CONSTRUCTION PLANS FOR:
AMITY CREEK BANK STABILIZATION (2017)
REACH #579 D-2, D-3

CITY PROJECT NO. 1355

SITE LOCATION MAP
NO SCALE

WARNING
LOCATION OF UNDERGROUND UTILITIES
TO BE VERIFIED BY CONTRACTOR
Gopher State One Call
1-800-252-1199
REQUIRED BY LAW

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CHASE M. J. ET AL. "STANDARD GUIDELINES FOR THE COLLECTION AND DEPOSITION OF EXISTING SUBSURFACE UTILITY DATA".

PROJECT COORDINATE SYSTEM IS NAD 1983
MINN 43XL M3LT. LOUIS CS(3,6.6 FEET)

CITY APPROVAL
3/1/97
5/17/97

03010687
0.1

CONTRACTOR SIGNATURE:

PROJECT ENGINEER:

CITY OF DULUTH
MICHIGAN COUNTY
CITY OF DULUTH PROJECT NO. 1355
### Estimated Quantities - Table 1

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Spec.</th>
<th>Item Description</th>
<th>Units</th>
<th>Total Estimated Quantity</th>
<th>Quanity Site 579D-2</th>
<th>Quanity Site 579D-3</th>
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### General Construction Notes:

1. All excavation within or adjacent to the stream bed shall be undertaken in dry conditions. The contractor shall install sandbags, cofferdams, and bypass piping as necessary to safely route the stream flow around the excavation area until construction is complete. This work item shall be paid for as a part of the lump sum bid item for control of water.

2. Debris and deadfall removal shall not be interpreted to mean grubbing, but may include removal of live timber by cutting and leaving stump intact. Live timber can be cut at a break or no closer than 2 feet to the ground. Deadfall is to be considered only floatable debris. Deadfall or cut timber in good condition may be utilized onsite for toe wood or coir bench stabilization as approved by the engineer.

3. Site grading shall include topsoil stripping and stockpiling, and subsurface excavation and backfilling. It is anticipated that the excavated subsurface will be suitable to reuse as backfill for toe wood, coir bench and in other areas as necessary.

4. Other items where a method of payment is not noted shall be incidental to construction.

### Invasive Species Control Measures:

Prior to entering the project site, the contractor shall inspect all equipment and gear and remove all aquatic plants, animals, and mud from all items. Equipment and gear shall be defined as all boats, motorized tracked vehicles, heavy equipment, barges, hoses, pumps, sheet piling, silt curtains, or turbidity barriers, waders and all other equipment which may come in contact with surface water during construction. The contractor shall maintain a manifest documenting the item, date, location and disinfection method used to perform disinfection.

### Estimated Earthwork Quantities - Table 2

<table>
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<th>Item Description</th>
<th>Units</th>
<th>Total Estimated Quantity</th>
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<td>CY</td>
<td>1856</td>
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### Earthwork Notes:

1. Quantities are not adjusted for expansion or shrinkage of material during excavation or filling.
2. Quantities include estimated amounts of excavation needed for installation of toe wood.
PROJECT #579 D-2
APPROXIMATE DISTURBANCE AREA: 3093 SQ. YD
STA. 13+25 TO STA. 17+48
N:3369116.88 N:3369425.03
E:4866301.18 E:4866123.02
LAT:46.857778 LAT:46.858889
LONG:92.013889 LONG:92.014444

PROJECT #579 D-3
APPROXIMATE DISTURBANCE AREA: 1751 SQ. YD
STA. 00+70 TO STA. 4+05
N:3368581.78 N:3368776.92
E:4866260.90 E:4866394.58
LAT:46.856389 LAT:46.857778
LONG:92.014167 LONG:92.013889

