



# Inspection of Prestressed and Precast Concrete Products

Pennsylvania Department of Transportation  
Bridge Office  
Structural Materials Section

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## **PREFACE**

In February 2004, Pennsylvania Department of Transportation introduced a comprehensive fabrication inspection documentation application, hereafter referred to as the Electronic Quality Management System (EQMS). This inspection manual has been revised around the premise that the inspection reporting process is now completely electronic. The intent of this manual is not to provide details or training for using the EQMS application. That information is available through separate training guides and help menus within the application.

Further, this manual was revised in 2020 to reorganize the content and provide general updates throughout.

# PART 1 – GENERAL INSPECTION & FABRICATION PLANT REQUIREMENTS

## SECTION I – INTRODUCTION

The purpose of this Publication is to outline general guidelines for Inspectors and PennDOT approved Precast/Prestressed Concrete Fabricators. The intent is to highlight procedures and specification requirements to 1) assist Inspectors to perform their duties at the fabrication facility and 2) provide general guidelines and requirements to the Fabricators on how to deliver acceptable products to the Department. These guidelines are generally written in the imperative mood. In sentences using the imperative mood, the subject “The Inspector(s)” is implied. The subject “Department” generally refers to PennDOT, also implied in this language are “shall” or “shall be”, or similar words and phrases. The word “will” generally pertains to the decisions or actions of the Department and/or the Chief Structural Materials Engineer (SME) or their Representatives.

Details in the following sections are intended to illustrate the more important and typical aspects of the inspection requirements. Do not construe them as being all-inclusive. An authorized Representative of the Department may monitor the inspection work done by Inspectors at any time.

## SECTION II – GENERAL REQUIREMENTS

### 1. Work Day (for Department work):

Seek approval for work more than 7.5 hours per shift when inspection is anticipated due to either occasional or extended production shifts. Contact the Supervisor or Regional Engineer in the Structural Materials Section (SMS) promptly to justify the action. Take a half-hour lunch break at a midway point during each regular shift. A shift is any continuous work period.

### 2. Sampling and Testing:

Witness and/or perform required tests, inspections, examinations and reports. Reinspect, collect samples, and make any special tests or reports when deemed necessary by the SME.

#### Quality Assurance (QA) Testing:

- a. The Inspector shall perform at least 10% of the number of plastic concrete tests performed by the plant or one test per week, whichever is greater. (Per mix design) The inspector will mold two 28-day compressive strength cylinders in precast plants and four 28-day compressive strength cylinders in prestressed plants for each lot.
  - i. Perform QA testing on the same sample that Quality Control (QC) Personnel used for acceptance.
  - ii. Reject concrete where either QC and/or QA testing falls outside specification limits.
- b. Perform compressive strength testing at twenty-eight (28) days using the Fabricator’s certified compressive strength equipment.
- c. Document all results in EQMS.
- d. Report failing test results, immediately, to the Inspection Supervisor and Regional SME.

### 3. References and Equipment:

The inspection office shall be equipped as specified in Pub 408, Section 714.5 and with the following references and equipment:

- a. Pub 408 (all applicable versions according to contract and supplements)
- b. Pub 145
- c. Pub 280 (Pipe Plants Only)
- d. Contract specific addenda or requirements (Special Provisions)
- e. Applicable AASHTO, ASTM, ACI, PTM and other relevant specifications or publications
- f. Measuring tapes –200 ft tape at each P/S plant, 25 ft tape at each P/C plant
- g. Flashlight
- h. Magnifying glass
- i. Thermometers – concrete, surface, and high-low
- j. Slump cone
- k. Air meter

- l. J-Ring
- m. Magnified crack comparator (Prestressed, Box Culvert, and Pipe Plants Only)
- n. Leaf gauges (Pipe Plants Only)
- o. Calipers (Pipe Plants Only)
- p. Digital Camera
- q. Computer
- r. Printer/Scanner
- s. Electronic smart level (P/S and Box Culvert Plants Only)
- t. Laser distance measure tool (Box Culvert Plants Only)
- u. T-square tool (Barrier Plants, Twist Check)
- v. Reinforcing steel locator (e.g. "Pachometer", "Elcometer", or equivalent) (minimum of one per supervisor)
- w. Any other appropriate tools, as required

4. Documentation:

Maintain accurate records of time spent on each project. Prepare complete project records that may be used to facilitate the investigation of defects in concrete items that may develop later. File records in accordance with the office file structure outline in Part 1, Section VI. Where applicable, utilize the product dimensional review (pre and post pour) forms herein and/or in EQMS to document all product dimensional review inspections. Do not accept any deviation from the shop drawings/details even when an error is suspected. Do not accept any material which varies from the plans, drawings, specifications, or supplements without the written Department acceptance of the specific variation. Report and seek acceptance from the SME in such an event.

5. Harmonious Relations:

Be courteous and maintain fair and harmonious relations with shop personnel while diligently attending to the required inspection activities.

6. Inspection Responsibilities:

(The next two pages summarize the primary inspection roles and responsibilities)

- Assure Fabricator's conformance with their accepted Quality Control Plan (QCP) and Department specifications, policies and procedures.
- Verify that the Fabricator has Form CS-430, Notification of Inspection (NOI) for the job before production begins.
- Verify that the Fabricator is listed in Bulletin 15 for the product(s) they are going to produce.
- Verify that the Fabricator has approved standards and either "Accepted" or "Accepted as Noted" shop drawings before production begins. Notify the Fabricator that any work performed prior to receipt of the "Accepted" shop drawings will be performed 'at risk' and may not be accepted. Do not accept, stamp or ship such items without the receipt of the "Accepted" Shop Drawings.
- Verify that the Fabricator has a Department approved mix design that meets the strength and other requirements for the product to be produced.
- Assure that the steel for the project conforms with the requirements as specified in Pub 408, Section 106.01.
  - Use mill test report to verify the steel source of origin
  - A mill test report with the statement: "Melted and Manufactured in U.S.A." is acceptable. However, the statement "Made in the USA" is unacceptable.
  - Require Fabricator to obtain a certified letter from the mills furnishing steel products stating that the steel provided is melted and manufactured in the USA, when the mill test reports leave any doubt as to the steel's origin. Steel provided by a company with a domestic address does not guarantee that it is domestic.
- Assure that all materials are supplied from Bulletins 14, 15 and 42 approved sources. Copies of component material certifications may be initialed/signed and dated by the Inspector to indicate it was reviewed and should be returned to the Fabricator for retention. No original material certifications will be altered by the inspector. Do not stamp the final Certification Shipping Form (CS-4171) to be sent to the project with completed product.

# **PRESTRESSED/PRECAST CONCRETE PRODUCT INSPECTION RESPONSIBILITIES**

## **PRESTRESSED/PRECAST PLANT (FABRICATOR)**

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Produce Prestressed/Precast items within framework of approved QCP in accordance with Department specification.

### **QUALITY CONTROL**

### **RESPONSIBILITIES**

- Submit QCP revisions for review to the SMS
- Provide an ACI Concrete Field Testing Technician
  - Grade I certified QC Technician\* for concrete testing at precast plants
- Provide PCI Level II certified staff during tensioning, detensioning, and casting operations at prestressed plants
- Provide a PCI Level III QC Manager to provide overall management of QC processes at prestressed plants
- Perform acceptance tests
- Maintain required QC records

\* The Department is considering adoption of ACI's Self-Consolidating Testing Technician Certification for plants utilizing SCC

## **QA INSPECTION (DEPARTMENT REPRESENTATIVE)**

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Act as a Representative of the Department. Shop operations are monitored by the Inspector performing QA inspection.

### **QUALITY ASSURANCE**

### **RESPONSIBILITIES**

- Assure that Fabricator is following the accepted QCP
- Verify that materials incorporated in product are from approved sources and review certifications provided
- Perform QA tests at plant
- Perform pre and post pour dimensional reviews
- Monitor casting and consolidation operations
- Monitor curing operations per the current QCP
- Accept/reject finished item, identify rejected item unacceptable in EQMS. When item is rejected, immediately notify Supervisor/Regional SME
- Stamp acceptable product at time of shipping
- Document tests and inspection activities using the EQMS application

## **STRUCTURAL MATERIALS FIELD PERSONNEL**

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Department personnel oversee plants and observe the performance of the Inspectors.

### **INDEPENDENT ASSURANCE**

#### **RESPONSIBILITIES**

- Make random shop visits
- Observe/report on performance of consultant inspection
- Witness/perform independent assurance tests at plant (perform at least 5% of the number of concrete tests performed by the plant)
- Sample materials, as required, in accordance with the Materials Acceptance Program (Raw concrete materials (twice per year, per plant), steel reinforcement and strands (twice per year, per plant), and additional materials (as directed))
- Accept/reject finished item
- Assist in resolving fabrication related problems at project and fabrication plant

## **DISTRICT/PROJECT ENGINEER**

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Incorporates acceptable product into the project.

#### **RESPONSIBILITIES**

- Verify that items shipped were approved by the Inspector
- Verify the inspection stamp
- Visually inspect for damaged pieces
- Observe unloading operations by contractor
- Assure proper storage at project site prior to use
- Notify SMS of unacceptable quality of work/defects by completing the Structural Materials Quality Comment Sheet (TR-800)

## **STRUCTURAL MATERIALS STAFF ENGINEERS/MANAGERS**

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Direct state-wide program to produce Prestressed / Precast concrete products.

#### **RESPONSIBILITIES**

- Make random shop visits
- Provide service to the Districts.
- Prequalify Prestressed/Precast Fabricators for Bulletin 15 approval
- Accept QCPs and approve mix designs
- Accept repair procedures
- Supervise plant/field inspection personnel
- Conduct and document prefabrication meetings for new fabrication projects or for large/complex projects, as required
- Provide timely answers to Prestressed/Precast Fabricators concerning specification requirements
- Review specifications update as needed
- Work with Districts to resolve quality related issues

## SECTION III – MIX DESIGNS: APPROVAL, REVISIONS AND SUBSTITUTIONS, BATCHING, AND TOLERANCES

Concrete may be supplied by either a Bulletin 42 approved Ready-Mix Supplier or the Fabricator. In either case, the mix design must be submitted for approval. District approved mix designs may be approved for use with the approval of the SME.

Determine percent moisture of fine and coarse aggregates at the start of work (for each shift) and every four hours, thereafter, as production continues. Perform additional moisture tests when material consistency and workability is questionable. A new batcher mixer slip shall be issued after each moisture test is performed.

### 1. Approvals

#### Mix Designs Using Potentially Reactive Aggregate:

Pub 408, Section 704 describes the requirements for mix designs using potentially reactive aggregate.

### 2. Revisions and Substitutions

Mix design must be resubmitted to SMS for approval for the following:

#### a. Alkali-Silica Reaction (ASR):

Mix designs must be resubmitted and new trial batching/evaluation must be conducted when:

- An aggregate reactivity class changes as specified in Pub 408, Section 704.1(g)2
- Cement alkalis (%  $\text{Na}_2\text{O}_e$ ) in the Portland Cement changes the minimum level of Supplementary Cementitious Material (SCM) [Pozzolan]
- Alkali Level of SCM changes in such a manner that the minimum replacement Level of Prevention as specified in Pub 408, Section 704.1(g)2

#### b. Conventional 'Slump' Mixtures:

Mix designs must be resubmitted, but not trial batched, when changes to the bulk specific gravity (saturated, surface-dry (SSD)), of any aggregate, is less than 0.04 from the original, trial batched, mix design. Changes to the absorption must be resubmitted but not trial batched.

Mix designs must be resubmitted and will require new trial batching, evaluation, and approval when:

- Changes in the bulk specific gravity (SSD) of any aggregate greater than or equal to 0.04 from the original, trial batched, mix design
- Changes to the water cement (w/c) ratio, higher than that from the "Trial Batch"
- An addition of any admixture
- A change in the type or supplier source of any admixture
- A change in any aggregate, cement, or SCM sources

If during fabrication, unforeseen conditions arise, (e.g. aggregate/cement source is removed or becomes unavailable), the Department may provide approval for the Fabricator to trial batch and resume production at their risk, subject to maintaining uniformity of color (where necessary, i.e., exposed surfaces), and meeting all other requirements including 28-day strength.

#### c. Self-Consolidating Concrete Mixtures:

Due to the extensive time frame to evaluate self-consolidating concrete mixtures for freeze-thaw, rapid chloride permeability, etc., the Department may allow substitution of the following components to maintain production until all testing can be completed, if required by the SME.

- Cement: If same type, Type I to II or Type I to III
- SCM – Same type, quantity, with similar chemistry



- d. Aggregate Mineral Fillers (AMF):  
Portions of the cement and/or fine aggregate may be replaced using AMF as specified in Pub 408, Section 714(b)1.
- e. Other Substitutions:  
Other substitutions will be evaluated on a case by case basis. The relative impact of the substitution shall be evaluated prior to the use and approval for production. The Fabricator may request to resume production, at their own risk, prior to final approval.

### 3. Batching

- a. Batching System Acceptance – new systems will be approved/accepted according to AASHTO M 157 – Table 5.
- b. Moisture Probes – Fully Automated Batching System – Internal Mixer Moisture Probes may be used according to Part 1, Section III (5) and as specified in Pub 408 Sections 714.

### 4. Batch Tolerances

#### **Batching Tolerance for Mixing Water – Small Batches**

Section 704 indicates that batching tolerances for concrete mixtures must conform to AASHTO M 157. Although the specification provides additional consideration of tolerances for small batches for cement and aggregates, batching tolerances for the mixing water for small batches was not similarly addressed.

Because of the variety of types of mixers and how water is introduced into the batch, some precast fabricators who introduce water by volume in minimum increments of one gallon or by weight in increments of 10 lbs may not be able to meet the 1%<sup>1</sup> tolerance in AASHTO M 157 for small batches (3 cubic yards and less).

In these cases, the Department will allow the water tolerance to be controlled through a variation of the target water/cement ratio of 0.01. For example, for a two-yard batch produced for a mixture having a w/c ratio of 0.40 and a cement quantity of 700 pounds, the actual water may vary from design by  $(700 \times 0.01) = +/- 7 \text{ lbs/cy} \times 2 \text{ yds} = +/- 14 \text{ lbs}$ .

In any case, whether aggregate, cement or water tolerances are not met, the Inspector should immediately contact the Regional SME. In most cases during production, a fabrication incident report would be issued, but the concrete would generally be accepted based on the plastic concrete testing and compressive strength testing.

#### **Batching Tolerance for Fully Automated Batching System – Internal Mixer Moisture Probes**

The use of moisture probes with computer-controlled batch weight adjustments of fine aggregates along with a mixer probe to compensate final batch water will be acceptable for Department use. The Fabricator shall submit a QC Plan addendum which outlines specific testing and verification requirements for acceptance by the SME. This method is only allowed on a case-by-case basis until the Department further develops policy for this method in full implementation.

This method will control water content (in real time) to ensure proper consistency from batch to batch with the use of microwave probes. The microwave probes used in the mixer emits electromagnetic waves through the aggregates. This causes the water molecules to oscillate, which is measured according to ASTM C566.

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<sup>1</sup> Due to AASHTO and Dept. rounding rules a 1% tolerance (where no decimal is shown after the integer digit) provides for a maximum actual tolerance of 1.49% of the total mixing water. (Total mixing water is defined as water added to the batch, ice added to the batch, water occurring as surface moisture on the aggregates and water introduced in the form of admixtures.)

The adjustments made are needed to compensate for slight variations in moisture content of the aggregates, residual moisture in the mixer, or variables related to overall moisture content of the mix.

During use of a Fully Automated Batching System, the Fabricator must perform additional verification testing to assure concrete of the same level of quality is obtained.

During regular production, the w/c ratio may fluctuate +/- 0.02 from the intended step-down interval. However, at no time will the w/c ratio be allowed to exceed the w/c ratio used during the trial batching of the approved mix design. Products where the w/c ratio exceeds that of the trial batch will be rejected. Further, SMS may suspend the use of the Fully Automated Batching System to re-evaluate its use.

The Fabricator must continue to conform to AASHTO M 157 for all materials other than batched water weight and sand weight.

Since the probes cannot detect the addition of ice added into the mix, it is critical to either use chilled water or reduce the amount of batch water.

Perform a moisture content test according to AASHTO T 318 to determine the w/c ratio of the mix on the first batch of concrete and any test batches for a shift's production. Further, perform the aforementioned test for each structural element being casted. Additional testing may be required when the quality of the concrete comes into question.

## SECTION IV – WELDING

Welding shall only be performed when approved by the Department. Manual welding of reinforcing steel shall be performed using either shielded metal arc welding (SMAW), gas metal arc welding (GMAW), or flux cored arc welding processes (FCAW). Welder and procedure qualification must be performed in accordance with AWS D1.4-2018.

Precast/Prestressed Fabricators must submit a weld procedure specification (WPS) to the Chief SME for approval, (see Form TR-37). Procedure Qualification shall be performed by independent laboratories. The following is a summary of the Department's interpretation of the Welder and WPS qualification requirements for lapped reinforcement (either tack or permanent welds).

1. Tack welds are required to meet the requirements of permanent welds.
2. Refer to Figure 5.4 in AWS D1.4 – Lap Joint (single flare bevel groove weld)
  - a. **Welder Qualification for Lap Joint**
    - i. AWS D1.4, Section 8.3.3.2 – (2) The joint assembly to qualify an indirect butt joint flare groove weld test made using FCAW, GMAW or SMAW shall be a double flare-bevel-groove and flat bar as shown in Figure 8.6(C).
    - ii. AWS D1.4, Table 8.5 – Two test assemblies and two macro-etch specimens (one per assembly) are required.
    - iii. Refer to AWS D1.4 for the qualification test assembly for the indirect butt joint in Figure 8.6(C) – two plates and a rebar.
    - iv. AWS D1.4, Section 8.3.2.2 - The smallest bar size used for the welder qualification, qualifies the welder for that bar size and any larger.
  - b. **WPS Qualification**
    - i. The production joint to be welded is described as a 'direct lap joint' in AWS D1.4, Section 5.5.1.
    - ii. Refer to AWS D1.4, Table 8.3 for the number and types of tests for WPS qualification. Because lap joints are not described, the Department has determined that the closest joint is the Indirect Butt joint shown in Figure 8.5(D) (Two rebars, joined at their butt ends and confined between two other rebar (thus allowing a tension test with no eccentricity.)) Two test assemblies (minimum) are required with two tension tests and two macro-etch tests performed.

- iii. WPS qualification for each specification and grade of steel reinforcing bar is not required, provided that WPS parameters are as listed in Table 8.2 General (13) (reference AWS D1.4, 8.2.1 limitation of variables, Section 8.2.1.1)
- iv. WPS qualification shall be performed using a steel that has a carbon equivalent (CE) at least equal to the highest CE to be encountered in production. The WPS is then qualified for the highest CE value qualified and all lower values (reference AWS D1.4, Section 8.2.1.2).

## SECTION V – REPORTS

### 1. Major reports

All reporting is to be completed in EQMS unless otherwise directed. The following information is intended primarily to provide general guidance in describing the reporting functions in EQMS and the Department's direction for your role in providing QA inspection. This information is not intended to replace the specific instruction provided in the User Guide/Help Topics of EQMS.

