

1 to 3 INDIVIDUAL STONES MAY BE USED TO SHIM BOULDERS. DO NOT USE RIPRAP LAYER. MINIMIZE USAGE OF SHIM STONES. ASSURE GROUT PENETRATION INTO VOIDS BELOW BOULDERS.

SURFACES OF BOULDERS ABOVE DESIGN TOP OF GROUT TO REMAIN CLEAN AND FREE OF GROUT.

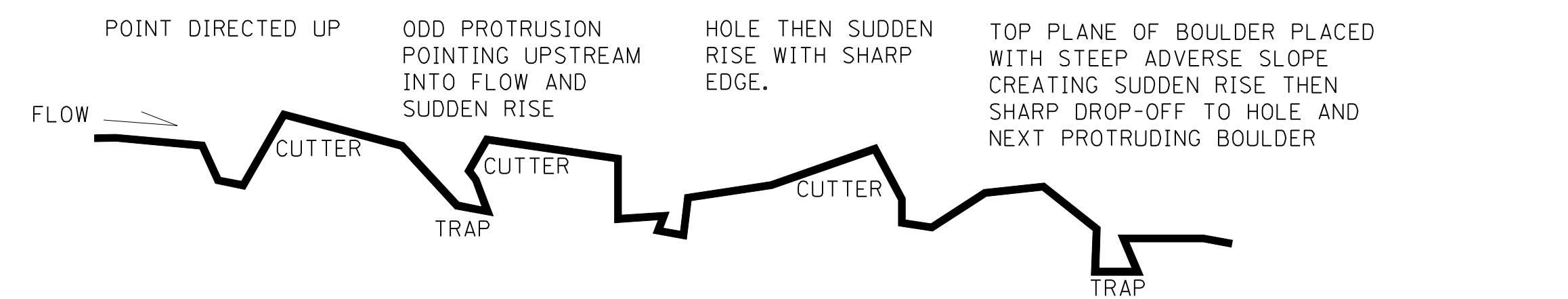
FOR BOTTOMS OF WATERWAYS, THE CONSTRUCTED PLANE WILL TYPICALLY BE WITHIN 0.5 FEET OF DESIGN PLANE ALONG WATERWAYS CHUTES AND OTHER GENERAL CONTROLS THE CONSTRUCTED PLANE WILL BE WITHIN 0.25 FEET. AT CONTROL CRESTS SUCH AS WEIRS AND ENTRY TO WATERWAYS AND CHUTES THE CONSTRUCTED PLANES WILL BE AT DESIGN PLANE OR BELOW 0.1' MAX. SEE DRAWINGS

**GENERAL**

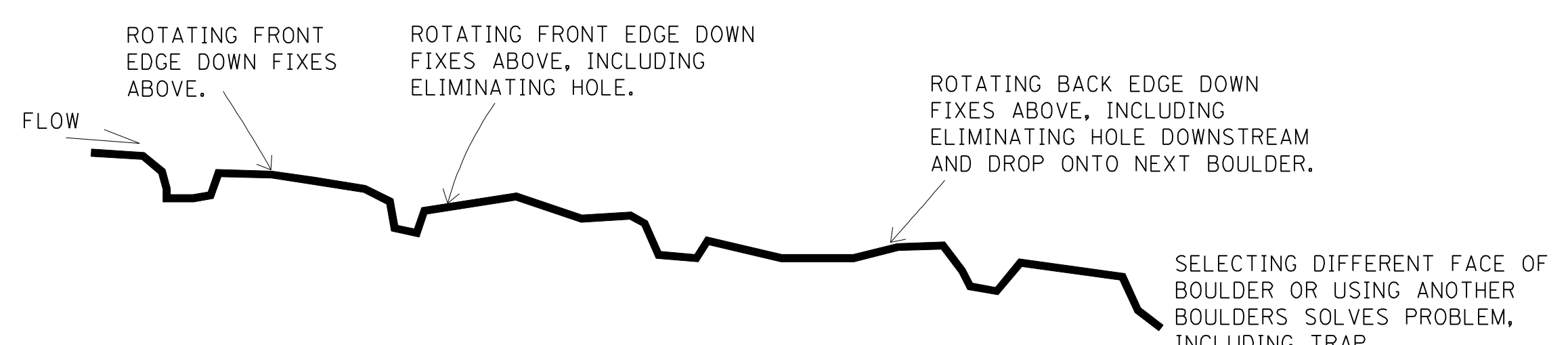
1. THE GROUTED BOULDER LINING IS INTENDED FOR FLOOD AND EROSION CONTROL, DIVERSION AND RIVER GRADE CONTROL, WHITEWATER BOATING, AND ENVIRONMENTAL PURPOSES. THE INTENT IS TO ACHIEVE A ROUGH, NATURALISTIC APPEARANCE, SIMILAR TO A MODERATE RAPID. PRECISION CUT STONE, SMOOTH CONCRETE LINING, OR PATIO LIKE STONE PAVING, GROUT METICULOUSLY PLACED TO THE TOP AND COVERING BOULDERS IS NOT REQUIRED OR DESIRED. A ROUGH SURFACE WITH DEEP JOINTS BETWEEN BOULDERS IS CALLED FOR TO SUSTAIN FLOW DEPTHS, DISSIPATE ENERGY, LESSEN VELOCITIES, PROVIDE HABITAT, AND FISH PASSAGE.
2. THE OVERALL PROFILE OF A PLACEMENT ZONE AND COMBINATIONS OF INDIVIDUAL ROCK SHAPES IS KEY TO SATISFACTORY PERFORMANCE AND FOR EFFICIENT CONSTRUCTION.
3. THE CONTOURS SHOWN ON THE PLANS ARE GUIDELINE EXCEPT FOR HYDRAULIC CONTROL SURFACES. SEE TYPICAL AND EXAMPLE DETAILS FOR PLACEMENT REQUIREMENTS.