SEVEN BRIDGES ROAD
PROJECT COORDINATE SYSTEM IS NAD 1983
HARN ADJ. MN ST. LOUIS CS96 (US FEET)
GENERAL NOTES:
1. SEVEN BRIDGES ROAD IS TO REMAIN OPEN DURING CONSTRUCTION; ANY TEMPORARY CLOSURES NEED TO BE SUBMITTED THREE (3) WORKING DAYS PRIOR TO CLOSURE AND APPROVED BY THE CITY REPRESENTATIVE.
2. TRAFFIC CONTROL DEVICES AND MATERIALS SHALL CONFORM TO THE MUTCD AND APPLICABLE STATE DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.
3. TRAFFIC CONTROL DEVICES MUST BE IN PLACE PRIOR TO ANY WORK COMMENCING; DEVICES MUST ALSO BE MAINTAINED THROUGH THE ENTIRETY OF THE PROJECT. ANY WORK RELATED TO PLACING, Maintaining OR REMOVING TRAFFIC CONTROL DEVICES WILL BE INCIDENTAL TO PROJECT COSTS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY TRAFFIC CONTROL MEASURES REQUIRED FOR SITE ACCESS, DELIVERIES OR WORK WITHIN THE ROW OF SEVEN BRIDGES ROAD; THIS MAY INCLUDE TEMPORARY FLAGGERS AND SHALL BE INCIDENTAL TO PROJECT COSTS.
5. Gopher State One Call Design Locate Ticket #170760926
GENERAL NOTES:

1. TREE SALVAGE AREAS ARE LOCATIONS WHERE THE ENGINEER HAS DETERMINED THAT THERE ARE PREVIOUSLY FALLEN TREES SUITABLE FOR USE IN THE STREAM BANK RESTORATION ACTIVITY OCCURRING. WORK RELATED TO COLLECTING TREES FROM SALVAGE AREAS WILL BE INCIDENTAL TO THE STREAM RESTORATION ACTIVITY OCCURRING. DISTURBED AREAS MUST BE MULCHED AND SEEDED.

2. CONTRACTOR SHALL SALVAGE SELECT TREES WHILE CREATING SITE ACCESS ROUTES TO BE USED FOR STREAM BANK RESTORATION ACTIVITIES. ON-SITE REPRESENTATIVE WILL DETERMINE WHICH TREES WILL BE SALVAGED.

3. CONTRACTOR SHALL LIMIT TRACKING OF MATERIAL ONTO THE PAVED ROADWAY BY INSTALLING ROCK CONSTRUCTION ENTRANCES AT ACCESS POINTS. ANY TRACKED MATERIAL ON THE ROAD WILL BE REQUIRED TO BE CLEARED BEFORE THE END OF WORK EACH DAY. CLEAVING OF ROADSIDE'S WILL BE INCIDENTAL TO THE INSTALLATION AND REMOVAL OF ROCK CONSTRUCTION ENTRANCES.

4. SITE ACCESS ROUTES SHALL BE COORDINATED WITH THE ON-SITE REPRESENTATIVE PRIOR TO CLEARING SITE ACCESS.

5. CONTRACTOR SHALL RESTORE SITE ACCESS ROUTES AS SPECIFIED AT CONSTRUCTION COMPLETION.

6. IF THE CONTRACTOR DETERMINES A STAGING AREA IS NECESSARY, CONTRACTOR SHALL DISCUSS THIS NEED AT THE PRECONSTRUCTION MEETING, AND COORDINATE AVAILABLE LOCATION WITH CITY AND ENGINEER.

7. SEVEN BRIDGES ROAD SHALL REMAIN OPEN DURING CONSTRUCTION. CONTRACTOR SHALL DISCUSS ANY TEMPORARY CLOSURES WITH ENGINEER AND CITY REPRESENTATIVE A MINIMUM OF THREE (3) WORKING DAYS PRIOR TO TEMPORARY ROAD CLOSURE.

8. CONTRACTOR WILL BE REQUIRED TO BRING MINIMUM TO CREATE ACCESS TO EACH SITE OFF OF SEVEN BRIDGES ROAD DUE TO THE STEEP SLOPE ALONG THE SHOULDER OF THE ROAD. SLOPE IS APPROXIMATELY 7-FT HIGH AT APPROXIMATELY A 1:1 (H:V) SLOPE. ANY FILL REQUIRED FOR ACCESS WILL BE INCLUSIVE TO THE CONSTRUCTION ENTRANCE BID ITEM.

9. CONTRACTOR WILL BE REQUIRED TO PROTECT BITUMINOUS PAVEMENT OF SEVEN BRIDGES ROAD. ANY PAVEMENT DAMAGE WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR. NO ADDITIONAL PAYMENT WILL BE PROVIDED.
1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.

2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE BLANKET.

3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE.

4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2"-5" (5 CM-12.5 CM) OVERLAP DEPENDING ON BLANKET TYPE.

5. CONSECUTIVE BLANKETS SPliced DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE BLANKET WIDTH.

NOTE: *IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE BLANKETS.

