United States Department of Agriculture

NRCS

Natural Resources Conservation Service
Denver Federal Center
Building 56, Room 2604
P.O. Box 25426
Denver, CO 80225

720-544-2816-OFFICE
david.droullard@usda.gov

Flood Hazard Assessment Report
Boyd Gulch, Larimer County, Colorado

March 6, 2013

Prepared by: Al Albin, Dave Droullard, and Dave Wolff.

Purpose: The purpose of this report is to summarize the findings of our (NRCS) site evaluation of post fire conditions in Boyd Gulch (along Kings Canyon Road) south of State Highway 14.

Background: Wildfire burned 259 homes and approximately 87,000 acres of forest land west of Fort Collins, Colorado in June 2012. Larimer County asked NRCS for assistance in evaluating the risk to structures within the watersheds affected by fire and make recommendations for mitigation of potential losses.

NRCS Evaluation Team: Al Albin, Dave Droullard, and Dave Wolff.

Assets and Resources at Risk: Two land owners have moved back on one of their properties which are about ½ mile south of Highway 14. One owner has an older motor home that was donated to him, and the other is a new 50' pull RV camper. Both RV's would be in extreme danger if flooding were to occur. The culverts under Kings Canyon Road are subject to being blocked by debris during a flood in addition to not having the capacity to conduct flood flows. This condition has led to significant damage to the road. Erosion of the road has increased sediment deposition farther down the canyon, on Highway 14, and in the Poudre River.

Assessment of the Conditions: A large precipitation event occurred on July 7th, 2012, a few weeks after the fire. Flood water transported large woody and sediment debris that blocked or partially blocked culverts at road crossings. Woody debris accumulated on trees and other obstructions along the flow path restricting flow and forcing water onto the road. This removed most of the fines on the road and flushed them across Highway 14 and into the Poudre River. A half mile section of Kings Canyon Road has been rebuilt. The rest of the canyon is accessible only with a well equipped 4-wheel drive. There is one house that didn't burn on the higher end of the canyon.

Investigative activities: Hydrologic data developed using post fire conditions were used to estimate flooding potential along the creek using the 25 year-1 hour flood event, 1.8 inches of rain in 1 hour, estimated to produce a flow of 610 cubic feet per second (cfs). Our team hiked up the canyon a little over a mile from where the road becomes impassable. Many of the culverts were buried and undetectable, we could not tell if they were there or not. There were burned out cars and trailers along with miscellaneous debris from the burned out homes. Many areas of the canyon are so narrow that the road is the only option for the stream to overflow onto. Our team thought a debris structure

should be installed about a ½ mile south of Highway 14 in an area where a resident had built a homemade pond. This site would hold a small amount of debris but it is about as good as it gets. The canyon is so narrow there are no other places for a debris structure. The next property down the canyon from the proposed debris structure has a driveway with a 24" CMP culvert that constricts the flow of the stream so much that the stream has no choice but to flow down the road. From this point down to Highway 14 we came across (5) 36" CMP culverts and (2) 48" smooth steel culverts. One of the 36" culverts was completely filled. We found burned residences with debris that needed to be removed in this stretch of the canyon also.

Recommendations: Construct debris structure in the area described on Site Plan drawing. Remove the dam and the 24" CMP culvert in where debris structure is to be built. The debris structure should be constructed in the footprint of the dam since that ground will already be disturbed. Leave the pond berm along the road to protect the road and contain debris in the channel. Construct a drainage dip at the crossing just upstream of the existing pond to direct out of channel flows back into the channel. Remove the existing 24" CMP culvert and breach the driveway access to the property just north of where the debris structure is to be built. If the property owner wants to rebuild, a bridge should be constructed. Build 2' high drainage dips across road to force water back into creek. Location of these drainage dips will be staked by the field Engineer. Remove the existing 36" CMP culvert at the first house on Kings Canyon Road and replace it with a culvert of similar capacity to the culvert installed under Highway 14. Clear the channel of debris from the driveway to Highway 14. Water needs to be kept in the stream and off of the road as much as possible. This canyon is narrow and has many choke points that will force water onto the road. The stream channel needs to be cleared of debris and the existing culverts need to be kept clean or replaced if damaged. Debris from burned homes should be removed from canyon.