Narratives are expected to be brief and concise but must provide a basic accounting of the QA oversight activities performed or witnessed, not just a recordation of deficiencies.

#### a. General/Plant Narrative

These narratives are those activities which are general in nature and do not pertain specifically to and individual inspector or which pertain to all projects. At a minimum (if applicable) this narrative must contain the following:

- Inspector Hours
- Visitors
- List of projects worked on that day (plant job number/ECMS number)
- Equipment calibrations that were reviewed
- Material Certifications received
- Note when materials are sampled
- List any correspondence from that day, if not project specific
- Identify any general plant problem(s) and the action(s) taken or wanted to take. Follow-up on problems previously reported until resolved. Note final dispositions.

#### b. Project Narrative

This narrative is a description of those activities associated only with a specific project.

At a minimum this narrative must contain the following:

- Inspector's name.
- Describe the major items of inspection that day.
- Identify any project specific problem(s) and the action(s) taken or desired. Follow-up on problems previously reported until resolved. Note final dispositions.
- Note and attach correspondence, indicating date received, if appropriate.
- Note when shop drawings are not approved. Follow-up daily until approved.
- Note when unapproved mix designs are used.
- Note when Department approved repairs are performed, attach approved repair procedure.
- Note when inspection for stored materials payment is performed.
- Note when materials are sampled.
- Project Specific Material Certifications received.
- Note when Stock is used and copy the associated project narrative for this stock into the project narrative the stock is being used for.
- Project specific correspondence.

### 2. Miscellaneous Reports

The Department's role in providing QA plant inspection is not intended to replace or relieve the fabricator from providing QC inspection. While it may not be practical or possible to oversee the entire production operation, the Inspector should review and document fabrication activities to the greatest extent possible.

- a. Concrete Plant Startup: Complete this form initially at new plants and not less than monthly at active locations.
- b. Concrete Forms: Each approved concrete mix design shall be entered in EQMS. Additionally, the original approved mix design shall be uploaded and attached in the Concrete Mix Design Entry Form in EQMS. It is not practical to expect that EVERY aggregate gradation, batcher mixer slip, and batch tolerance information will be documented, however these electronic forms should be completed wherever practical, without sacrificing and an inordinate amount of inspection time on the plant floor. It is required, however, that all concrete test data, i.e., slump, air and compressive strength results be documented.
- c. Air Meter calibration and Scale Checks: These operations occur infrequently, they should be documented each time they are performed.
- d. Sample Identification: Use hardcopy Department Form TR-447 when samples are sent to Material Testing Lab (MTL) for testing purposes. Immediately after completing, forward a completed copy of the form to the SME via email or other appropriate methods. Enter samples in EQMS and periodically check status of sampled material. Notify fabricators of the disposition of sampled materials.
- e. Fabricated Items: Complete the pre-pour checklist column for each item that is being fabricated. Standard items can be consolidated on a single form. For general precast concrete products, perform and document post pour dimensions on not less than 10% of the units produced each day. For box culverts and prestressed concrete beams, perform a post-pour inspection on not less than 25% of the culverts sections/beams produced for the structure, or as required by the SME. Increase the inspection frequency when dimensional tolerances or other defects are encountered, or as required by the SME.

For box culverts, when dimensional deviations (deviations at or exceeding dimensional tolerance limits) are found, perform dry fitting of two (2) adjacent pieces (at a minimum) for 100% of the structure, or as required by the SME. The SMS recommends performing dry fitting of all box culvert segments to alleviate concerns with box culvert placement in the field.

- f. Fabrication Incident Reports (FIR) and Quality Reports (QR): This procedure is intended to address the intent of and justification for issuance of FIRs and QRs. For situations not specifically addressed, the Inspector is directed to consult with the SME. FIRs and QRs are issued to provide written notification to the Fabricator of a product or procedural deviation. The supporting justification for issuing a FIR differs from a QR as illustrated below. **For situations where it is unclear whether a FIR or QR is to be issued, the Inspector or Department Representative will seek direction from the SME.**
  - i. FIR: Issued for 'less serious' circumstances than a QR. A FIR should be issued to the Plant QC Manager when the following conditions are met:
    1. Continued Poor Quality of Work, requiring repair.
    2. QC plan deviations.
    3. Minor specification deviations which do not affect product acceptability or performance.
    4. FIRs should NEVER be issued when the product specification deviation would prevent acceptance. For these circumstances, a QR must be issued.

FIRs must be completed in their entirety and resolved in a timely manner. Upon completion of the FIR, the plant will submit to the Inspector and SME for review and acceptance. Continued QC violations or specification deviations, however minor, will not be permitted to persist. Bring repetitive quality issues or outstanding deviations to the attention of the SME for further action.

- ii. QRs: Three (3) QRs received for repetitive quality issues in a continuous 12-month period will require a quality meeting with the Chief SME. Further unresolved quality issues may result in suspension from Bulletin 15. Production cannot resume until the quality issues are addressed. Issued to address 'more serious' circumstances than a FIR. A QR should be issued to the Plant QC Manager when the following conditions are met:

1. Fabrication which is not in accordance with the approved drawings.
2. Shipment of unapproved /unstamped material.
3. Significant specification deviations which render the material unacceptable.
4. Other areas, as defined in Form TR-443, QR.
5. **Persistent quality related issued which have not been corrected.**

QRs must be completed in their entirety and resolved in a timely manner. Upon completion of the QR, the plant will submit to the Inspector and SME for review and acceptance.

- g. Shipping Papers: Form CS-430 must be obtained prior to shipping products. For precast products only Form CS-4171 (and Form CS-4171S as applicable), Certificate of Compliance, is required to be completed by the Fabricator to certify material delivered to a project. For prestressed products, Form TR-4218, Notice of Approval and Shipment of Prestressed Concrete Bridge Beams must be completed, signed, and provided to the Fabricator to include with their CS-4171 (and Form CS-4171S as applicable).

NOTE: For box culverts, only a single Form CS-4171 (and Form CS-4171S as applicable) is needed for materials permanently incorporated/cast in the piece at time of delivery. However, other appurtenances shipped with the precast element must have a properly filled out Form CS-4171 along with any supporting documentation such as required for "unidentifiable steel". Examples of these items include, but are not limited to, post-tensioning strand, galvanized straps for box culverts, high-strength bolts and washers.

### 3. Miscellaneous

Other forms or reports may be required if requested by the Engineer.

## SECTION VI – RECORD KEEPING

The Fabricator is responsible for maintaining a minimum number and type of records or other documentation as indicated in the QCP guidelines in Part 4, Section II and Form TR-36. The Inspector periodically reviews records for verification and conformance to the approved QCP. It is recommended that the Fabricator's filing system mimics Table 1, below.

Certain documents must be maintained by the Inspector at the fabrication shop. These files must be maintained in either the fire-proof filing cabinet or electronically (upon approval for each specific Fabricator). Documents such as batcher mixer slips, pre/post pour forms, or batch tickets which are directly entered into EQMS may be purged by the Inspector on a periodic basis.

Table 1 is a minimum outline of an acceptable filing system format (hard copy or electronic). Filing systems must be labeled with a letter designation and title of the folder.

**Table 1 - Filing System Format**

<b>File Folder</b>	<b>Folder Type</b>	<b>Contents</b>
A	General Plant	QC Plan/WPS/Mix Design/Calibrations/Scale Checks/Correspondence & Waivers/tensioning equip
B	General Plant	Batcher Mixer Slip/Moisture Work Sheet/Ready Mix Sheets
C	Testing	Gradations (Separate folders per Agg. Type)
D	Certifications	Certs: Cementitious Material/Cement Mill Reports (Separate Folders per Type)
E	Certifications	Certs: Aggregates/Delivery Tickets (Separate Folders per type)
F	Certifications	Certs: Add Mix (Separate Folders per type)
G	Certifications	Certs: Steel (Separate Folders per type)
H	Certifications	Certs: Steel Miscellaneous (Separate Folders per Type) I.e.: Wall Ties, Wire Ties, inlet top frames etc.
I	Certifications	Certs: Patching (Separate Folders per type) I.e.: Patch, Sealant, Bonding Agent, epoxy repair kits
J	General Plant	QR Report/Fab Report
K	Samples	Material Samples/Blank Sample Forms/ECAMMS Reports
L	Miscellaneous Items	Miscellaneous Items

The Fabricator must provide the documentation to the Inspector to allow for adequate time for review prior to incorporating materials into the finished product. The Fabricator may email or use another method (mutually agreed upon) to provide electronic documents to the Inspector. The Fabricator and Inspector must both ensure that electronic files are backed up in the event of a computer failure.

## **SECTION VII – PRODUCTION, SHIPPING, AND INVENTORY CONTROL OF STANDARD (STOCK) PRECAST CONCRETE PRODUCTS**

Stock items are defined as standard precast concrete products which are not produced for a specific Department project. Historically, the Department has permitted production of additional standard items for fabricators to have on hand as inventory to readily fill orders for Department projects.

Fabricators may only produce Inventory Stock Items during production for a Department project. During this time the Fabricator is limited to producing, up to, an equal number of pieces, of the same product type, as made for the project, per shift and designate them as stock. The Precast Fabricator must be producing to an active Department project and the product inspected must be maintained in inventory for use on Department or other County/Local Governmental Agencies' Projects. (E.g. if a Fabricator is producing Type C inlet tops for a PennDOT project, the Fabricator may also produce the same number of Type M inlet tops to be stored in stock inventory.)

When shipments are made to local governmental agencies, the Fabricator will complete the 'Local Government/Commercial Stock EQMS Transfer Worksheet' and associated shipping papers and provide a copy to the Inspector.

Table 2 provides guidance for the minimum inventory verification to be performed by Fabricator and Department Representative. Stock inventory reports will be generated from EQMS by the Department quarterly and forwarded to the Fabricator and inspection agency for verification within ten calendar days. Verification of inventory at inactive plants may be extended or postponed at the discretion of the Department.

The inspection agency will report any discrepancies to the Regional SME following the inventory inspection, especially where stock products cannot be accounted for (i.e. were shipped to commercial projects). Discrepancies will be investigated and resolved between the plant and the Department.

Inventory must be controlled by the Fabricator where the 'oldest' products are shipped first by production date. Inventory must be shipped within five years of the lot number. The Inspector shall utilize the stock report to ensure the oldest product is shipped first. Fabricator is required to maintain material certifications for three years beyond the project completion date.

Temporary Barrier may be shipped and used throughout its "useful service life" according to Pub 2, Project Office Manual, Section C.9.8.

**Table 2 - Minimum Inventory Verification**

	<b>Product Type and Quantity</b>	<b>Inlet Tops (Each Type)</b>	<b>Inlet bases, risers, cover adjustment slabs (Each Size and Type)</b>	<b>Inlet grade adjustment rings</b>	<b>Manhole bases, riser sections, conical tops and grade rings (Each)</b>	<b>Endwalls D, DE, DW and ES (Each Type). Sub surface drain outlets (Each Size)</b>	<b>Junction Boxes and lids (Each Type)</b>	<b>Permanent and Temporary Traffic Barrier, (# Sections of Each Size)</b>
Minimum inventory inspection frequency	Quarterly	50 or more	50 or more	100 or more	50 or more	50 or more	50 or more	100 or more
	Bi- Annually	25-49	25-49	50-99	25-49	25-49	25-49	50-99
	Annually	<25	<25	<50	<25	<25	<25	<50

Note: The products listed above, in Table 2, are the ONLY items that can be produced to stock.

## PART 2 – PRECAST/PRESTRESSED PRODUCT REQUIREMENTS

### SECTION I – INSPECTED PRODUCTS

1. Precast Concrete Products
2. Prestressed Concrete Products
3. Reinforced Concrete Pipe (RCP) – See Pub 280

### SECTION II – INSPECTION

#### 1. Precast Concrete Products

##### a. REINFORCING STEEL

The Inspector checks that:

- i. Steel reinforcement is domestic, and the designated size and grade is according to the shop drawings and properly positioned in the members.
- ii. Reinforcement is adequately secured.
- iii. Reinforcement bars are prefabricated into cages by welding or tying. Undercutting is not present. Reinforcing bars shall not be welded without an approved procedure. (See Part 1, Section IV) Welding of epoxy coated rebar is not permitted.
- iv. Adequately and rigidly secure box culvert post tensioning ducts from movement during concrete placement. Movement or internal bowing (sway) of post tensioning ducts may require redrilling of duct to provide proper post tensioning. Any internal movement, bowing or sway of post tensioning ducts requires the acceptance for use by the SME. A #8 rebar for 1½ inch diameter duct or #9 rebar for 2 inch diameter duct may be pushed through the bowed post tensioning duct, in the presence of the Inspector or Designee, to determine acceptability of the bowed duct. Findings must be submitted to the SMS for review/consideration.

##### b. FORMS

The Inspector checks:

- i. That unless otherwise specified, only steel forms and steel or concrete bottom forms are used for standard members. Knockouts or voids are polystyrene or other material that will not damage the piece upon removal.
- ii. The forms, bulkhead, spacers, spreader bars, and other equipment having a bearing upon the accuracy of dimensions of the completed beams. The Inspector informs the Fabricator of any discrepancies observed and overviews the necessary corrections.
- iii. The alignment of forms before and during the casting operation. Joints between soffit, side forms and bulkheads are tight and leak proof. Plugging of holes and slots in the forms is neatly done so that the finished member has a favorable appearance.
- iv. The void forms are anchored firmly and securely braced in their final position. The thickness of the bottom layer of concrete shall be checked before placing the voids.
- v. The position of the void is maintained both vertically and laterally during concrete placement. The concrete cover over each void is measured as soon as the surface is finished to discover any dislocations of the voids, with suitable gauges or probes.
- vi. The air vents are installed prior to placing concrete.
- vii. Forms are treated with an approved form release agent.
- viii. Any strand or reinforcement found contaminated with a bond breaking substance is properly cleaned prior to placing concrete.
- ix. Wood forms must be rigid and maintain accurate form alignment. Securely brace and tie together, if required, by means of form ties, tight enough to prevent leakage of mortar and strong enough to withstand the action of mechanical vibrators. Plywood is to be at least 5/8 inch thick. Use wood that is free of knots, holes, bulges and depressions. Coat wood to be non-absorptive to prevent moisture retention and warping while also ensuring the wood grain is not transferred to the finished product.



**c. CONCRETE MIX**

The Inspector checks that:

- i. The Fabricator's mix designs are approved.
- ii. Aggregates are stockpiled, and moistures controlled to keep the material above SSD, as specified in Pub 408, Section 703.
- iii. Cement conforms to Pub 408, Section 701.
- iv. SCMs conforms to Pub 408, Section 724
- v. Water conforms to Pub 408, Section 720.1.
- vi. Admixtures conform to Pub 408, Section 711.3.
- vii. Calcium chloride is not used.

**d. BATCHING MATERIALS FOR CONCRETE**

The Inspector assures that aggregates, cement, SCMs, water and chemical admixtures are proportioned in accordance with the concrete mix design.

**e. CONCRETE TESTS**

The Inspector assures that:

- i. General tests, i.e., slump, air and temperature are conducted on the same batch of concrete, independently from the plant's quality control tests. The Inspector performs 10% air and slump testing, and molds two 28-day cylinders per test based on the frequency of testing conducted by the plant, or one test per week at a minimum, per mix design. Four inspection cylinders per test will be molded at prestressed facilities.
- ii. Compression tests of molded cylinders are used to determine the time of detensioning in addition to the 28-day concrete strengths.
- iii. Samples are carefully selected and are representative of all the concrete placed for the product. Samples are taken approximately from the middle third of the batch or from a chute which is under full flow of concrete.
- iv. Cylinders are made, marked and handled according to the approved QCP and PTM No. 631.
- v. Store and cure cylinders adjacent to the casting bed during accelerated curing. Cylinders must follow the product for the full curing and storage cycles. Alternate cylinder curing methods may be approved for incorporation into their QCP.
- vi. The compressive strength of the concrete at stress transfer is determined by testing cylinders cured with the concrete members. Cylinder molds are required to be steel to prevent deformation according to PTM No. 631, during accelerated steam curing.
- vii. Cylinder molds are stripped at the same time as member forms are stripped.
- viii. Slump and air content tests are made in accordance with the QCP. Slump flow and J-ring tests are performed whenever Self Consolidated Concrete (SCC) is used. Stability of the mixture is visually assessed. Mixtures having a visual stability index greater than 1.0 are rejected.
- ix. Test results are entered in EQMS.

**f. PLACING CONCRETE**

The Inspector checks that:

- i. Concrete is deposited as nearly as possible in its final position, except when SCC is used. Concrete that has reached initial set is not to be re-vibrated.
- ii. Maintain the concrete temperature within 50°F to 90°F at the time of placing.

**g. VIBRATION OF CONCRETE**

The Inspector checks that:

- i. Concrete in members is compacted using an external and/or internal mechanical vibrator(s). SCC mixtures which were not qualified for vibration during the trial batching and evaluation phase may not be vibrated.
- ii. Vibration is not prolonged until it caused segregation of the materials.
- iii. Sufficient vibrators to complete the compaction are used.
- iv. Vibration is performed at the point of deposit and around freshly deposited concrete. The internal vibrators are moved about in the freshly deposited concrete and across the junctions between succeeding batches of concrete so that the entire mass will be thoroughly and uniformly compacted. Internal vibrators are not pushed rapidly but allowed to work themselves into the concrete mass and withdrawn slowly to avoid the formation of air voids.

Cold joints in the concrete are not accepted. If delays are encountered, concrete which has set so long that it will not receive a vibrator easily is to be completely removed from the form, if possible, or the member rejected.

**h. FINISHING OF CONCRETE**

The Inspector checks that: Concrete surface finishes are as specified on the Approved Contract or Accepted Shop Drawings. Provide architectural finishes as specified on the Accepted Shop Drawings and Accepted on the Mock-up.

**i. CURING OF CONCRETE**

The Inspector checks that:

- i. Special attention is given to the proper curing of all fresh concrete. Concrete is protected so that moisture is not lost during the early stage of hydration.
- ii. The curing procedure is established and carefully controlled. Concrete is kept continuously moist until the conclusion of the specified curing period.
- iii. After placing and vibrating, the concrete is required to attain initial set before steam is applied so that the concrete has sufficient strength to resist cracking due to thermal expansion. The length of the delay period between the finishing of the concrete and the application of the steam varies according to the mix design.
- iv. Steam curing is completed under a suitable enclosure to contain the live steam and minimize moisture and heat losses.
- v. Recording thermometers showing the time-temperature relationship throughout the entire curing period are located at a spacing not to exceed 100' of the bed. The ambient temperature is verified with hand thermometers. Temperature recording charts are retained as a part of the permanent records.

**j. INSPECTION OF COMPLETED PRODUCTS**

The Inspector assures that:

- i. Products are fabricated within specified tolerances. Post-pour dimensional checks by the Inspector must be performed on a minimum of 10% of completed products. When dimensional deviations exceeding the allowable tolerances are found, 100% of the completed products produced for that structure must be inspected, or as required by the Engineer.

For box culverts, perform a post-pour inspection on not less than 25% of the culverts sections produced for the structure, or as required by the SME. Increase the inspection frequency when dimensional tolerances or other defects are encountered, or as required by the SME.

