INFORMATION HANDOUT

For Contract No. 06-0R0504
At 06-Tul-198-R4.2/R4.9; 6.8/8.3

Identified by
Project ID 0614000001

PERMITS

1. U.S. Fish and Wildlife Service Letter of Concurrence 08ESMF00-2015-I-0149
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1. U.S. Fish and Wildlife Service Letter of Concurrence 08ESMF00-2015-I-0149

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2015-I-0149

MAR 26 2015

Ms. Dena Gonzalez
Chief, Central Region Biology Branch
California Department of Transportation, District 6
855 M Street, Suite 200
Fresno, California 93721

Subject: Informal Consultation for the Visalia Median Barrier Project, Tulare County, California (California Department of Transportation 06-TUL-198-PM R4.2-R4.9 and PM 6.8-8.3; EA 06-0R050)

Dear Ms. Gonzalez:

This is the U.S. Fish and Wildlife Service's (Service) response to the California Department of Transportation's (Caltrans) letter requesting the initiation of informal consultation on its action to construct the proposed Visalia Median Barrier Project (project) in Tulare County, California.

The Moving Ahead for Progress in the 21st Century Act (MAP-21) was signed into law on July 16, 2012. Caltrans was approved to participate in the MAP-21 Surface Transportation Project Delivery Program through the National Environmental Policy Act (NEPA) assignment Memorandum of Understanding (MOU) between the Federal Highway Administration (FHWA) and Caltrans (effective October 1, 2012), as codified in 23 U.S.C. 327. The MOU allows Caltrans to assume the FHWA's responsibilities under NEPA as well as FHWA's consultation and coordination responsibilities under Federal environmental laws for the majority of transportation projects in California.

We received your February 25, 2015, letter in this office on March 2, 2015. In this letter, you determined that the proposed project may affect, but is not likely to adversely affect the federally-listed as endangered San Joaquin kit fox (*Vulpes macrotis mutica*).

This document has been prepared in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq.*) (Act). The findings and recommendations of this document are based on: (1) Caltrans' February 25, 2015 letter and its supporting *Visalia Median Barrier Biological Assessment*, dated February 2015; (2) email correspondence between the Service and Caltrans; and (3) other information available to the Service.

Project Description

Caltrans proposes to install median barriers at two locations along State Route (SR) 198 in the City of Visalia. As a safety project, the purpose is to prevent errant vehicles from crossing the highway median and hitting oncoming vehicles. SR 198 is a high-traffic four-lane divided highway that runs

east-west from SR 101, south of King City in Monterey County to Sequoia National Park in Tulare County; it bisects the City of Visalia and is the primary travel corridor for this urban area.

Location 1. Approximately 3,700-feet (ft.) of Type 60 concrete median barrier will be installed between the SR 99/SR 198 intersection and the Road 80 Overcrossing , also known as Plaza Drive (postmiles [PM] R4.2 - R4.9). This site is situated directly north of the Visalia Municipal Airport. Other construction activities due to take place at this location include:

- Placing fill in the median to create an outward slope for draining away stormwater;
- Paving the median with a 0.35-ft. thick layer of asphalt;
- Widening the inside shoulders to a standard 5-ft. width;
- Upgrading and modifying existing guardrails and end-treatments within the median;
- Installing one new Vehicle Counting Station (VCS) at PM 4.39;
- Installing ground-in rumble strips along the inside and outside edges of both eastbound and westbound travel lanes; and
- Removing three existing trees within the median, including a valley oak (*Quercus lobata*).

Because the median is very narrow at this location, a lane closure will be required in order to carry out the installation of the median barrier and its associated activities. This work will occur at night when there is less traffic on the highway. Temporary k-rail barriers will be installed throughout the site along the edge of the traveled-way of the inside lanes. K-rail is a traffic control safety measure used to separate the construction areas from the roadways and vehicle traffic. The structures will be present for the duration of construction but will be removed once construction at the site is completed. All proposed work will be limited to the existing median and Caltrans' right-of-way (ROW).

Location 2. Approximately 7,920 linear-ft. of high-tension cable median barrier will be installed just west of downtown Visalia, beginning at the Akers Street Undercrossing and ending 0.2-mile (mi) east of the County Center Drive Overcrossing (PM 6.8 - 8.3). This barrier type consists of four cable strands, with the lowest strand situated 1.6-ft. above ground-level and each successive cable spaced approximately 3-inches apart. The barrier posts will stand 2.7-ft. above ground-level, buried in either pre-cast or cast-in-place concrete foundation blocks at a depth of 2.5-ft. The distance between the posts will vary between 6- and 10-ft. Other construction activities due to take place at this location include:

- Modifying two existing VCS at PM 7.21 and PM 8.25;
- Installing one new permanent Changeable Message Sign approximately 200-ft. west of the Linwood Street Bridge;
- Upgrading and modifying existing guardrails and end-treatments within the median and on the outside edge of the highway (at on- and off-ramps); and
- Installing ground-in rumble strips along the inside and outside edges of both eastbound and westbound travel lanes.

Although the median at this site is wide enough for Caltrans to install the barrier without having to close any lanes, intermittent nighttime lane closures may be required for other associated activities on the existing roadway. Temporary k-rail barriers are not proposed for use at this location. All proposed work will be limited to the existing median and Caltrans' ROW.

Caltrans proposes to begin construction in April 2017 and to finish in June 2017. Work is expected to take approximately 50 days to complete. Installation of the concrete barrier at Location 1 is anticipated to take approximately 30 days, while the installation of the high-tension cable at Location 2 is anticipated to take approximately 20 days. However, work at both locations may be carried out concurrently.

The contractor will follow Best Management Practices during construction. Dust control measures will be implemented as part of the project. The contractor is responsible for the selection and environmental compliance of the selected borrow site from which fill material will be imported to the project site. Caltrans first must approve the fill by ensuring it meets all appropriate engineering standards. Equipment parking, project access, equipment maintenance, and other project-related activities will occur within Caltrans' existing ROW. Caltrans has indicated that designated staging areas for equipment storage and vehicle parking will be pre-approved by a Caltrans biologist. For the purpose of this project, all staging areas will occur within the project footprint for each location, as described on page 4. Any location the contractor uses that is outside this area will need to be evaluated and may require Caltrans either to revise its informal consultation or initiate formal consultation.

Avoidance and Minimization Measures

Caltrans will implement measures to reduce the potential for effects to the San Joaquin kit fox:

1. Preconstruction/pre-activity surveys will be conducted no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities. Surveys for the San Joaquin kit fox and its dens will be performed throughout the project footprints at Locations 1 and 2, as well as within 200-ft. of each footprint, as feasible.

2. A qualified biologist(s) will conduct an environmental awareness training program for all construction personnel, covering the status of the San Joaquin kit fox, the importance of avoiding impacts to the species, and the penalties for not complying with minimization requirements. New construction personnel who are added to the project after the training is first conducted also will be required to take the training.

3. A qualified biologist(s) will be present on-site in the event that preconstruction surveys identify any potential or known dens in the project area. To the extent possible, the biologist(s) also will be available on-call when not present on-site.

4. Disturbance to all San Joaquin kit fox dens will be avoided to the maximum extent possible.

    a. Potential and atypical dens that are located at least 50-ft. from construction will be protected with a 50-ft. zone. Known dens that are located at least 100-ft. from construction will be protected with a 100-ft. zone. In instances where 50-ft. or 100-ft. exclusion zones cannot be maintained, potential and/or known dens will be monitored; once these dens are verified to be unoccupied, they will be blocked temporarily (via sandbagging or installation of a one-way door) for the duration of the project.

    b. If a natal/pupping den is discovered either within one of the project footprints or within 200-ft. of that footprint, Caltrans will notify the Service immediately.

5. At Location 1, Caltrans proposes to install 24 9-inch radius semi-circular wildlife passageways in the base of the concrete median barrier (Type 60/S design) at intervals of approximately 148-ft. The purpose of the openings is to maintain a degree of permeability and to allow the San Joaquin kit fox and other small wildlife to pass through the barrier.

6. All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in closed containers and removed daily from each location in order to reduce the potential for attracting predator species.

7. No pets or firearms will be allowed on the project sites.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area is composed of the project footprint for each of the two barriers at Locations 1 and 2. The footprints encompass 1) a total of 2.2-mi of median in which barrier installation activities will occur; plus 2) Caltrans' existing ROW (i.e., pavement, bare ground, ruderal/weedy habitat, and landscaped vegetation) in which staging and other construction activities will occur. The action area also includes land extending approximately 200 ft. from the edge of each footprint, which will experience further-reaching effects of construction activities such as noise and visual disturbance.

Effects Analysis

The medians at Locations 1 and 2 contain ruderal, non-native annual grassland. At Location 1, which is characterized as rural, the median is narrow and difficult to access because the east- and westbound lanes are situated in close proximity to one another; at Location 2, which is characterized as urban, the median is significantly wider throughout the majority of the site. Each segment of median is routinely maintained by Caltrans through mowing and herbicide application. At both Locations 1 and 2, the highway ROW is composed of paved areas, bare ground, ruderal/weedy habitat, and landscaped vegetation (e.g., brush and small trees).

Surveys

According to the California Natural Diversity Database (CNDDB, 2015)[1], there are no records of the San Joaquin kit fox within the action area, but there are three records of the species (one dating from 2003 and two from 1975) located within approximately 4-mi of the action area. In 2000 and 2014, Caltrans conducted spotlighting surveys for the San Joaquin kit fox in a rectangular region within approximately 2-mi of the Location 1 project area. The 2000 survey (which was performed for the SR 198 Hanford Expressway Project located immediately west of the current proposed project) detected three occurrences of the San Joaquin kit fox located approximately 1.5-mi north and 1.75-mi northeast of the Location 1 project area. Two of these occurrences were observed in virtually the same location and therefore were assumed to be the same individual. Although no San Joaquin kit foxes were detected during the 2014 surveys (6 separate surveys conducted on August 18-21, 27-28), three sightings of the grey fox (*Urocyon cinereoargenteus*) were observed in the same general area as the 2000 San Joaquin kit fox sightings. No spotlighting surveys were performed in and around the Location 2 project area because of its urban setting and lack of history of occurrences. When Caltrans conducted site assessments at both Locations 1 and 2 on

[1] California Natural Diversity Database. 2015. Natural Heritage Division, California Department of Fish and Wildlife. RareFind 5. Sacramento, California. Accessed March 17, 2015.

September 30 and November 6, 2014, it did not detect any San Joaquin kit foxes or associated sign, such as dens, scat, or tracks.

Habitat Loss/Disturbance and other Construction Effects

Caltrans has determined there to be no potential denning or foraging habitat available for the species at either Location 1 or 2. Therefore, the proposed project is not expected to permanently remove or temporarily disturb any potential San Joaquin kit fox habitat. With the implementation of the proposed avoidance and minimization measures such as preconstruction personnel training, monitoring, and den exclusion zones, adverse effects from project-related equipment/vehicle strikes are not anticipated.

Movement Corridors and Median Barriers

Given the high volume of traffic and the presence of well-maintained chain link fencing along the edge of the ROW on the north side of the highway and along the edge of the Visalia Municipal Airport property on the south side, Location 1 is unlikely to function as a suitable movement corridor for the San Joaquin kit fox. However, because there are past observations of the species in the vicinity of Location 1, and there is potentially suitable foraging habitat to the north and south of the ROW, there still remains the possibility that the species could enter the Location 1 project area in order to cross the highway. In contrast, Caltrans has concluded that Location 2 is not a suitable movement corridor due to its setting in downtown Visalia, high traffic volumes, elevated frontage roads and concrete retaining walls, and the absence of past San Joaquin kit fox sightings; therefore, the species is unlikely to enter the Location 2 project area.

Because there is some potential, though low, for the species to use the Location 1 project area to move across the highway, the permanent installation of the concrete median barrier at this site could trap the San Joaquin kit fox in the narrow median area and increase the likelihood of injury or death from vehicle strikes. By drilling 24 9-inch radius openings through the base of the median barrier at approximately 148-ft. intervals, Caltrans will reduce the risk to the San Joaquin kit fox by maintaining a degree of highway permeability and a means for the species potentially to move through the barrier. The permanent installation of the cable median barrier at Location 2 is not expected to hinder movement across the highway or increase the risk of vehicle-related mortality since the barrier's design allows species to pass freely underneath the cables.

Temporary K-rail Barriers

Temporary k-rail barriers will be used as a means of traffic control and safety only at Location 1. Although these are impermeable concrete features, their presence on-site is not likely to adversely affect the San Joaquin kit fox because: 1) the footprint of the project at this location is small-scale so the barriers will be in place only within a very small area (approximately 3,700-ft.) and for a very brief period of time (approximately 30 days); 2) the Location 1 project area is located outside of the San Joaquin kit fox core, satellite, and linkage recovery areas (Service, 2010)[2]; and 3) habitat within the Location 1 project area is unsuitable for the species.

Night Work

Caltrans proposes to carry out its median barrier installation activities at Location 1 at night; this also may be necessary for several activities at Location 2. Night work often involves activities that

[2] U.S. Fish and Wildlife Service. 2010. San Joaquin Kit Fox (*Vulpes macrotis mutica*) 5-Year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office, Sacramento, California. 122 pp.

are more highly disruptive to traffic, and which otherwise cannot be undertaken safely during daylight hours under normal traffic conditions. Since there is some potential (though low) for the San Joaquin kit fox to move through the Location 1 project area, night work could be disruptive to the San Joaquin kit fox, particularly at dusk and dawn when the species is most active. Because the San Joaquin kit fox is unlikely to be present at Location 2, the risk to the species from the adverse effects of night construction is expected to be very low.

Determination

Caltrans has concluded that the project may affect, but is not likely to adversely affect the San Joaquin kit fox. This determination is based on the lack of suitable habitat present within the medians of Locations 1 and 2, as well as within the highway ROW; and the conservation measures proposed to minimize potential effects to the species.

After reviewing Caltrans' letter, and engaging in further correspondence with Caltrans, the Service concurs that it is reasonably likely that effects to individual San Joaquin kit foxes will be discountable, and that effects to habitat for the species will be insignificant; the action, therefore, is not likely to adversely affect the species.

Closing Statement

This concludes the Service's review of Caltrans' action to construct the Visalia Median Barrier Project and the Service's consideration of the project's effects on the San Joaquin kit fox. No further coordination with the Service under the Act is necessary at this time. Note that take of listed species is not exempted from the prohibitions described under section 9 of the Act. If conditions change so that the project may adversely affect listed species, initiation of formal consultation, as provided in 50 CFR § 402.14, is required.

If you have questions regarding this project, please contact Jen Schofield, Wildlife Biologist, or me, at (916) 414-6600.

Sincerely,

Thomas Leeman
Chief, San Joaquin Valley Division

cc:
Craig Bailey, California Department of Fish and Wildlife, Fresno, CA

MATERIALS INFORMATION

2. U.S. Fish and Wildlife Service Letter of Concurrence Revision 08ESMF00-2015-I-0149

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2015-I-0149

JAN 21 2016

Javier Almaguer
Chief, Central Region Biology Branch – Environmental Stewardship
California Department of Transportation, District 6
855 M Street, Suite 200
Fresno, California 93721

Subject: Revision to the Letter of Concurrence for the Visalia Median Barrier Project, Tulare County, California (California Department of Transportation 06-TUL-198-PM R4.2-R4.9 and PM 6.8-8.3; EA 06-0R050)

Dear Mr. Almaguer:

This is the U.S. Fish and Wildlife Service's (Service) response to the California Department of Transportation's (Caltrans) January 20, 2016 email informing us of a proposed change to one of the avoidance and minimization measures for the Visalia Median Barrier Project (project) in Tulare County. The Service concurred with Caltrans' determination that the project may affect, but is not likely to adversely affect the federally-listed as endangered San Joaquin kit fox (*Vulpes macrotis mutica*) on March 26, 2015.

Caltrans proposes to modify the spacing between the wildlife passageway openings in the median barrier at Location 1. The distance between the openings either will be reduced from 148-feet (ft.) to 140-ft., or increased from 148-ft. to 150-ft.

On page 4 of our concurrence letter, measure #5 under Avoidance and Minimization Measures is being modified as follows. Text removed from the concurrence letter is shown by a strikethrough line and new text is shown by an underline; this convention is used throughout the present letter.

5. At Location 1, Caltrans proposes to install 24 9-inch radius semi-circular wildlife passageways in the base of the concrete median barrier (Type 60/S design) at intervals of ~~approximately 148-ft~~ no more than 150-ft. The purpose of the openings is to maintain a degree of permeability and to allow the San Joaquin kit fox and other small wildlife to pass through the barrier.

On page 5 of our concurrence letter, the second paragraph under *Movement Corridors and Median Barriers* within the **Effects Analysis** is being modified as follows.

> Because there is some potential, though low, for the species to use the Location 1 project area to move across the highway, the permanent installation of the concrete median barrier at this site could trap the San Joaquin kit fox in the narrow median area and increase the likelihood of injury or death from vehicle strikes. By drilling 24 9-inch radius openings through the base of the median barrier at ~~approximately 148-ft.~~ intervals of no more than 150-ft., Caltrans will reduce the risk to the San Joaquin kit fox by maintaining a degree of highway permeability and a means for the species potentially to move through the barrier.

The permanent installation of the cable median barrier at Location 2 is not expected to hinder movement across the highway or increase the risk of vehicle-related mortality since the barrier's design allows species to pass freely underneath the cables.

These modifications do not change the conclusion of our March 26, 2015 concurrence letter: the action is not likely to adversely affect the species. No further coordination with the Service under section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq.)* is necessary at this time. This concludes our revision letter for the Visalia Median Barrier Project.

If you have questions regarding this letter, please contact Jen Schofield (jen_schofield@fws.gov) or me (thomas_leeman@fws.gov) at the letterhead address, by email, or at (916) 414-6544.

Sincerely,

Thomas Leeman
Chief, San Joaquin Valley Division

cc:
Craig Bailey, California Department of Fish and Wildlife, Fresno, California

MATERIALS INFORMATION

3. Geotechnical Soil Information for High Tension Cable Barrier

Memorandum

Serious drought.
Help Save Water!

To: FERNANDO MORALES
Transportation Engineer
Central Region PJD/Design 1

Date: June 3, 2016

File: 06-Tul-198
PM R4.2/R4.9, 6.8/8.3
EA 06-0R050
ID 0614000001

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Memo for High Tension Cable Barrier

This memo prepared by Office of Geotechnical Design North (OGDN) for the proposed High Tension Cable Barrier (HTCB) on SR 198. The project will install HTCB in the median from PM R4.2 to PM R4.9 and PM 6.8 to PM 8.3. We understand that the HTCB will require foundations/anchors with embedment on the order of 3 feet below ground surface. Work performed by OGDN for this memo was a literature review and specific to the site.

Site Research and Conclusions

In order to determine soil profile existing LOTB's exist for surrounding structures that provide adequate soil and groundwater information. They include:

1) Caltrans LOTB for Eastbound Connector O.C., Bridge No. 46-234, SR 198 PM 3.7, dated May 1971.
2) Caltrans LOTB for Road 80 O.C., Bridge No. 46-0237, SR 198 PM R4.8, dated October 1971.
3) Caltrans LOTB for Akers Street U.C., Bridge No. 46-0251L/R, SR 198 PM 6.76, dated May 1998.
4) Caltrans LOTB for Retaining Wall No. 11, SR 198 PM 8.0, dated July 1998.
5) Department of Water Resources website https://gis.water.ca.gov/app/gicima/ for groundwater depth.

The LOTB for Eastbound connector show micaceous silt to an approximate elevation 275 at PM 3.7 and the LOTB for Road 80 shows sandy micaceous silt to an approximate elevation of 285 at PM 4.8. The reported density was compact to slightly compact in the

top 10 feet of the subsurface. The LOTB for Akers Street U.C at PM 6.76 show micaceous silt to an approximate elevation of 295 and the LOTB for Retaining Wall No. 11 show a silty sand top soil to an approximate elevation of 295. The reported density was loose to compact.

According to DWR groundwater mapping, the water table is estimated to be at an elevation of 140. That is greater than 100 feet below the surface. This does not show local perched water. There is a possibility that weather conditions may present a local wetting of soil not captured in the LOTBs or in the DWR website.

Location	PM	ϕ (degree)	Unit Weight γ (pcf)	Elevation of Groundwater (ft)	Ground Elevation (ft)
Eastbound Connector	3.7	31	120	135	283
Road 80	4.8	31	118	138	293
Akers St.	6.76	30	115	150	306
Retaining Wall No. 11	8.0	30	112	160	311

Conclusions and Recommendations

The soil along SR 198 from PM 3.7 to PM 8.0 is typically a non-cohesive clayey silt in approximately the top 10 feet of the soil. According to SPT blow counts, the soil is suitable to anchor HTCB. Groundwater is over 100 feet below ground in proposed work area. Standard installation of HTCB is recommended.

If you have any questions, please call me at 916-227-1047

Chuck Carlson, P.E.
Transportation Engineer
Office of Geotechnical Design - North

MATERIALS INFORMATION

4. Geotechnical Soil Information for Trenchless Culvert Installation

M e m o r a n d u m

Serious drought.
Help Save Water!

To: FERNANDO MORALES
Transportation Engineer
Central Region PJD/Design 1

Date: June 7, 2016

File: 06-Tul-198
PM R4.2/R4.9, 6.8/8.3
EA 06-0R050
ID 0614000001

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Memo for Jack and Bore of 18 inch culvert

This memo prepared by Office of Geotechnical Design North (OGDN) for the proposed jack and bore 18 inch culvert on SR 198. The project will install a culvert across SR 198 about 30 feet east of Plaza OC (aka Road 80) at approximately PM 4.79 or station 250+71.5. We understand that the culvert will be placed with the flowline 2.6 feet below original ground (OG) surface. Work performed by OGDN for this memo was a literature review and specific to the site.

Site Research and Conclusions

In order to determine soil profile existing LOTB exist for surrounding structure that provide adequate soil and groundwater information. They include:

1) Caltrans LOTB for Road 80 O.C., Bridge No. 46-0237, SR 198 PM R4.8, dated October 1971.
2) Department of Water Resources website https://gis.water.ca.gov/app/gicima/ for groundwater depth.

The LOTB for Road 80 shows sandy micaceous silt to an approximate elevation of 285 at PM 4.8. The reported density was compact to dense in the top 10 feet of the subsurface.

According to DWR groundwater mapping, the water table is estimated to be at an elevation of 140. That is greater than 100 feet below the surface. This does not show local perched water. There is a possibility that weather conditions may present a local wetting of soil not captured in the LOTBs or in the DWR website.

Soil Properties

Subsurface material encountered in the LOTB at the location of drainage system 1 (DS1) in approximately the top 10 feet has the following properties:

Drainage System	Station	Unit Weight γ (pcf)	Friction Angle ϕ
1	250+71.5	118	31

Methods of Trenchless Excavation Construction

The following trenchless methods are viable for the proposed diameter, length, and soil type as per Caltrans DIB No. 83-04, 2014.

Auger Boring

Smaller diameter bores than Pipe Crossings may be accomplished using auger boring (8 inch to 60 inch). This method involves simultaneously jacking a welded steel pipe casing while removing the spoil inside with a continuous rotating flight auger. This method is normally used when encasements are required for utility crossings. Auger boring has medium accuracy and will need to be monitored closely due to the shallow depth of bore.

According to the DIB there are no other applicable methods due to length and/or diameter restrictions.

Monitor Settlement and Heave

The depth of installation of the proposed culvert is shallow. Settlement and/or heave can occur during and after construction. Ground improvement may be required. We recommend that the contractor estimate risks of settlement and heave and develop an instrumentation and monitoring plan to monitor soil behavior. Install the monitoring system to perform a baseline survey before trenchless excavation begins and survey at sufficient intervals after beginning the excavation and thereafter until no changes are detected.

Recommendations

The design and construction of the proposed Pipe Crossing must comply with the project related specifications and any other applicable criteria including Cal-OSHA regulations,

etc. The submittal shall address but not limited to the following items:

1) Jacking and receiving pits excavation and shoring (if applicable); reaction wall acceptable passive earth pressure design; and related construction considerations,
2) Soil parameters and earth pressures used,
3) The maximum jacking pressure and allowable pipe compression stress,
4) The trenchless method used to jack the pipe,
5) The drilling, encasement requirements, and details of grouting the annular space between the pipe and drilling holes, and
6) The survey grid establishment for monitoring ground surface movement (settlement or heave).

Actual vs. Reported Site Conditions

The characterizations of geotechnical conditions along the project alignment and presented in this report are based on the review of the design information provided, proposed project features, geologic maps, geologic literature, exploration by OGDN. The evaluations and recommendations contained in this report are based on the information discovered and data gathered. If conditions encountered during the project that appear to differ from the conditions conveyed in this report, or if construction difficulties related to soil conditions are encountered, a representative of OGDN should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

If you have any questions, please call me at 916-227-1047

Chuck Carlson, P.E.
Transportation Engineer
Office of Geotechnical Design - North

MATERIALS INFORMATION

5. Geotechnical Soil Information for CMS

State of California
Department of Transportation

California State Transportation Agency

M e m o r a n d u m

Serious drought.
Help Save Water!

To: FERNANDO MORALES
Transportation Engineer
Central Region PJD/Design 1

Date: February 18, 2016

File: 06-Tul-198
PM R4.2/R4.9, 6.8/8.3
EA 06-0R050
ID 0614000001

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Memo for Foundation Report referring to District Preliminary Geotechnical Report

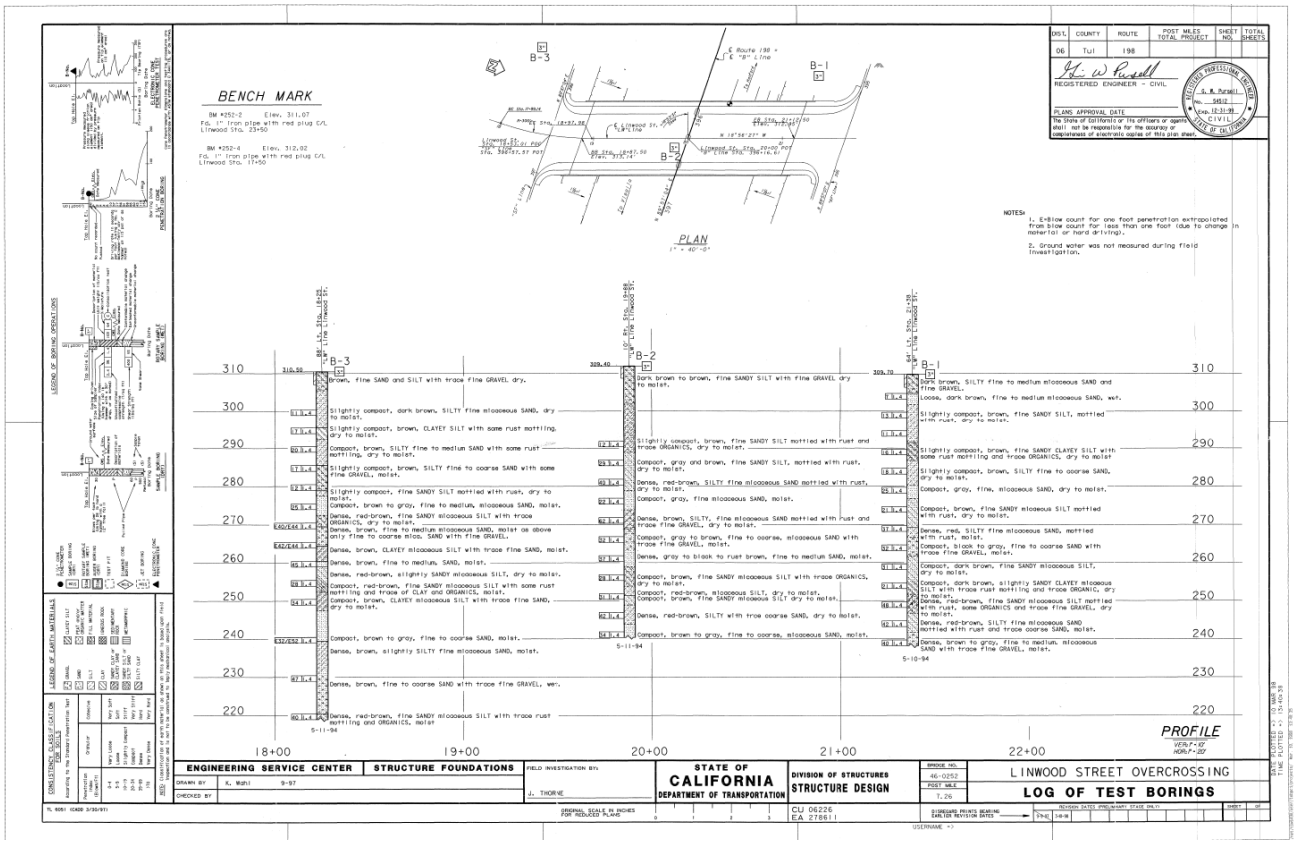
The District Preliminary Geotechnical Report (DPGR) was prepared on January 9, 2015 to provide recommendations for a changeable message sign (CMS) on State Route (SR) 198 at approximately post mile (PM) 7.2 in the city of Visalia in Tulare County. The DPGR is valid as a final report. In an effort to answer requests presented by the design engineer for a minimum depth for the CIDH pile for the CMS and the log of test borings (LOTB), I will include a pdf file of the LOTB referenced and discuss the minimum pile depth below.

The minimum pile depth for a 2010 Standard Model 500 CMS, Overhead Sign-Truss, Single Post Type has a minimum depth of 22 feet according to S116 of the 2010 Standard Plans on Page 405. Use a linear relation of depth to extension above ground. That is for every foot extending above ground increase the depth of the CIDH by one foot.

The LOTB is included below this memo.

