



EROSION AROUND OUTFALL

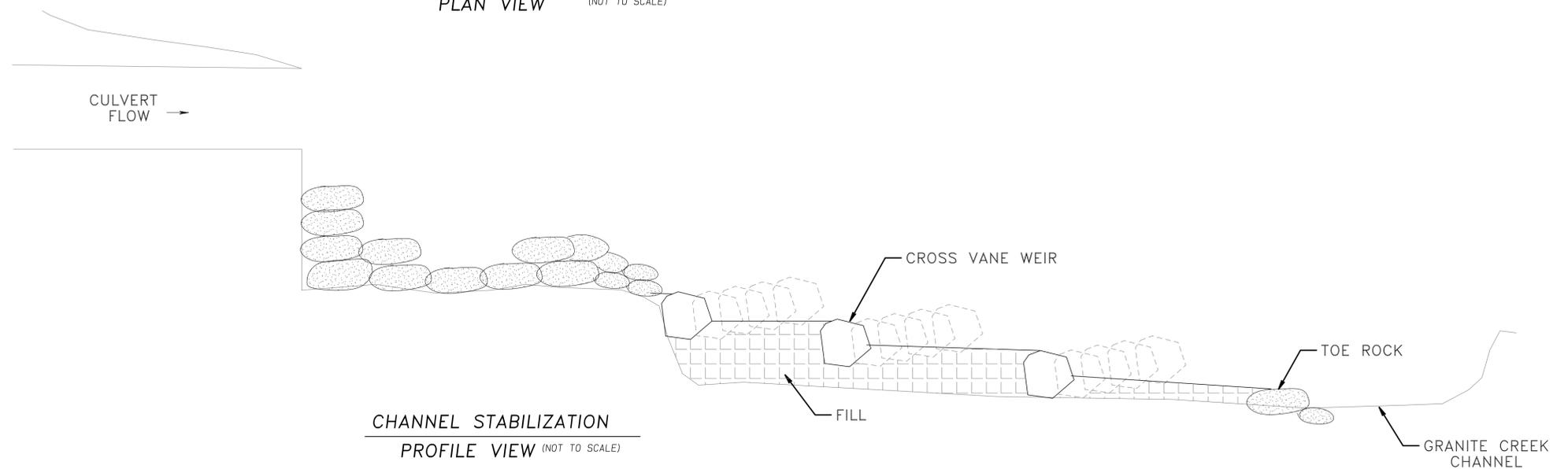
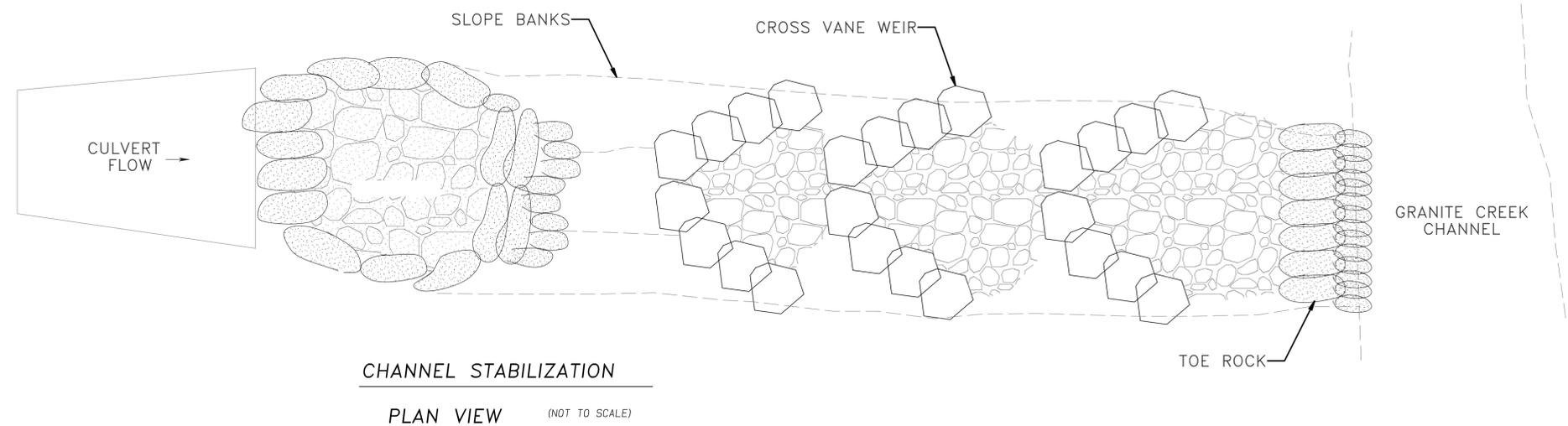
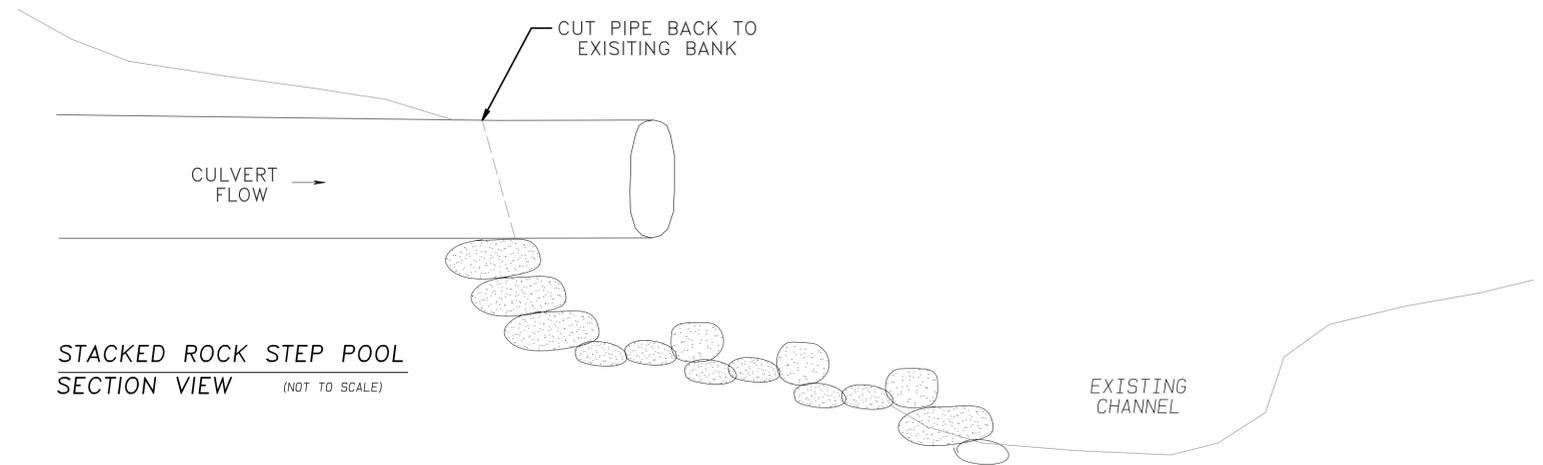