**EROSION CONTROL BLANKET SLOPE INSTALLATION**

**ROCK CONSTRUCTION ENTRANCE DETAIL**

**FILTER FABRIC. SEE SPECS.**

**MATERIAL STOCKPILE DETAIL**

**BIOROLL BLANKET SYSTEM**

**TOPSOIL AND SEEDING DETAIL**

**TYPICAL SILT FENCE INSTALLATION AT SITE PERIMETER DETAIL**

**MATERIAL STOCKPILE DETAIL**

**EROSION CONTROL DETAILS**

CITY OF DULUTH PROJECT NO. 1355

CITY OF DULUTH, MINNESOTA

AMITY CREEK BANK STABILIZATION 2017

PLOT DATE: 3/28/17

FILE NO.: P:\610s\616\00616087\CADD\Construction Documents\00616087_Amity Details.dwg

BY

JOSEPH J JUREWICZ

MAR. 13, 2017

License No. 50396

I HEREBY CERTIFY THAT THIS PLAN, REPORT, OR SPECIFICATION WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Date

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DETAIL OF BOULDER CROSS VANE
PLAN VIEW

INNER BANKFULL BENCH 4'±
TOP OF BANK/BANKFULL SLOPE 9.3'
CENTERLINE BOTTOM OF CHANNEL
FOOTER BOULDER
HEADER BOULDER

L=20'±
OUTER BANKFULL BENCH, WIDTH VARIES
MNDOT COARSE FILTER AGGREGATE (TYP)

DETAIL OF BOULDER CROSS VANE CROSS SECTION

CHANNEL THALWEG
FLOW
HEADER AND FOOTER BOULDERS FOR CROSS VANE ARMS SHALL BE BURIED INTO BANKFULL BENCH A MINIMUM OF 6 FT

FLOW
GROUND SURFACE OF BANKFULL BENCH
ROCK BACKFILL

TYPICAL VEGETATED KEYWAY PLAN
NO SCALE

TYPICAL VEGETATED KEYWAY SECTION
NO SCALE

NOTES:
1. COARSE BACKFILL (MNDOT COARSE FILTER AGGREGATE) SHALL BE PLACED TO A THICKNESS EQUAL TO THE DEPTH OF THE HEADER AND FOOTER BOULDERS AND SHALL EXTEND OUT FROM THE VANE ARMS TO THE STREAM BANK.
2. THE VANE ARMS OF THE BOULDER CROSS VANE SHALL BE CONSTRUCTED FIRST, FOLLOWED BY THE CENTRAL VANE.
3. BOULDER CROSS VANE SHALL BE BUILT TYPICALLY AS FOLLOWS:
   A. OVER EXCAVATE STREAM BED TO A DEPTH EQUAL TO THE TOTAL THICKNESS OF THE HEADER AND FOOTER BOULDERS.
   B. PLACE FOOTER BOULDERS OF THE VANE ARM. THERE SHALL BE NO GAPS BETWEEN BOULDERS.
   C. PLACE COARSE BACKFILL BEHIND THE FOOTER BOULDERS.
   D. INSTALL HEADER BOULDERS ON THE VANE ARM ON TOP OF THE FOOTER BOULDERS. THERE SHALL BE NO GAPS BETWEEN THE BOULDERS.
   E. PLACE COARSE BACKFILL BEHIND HEADER BOULDERS ENSURING THAT ANY VOIDS BETWEEN THE BOULDERS ARE FILLED.
   F. PLACE EACH BOULDER TO FORM THE HOOK BY INSTALLING A FOOTER BOULDER, THEN A HEADER BOULDER. GAP AS WIDE AS 1/4 TO 1/3 THE BOULDER DIAMETER SHALL BE LEFT BETWEEN THE CENTRAL VANE BOULDERS.

