

Architectural Treatment

Issues addressed on September 21, 2012

Bridge Contractors/Caltrans meeting identified the following issues:

1. Treatments that are designed to imprint inward cost more money to construct. The outward designs are more cost effective
2. The form liner specification is too prescriptive

Issues addressed on September 21, 2012 (cont.)

3. The designs are not taking into account the dimensions and placement of the liners in relationship to what is being built, i.e. retaining walls
4. The wall is built vertically whereas the architectural treatment design maybe on a slope

Industry partners who volunteered to participate in feedback included George Delano (Granite), Rich Hebert (CC Myers, Inc.), Mike Finley (Brutoco) and Mike Powell (Powell Constructors)



Thank you for the comments

A lot of Offices are involved, and their effort could be difficult to coordinate:

DES Offices:

1. Office of Transportation Architecture
2. Office of Structure Design

Non-DES Offices:

3. Landscape Architecture Program(HQ)
4. Landscape Architecture – districts
5. District designed RW and SW
6. Design by private firms and local Agencies

- The Bridge Architecture & Aesthetics Branch in the Division of Engineering Services (DES) has a long standing practice of communicating and coordinating their architectural and aesthetic intentions with the structure designer at various stages of project development. However, as outlined above, many more design groups could be involved in the Caltrans project delivery and contract plan development process other than DES.
- The following responses will be from the DES perspective.

Issues Reviewed:

Based on the comments received, Caltrans prepared responses to the following issues:

1. Coordination of plans
2. Forming materials
3. Using 8' layout
4. Repetitive vs. non repetitive patterns
5. Footing step heights
6. Inward vs. outward treatments

Issues Reviewed (cont.):

7. Horizontal vs. vertical patterns
8. Horizontal wall angle points
9. Shop plan process
10. Pattern relief depth
11. Bid time sample



ISSUE #1. Coordination of Plans

- It appears that the Designer and Architect work independently and do not coordinate their intents
- During the design, the Designer and Architect shall work together to limit the amount of custom, one-time use texture details
- Retaining wall layouts shall be consistent with forming materials available to the contractors.
- Shall ensure appropriate location and dimensions of footing steps, expansion and weakened joints, horizontal wall angle points, horizontal curve layout, etc.

Response to Issue #1.

Coordination of Plans

- DES strives to limit the amount of one-time-use texture detail applications, whenever possible. However, not all design assignments are typical, and may require special surface textures details. This can occur as a result of community interaction.

Response to Issue #1.

Coordination of Plans (cont.)

- We believe that as far as the project controlled by DES only, we already comply with this practice.
- The issue may be due to contribution of other designers (e.g., District and private engineers) outside of DES, using and modifying the DES Standard Type 1 Retaining Walls with standard spread footings.

Issue #2. Forming Materials

- The current specification requires the use of an elastomeric form liner to provide the requested architectural treatment. This product is expensive and is not always needed especially when the number of uses is below 4-5 times. The manufacturers produce both PVC based and semi elastomeric patterns that can produce the same features requested by the architect at a far lesser cost. It is not meant to be said that the elastomeric product is not useful, but it is only needed when multiple repetitive (5 uses +) uses are needed.

Issue #2. Forming Materials (cont.)

- The specification should be re-written to allow the contractor his choice of means and methods to provide the requested treatment to Caltrans based on what they feel is needed to construct as long as the requested structure within the finishing requirements specified by the State.

Issue #2. Forming Materials (cont.)