EROSION AT OUTFALL



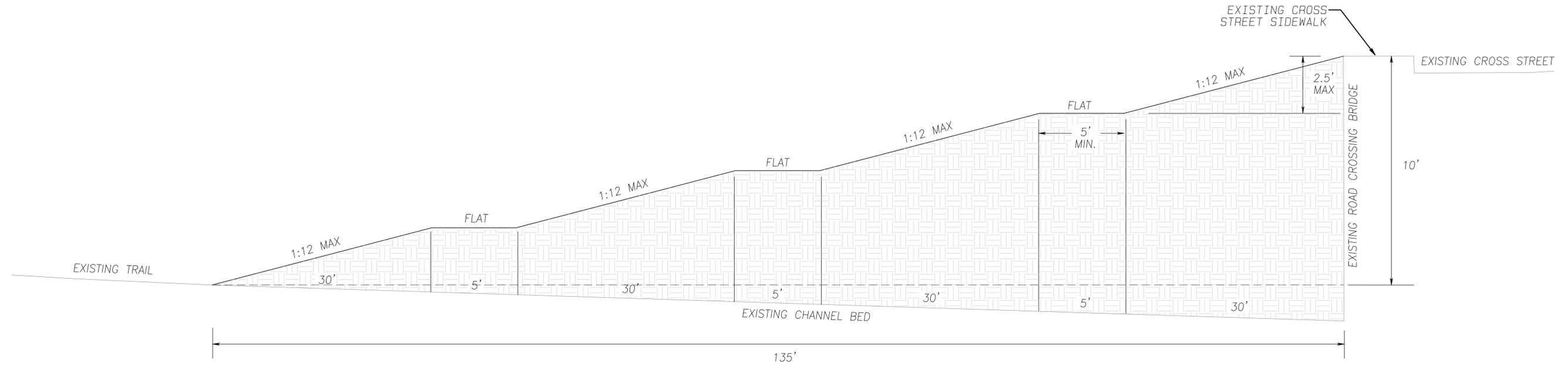
EXAMPLE ZUNI BOWL

CONCEPTUAL ENHANCEMENTS – EROSION AT STORMWATER OUTFALLS

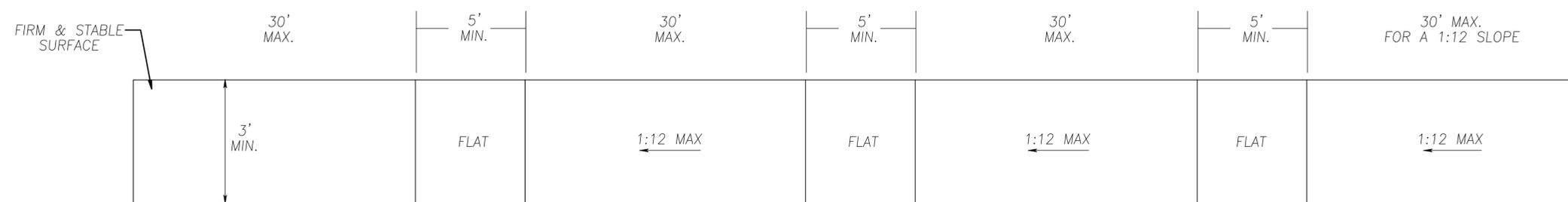


NO.	DATE	BY	REVISION

CONCEPTUAL ENHANCEMENTS - ADA TRAIL ACCESS RAMP



PEDESTRIAN RAMP (TYP.)
PROFILE VIEW (NOT TO SCALE)