**CONSTRUCTION REQUIREMENTS:**

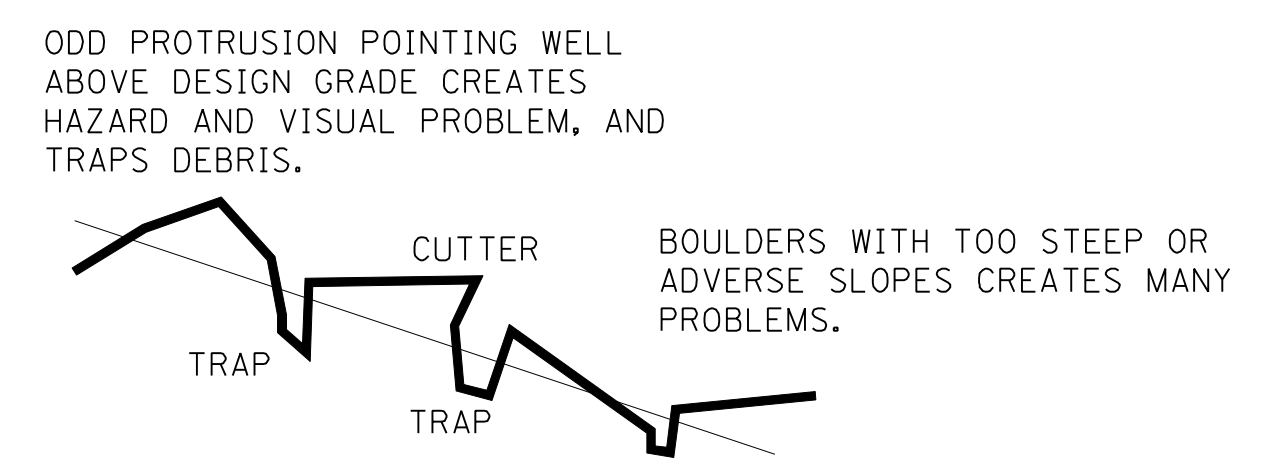
1. PREPARE AND COMPACT SUBGRADE. DO NOT PLACE BOULDERS ON FREE DRAINING GRAVEL OR LAYER OF RIPRAP MORE PERMEABLE THAN "FILL MATERIAL" OR NATURAL SUBGRADE. SELECT AND ARRANGE BOULDERS TO MINIMIZE VOID SPACE AND AREA OF EXPOSED GROUT.
2. BEFORE GROUTING, CLEAN ALL DIRT AND MATERIALS FROM ROCK THAT COULD PREVENT THE GROUT FROM BONDING TO ROCK. REMOVE ANY LOOSE SOIL BETWEEN BOULDERS. FINAL PLACEMENT OF BOULDERS TO BE APPROVED ONE DAY MIN. PRIOR TO GROUTING. COMPLETE CORRECTIONS ONE DAY PRIOR TO GROUTING.
3. PLACE GROUT BY INJECTION METHODS TO FILL VOIDS TO ACHIEVE THE MINIMUM THICKNESS AND TO RECESS THE TOP GROUT SURFACE BELOW THE TOP OF BOULDER AS SHOWN. PAINT PERIODIC MARKS SUFFICIENT TO GUIDE GROUTING THICKNESS OR RELIEF BELOW TOP OF BOULDER. DURING PLACEMENT, CLEAN EXCESS GROUT FROM ALL BOULDER SURFACES TO BE LEFT EXPOSED. VIBRATE ALL GROUT AND ASSURE THAT ALL VOIDS UNDER AND BETWEEN BOULDERS ARE GROUTED.
4. CONTROL GROUT MIX AND PLACEMENT PROCEDURES TO ACHIEVE THE SPECIFIED THICKNESS, EASY MOVEMENT INTO VOIDS GRADE AND CONFIGURATION OF THE GROUT. GROUT IN SINGLE BOULDER LIFTS. AT STEEP LOCATIONS ADJUST TO STIFFER MIX, REDUCING PLACEMENT THICKNESS AND/OR CONTAIN GROUT SO THAT VIBRATION CAN TAKE PLACE AND GROUT DOES NOT RUN LATERALLY OR EXCEED DESIGN GRADES.
5. FINISH GROUT SURFACE WITH WOOD FLOAT AND/OR STIFF BROOM. SMOOTH FINISH NOT DESIRED. PROVIDE CONTINUOUS GROUT SURFACE GRADES. FILL ANY ZONES THAT WOULD OTHERWISE CREATE FOOT TRAPS, BUT DO NOT PLACE GROUT TO TOP OF BOULDERS. BRUSH AND WASH OFF ANY RESIDUAL GROUT ON BOULDERS UNLESS CULLED FOR AT CONTROL SURFACES. APPLY A NON-WHITE SEALER THAT DRIES CLEAR SAME DAY OF GROUT PLACEMENT.
6. AFTER GROUT HAS SET INSPECT BOULDER AND GROUT SURFACES FOR ANY HAZARDOUS SITUATIONS. KNOCK OFF SHARP EDGES THAT COULD CUT. IDENTIFY VOIDS THAT MAY CREATE TRAPS. GROUT TO FILL SUCH VOIDS. MAKE OTHER MINOR CORRECTIONS AS DIRECTED.