1 to 5 uses



ThermoSpec™
SINGLE OR MULTI-USE PLASTIC

| Property | HIPS | ABS |
|--|-----------|-----------|
| Tensile D638 | 3700 | 5300 |
| IFlexural D7905 | - | 9300 |
| Hardness D786 | - | 105 |
| Material Weights - lbs/ft² | | |
| 0.070 MIL | 0.110 MIL | 0.150 MIL |
| 0.393 | 0.621 | 0.843 |

10 uses



ElastoSpec Lite™ Semi-Elastomeric
MULTI-USE MATERIAL

| Property | ASTM | Rating |
|--|-------|----------|
| Shore D | D2240 | 65 |
| Tensile | D412 | 3000 psi |
| Elongation | D412 | 300% |
| Tear Strength | D2370 | 23 MPa |
| Material Weights - lbs/ft² | | |
| Varies by Pattern | | |

20-50 uses



ElastoSpec™ 100% Solid Urethane
BONDED TO 3/4" PLYWOOD

| Property | ASTM | Rating |
|--|-------|---------|
| Shore A | D2240 | 50-55 |
| Tensile | D638 | 800 psi |
| Elongation | D638 | 600% |
| Tear Strength | D624 | 200 pli |
| Material Weights - lbs/ft² | | |
| Varies by Pattern | | |

Response to Issue #2. Forming Materials

- Elastomeric form liners produce the highest quality finishes in terms of texture relief definition, pattern complexity, level variation, surface coarseness, edge clarity, and the depiction of real rustic stone surfaces. We have not had satisfactory results from hard plastic liners which usually produce low quality finishes, and badly fitted seams.
- Authority of the Engineer allows structure representative to consider other options via a CCO or CRIP.

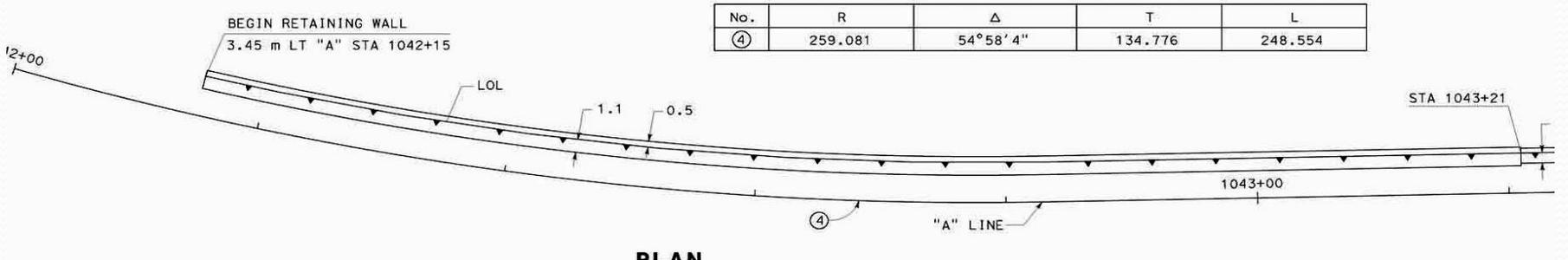
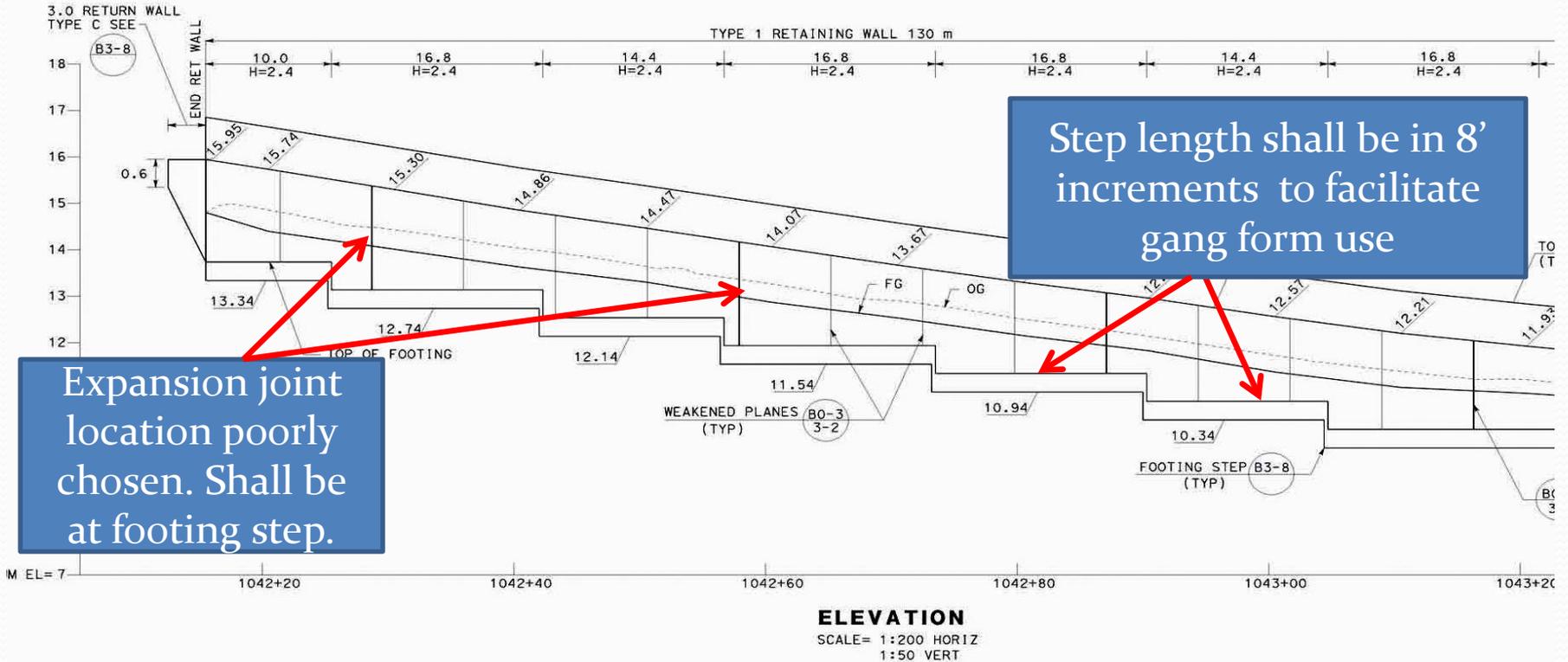
Issue #3. Using 8' Layout