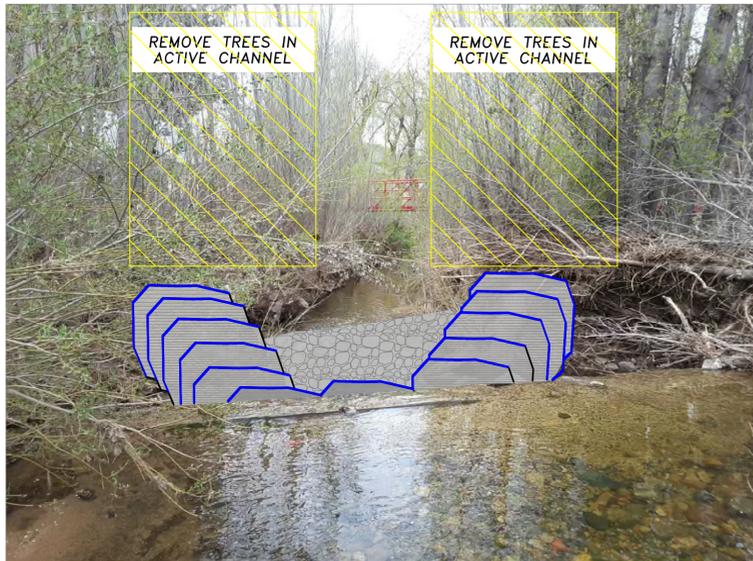


PEDESTRIAN RAMP (TYP.)
PLAN VIEW (NOT TO SCALE)