If you have any questions, please call me at 916-227-1047

Chuck Carlson, P.E.
Transportation Engineer
Office of Geotechnical Design - North


BENCH MARK
PLAN
PROFILE
LINWOOD STREET OVERCROSSING
LOG OF TEST BORINGS
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
ENGINEERING SERVICE CENTER
STRUCTURE FOUNDATIONS
DIVISION OF STRUCTURES
STRUCTURE DESIGN
18+00
19+00
20+00
21+00
22+00

MATERIALS INFORMATION

6. Temporary Alternative Crash Cushion System Information

ABSORB 350® | NON-REDIRECTIVE CRASH CUSHION - SACRIFICIAL

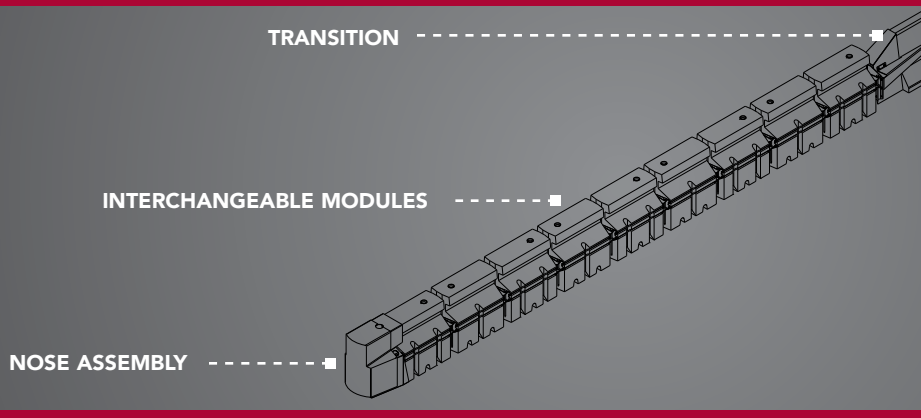
- ANCHORLESS INSTALLATION - NO FOUNDATION REQUIRED
- COST EFFECTIVE PROTECTION FROM CONCRETE BARRIER ENDS
- WORLDWIDE PROVEN PERFORMANCE
- NCHRP 350 ACCEPTED

BARRIER SYSTEMS®
BY LINDSAY

ABSORB 350® | NON-REDIRECTIVE CRASH CUSHION - SACRIFICIAL

PHYSICAL SPECIFICATIONS

Classification	NR-S	
TL-3 Length	32′	9.7 m
Width	24″	610 mm
Height	32″	813 mm
Module Weight Empty	110 lb.	50 kg
Test Level	NCHRP 350	TL 1/2/3



NARROW ANCHORLESS WATER FILLED CRASH CUSHION

No ground anchoring, the largest selection of transitions and modular technology allow the ABSORB 350 System to be used in multiple speed conditions. The ABSORB 350 System is ideal for contractors due to the ease of maintenance after an impact and quick deployment. At 24″ (610 mm) wide, it is ideally suited for narrow areas where road and workspace is limited. The ABSORB 350 System is easy to restore after an impact because the System uses uniform modular components. The use of standardized modular components also helps to reduce inventory costs.

FREQUENTLY ASKED QUESTIONS

Can the nose be angled off the barrier to better face traffic?
Yes, as long as all of the ABSORB 350 modules remain pinned and connected. For larger angles, it is recommended that the last barrier section be moved to face traffic.

Can the ABSORB 350 System be moved while filled with water?
Yes, the System is rigid enough to be repositioned filled with water by sliding the optional wheel / jack assembly under each element.

What transitions are available?
Dozens of transition options are available, including attachments to; Standard NJ / J / K / F, Wide / X-Wide NJ, I-Lock, Smooth Face, JJ Hook, QMB, ArmorGuard®, Orion®, BarrierGuard® and ZoneGuard®.

Can the ABSORB 350 System be used during cold weather?
Since ABSORB 350 modules have no internal steel parts, the use of any approved anti icing chemical is acceptable.

FEATURES

- Rapid deployment and retrieval
- No ground anchoring required
- Low initial price
- Narrow footprint
- Can be deployed on almost any road surface
- Meets NCHRP 350 TL-1, TL-2, TL-3 test criteria
- Easily transitioned to multiple widths and shapes of barriers
- Nose and transition are reusable after most design impacts
- Approved for use in permanent and work zone locations

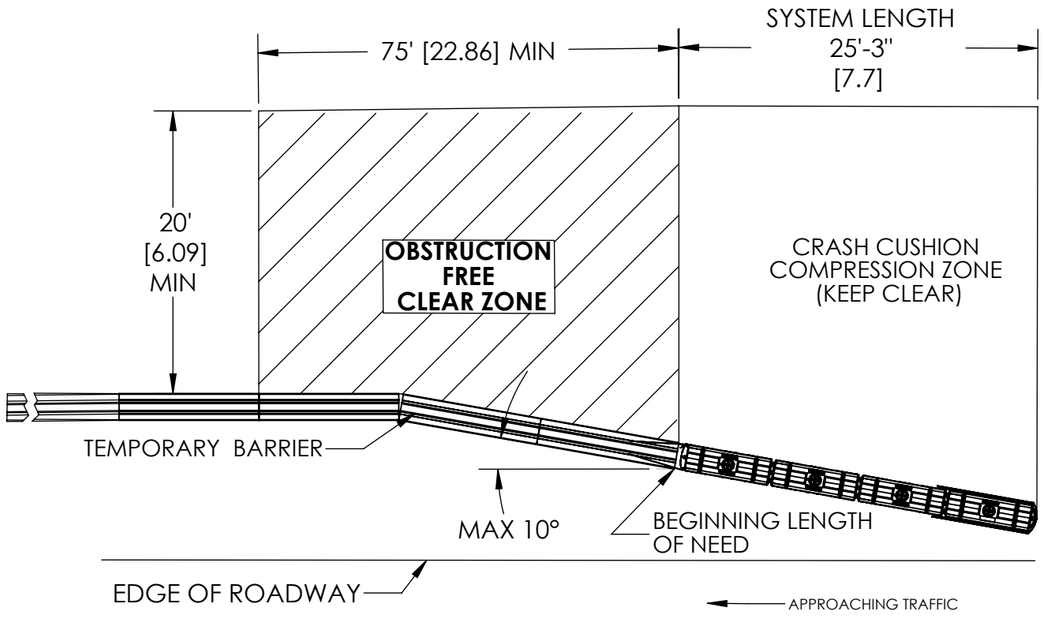
DISTRIBUTED BY:

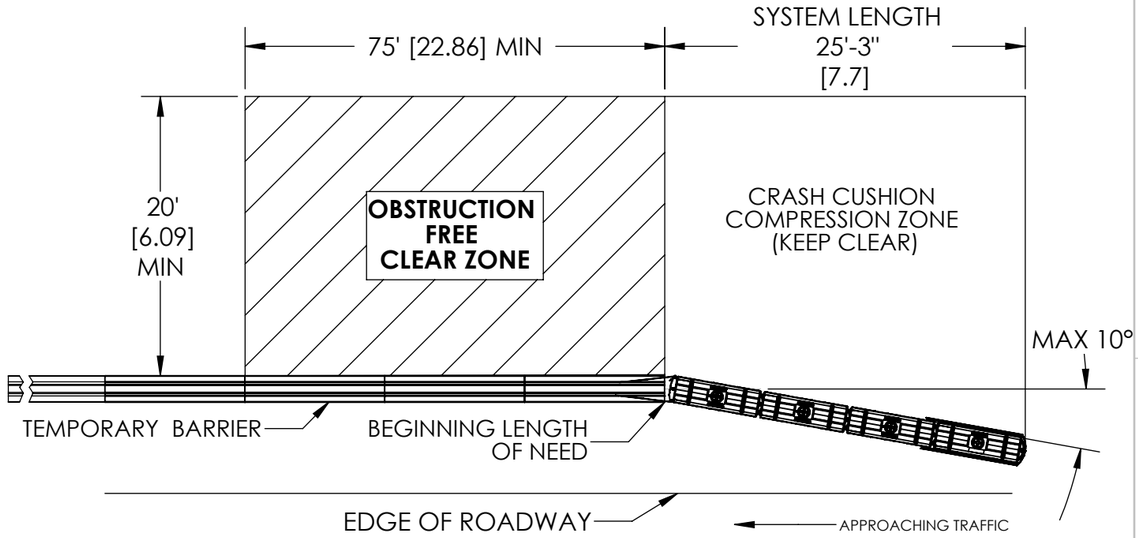
LINDSAY™ TRANSPORTATION SOLUTIONS | BARRIER SYSTEMS® BY LINDSAY | RAILROAD PRODUCTS BY LINDSAY | SNOLINE™ BY LINDSAY

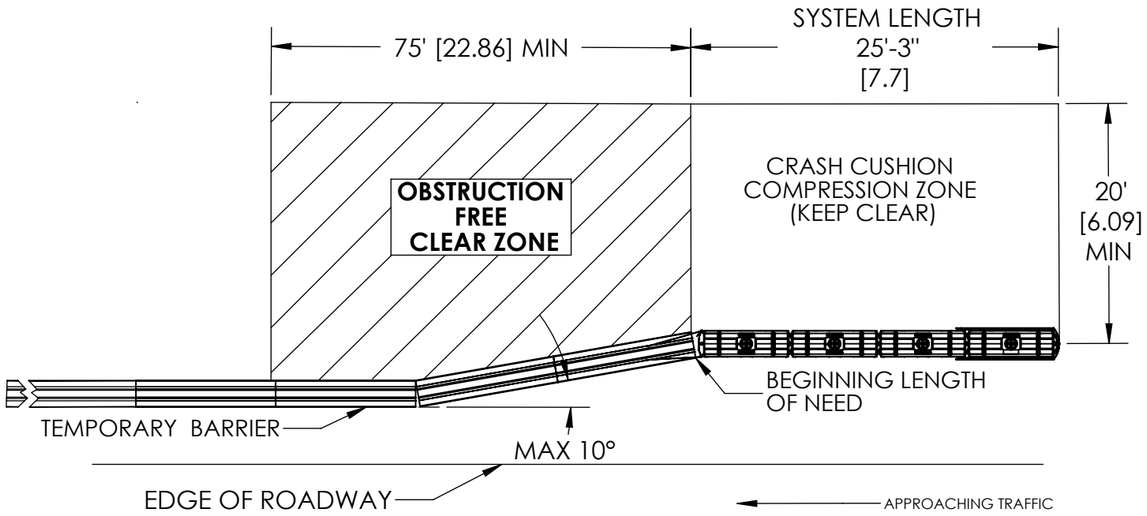
Lindsay Transportation Solutions Sales and Services, Inc.
180 River Road • Rio Vista, CA 94571 • +1 707.374.6800 U.S. Toll Free: 888.800.3691 • www.barrriersystemsinc.com
General details for the ABSORB 350 System are subject to change without notice to reflect improvements and upgrades.
Additional information is available from Lindsay Transportation Solutions Sales and Services, Inc.
PT # ABS04-03252013

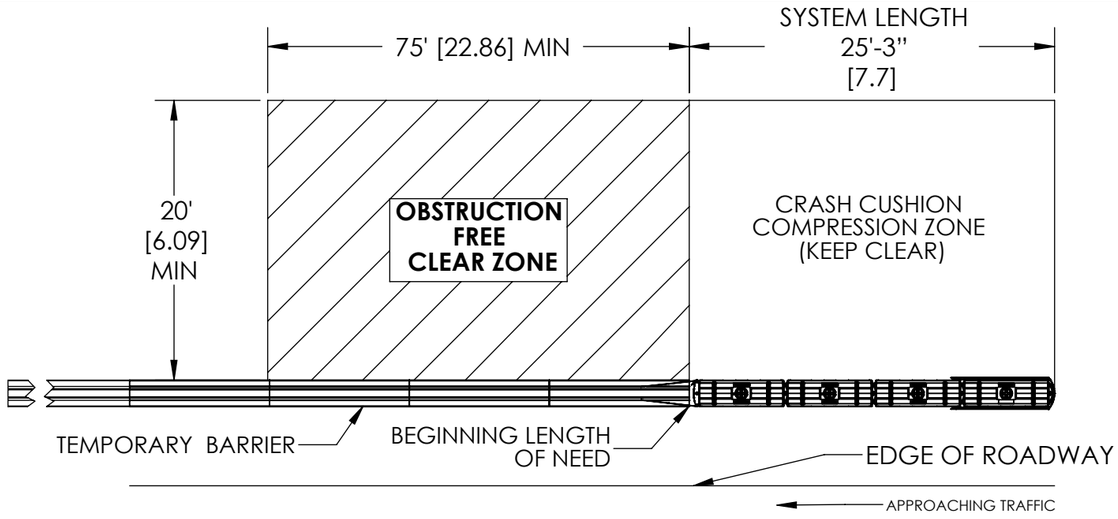
SLED EURO TERMINAL MANUFACTURED BY TRAFFIX DEVICES, INC., 160 AVENIDA LA PATA, SAN CLEMENTE, CA 92673 (PHONE: 949-361-5663) AND DISTRIBUTED BY A&A SAFETY. (PHONE: 513-943-6100)

DRAWING NUMBER	DRAWING NAME	MOST RECENT REVISION DATE
300-148	SLED END TREATMENT ANCHORED/UNANCHORED CONFIGURATIONS	6/9/2011
300-147	SLED END TREATMENT SYSTEM	6/10/2011
300-146	SLED END TREATMENT TL3	6/10/2011
45044-Y	SLED END TREATMENT MODULE	6/10/2011
45044-T	SLED END TREATMENT TRANSITION ASSEMBLY (PAGE 1 OF 6 ONLY)	6/2/2010
SPEED CONFIGURATION	TL-2 & TL-3 SPEED CONFIGURATION	--









NOTES:

1. MINIMUM LENGTHS OF TEMPORARY CONCRETE BARRIER ARE BASED ON UN-ANCHORED LENGTHS
2. SLED END TREATMENT SYSTEM DOES NOT REQUIRE ATTACHMENT TO A FOUNDATION. THE SYSTEM CAN BE LOCATED ON FIRM SOIL, ASPHALT, OR CONCRETE SURFACES.
3. SLED SYSTEM ANGLED TOWARD TRAFFIC AT ANGLE APPROPRIATE PER STATE AND LOCAL SPECIFICATION FOR GATING CRASH CUSHION.
4. RUN OF BARRIER SHALL MEET THE LENGTH OF NEED CALCULATION
5. SLED SYSTEM TO BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS AND SPECIFICATION
6. AN APPROPRIATE OBSTRUCTION FREE CLEAR ZONE MUST BE ADJACENT TO THE SLED SYSTEM. THE OBSTRUCTION FREE CLEAR ZONE REPRESENTS THE IMPACT TEST RECOVERY AREA OF APPROXIMATELY 75 FT LONG BY 20 FT WIDE.
7. IN ADDITION TO THE RECOMMENDED OBSTRUCTION FREE CLEAR ZONE, AN AREA DIRECTLY ADJACENT TO THE CRASH CUSHION (CRASH CUSHION COMPRESSION ZONE) MUST BE KEPT CLEAR

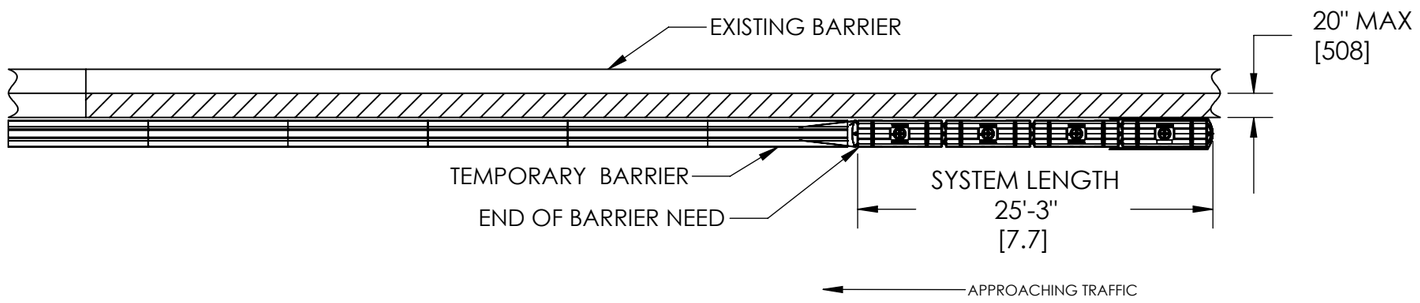
UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN FEET[m].

TrafFix Devices Inc.
160 Avenida La Pata
San Clemente, CA 92673
(949) 361-5663
FAX (949) 361-9205
www.traffixdevices.com

TITLE:
SLED END TREATMENT ANCHORED/UNANCHORED CONFIGURATIONS

DRAWN BY:	DATE:
Mary Dralle	06-09-11
CHECKED BY: FA	DATE: 06-09-11
APPROVED BY: FA	DATE: 06-09-11

SIZE	DWG. NO.	REV
B	300-148	C



ROADSIDE INSTALLATION ON APPROACH OF ELEVATED BRIDGES OR ROADWAYS

PLACEMENT OF THE SLED SYSTEM ON ELEVATED BRIDGE DECKS OR ROADWAYS ADJACENT TO EXISTING RAIL OR BARRIER SHALL BE OFFSET AT LEAST 20 INCHES [0.5 METER] FROM THE EXISTING RAIL OR BARRIER.

HATCHED AREA TO BE KEPT CLEAR OF ANY OBJECTS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN FEET[m].

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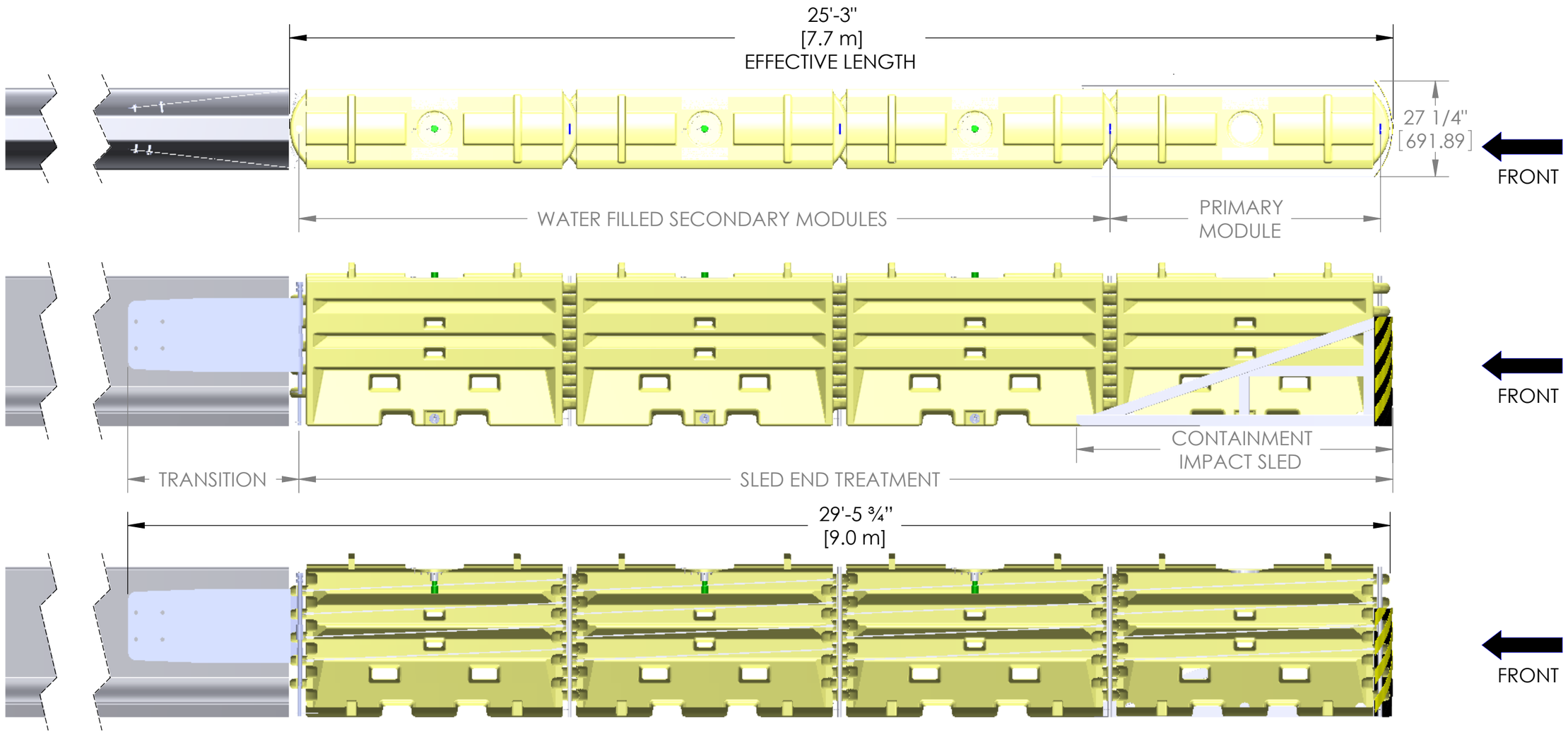
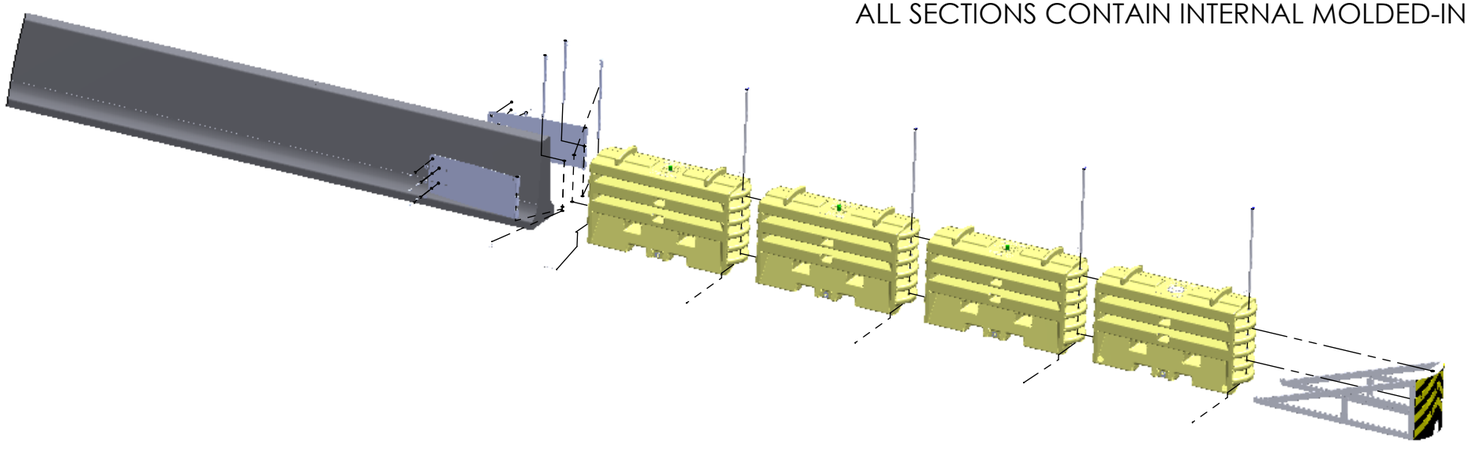
FAX (949) 361-9205
www.traffixdevices.com

TITLE: SLED END TREATMENT ANCHORED/UNANCHORED CONFIGURATIONS

DRAWN BY: Mary Dralle	DATE: 06-09-11	SIZE B	DWG. NO. 300-148
CHECKED BY: FA	DATE: 06-09-11		REV C
APPROVED BY: FA	DATE: 06-09-11		SHEET 2 OF 2



CUT AWAY SLED END TREATMENT
ALL SECTIONS CONTAIN INTERNAL MOLDED-IN CABLES.



UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES[mm].
TOLERANCES:
FRACTIONAL: X/X ± 1" [25.4mm]
DECIMAL: .000 ± .0625
DEGREES: ± 0.5°

DRAWN BY: Mary Dralle	DATE: 06-10-11
CHECKED BY: FA	DATE: 06-10-11
APPROVED BY: FA	DATE: 06-10-11

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160 Avenida La Pata
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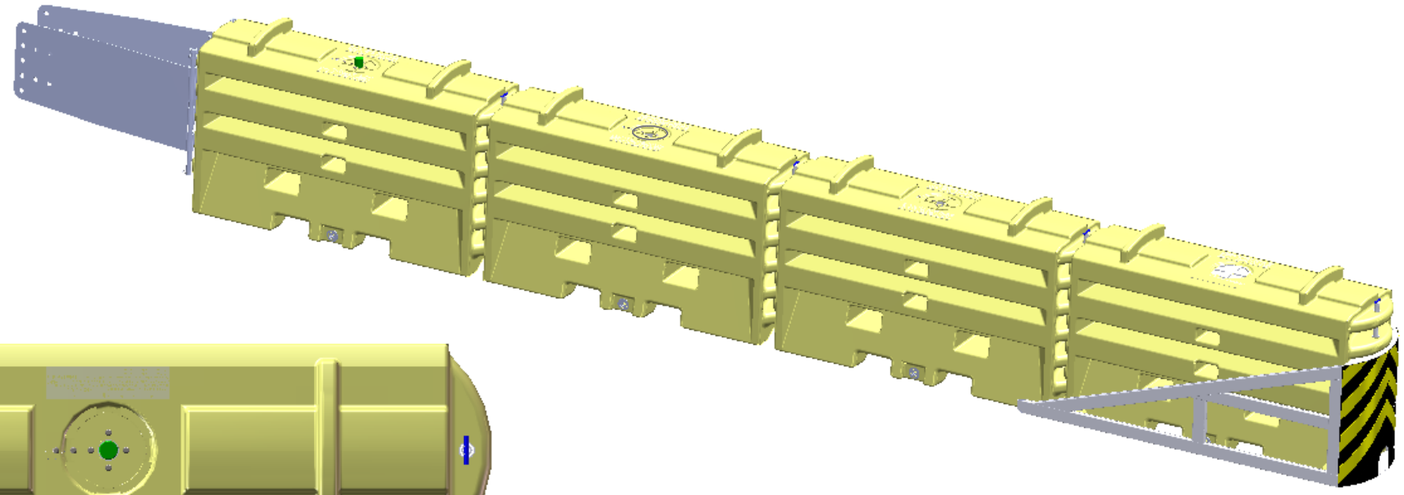
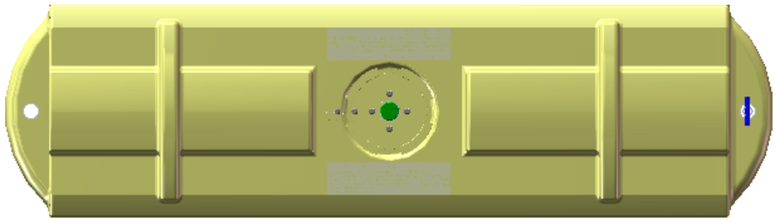
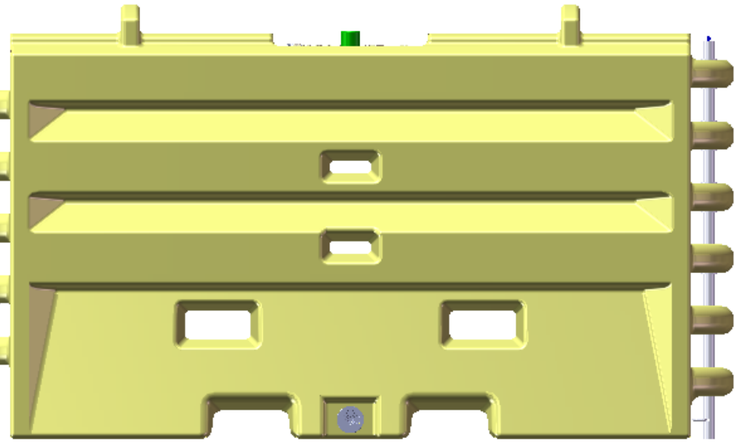
TITLE:
SLED END TREATMENT SYSTEM

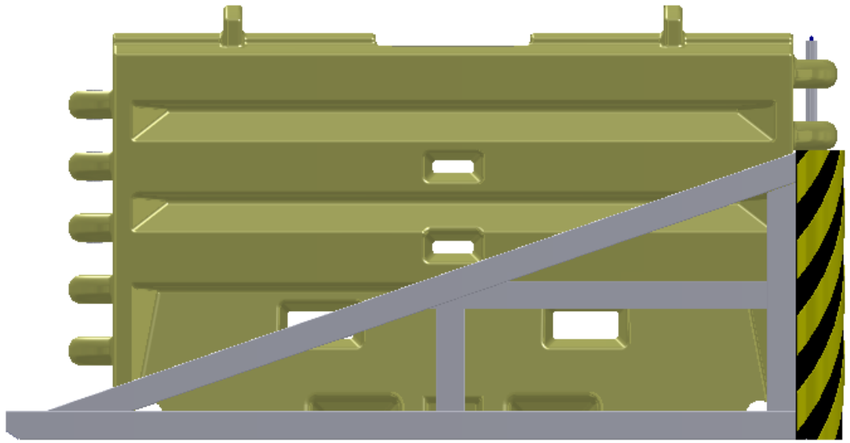
SIZE	DWG. NO.	REV
B	300-147	A

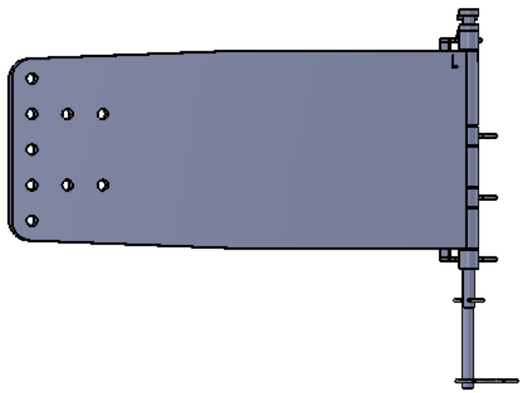
SHEET 1 OF 1











45044-T

45044-Y

45044-CIS

PN	DESCRIPTION	QTY
45044-Y-CIS	Containment Impact Sled	1
45044-Y	43" SLED End Treatment Module	3
45044-T	SLED End Treatment Transition	1