Most often, the contractors use a gang form system that is based on 8 foot and 24 foot long panels that are put together to achieve the necessary length and 8 foot panel heights to achieve the wall height. This system works well the maximum 96 foot wall joint detail specified in the Standard Plans. The contractors' goal is to cycle the gang form system down the wall run daily to efficiently construct the wall.

Issue #3. Using 8' Layout (cont.)

Base wall layout on 4' to 8' dimensions (even along curved walls). Strive to place all expansion joints, weakened plane joints, angle points, footing steps, begin and end curve on 8' increments. This will match typical forming and texture dimensions closer saving labor and material costs while the texture will look better also.

Issue #3. Using 8' Layout



Response to Issue #3.

- Yes, this is a potential design issue. DES sees merit in this concept and will strive to adhere to the suggestion as we pursue aesthetic wall design in collaboration with the design of the structure.

Issue #4. Repetitive vs. non Repetitive Patterns

- When a non repetitive pattern is requested, it forces the contractor to either dedicate an additional or multiple panels to the project for use or requires the contractor to remove and replace the form liner
- Make primary patterns stay $1'_{\pm}$ inside the typical 4x8 form panel dimension. This will help maximize the number of re-uses requiring less texture

Issue #4. Repetitive vs. non Repetitive Patterns (cont.)

- On several projects, the architectural details were complex and similar, but not identical. This would require purchase of two sets of texture and a one-time use of material. Making the texture an identical would simplify the form layout and require less texture, reducing cost.