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ROCK CROSS VANE WEIR

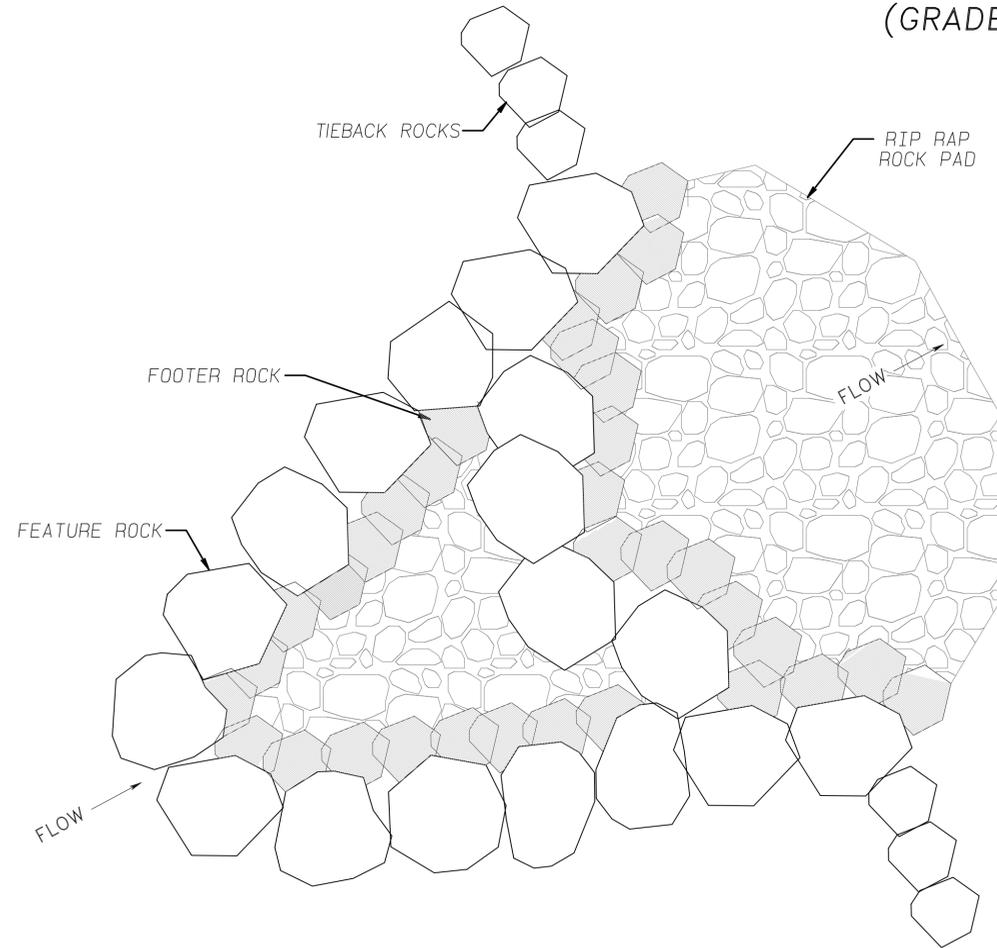


CONCEPTUAL CROSS VANE WEIR

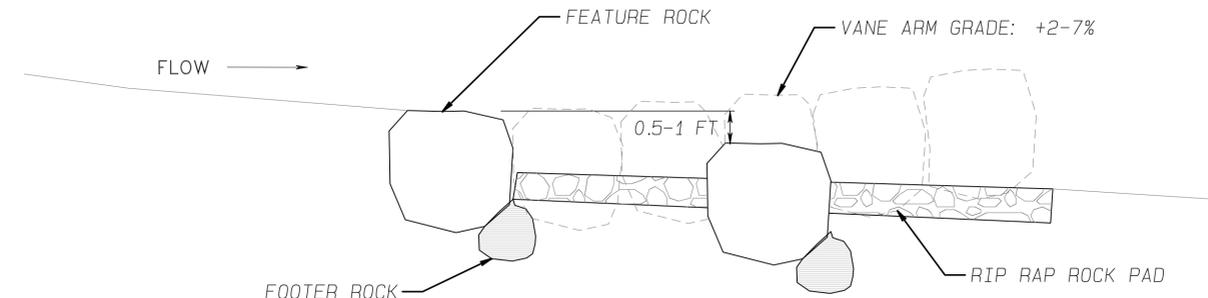


OVERWIDE UTILITY CROSSING, DIRECTS FLOW TOWARD BANK

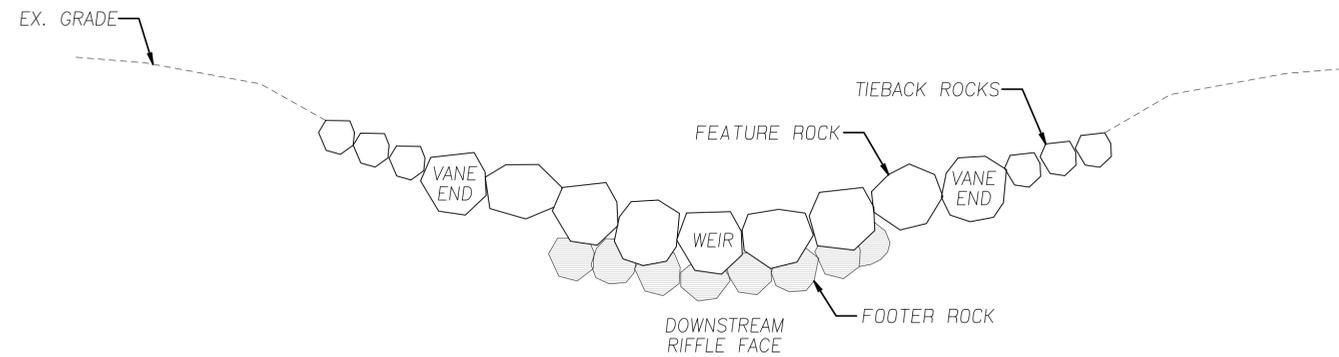
CONCEPTUAL ENHANCEMENTS – CROSS VANE WEIR
(GRADE CONTROL AND BANK PROTECTION)



CROSS VANE WEIR (TYPICAL)
PLAN VIEW (NOT TO SCALE)



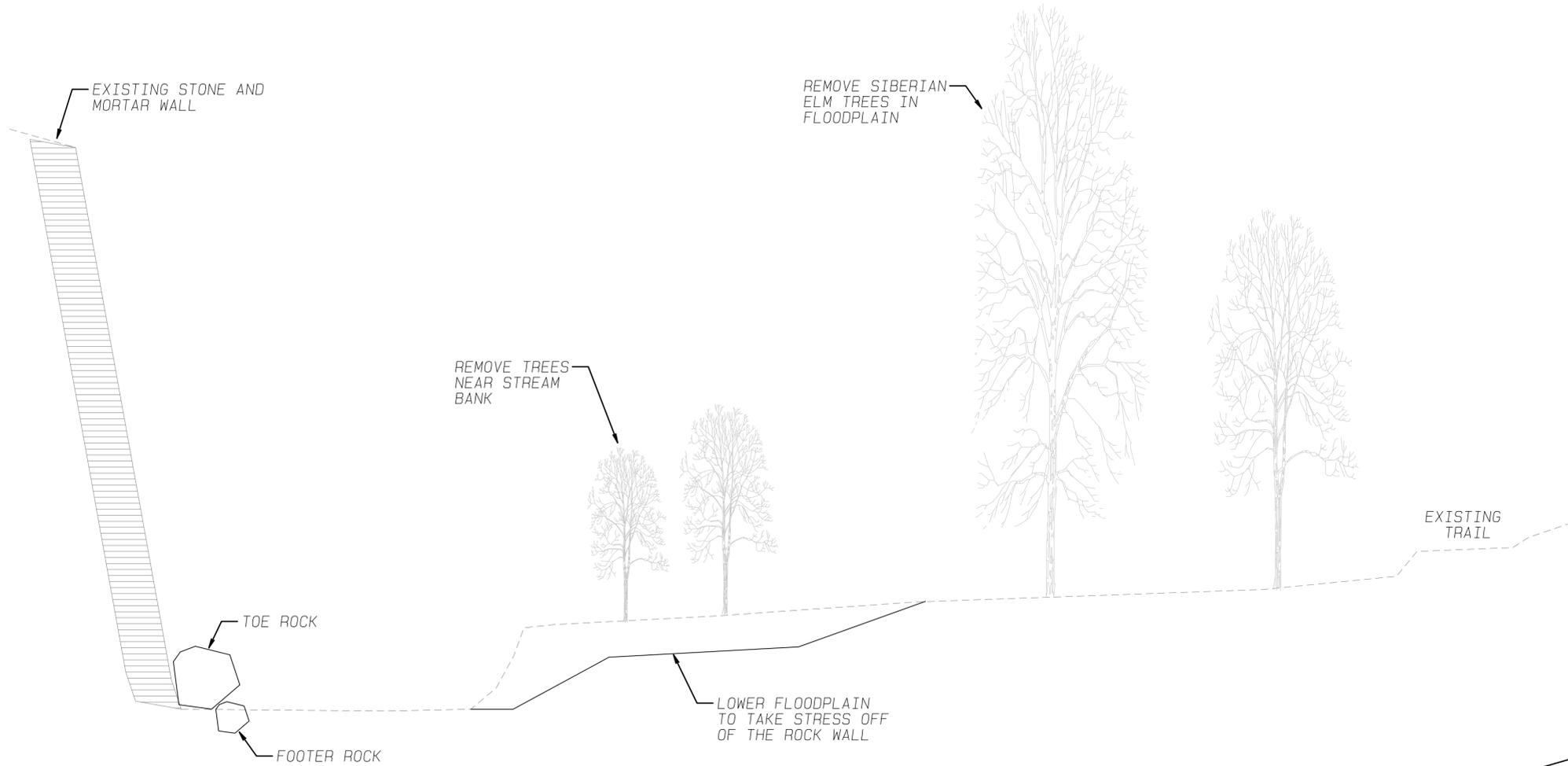
PROFILE VIEW
(NOT TO SCALE)