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES[mm].
TOLERANCES:
FRACTIONAL: X/X ± 1/16" [1.6mm]
DECIMAL: .000 ± .0625
DEGREES: ± 0.5°

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FAX (949) 361-9205
www.traffixdevices.com

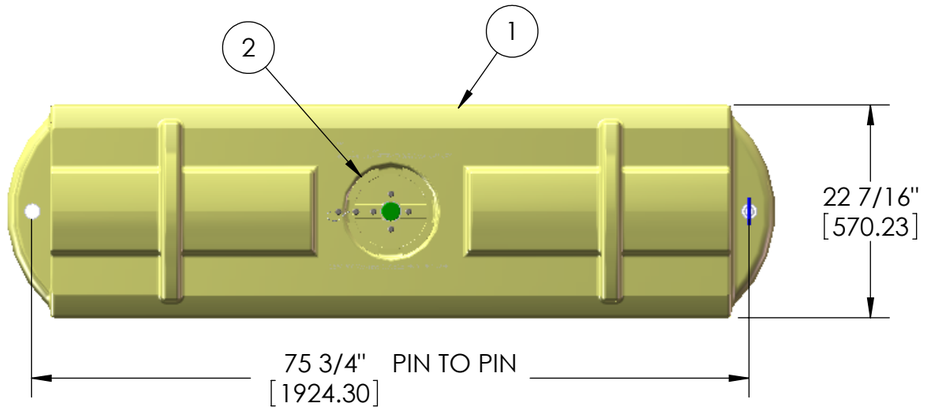
TITLE:

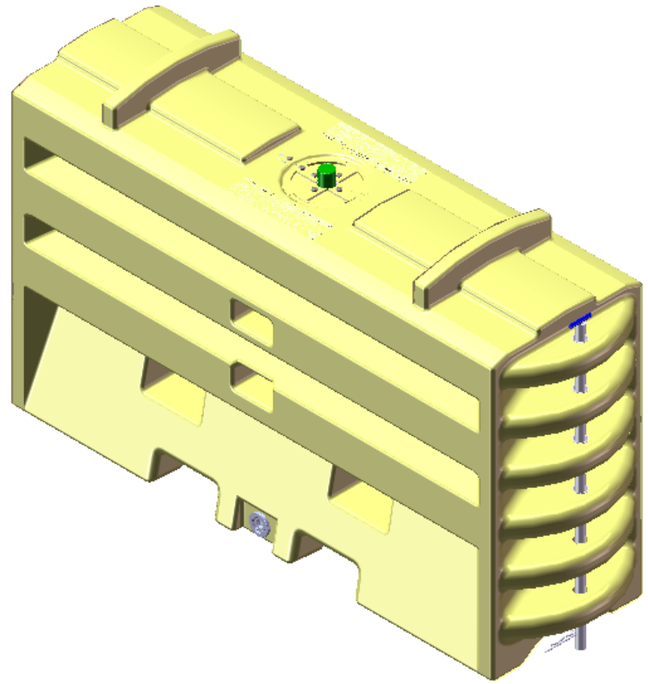
SLED End Treatment TL3

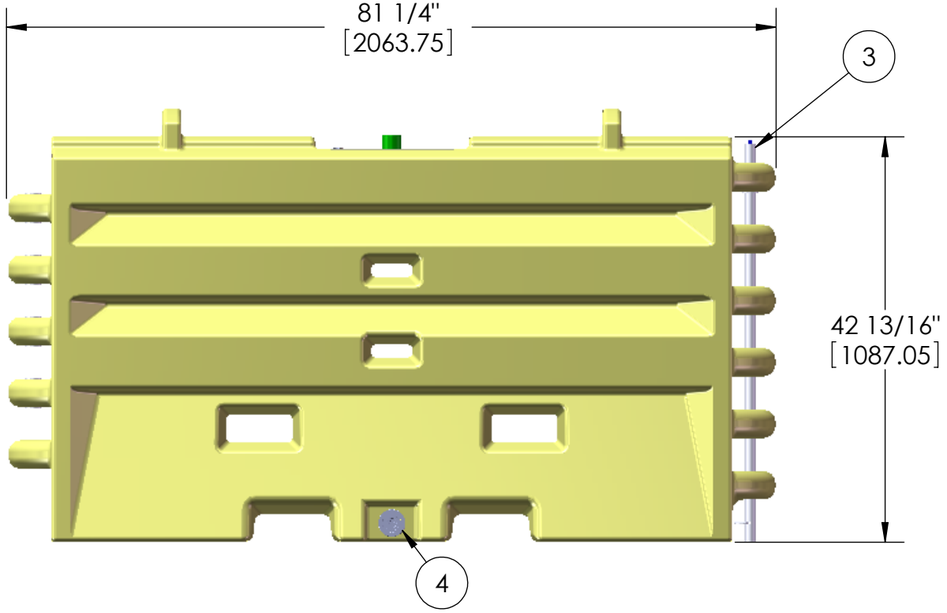
DRAWN BY: Mary Dralle	DATE: 06-10-11	
CHECKED BY: GM	DATE: 06-10-11	
APPROVED BY: GM	DATE: 06-10-11	

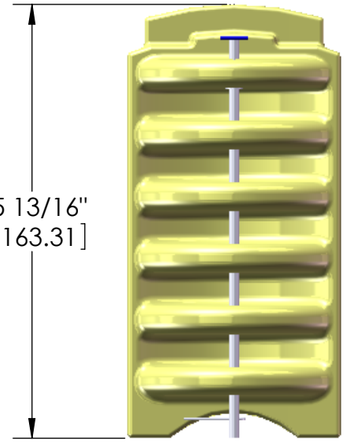
SIZE B | DWG. NO. 300-146 | REV A

SHEET 1 OF 1









SLED END TREATMENT
UNITS: INCHES [mm]
COLOR: YELLOW
EMPTY WEIGHT: APPROX. 160 LBS. [73 kg]
FILLED WEIGHT: APPROX. 2000 LBS [907 kg].
FILL MATERIAL: WATER

ITEM	DESCRIPTION	PN	QTY
1	43" SLED End Treatment	45044-YEL	1
2	Water Level Indicator Fill Cap	18009-Y-I	1
3	Sentry Water Cable Barrier T-Pin w/Keeper Pin	45043-CP	1
4	Water Wall Drain Plug	45033-RC-B	1

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES[mm].
TOLERANCES:
FRACTIONAL: X/X ± 1/16" [1.6mm]
DECIMAL: .000 ± .0625
DEGREES: ± 0.5°

DRAWN BY: Mary Dralle	DATE: 06-10-11	
CHECKED BY: FA	DATE: 06-10-11	
APPROVED BY: FA	DATE: 06-10-11	

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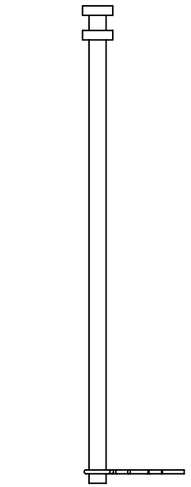
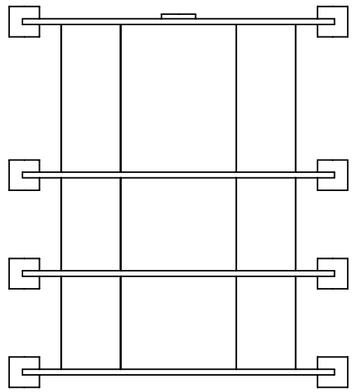
TITLE:
SLED END TREATMENT MODULE

SIZE	DWG. NO.	REV
B	45044-Y	A

SHEET 1 OF 1

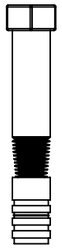


45145
SLED TRANSITION
SHORT DROP PIN



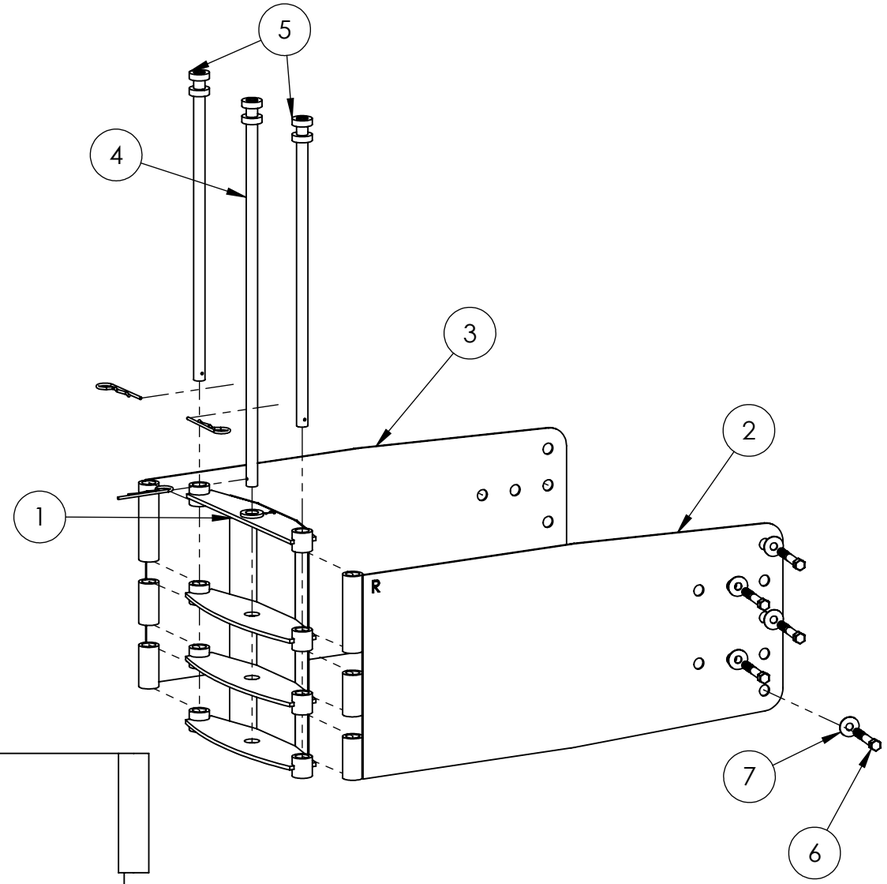
45130
SLED TRANSITION FRAME

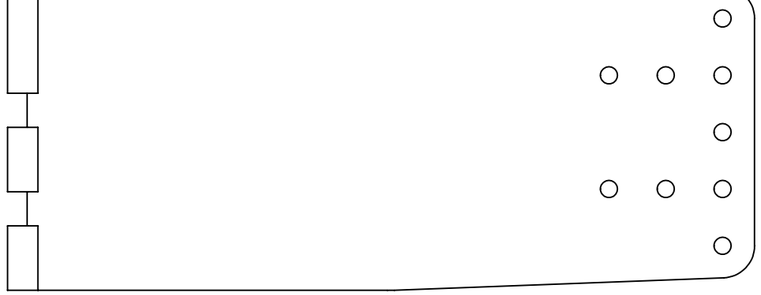
45140
SLED TRANSITION
LONGDROP PIN



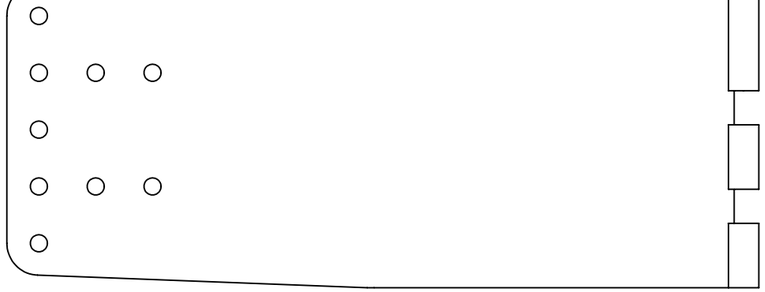
45047
BOLT,
TAPER ANCHOR,
3/4" X 4-1/8"

12060
WASHER, FLAT,
3/4"IDX2"OD





45150L
SLED TRANSITION PANEL, LEFT



45150R
SLED TRANSITION PANEL, RIGHT

ITEM NO.	DESCRIPTION	PN	QTY
1	SLED TRANSITION FRAME ASSY	45130	1
2	RIGHT SLED TRANSITION PANEL ASSY	45150R	1
3	LEFT SLED TRANSITION PANEL ASSY	45150L	1
4	SLED TRANSITION LONG DROP PIN	45140	1
5	SLED TRANSITION SHORT DROP PIN	45145	2
6	BOLT, TAPER ANCHOR, 3/4" X 4/1/8"	45047	9
7	WASHER, FLAT, 3/4"ID X 2"OD	12060	9

2. FINISH: HOT DIP GALVANIZE
1. MATERIAL: A36 AND A513 STEEL
NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES[mm].
TOLERANCES:
FRACTIONAL: X/X ± 1/16" [1.6mm]
DECIMAL: .000 ± .0625
DEGREES: ± 0.5°

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TITLE: SLED END TREATMENT TRANSITION ASSY

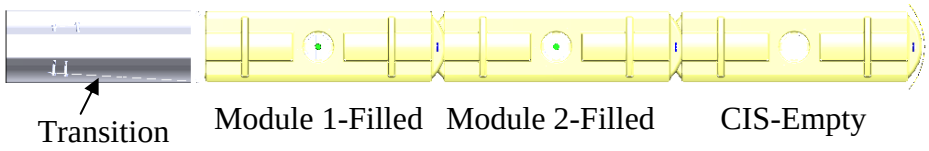
DRAWN BY: Mary Dralle	DATE: 06-02-10	
CHECKED BY: FA	DATE: 06-02-10	
APPROVED BY: FA	DATE: 06-02-10	

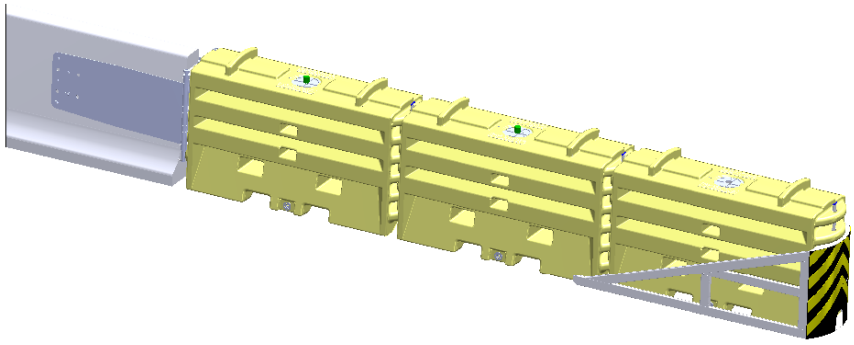
SIZE B | DWG. NO. 45044-T | REV B

SHEET 1 OF 6

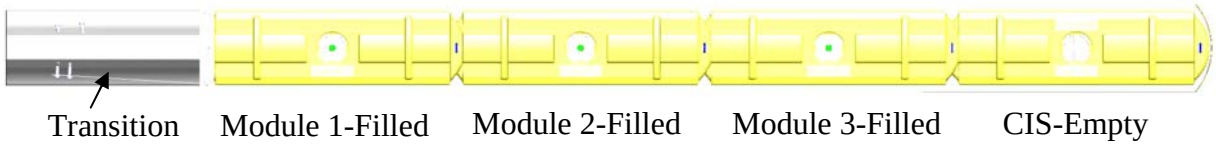
Speed Configuration

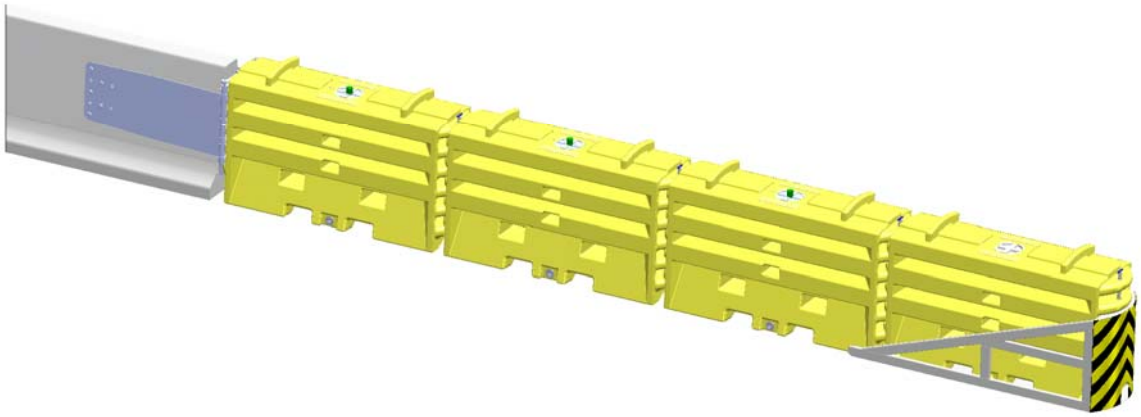
TL-2 Configuration





TL-3 Configuration





* CIS is ALWAYS empty.

ACZ-350™

PORTABLE
TL-2 & TL-3
END
TREATMENT

OVERVIEW

The ACZ-350 System combines ease of use and NCHRP 350, gating, non-redirective TL-2 and TL-3 crash cushion performance for work zone protection. This partially reuseable crash cushion can be easily transported, and installed with No Roadway Anchors.

SUPERIOR IMPACT PERFORMANCE

The unique design of the ACZ-350 systems protects errant drivers from impacting concrete barrier ends, and also contains the errant vehicle from vaulting into the workzone.

FEATURES AND BENEFITS

- No Vaulting
- Safely contains errant vehicle
- Accommodates impacts up to 2,000 kg, (4,500 lbs) traveling at speeds up to 100 km/h (62 mph)
- Simple and Fast Installation
- Protects Permanent or Temporary, Steel or Concrete Barrier
- Ideal for Work Zones
- No Foundation or Anchoring

EASY CLEAN-UP
NARROW PROFILE
MINIMUM INTRUSION
LOW COST/ AFFORDABLE
QUICK/EASY TO MOVE

NON-REDIRECTIVE, GATING CRASH CUSHION SYSTEM

All Crash Cushions defined as Non-redirective and Gating require a clear zone. Clear Zones are areas behind the crash cushion that NO workers, machinery, obstructions or other debris could interfere with an errant vehicle. This area should also remain relatively flat. If there are any questions or concerns, please contact your local Energy Absorption Systems, Inc. representative.






ENERGY ABSORPTION SYSTEMS, INC.

SAVING LIVES BY DESIGN®

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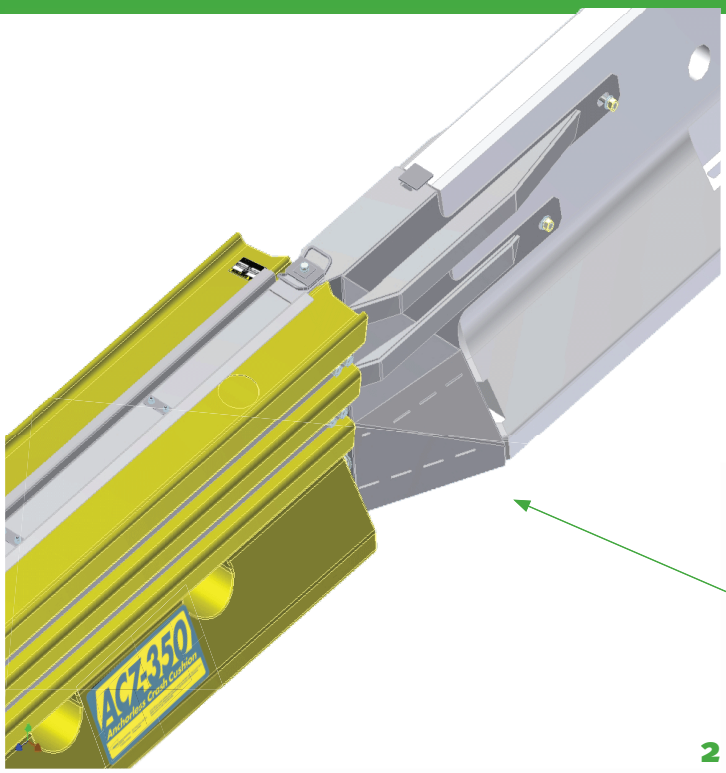
ACZ-350™

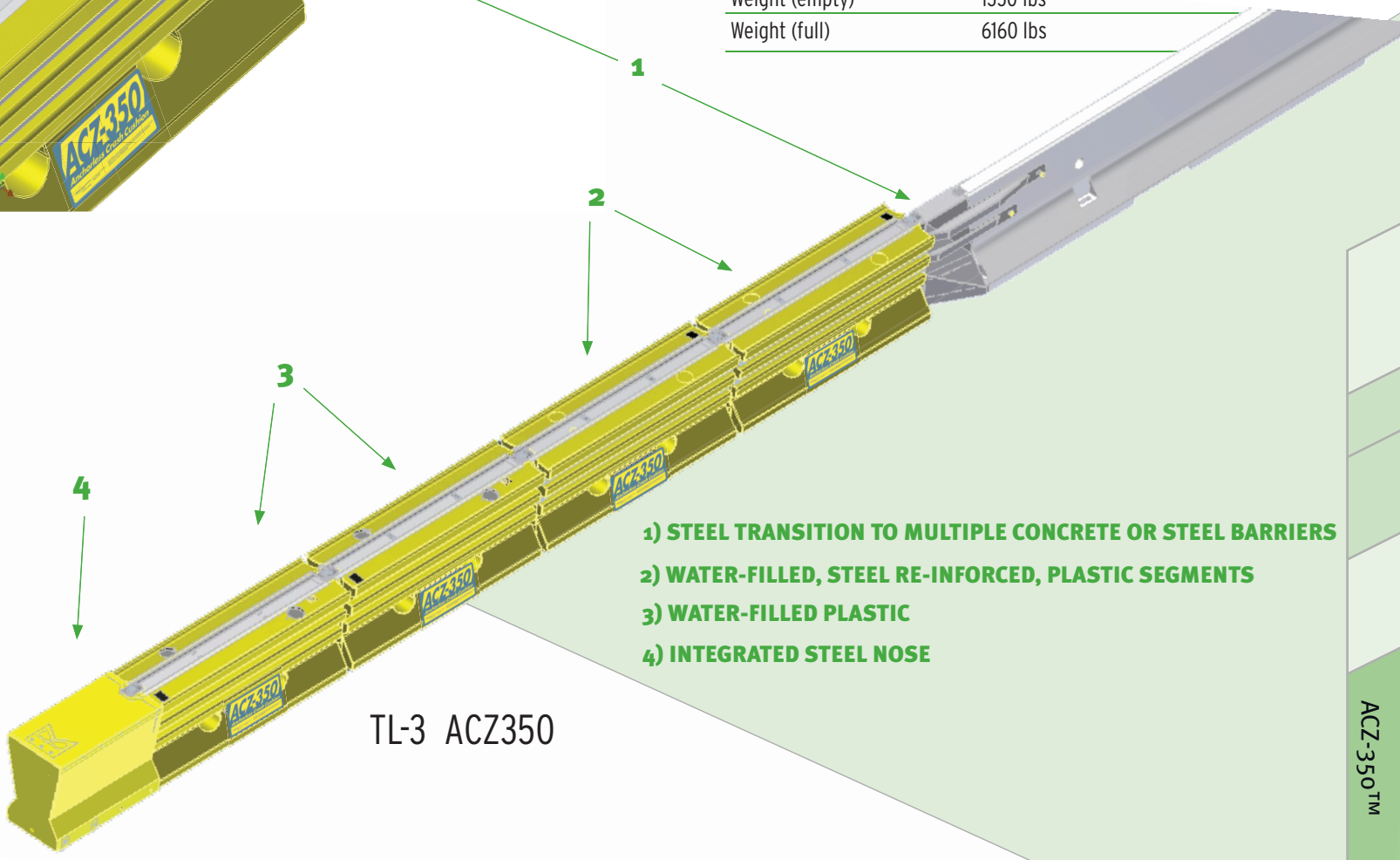


EASY DEPLOYMENT AND REMOVAL

The ACZ-350 System can be easily unloaded and positioned without cranes or heavy equipment. Deployment involves three simple steps:

1. Unload
2. Position and pin barrier sections.
3. Fill Segments with water

SPECIFICATIONS	TL-3
Length	31'-7" (9.6 m)
Width	1'-10" (.6m)
Height	2' 9" (.8m)
Weight (empty)	1350 lbs
Weight (full)	6160 lbs



TL-3 ACZ350

1) STEEL TRANSITION TO MULTIPLE CONCRETE OR STEEL BARRIERS

2) WATER-FILLED, STEEL RE-INFORCED, PLASTIC SEGMENTS

3) WATER-FILLED PLASTIC

4) INTEGRATED STEEL NOSE

ACZ-350™

DISTRIBUTED BY:

Quixote Transportation Safety

35 East Wacker Drive • Chicago, IL 60601
Tel: (312) 467-6750 • Fax: (312) 467-9625
www.energyabsorption.com

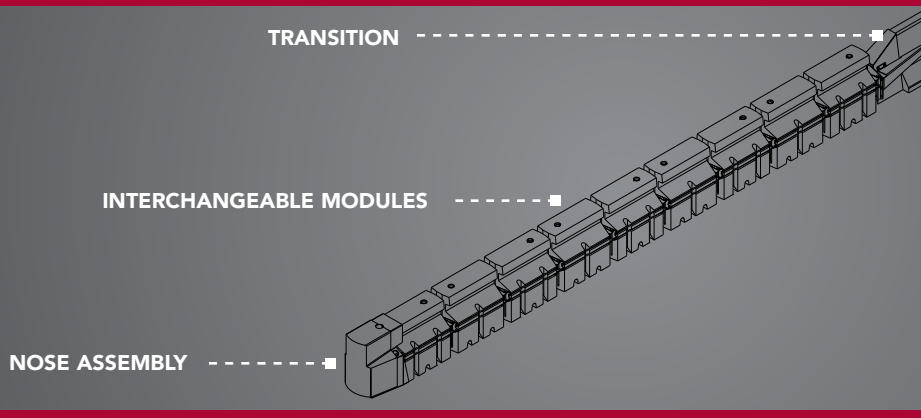
ENERGY ABSORPTION SYSTEMS, INC.

www.quixtrans.com

ABSORB 350® | NON-REDIRECTIVE CRASH CUSHION - SACRIFICIAL

PHYSICAL SPECIFICATIONS

Classification	NR-S	
TL-3 Length	32′	9.7 m
Width	24″	610 mm
Height	32″	813 mm
Module Weight Empty	110 lb.	50 kg
Test Level	NCHRP 350	TL 1/2/3



NARROW ANCHORLESS WATER FILLED CRASH CUSHION

No ground anchoring, the largest selection of transitions and modular technology allow the ABSORB 350 System to be used in multiple speed conditions. The ABSORB 350 System is ideal for contractors due to the ease of maintenance after an impact and quick deployment. At 24″ (610 mm) wide, it is ideally suited for narrow areas where road and workspace is limited. The ABSORB 350 System is easy to restore after an impact because the System uses uniform modular components. The use of standardized modular components also helps to reduce inventory costs.

FREQUENTLY ASKED QUESTIONS

Can the nose be angled off the barrier to better face traffic?
Yes, as long as all of the ABSORB 350 modules remain pinned and connected. For larger angles, it is recommended that the last barrier section be moved to face traffic.

Can the ABSORB 350 System be moved while filled with water?
Yes, the System is rigid enough to be repositioned filled with water by sliding the optional wheel / jack assembly under each element.

What transitions are available?
Dozens of transition options are available, including attachments to; Standard NJ / J / K / F, Wide / X-Wide NJ, I-Lock, Smooth Face, JJ Hook, QMB, ArmorGuard®, Orion®, BarrierGuard® and ZoneGuard®.

Can the ABSORB 350 System be used during cold weather?
Since ABSORB 350 modules have no internal steel parts, the use of any approved anti icing chemical is acceptable.