For box culverts, when dimensional deviations (deviations at or exceeding dimensional tolerance limits) are found, perform dry fitting of two (2) adjacent pieces (at a minimum) for 100% of the structure, or as required by the SME. The SMS recommends performing dry fitting of all box culvert segments to alleviate concerns with box culvert placement in the field.

- ii. "Bug-holes" are not excessive in number and/or size.
- iii. Department approval is obtained before repairing any products not covered by the procedures listed in Part 3, Section I.
- iv. Patching is performed in accordance with approved procedures. Affected concrete is removed down to sound concrete and the patch is well bonded. Patching is done prior to storage. Mortar repairs are moist cured. Bulletin 15 repair materials are cured according to the manufacturer's recommendations.
- v. For box culverts: all temporary lifting or handling devices, which are for in-plant use only, must be patched prior to shipping. Patching must be performed using appropriate Bulletin 15 approved materials.
- vi. If temporary lifting or handling devices are deemed necessary to be used during shipping to and/or handling at the job site, they must be detailed on the approved shop drawings.
  - These temporary lifting or handling devices shall be patched at the job site using appropriate Bulletin 15 approved materials.

**k. TRANSPORTATION AND STORAGE**

- i. Ensure precast concrete products are transported in positions that prevent damage to the product during transit.

- ii. Storage areas are flat, firm, and organized in such a manner that the oldest production piece is easiest to access.
- iii. Prior to storage, products are given a complete inspection for tolerances according to the appropriate dimensional review sheets. Check for cracks, spalls, honeycombing, bug holes, and rebar or projection steel that requires epoxy touch-up, etc.
- iv. Necessary corrections are made prior to the Inspector's approval for partial payment or shipment.
- v. The Inspector's stamp of approval is placed on each accepted product. Indelible ink is used for stamping.
- vi. Rejected products are properly identified.

Additionally, for box culverts verify the following:

- i. Handle and store precast reinforced concrete box culvert segments so that damage will not occur to the concrete or reinforcing steel. Provide suitable lifting devices for handling and installing precast reinforced concrete box culvert segments. Galvanize metal devices as specified in Section 1105.02(s). Prior to shipping, verify gasket material is sufficiently adhered to the joint. Additionally, verify gaps are not present between strips of adjacent gasket material. If gaps are present, a minimum of 6 inches must be replaced to assure material is tight.
- ii. Replace precast reinforced concrete box culvert segments damaged by improper storing, handling, transporting, or erection when it cannot be repaired in the field as per Pub 145 or according to an approved repair procedure. Submit repair procedures beyond the scope of Pub 145 to the SME for evaluation and disposition.
- iii. The Representative will inspect the segments at the site for possible damage and cracking during shipment and for tolerances and other dimensions required for acceptance.
- iv. Do not ship segments until the 28-day minimum compressive strength is attained.
- v. Provide 24-hour advance notice of loading and shipping schedule. Have the Department Representative review Form CS-4171, verify product is properly marked as specified in Pub 408, Section 714.6(d) and properly stamp segments with indelible ink before shipping. Do not ship unapproved items.

## **2. Prestressed Concrete Products**

Prestressed members are fabricated as shown on the contract plans or the approved shop drawings, unless specific deviations are authorized.

### **a. STRESSING REQUIREMENTS**

The Inspector assures:

- i. That the stress induced in the prestressing steel is measured both by gauges, and by elongation of the tendons and/or load cells as specified in Pub 408, Section 1107.
- ii. That approved certified pressure gauges, load cells, dynamometers or gauging devices are used and re-calibrated at least once a year. Discrepancies between measured elongations and gauging measurements in excess of specifications should be carefully checked and the source of error determined and corrected before proceeding further.
- iii. That copies of reports are reviewed for each manufacturing operation recorded by the Fabricator's QC Representative.

### **b. PRETENSIONING**

The Inspector:

- i. Checks the casting beds and pallets periodically for deviation from a plane surface.
- ii. Verifies the initial tensioning force.
- iii. Verifies the proper marking of reference points prior to and after the initial tensioning forces have been applied to the strands, i.e., tape on strands and paint marks.
- iv. Notes changes in the ambient temperature and verifies that the proper adjustment is made to elongation for fixed abutment beds.
- v. Checks for slippage of strand anchorages.
- vi. Checks the actual dimensions of the bed layout and locations of hold-up and hold-down points to see if they agree with the dimensions shown on the approved shop drawings within

the allowable tolerances. Approved hold-up and hold-down devices as shown on the shop drawings are attached in such a manner as to maintain the specified center-to-center spacing of strands in both the vertical and the horizontal directions.

- vii. Checks for size and location of mild steel reinforcement and that minimum concrete cover is obtained including hold-down devices remaining in the beams.

**c. DETENSIONING**

Inspector assures that:

- i. Forms, ties, inserts, over yokes, hold-down, or other devices, which may restrict either horizontal or vertical movement of prestressed members, are stripped, or at least loosened, prior to detensioning. Detensioning immediately follows the curing period required by the specifications and when test cylinders indicate the required strength is obtained. During detensioning operations, the prestressing forces are kept symmetrical about the vertical axis of the member and applied in such a manner as to prevent any sudden (shock) loading.
- ii. All strands are released simultaneously by hydraulic jacking. The total force is taken from the header by the jack, and then gradually released. With this method, some sliding of the members on the beds is inevitable. **OR**
- iii. The strands are released by heating and gradually cutting the strands in accordance with the approved detensioning sequence. Cutting is performed simultaneously at both ends of adjacent members. Detensioning patterns are approved by the Fabricator's Engineer.

**d. FORMS**

As per Part 2, Section II (1)b.

**e. PRESTRESSING STEEL**

The Inspector checks that:

- i. Prestressing steel is domestic and free of deleterious materials such as grease, oil, wax, rock, clay, dirt, paint and loose rust. Strands which exhibit rust that cannot be removed by wiping with a dry cloth are not used.
- ii. Prestressing tendons or strands having kinks, bends, nicks or other defects are not used.
- iii. Tensioned strand is not subjected to excessive temperatures produced by torches, welding equipment or sparks.
- iv. Strands are positioned as shown on the shop drawings.
- v. Ducts or voids provided in the concrete for longitudinal post-tensioning tendons are formed by means of rigid PVC or metal conduit, metal tubing or other approved means or void forms are completely sealed against leakage of mortar and properly anchored in position. Lateral post-tensioning tubes shall be rigid PVC material or other material if approved by the SME.
- vi. No more than one approved splice per strand is used.
- vii. Multiple strand tensioning has all the strands spliced or no more than 10% of them. If all the strands are spliced, the average splice slippage should be considered in computing the elongation. If 10% or less are spliced, no slippage allowance is required.
- viii. Splices are not located within the concrete members.

**f. REINFORCING STEEL**

The Inspector checks that:

- i. Steel reinforcement is domestic, and the designated size and grade is according to the shop drawings and properly positioned in the members.
- ii. Reinforcement is adequately secured.
- iii. Reinforcement bars are prefabricated into cages by welding or tying. Undercutting is not present. Reinforcing bars shall not be welded without an approved procedure. (See Section VI.) Welding of epoxy coated rebars is not permitted.

**g. BEARING**

The Inspector checks that:

- i. The bearing areas on members are true and flat.
- ii. Beam daps meet the dimensional requirements and tolerances.

**h. CONCRETE MIX**

As per Part 2, Section II (1)c.

**i. BATCHING MATERIALS FOR CONCRETE**

As per Part 2, Section II (1)d.

**j. CONCRETE TESTS**

As per Part 2, Section II (1)e.

**k. PLACING CONCRETE**

As per Part 2, Section II (1)f.

**l. VIBRATION OF CONCRETE**

As per Part 2, Section II (1)g.

**m. FINISHING OF CONCRETE**

As per Part 2, Section II (1)h and:

After the concrete has been placed and before initial set, the beam is finished with a stiff wire bristle broom, flat tine wire broom or template in a transverse direction to produce not less than 4 scores per inch, to achieve a final texture from 1/16 inch to 3/16 inch in depth. Verifies that when manual techniques are used, concrete is not penetrated to depths where the brooming or tining operation pulls coarse aggregate to the surface.

**n. CURING OF CONCRETE**

As per Part 2, Section II (1)i.

**o. INSPECTION OF COMPLETED PRODUCTS**

The Inspector assures that:

- i. Products are fabricated within specified tolerances. Post-pour dimensional checks by the Inspector must be performed on a minimum of 25% of completed members. When dimensional deviations exceeding the allowable tolerances are found, 100% of the completed members produced for that structure must be inspected, or as required by the Engineer.
- ii. "Bug-holes" are not excessive in number and/or size.
- iii. Department approval is obtained before repairing any members not covered by the procedures listed in the Part 3 of this document.
- iv. The depressions left in the bottom of pretensioned members with draped strands after removal of the hold-down devices are cleaned of oil or grease and the depressions are completely filled with an approved mortar or Bulletin 15 repair material in the plant, prior to storage.
- v. Patching is performed in accordance with approved procedures. Affected concrete is removed down to sound concrete and the patch is well bonded. Patching is done prior to storage. Mortar repairs are moist cured. Bulletin 15 repair materials are cured according to the manufacturer's recommendations.
- vi. All temporary lifting or handling devices, which are for in-plant use only, must be patched prior to shipping. Patching must be performed using appropriate Bulletin 15 approved materials.
- vii. If temporary lifting or handling devices are deemed necessary to be used during shipping to and/or handling at the job site, they must be detailed on the approved shop drawings.
- viii. These temporary lifting or handling devices shall be patched at the job site using appropriate Bulletin 15 approved materials.

**p. TRANSPORTATION AND STORAGE**

The Inspector checks that:

- i. Prestressed concrete beams are transported in an upright position in accordance with specifications.
- ii. Storage areas are flat and firm, and beams are not twisted.
- iii. Prior to storage, beams are given a complete inspection for tolerances, camber, cracks,

bearing area, stirrup placement, alignment, recessed strand areas are patched, open drains, patched vents, and rebar or projection steel that requires epoxy touch-up, etc. Verification of camber and lateral sweep must be performed approximately two weeks prior to shipment. (NOTE) In the event the vertical camber or lateral sweep changed from the release camber or initial lateral sweep, the length of the member shall also be verified prior to shipping.

- iv. Necessary corrections are made prior to Inspector approval for partial payment or shipment.
- v. The Inspector's stamp of approval is placed on each accepted beam. Indelible ink is used for stamping.
- vi. Rejected members are properly identified.

**q. DEFECTIVE BEAMS**

The Inspector assures that:

- i. If the product does not meet the specifications, the beams are placed in an unacceptable status, and a QR is issued to the Fabricator.
- ii. Reports are promptly issued for any damaged or defective beam to both the SME and their supervisor. There are several reasons that a beam is declared defective, including but not limited to:
  - a. Cracks which exceed allowable types and limits. (Refer to the "Acceptance and Repair Procedures for Prestressed Beams with Cracks" in the Part 3, Section II)
  - b. Dimensional deviations beyond accepted tolerances.
  - c. Damage beyond preapproved limitations.
  - d. Other specification non-conformances.
- iii. The Inspector notifies the Fabricator (QR to QC Manager) of the specific non-conformance or deviation.

**3. Reinforced Concrete Pipe – See Pub 280 and BD-636M**

## PART 3 – PREAPPROVED REPAIRS

### SECTION I – REPAIR PROCEDURES FOR PRECAST CONCRETE PRODUCTS

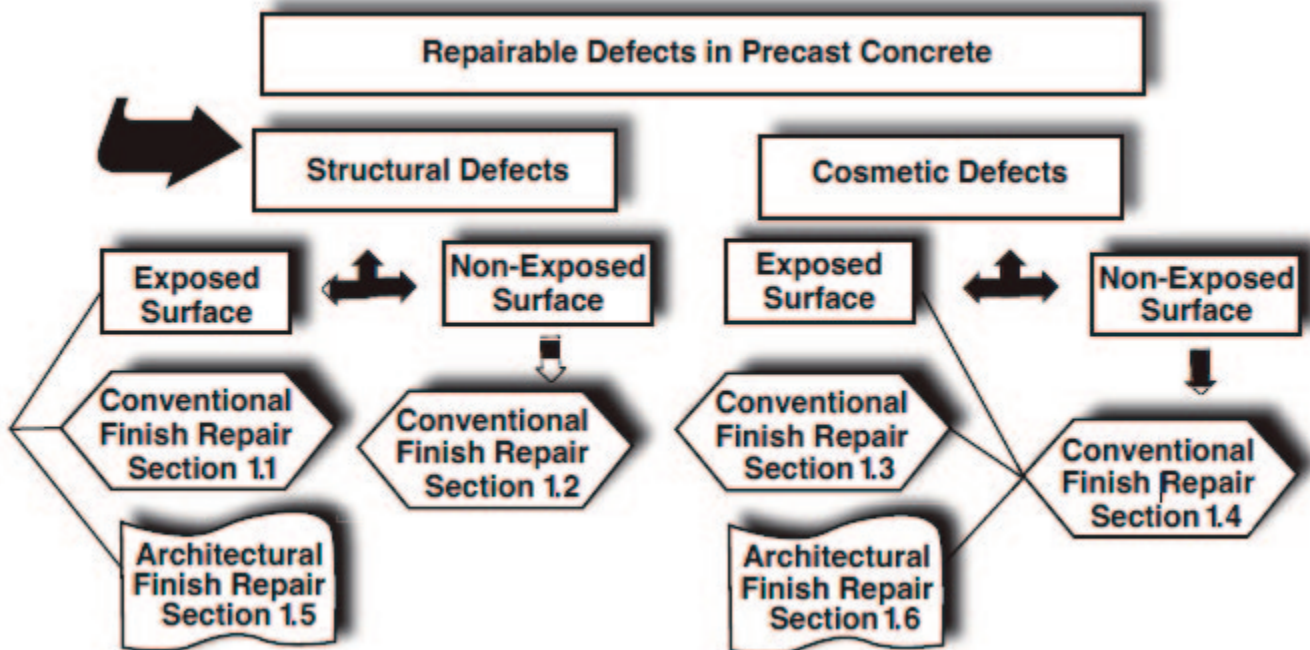
Precast concrete is a manufactured material using natural ingredients that can be produced in almost any combination of color, form, or texture. Through exercising proper quality control, precast concrete manufacturing defects will be minimized; however, repairs to some extent are to be expected. Properly repaired precast concrete can be sound, durable, and closely match the adjacent unrepaired concrete section.

The Department, in cooperation with the Pennsylvania Precast Concrete Association (PPCA/PPA), has developed 'preapproved' repair procedures for precast concrete.

For defects meeting the guidelines and limits given below, the Department will accept properly repaired precast concrete products. Additionally, repair of precast concrete products containing cracks shall be followed in Part 3, Section II (3).

**Recurring defects must be evaluated to ensure that future repairs are reduced or eliminated.**

Any repairs beyond the scope of this procedure may be submitted to the SME for evaluation on a case by case basis. Such repair proposals should include a photograph or sketch of the affected area and a detailed repair proposal. Submitted repairs must be presented to the Inspector for verification (by initials). Preapproved product specific repairs may be incorporated into a Fabricator's QCP as an addendum at the direction of the SME.



## Definitions:

### **Defects:**

#### **Structural Defect**

Broken corners, large spalls, reinforcement may be exposed. Depth range: greater than 2 inches and up to 6 inches. Surface area less than 150 in<sup>2</sup>.

#### **Cosmetic Defect**

Chips and/or surface defects, fractures, and spalls that do not expose reinforcement. Depth range: up to 2 inches. Surface area less than 100 in<sup>2</sup>. Very small surface voids caused by entrapped air at formed surfaces (bug holes) are normally considered a cosmetic defect that does not require repair. Bug holes over ½ inch in diameter or clusters of bug holes covering an area larger than 100 in<sup>2</sup> are required to be repaired.

### **Surfaces:**

#### **Exposed Surface**

Any surface above normal water or grade level (when applicable), and/or a surface that is not concealed by other construction. An internal surface of a precast product is not considered an exposed surface.

#### **Non-Exposed Surface**

Any surface below normal water or grade level (when applicable), and/or a surface that will be concealed by other construction. An internal surface of a precast product is considered a non-exposed surface.

### **Surface Finish:**

#### **Architectural Finish**

An architectural finish represents a finish with a specified standard of uniform appearance, surface details, color, and texture. Approved samples must establish the range of acceptability with respect to color and texture variations, surface defects, and overall appearance. Such samples must be viewed at a distance consistent with the normal viewing distance of the structure, but not less than 30 feet.

#### **Conventional Finish**

Precast concrete surfaces may have slight irregularities that are the result of form conditions and form joints. These irregularities may include fins or protrusions less than 3/16 inch or surface voids as described above. These defects typically do not require repairs.

#### **Special Finish**

A special finish is selected for specific projects and is to be specified on a project by project basis. Such finish consists of a specified application on the exposed and/or non-exposed surfaces of a precast product. These applications can include, but are not limited to, epoxy coatings, bituminous coatings, and requirements for patching extremely small holes.

## **REPAIR PROCEDURES**

### **1. For Structural Repairs of Exposed Surfaces with Conventional Finishes**

- Areas to be repaired must be clean, sound, and free of contaminants.
- Make a ¾ inch deep vertical surface along the perimeter of the damaged area.
- Remove concrete for a minimum of 1 inch behind all exposed reinforcement where at least 2 inches of continually exposed reinforcement is visible.
- Provide an aggregate fractured surface with a minimum surface profile of -1/8 inch.
- Drill and insert 3/8-inch diameter steel expansion anchor pins on 4 inches centers for damaged areas with depth greater than 3 inches when rebar is not prevalent.
- Clean the repair surface.
- When using a Bulletin 15 approved repair material, apply an approved bonding agent unless the manufacturer's instructions expressly state that a bonding agent is not required. If using the approved mix design, first apply a mortar scrub coat to the repair area, filling all voids.



- Fill the area with either a Bulletin 15 approved repair material, thoroughly mixed according to the manufacturer's recommendations, or with the approved concrete mix design.
- Cure repaired area either according to the Bulletin 15 manufacturer's recommendations, or in accordance with the approved QCP for a minimum of 24 hours, prior to shipping.
- Evaluate the repaired area by applying a moderate blow with 16-ounce hammer at several locations within the repaired area.
- The repaired area should closely match both color and texture of the undamaged adjacent concrete surfaces.

## **2. For Structural Repairs of Non-Exposed Surfaces with Conventional Finishes**

- Areas to be repaired must be clean, sound, and free of contaminants.
- Make a ¾ inch deep vertical surface along the perimeter of the damaged area where patch will feather to nothing, where applicable.
- Remove concrete for a minimum of 1 inch behind all exposed reinforcement where at least 2 inches of continually exposed reinforcement is visible.
- Provide an aggregate fractured surface with a minimum surface profile of -1/8 inch.
- Drill and insert 3/8-inch diameter steel expansion anchor pins on 4-inch centers for damaged areas with depth greater than 3 inches when rebar is not prevalent.
- Clean the repair surface.
- When using a Bulletin 15 approved repair material, apply an approved bonding agent unless the manufacturer's instructions expressly state that a bonding agent is not required. If using the approved mix design, first apply a mortar scrub coat to the repair area, filling all voids.
- Fill the area with either a Bulletin 15 approved repair material, thoroughly mixed according to the manufacturer's recommendations, or with the approved concrete mix design.
- Cure repaired area either according to the Bulletin 15 manufacturer's recommendations, or in accordance with the approved QCP for a minimum of 24 hours, prior to shipping.
- Evaluate the repaired area by applying a moderate blow with 16-ounce hammer at several locations within the repaired area.