SECTION VIEW: WEIR FACE
FRONT ELEVATION (STEP NOT SHOWN) (NOT TO SCALE)

DRAFT CONCEPTUAL DESIGN		DATE: 09/03/2019	SHEET NUMBER: 3 of 6
GRANITE CREEK CORRIDOR CONCEPTUAL ENHANCEMENTS MASTER PLAN CITY OF PRESCOTT			
DRAWN BY: JF/CS	DESIGNED BY:	CHECKED BY:	INCH DATE
			REVISION
2900 N. West St. #50004 Flagstaff, Arizona (928) 774-2336			

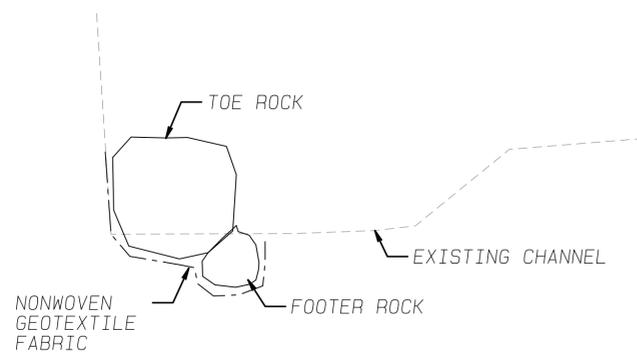
CONCEPTUAL ENHANCEMENTS — RETAINING WALL PROTECTION



EROSION IS UNDERMINING WALL

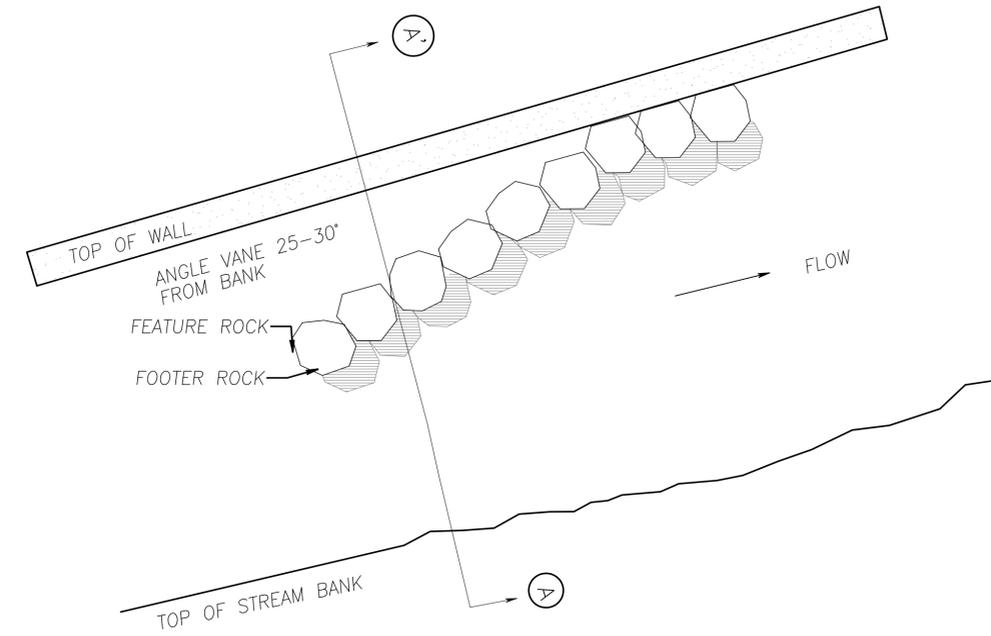
TOE ROCK WALL PROTECTION

(NOT TO SCALE)



