6 | TEMP CROSSING - TEMP BRIDGE | | Where surface runoff accumulates at the top of a slope and must be conveyed, either temporarily or permanently, from a higher to lower elevation within a short horizontal distance, down steep slopes, or when soils are highly erodible or excessively wet. Also used when velocities must be reduced to prevent channel scour or drain bank erosion at the outlet. |
| 13 | PIPE DROP SPILLWAY | | Where surface runoff accumulates at the top of a slope and must be conveyed to a lower elevation without causing slope erosion, gully formation, slope failure, or channel scour. |
| 14 | SLOPED PIPE SPILLWAY | | When concentrated flow must be conveyed down a drain bank or slope or discharge into another drain. Where slope failure or channel scour is observed or is likely to occur, or when runoff must be redirected around work in the drain. |
| 15 | ARMORED SPILLWAY | | When slope failure at eroded outlets are observed or are likely to occur from concentrated runoff on very shallow slopes (where flow velocities will be low enough not to undermine the reinforced grass root structure). |
| 16 | REINFORCED VEGETATED SPILLWAY | | Where piping is causing erosion and unstable drain banks. |
| 17 | TOE DRAIN | | In and adjacent to a stream when flow conditions prevent completing work activity without diverting flow around a work area. |
| 18 | TEMPORARY BYPASS CHANNEL | | Where the discharge velocity of concentrated flow exceeds the erosive velocity of the receiving area or channel. |
| 19 | ENERGY DISSIPATORS | | At culvert ends as a headwall when culvert backfill is eroding or a longer culvert is impractical. |
| 20 | CONCRETE BAG RIPRAP HEADWALL | | As a permanent measure in locations where a vertical bank is required and other erosion control measures have failed. As a weir. As a temporary cofferdam during construction. |
| 21 | SHEET PILING | | Within or adjacent to a stream to isolate or divert flow during construction. Can also be used to temporarily impound water for very short time periods. |
| 22 | SAND OR STONE FILLED BAGS | | |

EROSION CONTROL MEASURES (CONTINUED)

| | | | |
|----|------------------------------|--|---|
| 22 | SAND OR STONE FILLED BAGS | | Within or adjacent to a stream to isolate or divert flow during construction. Can also be used to temporarily impound water for very short time periods. |
| 23 | TREE REVETMENT | | Where stream banks are eroding or undercutting. The placement of trees or tree tops along the edge of the stream provides a place for sediment to settle out behind the trees when water levels recede. The sediment remains in place behind the logs and allows a stream to "naturally" rebuild its banks. |
| 24 | LOG REVETMENT | | Where stream banks are eroding or undercutting. The placement of logs along the edge of the stream provides a place for sediment to settle out behind the logs when water levels recede. The sediment remains in place behind the logs and allows a stream to "naturally" rebuild its banks. |
| 25 | GABION BASKETS | | At the toe of steep slopes and drain banks within or adjacent to the stream channel when flow velocities are resulting in major drain bank or slope failure or instability and slope and drain bank reshaping with or without riprap is not practical. |
| 26 | DUST CONTROL | | As a temporary measure on exposed and unstabilized areas that must be protected from wind or water erosion. |
| 27 | LIVE STAKING | | Slopes and drain banks, wetland buffer and reservoir drawdown areas. In areas requiring stabilization but with limited access for equipment or when little site disturbance is required. |
| 28 | WATTLES | | Where a slope or streambank requires stabilization and minimal disturbance is preferred or the site has limited access. |
| 29 | CELLULAR CONFINEMENT SYSTEMS | | On steep slopes and stream or drain banks and in high velocity vegetated channels. |