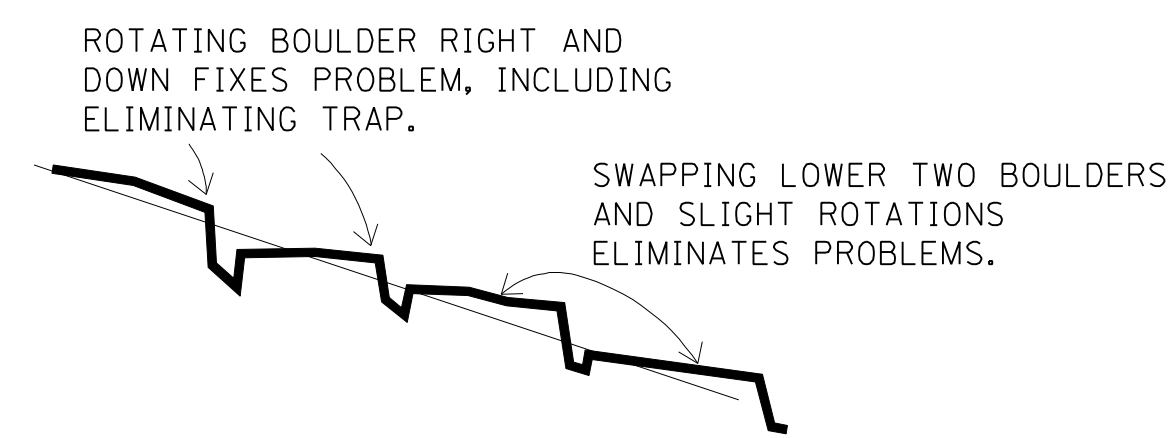
**OBJECTIONABLE PROFILE**



**ACCEPTABLE PROFILE**



**OBJECTIONABLE SECTION**



**ACCEPTABLE SECTION**

**1 TYPICAL GROUTED BOULDER DETAILS**  
NOT TO SCALE

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