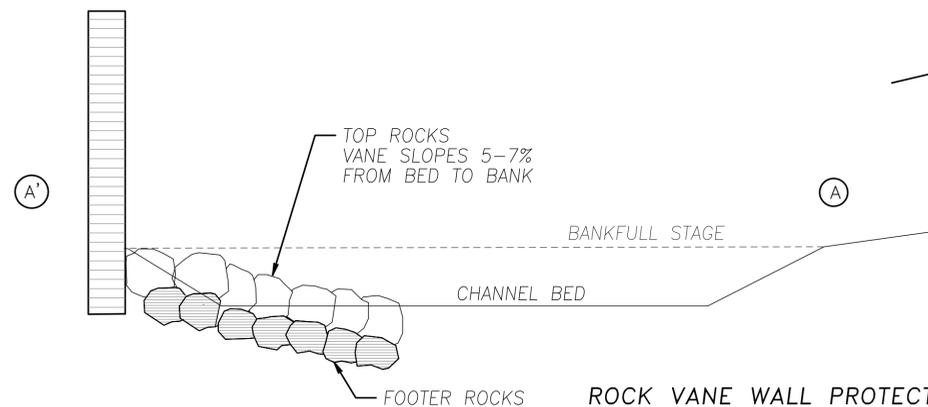
TOE ROCK (TYP.)

CROSS SECTION VIEW (NOT TO SCALE)



ROCK VANE WALL PROTECTION

PLAN VIEW (NOT TO SCALE)