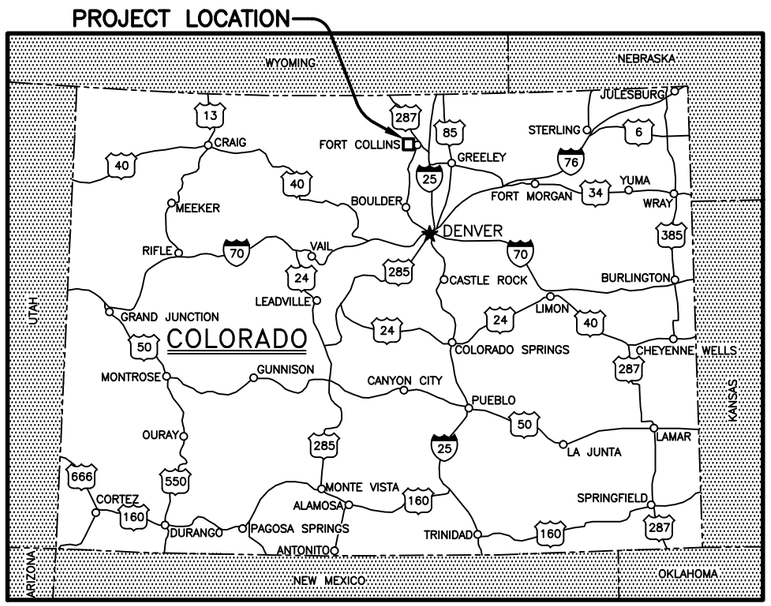
Cost Estimates: A summary of recommended flood protection measures and cost estimates is attached. These figures are based on prevailing contract costs.

Boyd Gulch – Summary of Recommended Flood Protection Measures		
Location	**Recommendations**	**Estimated Cost**
As shown on Site Plan Drawing	Drainage Dips	6 Drainage Dips @ $1,500 each Total Cost - $9,000
As shown on Site Plan Drawing	Debris Control Structure	36 feet@ $600/ft Total Cost - $21,600
Boyd Gulch	Debris Removal from stream channel	Total Cost - $15,000
Boyd Gulch	Clean culverts or replace if damaged.	Total Cost - $4,000
		Total Cost = $49,600

_____

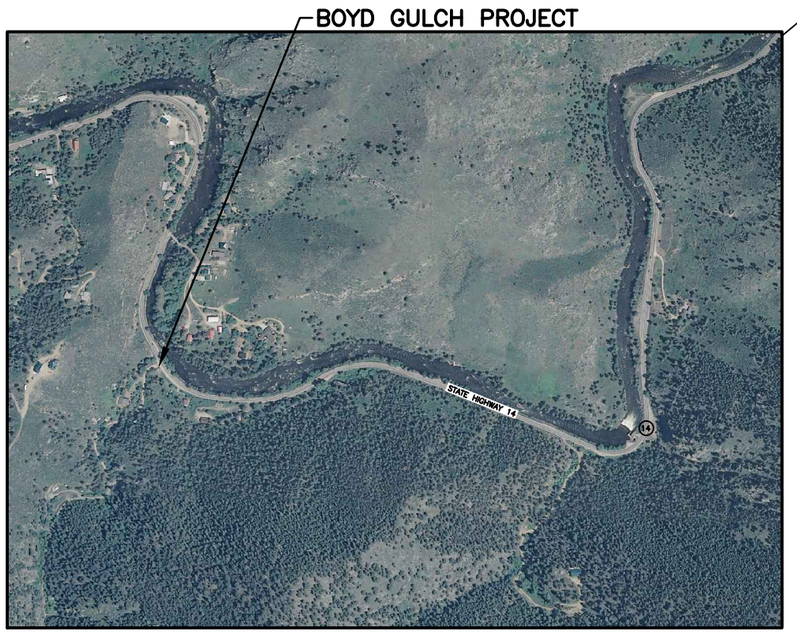
John Andrews
State Conservation Engineer