FEATURES

- Rapid deployment and retrieval
- No ground anchoring required
- Low initial price
- Narrow footprint
- Can be deployed on almost any road surface
- Meets NCHRP 350 TL-1, TL-2, TL-3 test criteria
- Easily transitioned to multiple widths and shapes of barriers
- Nose and transition are reusable after most design impacts
- Approved for use in permanent and work zone locations

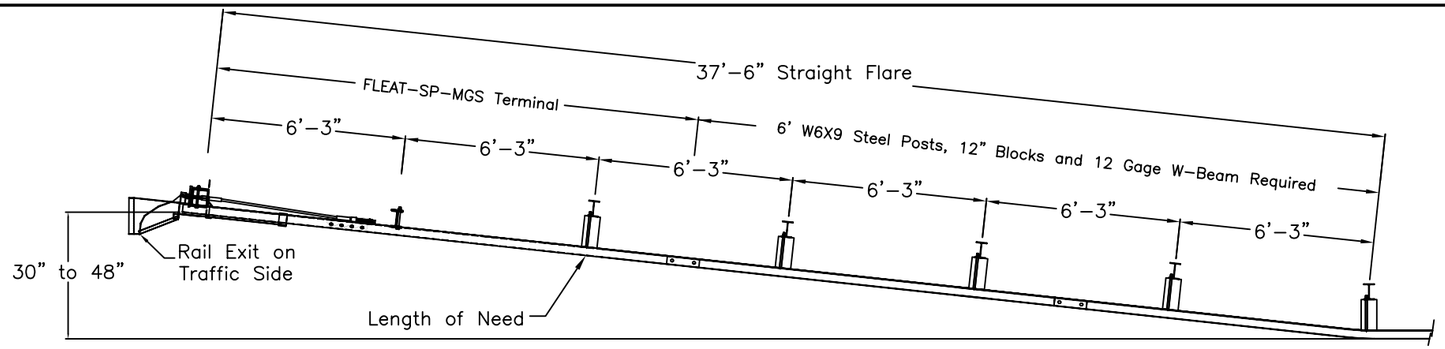
DISTRIBUTED BY:

LINDSAY™ TRANSPORTATION SOLUTIONS | BARRIER SYSTEMS® BY LINDSAY | RAILROAD PRODUCTS BY LINDSAY | SNOLINE™ BY LINDSAY

Lindsay Transportation Solutions Sales and Services, Inc.
180 River Road • Rio Vista, CA 94571 • +1 707.374.6800 U.S. Toll Free: 888.800.3691 • www.barrriersystemsinc.com
General details for the ABSORB 350 System are subject to change without notice to reflect improvements and upgrades.
Additional information is available from Lindsay Transportation Solutions Sales and Services, Inc.
PT # ABS04-03252013

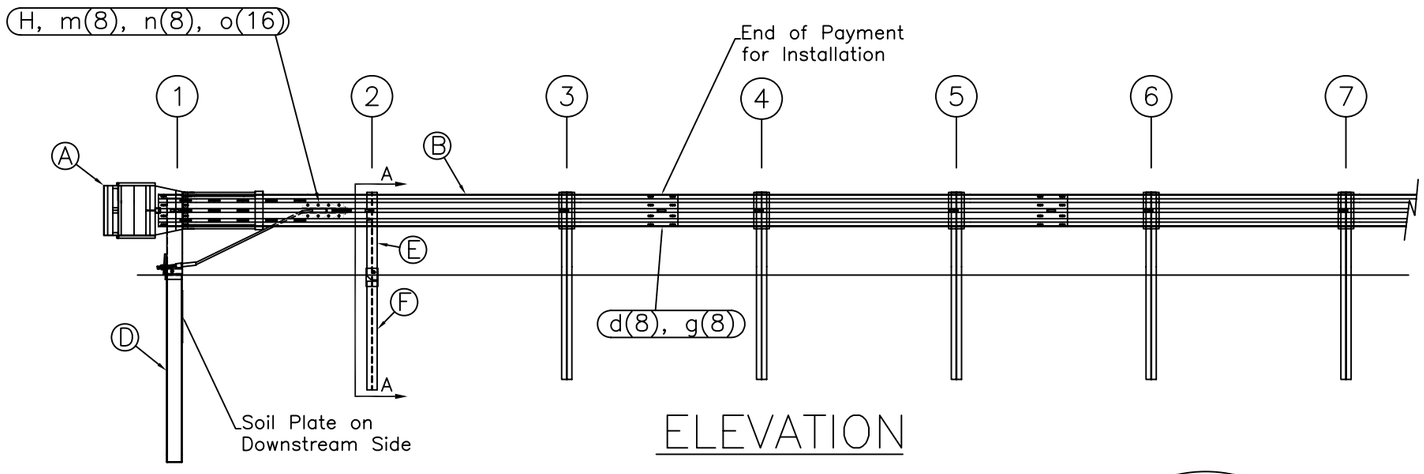
MATERIALS INFORMATION

7. Alternative Flared Terminal System Information

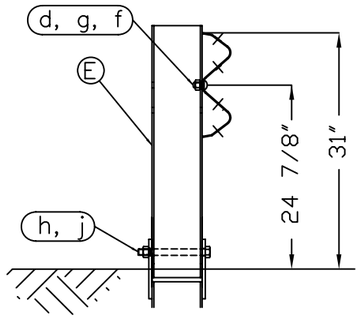


PLAN

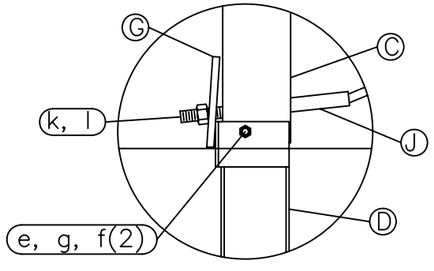
TRAFFIC



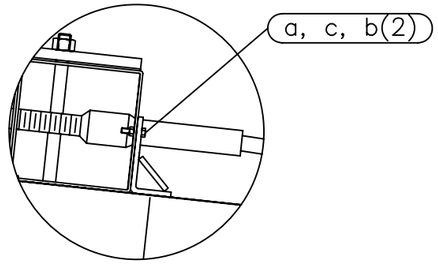
ELEVATION



SECTION A-A
Post #2



Post #1 Connection Detail



Impact Head Connection Detail

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	F3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	MGS-SF1303
C	1	FIRST POST TOP (6X6X$\frac{1}{8}$" Tube)	TPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	TPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP3B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
		HARDWARE (ALL DIMENSIONS IN INCHES)	
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	9	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	1	5/8 Dia. x 9 HEX BOLT GRD 5	B580904A
f	3	5/8 WASHER	W050
g	10	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

GENERAL NOTES:
1. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
2. The lower sections of the Posts 1&2 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
3. The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
4. When competent rock is encountered, a 12" Ø post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for post 1. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
5. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.

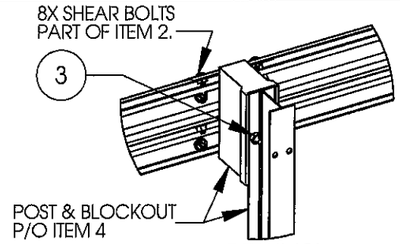
RSI
Road Systems, Inc.
Big Spring, TX
Phone: 432-263-2435
or Phone: 330-346-0721

FLEAT-SP-MGS Terminal Midwest Guardrail System 31" Top of Rail

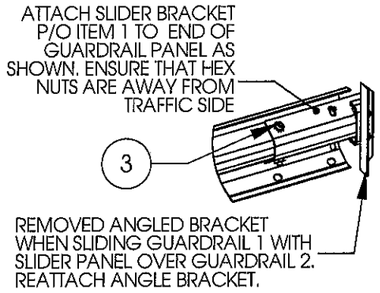
Sheet:	Date:	By:
1	02/24/10	JRR

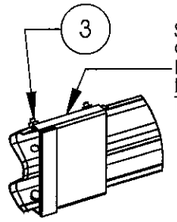
Drawing Name:	Scale:	Rev:
FLT-SP-S-MGS	None	0

ITEM NO.	PART NUMBER	DESCRIPTION	QTY	UOM
1	BSI-1301252-KT	X-Tension Terminal Comp, 31 in	1	EACH
2	K070202	X-Tension Hardware Kit, GT,	1	EACH
3	K070206	X-Tension System Hardware Kit,	1	EACH
4	K070210	X-Tension GT Guardrail	1	EACH
5	B061100	BSI, I-Beam Post, Middle, X350	1	EACH
6	MANXT1	X-TENSION Installation Manual	1	EACH

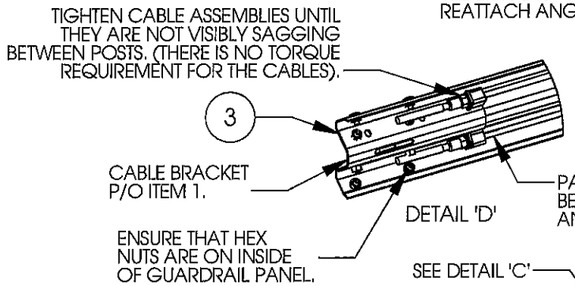


DETAIL 'C'

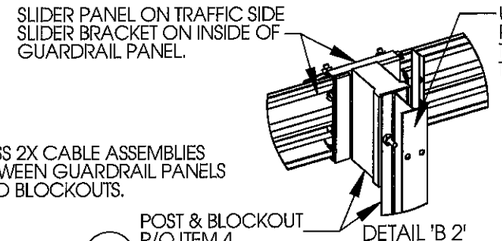




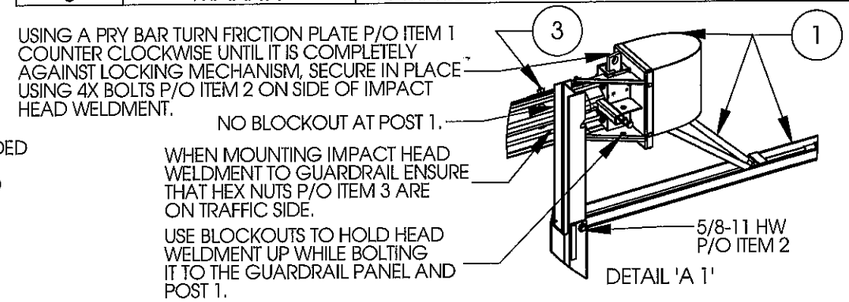
DETAIL 'B 1'



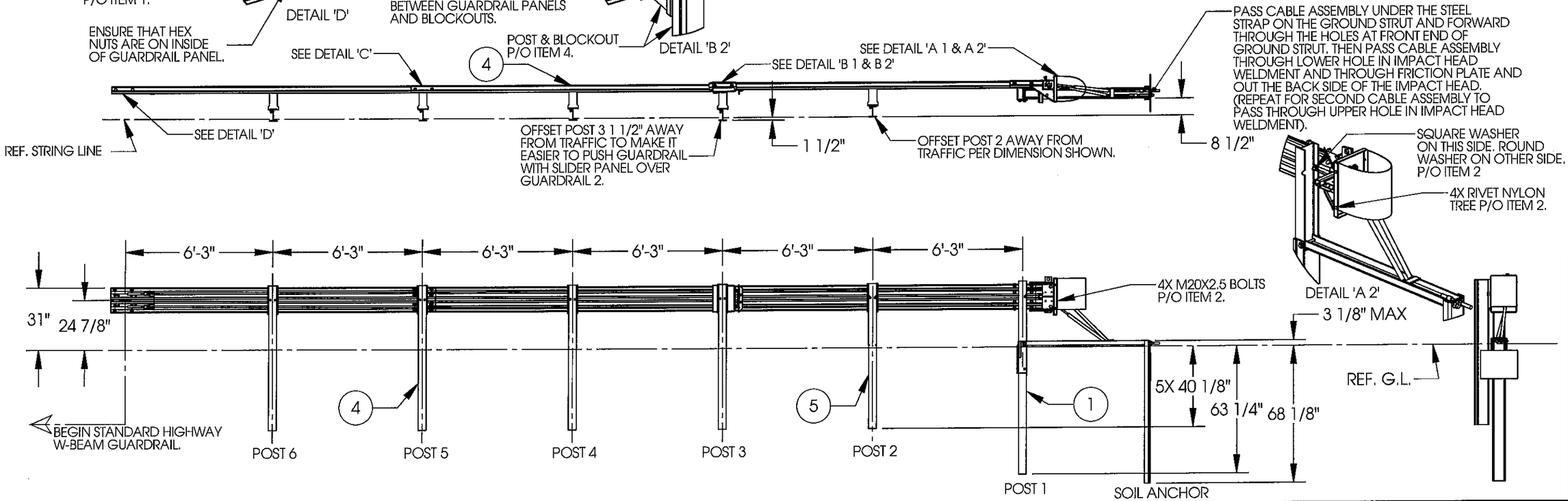
DETAIL 'D'



DETAIL 'B 2'



DETAIL 'A 1'



DETAIL 'A 2'

NOTES: UNLESS OTHERWISE SPECIFIED.

1. SYSTEM TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE NUTS AT THE CABLE BRACKET (SEE DETAIL 'D'). DO NOT TIGHTEN THE CABLES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING TO THE TOP OF THE POST.

APPROVALS	
DRAWN BY:	NMV
DRAWN DATE:	2/08/13
APPR'D BY:	JMT
APPR'D DATE:	2/08/13

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ARE:
FRACTIONS ±1/16 DECIMAL .XX = ±.03 .XXX = ±.010 ANGLES ±1/2°
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

REV	ECN#	DATE
B	2067	05/02/13
A	2022	2/08/13

LINDSAY TRANSPORTATION SOLUTIONS
BARRIER SYSTEMS INC.
3333 Vaca Valley Parkway Ste 800
Vacaville, CA 95688
Tel: 888-800-3691
www.barriersystemsinc.com

TITLE
X-TENSION GUARDRAIL TERMINAL SYSTEM STEEL POST WITH COMPOSITE BLOCKOUT 31" RAIL HEIGHT

SIZE	DWG NO.	REV.
B	XTGTSS5	B

SCALE 1:50 SHEET 1 OF 1

Doc. B100108

Last Saved by: jeff.thompson; Friday, May 03, 2013 1:23:29 PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
06	Tul	198	R4.2/R4.9, 6.8/R8.3		

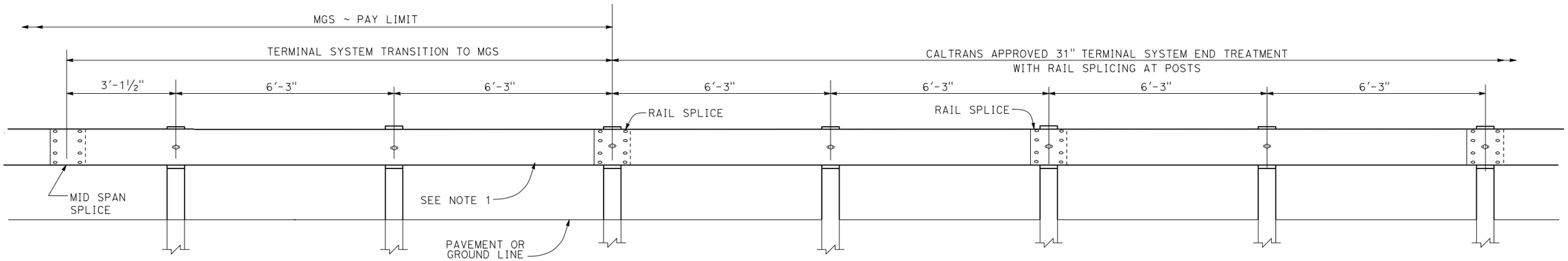
REGISTERED CIVIL ENGINEER — DATE: 6-27-16

PLANS APPROVAL DATE: 6-27-16

REGISTERED PROFESSIONAL ENGINEER — MARK GONZALEZ — No. 73897 — Exp. 6-30-17 — CIVIL — STATE OF CALIFORNIA

NCM ENGINEERING CORPORATION
1322 East Shaw Ave, Ste 190
Fresno, CA 93710

NOTE:
1. USE 15′-7½" LENGTH RAIL.

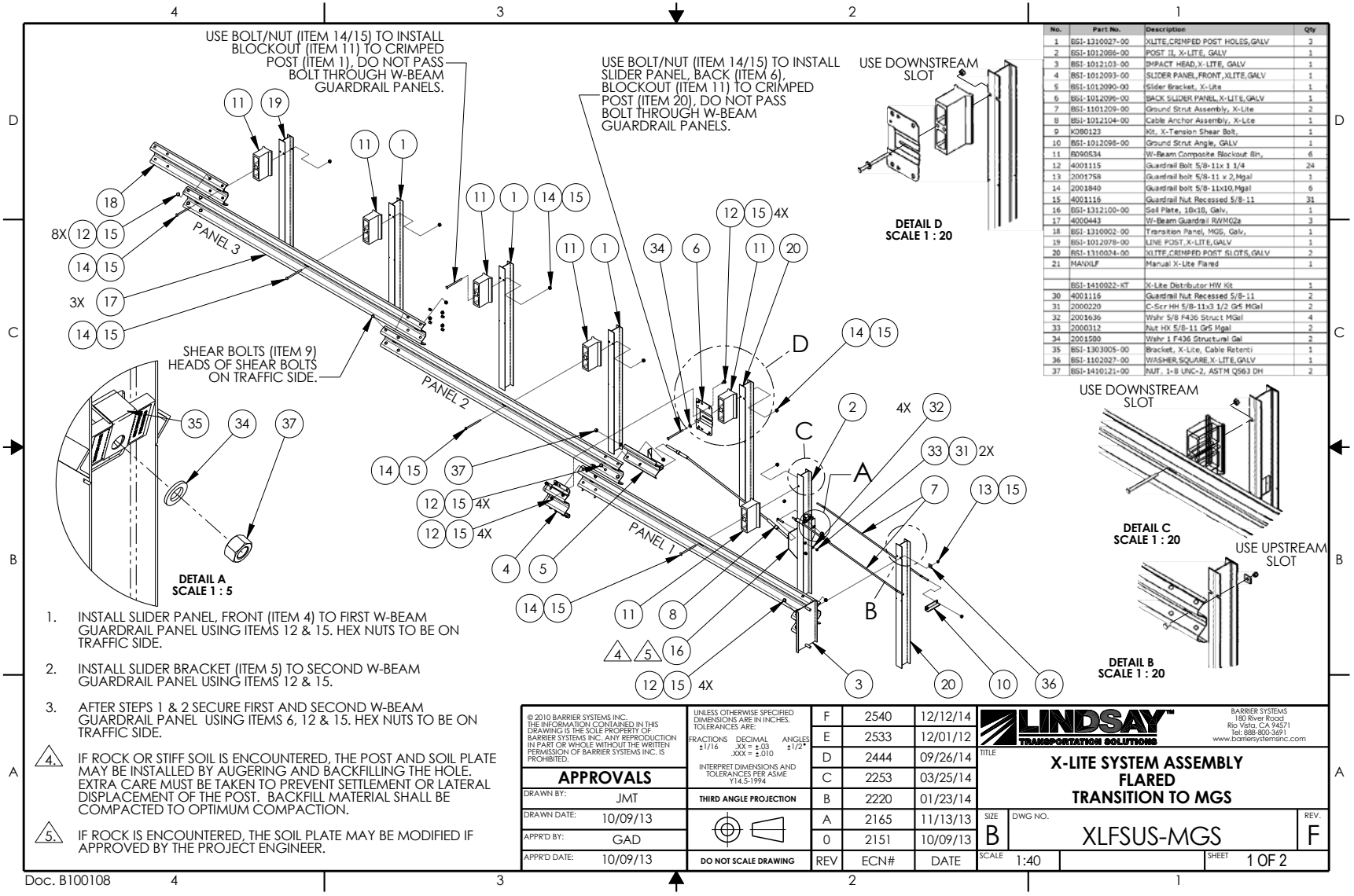


TRANSITION DETAIL FOR 31" TERMINAL SYSTEM END TREATMENT WITH RAIL SPLICING AT POSTS TO MIDWEST GUARDRAIL SYSTEM

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: MARK GONZALEZ
CHECKED BY: ED NG
CONSULTANT FUNCTIONAL SUPERVISOR: STEVE MISLINSKI
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION DATE PLOTTED => 19-AUG-2016
06-27-16 TIME PLOTTED => 09:08



No.	Part No.	Description	Qty
1	BSI-1310027-00	XLITE,CRIMPED POST HOLES,GALV	3
2	BSI-1012086-00	POST II, X-LITE, GALV	1
3	BSI-1012103-00	IMPACT HEAD,X-LITE, GALV	1
4	BSI-1012093-00	SLIDER PANEL,FRONT,XLITE,GALV	1
5	BSI-1012090-00	Slider Bracket, X-Lite	1
6	BSI-1012096-00	BACK SLIDER PANEL,X-LITE,GALV	1
7	BSI-1101209-00	Ground Strut Assembly, X-Lite	2
8	BSI-1012104-00	Cable Anchor Assembly, X-Lte	1
9	K080123	Kit, X-Tension Shear Bolt,	1
10	BSI-1012098-00	Ground Strut Angle, GALV	1
11	8090534	W-Beam Composite Blockout Bln,	6
12	4001115	Guardrail Bolt 5/8-11x 1 1/4	24
13	2001758	Guardrail bolt 5/8-11 x 2,Mgal	1
14	2001840	Guardrail bolt 5/8-11x10,Mgal	6
15	4001116	Guardrail Nut Recessed 5/8-11	31
16	BSI-1312100-00	Soil Plate, 10x10, Galv,	1
17	4000443	W-Beam Guardrail RWM02a	3
18	BSI-1310002-00	Transition Panel, MGS, Galv,	1
19	BSI-1012078-00	LINE POST,X-LITE,GALV	1
20	BSI-1310024-00	XLITE,CRIMPED POST SLOTS,GALV	2
21	MANXLF	Manual X-Lite Flared	1
	BSI-1410022-KT	X-Lite Distributor HW Kit	1
30	4001116	Guardrail Nut Recessed 5/8-11	2
31	2000220	C-Scr HH 5/8-11x3 1/2 Gr5 MGal	2
32	2001636	Wshr 5/8 F436 Struct MGal	4
33	2000312	Nut HX 5/8-11 Gr5 Mgal	2
34	2001580	Wshr 1 F436 Structural Gal	2
35	BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1
36	BSI-1102027-00	WASHER,SQUARE,X-LITE,GALV	1
37	BSI-1410121-00	NUT, 1-8 UNC-2, ASTM Q563 DH	2

1. INSTALL SLIDER PANEL, FRONT (ITEM 4) TO FIRST W-BEAM GUARDRAIL PANEL USING ITEMS 12 & 15. HEX NUTS TO BE ON TRAFFIC SIDE.
2. INSTALL SLIDER BRACKET (ITEM 5) TO SECOND W-BEAM GUARDRAIL PANEL USING ITEMS 12 & 15.
3. AFTER STEPS 1 & 2 SECURE FIRST AND SECOND W-BEAM GUARDRAIL PANEL USING ITEMS 6, 12 & 15. HEX NUTS TO BE ON TRAFFIC SIDE.
4. IF ROCK OR STIFF SOIL IS ENCOUNTERED, THE POST AND SOIL PLATE MAY BE INSTALLED BY AUGERING AND BACKFILLING THE HOLE. EXTRA CARE MUST BE TAKEN TO PREVENT SETTLEMENT OR LATERAL DISPLACEMENT OF THE POST. BACKFILL MATERIAL SHALL BE COMPACTED TO OPTIMUM COMPACTION.
5. IF ROCK IS ENCOUNTERED, THE SOIL PLATE MAY BE MODIFIED IF APPROVED BY THE PROJECT ENGINEER.

APPROVALS

DRAWN BY:	JMT
DRAWN DATE:	10/09/13
APPR'D BY:	GAD
APPR'D DATE:	10/09/13

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE:
FRACTIONS ±1/16 DECIMAL .XX = ±.03 .XXX = ±.010 ANGLES ±1/2°
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

REV	ECN#	DATE
F	2540	12/12/14
E	2533	12/01/12
D	2444	09/26/14
C	2253	03/25/14
B	2220	01/23/14
A	2165	11/13/13
0	2151	10/09/13

LINDSAY TRANSPORTATION SOLUTIONS

BARRIER SYSTEMS
180 River Road
Rio Vista, CA 94571
Tel: 888-800-3691
www.barriersystemsinc.com

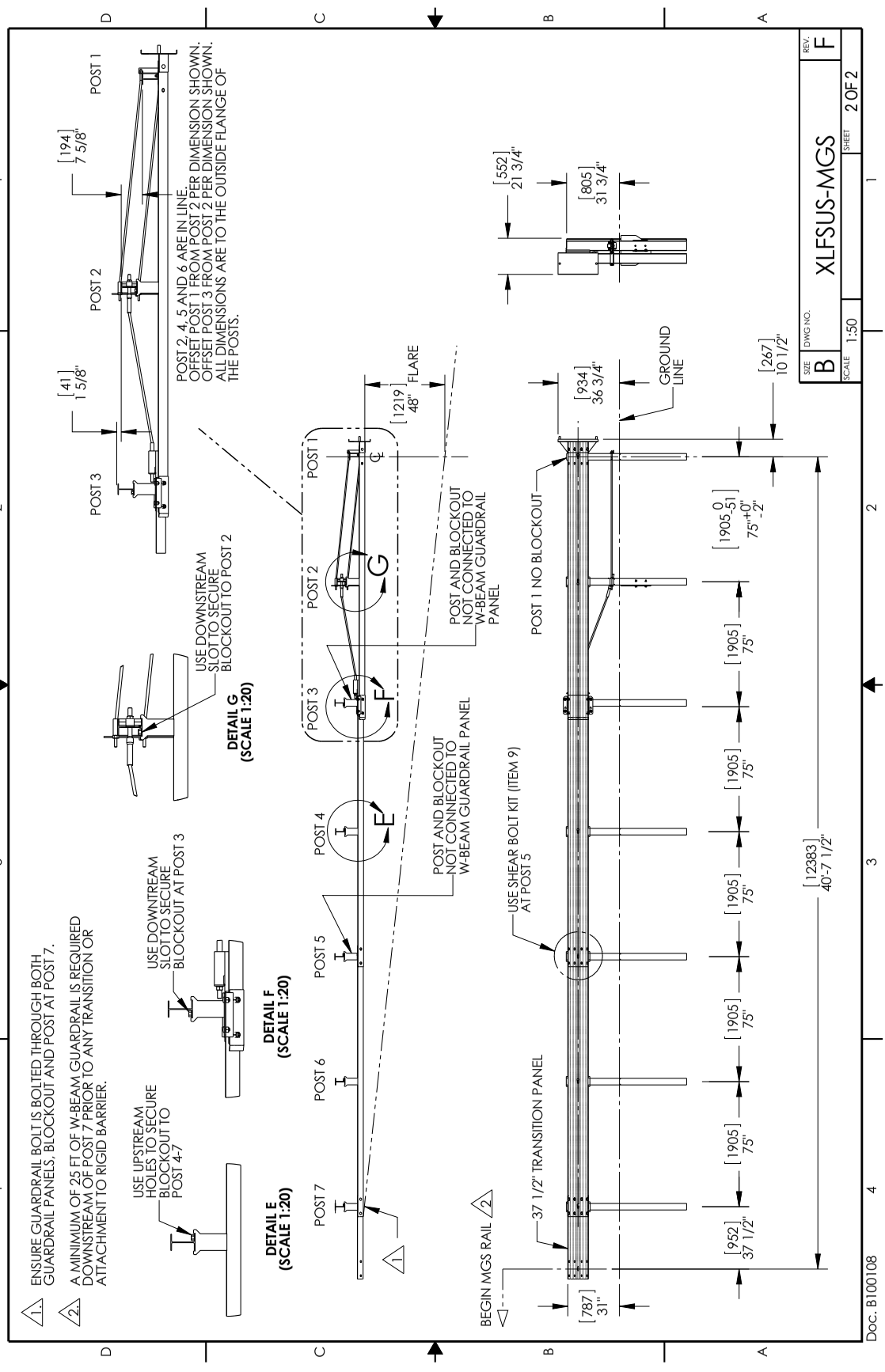
TITLE: **X-LITE SYSTEM ASSEMBLY FLARED TRANSITION TO MGS**

SIZE B | DWG NO. XLFSUS-MGS | REV. F

SCALE 1:40 | SHEET 1 OF 2

Doc. B100108

Appendix A - System Configuration, 37’ 6” MGS

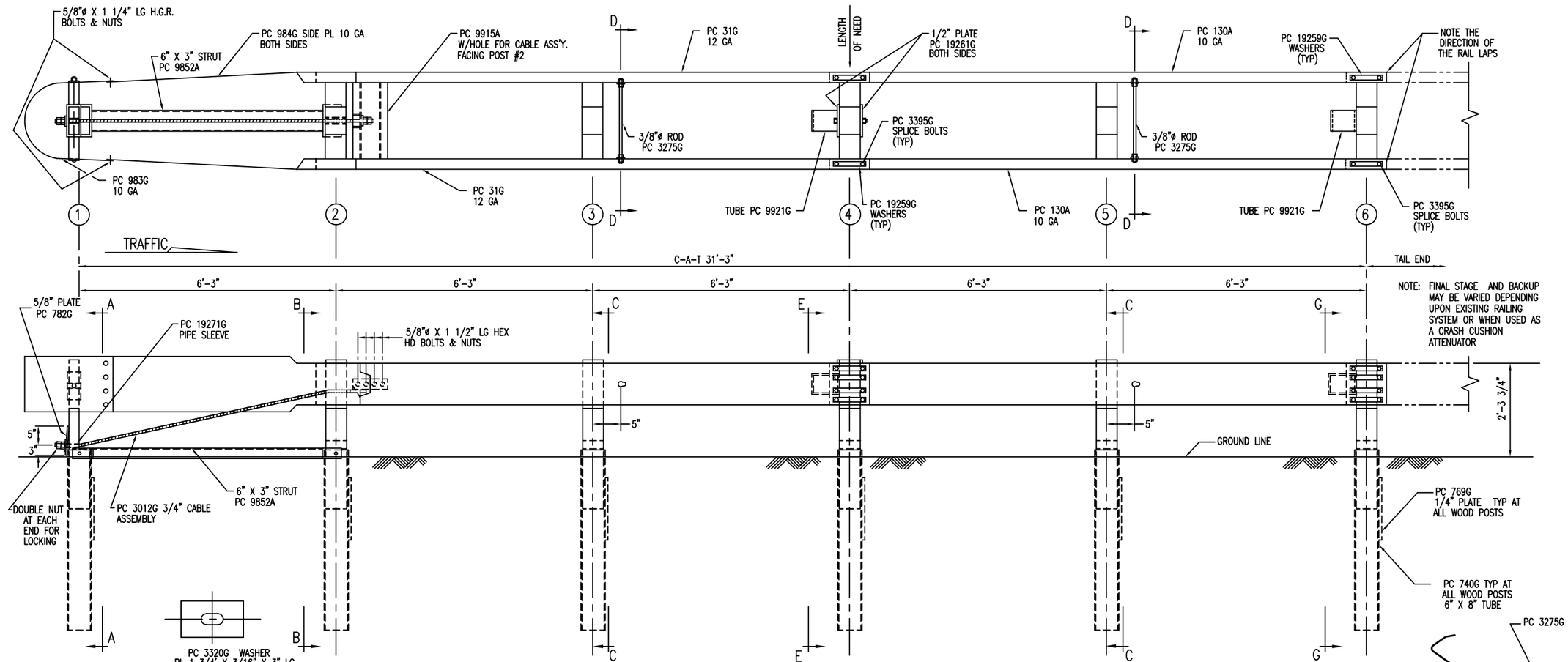


Appendix A -Bill of Materials - X-Lite Flared, MGS 37’ 6”