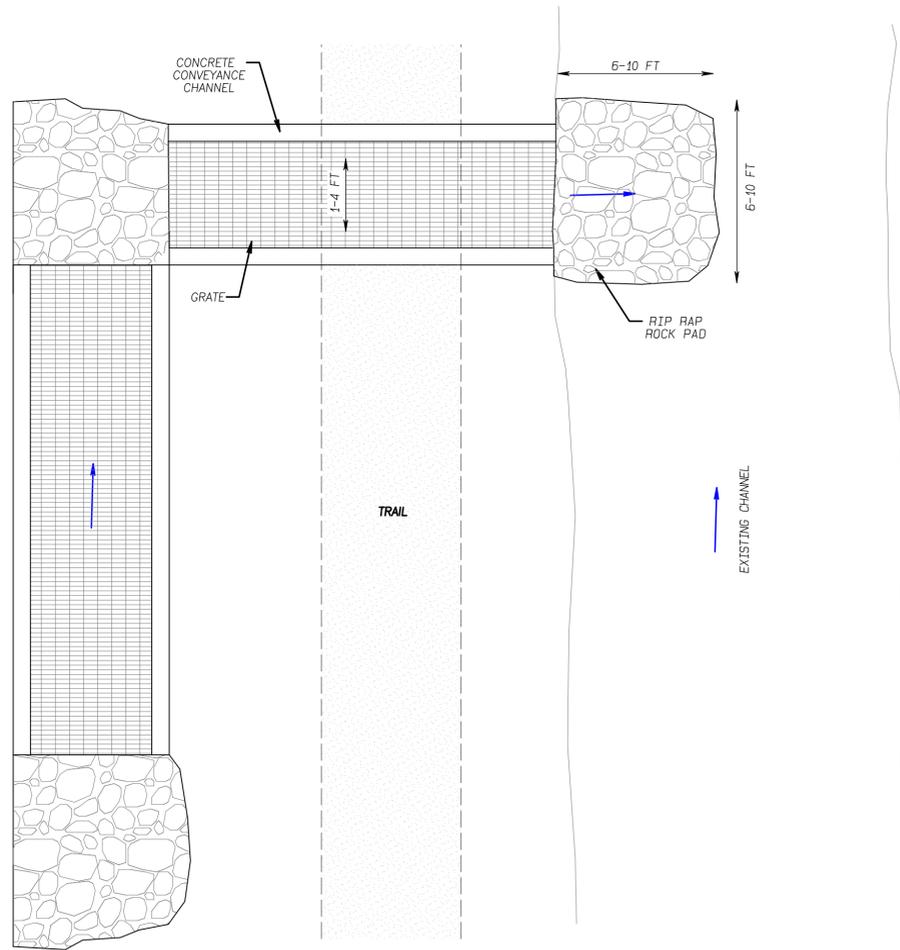


ROCK VANE WALL PROTECTION

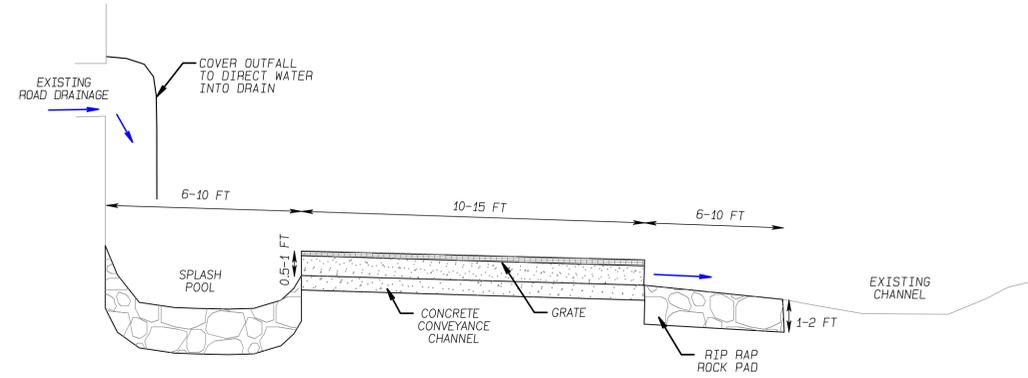
CROSS SECTION VIEW (NOT TO SCALE)

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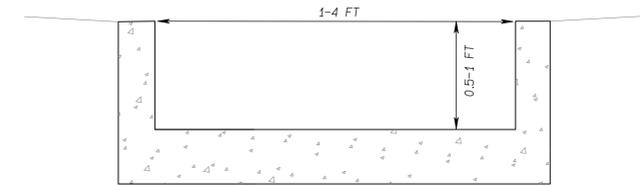
CONCEPTUAL ENHANCEMENTS — STORMWATER OUTFALLS UNDER BRIDGES



STORM DRAIN OUTLET PROTECTION
PLAN VIEW (NOT TO SCALE)



STORM DRAIN OUTLET PROTECTION
SECTION VIEW (NOT TO SCALE)



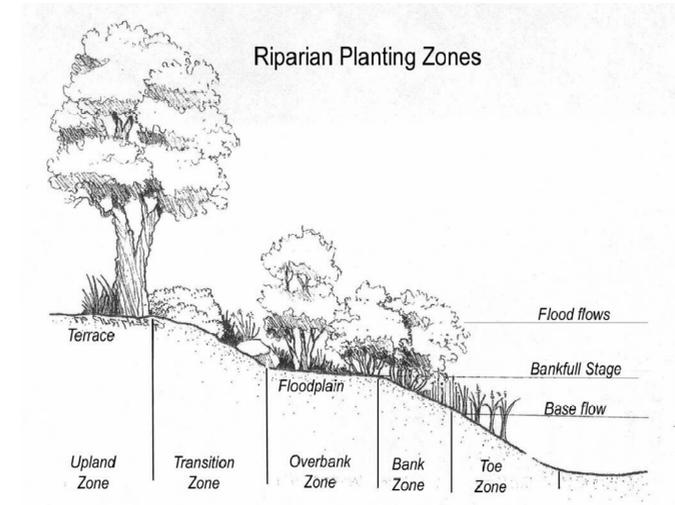
STORM DRAIN CONCRETE CHANNEL
CROSS SECTION VIEW (NOT TO SCALE)



PHOTOS ABOVE SHOW STORM DRAIN OUTFALLS ALONG THE TRAIL UNDERNEATH GOODWIN ST

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RIPARIAN VEGETATION



Source: Hoag, et al., 2001. Riparian Planting Zones in the Intermountain West. Information Series #16. NRCS - Plant Material Center, Aberdeen, ID.

RIPARIAN PLANTING ZONES CAN BE USED TO DETERMINE WHERE RIPARIAN SPECIES SHOULD BE PLANTED IN RELATION TO THE WATERLINE. THIS IS A GENERAL DEPICTION OF A RIPARIAN ZONE. NOT ALL STREAMS LOOK LIKE THIS ONE. IN THE REAL WORLD, SOME OF THESE ZONES MAY BE ABSENT.

TREE REMOVAL

THERE ARE TWO REASONS TO REMOVE TREES IN GRANITE CREEK:

- (1) THE TREES ARE INVASIVE SPECIES, PRIMARILY SIBERIAN ELM (ULMUS PUMILA) OR
- (2) TREES THAT ARE INAPPROPRIATE FOR THE RIPARIAN ZONE AND ARE, OR POTENTIALLY ARE, BLOCKING THE CHANNEL OR FLOODPLAIN CAUSING SPLIT CHANNELS, DEBRIS JAMS OR EROSION. IN SOME CASES BOTH REASONS APPLY.

RIPARIAN PLANTING ZONES

RIPARIAN PLANT COMMUNITIES ARE IMPORTANT TO MAINTAINING THE STABILITY AND FUNCTION OF STREAM SYSTEMS. RIPARIAN VEGETATION PROVIDES WILDLIFE HABITAT WHILE VEGETATION ROOTING PROVIDES ADDITIONAL STRENGTH TO ERODIBLE BANKS.