## **3. For Cosmetic Repairs of Exposed Surfaces with Conventional Finishes**

- Areas to be repaired must be clean, sound, and free of contaminants.
- If the depth exceeds 1 inch, make a ¾ inch deep vertical surface along the perimeter of the damaged area.
- Provide an aggregate fractured surface with a minimum surface profile of -1/8 inch.
- Saturate the repair surface with clean water to provide a SSD condition, when applicable.
- Fill the area either with a thoroughly mixed Bulletin 15 approved repair material according to the manufacturer's recommendations, the approved concrete mix design, or if less than 1 inch in depth, a mortar mix.
- Cure repaired area either according to the Bulletin 15 manufacturer's recommendations, or in accordance with the approved QCP for a minimum of 24 hours, prior to shipping.
- If the depth exceeds 1 inch, evaluate the repaired area by applying a moderate blow with 16-ounce hammer at several locations within the repaired area.
- The repaired area should closely match both color and texture of the undamaged adjacent concrete surfaces.

## **4. For Cosmetic Repairs of Non-Exposed Surfaces with Conventional Finishes**

- Areas to be repaired must be clean, sound, and free of contaminants.
- If the depth exceeds 1 inch, make a ¾ inch deep vertical surface along the perimeter of the damaged area.
- Provide an aggregate fractured surface with a minimum surface profile of -1/8 inch.
- Saturate the repair surface with clean water to provide a SSD condition, when applicable.
- Fill the area either with a thoroughly mixed Bulletin 15 approved repair material according to the manufacturer's recommendations, the approved concrete mix design, or if less than 1 inch in depth, a mortar mix.
- Cure repaired area either according to the Bulletin 15 manufacturer's recommendations, or in accordance with the approved QCP for a minimum of 24 hours, prior to shipping.
- If the depth exceeds 1 inch evaluate the repaired area by applying a moderate blow with 16-ounce hammer at several locations within the repaired area.

## 5. For Structural Repairs of Exposed Surfaces with Architectural Finishes

- Areas to be repaired must be clean, sound, and free of contaminants.
- Make a 3/4 inch deep vertical surface along the perimeter of the damaged area, where applicable.
- Remove concrete for a minimum of 1-inch behind all exposed reinforcement where at least 2 inches of continually exposed reinforcement is visible.
- Provide an aggregate fractured surface with a minimum surface profile of -1/8 inch.
- Drill and insert 3/8 inch diameter steel expansion anchor pins on 4-inch centers for damaged areas with depth greater than 3 inches when rebar is not prevalent.
- Clean the repair surface.
- When using a Bulletin 15 approved repair material, apply an approved bonding agent unless the manufacturer's instructions expressly state that a bonding agent is not required. If using the approved mix design, first apply a mortar scrub coat to the repair area, filling all voids.
- Fill the area with either a Bulletin 15 approved repair material, thoroughly mixed according to the manufacturer's recommendations, or in accordance with the approved QCP.
- Cure repaired area either according to the Bulletin 15 manufacturer's recommendations, or in accordance with the approved QCP for a minimum of 24 hours, prior to shipping.
- Evaluate the repaired area by applying a moderate blow with 16-ounce hammer at several locations within the repaired area.
- Apply a finish coat to the repaired area to match the approved architectural finish.

**Note:** A repair mix is typically developed through a trial and error process to match the color and texture of the concrete surface. Slight variations can be expected due to the difference in age and curing conditions for the repair.

## SECTION II – REPAIR PROCEDURES FOR PRESTRESSED CONCRETE PRODUCTS

### General Notes:

Repair procedures for Precast Concrete Products are also applicable to Prestressed Concrete Products. Repairs are to be witnessed by a Department Representative. **(For submitted repairs, the procedure must be presented to the Inspector for verification. After the condition of the beam is verified, the Inspector will sign the procedure for distribution to the Department.)**

Patching operations, as well as, the curing cycle shall be done at a minimum of 40°F.

- Repairs to bearing areas must be submitted to the Department for review and approval.
- The damaged area may not exceed a length of 24 inches in any direction.
- Repairs to exposed surfaces will be limited to 5% of the total exposed surface area of each face.
- Bulletin 15 approved materials must be listed in the following sections:

#### Concrete Repair Materials:

1. Pub 408, Section 525.2(c) 'Rapid Set Concrete Patching Materials'
2. Miscellaneous 'Polymer Modified and Special Cements, Mortars and Concrete'

#### Bonding Compounds:

1. Pub 408, Section 706.1 'Epoxy-Bonding Compound' Systems, Type II Grade 2 only
2. Pub 408, Section 706.2 'Other Bonding Compound' Systems

## ACCEPTANCE AND REPAIR OF PRESTRESSED CONCRETE BEAMS WITH CRACKS AND OTHER REPAIRS

The goal of design, detailing, and fabrication specifications and practices is to produce prestressed concrete bridge beams without cracks. Some types of cracks are very difficult to predict, and the best a designer can do is to react to the occurrence of cracks to prevent reoccurrence. While fabricator practices can lead to cracks, not all cracks are a result of fabrication errors.

The following descriptions, cause/cure considerations, and recommendations of Part 3 Section II (2) may be helpful to designers and others who may have to review submittals for changes to details for the most likely cures

to chronic cracking problems or to better understand how to prevent them in the future. Crack width and length limitations and repair methods for acceptance of beams are given in Sections II (3) and (4). Beams with cracks, which do not exceed the limits, described in Table 3 and which have been satisfactorily repaired will be accepted. Any repairs beyond the limits defined in Section II (3) may be submitted to the SME for evaluation on a case-by-case basis. **(For submitted repairs, the procedure must be presented to the Inspector for verification. After the condition of the beam is verified, the Inspector will sign the procedure for distribution to the Department.)**

## 1. GENERAL OBSERVATIONS

- a. Precast/Prestressed concrete beams are designed to be crack free in the compression zone of the member.
- b. Additional reinforcing for crack control will not eliminate cracks but may reduce the size of them.
- c. End-tension design stresses are not the primary cause of cracks as cracks may appear in members with zero tension.
- d. There is little known of the effect that cracks will have on the life of a reinforced member under cyclic loading. Therefore, cracks should be kept to a minimum.
- e. Cracking may be induced due to rapid cooling of different sections of the prestressed member.
- f. Many small reinforcing bars are more effective in reducing cracking than fewer larger bars furnishing the same area of steel.

## 2. CLASSIFICATION OF CRACKS

### Type 1 Crack (V-Crack)

Appears in ends of beams regardless of skew. These cracks more often appear at acute corners as compared to the obtuse corners (See Figure 1).

Cause: High stress concentrations created by one or more of the following:

- Point bearing due to beam chamber
- Rapid temperature changes
- Sliding of beam at detensioning

Cure: Use non-bearing detail at bottom of beam end. Use heavier end gird reinforcement.

### Type 2 Crack (Entrant Crack)

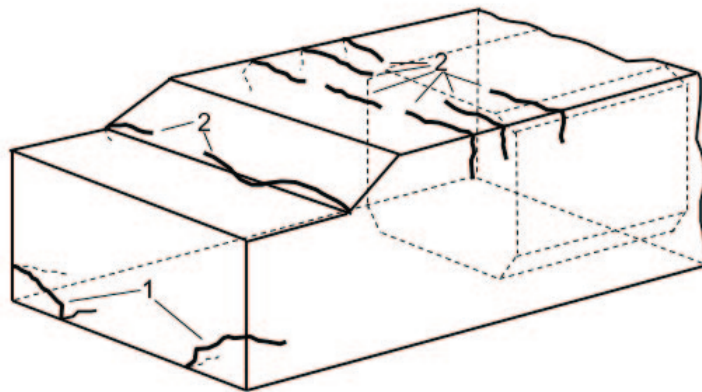


Figure No. 1

Appears at beam notch. May appear in beams with a low or high percentage of prestressing reinforcement. (See Figure 1)

Cause: Stress concentration due to sharp changes in section, temperature and/or tension stresses. Inadequate bond length in area of reinforcement steel, temperature effect of notch.

Cure: Increase bond length of reinforcing or area of reinforcing. Carefully finish the reentrance angle face by providing approximately 4 inches tooled bead. Unbonding of part of reinforcing (when permitted) may reduce cracking. Changing strand release sequence and reducing time between removing steam cure and detensioning may be helpful.

#### **Type 2A Crack** (Change of Section Crack)

Crack generally at top of beam near the change in section from hollow beam to solid beam at inserts. (See Figure 1)

Cause: Crack may be induced due to stress concentration caused by a combination of changes of section or tension stresses.

Cure: Increasing top reinforcing. Move up center of gravity of strands. Use less economical strand patterns or draped strands.

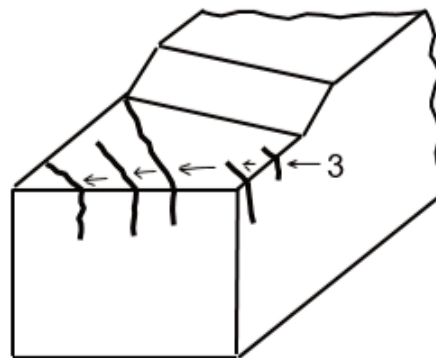
#### **Type 3 Crack** (Skewed End Crack)

Crack at sharp point of skewed end of box beams. (See Figure 2)

Cause: Stresses due to detensioning of strands cause tensile stresses to develop, contributing to cracking. Ineffective mild reinforcing.

Cure: Use debonding of strands and/or additional reinforcement. Furnish sufficient end grid reinforcing.

#### **Type 3A Crack** (Horizontal End Crack)



**Figure No. 2**

Horizontal crack close to top row of strand pattern. (See Figure 3)

Cause: Stresses due to detensioning of strands cause tensile stresses to develop, contributing to cracking. Ineffective mild reinforcing. Excessive rate of cooling.

Cure: Use debonding of strands and/or additional reinforcement. Furnish sufficient end grid

reinforcement. Stay within specified removal of steam curing.

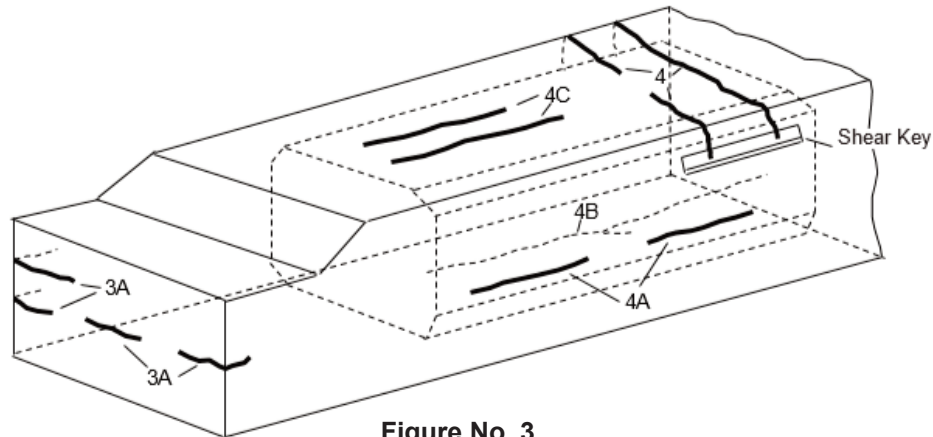
**Type 4 Crack (Restrained Shrinkage Crack)**

Lateral crack appears over top of beam anywhere along beam length. (See Figure 3)

Cause: High cement factors or curing problems. Failure to release strand within one half hour after removal of curing.

Cure: Reduction of cement factor or immediate release following curing, or correction of incorrect curing practices.

**Type 4A Crack (Horizontal Shrinkage Crack)**



**Figure No. 3**

Crack appears at web of beam, continuous or non-continuous, generally above bottom slab or bottom flange in Prestressed I-Beams. (See Figures 3 and 5)

Cause: High cement factor or curing problems. Failure to release strand within one half hour after the completion of final curing.

Cure: Reduction of cement factor or immediate release following final curing, or correction of incorrect curing practices. Keeping Prestressed I-Beams wet.

**Type 4B Crack (Bottom Shrinkage Crack)**

Crack appears at bottom of box beams, near the center of beams. May be continuous or non-continuous (See Figure 3).

Cause: High cement factor or curing problems. Failure to release strand within one half hour after the completion of final curing.

Cure: Reduction of cement factor or immediate release following final curing, or correction of incorrect curing practices.

**Type 4C Crack (Top Longitudinal Shrinkage Crack)**

Crack appears longitudinal along top of box beams. (See Figure 3)

Cause: Differential in curing temperature or steel bars too close to top of beam or floating void.

Cure: Use of effective breather tubes, proper bar clearance, securing of void.

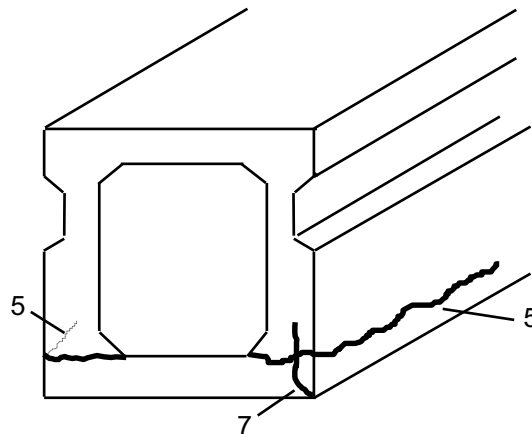
**Type 5 Crack (Cold Joint Crack)**

Crack appears at junctions – increments of pours – generally between bottom flange or slab or a web and may be continuous. (See Figures 4 and 5)

Cause: Premature hardening of concrete due to delays between increments of pours or cold joints at bottom of slab.

Cure: Better fabrication control, addition of retarder in concrete. Effective vibration between bottom flange and sidewalls.

**Type 6 Crack** (Plastic Deformation Crack)



**Figure No. 4**

Crack appears at Types 1 to 3 crack locations after beam has been stored for a period. Length of time from release to discovery may vary. (See Figures 1 and 2)

Cause: Increase in concrete stress caused by creep and plastic deformation.

Cure: Since time, temperature variations, and numerous other variables affect this type of cracking, serious cases will have to be investigated and studied. No general cure can be recommended, although study of the plant operations may lead to recommendation of change in operational procedure which may help to eliminate cracking.

**Type 7 Crack** (Chamfer Cracks)

Crack appears at chamfer strip. (See Figure 4)

Cause: Improper vibration or yielding of forms while concrete is still in a semi-plastic stage. (See Figure 3)

Cure: Careful inspection of bed forms and pouring sequence.

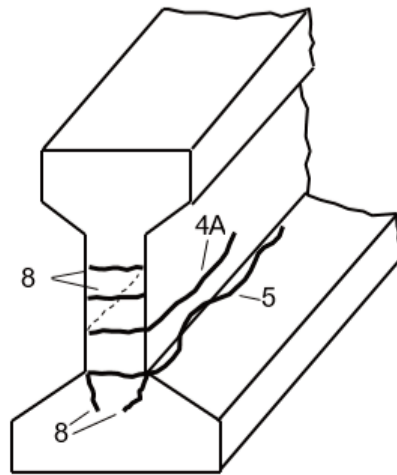
**Type 8 Cracks** (Web End Cracks)

Cracks may appear at the end of the web in I-Beams (see Figure 5).

Cause: Stresses due to detensioning of strands cause tensile stresses to develop that contribute to cracking.

Cure: Use of debonding of strands and/or additional reinforcement.

**Type 9 Crack** (Diagonal Web Crack)



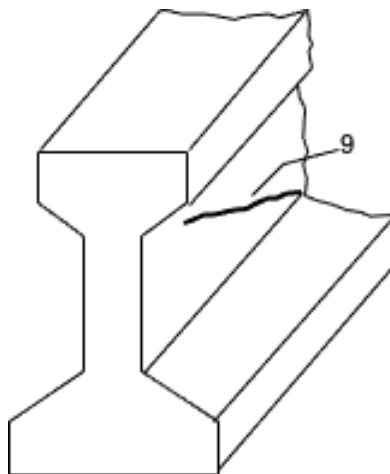
**Figure No. 5**

Crack appears in the web of I-Beams with draped strand patterns and is typically diagonal starting near the end of the beam. (See Figure 6)

Cause: When deflected strands are too concentrated near the top of the beam.

Cure: "Fanning out" deflected strands across the depth of the beam promoting a more even distribution of the prestressing force.

**Type 10 Crack** (Dowel Hole Crack)



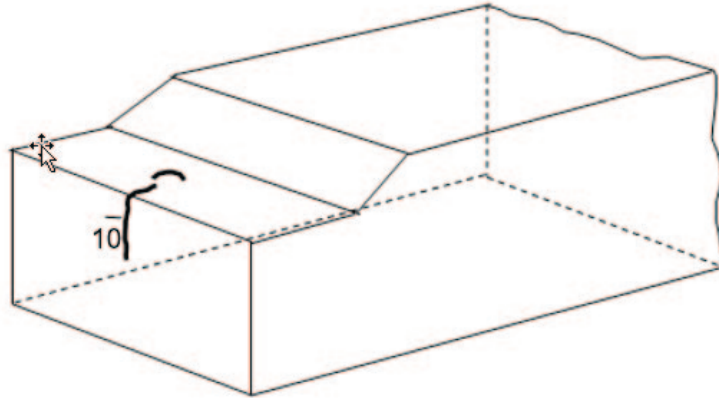
**Figure No. 6**

Crack starts at the dowel holes of the box beam, after extending towards the beam end and then downward along the end of the beam. (See Figure 7)

Cause: Crack may be induced by stress concentrations caused by a combination of changes in section or tension stresses.

Cure: Increase reinforcing.

### **3. REPAIR OF PRECAST/PRESTRESSED CONCRETE PRODUCTS CONTAINING CRACKS**



**Figure No. 7**

- a. Cracks covered by Table 3 of this document shall be repaired in accordance to the following procedure:
  - i. Cracks less than 0.004 inches in width at the widest part are classified as hairline cracks and do not require patching.
  - ii. Cracks 0.004 inches to 0.008 inches shall be sealed as follows: Initially apply a Bulletin 15 approved penetrating sealer. When dry, follow by rubbing the crack closed at the surface with Type III Cement. Finish by reapplying a fog spray of the sealer over the crack, taking care not to flush open the crack. (Note: Use sealers which do not form a vapor barrier).
  - iii. Cracks that exceed 0.008 inch in width at the widest part, but do not exceed the width limits in Table 3, shall be injected with an approved epoxy listed in Bulletin 15, **Approved Construction Materials**, using an injection method recommended by the manufacturer.
- b. If a crack falls outside the limits of Table 3, submit a detailed description and proposed repair procedure to SMS for evaluation.
- c. Width of cracks shall be measured with a fine scale magnifying comparator at approximate center of the crack. Crack width measurement with a feeler gauge is not acceptable.
- d. Cracks up to the limits of Table 3, that will receive cast-in-place concrete in the final structure, do not have to be surface sealed; but, if not patched, will need to be protected during any period of prolonged storage.