Item	Description	Full System	Kit Only
BSI-1310024-00	XLITE,CRIMPED POST SLOTS,GALV	2.00	2.00
BSI-1310027-00	XLITE,CRIMPED POST HOLES,GALV	3.00	3.00
BSI-1012086-00	POST II, X-LITE, GALV	1.00	1.00
BSI-1012103-00	IMPACT HEAD,X-LITE, GALV	1.00	1.00
BSI-1012093-00	SLIDER PANEL,FRONT,XLITE,GALV	1.00	1.00
BSI-1012090-00	Slider Bracket, X-Lite	1.00	1.00
BSI-1012096-00	BACK SLIDER PANEL,X-LITE,GALV	1.00	1.00
BSI-1012097-00	Ground Strut, X-Lite	2.00	2.00
BSI-1012098-00	Ground Strut Angle	1.00	1.00
BSI-1012104-00	Cable Anchor Assembly, X-Lite	1.00	1.00
K080123	Kit, X-Tension Shear Bolt,	1.00	1.00
BSI-1102027-00	WASHER,SQUARE,X-LITE,GALV	1.00	1.00
B090534	W-Beam Composite Blockout 8in,	6.00	-
4001115	Guardrail Bolt 5/8-11x 1 1/4	24.00	-
2001758	Guardrail Bolt 5/8-11 x 2”	1.00	-
2001840	Guardrail Bolt 5/8-11 x 10”	6.00	-
4001116	Guardrail Nut Recessed 5/8-11	33.00	2.00
2001580	Wshr 1 F436 Structural Gal	2.00	2.00
4000443	W-Beam Guardrail RWM02a	3.00	-
BSI-1312100-00	Soil Plate	1.00	1.00
2000220	C-Scr HH 5/8-11x3 1/2	2.00	2.00
2001636	Wshr 5/8 F436	4.00	4.00
2000312	Nut HX 5/8-11	2.00	2.00
BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1.00	1.00
BSI-1310016-KT	Transition Kit, MGS, X-Lite	1.00	1.00

MATERIALS INFORMATION

8. Alternative Crash Cushion System (Type A) Information



C-A-T BILL OF MATERIAL

PRODUCT CODE	QTY	DESCRIPTION
31G	2	12/12'6/0 CAT (GUARDRAIL)
130A	2	10/12'6/5'10:6'8/SP CAT (GUARDRAIL)
705G	1	2" x 5 1/2" PIPE
740G	6	4'6 TUBE SLEEVE
769G	6	1/4 x 18 x 24 SOIL PLATE
782G	1	5/8" x 8" x 8" BEARING PLATE
983G	1	10/NOSE PLATE/CAT/ROLLED
984G	2	10/SIDE PLATE CAT
3012G	1	CABLE 3/4 x 8'0/DBL SWG
3074B	5	WD 3'6 POST #2, 3, 4, 5, 6 CAT
3075B	1	WD 3'6 POST #1 CAT
3100B	2	WD BLOCK 1'2 #1 CAT
3101B	10	WD BLOCK 1'2 #2-6 CAT
3255G	4	3/8" FLAT WASHER
3263G	4	3/8"ø x 2" LAG SCREW
3275G	2	3/8"ø x 24 1/2" RESTRAINT ROD
3300G	20	5/8" FLAT WASHER
3320G	4	3/16" x 1 3/4" x 3" RECT WASHER
3340G	85	5/8" G.R. NUT
3360G	16	5/8"ø x 1 1/4" G.R. BOLT
3380G	8	5/8"ø x 1 1/2" HEX BOLT
3395G	32	5/8"ø x 1 3/4" HEX BOLT CAT
3478G	13	5/8"ø x 7 1/2" HEX BOLT
3497G	6	5/8"ø x 9 1/2" HEX BOLT
3650G	2	5/8"ø x 25" G.R. BOLT
3900G	2	1" FLAT WASHER
3910G	4	1" HEX NUT
4252G	8	3/8" HEX NUT
4258G	4	3/8" LOCK WASHER
4640G	8	5/8"ø x 24" HEX BOLT
9852A	1	CHANNEL STRUT x 6'-6"
9915A	1	SPACER CHANNEL CAT
9916A	1	10/BENT PLATE SLEEVE
9921G	2	6" SLEEVE 6 x 8
19259G	32	3/16" x 2" x 10" PLATE WASHER
19261G	2	1/2 x 3 x 7 POST PLATE
19271G	1	1" x 2 1/2" PIPE SLEEVE CAT

REV.	CHK'D	BY	DATE	REMARKS
6		BT	8-9-00	CHANGED SYSTEM HEIGHT, WAS 2'-3"
5		LH	6-22-00	REPLACED PC 766 WITH PC 769, CHANGED TITLE BLOCK
4		BT	4-10-97	ROTATED BLOCK PC 9921 90° AT POST 4 & 6
3		BT	3-10-97	DELETED PC 3072, 3073, 4470, CHG QTY 3074 & 3478
2		BT	8-12-96	SECTIONS A-A & B-B, CORRECTED PIPE SLEEVE PC No
1		BT	5-1-96	REVISED PC No 31G & 130A

C-A-T

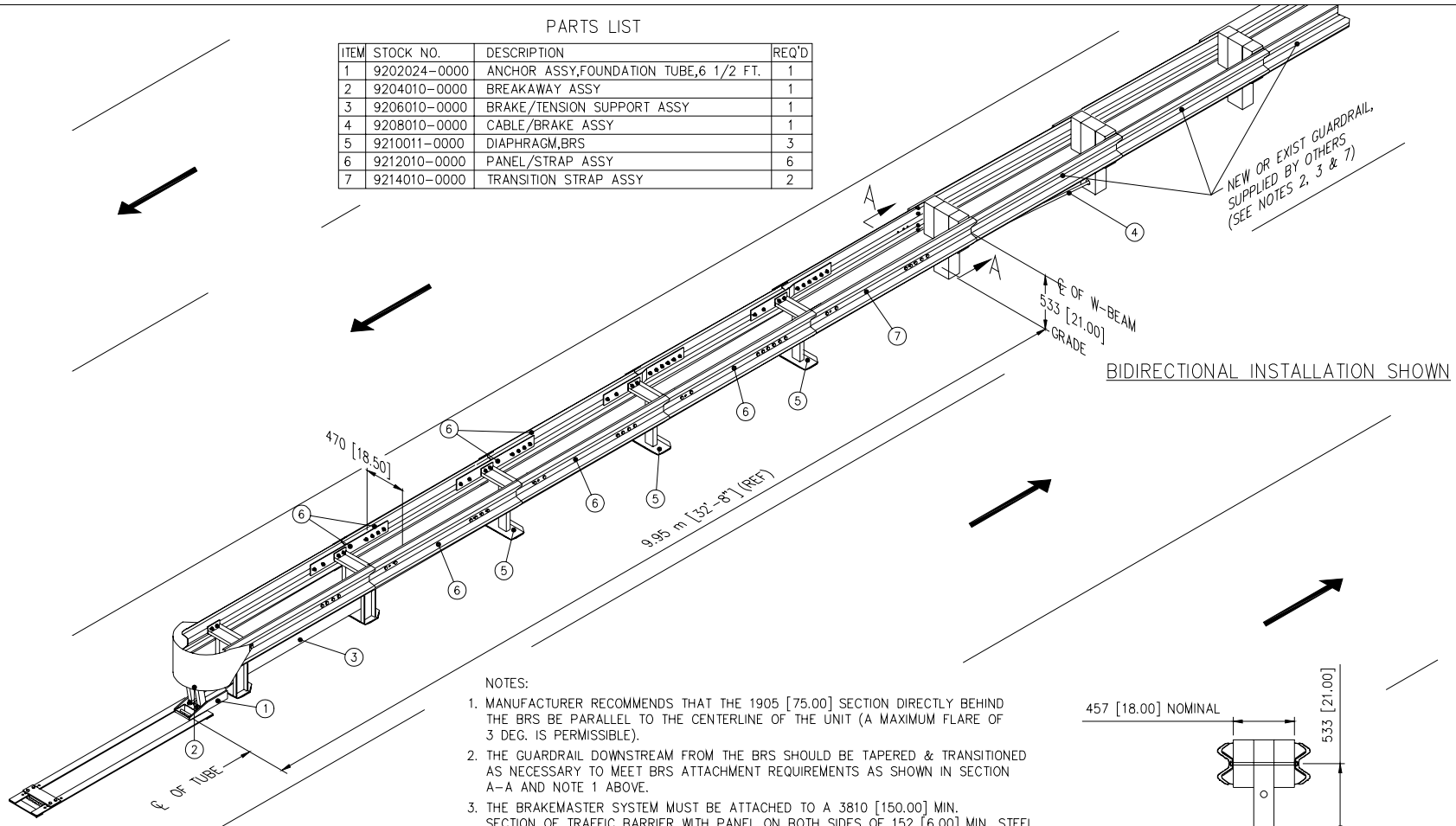
CRASH-CUSHION ATTENUATING TERMINAL
PLAN, ELEVATION & SECTIONS FOR USE
AS A LONGITUDINAL MEDIAN BARRIER TERMINAL
OR CRASH CUSHION ATTENUATOR

DRAWN	BT
CHECKED	EN
SCALE	N.T.S.
DATE	7-15-94
ENG. FILE #	SS245-01E
SHT.No.	E1 OF 1
DRAWING NO.	SS-245
REV.	6

TRINITY INDUSTRIES, INC.
HIGHWAY SAFETY PRODUCTS
2525 STEMMONS FREEWAY, DALLAS, TX 75207

PARTS LIST

ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	9202024-0000	ANCHOR ASSY,FOUNDATION TUBE,6 1/2 FT.	1
2	9204010-0000	BREAKAWAY ASSY	1
3	9206010-0000	BRAKE/TENSION SUPPORT ASSY	1
4	9208010-0000	CABLE/BRAKE ASSY	1
5	9210011-0000	DIAPHRAGM,BRS	3
6	9212010-0000	PANEL/STRAP ASSY	6
7	9214010-0000	TRANSITION STRAP ASSY	2



BIDIRECTIONAL INSTALLATION SHOWN

SECTION A–A

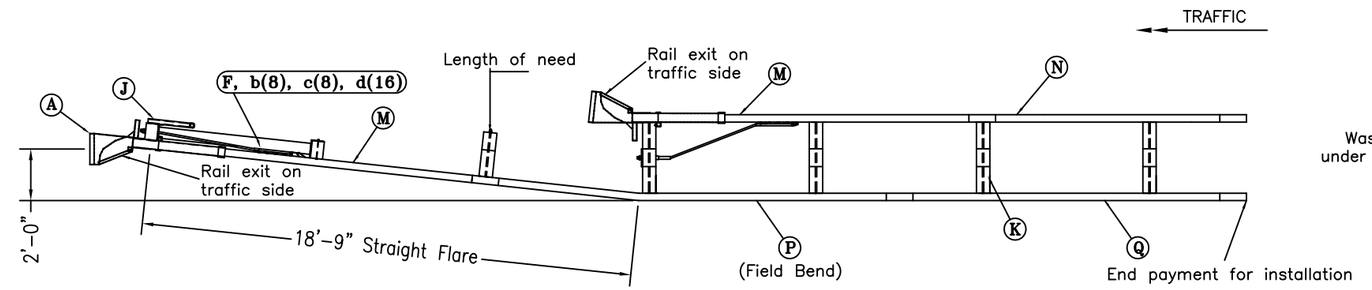
NOTES:

1. MANUFACTURER RECOMMENDS THAT THE 1905 [75.00] SECTION DIRECTLY BEHIND THE BRS BE PARALLEL TO THE CENTERLINE OF THE UNIT (A MAXIMUM FLARE OF 3 DEG. IS PERMISSIBLE).
2. THE GUARDRAIL DOWNSTREAM FROM THE BRS SHOULD BE TAPERED & TRANSITIONED AS NECESSARY TO MEET BRS ATTACHMENT REQUIREMENTS AS SHOWN IN SECTION A–A AND NOTE 1 ABOVE.
3. THE BRAKEMASTER SYSTEM MUST BE ATTACHED TO A 3810 [150.00] MIN. SECTION OF TRAFFIC BARRIER WITH PANEL ON BOTH SIDES OF 152 [6.00] MIN. STEEL OR WOODEN POSTS & BLOCKOUTS FOR PROPER IMPACT PERFORMANCE.
4. DURING AN IMPACT, THE FENDER PANELS MAY FLARE OUT AS MUCH AS 1220 [48.00] ON BOTH SIDES.
5. MANUFACTURER RECOMMENDS CROSS SLOPE NOT TO EXCEED 8% (4.5 DEG.) (12:1).
6. IN COMPLIANCE WITH THE AASHTO 1989 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS FOR PROPER IMPACT PERFORMANCE.
7. DOWNSTREAM GUARDRAIL MUST BE ANCHORED TO WITHSTAND A TENSION OF 534 kN [120,000 LBS.] WHICH COULD DEVELOP DURING A SIDE ANGLE IMPACT.
8. CAUTION: DO NOT ATTACH THE BRAKEMASTER SYSTEM DIRECTLY TO A RIGID CONCRETE BARRIER. A GUARDRAIL TRANSITION SECTION IS REQUIRED. CONTACT ENERGY ABSORPTION SYSTEMS AT (312) 467-6750 FOR MORE INFORMATION.
9. UNITS OF MEASURE ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
10. SEE THE "BRAKEMASTER SYSTEM DESIGN MANUAL" CODED ENE 704-1091 FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS BEFORE PLACING A SYSTEM AT A GIVEN SITE. INFORMATION AND ADDITIONAL COPIES OF ABOVE MANUAL ARE AVAILABLE BY CALLING THE CUSTOMER SERVICE DEPARTMENT AT (312) 467-6750.

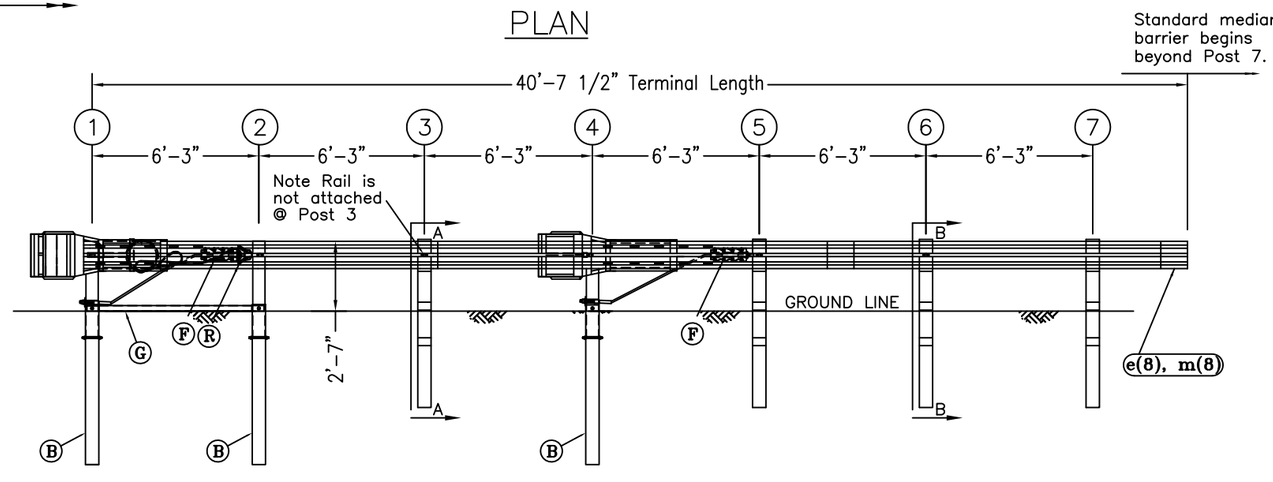
MODEL NO. 106106BRS5

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

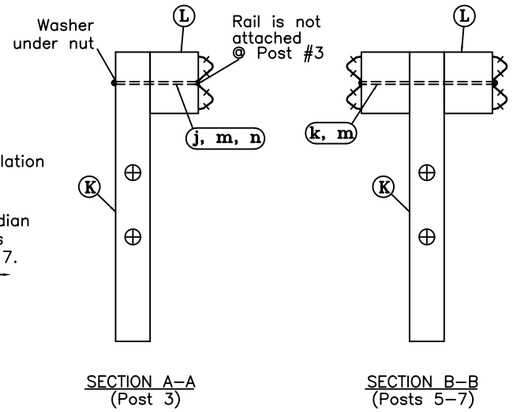
BRAKEMASTER®350 SYSTEM (BRS)
GENERAL ASSEMBLY
(BIDIRECTIONAL SYSTEM)



PLAN

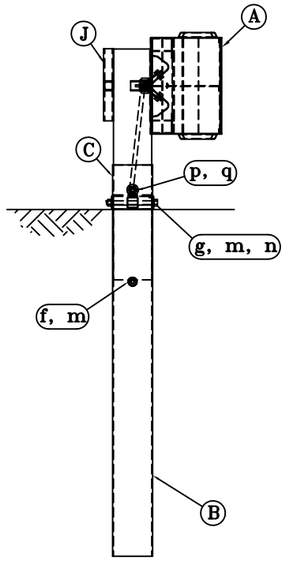


ELEVATION

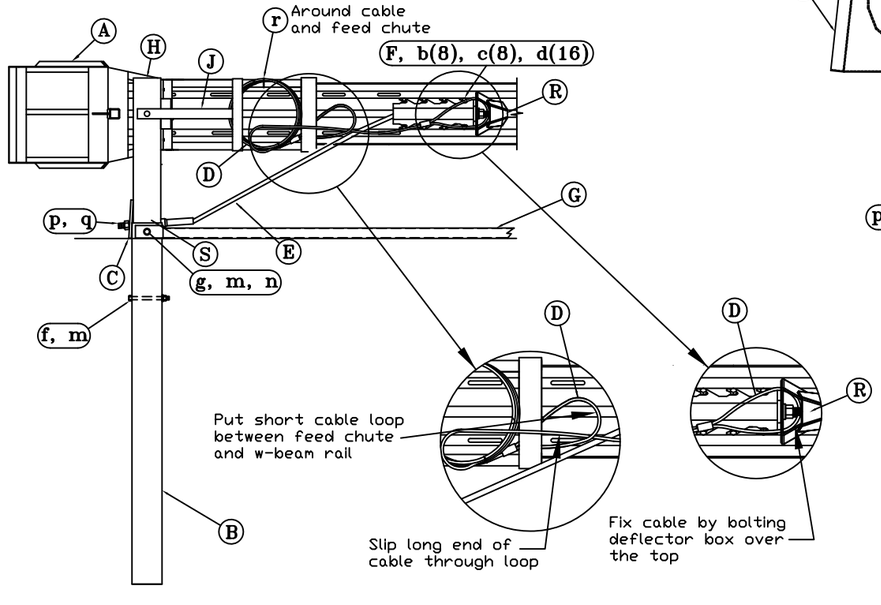


SECTION A–A
(Post 3)

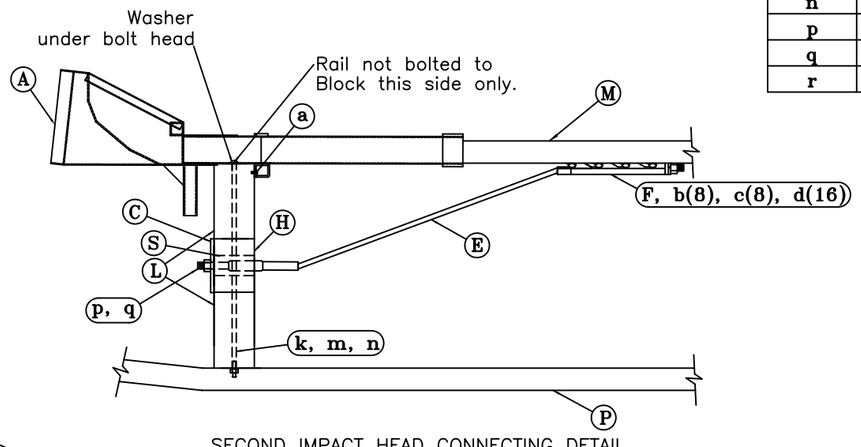
SECTION B–B
(Posts 5–7)



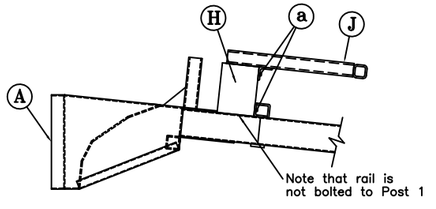
END VIEW OF POST 1



BACK VIEW OF POST 1



SECOND IMPACT HEAD CONNECTING DETAIL
(Post 4)



IMPACT HEAD CONNECTING DETAIL
(Post 1)

ITEM	QTY	DESCRIPTION	PART #
A	2	FLEAT IMPACT HEAD	F3000
B	3	SOIL TUBE, 6" x 8" x 6'–0"	S730
C	2	BEARING PLATE	E750
D	1	3/8" GALV Cable 20'–0"	C3820
E	2	BCT CABLE ANCHOR ASSEMBLY	E770
F	2	CABLE ANCHOR BOX	S760
G	1	GROUND STRUT	E780
H	3	UNIVERSAL BCT POST	UP650
J	1	POST BREAKER	PBMT
K	4	UNIVERSAL CRT POST	UP671
L	9	MGS TIMBER BLOCKOUT OR RECYCLED EQUIV	P676
M	2	W–BEAM END SECTION, 12 GA. 12.5'	SF1303
N	1	MGS W–BEAM SECTION, 12 GA. 9'–4 1/4"	G1202A
P	1	MGS W–BEAM GUARDRAIL, 12 GA. 15'–7 1/2"	G1204A
Q	1	MGS W–BEAM GUARDRAIL, 12 GA. 12'–6"	G1203A
R	1	DEFLECTOR BOX	DBMT
S	2	PIPE SLEEVE	E740
		HARDWARE	
a	6	3/8" DIA. x 3" LAG SCREW	E350
b	16	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
c	16	1/2" A325 STRUCTURAL NUT	N055A
d	32	1 1/16" OD x 9/16" ID A325 WASHER	W050A
e	40	5/8" DIA. X 1 1/4" SPLICE BOLT	B580122
f	3	5/8" DIA. x 7 1/2" HEX BOLT	B580754
g	3	5/8" DIA. x 10" HEX BOLT	B581004
h	1	5/8" DIA. x 10" H.G.R. BOLT (POST 2)	B581002
j	1	5/8" DIA. x 22" H.G.R. BOLT (POST 3)	B582202
k	4	5/8" DIA. x 33" H.G.R. BOLT (POSTS 4–7)	B583302
m	52	5/8" H.G.R. NUT	N050
n	6	5/8" H.G.R. WASHER	W050
p	4	1" ANCHOR CABLE HEX NUT	N100
q	4	1" ANCHOR CABLE WASHER	W100
r	1	Cable Tie	CT100ST

GENERAL NOTES:

1. Breakaway posts are required with the FLEAT–MT.
2. All bolts, nuts, cable assemblies, cable anchors and plates shall be galvanized.
3. The soil tubes shall not protrude more than 4" above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
4. The soil tubes may be driven with an approved driving head. Soil tubes should not be driven with the post in the tube. If the tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
5. When rock is encountered during excavation, a 12' Dia. post hole, 20" deep may be used if approved by the engineer. Granular material will be placed in the bottom of the hole approx. 2 1/2" deep to provide drainage. The soil tubes will be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
6. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.

RSI
Road Systems, Inc.
Big Spring, TX
Phone: 432-263-2435
or Phone: 330-346-0721

Median FLEAT Terminal
Midwest Guardrail System
Wood Post

Sheet: S1
Date: 08/22/11
Drawing Name: MEDFLT-W-MGS
Scale: NONE
By: JRR
Rev: 0

MATERIALS INFORMATION

9. Alternative Crash Cushion System (Type B) Information

SMART CUSHION®

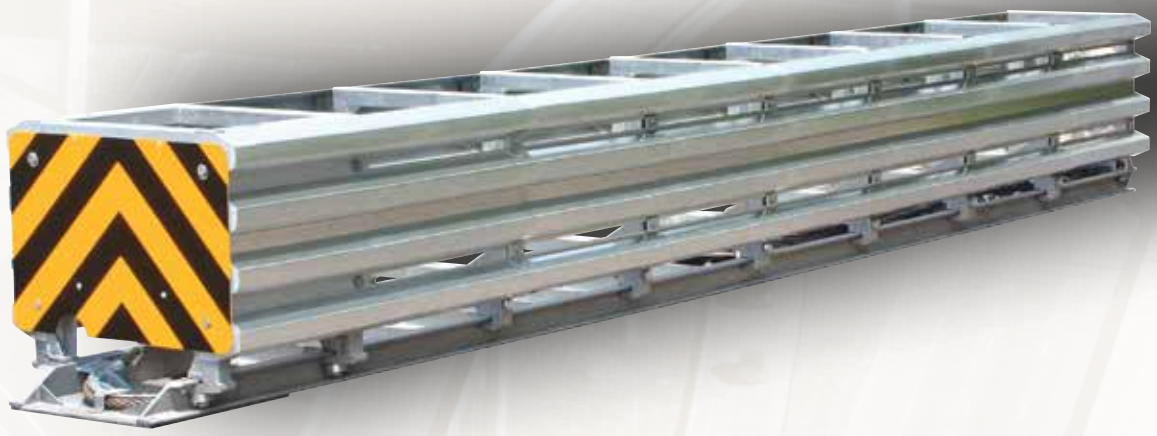
The World's Only

Speed-Dependent

Crash Attenuators

SMART CUSHION INNOVATIONS®

NCHRP 350 Approved



Marketed and Distributed by

Work Area Protection Corp.

SMART CUSHION INNOVATIONS®

The World's Only Speed-Dependent Crash Attenuators

The Smart Cushion® crash attenuator is a revolutionary, speed-dependent product that varies stopping resistance during an impact. The Smart Cushion® crash attenuator allows lighter and slower-moving vehicles to have longer ridedown distances and lower ridedown g-forces.

Unlike fixed-resistance attenuators, the Smart Cushion® attenuator does not reach maximum stopping resistance unless a vehicle is traveling at the maximum design speed. This fully re-directive, non-gating, bidirectional, impact attenuator was designed for maximum safety and reusability, as well as outstanding durability before, during and after an impact.

The Smart Cushion® is the only attenuator with a reverse-tapered design to eliminate side panel stress during a collapse. It also has an extremely low angle of exit on side impacts (<1°) to keep vehicles from rebounding back into traffic and causing secondary accidents. This is the lowest angle of exit for any re-directive attenuator on the market.

How It Works

The hydraulic porting of the attenuator ensures that the proper resistance is used to stop the vehicle before it reaches the end of the cushion's usable length. The Smart Cushion® was specifically designed for durability and resetability to enable resets to be performed in less than 30 minutes. Side impacts within NCHRP 350 specifications do not damage the attenuator.

After an impact, the cushion requires a dual-stage pull-out with the replacement of two 1/4" shear bolts. The crash attenuator requires a minimal inventory of spare parts because of the new side panels' durability and the normal requirement of only two shear bolts on the frontal impact reset. Minimal damage means quick resetting and reduced worker exposure to traffic, as well as lower costs for traffic control, replacement parts and labor.

Ready To Install

Smart Cushion® attenuators come fully assembled for a pick-and-set install. A typical installation can be performed in less than 90 minutes. The Smart Cushion® is self-supporting and requires no additional support for permanent or temporary construction applications.

NCHRP 350 Test Results

All NCHRP 350 tests were performed on the same unit over four consecutive days. All tests showed outstanding results for ridedown g-forces and low angle of exit. There were no replacement parts required prior to the next test except for shear bolts.

SMART CUSHION INNOVATIONS®

Highlights

Safety Benefits

- Variable resistance (speed-dependent), not fixed resistance, provides consistent deceleration during ridedown.
- Longer ridedown distances and lower sustained g-forces for lighter or slower-moving vehicles.
- Quick and easy resets for reduced worker exposure to traffic.
- Low angle of exit on side impacts (<1°) to keep vehicle from rebounding back into traffic.
- No mobilization required after side impacts reduces public and worker exposure.

Cost Benefits

- Few replacement parts requirement virtually eliminates spare parts inventory and parts costs.
- Thirty minute resets reduces labor and traffic control costs.
- The reverse-tapered design eliminates side panel stress on frontal impacts to reduce damage and system fatigue from multiple impacts.
- Life cycle cost savings increase dramatically as additional impacts occur.
- No damage on side impacts can save up to 75% on repair costs.
- Systems shipped from factory fully assembled reduce on-site labor.

Repair Costs

Based on NCHRP 350 test results, the SCI100GM required the following parts and labor:

NCHRP 350 TEST LEVEL 3 REPAIR RESULTS	Part Names	Cost	Repair Hrs.	Cost	Total Cost
#3-31 2000 kg vehicle 0 degree frontal impact at 102 km/h	2 - Shear Bolts	$1	2 man hours	$80	$81
#3-32 820 kg vehicle 15 degree frontal impact at 101 km/h	2 - Shear Bolts	$1	2 man hours	$80	$81
#3-33 2000 kg vehicle 15 degree frontal impact at 101 km/h	2 - Shear Bolts	$1	2 man hours	$80	$81
#3-37 2000 kg vehicle 20 degree side impact at 99 km/h	0	$0	0	$0	$0
#3-39 2000 kg vehicle 20 degree rev. side impact at 99 km/h	0	$0	0	$0	$0

Test Levels Available

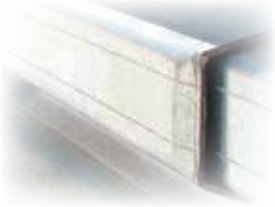
The SCI70GM is a Test Level 2 (45 MPH) attenuator and the SCI100GM is a Test Level 3 (62 MPH) attenuator.
Both attenuators can protect a wide range of hazards including but not limited to bridges, median barriers and highway signs.

reusability.