RIPARIAN PLANT COMMUNITIES ARE GENERALLY DISTRIBUTED BY THE AMOUNT OF SOIL MOISTURE AND PERIODIC DISTURBANCE AND AS A RESULT THEY CREATE A SERIES OF ZONES THAT RUN PARALLEL TO THE STREAM CHANNEL. THESE ZONES ARE CALLED: TOE, BANK, OVERBANK (FLOODPLAIN), TRANSITION, AND UPLAND. THE TOE ZONE SUPPORTS WETLAND SPECIES (SEDGES, RUSHES, ETC.), THE BANK AND OVERBANK ZONES ARE DOMINATED BY GRASSES AND SMALL TO MEDIUM SHRUBS WITH FLEXIBLE STEMS, AND THE TRANSITION ZONE SUPPORTS MORE ARID GRASSES, SHRUBS AND TREES. PLANTS WITH FLEXIBLE STEMS AND CREEPING ROOT SYSTEMS ARE USUALLY LOCATED FROM THE TOP OF THE TOE ZONE THROUGH THE BANK ZONE. THE STIFFNESS OF VEGETATION GENERALLY INCREASES AS IT MOVES AWAY FROM THE CENTRAL STREAM CHANNEL.

GRANITE CREEK HAS MANY LARGE AND MEDIUM TREES IN THE ACTIVE CHANNEL, BANK AND FLOODPLAIN. MANY OF THESE ARE BEAUTIFUL NATIVE TREES PROVIDING SHADE, HABITAT AND BANK PROTECTION AND SHOULD NOT BE REMOVED EVEN THOUGH THEY ARE IN THE "WRONG" ZONE. HOWEVER, MANY OF THEM ARE CAUSING PROBLEMS INCLUDING BANK EROSION, SPLIT CHANNELS, DEBRIS JAMS AND FLOODPLAIN BLOCKAGES AND SHOULD BE REMOVED IN THESE CIRCUMSTANCES. MOST OF THE SMALLER NATIVE TREES (<4") SHOULD BE REMOVED FROM THE TOE, BANK AND LOWER FLOODPLAIN. HOWEVER, THEY NEED TO BE REPLACED WITH NATIVE GRASSES, SEDGES AND WILLOWS TO ENSURE THERE ARE PLANT ROOTS TO PROTECT AGAINST BANK EROSION.



EXCESSIVE VEGETATION NEAR CHANNEL NARROWS FLOODPLAIN.



EXCESSIVE VEGETATION NEAR CHANNEL NARROWS FLOODPLAIN.

INVASIVE TREE SPECIES

EVENTUALLY, ALL INVASIVE TREE SPECIES SHOULD BE REMOVED (SIBERIAN ELM, TREE OF HEAVEN (AILANTHUS ALTISSIMA) & RUSSIAN OLIVE? (ELAEAGNUS ANGUSTIFOLIA)). HOWEVER, THERE ARE MANY LARGE ELMS THAT ARE CURRENTLY PROVIDING A SIGNIFICANT PORTION OF THE CANOPY COVER (SHADE). WE RECOMMEND BEGINNING A PROGRAM TO REMOVE AND REPLACE THE LARGER ELMS WITH NATIVE TREE SPECIES THAT WILL TAKE AT LEAST A DECADE OR TWO TO COMPLETE. WE RECOMMEND NOT REMOVING MORE THAN 20% OF THE CANOPY COVER IN ANY ONE AREA AT A TIME AND PLANTING NATIVE TREE SPECIES IN THE CANOPY GAPS. WE SUGGEST REPLACING INVASIVE TREES WITH THE FOLLOWING NATIVE SPECIES:

- TREES
- COTTONWOOD (NARROWLEAF OR HYBRID?) (POPULUS ANGUSTIFOLIA OR HYBRID)
 - GOODINGS AND RED WILLOW (SALIX GOODINGII AND S. LAEVIGATA)
 - BOX ELDER (ACER NEGUNDO)
 - ARIZONA WALNUT (JUGLANS MAJOR)
 - BLACK CHERRY (PRUNUS SEROTINA)
 - VELVET ASH (FRAXINUS VELUTINA)
 - ARIZONA CYPRESS (CUPRESSUS ARIZONICA)

- SHRUBS
- ARROYO AND COYOTE WILLOW (S. LASIOLEPIS AND S. EXIGUA)
 - REDOSIER DOGWOOD (CORNUS SERICEA)
 - WOODS ROSE (ROSA WOODSII)
 - GOLDEN CURRANT (RIBES AUREUM)
 - BLUE ELDERBERRY (SAMBUCUS NIGRA SSP. CERULEA)

WE RECOMMEND IMMEDIATELY REMOVING ALL THE TREE OF HEAVEN, ALL THE SMALLER ELMS (LESS THAN 4"), AND ALL ELMS THAT ARE IN THE UNDERSTORY OR GROWING IN THE ACTIVE CHANNEL.

BOTH TREE OF HEAVEN AND SIBERIAN ELM RE-SPROUT WHEN CUT WHICH MAKES HERBICIDE THE MOST RELIABLE AND EFFECTIVE METHOD OF KILLING THEM. WE RECOMMEND USING A CUT-STUMP METHOD, CUTTING THE TREE AND IMMEDIATELY APPLYING AN HERBICIDE TO THE CUT AREA. SMALLER TREES (UP TO 2") MAY BE CUT WITH A GOOD BRUSH CUTTER.



THESE SIBERIAN ELMS ARE IN THE CHANNEL BED, CAUSING A SPLIT CHANNEL AND SHOULD BE REMOVED

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