**D. OTHER PREAPPROVED REPAIRS**



**Table 3 - Acceptance Criteria for Cracked Prestressed Beams**

Type of Crack	Max Allowable Crack Width (inches)	Maximum Allowable Crack Length
1	0.008	½ of beam depth, each way
2	0.010	½ of beam depth, each way
2A	0.010	½ of beam depth, each way
3	0.008	Not to exceed beyond end block
3A	0.008	Not to exceed beyond end block
4	0.008	8" down from top of beam when beam depth is < 33" 13" down from top of beam when beam depth is > 33"
4A	0.004	Non-continuous crack, each not exceeding 3' Total length not to exceed 1/3 length of beam No cracks in middle 1/3 of beam
4B	0.006	Non-continuous crack, each not exceeding 3' Total length not to exceed 1/3 length of beam
4C	0.004	Non-continuous crack, each not exceeding 3' Total length not to exceed 1/3 length of beam
5	0.006	Non-continuous crack, each not exceeding 3' Total length not to exceed 1/3 length of beam No cracks in middle 1/3 of beam
6	0.004	½ of beam depth each way
7	0.005	½ of beam depth each way
8	0.006	12"
9	0.004	2x the beam depth
10	0.008	½ of beam depth

### Surface Tearing or Stretch Cracking

Surface tearing or stretch cracking may appear in random patterns on sides of box beams and I-beams. This type of crack is a surface defect with a maximum depth of ½ inch and maximum width of ¼ inch.

**Cause:** Expansion of forms due to internal and external temperature changes while the concrete is still in the semiplastic state. Forms can expand or slide along the surface of the beam and drag or tear the exterior finish of the concrete. This type of surface defect is more likely to occur on longer beams.

**Cure:** Ensure that forms are well cleaned, smooth, and oiled properly.

**Repair Method:** Seal tear using the procedure described under "Cosmetic Repair" discussed earlier in this section.

### Cosmetic Spalls

Minor chips and spalls less than 2 inches deep that do not expose reinforcement. Surface areas are less than 100 in<sup>2</sup>. These may be located anywhere on the surface, for beams no spalls are to be repaired on the bearing area.

**Repair:** Utilize the "cosmetic repair" procedure described earlier in this section.

### Non-Structural Spalls

These spalls usually result from stress on the end of the beam caused by form release, beam camber, handling or a combination of these.

Beams with camber:

Fabricators should provide non-bearing details on shop drawings at the beam ends to reduce end damage attributed to camber.

Spalls at corners located at end of beam and/or along sides of top flange:

Reinforcing may be exposed. Depth range may vary from greater than 2 to 4 inches. Surface area must be less than 150 in<sup>2</sup>.

End Surface Spall:

Spalls located on ends of beams, depth limited to 2 inches at center of beam, and 4 inches at edge of beam, with only the surface of reinforcing exposed. Surface area not exceeding 25% of the cross-sectional area of I-beams or 15% of box beams.

Spalls located on bottom, side, or top of beam (away from end of beam). Surface of reinforcing may be exposed. Depth limited to 2 inches. Surface area must be less than 150 in<sup>2</sup>.

Repair: Utilize repair procedures described in 'Repair Procedures for Precast Concrete Products' for Structural Repairs of Exposed Surfaces with Conventional Finishes described earlier in this section.

### **Missing and Mislocated Inserts**

Inserts are omitted or mislocated either due to human error during set-up or due to shifting of an insert rack during production. Pub 408 provides a working tolerance of +/- 1/2 inch for the location of inserts. If the Fabricator determines that the mislocated inserts will perform in the as-fabricated position while meeting minimum cover requirements in the final structures, approval may be obtained through the Department's 'Serviceable Products Policy'. If a very limited number of mislocated or missing inserts are affected, the Fabricator may contact the Chief SME to determine whether a less formal approval may be considered through the SMS.

Insert Repair:

The Fabricator's engineering department must prepare a detailed sketch specifying location or zone for the replacement insert(s). Missed or mislocated diaphragm inserts may be replaced using anchors of sufficient size and capacity as those specified on the Accepted Shop Drawings. A Bulletin 15 approved epoxy adhesive that is recommended for this application is required. After obtaining approval for repair, use accepted shop drawings to verify replacement locations to avoid structural reinforcement or strand before drilling holes for the anchors.

### **Misaligned Form Joints**

Irregular or misaligned form joints can provide sidewall deviations exceeding the tolerances in Pub 408. Repeated use of damaged or mislocated formwork exceeding the specification tolerances is not acceptable. QC personnel are required to identify deviations during Prepour and Postpour inspections and notify production that appropriate measure are taken to ensure the errors are not (consistently) repeated. Form joints exceeding allowable tolerance may be repaired as follows:

Form joint misalignment repair by patching:

- a. Bush hammer joint 1/4 to 3/8-inch-deep to eliminate the step.
- b. Prepare the surface for bonding agent by chipping a surface profile of 1/16 to 1/8 inch.
- c. Apply a Bulletin 15 approved bonding agent.
- d. Apply a Bulletin 15 approved patching material that closely matches the color of the adjacent concrete.
- e. Allow to cure according to manufacturer's recommendations.

Form joint misalignment repair by grinding (not recommended for exterior surfaces of fascia beams):

- a. Transition the misalignment by grinding, carefully maintaining the required surface finish. Seal with a PennDOT approved sealer.

### **Bearing Area Flatness Deviation**

Deviations in bearing area flatness exceeding Pub 408 tolerances are found during post pour inspections, either due to irregularities in the forming pallet or dap forming equipment. Following identification of this condition, additional QC verifications are required to ensure that future production is produced within allowable tolerances.

#### Bearing Flatness Repair:

When deviations beyond the allowable tolerances are found, the bearing area may be carefully ground to within the allowable tolerance. Verify the flatness tolerance over an area not less than 1 inch beyond the bearing pad contact area in all directions. Prior to grinding, verify that minimum cover limitations will not be exceeded by the corrective action. After grinding, seal the bearing area with a PennDOT approved penetrating sealer in accordance with the manufacturer's instructions.

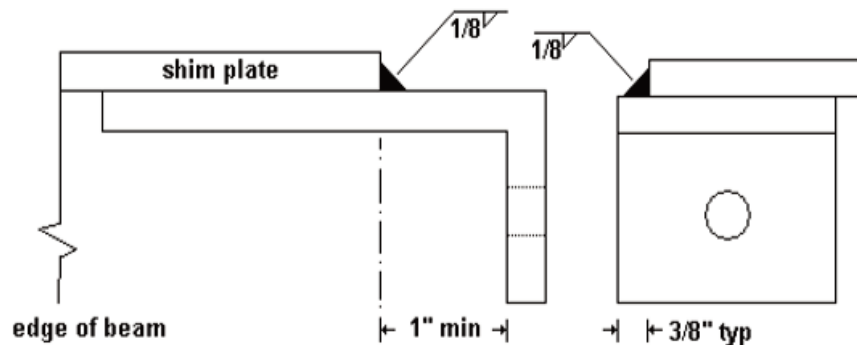
### **Mislocated Weld Clips**

When weld clips are mislocated slightly away from the beam edge during hand placement, by finishing or curing operations. Misplaced weld clips may be repaired when the distance from the edge of the weld clip to the edge of the beam exceeds 1/16 inch.

#### Weld Clip Repair:

Submit a Weld Procedure Specification to the Chief SME for attaching a shim plate above the mislocated weld clip, flush to the end of the beam (see below). After welding, remove slag and coat with a cold galvanizing repair compound meeting ASTM A780.

### **Misaligned Stirrup Projection Reinforcing**



During final finishing and curing, or during handling following curing, stirrup projection bars may become bent or misaligned. QC should verify that minimum cover limitations to formed beam edges were not exceeded for any stirrups which shifted during fabrication. Projection bars may be cold bent a maximum of 45°F back to their required vertical position. The ambient temperature at the time of repair must be at least 50°F. Following reorientation of the stirrups, inspect the stirrup at the point where it intersects the top flange of the beam. The repair will be accepted provided no cracking is evident.

## PART 4 – APPENDICES

### SECTION I – DISTRICT, DEPARTMENT FORCE, AND OTHER COMMONWEALTH AGENCIES FABRICATION POLICY

This section is reserved to outline minimum requirements for establishing a Fabrication Facility producing products solely for 100% State Funded Projects. Further, these facilities may be operated by other Commonwealth Agencies such as, but not limited to, Correctional Industries, District Maintenance Staff, General Services, Maintenance and Operations, etc.

Contact the PennDOT Chief SME prior to plant start-up to coordinate and assure compliance with Department specifications.

Agencies considering fabrication shall consider the following prior to fabrication.

1. Define precast product to be manufactured per PennDOT Specifications and Standards.
2. Establish QC for Facility per PennDOT Specifications and NPCA, ACI, PCI (as applicable).
3. Define Facility suitability and capability for producing precast product.
  - a. Location and roadway network for receipt of raw product to be utilized in the manufacturing.
  - b. Manufacturing LAYOUT:
    - i. Enclosed facility required
    - ii. Square footage for precast form layout for production and curing
      1. Storage of raw materials and access for utilization
        - a. Materials - aggregate, cement and water, steel reinforcement
      2. Precast forms:
        - a. Access by crane or ready-mix truck
        - b. Dimensions
        - c. Form material
      3. Temperature control
      4. Ability to lift and handle products (i.e. overhead crane, etc.)
4. Define staffing for the manufacturing of the precast product.
  - a. Establish an organizational chart, showing reporting structure and decision making
  - b. Plant manager qualifications – ACI Concrete Field Testing Technician – Grade 1, PCI Level III (as applicable)
  - c. QC manager qualifications – ACI Concrete Field Testing Technician – Grade 1, PCI Level III (as applicable)
  - d. Fabrication staff qualifications
    - i. Required training
5. Define product material
  - a. Concrete Mix Design
    - i. Approved by SMS for raw material mixes or
      1. Raw material will be obtained from Bulletin 15 and Bulletin 14 Suppliers
    - ii. Use ready mix from an approved Bulletin 42 Supplier.
  - b. Steel reinforcement will be obtained from a Bulletin 15 Supplier
6. Submit a QCP outlining specific QC requirements provided in this Publication. QCP needs to be accepted by PennDOT Chief SME.
7. Define Quality Assurance (QA)/Independent Assurance (IA) process to verify QC operations.
8. Facility be certified to NPCA requirements and audited by PennDOT SMS.
9. Acceptance criteria:
  - a. Plant qualified for product Certificate of Compliance, Form CS-4171
  - b. Plant qualified utilizing Third Party Inspection Agency
  - c. Plant qualified utilizing Commonwealth Agency Inspection Personnel

10. Payment for the product:
  - a. Establish unique project number system:
    - i. Establish item product number for each product type made by the Fabricator
    - ii. District project charge number and product item number used for cost and reimbursement tracking

## SECTION II – GENERAL FORMS

**Note:** This part does not contain a comprehensive list of inspection forms. Inspection documentation is to be entered directly into EQMS “Forms”, whenever applicable. Most Forms provided herein are hardcopy forms. Electronic fillable PDF forms are being investigated for future use.

EQMS does include some printer ready forms to facilitate data collection; however, final documentation is to be made within the application.

### **Index of Forms**

CS-110	Payment Authorization for Stored Material or on Hand
CS-430	Notification of Inspection
CS-4171	Certificate of Compliance [with supp. forms such as CS-4171C, F, or S]
TR-36	Quality Control Plan Guidelines for Precast and Prestressed Concrete Plants
TR-37	Production Joint Welding Procedure Specification Procedure Qualification Record
TR-38	Local Government/Commercial Stock EQMS Transfer Form
TR-62	Quality Control Plan Guidelines for RC Pipe
TR-443	Quality Report
TR-447	Sample Identification and Instructions
TR-800	Structural Materials Quality Comment Sheet

**CS-110 PAYMENT AUTHORIZATION FOR STORED MATERIAL OR ON HAND**

CS-110 (9-20)



**PAYMENT AUTHORIZATION  
FOR MATERIAL STORED OR  
ON HAND**

**Reference: Pub. 408, Section 110.06**

FILL OUT COMPLETELY  
Original to be retained with project records.

- CC:  District Office  
 Contractor  
 Supplier

S.R.: \_\_\_\_\_ Sec.: \_\_\_\_\_ County: \_\_\_\_\_ District: \_\_\_\_\_ Date: \_\_\_\_\_

ECMS No.: \_\_\_\_\_ Contractor: \_\_\_\_\_ Supplier: \_\_\_\_\_

- Storage Location:**  On Site (Location)  
 Vicinity of Project \_\_\_\_\_ (Location)  
 Off-Site \_\_\_\_\_ (Location)  
 \_\_\_\_\_ (Reason)

Approval Section:	Approval	Disapproval	Attachments:
Storage Location . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Contractor's Letter of Request
Certification & Shipment, Section 106.03(b) . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Invoices
Storage of Material, Section 106.05 . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Material Certifications
Material Identified & Set Apart . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> CS-430 Notification of Inspection
			<input type="checkbox"/> CS-4171 Certificate of Compliance

**Reason(s) for Disapproval(s):** \_\_\_\_\_  
 \_\_\_\_\_

**Inspected By:** \_\_\_\_\_  
 Signature Title Date Inspected

**Item Chart:**

Item No.	Amount Invoiced	Estimated Date of Usage	Item Contract Value	90% Item Contract Value*	Amount Payable

\* 75% of Item Value for fabricated structural steel that is to receive a protective coating. 90% of Invoice amount for Force Transfer Units.

Total Previously Requested: \_\_\_\_\_ Subtotal: \_\_\_\_\_

25% Current Contract Amount: \_\_\_\_\_ Total Payable: \_\_\_\_\_

**Approvals:**

Inspector-In-Charge: \_\_\_\_\_ Date: \_\_\_\_\_

Asst. Const. Engr./Mgr.: \_\_\_\_\_ Date: \_\_\_\_\_

CS-430 (8-20)



**NOTIFICATION OF INSPECTION**

(REPRODUCE LOCALLY)  
Fillable Fields/Print

SYS	SR OR WO	SPUR	PHA	SECT	ORGN	ALLOT	CST. FCT	S#	BRKey	COUNTY

\* CMS/ECMS No.: Yes  No  (if yes) # \_\_\_\_\_ Project Value: \$ \_\_\_\_\_  
 Federal Project No.: \_\_\_\_\_ or 100% State

Prime Contractor: \_\_\_\_\_

Special Provision for fabricated material(s)?: Yes  (please attach), No

Project Let Date: \_\_\_\_\_

Fabricator(s)/Location(s)	Material Description	Anticipated Production	
		Date (Range)	Quantity

Submitted by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Signed Name Phone: # \_\_\_\_\_

E-Mail: \_\_\_\_\_

**\* REQUIRED FIELD (missing and/or incomplete information may result in our inability to provide inspection Services.**

*This completed form must be forwarded to the Chief, Structural Materials Engineer, Material Testing Division-Bureau of Construction and Materials, to authorize inspection for fabricated materials. Inspection is required for, but not limited to, products defined in Publication 408, Sections 601.2.3(a) - special design concrete pipe, 714 - precast concrete products, 1085 - precast concrete box culverts, 1086 - precast sound barrier, 1101 - highway light poles, 1104 - traffic poles, 1105 - fabricated structural steel and 1107 - prestressed concrete bridge beams Refer to PUB 2 (POM) A/2/3 for listing of shop inspected items.*

**Acceptable Methods of Submitting NOI (send to only one):**  
**ECMS Source of Supply: ([ECMS Quick Guide, Pg. 40](#)) [Preferred]**  
**PennDOT Project Collaboration Center (PPCC): [ppcc.pennndot.gov](http://ppcc.pennndot.gov)**  
**E-Mail: [ra-pdstructmats@pa.gov](mailto:ra-pdstructmats@pa.gov)**

**Mail to**  
 Pennsylvania Department of Transportation  
 Bridge Design and Technology Division  
 Structural Materials Section  
 81 Lab Lane • Harrisburg PA 17110

CS-4171 (7-23)



# CERTIFICATE OF COMPLIANCE

1. ◆COUNTY: \_\_\_\_\_ ◆LR/SR: \_\_\_\_\_ ◆SEC/SEG: \_\_\_\_\_ ◆ECMS#: \_\_\_\_\_  
 (◆ - To be completed by the party that will ship the material to the project, otherwise enter N/A.)

2. I / WE hereby certify that the material listed on line 5 was:  
 If a single company performs more than one operation (e.g., a company manufactures and coats guiderail), more than one box may be checked.  
 Manufactured    Fabricated    Coated    Precasted    Produced

By \_\_\_\_\_ (Name of Manufacturer, Fabricator, Coater, Precaster or Producer) \_\_\_\_\_ (Supplier Code) **Must match exactly as in eCAMMS**

3. and the party listed above certifies that the material(s) on line 5 meets the requirements of **Publication 408**, Section(s) \_\_\_\_\_  
**AASHTO, ASTM**, Federal or other designation \_\_\_\_\_

4. The material listed below is being shipped to (Company Name): \_\_\_\_\_

5.

LOT NO.	HEAT NO.	QUANTITY	UNIT OF MEASURE	APPROVED MATERIAL AS LISTED IN PENNDOT BULLETIN

6.  **CHECK HERE IF YOUR PRODUCT CONTAINS IRON OR STEEL.** I certify the material identified above conforms to Sections 106.01 and 106.10(a) of Publication 408.

**CHECK ONE OF THE TWO BOXES:**  
 Product is 100% US steel.       Product contains minimal foreign steel in accordance with Act 3 and Buy America.  
**Attach Form CS-4171S with receipts or invoices.**

**CHECK THE BOX THAT APPLIES TO YOUR PRODUCT:**

'Identifiable Steel' - Steel products that contain permanent markings that identify that the material was melted and manufactured in the United States. **Only Form CS-4171 is required.**

Steel Products and Products Containing Steel with In-Plant Inspection by the Department or a Department Representative - **For 100% US steel products where in-plant inspection has verified that the steel was melted and manufactured in the United States, only Form CS-4171 is required. For products where in-plant inspection has verified minimal foreign steel in accordance with Act 3 and Buy America, attach bills of lading or shipping documents for foreign steel, and attach Form CS-4171S with supporting documentation.**

'Unidentified Steel' – Steel products that do not meet the definition of "Identifiable Steel" and do not receive in-plant inspection as defined above. **For 100% US steel products, attach supporting documentation including invoices, bills of lading and mill test reports that positively identify that the steel was melted and manufactured in the United States. For products containing minimal foreign steel in accordance with Act 3 and Buy America, attach bills of lading or shipping documents for foreign steel, and attach Form CS-4171S with supporting documentation.**

7. **VENDOR CLASSIFICATION (CHECK ONE BLOCK ONLY) -**

**#1** Manufacturer, Fabricator, Coater, Precaster Listed in Bulletin #15, or Producer Listed in Bulletin #14, 41 or 42       **#2** Distributor, Supplier or **\*Private Label Company** Not Listed in Bulletin #15. Bulletin #15 or Agent listed in Bulletin #14. **Also, complete line 10**

*I certify that the above statements are true and to the best of my knowledge, fairly and accurately describe the product(s) listed.*      *I certify that the material being supplied is one and the same as provided to us by the manufacturer listed on this document and quantities listed above are accurate.*

8. By signing this document, you are certifying that this product meets the Build America, Buy America Act requirements and conforms to Section 106.11 of Publication 408.