The first speed-dependent, variable-resistance attenuator that can ramp resistance up or down to provide the smoothest ridedown of any system on the market.

Features

Support Gussets
Gussets located behind the panels reduce gap formation and deformation to prevent snagging on reverse side impacts.

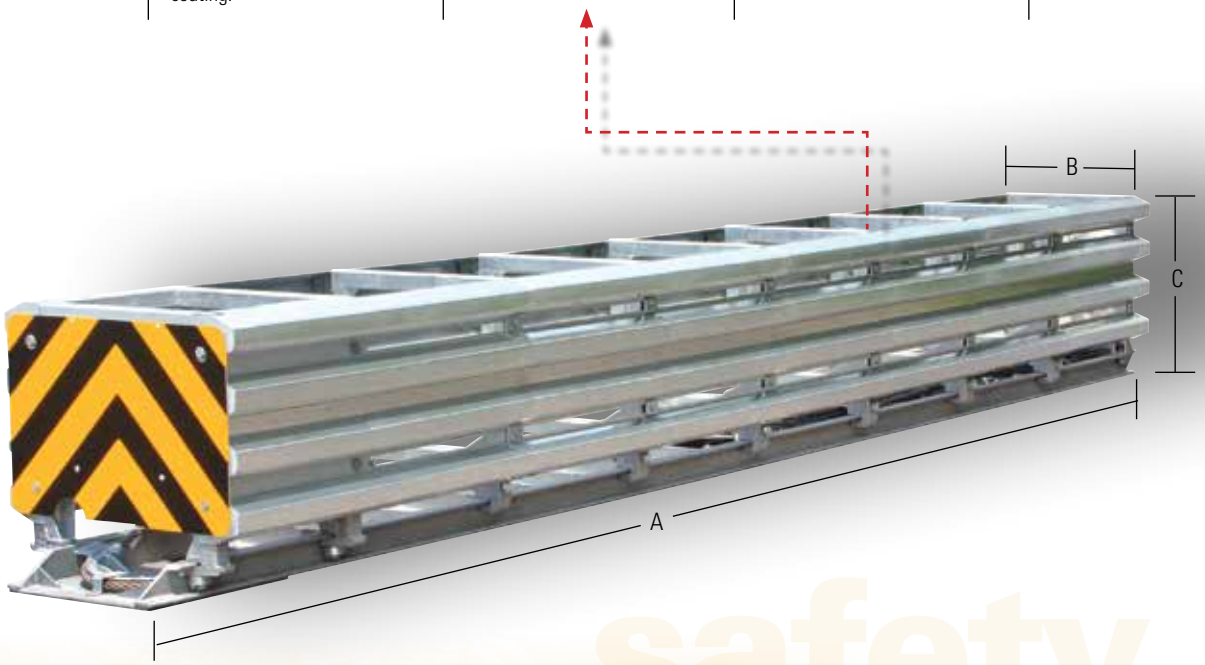


Stronger Side Panel
The panel is over 90% stronger than curved profiles. The profile allows the edges to be beveled, reducing the potential for snagging and damage on reverse-direction impacts. The panel also smoothly redirects vehicles on side impacts. The side panel is fabricated from 10-gauge, 60-ksi, minimum-yield steel with an ASTM A123 galvanized coating.

Cable & Cylinder System
This system allows longer ridedown distances for smaller vehicles, as well as smoother ridedown with lower g-forces for all vehicles. The cylinder's hydraulic porting assures a controlled ridedown by applying the necessary resistance required based on the speed and mass of the vehicle.

Side Guide Design
This revolutionary design withstands side impacts with no damage.

Front Rollers
The roller guide design on the front sled produces a smooth, aligned collapse by reducing friction and binding.



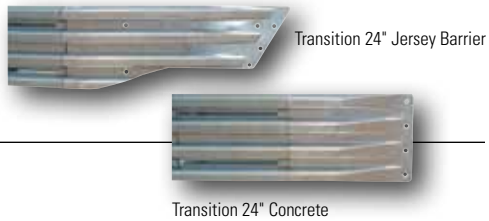
SCI Dimensions	Test Level 2	Test Level 3
A	13' 6"	21' 6"
B	24"	24"
C	34"	34"
Weight	2470 lbs.	3450 lbs.

Weights are for attenuators only

About Work Area Protection Corporation

Work Area Protection Corporation is the international leader in traffic control devices and work zone safety products. Since 1969, we have been meeting customer needs and exceeding quality standards with a wide range of highway and construction safety products. We back these products with knowledgeable, personalized customer service and strong distributor support.

Part No.	Description	Weight
Attenuators		
270128	SCI100GM Attenuator 24" wide w/Concrete Anchors Test Level 3	3500 lbs.
270127	SCI100GM Attenuator 24" wide w/Asphalt Anchors Test Level 3	3575 lbs.
270126	SCI70GM Attenuator 24" wide w/Concrete Anchors Test Level 2	2500 lbs.
270125	SCI70GM Attenuator 24" wide w/Asphalt Anchors Test Level 2	2550 lbs.
Anchor Kits		
270667	Concrete Anchor Kit for SCI100GM - requires #272612 Epoxy Kit	
270663	Asphalt Anchor Kit for SCI100GM - requires #272610 Epoxy Kit	
270666	Concrete Anchor Kit for SCI70GM - requires #272611 Epoxy Kit	
270664	Asphalt Anchor Kit for SCI70GM - requires #272609 Epoxy Kit	
Accessories		
270683	Shear Bolt	
273378	Delineator Panel Yellow Test Level 3	
273380	Delineator Panel Yellow Test Level 2	
272621	Reset Parts Kit Test Level 3	
272620	Reset Parts Kit Test Level 2	
Transitions		
275297	Transition 24" Jersey Barrier - Right (viewed from front)	
275294	Transition 24" Jersey Barrier - Left (viewed from front)	
275263	Transition 24" Concrete - Left & Right	
Transitions available for 30", 36", wide gores, various shaped barriers and guardrails		



Transition 24" Jersey Barrier

Transition 24" Concrete

Disclaimer

This product is only intended for use as a re-directive impact attenuator. Installations must be performed strictly according to manufacturer's specifications. Improper installation, modification, or unintended use may create a hazardous condition that can cause personal injury, property damage or death. Any modification or unintended use of this product shall immediately void all manufacturer's warranties. SCI Products Inc. disclaims all liability for injuries to persons or property resulting from any modifications to, unintended use of, or installation of, this product other than in strict accordance with the manufacturer's specifications.

Designs are subject to change without notice.

Cones • Barrels • Channelizers • ITS Products • Arrow Boards • Solar Message Centers

Work Area Protection Corporation
2500 Production Drive • St. Charles, IL 60174
Phone: 630.377.9100 • **Orders: 800.327.4417**
Fax: 630.377.9270 Web: www.workareaprotection.com

Member ATSSA

Distributed by:

QuadGuard® ELITE

Crash Cushion

The QuadGuard® Elite offers the added value of reusable cylinders for applications with above average impact frequency. The system is NCHRP 350 Test Level 2 and Test Level 3 compliant as a redirective, non-gating crash cushion. The QuadGuard® Elite's cylinders are made of High Density Polyethylene (HDPE), a material that can typically with-stand multiple impacts before requiring replacement.

QuadGuard® Elite, as a member of the QuadGuard® family of crash cushions, utilizes many of the same components as the QuadGuard®.

Features

- Reusable High Density Polyethylene (HDPE) cylinders provide low life cycle costs.
- Flex-belt nose.
- High strength Quad-Beam™ panels.
- Needs no anchoring chains or tension cables.
- Compact, modular design accommodates speeds from 25 mph (40 km/h) to 70 mph (113 km/h).
- Custom connections available.
- Systems available for various lengths, widths and speeds.

Back-Up Structure Attachments

- Simplified backups - Tension strut or concrete.
- Bridge pier(s) and parapet(s).
- Square block(s).
- Temporary & permanent concrete barrier(s).
- Thrie-beam.
- W-beam.

Installation and Repair Advantages

- Reusable HDPE cylinders may allow for multiple impacts.
- Monorail base eliminates need for anchoring chains/tension cables.
- QuadGuard® Elite may be reusable after NCHRP 350 testing impacts.
- Anchorage options include: asphalt, concrete, soil- drive pile.

Specifications

Typical eight-bay unit (available in widths of 24", 30", 36", 69", 90" or custom widths):

- 26.75' Long (8 m)
- 24" (610 mm) min., 90" (2.29 m) max. width at backup structure.
- 4900 lbs. (2223 kg)

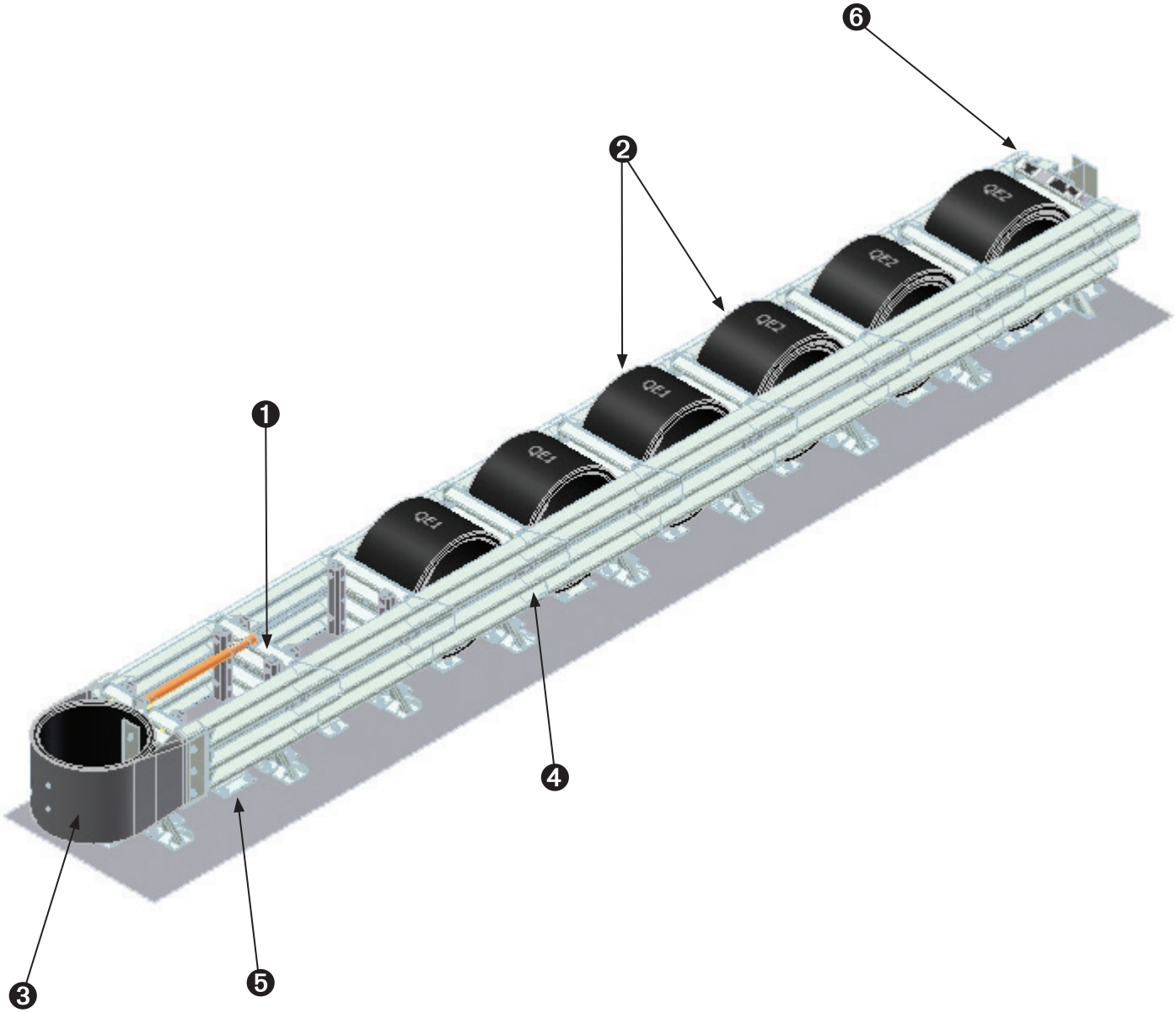
1-800-527-6050
www.highwayguardrail.com

1-888-323-6374
www.energyabsorption.com

4-12

QuadGuard® ELITE
Crash Cushion

1. Diaphragm
2. HDPE Cylinder
3. Flex-Belt Nose
4. Quad-beam™ Panel
5. Monorail Base
6. Backup



UNIVERSAL TAU-II-R® | REDIRECTIVE, NON-GATING CRASH CUSHION - REUSABLE

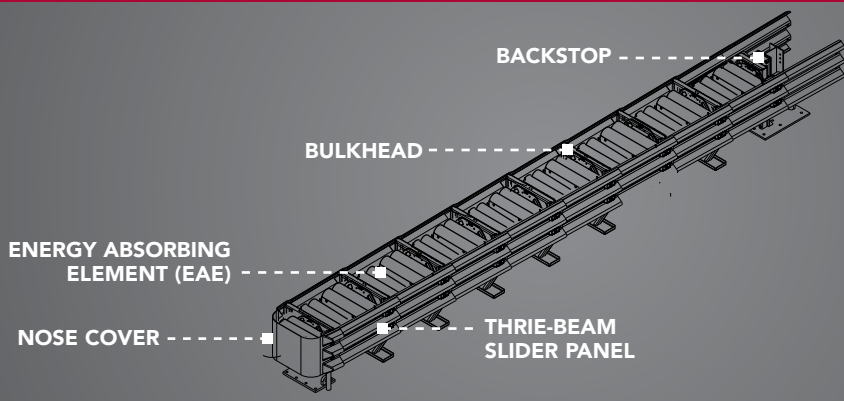
- SUSTAINS MULTIPLE DESIGN IMPACTS
- SELF RESTORING
- EASY TO CONVERT IN-SERVICE TAU-II SYSTEMS
- NCHRP 350 ACCEPTED

BARRIER SYSTEMS®
BY LINDSAY

UNIVERSAL TAU-II-R® | REDIRECTIVE, NON-GATING CRASH CUSHION - REUSABLE

PHYSICAL SPECIFICATIONS

Classification	R-NG-R	
TL-3 Length	23′ 10″	7.3 m
Width	27 - 102″	0.7 - 2.6 m
Height	31 ½″	800 mm
Test Level	NCHRP 350	TL 1/2/3



DESIGNED TO WITHSTAND MULTIPLE IMPACTS

The Redirective, Non-Gating, Reusable (R-NG-R) Universal TAU-II-R Crash Cushion is designed to meet NCHRP Report 350 as a reusable attenuator to protect motorists at speeds up to 70 mph (110 km/h) from hazards that range from 27 - 102″ (700 mm - 2.6 m). The TAU-II-R System uses hyperelastic polyurethane energy absorbing elements tested to withstand multiple design head-on impacts before requiring replacement. The Universal TAU-II-R System is part of the Universal TAU-II Family so maximum interchangeability between all Systems helps keep inventory costs low. In addition, existing TAU-II Systems can be upgraded to reusable Universal TAU-II-R Systems by replacing existing cartridges and nose with Universal TAU-II-R modules and heavy duty nose.

FREQUENTLY ASKED QUESTIONS

How easy is it to convert the Universal TAU II System to the Universal TAU-II-R System?

Universal TAU-II cartridges and nose can be simply replaced with the Universal TAU-II-R energy absorbing elements (EAEs) and reusable nose with no foundation modifications required. The entire conversion will take less than 3 hours with a trained crew and appropriate tools.

Can any width or length of Universal TAU-II System be converted to a Universal TAU-II-R System?

All Universal TAU-II Parallel Systems are compatible with Universal TAU-II-R Systems. Most, but not all Universal TAU-II Wide Systems are compatible with Universal TAU-II-R Systems.

Does the Universal TAU-II-R System restore itself after a design capacity head-on impact?

The Universal TAU-II-R System will self restore up to 80% after some, but not all impacts.

FEATURES

- High speed designs available
- Hyperelastic (HE) elements designed to withstand multiple design capacity head-on impacts
- Can convert existing Universal TAU-II Partially Reusable Systems to Universal TAU-II-R Reusable Systems by simply installing Universal TAU-II-R elements and reusable nose
- Utilizes same universal parts that are used with TAU-II Systems to reduce inventory costs
- Minimum number of anchors
- Uses standard transitions

DISTRIBUTED BY:

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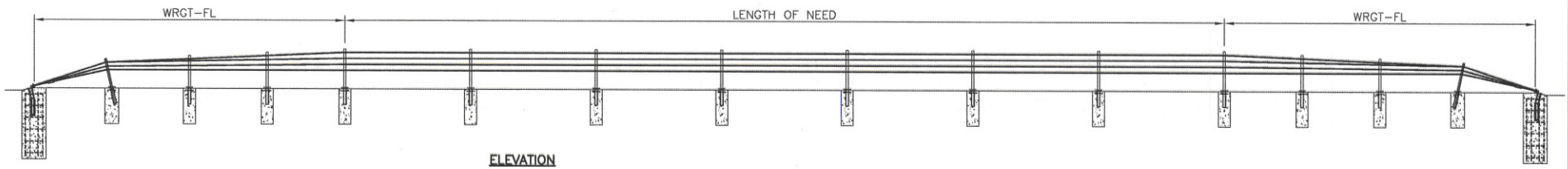
Lindsay Transportation Solutions Sales and Services, Inc.
180 River Road • Rio Vista, CA 94571 • +1 707.374.6800 U.S. Toll Free: 888.800.3691 • www.barrriersystemsinc.com

General details for the TAU-II-R System are subject to change without notice to reflect improvements and upgrades.

PT # TAUR04-03252013

MATERIALS INFORMATION

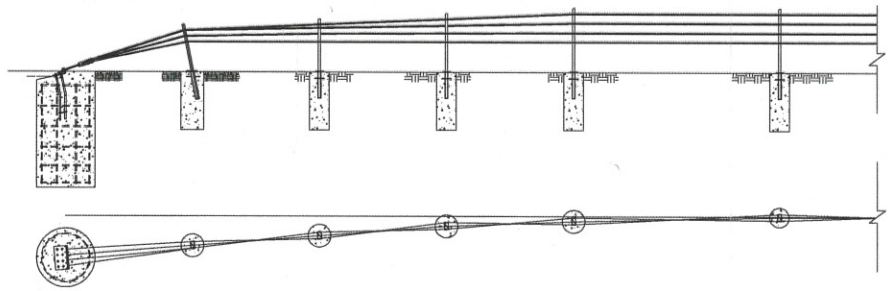
10. Alternative High Tension Cable Barrier Information



ELEVATION

PLAN

WRGT–FL END ANCHOR



* SEE SHEET 3 OF 3 FOR FURTHER INFORMATION

ROPE TENSION TABLE		
ROPE TEMP. (F°)	TENSION (LBS)	TENSION (kN)
0	5700	25.4
5	5550	24.7
10	5400	24.0
15	5250	23.4
20	5100	22.7
25	4950	22.0
30	4800	21.4
35	4650	20.74
40	4500	20.0
45	4350	19.3
50	4200	18.7
55	4050	18.0
60	3900	17.3
65	3750	16.7
70	3600	16.0
75	3450	15.3
80	3300	14.7
85	3150	14.0
90	3000	13.3
95	2850	12.7
100	2700	12.0
105	2550	11.3
110	2400	10.7
115	2250	10.0
120	2100	9.3
125	1950	8.7
130	1800	8.0
135	1650	7.3
140	1500	6.7

* ROPE TENSION: ±20% AFTER 2–WEEK INTERVAL

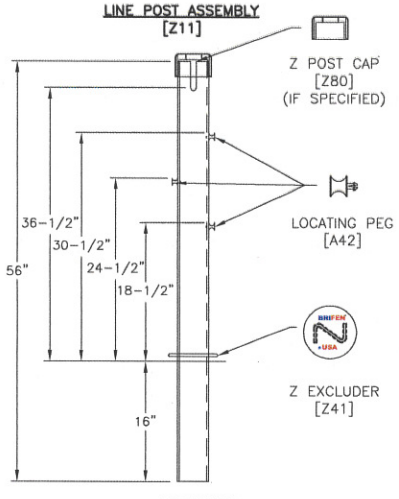
GENERAL NOTES:

1. BRIFEN DRAWINGS, SPECIFICATIONS, AND PRODUCT MANUAL SHOULD BE REVIEWED PRIOR TO STARTING AN INSTALLATION. FOR ADDITIONAL INFORMATION OR QUESTIONS, CONTACT BRIFEN USA, INC. AT 1–866–427–4336.
2. THE BRIFEN WRSF HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL–4 CONDITIONS ON SLOPES 6:1 OR FLATTER AND NCHRP 350 TL–3 CONDITIONS ON SLOPES 4:1 TO 6:1.
3. THE POST SPACING SHALL BE DETERMINED BY THE SPECIFYING AGENCY. POST SPACING MAY BE DECREASED TO AVOID OBSTRUCTIONS OR UTILITIES. IN NO EVENT SHALL THE POST SPACING EXCEED 21'–0".
4. BRIFEN WRSF SHALL BE PLACED ON A SMOOTH SURFACE, WITHOUT HUMPS, DROP–OFFS, HOLES, ETC THAT WOULD INTERFERE WITH THE STABILITY OF THE ERRANT VEHICLE. GRADING, FILL AND COMPACT MAY BE REQUIRED TO ASSURE THAT ROPES ARE INSTALLED AT THE DESIGN HEIGHT.
5. THE WRGT–FL END ANCHOR HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL–3 CONDITIONS. THE LENGTH OF NEED BEGINS 31'–0" FROM THE END ANCHOR. POSTS A THROUGH POST B3, SPACED 6'–6" APART, HAVE WEAKENED CUTS AT THE GROUND THAT SHALL FACE THE ANCHOR.
6. ANCHOR AND LINE POST DIMENSIONS AND STEEL REINFORCEMENT WILL BE DETERMINED ON PROJECT SPECIFIC SOIL CLASSIFICATION, PROPERTIES AND TEMPERATURE EXTREMES. CONTACT BRIFEN USA, INC. FOR ADDITIONAL INFORMATION.
7. ALL REINFORCEMENT AND CONCRETE FOR THE ANCHORS AND LINE POSTS PROVIDED BY OTHERS.
8. REINFORCEMENT AND CONCRETE PROPERTIES SHALL MEET AGENCY SPECIFICATIONS.
9. FOR PLACEMENT NEAR GUARDRAIL OR OTHER OBSTACLES CONTACT BRIFEN USA, INC. FOR ADDITIONAL DRAWINGS AND SUPPORT.
10. TAPER RATES FOR THE BRIFEN WRSF ARE AS FOLLOWS:
    HORIZONTAL: 25:1 MAXIMUM, 50:1 PREFERABLE
    VERTICAL: 25:1 MAXIMUM, 50:1 PREFERABLE

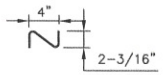
BRIFEN ★ USA INC.

Revision			BRIFEN WRSF NCHRP 350 TL–4 INSTALLATION & LAYOUT DETAILS		
No.	Date	By			
1.			Date 6.27.12	Drawn By Manita Elizondo	Scale None
2.					
3.			VERSION 12.1		Sheet No 1 OF 3
4.			Dwg. No.	WRGTFL–11–001b	
5.					

LINE POST ASSEMBLY [Z11]



ELEVATION

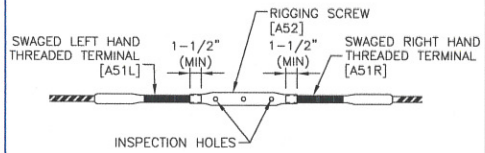


PLAN

NOTES SPECIFIC TO LINE POST ASSEMBLY

1. ROPE HEIGHTS SHALL BE ±1" TO GROUND LINE.
2. POST SHALL BE ±4" FROM VERTICAL PLUMB.
3. POST CAPS SHALL BE USED IF SPECIFIED.
4. REFLECTORS SHALL BE SPACED ACCORDING TO AGENCY SPECIFICATIONS.
5. REFLECTORS CAN BE PLACED ON THE POST CAP OR POST.

ROPE CONNECTION DETAIL

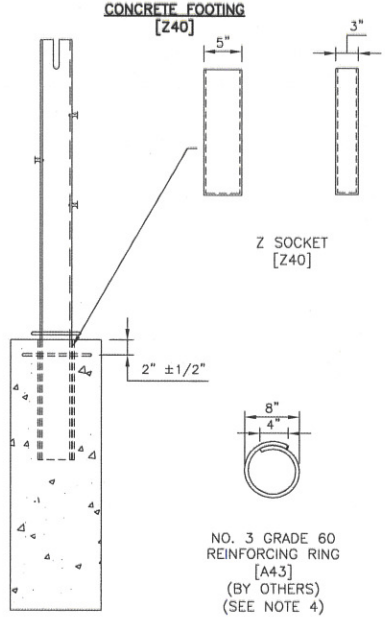


NOTES SPECIFIC TO ROPE CONNECTION DETAIL

1. THE WIRE ROPE TERMINALS SHALL BE THREADED A MINIMUM OF 1-1/2" INTO RIGGING SCREW.
2. AFTER FINAL TENSIONING, THE TERMINALS SHALL BE VISIBLE IN THE INSPECTION HOLES.

SOCKET ASSEMBLY

CONCRETE FOOTING [Z40]



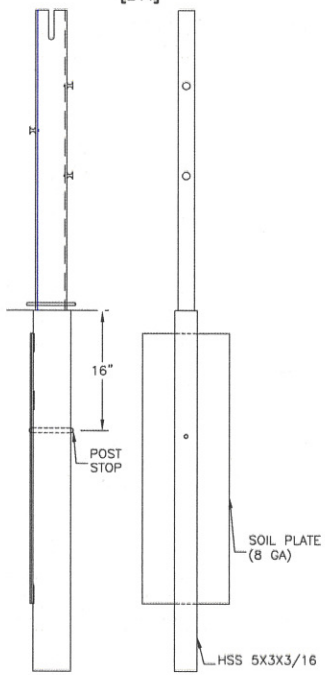
ELEVATION

PLAN

NOTES SPECIFIC TO CONCRETE FOOTING

1. SIZE OF FOOTING WILL BE DETERMINED BY SOIL CONDITIONS, FOUNDATION TYPE AND PROJECT CONDITIONS.
2. CONCRETE BASED ON AGENCY SPECIFICATIONS.
3. CONCRETE BY OTHERS.
4. REINFORCING RING (BY OTHERS) WILL BE USED ACCORDING TO FOUNDATION SIZE AND TYPE. THE REINFORCING RING MAY BE OMITTED IF THE FOOTING IS PLACED IN A CONTINUOUS CONCRETE MOW STRIP.
5. FOOTING SHALL BE FLUSH WITH THE GROUND LINE, TO A MAXIMUM OF 1 INCH BELOW OR ABOVE GROUND LINE.
6. SOCKET SHALL BE ±2° OF VERTICAL PLUMB.

DRIVE SOCKET [Z44]



ELEVATION SIDE

PLAN

NOTES SPECIFIC TO DRIVE SOCKETS

1. SIZE OF SOIL PLATE WILL BE DETERMINED BY SOIL CONDITIONS AND PROJECT CONDITIONS.
2. THE SOIL PLATE SHALL BE PARALLEL TO ROADWAY AND CAN FACE TOWARD OR AWAY FROM THE TRAVEL LANE.
3. FOOTING SHALL BE FLUSH WITH THE GROUND LINE, TO A MAXIMUM OF 1 INCH BELOW OR ABOVE GROUND LINE.
4. SOCKET SHALL BE ±2° OF VERTICAL PLUM.
5. SOCKETS SHALL BE DRIVEN IN A MANNER TO NOT DISTORT OR DESTROY THE TOP OF SOCKET TO A DEGREE THAT PLACES THE SOCKET OR LINE POST OUT OF CONSTRUCTION TOLERANCES.

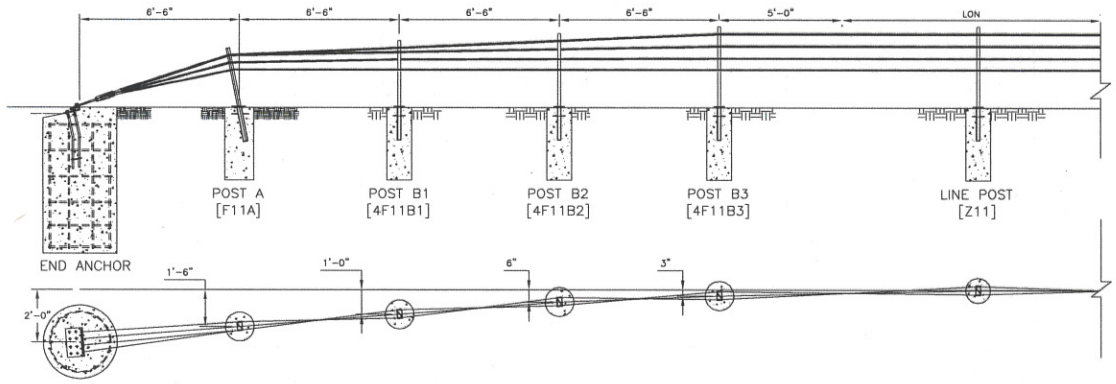
GENERAL NOTES:

1. BRIFEN DRAWINGS, SPECIFICATIONS, AND PRODUCT MANUAL SHOULD BE REVIEWED PRIOR TO STARTING AN INSTALLATION. FOR ADDITIONAL INFORMATION OR QUESTIONS, CONTACT BRIFEN USA, INC. AT 1-866-427-4336.
2. THE BRIFEN WRSF HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL-4 CONDITIONS ON SLOPES 6:1 OR FLATTER AND NCHRP 350 TL-3 CONDITIONS ON SLOPES 4:1 TO 6:1.
3. THE POST SPACING SHALL BE DETERMINED BY THE SPECIFYING AGENCY. POST SPACING MAY BE DECREASED TO AVOID OBSTRUCTIONS OR UTILITIES. IN NO EVENT SHALL THE POST SPACING EXCEED 21'-0".
4. BRIFEN WRSF SHALL BE PLACED ON A SMOOTH SURFACE, WITHOUT HUMPS, DROP-OFFS, HOLES, ETC THAT WOULD INTERFERE WITH THE STABILITY OF THE ERRANT VEHICLE. GRADING, FILL AND COMPACTION MAY BE REQUIRED TO ASSURE THAT ROPES ARE INSTALLED AT THE DESIGN HEIGHT.