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
BOYD GULCH FLOOD PROTECTION RECOMMENDATIONS



N

COLORADO STATE MAP
NOT TO SCALE



PROJECT VICINITY MAP
NOT TO SCALE

INDEX OF DRAWINGS

GENERAL NOTES

CONSTRUCTION SPECIFICATIONS

NO.	TITLE

CONSTRUCTION QUANTITIES

COOPERATOR AGREEMENT

THIS PLAN HAS BEEN DISCUSSED WITH ME BY THE NRCS AND I AM IN AGREEMENT WITH THE CALCULATIONS AND DESIGN. I WILL PROVIDE NRCS WITH THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) TICKET NUMBER MY CONTRACTOR HAS ACQUIRED PRIOR TO START OF CONSTRUCTION.

_____ DATE: _____
COOPERATOR

UTILITY NOTIFICATION

NOTICE TO THE COOPERATOR AND CONTRACTOR

NO REPRESENTATION IS MADE BY THE NATURAL RESOURCES CONSERVATION SERVICE AS TO THE EXISTENCE OR NONEXISTENCE OF UNDERGROUND UTILITIES. **CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.** CALL UTILITY NOTIFICATION CENTER OF COLORADO AT 1–800–922–1987 OR 811. IN THE METRO DENVER AREA CALL 303–232–0491 OR 811.

UNCC TICKET NUMBER: _____

CONSTRUCTION DATA & AS–BUILT DRAWINGS

LAYOUT BY:

_____ DATE: _____

CONTRACTOR NAME AND ADDRESS:

_____

_____

_____

CONSTRUCTION COMPLETED _ _ _ _ _ _ _ _ _ _ _ DATE: _____

PRACTICE (DOES) (DOES NOT) MEET STANDARDS AND SPECIFICATIONS.

_____ DATE: _____

_____
TITLE:

AS–BUILT DRAWINGS REVIEWED AND APPROVED BY:

_____ DATE: _____
TITLE:

DESIGNED D. WOLFF — DATE 02/13
DRAWN D.D. DROULLARD — DATE 02/13
CHECKED A. ALBIN — DATE 02/13
APPROVED _____ — DATE _____