9. **NAME (print) :** \_\_\_\_\_ **TITLE:** \_\_\_\_\_

**COMPANY NAME :** \_\_\_\_\_ **SHIPMENT/CERTIFICATION DATE:** \_\_\_\_\_

**SIGNATURE :** \_\_\_\_\_ **DATE:** \_\_\_\_\_  
By Responsible Company Official

10. List company that sold you the material(s) documented above: \_\_\_\_\_  
 (Complete if you checked Block # 2 on line # 7, otherwise leave blank.) (Company Name)





**QUALITY CONTROL PLAN GUIDELINES FOR  
PRECAST AND PRESTRESSED  
CONCRETE PLANTS**

	<u>Minimum Testing Frequency</u>	<u>Page # of QC Plan</u>
<b>I. Aggregate Testing</b>		
<b>A. Fine Aggregate</b>		
1. Gradation & FM	- Restocking bins – PTM 616	_____
2. Minus #200 mat'l	- Every five gradations – PTM 100	_____
3. Percent of moisture	- Beginning of work and every 4 hours, thereafter, and as required ASTM C 70 or AASHTO T 255.	_____
<b>B. Coarse Aggregate</b>		
1. Gradation	- Restocking bins – PTM 616	_____
2. Minus #200 mat'l	- Every five gradations – PTM 100	_____
3. Percent of moisture	- Beginning of work and every 4 hours, thereafter, and as required ASTM C 70 or AASHTO T 255.	_____
4. Crush Count (Gravel)	- Monthly	_____
5. % of solids	- Beginning of season or as necessary due to extreme aggregate changes.	_____
<b>II. Batch Scale Checks</b>		
A. Aggregate scale	- Monthly – PTM 410 **	_____
B. Cement scale	- Monthly – PTM 410 **	_____
C. Water scale	- Monthly – PTM 410 **	_____
<b>III. Calibration of Equipment</b>		
A. Water meter	- Annually	_____
B. Plant admixture dispensers	- Annually	_____
C. Unit Weight Bucket	- Optional, can use Air Meter Base as Unit Weight Bucket	_____
D. Air meter	- Bi-weekly	_____
E. Cylinder compression	- Annually by private calibration service.	_____
F. 50 lb. weights	- Once every three years by Dept. of Agriculture or private Calibration service.	_____
G. QC Small Lab Scale	- Annually	_____
* H. Load cells, hydraulic gages, Dynanometers, etc. Section 1107.03(c)3	- Annually	_____
* I. Temperature recording checks	- Annually	_____
J. Batch Scale	- Annually	_____

NOTE: Equipment calibration will be documented and kept in Plant Book.

**IV. Reinforcing Fabrication (Epoxy Coated) and Welding (if applicable)**

Reinforcement fabrication

A. Protective Pin Bushings (ECR)	- Daily for wear. Replace as required	_____
B. Bend radii, rebar length Geometry (from shop dwgs.)	- First piece, if automated; 10% if manual	_____
C. End coatings, if sheared	- Positector, 10% daily	_____

TR-36 (cont'd)

TR-36 (2-19) continued	Minimum Testing Frequency	Page # of QC Plan
Welding		
D. Procedure/Equipment		
1. Weld Procedure Specification 2. Verify equipment settings 3. Carbon equivalency	- Posted at weld station, verify daily - Verify daily - Each rebar heat /document	_____ _____ _____
E. Workmanship		
1. Undercut (1/32" max) 2. Cracking, Overlap (none Permitted) 3. Weld size	- Check/document 10% welds daily - Check/document 10% welds daily - Check/document 10% welds daily	_____ _____ _____
V. Prepour Checks	- Form dimensions, steel placement	_____
VI. Temperature Checks		
A. Aggregate	- During cool & cold weather – 408, Section 704.1(F)	_____
B. Water	- During cool & cold weather – 408, Section 704.1(F)	_____
C. Concrete Mixture	- First batch each day and two thereafter at increments of 10 c.y. to establish consistency***	_____
VII. Concrete Mixture		
A. Air Test	- First batch each day and two thereafter at increments of 10 c.y. to establish consistency***	_____
B. Slump Test	- First batch each day and two thereafter at increments of 10 c.y. to establish consistency***	_____
C. Molding/Marking Cylinders and Cylinder Molds (Describe marking system per PTM 631)	- Each shift's production (4 cyls min)	_____
VIII. Curing	- Develop plan using ACI 308 or Pub 408 where applicable. Initial cure with product in form; secondary cure after stripping	_____
IX. Post Pour Checks	- Measure and record dimensions (p/c- 10% or not less than one unit per lot daily; p/s-each unit) - Visual Inspection	_____ _____
X. Patching	- Mortar Patched areas are cured a minimum of 24 hours. Bulletin 15 repair materials are cured in accordance with the manufacturer's recommendations	_____

TR-36 (cont'd)

TR-36 (2-19) continued

	<u>Minimum Testing Frequency</u>	<u>Page # of QC Plan</u>
<b>XI. Documentation</b>		
A. Batcher/Mixer slips		_____
B. Gradations		_____
C. Moisture		_____
D. Certification shipping form (Form CS-4171)		_____
E. Straight-Line Analysis Charts – Note: establish action points at critical values		_____
1. Fine Aggregate		_____
2. Coarse Aggregate		_____
3. Slump		_____
4. Air		_____
F. Pre-pour Verification Checklist (Steel Size, Location, Dimensions, etc)		_____
G. Post-pour Measurements		_____
H. Rebar end coating thickness measurements		_____
<b>XII. Certification</b>		
A. Admixture	- Certification	_____
B. Cement	- Certification	_____
C. Steel	- Certification	_____
D. Repair Materials	- Certification	_____
<b>XIII. Identify the Quality Control Manager</b>		
XIII. Identify the Quality Control Manager		_____
XIV. Handling and Storage	- Pub 408, Section 1085.3(e)	_____
XV. Delivery	- Pub 408, Section 1085.3(f)	_____
* P/S Plants Only		
** Scale checks to be conducted only at 100% of the nominal batch capacity of the mixer.		
*** Once material control is established, frequency will be limited to every 25 cubic yards. If a subsequent test fails to meet specification requirements or exceeds the upper or lower action points, increase testing frequency to 10 cubic yards and test the next two batches. Continue testing at this frequency until material consistency has been re-established.		

TR-37 (2-19)



# PRODUCTION JOINT WELDING PROCEDURE SPECIFICATION PROCEDURE QUALIFICATION RECORD

WPS No: \_\_\_\_\_ Date Issued: \_\_\_\_\_

Revision No: \_\_\_\_\_ Revision Date: \_\_\_\_\_

FABRICATOR NAME:	PREPARED BY:
WIRE MATERIAL SPECIFICATION:	WIRE SIZE OR RANGE: (IN.)
WELDING PROCESS: (CHECK ONE) <input type="checkbox"/> SMAW F <input type="checkbox"/> FCAW F <input type="checkbox"/> GMAW F      (TRANSFER MODE: _____)	
SHIELDING GAS:	GAS FLOW RATE:
POSITION(S) OF WELDING:	
FILLER METAL SPECIFICATION:	
FILLER METAL CLASSIFICATION:	
SINGLE OR MULTIPLE PASS:	
POLARITY : (CHECK ONE) <input type="checkbox"/> AC F <input type="checkbox"/> DC (NEGATIVE) F <input type="checkbox"/> DC (POSITIVE) F	
ELECTRODE EXTENSION: (ELECTRICAL STICKOUT)	
PREHEAT AND INTERPASS TEMPERATURE: PER AWS D1.4 BASED ON BAR SIZE AND CARBON EQUIVALENCY	

Pass No.	Elect. Size	Welding Process Variables		Joint Detail Show relevant dimensions and AWS symbols
		Amperes	Voltage	
				<p style="text-align: center;"><b>Effective weld size (E) = 0.6S, typical</b></p>

This procedure may vary due to fabrication sequence, fit-up, pass size, etc. within the Limitation of Variables.

Authorized Company Signature: \_\_\_\_\_

Additional Shop Notes:

Test Results:

For PennDOT Use Only

TR-37 Sample

TR-37 (2-19)



**PRODUCTION JOINT WELDING  
PROCEDURE SPECIFICATION  
PROCEDURE QUALIFICATION RECORD**

WPS No: \_\_\_\_\_ Date Issued: \_\_\_\_\_

Revision No: \_\_\_\_\_ Revision Date: \_\_\_\_\_

FABRICATOR NAME: Any Plant		PREPARED BY: John Doe	
WIRE MATERIAL SPECIFICATION: A185		WIRE SIZE OR RANGE: (IN.) 0.1875 through 0.250 inch	
WELDING PROCESS: (CHECK ONE) SMAW <input checked="" type="checkbox"/> FCAW F GMAW F (TRANSFER MODE: _____)			
SHIELDING GAS: NA		GAS FLOW RATE: NA	
POSITION(S) OF WELDING: Flat/Horizontal			
FILLER METAL SPECIFICATION: A5.1			
FILLER METAL CLASSIFICATION: E7018			
SINGLE OR MULTIPLE PASS: single			
POLARITY : (CHECK ONE) AC F DC (NEGATIVE) F DC (POSITIVE) <input checked="" type="checkbox"/>			
ELECTRODE EXTENSION: (ELECTRICAL STICKOUT) NA			
PREHEAT AND INTERPASS TEMPERATURE: PER AWS D1.4 BASED ON BAR SIZE AND CARBON EQUIVALENCY			

Pass No.	Elect. Size	Welding Process Variables		Joint Detail Show relevant dimensions and AWS symbols
		Amperes	Voltage	
1	1/8	100-140	10-28	<p><b>Effective weld size (E) = 0.6S, typical</b></p>

This procedure may vary due to fabrication sequence, fit-up, pass size, etc. within the Limitation of Variables.

Authorized Company Signature: \_\_\_\_\_ John Smith

Additional Shop Notes:

Test Results: (Attach PQR test results from lab)

For PennDOT Use Only

TR-38 (2-19)



## LOCAL GOVERNMENT/COMMERCIAL STOCK EQMS TRANSFER WORKSHEET

Name of Precaster: \_\_\_\_\_ Date: \_\_\_\_\_

**LOCAL GOVERNMENT SHIPMENT**

NAME OF LOCAL GOVERNMENT/AGENCY:		
DATE OF SHIPMENT:	PROJECT NUMBER (IF APPLICABLE):	
DESCRIPTION OF PROJECT:		
<b>Product Shipped</b>	<b>Lot #/Date</b>	<b>Quantity</b>

Additional shipping paper work is attached

**COMMERCIAL PROJECT SHIPMENT (Must have PENNDOT's Regional Engineer's approval)**

OWNER / GENERAL CONTRACTOR:		
DATE OF SHIPMENT:	PROJECT NUMBER (IF APPLICABLE):	
DESCRIPTION OF PROJECT:		
<b>Product Shipped</b>	<b>Lot #/Date</b>	<b>Quantity</b>

Additional shipping paper work is attached

PENNDOT Approval:      Regional Engineer's Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

QC Manager's Name: \_\_\_\_\_

Signature: \_\_\_\_\_



## QUALITY CONTROL PLAN GUIDELINES FOR RC PIPE

*Note: The Quality Control Plan must be developed using these requirements as a guide. Amplification of how the fabricator controls their process, using these criteria to meet specifications is required.*

	<u>Minimum Testing Frequency</u>	<u>Page # of QC Plan</u>
I. Materials		
A. Cement	- Certification from Bulletin 15 source	_____
B. Reinforcement	- Certification from Bulletin 15 source	_____
C. Aggregates	- Approved Bulletin 14 sources within plant or Quarry gradation result	_____
D. Admixtures	- Certification from Bulletin 15 source	_____
II. Prepour Inspection		
A. Rings		
• Dimensions	- Measure 25% monthly	_____
• Clean	- Review 10% daily	_____
B. Forms		
• Dimensions	- Measure 25% monthly	_____
• Clean	- Review 10% daily	_____
• Lift Hole	- Identify fabrication method	_____
C. Reinforcement		
• Wire Size/Area	- Measure 10% and record daily	_____
• Cage Diameter	- Measure 10% and record daily	_____
• Welding	- Verify WPS machine parameters, document daily	_____
• Spacer Position	- Check 10% daily	_____
III. Concrete Mix		
A. Batch Mass (Weight)	- Record 2 batch masses (weights) each shift.	_____
B. Cylinders/Cores	- Cast cylinders each day or core 3 pipe sections weekly to monitor concrete strength – each mix design	_____
IV. Curing		
Define curing method; indicate curing temperature and duration of curing period. Describe the procedure for recording the curing cycle.		_____
V. Post pour Inspection		
A. Wall Thickness	- Measure 10% and record daily	_____
B. Internal diameter	- Measure 10% and record daily	_____
C. Length of two opposite sides	- Measure 10% and record daily	_____
D. Length of Pipe	- Measure 10% and record daily	_____
E. Appearance	- Review 10% daily	_____
F. Position of Reinforcement	- One core weekly or measure nondestructively	_____

TR-62 (cont'd)

TR-62 (9-20) continued

	<u>Minimum Testing Frequency</u>	<u>Page # of QC Plan</u>
VI. Calibration – maintain calibration certifications on file		
A. Cylinder compression machine	- Start of season	_____
B. Admixture dispensers	- Start of season	_____
C. Three edge bearing machine	- Start of season	_____
D. Scale check	- Start of season	_____
VII. Patching		
A. Outside surface	- Patch before curing pipe, if possible	_____
B. Inside surface, ends	- Use approved patching material and cure in accordance with the Manufacturer's recommendations.	_____
VIII. Documentation		
A. Straight-Line Analysis Charts	- Plot compressive strength	_____
B. Certification Shipping Form	- Form CS-4171	_____
C. Quality Control Procedures	- Record test results, post pour measurements, etc.	_____
D. Material Certifications	- Maintain on file	_____
IX. Submit an Organizational Chart, Illustrating a Quality Control Department operating and reporting to Management, independent from production		_____



TR-443 (2-19)



# QUALITY REPORT

FABRICATOR NAME:			FORM ID:			
			PIECE MARK:			
PLANT JOB ID:	ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-

Contract/Permit No.: \_\_\_\_\_ Date: \_\_\_\_\_

Inspection Agency: \_\_\_\_\_ Inspector: \_\_\_\_\_

Product Type / No. Pieces: \_\_\_\_\_ / \_\_\_\_\_

Material Type (check one )

- Prestressed  
  Precast  
  RC Pipe  
  Steel/Bridge  
  Steel/Sign  
  Steel/Pole  
  Timber

Discrepancy Type (check one major heading and all sub-elements that apply )

- Specification violation  
  QC violation  
  Product deviation  
  Field identified concern

**Quality Control Process**

- Unapproved/uncertified technician  
 No QC on operation  
 Fabricated without inspection  
 Other, QC

**Material**

- incorrect material used  
 No certification for material  
 Unapproved supplier/subcontractor  
 Finished product out-of-tolerance  
 Unstamped material shipped  
 Deficient concrete strength  
 Other, Material

**Construction Procedures**

- Does not conform to drawing  
 Did not perform procedure (properly)  
 Welding out-of-position  
 Unqualified welder  
 Unapproved repairs performed  
 Safety concern  
 Other, Construction

**Documentation**

- Documentation missing/incomplete  
 Unapproved drawing  
 Unapproved WPS/Mix design  
 Other, Documentation

**Equipment**

- Incorrect type of equipment used  
 Equipment not calibrated  
 Required equipment not used  
 Other, Equipment

**Sampling/Testing**

- Testing frequencies not followed  
 Applicable test method not followed  
 Other, Sampling/Testing

Description of discrepancy:

\_\_\_\_\_

\_\_\_\_\_

Company Disposition: (check one )

- Rework  
  Repair  
  Use 'as is'  
  Reject  
  Other (end product not affected)

Explanation of disposition:

\_\_\_\_\_

\_\_\_\_\_

Action taken to prevent recurrent problem:

\_\_\_\_\_

\_\_\_\_\_

Company Representative Signature / Date: \_\_\_\_\_

Disposition acceptable? :  (check  if 'yes')

Disposition resolved and completed? :  (check  if 'yes')

Conditions of acceptance / other comments:

\_\_\_\_\_

\_\_\_\_\_

PENNDOT or Inspector Signature / Date: \_\_\_\_\_

SAMPLE IDENTIFICATION TR-447

TR-447 (9-17)



SAMPLE IDENTIFICATION

A737595



A737595

Matl Code 414	Material Class 50LAM	S Class QR	LTS USE ONLY Lab Serial Number
------------------	-------------------------	---------------	-----------------------------------

Aggregate Usage by Sect 703 Table D	Lot/Batch Number 210-9	Lot/Batch Size & Units 10 PADS
-------------------------------------	---------------------------	-----------------------------------

Location Code NORPP-15	Place Collected City & State	Date Collected 01/01/2019	# of Inc 01	Related Sample
---------------------------	---------------------------------	------------------------------	----------------	----------------

Tank #	Construction Item #	PE/PEO	Product Name BEARING PAD
--------	---------------------	--------	-----------------------------

WORK BREAKDOWN STRUCTURE (WBS)										
Contract Number E000000	MP 3	S 30	SR or WO 30	Sp 1	P 20	Sec 7001	Org 0340	Program 362	PC	Supplier (Party) Code SCOV6-15

Pub-408 Year 2016	Ver 01	Section 1113	Special Provision <input type="checkbox"/> Yes	PO Number
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Sampled By	Title	First Name INSPECTOR	Middle Name INSPECTOR	Last Name / Suffix INSPECTOR		
	Phone Number 717-555-1212	Ext.	Certification ID	Email Address Inspector@ZZ.COM		
	Consultant <input checked="" type="checkbox"/>	Contractor <input type="checkbox"/>	Manufacturer <input type="checkbox"/>	PennDOT Employee <input type="checkbox"/>	Producer <input type="checkbox"/>	Other <input type="checkbox"/>

Inspected By	Title	First Name	Middle Name	Last Name / Suffix
	Phone Number	Ext.	Certification ID	Email Address
	PennDOT Employee <input type="checkbox"/>	Consultant <input type="checkbox"/>	Other <input type="checkbox"/>	

INCREMENT INFORMATION										
Inc	County	SR	Segment	Offset	Section	Station	CTR Offset	L/R	Placement Date	AASHTO T 209
1										*
2										*
3										*
4										*
5										*
6										*
7										*

JMF	Design	Concrete			Self Consolidating Concrete			
Year	Number	Thickness	Air	Slump	Temp	J-Ring	Slump Flow	VSI
		*	*	*	*	*	*	*

Remarks:

LAB

## SAMPLING INFORMATION

Accelerator	Liquid, 30 oz plastic bottle Code/403, Class/ACCL, 408/711.3f
AEA	Liquid, 30 oz plastic bottle Code/403, Class/AEA, 408/711.3d
Bearing Pads	Sampled by Inspectors Code/414, Class/50PL, 50LAM, 60PL, 60LAM, 408/ 1113. Pads for Sound wall use PTM 312, 3 pads per structure. 408/1086.2j
Cement	Powder, 1 Gallon plastic bucket Code/276, class/1 (1, 1A, 2, 2A, 3, 3A, 4, 5), 408/ 701.1e
Corrosion Inhibitor	Liquid, 30 oz plastic bottle Code/403, Class/CI, 408/711.3f
Coarse.Agg.	Stone, Large cloth bags approx. 50 pounds, sampled with square end shovel Code/203 Class/A57 (for Limestone) Class/A57SL (for Slag) Class/A57GL (for Gravel) Class/5, 7, 8, 57, 67), 408/703.2 Pipe Plant – Exclude Gradation, Wash Test only
Cure Comp	Liquid, 30 oz plastic bottle Code/398, Class/CLEAR, 408/711.2a TYPE 1-D ONLY WITH RED DYE
Cylinders	2 cylinders for compression test Code/217, Class/BOXBM, IBEAM, 408/1107 Class/SDWALL, 408/1086 Class/BOXCVT, 408/1085 Class/INLET, MEDNBR, EDWALL, JNCBOX, MHLSEC, REWALL, AASTRU, 408/714 Strength Required. Date 28 days from date of pour (Slump & Air Entrainment) 1 cylinder for hardened air, Structural Review, SR WBS:0-90085-0-9-000-4814-614-1Hardened Air Only (Slump & Air Entrainment)
Cores	2" diameter by 4" high preferred Code/218, Class/Same as cylinders compression test
Fine Agg.	Small cloth bags, approx 10 pounds, sampled with 2" tube Code/207, class/A, 408/703.1 Pipe Plant – Exclude Gradation, Wash test and FM only

Fly Ash	Powder, 1 Gallon plastic bucket Code/276, Class/FLYAC OR FLYAF, 408/724.2
GGBFS	Powder, 1 Gallon plastic bucket Code/276, Class/GGBFS, 408/724.3
HRWR	Liquid, 30 oz plastic bottle Code/403, Class/HRWR, 408/711.3f
Linseed Oil	Liquid, 30 oz plastic bottle Code/402, Class/ ASPALL, 408/503
Masonry Unit	3 blocks from different stacks Code/221, Class BLOCK, 408/713
Mesh (Def.)	1 sheet 36" by 36" or 2 sheets 18" by 36" Code/235, Class/BLACK, 408/709.4 Class/EPOXY, 408/709.4a Class/GALV, 408/709.4b Class/WIRE, 408/709.4
Mesh (Plain)	1 sheet 36" by 36" or 2 sheets 18" by 36" Code/230, Class/BLACK, 408/709.3 Class/EPOXY, 408/709.3a Class/GALV, 408/709.3b
Mesh (Wire)	1 wire approx. 72" Code/230, Class/WIRE, 408/709.3
Patch Material	This is not sampled Code/276, Class/PATCH 408/714
Rebar	3 pieces 48 inches long from 3 different bars Code/231, Class/BLACK, 408/709.1 Class/EPOXY, 408/709.1d Class/GALV, 408/709.1e
Retarder	Liquid, 30 oz plastic bottle Code/403, Class/RE, 408/711.3f
Silica Fume	Powder, 1 Gallon plastic bucket Code/276, Class/SPLCEM, 408/724.4
Steel Cables	Code/238, Class/STRAND, 408/1086.3(e)2.b Steel cables in precast concrete panels: Assemble 3 sample connections by the same process used for production panels. Tighten nuts according to manufacturer's recommendations. Cable sample length 3'
Strand	Code/238, Class/STRAND, 408/1107.2 Test according to "AASHTO" M203, Pub 408, section 1107.02(m)3.c, except the wire must meet only and 8 kip breaking strength. Cable sample length 3'

VMA	Liquid, 30 oz plastic bottle Code/403, Class/S-VM,408/711.3f
Water	Liquid, 30 oz plastic bottle Code/420, Class/WTRMIX, 408/720.1
Welds (RCP cages)	12" wire on both sides of weld. Min. 10 samples of each wire size. Do not select samples with visible undercut or other defects.
Workability Admix	Liquid, 30 oz plastic bottle Code/403, Class/S-WKR, 408/711.3f
WR	Liquid, 30 oz plastic bottle Code/408, Class/WR, 408/711.3f

## How to complete a Form TR-447:

Fill blocks left to right except 408 – Submit (3) copies to the Regional SME via email, mail, fax.

Material Code – From the list above

Material Class – From the list above

S Class – QR except cylinders for hardened air then use SR

Lot Number – Lot, Heat, Batch number etc.

Lot size/Quantity – Number of reels, Number of pads, etc. QA Engr – Your initials

Location Code – Bulletin 15 code for the plant where the sample is collected.

Place Collected – Plant location, Town and state

Date Collected – MMDDYYYY

# of Inc – Total increments

Product Name – Simple name of product, bearing pad, etc.

Contract Number – From EQMS

State Project Number – From EQMS

Supplier (Party) Code – Bul. 15 code, or Bul. 14 code, if available, or list supplier in the remarks

408 Year, Ver., Section – **Year** = “07”, “11”, or “16”, **Ver.** = Edition # “IE”, “01”, etc. **Section** – from the list above.

Sampled By: First/Last Name – Your Name

Phone Number – Plant inspection office phone number or your office phone number.

Email Address – Your email address

Selection Box – Consultant, Contractor, Manufacturer, PennDOT Employee, Producer, Other (whichever applies)

Remarks – Describe material being sampled, anything not labeled above.

TR-800 (8-18)



# STRUCTURAL MATERIALS QUALITY COMMENT SHEET

## PROJECT INFORMATION

SR/WO: \_\_\_\_\_ SEC: \_\_\_\_\_ CO: \_\_\_\_\_

ECMS No: \_\_\_\_\_ Structure No: \_\_\_\_\_

Completed by: \_\_\_\_\_ (NAME - please print) \_\_\_\_\_ (Date)

Check if you would like someone to contact you to discuss this issue.  
 Telephone Number to contact: (\_\_\_\_) \_\_\_\_ - \_\_\_\_\_.

## MATERIAL DESCRIPTION

Contract Item No: \_\_\_\_\_

Material Type: \_\_\_\_\_ #Pcs: \_\_\_\_\_

Date Delivered: \_\_\_\_\_ Date Defect Noted: \_\_\_\_\_

Fabricator: \_\_\_\_\_

## DESCRIPTION OF DEFECT(S)/DEVIATION(S):

(office use only)  
Findings/Corrective Action

Mail this completed form to: PENNDOT - Structural Materials Section  
 81 Lab Lane  
 Harrisburg, PA 17110  
 OR  
 E-mail with digital photos to: ra-pdstructmatls@pa.gov

## SECTION III – PRODUCT DIMENSIONAL REVIEW FORMS

<b>Form</b>	<b>Dimensional Review for:</b>
<a href="#">TR-1</a>	<a href="#">Barrier 52" Glare Screen</a>
<a href="#">TR-2</a>	<a href="#">Barrier 34" &amp; 41" Single Face</a>
<a href="#">TR-3</a>	<a href="#">Barrier 34" Median Double Face</a>
<a href="#">TR-4</a>	<a href="#">Manholes</a>
<a href="#">TR-5</a>	<a href="#">JJ-Hook Barrier</a>
<a href="#">TR-6</a>	<a href="#">RC-46M Precast Inlet Base</a>
<a href="#">TR-7</a>	<a href="#">RC-46M Precast Inlet Riser</a>
<a href="#">TR-8</a>	<a href="#">RC-46M Precast Inlet Top or Transitional Slab</a>
<a href="#">TR-9</a>	<a href="#">RC-45M Precast Inlet Top Type D-H</a>
<a href="#">TR-10</a>	<a href="#">RC-45M Precast Inlet Top D-H Level</a>
<a href="#">TR-11</a>	<a href="#">RC-45M Precast Inlet Top Type C &amp; C Alternate</a>
<a href="#">TR-12</a>	<a href="#">RC-45M Precast Inlet Top Type M</a>
<a href="#">TR-13</a>	<a href="#">RC-45M Precast Inlet Top Type S</a>
<a href="#">TR-14</a>	<a href="#">RC-81M Precast Light Duty Junction Box JB1/JB2</a>
<a href="#">TR-15</a>	<a href="#">RC-82M Precast Heavy-Duty Junction Box JB11/JB12</a>
<a href="#">TR-16</a>	<a href="#">Precast D Endwall</a>
<a href="#">TR-17</a>	<a href="#">Precast D-E Endwall</a>
<a href="#">TR-18</a>	<a href="#">Precast D-W Endwall</a>
<a href="#">TR-19</a>	<a href="#">Precast E-S Endwall</a>
<a href="#">TR-20</a>	<a href="#">Precast Subsurface Drain Outlet Endwall</a>
<a href="#">TR-21</a>	<a href="#">Precast Sound Barrier</a>
<a href="#">TR-22</a>	<a href="#">Reinforced Concrete Pipe</a>
<a href="#">TR-23</a>	<a href="#">Prestressed Adjacent Box Beams</a>
<a href="#">TR-24</a>	<a href="#">Prestressed Spread Box Beams</a>
<a href="#">TR-25</a>	<a href="#">Prestressed I-Beam</a>
<a href="#">TR-26</a>	<a href="#">Precast NEXT Beam</a>
<a href="#">TR-27</a>	<a href="#">Prestressed NEXT Beam</a>
<a href="#">TR-28</a>	<a href="#">Box Culvert</a>
<a href="#">TR-29</a>	<a href="#">MSE Wall Panels</a>
<a href="#">TR-30</a>	<a href="#">Parapet Barrier</a>
<a href="#">TR-31</a>	<a href="#">T-Wall</a>
<a href="#">TR-32</a>	<a href="#">Dura-Hold Units</a>
<a href="#">TR-33</a>	<a href="#">Super Slab</a>
<a href="#">TR-34</a>	<a href="#">Inverset</a>
<a href="#">TR-35</a>	<a href="#">Con/Span Arch Structure</a>
<a href="#">TR-57</a>	<a href="#">Barrier 32" Median Double Face</a>
<a href="#">TR-58</a>	<a href="#">SINE Wall</a>
<a href="#">TR-59</a>	<a href="#">EcoSpan Arch Culvert</a>
<a href="#">TR-60</a>	<a href="#">Redi-Rock Gravity Wall Units</a>
<a href="#">TR-61</a>	<a href="#">Stone-Strong Gravity Wall Units</a>
<a href="#">TR-72</a>	<a href="#">Three-Sided Rigid Frames</a>
<a href="#">TR-73</a>	<a href="#">32" MASH 2016, F-Shape Median Barrier</a>
<a href="#">TR-74</a>	<a href="#">42" MASH 2016, F-Shape Median Barrier</a>
<a href="#">TR-75</a>	<a href="#">50" MASH 2016, F-Shape Median Barrier</a>



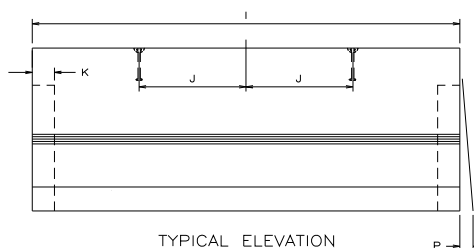
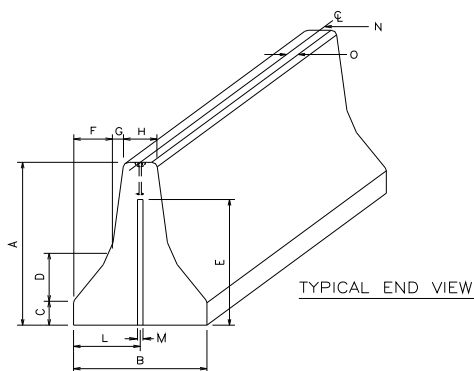
TR-1

TR-1 (1-19)



**DIMENSIONAL REVIEW FOR BARRIER 52" GLARE SCREEN**

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Pre-Pour	Actual	Deviation
A	Overall Height	+/- 3/8"				
B	Bottom Width	+/- 1/4"				
C	Reveal Height	+/- 1/4"				
D	Sloped Vertical	+/- 1/4"				
E	Slot Height	- 0", + 1"				
F	Sloped Horizontal Dimension	+/- 1/4"				
G	Sloped Horizontal Dimension	+/- 1/4"				
H	Top Width	+/- 1/4"				
I	Overall Length	1/4" per 10' of length (1/2" Max.)				
J	Location of Lifting Hardware	(symmetrical and +/- 4")				
K	Slot Depth	-0", + 1/4"				
L	Slot Location	+/- 1/4"				
M	Slot Width	As shown on standard drawing RC57 sheet 3 of 5"				
N	Twist	1/4" per 10' of length				
O	Sweep (measured from centerline)	+/- 1/4"				
P	End Skew	+/- 3/8"				

If, With drainage slots,  
 block out or weep holes per drawing .....  YES  NO  
 If, With transition piece per drawing .....  YES  NO  
 Protective coating properly applied. ....  YES  NO  
 Reinforcement (size, grade, location) .....  YES  NO

(Maximum = 1/4"/10ft)  
 Glare Screen: Check for twist .....  YES  NO  
 Approved Shop Drawing .....  YES  NO  
 RC- Drawing .....  YES  NO  
 Properly Repaired .....  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

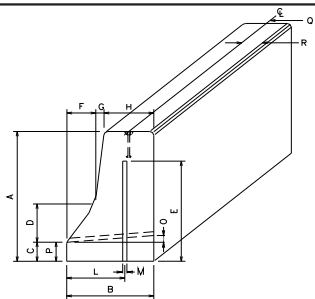
Comments: \_\_\_\_\_  
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TR-2 (7-20)

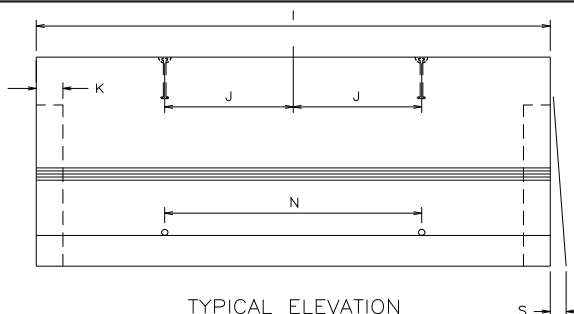


## DIMENSIONAL REVIEW FOR BARRIER 34" & 41" MEDIAN SINGLE FACE

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



TYPICAL END VIEW



TYPICAL ELEVATION

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Overall Height	+/- 1/4" for 34"    +/- 3/8" for 41"				
B	Bottom Width	+/- 1/4"				
C	Reveal Height	+/- 1/4"				
D	Sloped Vertical	+/- 1/4"				
E	Slot Height	- 0", + 1"				
F	Sloped Horizontal Dimension	+/- 1/4"				
G	Sloped Horizontal Dimension	+/- 1/4"				
H	Top Width	+/- 1/4"				
I	Overall Length	1/4" per 10' of length (1/2" Max.)				
J	Location of Lifting Hardware	(symmetrical and +/- 4")				
K	Slot Depth	-0", + 1/4"				
L	Slot Location	+/- 1/4"				
M	Slot Width	As shown on standard drawing RC57 sheet 3 of 5				
N	Location between Weep holes	+/- 4"				
O	Minimum Pitch of Weep holes	1"				
P	Vertical Location of Weep holes	+/- 1/2"				
Q	Twist	1/4" per 10' of length				
R	Sweep (measured from centerline)	+/- 1/4"				
S	End Skew	+/- 3/8"				

If, With drainage slots,  
 block out or weep holes per drawing .....  YES     NO      Approved Shop Drawing .....  YES     NO  
 If, With transition piece per drawing .....  YES     NO      RC-Drawing .....  YES     NO  
 Protective coating properly applied .....  YES     NO      Properly Repaired .....  YES     NO  
 Reinforcement (size, grade, location) .....  YES     NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

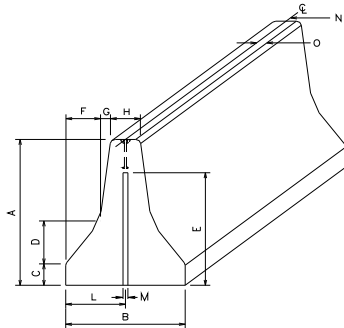
Comments: \_\_\_\_\_  
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 \_\_\_\_\_  
 \_\_\_\_\_

TR-3 (8-20)

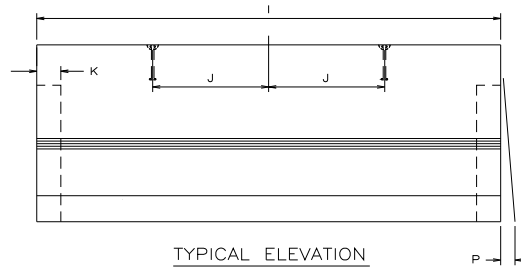


## DIMENSIONAL REVIEW FOR BARRIER 34" MEDIAN DOUBLE FACE

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



TYPICAL END VIEW



TYPICAL ELEVATION

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Overall Height	+/- 1/4"				
B	Bottom Width	+/- 1/4"				
C	Reveal Height	+/- 1/4"				
D	Sloped Vertical Dimension	+/- 1/4"				
E	Slot Height	- 0", + 1"				
F	Sloped Horizontal Dimension	+/- 1/4"				
G	Sloped Horizontal Dimension	+/- 1/4"				
H	Top Width	+/- 1/4"				
I	Overall Length	1/4" per 10' of length (1/2" Max.)				
J	Location of Lifting Hardware	(symmetrical and +/- 4")				
K	Slot Depth	-0", + 1/4"				
L	Slot Location	+/- 1/4"				
M	Slot Width	As shown on standard drawing RC57 sheet 3 of 5				
N	Twist	1/4" per 10' of length				
O	Sweep (measured from centerline)	+/- 1/4"				
P	End Skew	+/- 3/8"				

If, With drainage slots, block out or weep holes per drawing .....  YES     NO        Approved Shop Drawing .....  YES     NO

If, With transition piece per drawing .....  YES     NO        RC-Drawing .....  YES     NO

Protective coating properly applied .....  YES     NO        Properly Repaired .....  YES     NO

Reinforcement (size, grade, location) .....  YES     NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

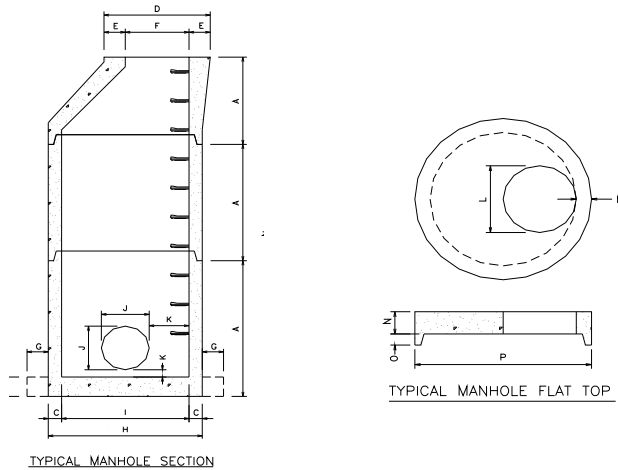
Comments: \_\_\_\_\_  
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 \_\_\_\_\_  
 \_\_\_\_\_

TR-4 (7-24)