BRIFEN ★ USA INC.

Revision			BRIFEN WRSF NCHRP 350 TL-4 LENGTH OF NEED COMPONENTS		
No.	Date	By			
1.					
2.			Date 6.27.12	Drawn By Manita Elizondo	Scale None
3.					
4.			VERSION 12.1		Sheet No 2 OF 3
5.			Dwg. No.	WRGTFL-11-002b	

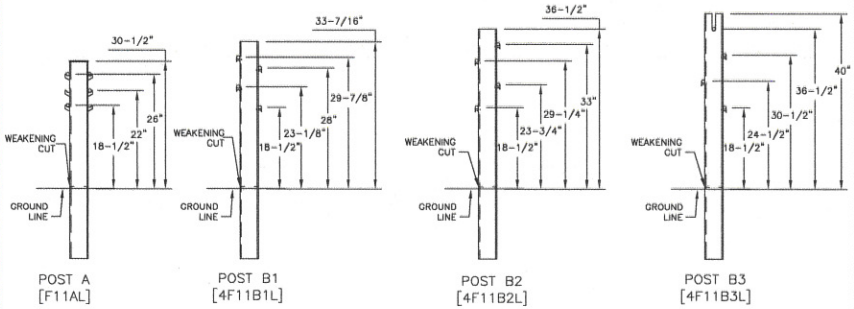
WRGT–FL END ANCHOR LAYOUT



GENERAL NOTES:

1. BRIFEN DRAWINGS, SPECIFICATIONS, AND PRODUCT MANUAL SHOULD BE REVIEWED PRIOR TO STARTING AN INSTALLATION. FOR ADDITIONAL INFORMATION OR QUESTIONS, CONTACT BRIFEN USA, INC. AT 1–866–427–4336.
2. THE WRGT–FL END ANCHOR HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL–3 CONDITIONS. THE LENGTH OF NEED BEGINS 31'–0" FROM THE END ANCHOR. POSTS A THROUGH POST B3, SPACED 6'–6" APART, HAVE WEAKENED CUTS AT THE GROUND THAT SHALL FACE THE ANCHOR.
3. ANCHOR AND LINE POST DIMENSIONS AND STEEL REINFORCEMENT WILL BE DETERMINED ON PROJECT SPECIFIC SOIL CLASSIFICATION, PROPERTIES AND TEMPERATURE EXTREMES. CONTACT BRIFEN USA, INC. FOR ADDITIONAL INFORMATION.
4. ALL REINFORCEMENT AND CONCRETE FOR THE ANCHORS AND LINE POSTS PROVIDED BY OTHERS.
5. REINFORCEMENT AND CONCRETE PROPERTIES SHALL MEET AGENCY SPECIFICATIONS.
6. FOR PLACEMENT NEAR GUARDRAIL OR OTHER OBSTACLES CONTACT BRIFEN USA, INC. FOR ADDITIONAL DRAWINGS AND SUPPORT.

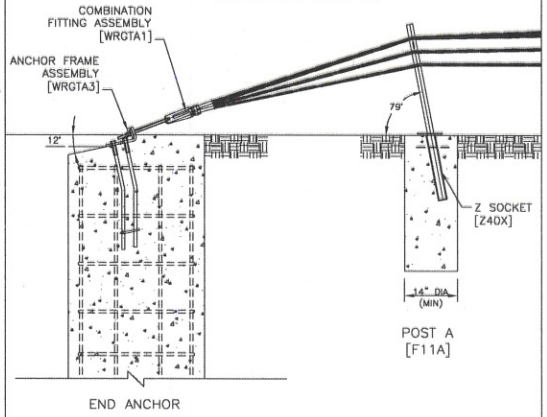
WRGT–FL POST DETAILS



NOTES SPECIFIC TO WRGT–FL POST DETAIL

1. ROPE HEIGHTS SHALL BE ±1" TO GROUND LINE.
2. POST SHALL BE ±4" FROM VERTICAL PLUMB.
3. POST CAPS SHALL BE USED IF SPECIFIED.
4. REFLECTORS SHALL BE SPACED ACCORDING TO AGENCY SPECIFICATIONS.
5. REFLECTORS CAN BE PLACED ON THE POST CAP OR POST.
6. Z EXCLUDER (Z41) SHALL BE USED.
7. POST A & SOCKET SHALL BE PLACED 79° (±4°) TOWARD END ANCHOR FROM THE HORIZONTAL PLANE.
8. POST A SOCKET SHALL BE PLACED IN 14" (MIN) CONCRETE FOUNDATION. DEPTH TO BE DETERMINED FROM SOIL CONDITIONS AND PROJECT CONDITIONS.
9. FOUNDATIONS FOR POST B1 THRU B3 SHALL BE THE SAME AS THE LINE POST ASSEMBLY'S FOR THE PROJECT.
10. WEAKENED CUTS SHALL FACE END ANCHOR.

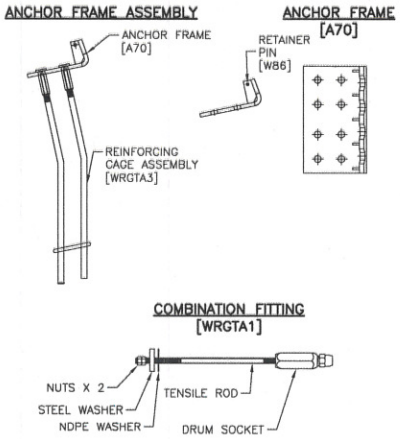
END ANCHOR DETAILS



NOTES SPECIFIC TO END ANCHOR DETAIL

1. THE END ANCHOR ASSEMBLY SHALL BE PLACED 12° (+3°, −1°) BELOW HORIZONTAL PLANE.
2. POST A & SOCKET SHALL BE PLACED 79° (±4°) TOWARD END ANCHOR FROM THE HORIZONTAL PLANE.
3. POST A SOCKET SHALL BE PLACED IN 14" (MIN) CONCRETE FOUNDATION. DEPTH TO BE DETERMINED FROM SOIL CONDITIONS AND PROJECT CONDITIONS.

END ANCHOR COMPONENTS

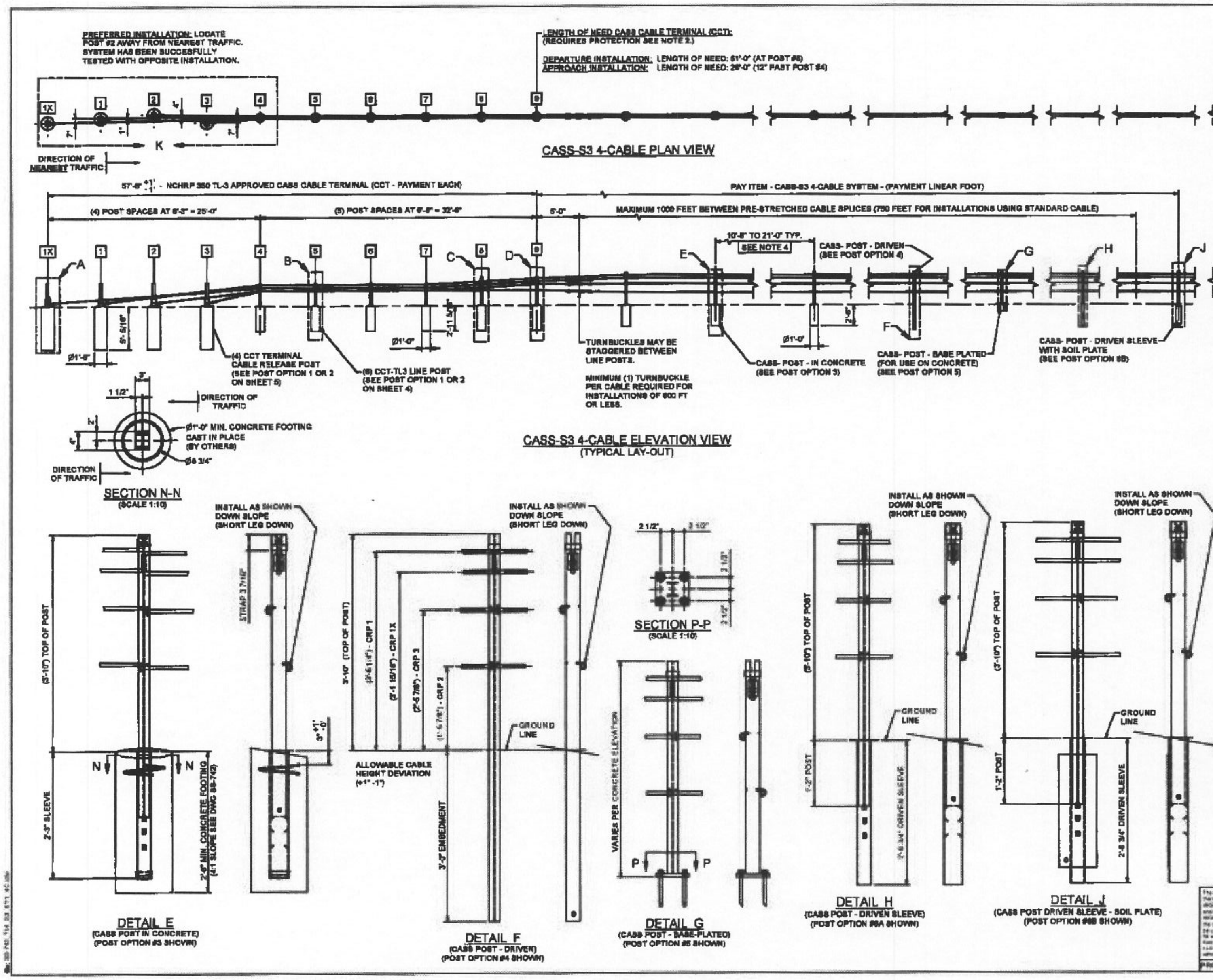


BRIFEN ★ USA INC.

Revision		
No.	Date	By
1.		
2.		
3.		
4.		
5.		

BRIFEN WRGT–FL END TERMINAL INSTALLATION & LAYOUT DETAILS

Date	Drawn By	Scale
6.27.12	Manita Elizondo	None
VERSION 12.1		Sheet No 3 OF 3
Dwg. No.	WRGTFL–11–003b	



NOTES:

1. CASS-S3 4-CABLE (4:1) HAS BEEN SUCCESSFULLY TESTED AND ACCEPTED TO NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 TEST LEVEL 3 (NCHRP 350 TL3) FOR VARIOUS POST SPACING WHEN INSTALLED ON A 4:1 OR FLATTER SLOPE. CASS-S3 4-CABLE (4:1) HAS BEEN SUCCESSFULLY TESTED AND ACCEPTED TO NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 TEST LEVEL 4 (NCHRP 350 TL4) FOR VARIOUS POST SPACING WHEN INSTALLED ON A 6:1 OR FLATTER SLOPE. ADDITIONAL INFORMATION CAN BE FOUND IN FHWA ACCEPTANCE LETTER B-141F.

2. CASS CABLE TERMINAL (CCT) HAS BEEN SUCCESSFULLY TESTED AND ACCEPTED TO NCHRP TL3. AN NCHRP 350 TL3 APPROVED TERMINAL (CCT) OR CASS-S3 4-CABLE (4:1) TRANSITION (VARIOUS) SHALL BE USED ON APPROACH AND DEPARTURE TERMINATIONS WHEN CASS-S3 4-CABLE (4:1) IS INSTALLED ON THE NATIONAL HIGHWAY SYSTEM (NHS). IF A NON-CRASHWORTHY ANCHOR (CCA) IS USED TO TERMINATE THE CABLE SYSTEM, THE NON-CRASHWORTHY ANCHOR MUST BE EITHER SHIELDED OR LOCATED SO THAT A VEHICLE IMPACTING THE CABLE CAN NOT IMPACT THE NON-CRASHWORTHY ANCHOR.

3. CASS-S3 4-CABLE (4:1) SHALL BE INSTALLED ON SHOULDERS OR MEDIANS WITH SLOPES OF 4:1 OR FLATTER WITHOUT OBSTRUCTIONS, DEPRESSIONS, ETC. THAT MAY SIGNIFICANTLY AFFECT THE STABILITY OF AN ERRANT VEHICLE. CASS-S3 4-CABLE (4:1) MUST BE INSTALLED A MAXIMUM OF FOUR (4) FEET FROM THE BREAK POINT. GRADING OF SITE AND/OR APPROPRIATE FILL MATERIALS MAY BE REQUIRED. THE DESIGNER/INSTALLER SHALL "FLATTEN" OR "ROUND" VARIOUS TOPOGRAPHICAL INCONSISTENCIES THAT COULD INTERFERE WITH THE ABILITY OF THE INSTALLER TO CONSISTENTLY MAINTAIN THE DESIGN HEIGHT (IN RELATION TO THE TERRAIN) OF THE CABLES. PLEASE CONSULT THE CASS MANUAL(S) FOR INSTALLATIONS IN "DITCH SECTIONS".

4. CASS-S3 4-CABLE (4:1) POST SPACING MAY BE MODIFIED TO AVOID OBSTACLES THAT CONFLICT WITH THE INSTALLATION OF CASS-S3 4-CABLE (4:1) LINE POSTS. NO POST SPACE CAN EXCEED THE MAXIMUM POST SPACE LIMIT OF 21'-0", OR MAXIMUM POST SPACING ALLOWED BY PROJECT ENGINEER - WHICHEVER IS LESS. REDUCING OR INCREASING POST SPACING AFFECTS DEFLECTION. CASS-S3 4-CABLE (4:1) MAY BE LATERALLY TRANSFERRED AT A RATE NOT TO EXCEED 30:1.

5. POST FOUNDATIONS MAY BE DRILLED THROUGH EXISTING PAVEMENT. TRINITY MAY ALLOW THE USE OF ALTERNATE LINE POST FOOTINGS IF SYSTEM IS INSTALLED WITH AN ACCEPTABLE MOWSTRIP APPLICATION - PLEASE CONTACT TRINITY.

6. FOR AESTHETIC PURPOSES TRINITY RECOMMENDS ALL SLEEVES, DRIVEN POSTS, AND LOWER CABLE RELEASE POSTS TO BE INSTALLED REASONABLY PLUMB (APPROXIMATELY 1/8" PER FOOT).

7. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 P.S.I. PRIOR TO TENSIONING THE SYSTEM. TRINITY RECOMMENDS THE CONCRETE TO BE VIBRATED IN ACCORDANCE WITH THE LATEST APPLICABLE AGENCY SPECIFICATION.

8. CASS-S3 4-CABLE (4:1) SHALL BE INSTALLED IN WELL-DRAINED, COMPACTED, NCHRP REPORT 350 STANDARD SOILS. IF SOIL DOESN'T MEET THIS CLASSIFICATION, IF SOLID ROCK/CONCRETE IS ENCOUNTERED BELOW GRADE OR IF SOIL IS SUSCEPTABLE TO SEVERE FREEZE/THAW CYCLES, PLEASE CONTACT TRINITY ABOUT ALTERNATE FOOTING DESIGN(S). TRINITY SUGGESTS THE USE OF "MOW STRIPS" FOR EROSION PREVENTION AND EASE OF MAINTENANCE / INSTALLATION.

9. WHEN THE SYSTEM & TERMINAL IS INSTALLED ENTIRELY ON A 4:1 OR FLATTER SLOPE, THE DEPTH OF THE CONCRETE FOOTINGS SHALL BE INCREASED BY 6". (SEE DRAWING SS-742) ALL OTHER DIMENSIONS, VARIOUS SPECIFICATIONS AND SOIL QUALIFICATIONS REMAIN IN PLACE AND MUST BE FOLLOWED.

10. PLEASE SEE SPECIFYING AGENCY (OR MUTCD) FOR PROPER "BARRIER" DELINEATION

11. PLEASE CONTACT TRINITY OR CONSULT THE DESIGN, INSTALLATION, OR REPAIR MANUAL(S) FOR ADDITIONAL INFORMATION.

TRINITY HIGHWAY PRODUCTS, LLC. EMAIL:
2525 STEMMONS FREEWAY PRODUCT.INFO@TRIN.NET
DALLAS, TX 75207 PHONE: (800) 644-7976

OPTION	CASS-TL3-S3 POST OPTIONS
1	CCT - TERMINAL POST 1 - 8 - IN CONCRETE
2	CCT - TERMINAL POST 1 - 8 - WITH SOIL PLATE
3	CASS-S3 POST - IN CONCRETE
4	CASS-S3 POST - DRIVEN
5	CASS-S3 POST - BASE-PLATED
6	CASS-S3 POST - IN DRIVEN SLEEVE
	6A - DRIVEN SLEEVE - WITH NOTCH
	6B - DRIVEN SLEEVE - WITH SOIL PLATE

CASS-S3 (6:1 SLOPE)
4-CABLE GUARDRAIL
SAFETY SYSTEM

TRINITY HIGHWAY PRODUCTS, LLC

SS-743

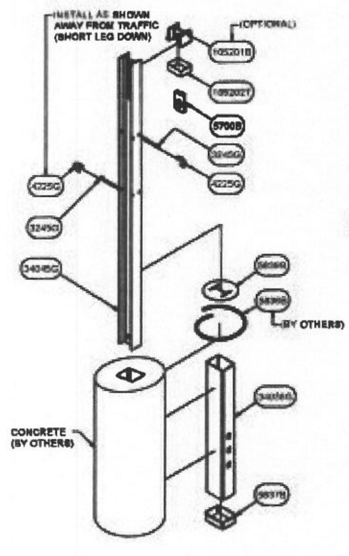
PARTS LIST - CASS-S3 POST - IN CONCRETE - POST OPTION #3			
QTY	PART No	TITLE	Lbs / Each
3	3245G	5/16 DIA. HEX NUT (A563)	0.01
3	4225G	CABLE LOCK BOLT (A307)	0.09
1	5700B	CASS & TL3 CABLE SPACER	0.11
1	5836B	CONCRETE REINFORCING RING	0.88
1	5837B	SLEEVE CAP - CASS-TERMINAL POST	0.12
1	5839B	SLEEVE COVER - S3 POST	0.11
1	34038G	27" POST SLEEVE - IN CONCRETE	12.18
1	34045G	CASS-S3 POST - SHORT	26.06
1	1052018	CASS-S3 POST CAP	0.13
1	1052027	CASS-S3 - POST STRAP	0.19

PARTS LIST - CASS-S3 POST DRIVEN - OPTION #4			
QTY	PART No	TITLE	Lbs / Each
2	3245G	5/16 DIA. HEX NUT (A563)	0.01
2	4225G	CABLE LOCK BOLT (A307)	0.09
1	5700B	CASS & TL3 CABLE SPACER	0.11
1	34038G	CASS-S3 POST - LONG	38.51
1	1052018	CASS-S3 POST CAP	0.12
1	1052027	CASS-S3 - POST STRAP	0.19

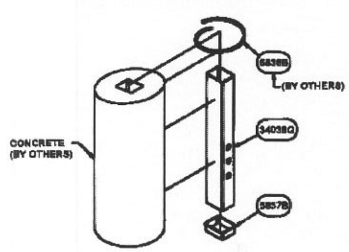
PARTS LIST - CASS-S3 POST BASE-PLATED - OPTION #5			
QTY	PART No	TITLE	Lbs / Each
2	3245G	5/16 DIA. HEX NUT (A563)	0.01
4	3300G	5/8" PLAIN WASHER - TYPE B - R - (F844)	0.06
4	3310G	5/8 LOCK WASHER	0.00
4	3381G	5/8" HEX NUT (A563 Gr DH)	0.01
2	4225G	CABLE LOCK BOLT (A307)	0.09
4	5225G	5/8 x 7 1/2" HAS SUPER ROD CHISL PT (A193 B7)	0.83
0.6	5448B	HIT HY 150 MAX EPOXY (HILTI - 00283548)	
1	5700B	CASS & TL3 CABLE SPACER	0.11
1	34037A	CASS-TL3 POST BASE-PLATED	29.50
1	1052018	CASS-S3 POST CAP	0.13
1	1052027	CASS-S3 - POST STRAP	0.19

PARTS LIST - CASS-S3 POST - IN DRIVEN SLEEVE - POST OPTION			
QTY	PART No	TITLE	Lbs / Each
2	3245G	5/16 DIA. HEX NUT (A563)	0.01
2	4225G	CABLE LOCK BOLT (A307)	0.09
1	5700B	CASS & TL3 CABLE SPACER	0.11
1	5839B	SLEEVE COVER - S3 POST	0.11
1	34039G	37" POST SLEEVE - DRIVEN	13.87
1	34045G	CASS-S3 POST - SHORT	26.06
1	1052018	CASS-S3 POST CAP	0.13
1	1052027	CASS-S3 - POST STRAP	0.19

PARTS LIST - PRE-STRETCHED CABLE ASSEMBLIES						
QTY	PART No	TITLE	LENGTH	TERM-1	TERM-2	Lbs / Each
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

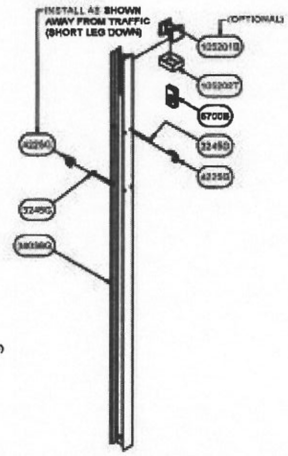


CASS-S3 POST - IN CONCRETE
(POST OPTION #3 - CAST IN PLACE)

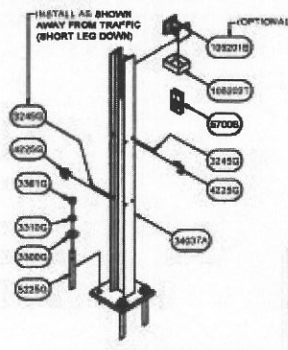


CONCRETE FOOTING ASSEMBLY
(POST OPTION #3 - PRE-CAST OPTION)

PARTS LIST - PRE-CAST CONCRETE FOOTING - OPTION #3			
QTY	PART No	TITLE	Lbs / Each
1	5836B	CONCRETE REINFORCING RING	0.88
1	5837B	SLEEVE CAP - CASS-TERMINAL POST	0.12
1	34038G	27" POST SLEEVE - IN CONCRETE	12.18



CASS-S3 POST - DRIVEN
(POST OPTION #4 - DRIVEN)



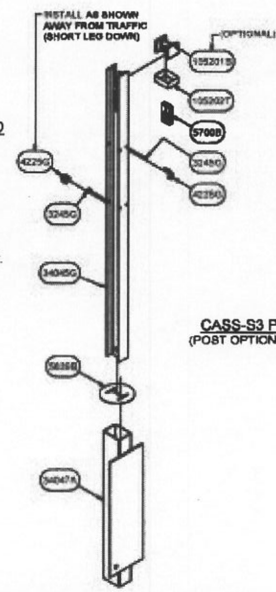
CASS-S3 POST - BASE-PLATED
(POST OPTION #5 - BASE-PLATED)

ANCHOR OPTIONS:
MIN. EMBEDMENT IN 3,000 P.S.I. CONCRETE = 6".
MIN. PULLOUT STRENGTH = 10,000 lbs.

1: 5/8 ADHESIVE ANCHORING SYSTEM.
(4 EACH 3300G, 3310G, 3381G & 5225G) & 0.6 EACH 5448B

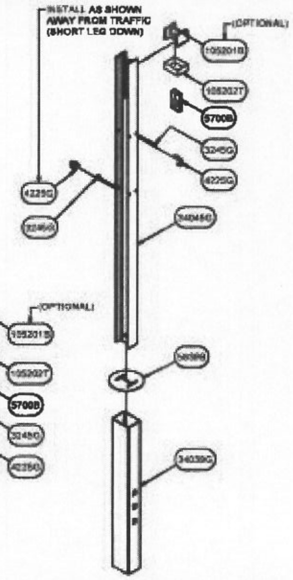
2: 5/8 x 8" ALL THREADED ROD (A449) WITH EPOXY.
(4 EACH 3300G, 3310G, 3381G & 5722G) & 0.6 EACH 5448B

3: 5/8 MECHANICAL ANCHOR. (BY OTHERS)



CASS-S3 POST - IN DRIVEN SLEEVE
(POST OPTION #6B - DRIVEN SLEEVE - SOIL PLATE)

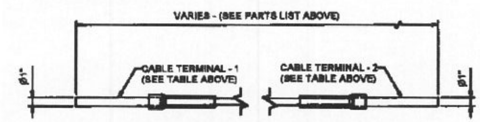
PARTS LIST - CASS-S3 POST - IN DRIVEN SLEEVE - POST OPTION #6B			
QTY	PART No	TITLE	Lbs / Each
2	3245G	5/16 DIA. HEX NUT (A563)	0.01
2	4225G	CABLE LOCK BOLT (A307)	0.09
1	5700B	CASS & TL3 CABLE SPACER	0.11
1	5839B	SLEEVE COVER - S3 POST	0.11
1	34045G	CASS-S3 POST - SHORT	26.06
1	34047A	30.75" CASS-S3 POST SLEEVE w/ SOIL PLATE	27.47
1	1052018	CASS-S3 POST CAP	0.13
1	1052027	CASS-S3 - POST STRAP	0.19



CASS-S3 POST - IN DRIVEN SLEEVE
(POST OPTION #6A - DRIVEN SLEEVE - NOTCH)

NOTE:

FOR THE STANDARD FIELD SPLICE SECTIONS ABOVE, SUPPLY (1) RIGHT HAND THREADED STUD ASSEMBLY 5910G EACH.



PRE-STRETCHED CABLE ASSEMBLY

NOTES:

1. IN LIEU OF BLACK SPACER 5700B SUPPLY YELLOW REFLECTIVE SPACER 5701B OR WHITE REFLECTIVE SPACER 5702. (AS REQUIRED PER PROJECT PLANS)

2. IF INTERFERENCE OCCURS BETWEEN THE CABLE SPLICE AND CASS-TL3 POST, SUPPLY A SPLICE INTERFERENCE POST.
LONG SPLICE POST 34081G IN LIEU OF LONG CASS-S3 POST 34038G
SHORT SPLICE POST 34049G IN LIEU OF SHORT CASS-S3 POST 34045G

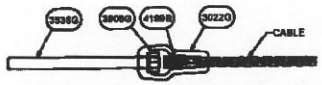
3. IF REQUIRED PER PROJECT PLANS SUPPLY:
CABLE PULLING TOOL 5850B
CABLE TENSION METER 5875B
CABLE THERMOMETER 5709B

CASS-S3 (6:1 SLOPE)
4-CABLE GUARDRAIL
SAFETY SYSTEM

TRINITY HIGHWAY PRODUCTS, LLC

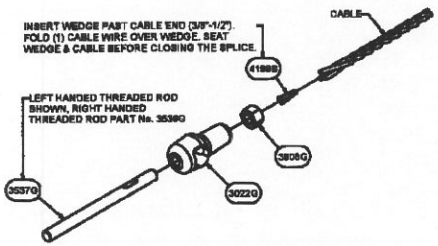
PROJ: CASS-S3_6:1

DRW: E.A.S 1/19/2010
SHT 2 OF 3
SIZE: B
DWG NO: SS-743
REV: 0



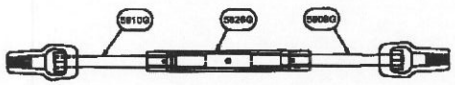
1" CABLE FIELD SPLICE - 5909G & 5910G
(5910G SHOWN, 5909G SIMILAR)

PARTS LIST - 5910G			
QTY	PART No	TITLE	Lbs / Each
1	3022G	1" CABLE END CASTING	0.59
1	3539G	1" STUD FLATTENED - R.H.T.	2.86
1	3809G	1" HEAVY HEX NUT (A563 DH)	0.47
1	4199B	3/4" CABLE WEDGE (3 x 7)	0.06



ASSEMBLY - 1" CABLE FIELD SPLICE - 5909G
(5909G SHOWN, 5910G SIMILAR)

PARTS LIST - 5909G			
QTY	PART No	TITLE	Lbs / Each
1	3022G	1" CABLE END CASTING	0.59
1	3537G	1" STUD FLATTENED - L.H.T.	2.86
1	3809G	1" HEAVY HEX NUT (A563 DH)	0.47
1	4199B	3/4" CABLE WEDGE (3 x 7)	0.06



1" CABLE SPLICE - 5633G
(CLOSED BODY STYLE)

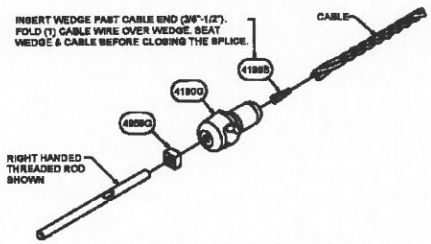
PARTS LIST - 5633G			
QTY	PART No	TITLE	Lbs / Each
1	5826G	1" CABS TURNBUCKLE CLOSED BODY STYLE	4.81
1	5909G	1" STUD ASSEMBLY L.H.T.	3.86
1	5910G	1" STUD ASSEMBLY R.H.T.	3.86

1" TURNBUCKLE - 5828G
(CLOSED BODY STYLE)

PARTS LIST - 5828G			
QTY	PART No	TITLE	Lbs / Each
1	5826G	1" CABS TURNBUCKLE CLOSED BODY STYLE	4.81

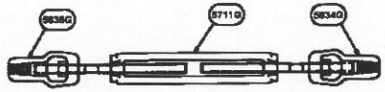
3/4" CABLE FIELD SPLICE - 5634G & 5635G
(5634G SHOWN, 5635G SIMILAR)

PARTS LIST - 5634G			
QTY	PART No	TITLE	Lbs / Each
1	1052040	3/4" STUD FLATTENED - L.H.T.	1.62
1	4190G	CABLE END CASTING	3.76
1	4199B	3/4" CABLE WEDGE (3 x 7)	0.06
1	4939G	3/4" HEAVY SQUARE NUT (A563)	0.29



ASSEMBLY - 3/4" CABLE FIELD SPLICE - 5635G
(5635G SHOWN, 5634G SIMILAR)

PARTS LIST - 5635G			
QTY	PART No	TITLE	Lbs / Each
1	1052050	3/4" STUD FLATTENED - R.H.T.	1.62
1	4190G	CABLE END CASTING	3.76
1	4199B	3/4" CABLE WEDGE (3 x 7)	0.06
1	4939G	3/4" HEAVY SQUARE NUT (A563)	0.29

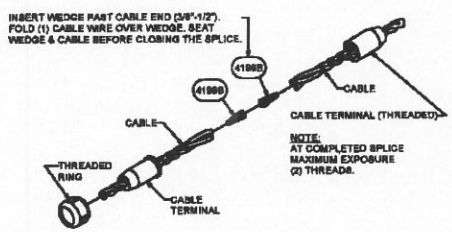


3/4" CABLE SPLICE - 5698G
(OPEN BODY STYLE)

PARTS LIST - 5698G			
QTY	PART No	TITLE	Lbs / Each
1	5634G	3/4" STUD ASSEMBLY L.H.T.	5.74
1	5635G	3/4" STUD ASSEMBLY R.H.T.	5.74
1	5711G	3/4" TURNBUCKLE OPEN BODY STYLE	10.89

TORPEDO CABLE SPLICE - 4099G

PARTS LIST - 4099G			
QTY	PART No	TITLE	Lbs / Each
1		CABLE TERMINAL - THREADED	1.78
1		CABLE TERMINAL	1.52
1		RING - THREADED	-0.08
2	4199B	3/4" CABLE WEDGE (3 x 7)	0.06



ASSEMBLY - TORPEDO CABLE SPLICE 4099G

CASS TEMPERATURE & TENSION CHART (NEAREST 100 lbf)

FAHRENHEIT DEGREES	STD. CABLE LB/FORCE	PRE-STRETCHED LB/FORCE
<= -15	9600	7300
-10	9500	7200
-5	9400	7100
0	9300	7000
5	9200	6900
10	9100	6800
15	9000	6700
20	8900	6600
25	8800	6500
30	8700	6400
35	8600	6300
40	8500	6200
45	8400	6100
50	8300	6000
55	8200	5900
60	8100	5800
65	8000	5700
70	7900	5600
75	7800	5500
80	7700	5400
85	7600	5300
90	7500	5200
95	7400	5100
100	7300	5000
105	7200	4900
110	7100	4800
115	7000	4700
120	6900	4600
125	6800	4500
130	6700	4400
135	6600	4300
140	6500	4200
145	6400	4100
150	6300	4000
160	6200	3900
170	6100	3800
180	6000	3700
190	5900	3600
200	5800	3500

ALLOWABLE DEVIATION FROM CHART IN TANGENT SECTIONS:
+600, -200 POUNDS/FORCE.