COVER SHEET

BOYD GULCH FLOOD PROTECTION RECOMENDATIONS

HIGH PARK BURN AREA

LARIMER COUNTY COLORADO

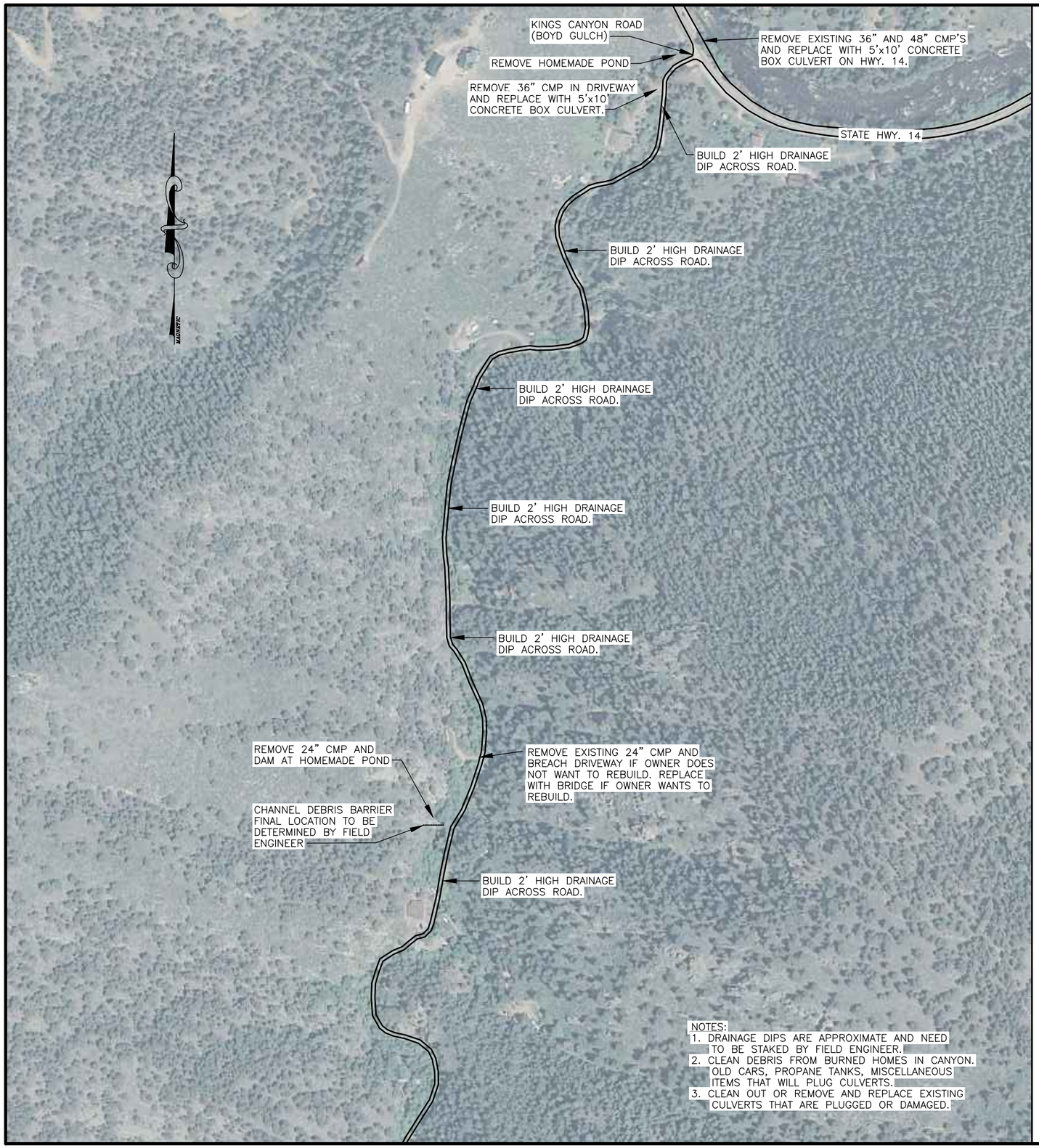
JOB CLASS __

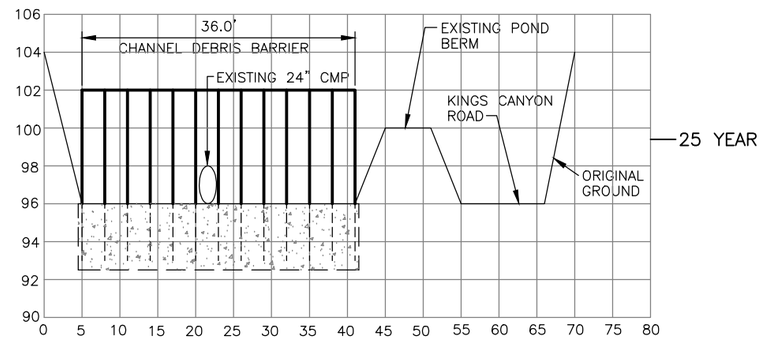
NRCS
Natural Resources Conservation Service
United States Department of Agriculture

FILE NO.

DRAWING NO.

SHEET 1 OF 3





SECTION ALONG DEBRIS STRUCTURE AND ROAD
(CHANNEL DEBRIS BARRIER LOCATED IN EXISTING POND AREA)

DESIGNED D. WOLFF — DATE 02/13
DRAWN D.D. DROULLARD — DATE 02/13
CHECKED A. ALBIN — DATE 02/13
APPROVED — DATE

SITE PLAN
CHANNEL DEBRIS BARRIER CROSS SECTION

BOYD GULCH
HIGH PARK BURN AREA
LARIMER COUNTY
COLORADO

NRCS
Natural Resources Conservation Service
United States Department of Agriculture

FILE NO.