HEADER AND FOOTER BOULDER PLACEMENT DETAIL

COARSE FILTER AGGREGATE AS NEEDED

DETAIL OF BOULDER CROSS VANE

CHANNEL TOP OF BANK

HEADER AND FOOTER BOULDERS FOR CROSS VANE ARMS SHALL BE BURIED INTO BANKFULL BENCH A MINIMUM OF 6 FT

OUTER BANKFULL BENCH
INNER BANKFULL BENCH 4'
TOP BANKFULL STAGE 2° TO 7°

FLOW
SLOPE INTERCEPT LINE

FLAT OR ANGULAR SURFACE PREFERRED

HEADER BOULDER
FOOTER BOULDER

FOOTER BOULDER
HEADER BOULDER

HEADER AND FOOTER BOULDER PLACEMENT DETAIL

COARSE FILTER AGGREGATE AS NEEDED
1. INSTALLATION SUMMARY

COIR BENCH CONSTRUCTION WILL BE DONE IN DRY WEATHER CONDITIONS AFTER STREAM HAS BEEN DIVERTED AND SITE DEWATERED.

ENGINEER REPRESENTATIVES MUST BE PRESENT FOR INSTALLATION OF COIR BENCH.

2. LIVE CUTTINGS

PLACEMENT:
- lay cuttings with a density of 10 cuttings per linear foot.
- tops of cuttings shall point toward channel.
- trim exposed ends of cuttings, leave no more than 6".
- deposit native fill over cuttings and water liberally.
- compress fill to 3'-4'.

3. SOIL LIFT

SPECIFICATION:
- Blanket shall be minimum 12" wide ROLANKA BIOD-MAT, GEOCOR 730, or equal lined with MNDOT CAT. 1 erosion control blanket with natural netting.
- secure blanket with stakes and nailing, and place a minimum of one 6" staked filter log and one inch of fill on top of blanket.
- blanket and buried fill to be placed to bank full elevation, and blanket slope of 2H:1V.
- secure blanket with stakes and nailing.
- install filter log along the top of the soil lift.

4. VEGETATION

SPECIFICATION:
- see planting plan for specifications.
- plant seed on face of lift before applying erosion control blanket.
- filter log to be removed once vegetation begins to grow, covering approximately 50% of soil lift.

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SECTION A-A

PLAN NOT SCALE

SECTION A-A

PLAN NOT SCALE

SECTION A-A

PLAN NOT SCALE

STATION - STATION (OUTSIDE BANK)

50HB - 17+45
50HB - 16+71
53H11 - 16+71
16+43 - 16+48
17+46 - 17+46
17+46 - 17+46
2+46 - 2+46
1+40 - 2+30
0+80 - 1+53

SEE CROSS SECTION SHEETS CS-1 THRU CS-19 FOR ELEVATIONS.
1. Boulders of the constructed riffle must have a minimum diameter of 3 feet.
2. Boulders between the inner berm and bankfull shall be underlain by footer boulders unless otherwise directed by the engineer.
3. Header boulders shall be offset slightly upstream of the footer boulders. Footer boulders shall be installed before the header boulders.
4. Header boulders must not exceed 0.3' above thalweg elevation. The thalweg elevation is shown in the profile view.
5. Header and footer boulders shall be keyed into bank, 4 ft. minimum bankfull width 27 feet.
6. Dig low flow channel through center of inner berm and avoiding all cluster rocks. Depth of low flow channel shall be 1.6 feet.
7. Cluster rocks shall be spaced randomly at 6'-10' spacing within the inner berm and throughout the length of the riffle.
8. Cluster rocks will be buried into the riffle exposing a maximum of 0.3' above the boulder depth. Footer boulders shall be placed behind each cluster boulder.
9. Backfill boulders with salvaged onsite gravel material.
10. Backfilling of channel and bankfull bench/floodplain will likely be required following installation of in-stream structures and shall be considered incidental to construction.
11. The engineer or engineering technician must be onsite during the placement of all in-stream structures. If structures are placed without engineering approval, they may be required to be reconstructed at the contractor's expense.

NOTES:
PLANTING PLAN FOR AMITY CREEK BANK STABILIZATION 2017

MNDOT APPLICABLE RESTORATION SPECIFICATIONS

THE FOLLOWING MNDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION, CURRENT EDITION, GOVERN THIS PROJECT'S RESTORATION PLAN.

DIVISION I

ENTIRE DIVISION

DIVISION II, CONSTRUCTION DETAILS

SECTION 2571 PLANT INSTALLATION

SECTION 2573 STORM WATER MANAGEMENT

SECTION 2575 CONTROLLING EROSION AND ESTABLISHING VEGETATION

SECTION 2577 SOIL BIOENGINEERED SYSTEMS

DIVISION III, MATERIALS

SECTION 3861 PLANT STOCK

SECTION 3876 SEED (MNDOT SEED MANUAL)

SECTION 3882 MULCH

SECTION 3885 EROSION CONTROL BLANKET

PLANTING PLAN

SEEDING SHALL TAKE PLACE ON AUTHORIZED SEED PLANTING DATES, AS PER SEED NOTES. CONTAINERIZED STOCK PLANTS CAN BE PLANTED ANY TIME BEFORE THE GROWING SEASON, AND BARE ROOT IS ALLOWED IN SPRING BEFORE JUNE 1ST.