CABLE TENSION READINGS ARE TYPICALLY HIGHER IN CURVED CABLE SECTIONS.

NOTE:

1. TURNBUCKLES SHALL BE INSTALLED WITH A MINIMUM OF 1-1/2" THREAD ENGAGEMENT. TO ALLOW FOR MAINTENANCE/REPAIR ADJUSTMENTS AT A LATER DATE, TRINITY SUGGESTS INSTALLER UTILIZE NO MORE THAN 4" THREAD ENGAGEMENT.

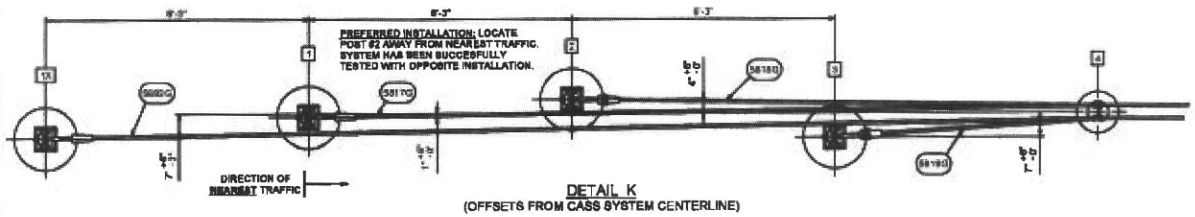
2. WHEN CUTTING CABLE LENGTHS IN THE FIELD FROM CABLE REELS, IT MAY BE PERMISSIBLE TO UTILIZE A CABLE TORPEDO SPLICE (4099G) BETWEEN TURNBUCKLES. DO NOT USE FOR CABLE LENGTH SHORTER THAN 100'. PLEASE CONTACT TRINITY, CONSULT TRINITY'S MANUAL OR SPECIFYING AGENCY TO DETERMINE IF APPROPRIATE FOR SPECIFIC APPLICATION.

PROJ CASS-S3_6:1

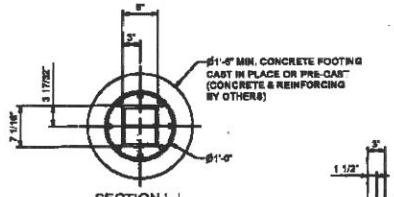
CASS-S3 (6:1 SLOPE) 4-CABLE GUARDRAIL SAFETY SYSTEM

TRINITY HIGHWAY PRODUCTS, LLC

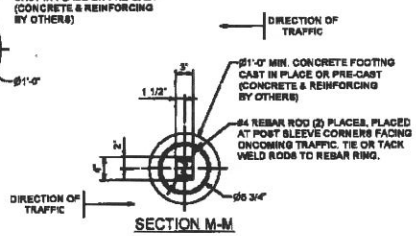
SPEC
SHIPPING WT.
DRW E.A.R. 11/4/2014
CHK
SHT 3 OF 5 SIZE D
DWG NO SS-743 REV 0



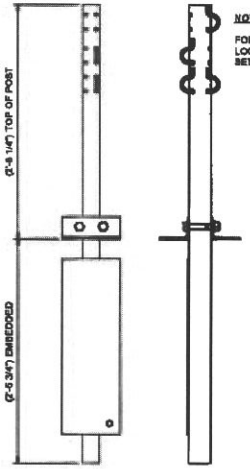
DETAIL K
(OFFSETS FROM CASS SYSTEM CENTERLINE)



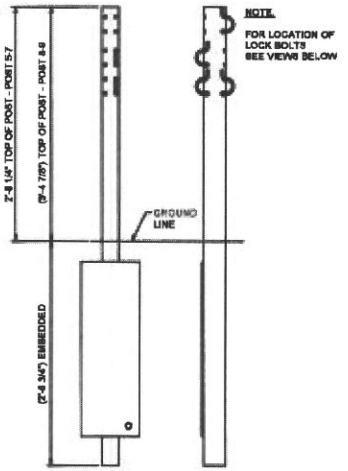
SECTION L-L



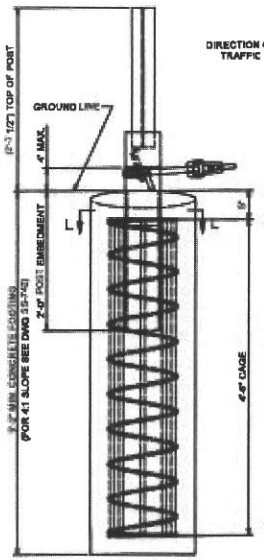
SECTION M-M



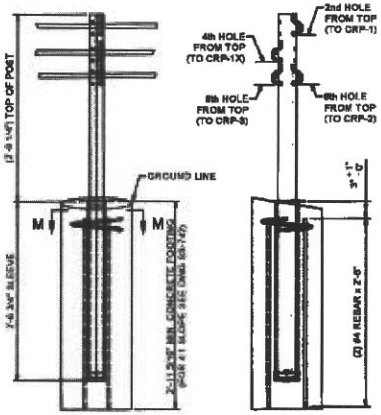
CCT TERMINAL POST
(CCT POST 4)
(POST OPTION 2 SHOWN)



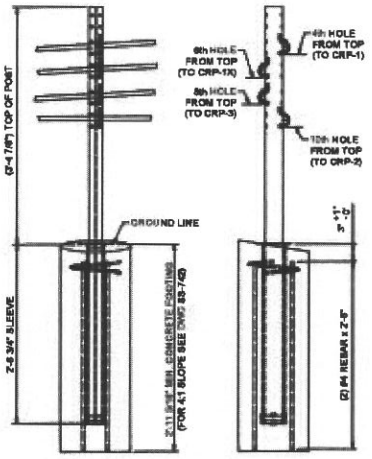
CCT TERMINAL POST
(CCT - POST 5 - 9)
(POST OPTION #2 SHOWN)



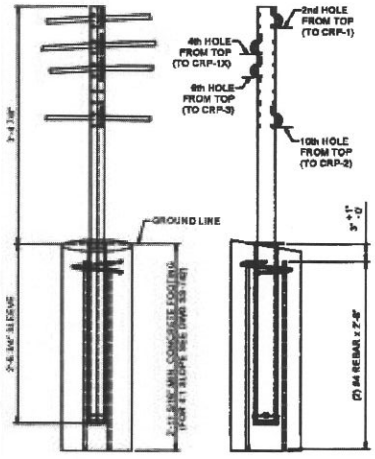
DETAIL A
(CABLE RELEASE POST 1-3)



DETAIL B
(POST-4-7)
(POST OPTION #1 SHOWN)



DETAIL C
(POST-8)
(POST OPTION #1 SHOWN)



DETAIL D
(POST-9)
(POST OPTION #1 SHOWN)

CASS-S3 (6:1 SLOPE)
4-CABLE GUARDRAIL
SAFETY SYSTEM

TRINITY HIGHWAY PRODUCTS, LLC

DWG SS-743

PARTS LIST - CCT CABLE RELEASE POST No. 1X-3 - IN CONCRETE			
QTY	PART No	TITLE	Lbs / Each
2	3240G	5/16 FLAT WASHER (F844)	0.00
2	3245G	5/16 HEX NUT (A563)	0.01
2	4211G	5/16 HEX BOLT x 1 3/4" (A307)	0.05
1	5851B	REFLECTOR - MEDIAN - YELLOW	0.10
1	33909G	CASS CABLE BRACKET	1.92
1	33916B	REINFORCING CAGE - CRP POST	58.97
1	33934A	CRP - LOWER POST	51.80
1	33935A	CRP - UPPER POST	31.57

ALL HARDWARE FOR THE CCT CAN BE ORDERED AS ONE PACKAGE:

PART No. 33598G (1) SET OF TERMINAL HARDWARE FOR 1" CABLE FITTINGS.
PART No. 33599G (1) SET OF TERMINAL HARDWARE FOR 3/4" CABLE FITTINGS

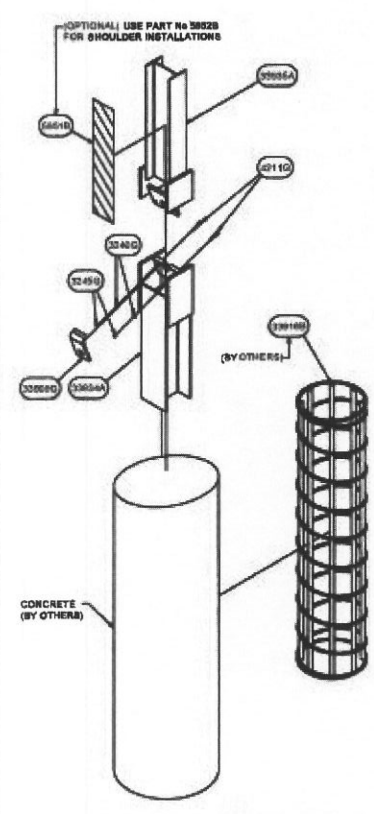
PARTS LIST - CCT TERMINAL POST No. 4-7 - IN CONCRETE			
QTY	PART No	TITLE	Lbs / Each
4	3245G	5/16 DIA. HEX NUT (A563)	0.01
4	5825G	CABLE LOCK BOLT (A307)	0.13
1	5836B	CONCRETE REINFORCING RING	0.88
1	5837B	SLEEVE CAP - CASS TERMINAL POST	0.12
1	5838B	SLEEVE COVER - S3 POST	0.11
2	5819B	#4 REBAR - TERMINAL POST	1.78
1	33908B	SLEEVE - TERMINAL LINE POST	13.80
1	33810G	350-TL3 TERMINAL POST	28.63

PARTS LIST - CCT CABLE RELEASE POST No. 1X-3 - DRIVEN			
QTY	PART No	TITLE	Lbs / Each
2	3240G	5/16 FLAT WASHER (F844)	0.00
2	3245G	5/16 HEX NUT (A563)	0.01
2	4211G	5/16 HEX BOLTS x 1 3/4" (A307)	0.05
1	5851B	REFLECTOR - MEDIAN - YELLOW	0.10
1	33909G	CASS CABLE BRACKET	1.92
1	33935A	CRP - UPPER POST	31.57
1	33936A	CRP - LOWER POST	176.57

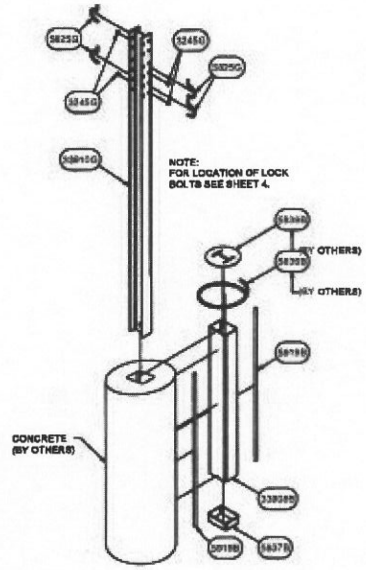
PARTS LIST - CCT TERMINAL POST No. 4-7 WITH SOIL PLATE			
QTY	PART No	TITLE	Lbs / Each
4	3245G	5/16 DIA. HEX NUT (A563)	0.01
2	3721G	3/4 FLAT WASHER (F436)	0.01
2	3711G	3/4 HEX NUT (A194 2H)	0.02
2	4778G	3/4 HEX BOLT x 4 1/2" (A325)	0.09
4	5825G	CABLE LOCK BOLT (A307)	0.12
2	9021G	BEARING ANGLE (A36)	3.81
1	33903A	350-TL3 TERMINAL POST w/ SOIL PLATE	42.25

PARTS LIST - CCT TERMINAL POST No. 8-9 - WITH SOIL PLATE			
QTY	PART No	TITLE	Lbs / Each
4	3245G	5/16 DIA. HEX NUT (A563)	0.01
4	5825G	CABLE LOCK BOLT (A307)	0.12
1	33989A	350-TL4 TERMINAL POST w/ SOIL PLATE	48.00

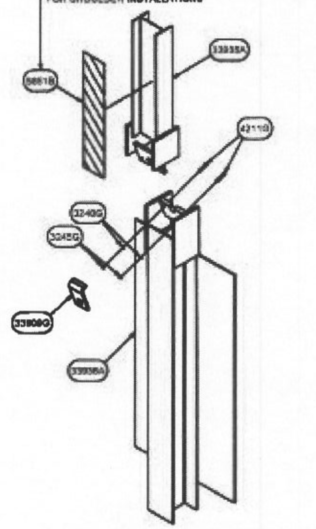
PARTS LIST - CCT TERMINAL POST No. 8-9 - IN CONCRETE			
QTY	PART No	TITLE	Lbs / Each
4	3245G	5/16 DIA. HEX NUT (A563)	0.01
4	5825G	CABLE LOCK BOLT (A307)	0.12
1	5836B	CONCRETE REINFORCING RING	0.88
1	5837B	SLEEVE CAP - CASS-TERMINAL POST	0.12
1	5838B	SLEEVE COVER - S3 POST	0.11
2	5819B	#4 REBAR - TERMINAL POST	1.78
1	33908B	SLEEVE - TERMINAL LINE POST	13.80
1	33995G	350-TL4 TERMINAL POST	32.40



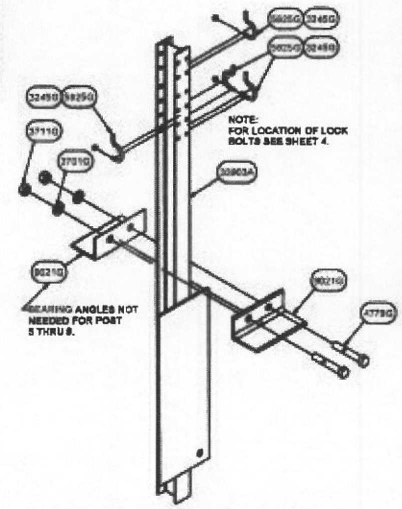
CRP TERMINAL POST - IN CONCRETE
(CCT TERMINAL POST 1X - 3)
(POST OPTION #1 SHOWN)



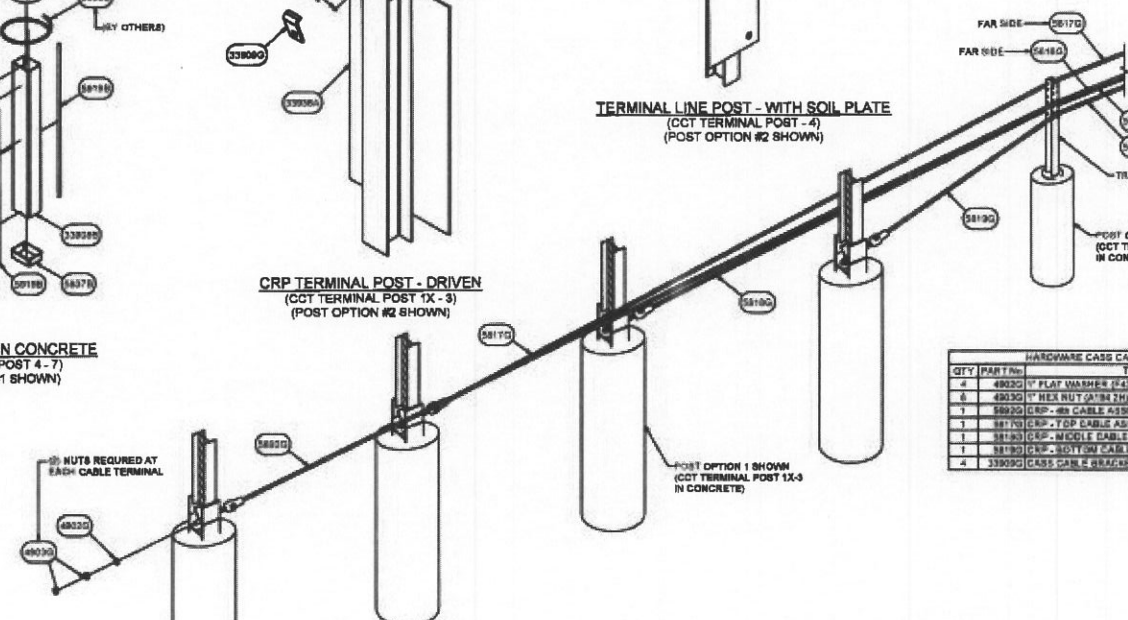
TERMINAL POST - IN CONCRETE
(CCT TERMINAL POST 4 - 7)
(POST OPTION #1 SHOWN)



CRP TERMINAL POST - DRIVEN
(CCT TERMINAL POST 1X - 3)
(POST OPTION #2 SHOWN)



TERMINAL LINE POST - WITH SOIL PLATE
(CCT TERMINAL POST - 4)
(POST OPTION #2 SHOWN)



HARDWARE CASS CABLE TERMINAL - CCT			
QTY	PART No	TITLE	Lbs / Each
4	4902G	1" FLAT WASHER (F436)	0.11
6	4903G	1" HEX NUT (A194 2H)	0.33
1	5892G	CRP - 4th CABLE ASSEMBLY [60'-6"]	116.90
1	5817G	CRP - TOP CABLE ASSEMBLY [54'-3"]	107.58
1	5818G	CRP - MIDDLE CABLE ASSEMBLY [48'-0"]	98.07
1	5819G	CRP - BOTTOM CABLE ASSEMBLY [41'-9"]	88.82
4	33909G	CASS CABLE BRACKET	1.92

CASS-TL3-S3 CABLE TERMINAL
(SHOWN WITH POST OPTION 1)

[illegible]	CASS-S3 (6:1 SLOPE) 4-CABLE GUARDRAIL SAFETY SYSTEM	DRW E.A.S. 11/4/2010
PROJ. CASS-S3_6-1	TRINITY HIGHWAY PRODUCTS, LLC	SHT - 5 OF 5 D
		SS-743 0

MATERIALS INFORMATION

11. List of Existing Traffic Management System Elements

TUL 198- R4.2-R4.9 & 6.8-R8.3									
Element	**ElementID**	**County**	**Route**	**PostMile**	**DetectorType**	**Location**	**Direction**	**OperationDate**	**Status**
TCS	CE-2199	TUL	198	4.587	Loop	EB OFF TO CO RD 80	EB		EXISTING
TCS	CE-2202	TUL	198	4.626	Loop	WB ON FR CO RD 80	WB		EXISTING
SIGNAL	SI-174	TUL	198	4.71		198 (WB) @ ROAD 80 NORTH/PLAZA		3/14/2000	EXISTING
SIGNAL	SI-175	TUL	198	4.72		198 (EB) @ ROAD 80 SOUTH/PLAZA		3/14/2000	EXISTING
CCTV	CC-103	TUL	198	4.78		PLAZA DR	WB	5/1/2001	EXISTING
VDS	VD-0270	TUL	198	4.79		ROAD 80	NB	5/16/2013	EXISTING
TCS	CE-0610	TUL	198	4.904	L-P-L	EAST OF PLAZA DR	EB/WB		EXISTING
CCTV	CC-104	TUL	198	6.8		AKERS ST	WB	5/1/2001	EXISTING
SIGNAL	SI-176	TUL	198	6.96		198 (WB) MINERAL KING @ AKERS RD. NORTH		1/1/2000	EXISTING
SIGNAL	SI-177	TUL	198	6.96		198 (EB) @ AKERS RD. SOUTH		1/1/2000	EXISTING
TCS	CE-2204	TUL	198	6.985	Loop	EB ON FR AKERS	EB		EXISTING
TCS	CE-2205	TUL	198	7.081	Loop	WB OFF TO AKERS RD.	WB		EXISTING
TCS	CE-0668	TUL	198	7.205	L-P-L	WEST OF DEMAREE RD.	EB/WB		EXISTING
VDS	VD-4442	TUL	198	7.27		JEO S LINWOOD ST	WB	2/10/2016	EXISTING
TCS	CE-2207	TUL	198	7.431	Loop	EB OFF TO DEMAREE RD.	EB		EXISTING
TCS	CE-2210	TUL	198	7.564	Loop	WB ON FR DEMAREE RD.	WB		EXISTING
SIGNAL	SI-178	TUL	198	7.89		198 (EB) @ DEMAREE EXIT		1/1/2000	EXISTING
SIGNAL	SI-179	TUL	198	7.92		198 (WB) @ DEMAREE NORTH		1/1/2000	EXISTING
TCS	CE-2208	TUL	198	7.936	Loop	EB ON FR DEMAREE RD.	EB		EXISTING
SIGNAL	SI-180	TUL	198	7.96		198 (EB) @ DEMAREE SOUTH		1/1/2000	EXISTING
TCS	CE-2209	TUL	198	8.086	Loop	WB OFF TO DEMAREE RD.	WB		EXISTING
SIGNAL	SI-181	TUL	198	8.2		198 (WB) MINKING@ DEMAREE EXIT		8/14/2001	EXISTING
VDS	VD-4444	TUL	198	8.27		E/O S COUNTY CENTER DR	WB		EXISTING
TCS	CE-0133	TUL	198	8.272	Add Piezo	WEST OF JCT. RTE. 63 SOUTH	EB/WB		EXISTING

MATERIALS INFORMATION

12. Water Source Information

Gonzalez, Julie A@DOT

From: Johnson, Stephen <SteJohnson@calwater.com>
Sent: Thursday, April 28, 2016 7:51 AM
To: Mark Gonzalez
Subject: RE: Confirmation of Water Availability - Caltrans Construction Project on State Route 198 in Visalia

Yes. At this point that is correct, barring any unforeseen circumstances.

Steve

From: Mark Gonzalez [mailto:mark.gonzalez@ncmcivil.com]
Sent: Wednesday, April 20, 2016 2:51 PM
To: Johnson, Stephen
Subject: RE: Confirmation of Water Availability - Caltrans Construction Project on State Route 198 in Visalia

This is an EXTERNAL EMAIL. Stop and think before clicking a link or opening attachments.
So we are okay with water being available in the estimated amount of 1.9M gallons in the Spring of 2017?

Mark Gonzalez, PE
Cell: 661.342.0552
mark.gonzalez@ncmcivil.com

NCM ENGINEERING CORPORATION
1322 E. Shaw Ave, Suite 190
Fresno, CA 93710 Office: 559.492.3016 Fax: 559.492.3539
www.ncmcivil.com

From: Johnson, Stephen [mailto:SteJohnson@calwater.com]
Sent: Wednesday, April 20, 2016 2:46 PM
To: Mark Gonzalez <mark.gonzalez@ncmcivil.com>
Subject: Re: Confirmation of Water Availability - Caltrans Construction Project on State Route 198 in Visalia

Ok. Thanks

Sent from my iPhone

On Apr 20, 2016, at 14:45, Mark Gonzalez <mark.gonzalez@ncmcivil.com> wrote:

> This is an EXTERNAL EMAIL. Stop and think before clicking a link or opening attachments.
> Thanks……We actually will not be in construction until Spring of next year. The contractor will request a meter and place the deposit at that time.
>
> We are just looking to confirm availability of water for the project when it does go to construction in Spring of 2017.
>
> **Mark Gonzalez, PE**
> Cell: 661.342.0552
> mark.gonzalez@ncmcivil.com
>
> <image001.jpg>
> 1322 E. Shaw Ave, Suite 190
> Fresno, CA 93710 Office: 559.492.3016 Fax: 559.492.3539

From: Johnson, Stephen [mailto:SteJohnson@calwater.com]
Sent: Wednesday, April 20, 2016 2:41 PM
To: Mark Gonzalez <mark.gonzalez@ncmcivil.com>
Cc: Morales, Fernando S@DOT (fernando.morales@dot.ca.gov) <fernando.morales@dot.ca.gov>
Subject: Re: Confirmation of Water Availability - Caltrans Construction Project on State Route 198 in Visalia

You are good to go. Please come into the office and request the construction meter. The deposit is $1000.

Sent from my iPhone

On Apr 20, 2016, at 14:39, Mark Gonzalez <mark.gonzalez@ncmcivil.com> wrote:

> This is an EXTERNAL EMAIL. Stop and think before clicking a link or opening attachments.
> Hi Steve,
>
> I just wanted to follow up and check in on the availability letter for this project. Thanks again for the help.
>
> **Mark Gonzalez, PE**
> Cell: 661.342.0552
> mark.gonzalez@ncmcivil.com
>
> <image001.jpg>
> 1322 E. Shaw Ave, Suite 190
> Fresno, CA 93710 Office: 559.492.3016 Fax: 559.492.3539
> www.ncmcivil.com
>
> ---
>
> **From:** Mark Gonzalez
> **Sent:** Tuesday, April 12, 2016 2:00 PM
> **To:** 'stejohnson@calwater.com' <stejohnson@calwater.com>
> **Cc:** Morales, Fernando S@DOT (fernando.morales@dot.ca.gov) <fernando.morales@dot.ca.gov>
> **Subject:** RE: Confirmation of Water Availability - Caltrans Construction Project on State Route 198 in Visalia
>
> Hi Steve,
>
> Thanks for the phone call earlier. Attached is a spreadsheet showing how the 1.9M gallons was calculated. This is just a rough calculation but you'll see that most of the usage is for dust control (the number of dust control days is an educated guess).
>
> The project will likely be in construction in spring of 2017. The construction contract will have roughly 65 working days and construction will happen at night between the hours of 8pm and 6am.
>
> If you need any additional information about the project, just let me know.
>
> Thanks!

Mark Gonzalez, PE
Cell: 661.342.0552
mark.gonzalez@ncmcivil.com

<image001.jpg>
1322 E. Shaw Ave, Suite 190
Fresno, CA 93710 Office: 559.492.3016 Fax: 559.492.3539
www.ncmcivil.com

From: Mark Gonzalez
Sent: Friday, April 08, 2016 1:55 PM
To: 'rburton@calwater.com' <rburton@calwater.com>
Subject: Confirmation of Water Availability - Caltrans Construction Project on State Route 198 in Visalia

Hi,

Following up on our phone conversation earlier, we are estimating that we will need roughly 1.9 million gallons of water for the Caltrans project on SR198 in the City of Visalia. Attached is a map showing the project locations. Essentially the project will be construction concrete barrier in the median of SR198 between SR99 and Plaza Drive and will be construction cable median barrier on SR198 between Akers St and County Center Drive.

This project is currently in design with construction anticipated to begin in the spring of 2017. We are just looking for confirmation of water availability.

Thanks!

Mark Gonzalez, PE
Cell: 661.342.0552
mark.gonzalez@ncmcivil.com

<image001.jpg>
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Fresno, CA 93710 Office: 559.492.3016 Fax: 559.492.3539
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Stephen Johnson
Superintendent II
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559-624-1661

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calwater.com

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