APPROXIMATE CONSTRUCTION SCHEDULE FOR SESC MEASURES

| SESC - CONSTRUCTION SEQUENCE | APRIL 2021 | MAY 2021 | JUNE 2021 | JULY 2021 | AUG 2021 |
|--|------------|----------|-----------|-----------|----------|
| INSTALL TEMPORARY SESC MEASURES: | | | | | |
| A. STABILIZED CONSTRUCTION ACCESSES | ■ | | | | |
| B. CONSTRUCTION/TREE PROTECTION FENCE | ■ | | | | |
| C. CATCH BASIN PROTECTION | ■ | | | | |
| D. STORM DRAIN INLET PROTECTION | ■ | | | | |
| E. SEEDING | ■ | | | | |
| MAINTAIN TEMPORARY SESC MEASURES | | | | | |
| SITE GRADING | | | | | |
| OPEN DRAIN CONSTRUCTION | | | | | |
| CULVERT CONSTRUCTION | | | | | |
| PAVEMENT CONSTRUCTION | | | | | |
| FINAL GRADE | | | | | |
| FINAL SITE STABILIZATION (TO BE COMPLETED WITHIN 24 HOURS OF FINAL GRADING OR ACTIVITY WITHIN THAT AREA) | | | | | |
| REMOVE TEMPORARY SESC MEASURES | | | | | |
| PERMANENT SESC MEASURES | | | | | |

APPROXIMATE CONSTRUCTION SCHEDULE FOR SESC MEASURES

| SESC - CONSTRUCTION SEQUENCE | SEPT 2021 | OCT 2021 |
|--|-----------|----------|
| INSTALL TEMPORARY SESC MEASURES: | | |
| A. STABILIZED CONSTRUCTION ACCESSES | ■ | |
| B. CONSTRUCTION/TREE PROTECTION FENCE | ■ | |
| C. CATCH BASIN PROTECTION | ■ | |
| D. STORM DRAIN INLET PROTECTION | ■ | |
| E. SEEDING | ■ | |
| MAINTAIN TEMPORARY SESC MEASURES | | |
| SITE GRADING | | |
| OPEN DRAIN CONSTRUCTION | | |
| CULVERT CONSTRUCTION | | |
| PAVEMENT CONSTRUCTION | | |
| FINAL GRADE | | |
| FINAL SITE STABILIZATION (TO BE COMPLETED WITHIN 24 HOURS OF FINAL GRADING OR ACTIVITY WITHIN THAT AREA) | | |
| REMOVE TEMPORARY SESC MEASURES | | |
| PERMANENT SESC MEASURES | | |



EROSION AND SEDIMENT CONTROL MEASURES

| | | | |
|----|--------------------------|--|--|
| 40 | CHECK DAM | | In constructed and existing flow corridors to reduce flow velocities. |
| 41 | CATCH BASIN | | Where surface water accumulates and needs an outlet or an open drain discharges to a stream or drain at erosive velocities. Within an enclosed drain system to provide an inlet and a sump. |
| 42 | VEGETATED BUFFER STRIPS | | Along stream and drain corridors, sensitive areas, and shorelines when earth changes will occur during a drain maintenance or improvement project or when an eroding bank or drain easement area needs to be stabilized. |
| 43 | DIVERSION DIKE | | Runoff needs to be diverted around sensitive areas, unstable or easily eroded soils, bare soils, away from steep banks, or around earth change activities. |
| 44 | DIVERSION DITCH | | Runoff needs to be intercepted and or diverted around sensitive areas, unstable or easily eroded soils, bare soils, away from steep banks, or around earth change activities. |
| 45 | DIVERSION DITCH AND DIKE | | Within existing flow corridors to divert runoff, temporarily or permanently, around sensitive areas, unstable or easily eroded soils, steep banks, along narrow drain easements or around maintenance or improvement activities. |
| 46 | STONE FILTER BERM | | When runoff must be filtered prior to entering a lake, stream, drain or wetland. Never use in place of a check dam in a flowing stream. |
| 47 | SAND FENCE | | In areas susceptible to wind erosion, particularly where the soil has not yet been stabilized by other means. To re-build a slope. |
| 48 | DEWATERING | | When construction or maintenance activities are limited by the presence of water and a dry work area is required. |
| 49 | STRAW BALES | | As a temporary diversion structure. Occasionally as an alternative to silt fence for projects that will be completed within a very short time period (less than one month). |