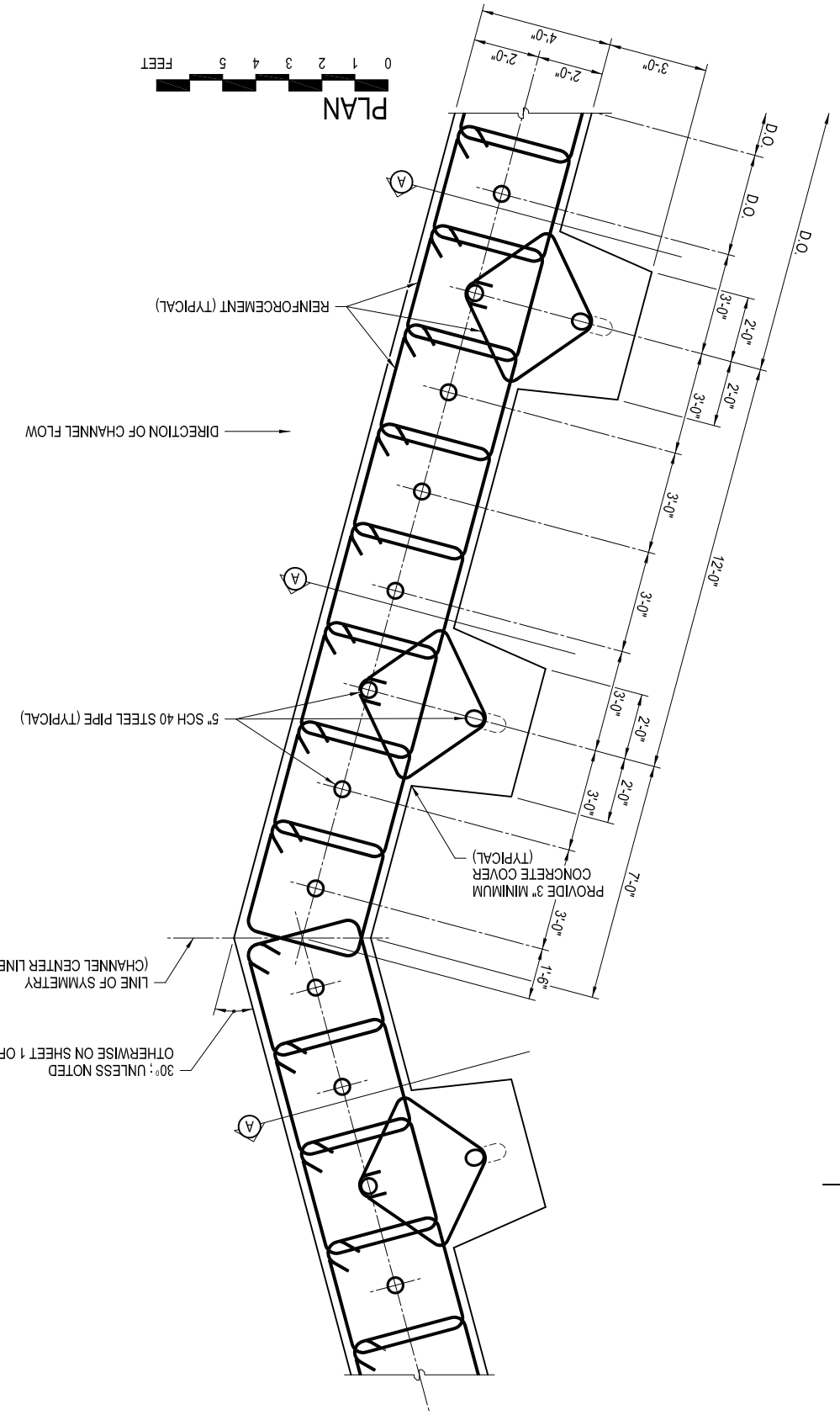
DRAWING NO.