Response to Issue #4. Repetitive vs. non Repatitive Patterns

- Non-repetitive patterns are necessary in some projects. Non-standard and complex custom aesthetic details are often a function of local political and community involvement requiring a context sensitive design, and a high degree of detail.
- The recommendation to make primary patterns stay $1'_{\pm}$ inside the typical 4x8 form panel dimension is too prescriptive. If we were to follow this suggestion, all of the textures would look alike throughout the state. This procedure would severely limit the appearance of aesthetic treatments for most projects.

Response to Issue #4. Repetitive vs. non Repatitive Patterns (cont.)

- Making the texture identical would simplify the form layout, requiring less purchase of form liner panels and reducing cost. This is taken into consideration when possible in the design process. However, not all treated surfaces have identical profiles, and making adjustments to the aesthetic treatments could be necessary based on the community input and other considerations. We agree that these situations should be minimized wherever possible.

Issue #5. Footing Step Heights

- Try to match footing step heights with the vertical pattern repeat dimension
- If the texture does not have a complex pattern (fractured rib), use step heights in even increments to make lining up the horizontal seams easier. In most cases texture is fabricated in vertical lengths in multiples of 8 (4', 8', 12', etc.).

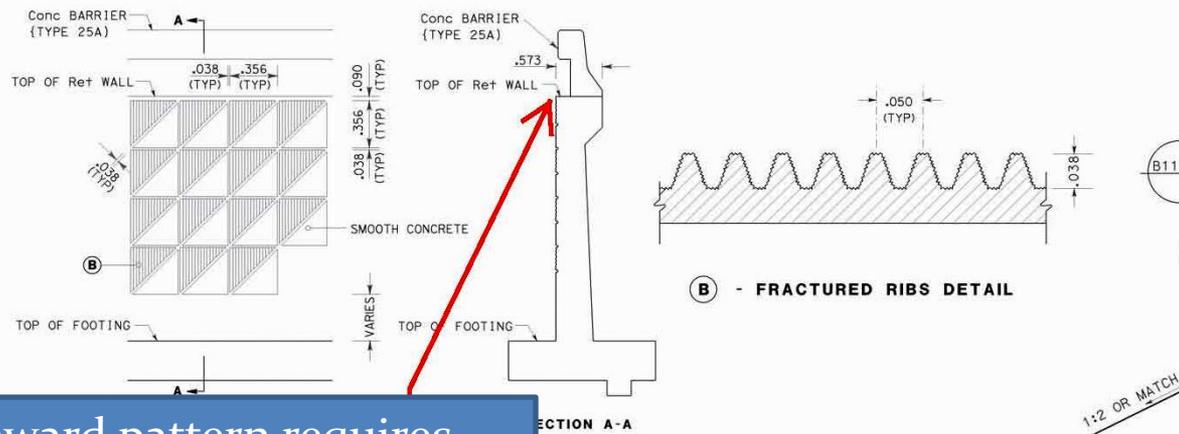
Response to Issue #5. Footing Step Heights

- DES sees merit in both of these suggestions and will strive to adhere to the suggestion as we pursue aesthetic wall design in collaboration with the design of the structure.