SESC Notes

- General Maintenance**
- Temporary SESC measures to be maintained by the contractor at all times.
- Silt fence**
- Silt fence is to be trenched in no less than 6 inches below the ground surface
 - Inspect silt fence immediately following each rainfall
 - Repair when silt fence is sagging or has been removed/torn down
 - When silt collects to half the height of the fence all silt is to be removed and fence repaired
 - Remove silt fence when permanent SESC measures are in place and vegetation is established
- Seeding and Mulching**
- Seeding practices include topsoil (as required), and mulch or mulch blanket (as directed by Engineer or required on plans).
 - Where necessary, appropriate mulch blanket must be applied based on slope and growing conditions as approved by the engineer.
 - All slopes and highly erosive areas will be temporarily seeded and mulched when construction activity is not taking place
 - Seed and mulch is to be inspected following each rain event to determine if concentrated flows are present
 - In the event that seed and mulch are removed by erosive runoff, repairs are to be made immediately.
 - Site will be permanently stabilized within 5 days of final grade
- Storm drain inlet protection**
- Storm drain inlets to be inspected weekly and after each rain event.
 - Empty sediment and keep inlet protection clean during inspection and maintenance operations.
- Compliance with Part 91 of PA 451**
- Respond immediately to stormwater operator and/or soil erosion and sedimentation control inspector concerns. Make corrective measures as Required
- Continued Maintenance Plan**
- Stormwater operator/APA owner or maintenance supervisor will inspect monthly through the first growing season. Non established vegetation will be repaired/reseeded as necessary

CONSTRUCTION & SOIL EROSION AND SEDIMENTATION CONTROL NOTES:

- ALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE BEFORE CONSTRUCTION BEGINS. THE CONTRACTOR IS RESPONSIBLE FOR INSPECTING ALL MEASURES AT LEAST ONCE EACH WEEK AND/OR WITHIN 24 HOURS OF A PRECIPITATION EVENT THAT RESULTS IN STORM WATER RUNOFF OR DISCHARGE.
- SURFACE RESTORATION OF ALL SEWER TRENCHES IN LAWN AREAS SHALL BE TOP SOILED, SEEDED, AND MULCHED WITHIN 5 CALENDAR DAYS OF BACKFILLING THE TRENCH.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR DUST CONTROL AND SHALL PROVIDE ALL EQUIPMENT AND MATERIAL NECESSARY TO KEEP DUST IN CHECK AT ALL TIMES. THE CONTRACTOR SHALL RESPOND IMMEDIATELY TO ANY AND ALL COMPLAINTS: STREETS, PARKING LOTS, DRIVEWAYS, PAVED ACCESS ROADS, AND ALL OTHER PAVED SURFACES SHALL BE SWEEPED AT LEAST ONCE A DAY AND/OR AS NEEDED THROUGHOUT THE DAY.
- MULCH AND/OR MULCH BLANKET SHALL BE APPLIED AND ANCHORED APPROPRIATELY ON ALL SLOPES 3:1 OR GREATER ON ALL SLOPES DEEMED NECESSARY TO PREVENT OR CORRECT EROSION PROBLEMS AND ON ALL DISTURBED AREA DUE TO CONSTRUCTION.
- ALL TEMPORARY SOIL EROSION MEASURES SHALL BE REMOVED AFTER PERMANENT MEASURES HAVE BEEN ESTABLISHED.
- ALL CONSTRUCTION SHALL BE CONFINED TO AREAS OF DISTURBANCE WITHIN THE ROAD RIGHT OF WAY AND/OR WITHIN STORM SEWER EASEMENTS. NO WORK, MATERIAL, OR STOCKPILES WILL BE ALLOWED OUTSIDE OF THESE LIMITS.
- ALL TRENCHES SHALL BE BACKFILLED TO GRADE OR PROPERLY PROTECTED IN ACCORDANCE WITH PROJECT PLANS & SPECIFICATIONS AT THE END OF EVERY DAY. AT NO TIME SHALL A TRENCH BE LEFT OPEN FOR A PERIOD LONGER THAN 48 HOURS.
- UNLESS SPECIFICALLY NOTED OTHERWISE, ALL UTILITY TRENCHES SHALL CONFORM TO TYPICAL TRENCH DETAIL.
- PROTECT ALL TREES AND VEGETATION NOT SCHEDULED TO BE REMOVED. ENGINEER APPROVAL IS REQUIRED FOR ANY UNSCHEDULED REMOVAL OF TREES, SHRUBS OR LANDSCAPING.
- EROSION AND SEDIMENTATION FROM WORK ON THIS PROJECT SHALL BE CONTAINED WITHIN THE WORK AREA AND NOT ALLOWED TO COLLECT ON OFF-SITE AREAS OR IN WATERWAYS - WATERWAYS INCLUDE BOTH NATURAL AND MAN-MADE OPEN DITCHES, STREAMS, STORM DRAINS, LAKES AND PONDS.
- SILT FENCE MAINTENANCE SHALL INCLUDE THE REMOVAL OF ANY BUILT-UP SEDIMENT. CONTRACTORS SHALL BE RESPONSIBLE TO REMOVE, REPLACE, RETRENCH OR REBACKFILL THE SILT FENCE SHOULD IT FAIL OR BECOME DAMAGED DURING THE CONSTRUCTION.
- INLET FILTER MAINTENANCE SHALL INCLUDE THE REMOVAL OF ANY ACCUMULATED SILT OR OTHER DEBRIS. IF INLET FILTERS CANNOT BE CLEANED, OR ARE DAMAGED, THEN THE FILTER AND/OR STONE SHALL BE REPLACED.