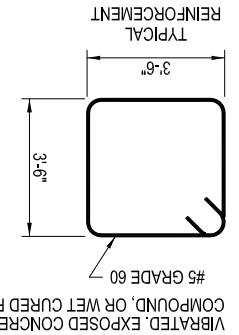
SHEET 2 OF 3

CHANNEL DEBRIS BARRIER

DETAILS, REINFORCEMENT, AND SECTION

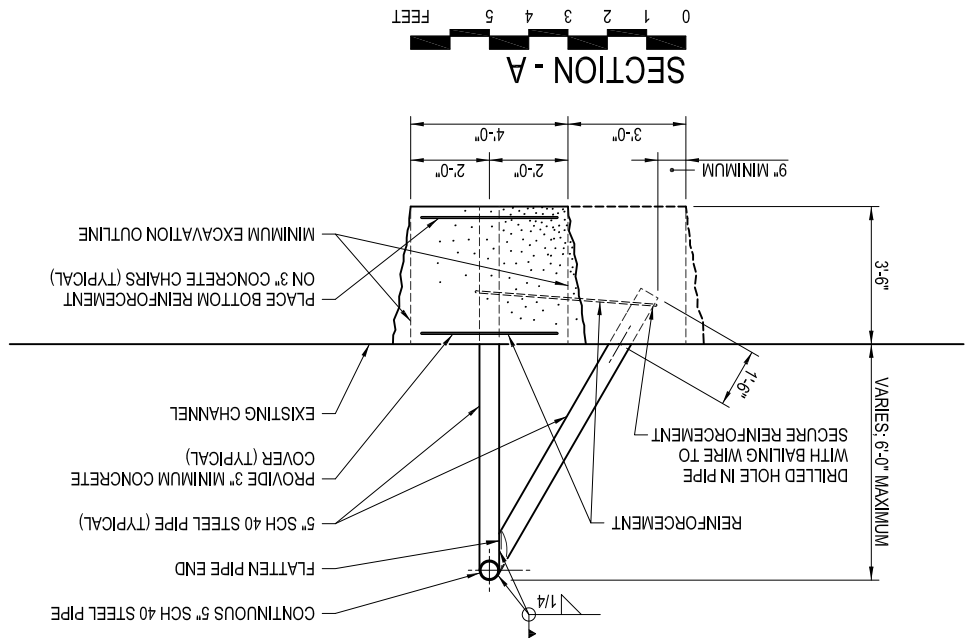
6-FOOT MAXIMUM HEIGHT





NOTES

1. LENGTH AND ALIGNMENT OF STRUCTURE TO BE DETERMINED ON A SITE SPECIFIC BASIS. SEE SHEET 1 OF 2 FOR DIMENSIONS AND ELEVATIONS.
2. IN LIEU OF 5" SCH 40 STEEL PIPE; STRUCTURAL STEEL TUBE SHAPES HAVING A SECTION MODULUS OF AT LEAST 4.5 IN³ MAY BE USED, OR 'W' OR 'T' SHAPES HAVING A SECTION MODULUS OF AT LEAST 4.9 IN³ MAY BE USED.
3. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 LB/IN²; AND SHALL HAVE A SLUMP BETWEEN 3 AND 5 INCHES. ALL CONCRETE SHALL BE VIBRATED. EXPOSED CONCRETE SURFACES SHALL BE COATED WITH CURING COMPOUND, OR WET CURED FOR 28 DAYS.



Designed	Stambaugh	**Date** AUG 2012
Drawn	Stambaugh	AUG 2012
Checked	Malone	AUG 2012
Approved	Andrews	AUG 2012

Natural Resource Conservation Service
United States Department of Agriculture

NRCS

File Name
XXXXXXXX

Drawing No.
XX - X -XXXX

Sheet 2 of 2