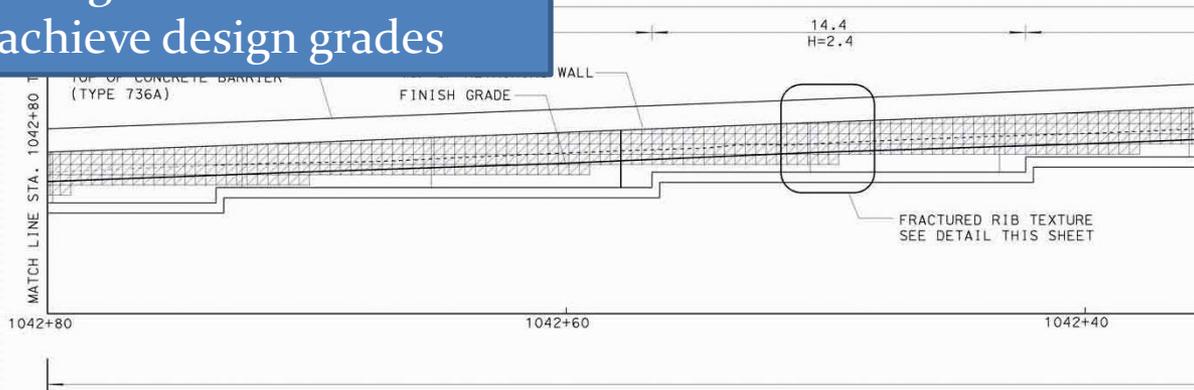
Issue #6. Inward vs. Outward Treatments

Inward or recessed architectural treatments create problems for the contractors because they require cutting down the form liner product to achieve the line and grade requested by the engineer, thus destroying a useful form liner and inherently causing additional materials to be procured. An outward pattern on the other hand allows contractors to block out the form liner above the grade to achieve the line and grade requested without cutting form liner.

Issue #6. Inward vs. Outward Treatments (cont.)



Inward pattern requires cutting all form liners to achieve design grades



Response to Issue #6.

Inward vs. Outward Treatments

- An outward design is typical of DES designs. DES does not endorse inward, or recessed architectural treatments, on aesthetic wall designs. DES designs are outward; adding a slight thickness to the outer face of the structural wall section.

Issue #7.

Horizontal vs. Vertical Patterns

- Horizontal patterns create problems. Vertical patterns are the way to go.
- Currently, horizontal seams must remain level and continuous over the length of an entire wall. Many times retaining walls require steps to follow the natural geography. These steps are not necessarily the same height as the horizontal architectural pattern thus requiring removing and replacing of the treatment on the form panel to provide the continuous horizontal lines required. The other option would be to make sure that the step heights being specified are consistent with the horizontal repetitive pattern.

Issue #7

Horizontal vs. Vertical Patterns (cont.)



Response to Issue #7

- DES understands that horizontal patterns may be more of a challenge to construct. However, many desirable patterns have horizontal components, such as simulated masonry walls with horizontal grout lines, which must be maintained.
- DES agrees that it would be desirable to have the step heights match the horizontal pattern height whenever practical.

Issue #8. Horizontal Wall Angle Points

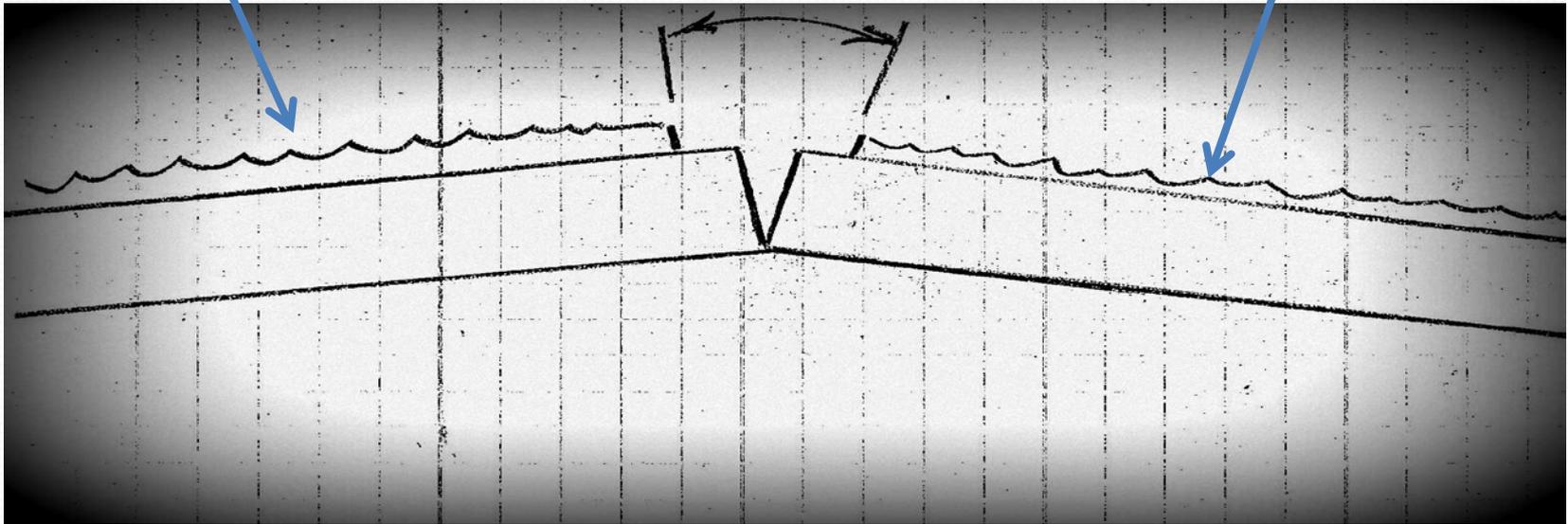
Form panels need to be placed perpendicular to each other so the forms ties line up correctly. Walls with angle points can create a gap between adjacent panels. Wall angles can fall such that the gap falls on the face where the texture is. Instead of trying to “continuously wrap” the texture around the angle point, locate a vertical “shiner” (smooth surface, no texture) at wall angle points. This allows the forms to stay lined up so the ties work and will provide a clean break in the texture that can be formed so no visible inconsistency, or gap, is left in the texture.