SEDIMENT CONTROL MEASURES

| | | | |
|----|--------------------------------|--|---|
| 60 | STORM DRAIN INLET PROTECTION | | Around the entrance to a newly constructed catch basin or an inlet that will capture runoff from an earth change activity. |
| 61 | SILT FENCE | | As a temporary measure used to capture sediment from sheet flow. May also divert small volumes of sheet flow to protected outlets. |
| 62 | SEDIMENT BASIN | | When working in the drain, or drain easement. In streams or drains where sediment sumps are inadequate. |
| 63 | SEDIMENT SUMP (TRAP) | | When working in the drain, or drain easement and the soil disturbance and anticipated sediment is limited. |
| 64 | POLYMER FLOCCULANTS | | Where turbid water can be collected and suspended sediments removed prior to discharging runoff to a lake, stream, drain, or a wetland or runoff leaves the drain easement. |
| 65 | TURBIDITY CURTAIN | | Within a stream or drain parallel to flow when a slack water area is necessary to isolate earth change activities from a lake or channel. |
| 66 | STABILIZED CONSTRUCTION ACCESS | | At locations where construction equipment will enter and exit the drain easement and tracking of soil is anticipated. |

ROUTINE MAINTENANCE ACTIVITY DETAILS

| | |
|----|--|
| 80 | Debris Removal |
| 81 | Sediment Removal |
| 82 | Stormwater Basin Maintenance |
| 83 | Vegetation Removal Without Grubbing |
| 84 | Vegetation Removal With Selective Grubbing |
| 85 | Slope and Streambank Stabilization |
| 86 | Drain Crossing Maintenance |
| 87 | Enclosed Drain Maintenance |
| 88 | Culvert Repair |

CONSTRUCTION & RESTORATION ACTIVITY DETAILS

| | |
|-----|-------------------------------|
| 100 | Stormwater Basin Construction |
| 101 | Drain Relocation |
| 102 | Drain Enclosure |
| 103 | Drain Crossing |
| 104 | Weir Installation |
| 105 | Beaver Dam Removal |
| 106 | Low Flow Channel |
| 107 | Floodway Shelf |
| 108 | Rifle Zones |
| 109 | Pools |
| 110 | Meanders |
| 111 | Cross-Vanes |
| 112 | J-Hook Vanes |

DETAILED DRAWINGS AND SPECIFICATIONS ARE LOCATED IN THE MICHIGAN ASSOCIATION OF COUNTY DRAIN COMMISSIONERS SOIL EROSION AND SEDIMENTATION CONTROL AUTHORIZED PUBLIC AGENCY PROCEDURES MANUAL

SYMBOLGY FOR INSERTION INTO CONSTRUCTION DRAWINGS:



DATE: 6/22/20
BY: JAJ
DATE: 6/22/20
APPROVED BY: [Signature]
DATE: [Blank]

NO. [Blank]

REVISIONS [Blank]

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MUSKEGON COUNTY DRAIN COMMISSIONER
STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK CONSOLIDATED DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
25 OF 25

DIVISION 5
SOIL EROSION CONTROL DETAILS