SEED NOTES

1. ALL SEED SHALL BE PLANTED PRIOR TO HYDRO MULCHING.

2. A HARROWING OR RAKING SHALL FOLLOW ALL GRASS SEED INSTALLATION.

3. A COVER CROP OF OATS OR WINTER WHEAT SHALL BE SOWN ALONG WITH NATIVE GRASSES AT A RATE OF 25 LBS./ACRE. OATS SHALL BE USED FOR A SPRING OR SUMMER SEEDING, AND WINTER WHEAT SHALL BE USED FOR A FALL SEEDING.

PLANT INSTALLATION

MAKE HOLE WITH REBAR AND HAMMER. DO NOT HAMMER STAKE IN WITHOUT PILOT HOLE. TAMPER IN LIVE STAKE WITH DEAD BLOW HAMMER WHILE TAKING CARE NOT TO DAMAGE. FILL THE HOLE WITH NATIVE FILL. LEAVE NO AIR SPACES AROUND THE CUTTING. LEAVE INDENTATION POCKET AROUND SURFACE FOR WATER TO COLLECT.

WILLOW POLE 3/4" DIAMETER BY 4' LONG MINIMUM SIZE

2 TO 5 BUD SCARS SHOULD BE ABOVE GROUND

CITY OF DULUTH PROJECT NO. 1355

AMITY CREEK BANK STABILIZATION 2017

PLOT DATE:

PLACE TOP OF ROOT BALL AT GRADE

PLACE MULCH AROUND BASE OF SHRUB

NOT TO SCALE

SHRUB PLANTING DETAIL

ZONE ONE - FLOODPLAIN

PLANTING AREA

11' WIDE BANKFULL BENCH AREA SEE ZONE PLANTING DETAIL ON THIS SHEET FOR PLANT AND SEED ZONE AREAS AND GENERAL AREA HATCHING ON PLANS

ZONE ONE

LIVE STAKES

PLANT ONE LIVE STAKE OR WILLOW PLUG FOR EVERY 5 FEET ALONG STREAM EDGE:

SHRUB WILLOW - 50%

BLACK WILLOW (SALIX NIGRA) - 50%

CANOPY

THE FOLLOWING CANOPY PLANTS NEED TO BE 28 CU.IN. PLANT BAND WITH A MINIMUM PLANT HEIGHT OF 1 FOOT. PLANT THE FOLLOWING EVERY 8 FOOT SPACING (WEIGHTED ALONG STREAM EDGE):

**WHITE CEDAR (THUJA OCCIDENTALIS) - 25%

*YELLOW BIRCH (BETULA ALLEGHANIENSIS) - 25%

WHITE SPRUCE (PICEA MARIANA) - 50%

SUB-CANOPY - THE FOLLOWING SUB-CANOPY PLANTS NEED TO BE 18" HEIGHT (MINIMUM), CAN BE PLUGS OR BARE ROOT STOCK (MUST BE PLANTED IN SPRING; PLANT THE EVERY 64 SQUARE FEET.

** SPECIES THAT REQUIRE 5' HIGH x 5" DIAMETER VENTED TREE TUBE WITH 1"X1"X5' OAK STAKES.

* SPECIES THAT REQUIRE 8' HIGH x 2.5" DIAMETER FENCING WITH 1 T-POST & THREE 1' LONG METAL LAWN STAKES OR 2 T-POSTS.

NOTE:

1. SCARIFY BOTTOM AND SIDES OF PLANTING PIT PRIOR TO PLANTING.

2. LOOSEN ROOT BALL BEFORE PLANTING.

3. BACKFILL WITH PLANTING SOIL AND TAMPER TO PREVENT SETTLEMENT.

4. SHRUBS ARE FOR ACCESS PATH RESTORATION. PLANTINGS SHALL BE SPACED 1 FOR EVERY 64 SF.

ZONE PLANTING DETAIL

PLANTING NOTES

1. SEEDING IS RECOMMENDED TO TAKE PLACE ON AUTHORIZED SEED PLANTING DATES, AS PER SEED NOTES. CONTAINERIZED STOCK PLANTS CAN BE PLANTED ANY TIME BEFORE THE GROWING SEASON, AND BARE ROOT IS ALLOWED IN SPRING BEFORE JUNE 1ST.