Issue #8. Horizontal Wall Angle Points (cont.)

Architectural
Texture

Architectural
Texture

Consider smooth surface here



Response to Issue #8. Horizontal Wall Angle Points

- DES routinely tries to ensure that form panels are designed perpendicular to each other. We are aware of the construction issues and difficulty when there are alignment issues. DES is not adverse to placing “shiners” where they would best be of use.

Issue #9. Shop Plan Process

Use a shop plan process rather than the prescriptive texture details currently used. A “concept” could be provided in the plans with specific detail dimensions and layout left to the contractor. This could include allowing the contractor to propose the repeat frequency and vertical and horizontal layout. This would allow the contractor to develop a texture that works with his particular forming preferences. Review time would be limited to one week to make sure the project does not get bogged down in architectural reviews.

Response to Issue #9. Shop Plan Process

- Using a shop plan process approval process would not work for Caltrans where the pattern layout and quality of the finish is very important.
- Current design development is much different than it used to be; today's designs are context sensitive and may have community involvement.

Issue #10. Pattern Relief Depth

The deeper the pattern relief the thicker the texture must be. Texture material is very heavy and can double or triple form weights requiring much larger cranes, increasing costs.

Response to Issue #10.

Pattern Relief Depth

- DES understands this concern and tries to minimize the depth of the relief pattern whenever practical, however some design require more relief.

Issue #11. Bid Time Sample

Maintaining a common architectural theme across several projects can be desirable. If this is the case, a prescribed texture pattern must be used. A mock up of the texture should be fabricated and made available during the bid for each contract so all bidders can price the exact same texture thus leveling the playing field. This will ensure less confusion during the test panel approval process. All texture manufacturers would be able to view the sample prior to preparing their bid for each project.

Response to Issue 11.

Bid Time Sample

- DES's standard practice, during the bidding period, is to maintain a referee sample of all project design textures being advertised for bid. The specification indicates where these samples are available for bidder's review and inspection. This specification notice, and practice, may not be universally applied to all Caltrans advertised construction work, especially when the design is performed outside of the DES (e.g., the District or private consultant work).

Conclusion:

Issues addressed in this presentation:

1. Coordination of plans
2. Forming materials
3. Using 8' layout
4. Repetitive vs. non repetitive patterns
5. Footing step heights
6. Inward vs. outward treatments
7. Horizontal vs. vertical patterns
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QUESTIONS?