2. A HARROWING OR RAKING SHALL FOLLOW ALL GRASS SEED INSTALLATION.

3. A COVER CROP OF OATS OR WINTER WHEAT SHALL BE SOWN ALONG WITH NATIVE GRASSES AT A RATE OF 25 LBS./ACRE. OATS SHALL BE USED FOR A SPRING OR SUMMER SEEDING, AND WINTER WHEAT SHALL BE USED FOR A FALL SEEDING.

SEED NOTES

1. ALL SEED SHALL BE PLANTED PRIOR TO HYDRO MULCHING.

2. A HARROWING OR RAKING SHALL FOLLOW ALL GRASS SEED INSTALLATION.

3. A COVER CROP OF OATS OR WINTER WHEAT SHALL BE SOWN ALONG WITH NATIVE GRASSES AT A RATE OF 25 LBS./ACRE. OATS SHALL BE USED FOR A SPRING OR SUMMER SEEDING, AND WINTER WHEAT SHALL BE USED FOR A FALL SEEDING.

SHRUB PLANTING DETAIL

NOT TO SCALE

ZONE ONE - FLOODPLAIN

PLANTING AREA

11' WIDE BANKFULL BENCH AREA SEE ZONE PLANTING DETAIL ON THIS SHEET FOR PLANT AND SEED ZONE AREAS AND GENERAL AREA HATCHING ON PLANS.

LIVE STAKES

PLANT ONE LIVE STAKE OR WILLOW PLUG FOR EVERY 5 FEET ALONG STREAM EDGE:

SHRUB WILLOW - 50%

BLACK WILLOW (SALIX NIGRA) - 50%

CANOPY

THE FOLLOWING CANOPY PLANTS NEED TO BE 28 CU.IN. PLANT BAND WITH A MINIMUM PLANT HEIGHT OF 1 FOOT. PLANT THE FOLLOWING EVERY 8 FOOT SPACING (WEIGHTED ALONG STREAM EDGE):

**WHITE CEDAR (THUJA OCCIDENTALIS) - 25%

*YELLOW BIRCH (BETULA ALLEGHANIENSIS) - 25%

WHITE SPRUCE (PICEA MARIANA) - 50%

SUB-CANOPY - THE FOLLOWING SUB-CANOPY PLANTS NEED TO BE 18" HEIGHT (MINIMUM), CAN BE PLUGS OR BARE ROOT STOCK (MUST BE PLANTED IN SPRING; PLANT THE EVERY 64 SQUARE FEET.

** SPECIES THAT REQUIRE 5' HIGH x 5" DIAMETER VENTED TREE TUBE WITH 1"X1"X5' OAK STAKES.

* SPECIES THAT REQUIRE 8' HIGH x 2.5" DIAMETER FENCING WITH 1 T-POST & THREE 1' LONG METAL LAWN STAKES OR 2 T-POSTS.

ZONE PLANTING DETAIL

PLANTING NOTES

1. SEEDING IS RECOMMENDED TO TAKE PLACE ON AUTHORIZED SEED PLANTING DATES, AS PER SEED NOTES. CONTAINERIZED STOCK PLANTS CAN BE PLANTED ANY TIME BEFORE THE GROWING SEASON, AND BARE ROOT IS ALLOWED IN SPRING BEFORE JUNE 1ST.

2. A HARROWING OR RAKING SHALL FOLLOW ALL GRASS SEED INSTALLATION.

3. A COVER CROP OF OATS OR WINTER WHEAT SHALL BE SOWN ALONG WITH NATIVE GRASSES AT A RATE OF 25 LBS./ACRE. OATS SHALL BE USED FOR A SPRING OR SUMMER SEEDING, AND WINTER WHEAT SHALL BE USED FOR A FALL SEEDING.

SEED NOTES

1. ALL SEED SHALL BE PLANTED PRIOR TO HYDRO MULCHING.

2. A HARROWING OR RAKING SHALL FOLLOW ALL GRASS SEED INSTALLATION.

3. A COVER CROP OF OATS OR WINTER WHEAT SHALL BE SOWN ALONG WITH NATIVE GRASSES AT A RATE OF 25 LBS./ACRE. OATS SHALL BE USED FOR A SPRING OR SUMMER SEEDING, AND WINTER WHEAT SHALL BE USED FOR A FALL SEEDING.

SHRUB PLANTING DETAIL

NOT TO SCALE

ZONE ONE - FLOODPLAIN

PLANTING AREA

11' WIDE BANKFULL BENCH AREA SEE ZONE PLANTING DETAIL ON THIS SHEET FOR PLANT AND SEED ZONE AREAS AND GENERAL AREA HATCHING ON PLANS.

LIVE STAKES

PLANT ONE LIVE STAKE OR WILLOW PLUG FOR EVERY 5 FEET ALONG STREAM EDGE:

SHRUB WILLOW - 50%

BLACK WILLOW (SALIX NIGRA) - 50%

CANOPY

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WARNING
LOCATION OF UNDERGROUND UTILITIES TO BE VERIFIED BY CONTRACTOR. GOPHER STATE ONE CALL CALL BEFORE DIGGING. 1-800-252-1166 REQUIRED BY LAW.

GENERAL NOTES:
1. AT THE PROJECT LIMITS, TOEWOOD AND COIR Benches shall be smoothly tapered and keyed into the existing bank a minimum of 6-feet. The Contractor shall use reclaimed boulders to bulkhead the toewood at each end.
2. All excavation within or adjacent to the stream bed shall be undertaken in dry conditions. The Contractor shall install sandbags, cofferdams and bypass pumping as necessary to safely route the stream flow around the excavation area until construction is complete. 
3. Contractor to remove deadfall and woody debris within 10-feet of top of bank between Station 13+25 to Station 17+48, as directed by Engineer.

Profile on Proposed Channel Alignment
GENERAL NOTES:

1. AT THE PROJECT LIMITS, TOEWOD AND COR BENCHES SHALL BE SMOOTHLY TAPERED AND KEYED INTO THE EXISTING BANK A MINIMUM OF 6-FEET. THE CONTRACTOR SHALL USE RECLAIMED BOULDERS TO BULKHEAD THE TOEWOOD AT EACH END.

2. ALL EXCAVATION WITHIN OR ADJACENT TO THE STREAM BED SHALL BE UNDERTAKEN IN DRY CONDITIONS. THE CONTRACTOR SHALL INSTALL RAMPAGE, COFFERDAMS AND BYPASS PUMPING AS NECESSARY TO SAFELY ROUTE THE STREAM FLOW AROUND THE EXCAVATION AREA UNTIL CONSTRUCTION IS COMPLETE.

3. CONTRACTOR TO REMOVE DEADFALL AND WOODY DEBRIS WITHIN 10 FEET OF TOP OF BANK BETWEEN STA 0+70 TO STA 4+05. AS DIRECTED BY ENGINEER.

WARNING
LOCATION OF UNDERGROUND UTILITIES TO BE VERIFIED BY CONTRACTOR
GOPHER STATE ONE CALL
CALL BEFORE DIGGING, 1-800-252-1166
REQUIRED BY LAW

AMITY CREEK
FLOW
MATCH EXISTING GRADES (TYP)

END CONSTRUCTION STA. 0+70

SITE ACCESS ROUTES SHALL BE COORDINATED WITH THE ON-SITE REPRESENTATIVE PRIOR TO CLEARING SITE ACCESS. SEE SHEET C-4.

WARNING LOCATION OF UNDERGROUND UTILITIES TO BE VERIFIED BY CONTRACTOR GOPHER STATE ONE CALL CALL BEFORE DIGGING, 1-800-252-1166 REQUIRED BY LAW
CS-10

CITY OF DULUTH PROJECT NO. 1355
CITY OF DULUTH, MINNESOTA

AMITY CREEK BANK STABILIZATION 2017

CROSS SECTIONS - REACH 579D-2

JOSEPH J JUREWICZ

TOEWOOD EXCAVATION LIMITS

STA. 13+47.5

DESIGN EL. = 851.70
EXISTING EL. = 850.8

STA. 13+49.5

DESIGN EL. = 851.17
EXISTING EL. = 850.7

CS-10

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TOEWOOD EXCAVATION LIMITS