## DIMENSIONAL REVIEW FOR MANHOLES

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Height of standard sections Max. variation from one side to the other: 1/2"	+/- 3/8"				
B	Base Slab thickness Levelness of bottom to within 1/2"	+/- 1/4"				
C	Wall thickness *	- 1/4" +1/2"				
D	Top of cone diameter	+/- 3/8"				
E	Top of cone wall thickness	+/- 3/8"				
F	Top of cone inside diameter (variation 3/4" max.)	+/- 3/8"				
G	Base slab flange width	+/- 1/4"				
H	Base slab diameter *	+/- 3/8"				
I	Diameter of manhole	+/- 3/8"				
J	Openings at discretion of manufacturer					
K	Hole Location	+/- 2"				
L	Access opening (variation 3/4" max.)	+/- 3/8"				
M	Access opening location	+/- 1/2"				
N	Flat top thickness	+/- 1/4"				
O	Tongue depth	+/- 1/4"				
P	Flat top diameter	+/- 3/8"				

Base section marked for maximum allowable depth .....  YES  NO      Approved Shop Drawing .....  YES  NO

Locations (with regard to joints, base bottom, and proximity to other openings) .....  YES  NO      RC-Drawing .....  YES  NO

Reinforcement (size, grade, location) .....  YES  NO      Properly Repaired .....  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\* The out-to-out dimension is limited to 1"

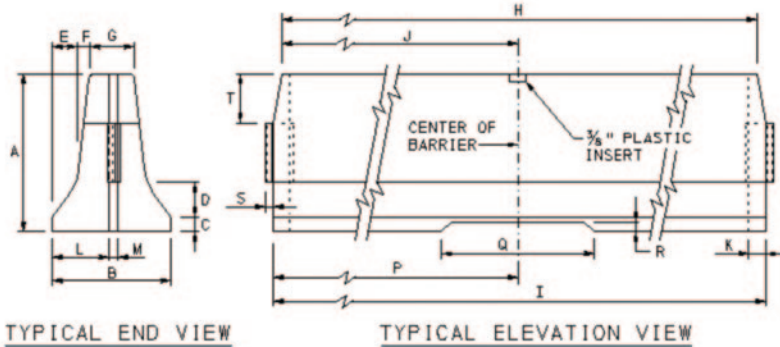
TR-5

TR-5 (1-19)



**DIMENSIONAL REVIEW FOR JJ-HOOK BARRIER**

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			SR:		SEC:	COUNTY:
ECMS #:		STATE PROJECT #:	PIECE MARK:	S-		
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Overall Height	+/- 1/4"	32"			
B	Bottom Width	+/- 1/4"	24"			
C	Reveal Height	+/- 1/4"	3"			
D	Sloped Vertical Dimension	+/- 1/4"	7"			
E	Sloped Horizontal Dimension	+/- 1/4"	5"			
F	Sloped Horizontal Dimension	+/- 1/4"	2 1/2"			
G	Top Width	+/- 1/4"	9"			
H	Overall Length (Top)	+/- 1/4"	143"			
I	Overall Length (Bottom)	+/- 1/4"	144"			
J	Plastic Insert/Location	+/- 1/4"	71 1/2"			
K	Slot Depth	-0", + 1/4"	2"			
L	Slot Location	+/- 1/4"	11 7/16"			
M	Slot Width	-0", + 1/4"	1 7/8"			
N	Twist	1/4" per 10' of length	-			
O	Sweep (measured from centerline)	+/- 1/4"	-			
P	Drain Slot Height	+/- 1/4"	72"			
Q	Maximum Drain Slot Width	+/- 1/4"	31"			
R	Drain Slot Height	+/- 1/4"	2"			
S	Hook Protrusion	+/- 1/4" *	1 11/16"			
T	Hook Location	+/- 1/4"	10"			

Markings properly applied?     YES     NO        Hook welding properly applied?     YES     NO  
 Protective coating properly applied?     YES     NO        Approved Shop Drawing     YES     NO  
 Reinforcement (size, grade, location)     YES     NO        RC Drawing?     YES     NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_  
 Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

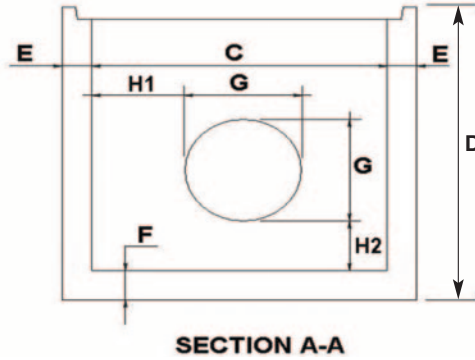
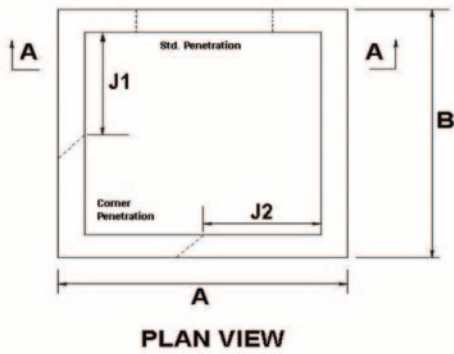
NOTES: \* Tolerances are not cumulative. Total tolerance for (I) + (S)x2 shall not exceed 1/2"  
 \*\* Coverage of primary steel reinforcing +/- 1/2" (13mm) from design with minimum 1 1/2" (38mm) coverage from the outside wall.

TR-6 (7-24)



## RC 46M DIMENSIONAL REVIEW FOR PRECAST INLET BASE

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length*	<36" = +/- 1/4" >36" = +/- 3/8"				
B	Width*	<36" = +/- 1/4" >36" = +/- 3/8"				
C	Internal Width	<36" = +/- 1/4" >36" = +/- 3/8"				
D	Depth	<36" = +/- 1/4" >36" = +/- 3/8"				
E	Wall Thickness*	-1/4", +1/2"				
F	Base Thickness	+/- 1/4"				
G	Size of Opening					
H1	Location of Opening	+/- 2"				
H2	Location of Opening	+/- 2"				
J1	Location of Corner Penetration	+/- 2"				
J2	Location of Corner Penetration	+/- 2"				

If required, are lifting device(s) either galvanized or plastic .....  YES  NO

Pipe block out within walls (Std. box allowed 1" penetration into wall) .....  YES  NO

8" minimum above corner penetration? .....  YES  NO

Maximum allowable depth marked on piece? ..  YES  NO

Reinforcement (size, grade, location) .....  YES  NO

Welded Cages: Was approved WPS followed? ..  YES  NO

Welds acceptable? .....  YES  NO

Were keyways provided according to RC Standard? .....  YES  NO

Approved Shop Drawing .....  YES  NO

RC - Drawing .....  YES  NO

Repaired Properly .....  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

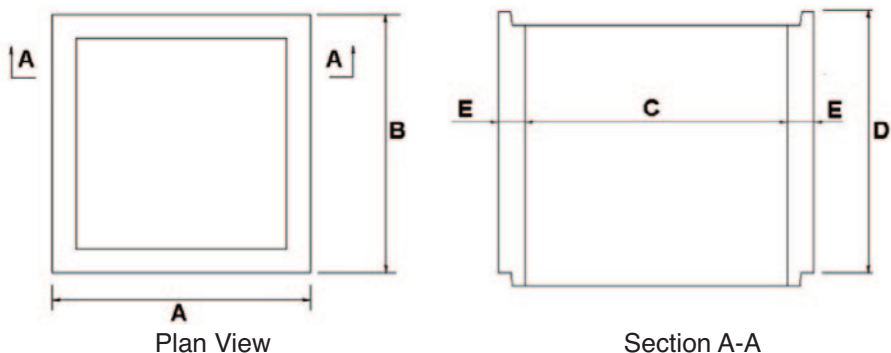
\* The out-to-out dimension is limited to 1"

TR-7 (9-20)



## RC 46M - DIMENSIONAL REVIEW FOR PRECAST INLET RISER

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
S-						
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length	<36" = +/- 1/4" >36" = +/- 3/8"				
B	Width	<36" = +/- 1/4" >36" = +/- 3/8"				
C	Internal Width	<36" = +/- 1/4" >36" = +/- 3/8"				
D	Depth	<36" = +/- 1/4" >36" = +/- 3/8"				
E	Wall Thickness	+/- 1/4"				

- If required, are lifting device(s) either galvanized or plastic? .....  YES     NO     N/A
- Manhole Steps - Are they required and the correct type? .....  YES     NO     N/A
- Weep holes - Are they installed according to General Note 15 in RC 46M? .....  YES     NO     N/A
- Reinforcement (size, grade, location)? .....  YES     NO     N/A
- Maximum allowable depth marked on piece .....  YES     NO     N/A
- Welded Cages: Was approved WPS followed? Welds acceptable? .....  YES     NO     N/A
- Were keyways provided according to RC Standard? .....  YES     NO     N/A
- Approved Shop Drawing? .....  YES     NO     N/A
- RC Drawing? .....  YES     NO     N/A
- Properly Repaired? .....  YES     NO     N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

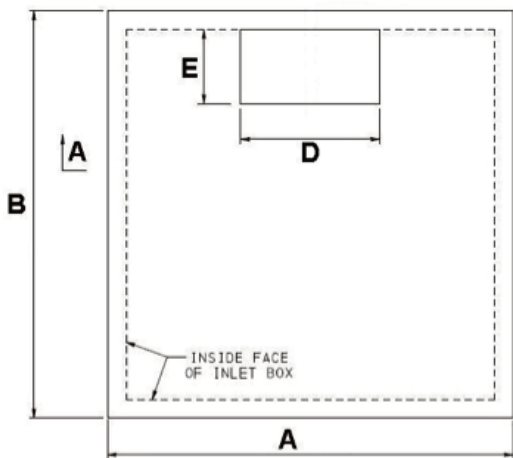
Comments: \_\_\_\_\_  
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 \_\_\_\_\_

TR-8 (1-19)

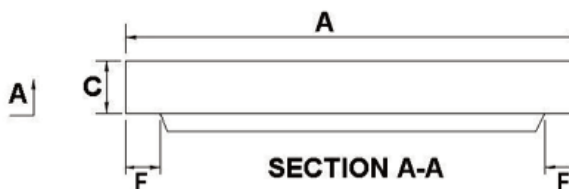


## RC 46M DIMENSIONAL REVIEW FOR PRECAST INLET TOP OR TRANSITIONAL SLAB

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



**PLAN VIEW**



OUT TO OUT DIMENSIONS OF TOP OR TRANSITIONAL SLAB TO MATCH SIZE OF INLET BOX.

SET EDGE OF OPENING AT INSIDE FACE OF INLET BOX FOR ACCESS, IF POSSIBLE.

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length	<36" = +/- 1/4" >36" = +/- 3/8"				
B	Width	<36" = +/- 1/4" >36" = +/- 3/8"				
C	Slab Thickness	+/- 1/4"				
D	Opening Length	<36" = +/- 1/4" >36" = +/- 3/8"				
E	Opening Width	<36" = +/- 1/4" >36" = +/- 3/8"				
F	Location of Joint	+/- 1/4"				

If required, are lifting device(s) either galvanized or plastic?  YES  NO  N/A  
 Additional "S2" reinforcement bar around opening?:  YES  NO  N/A  
 Reinforcement (size, grade, location) . .  YES  NO  N/A  
 Welded Cages: Was approved  
 WPS followed?  YES  NO  N/A

Welds acceptable?  YES  NO  N/A  
 Were keyways provided according to RC Standard?  YES  NO  N/A  
 Approved Shop Drawing  YES  NO  N/A  
 RC - Drawing  YES  NO  N/A  
 Repaired Properly  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

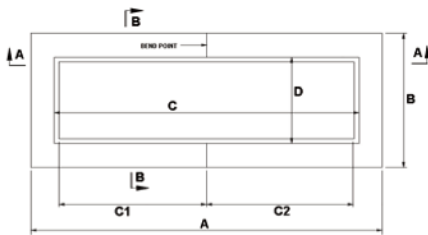


TR-9 (1-19)

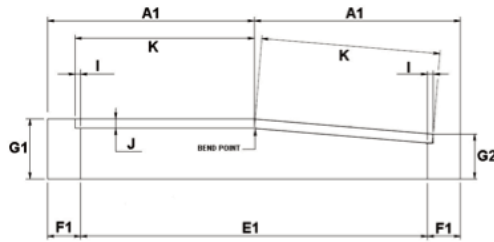


## RC 45M - DIMENSIONAL REVIEW FOR PRECAST INLET TOP TYPE D-H

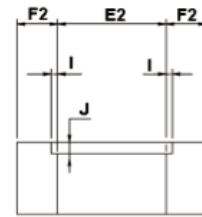
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PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



Plan View



Section A-A



Section B-B

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	External Length	+/- 1/4"	111"			
A1	Length (from back/front to bend point)	+/- 1/4"	55 1/2"			
B	External Width	+/- 1/4"	42"			
C	Internal Length (frame)	+/- 1/4"	96 1/4"			
C1	Internal Length (back/front wall to bend point)	+/- 1/4"	46 5/8"			
D	Internal width (frame)	+/- 1/4"	27"			
E1	Internal Length	+/- 1/4"	93 1/4"			
E2	Internal Width	+/- 1/4"	24"			
F1	Wall thickness (back/front)	+/- 1/4"	8 7/8"			
F2	Wall thickness (side)	+/- 1/4"	9"			
G1	Depth (back wall)	+/- 1/4"	16"			
G2	Depth (front wall)	+/- 1/4"	12"			
I	Frame Seat (width & length)	+/- 1/4"	1 1/2"			
J	Frame Seat (depth)	+/- 1/4"	2 1/2"			
K	Frame Length (back/front to bend point)	+/- 1/4"	48 1/8"			

If required, are lifting device(s) either galvanized or plastic? . . . . .  YES  NO  N/A  
 Frames exposed and galvanized? . . .  YES  NO  N/A  
 Protective coating properly applied as per Sect 714.8(b) of PUB 408? . . .  YES  NO  N/A  
 If tapered, is bottom dimension within 1 1/2" of top? . . . . .  YES  NO  N/A

Reinforcement (size, grade, location) . . .  YES  NO  N/A  
 Minimum splice length of 16 inches? . .  YES  NO  N/A  
 Welded Cages: Was approved  
 WPS followed and welds acceptable?  YES  NO  N/A  
 Approved Shop Drawing? . . . . .  YES  NO  N/A  
 RC Drawing? . . . . .  YES  NO  N/A  
 Properly Repaired? . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

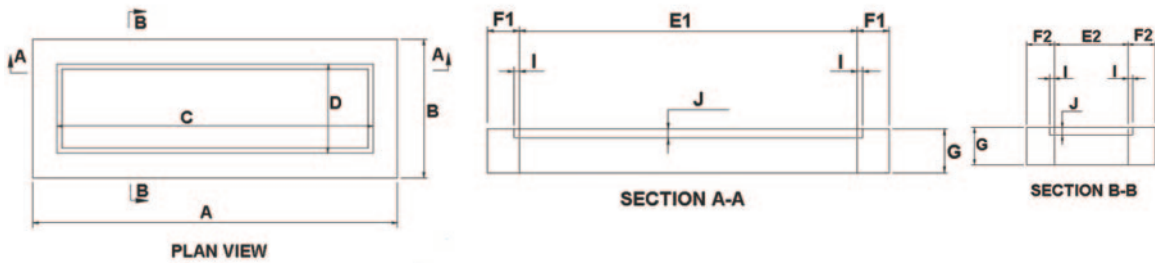
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-10 (1-19)



## RC 45M DIMENSIONAL REVIEW FOR PRECAST INLET TOP D-H LEVEL

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	External Length	+/- 1/4"	111"			
B	External Width	+/- 1/4"	42"			
C	Internal Length (frame)	+/- 1/4"	96 1/4"			
D	Internal Width (frame)	+/- 1/4"	27"			
E1	Internal Length	+/- 1/4"	93 1/4"			
E2	Internal Width	+/- 1/4"	24"			
F1	Wall Thickness (back/front)	+/- 1/4"	8 7/8"			
F2	Wall thickness (side)	+/- 1/4"	9"			
G	Depth	+/- 1/4"	12"			
I	Frame Seat (width & length)	+/- 1/4"	1 1/2"			
J	Frame Seat (depth)	+/- 1/4"	2 1/2"			

If required, are lifting device(s) either galvanized or plastic: . . . . .  YES  NO  N/A  
 Frames exposed and galvanized: . . . . .  YES  NO  N/A  
 Protective coating properly applied as per Sect 714.8(b) of Pub. 408: . . . . .  YES  NO  N/A  
 If tapered, is bottom dimension within 1 1/2" of top: . . . . .  YES  NO  N/A  
 Reinforcement (size, grade, location): . . . . .  YES  NO  N/A

Minimum splice length of 16 inches: . . .  YES  NO  N/A  
 Welded Cages: Was approved  
 WPS followed? Welds acceptable? . . .  YES  NO  N/A  
 Approved Shop Drawing . . . . .  YES  NO  N/A  
 RC - Drawing . . . . .  YES  NO  N/A  
 Repaired Properly . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

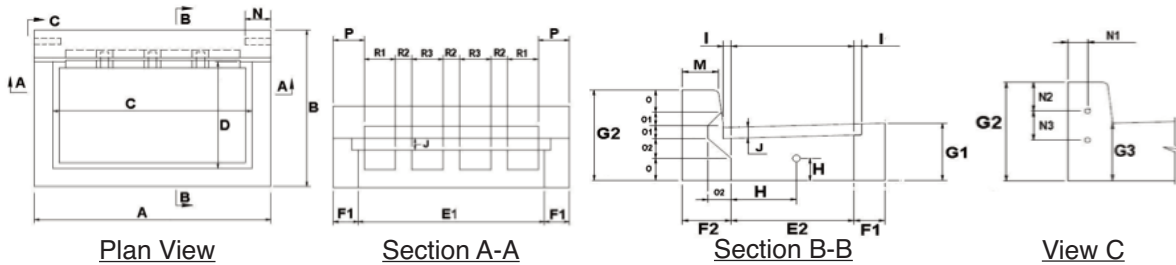
\_\_\_\_\_

TR-11 (1-19)



## RC 45M - DIMENSIONAL REVIEW FOR PRECAST INLET TOP TYPE C & C ALTERNATE

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			PIECE MARK:			
ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-	
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	External Length	+/- 1/4"	57 1/4"			
B	External Width	+/- 1/4"	39 1/2"			
C	Internal Length (frame)	+/- 1/4"	48 1/4"			
D	Internal Width (frame)	+/- 1/4"	27"			
E1	Internal Length Dimension	+/- 1/4"	45 1/4"			
E2	Internal Width Dimension	+/- 1/4"	24"			
F1	Wall Thickness (front & sides)	+/- 1/4"	6"			
F2	Wall Thickness (back)	+/- 1/4"	9 1/2"			
G1	Depth (front)	+/- 1/4"	13"			
G2	Depth (back)	+/- 1/4"	20 1/2"			
G3	Depth (gutter line)	+/- 1/4"	12" (min.)			
H	Lifting Eye Location	+/- 1/4"				
I	Frame Seat (width & length)	+/- 1/4"	1 1/2"			
J	Frame Seat (depth)	+/- 1/4"	2 1/2"			
M	Top of Curb	+/- 1/4"	7"			
N1	Location of Anchor Slots (from back)	+/- 1/2"	3 1/2" (typ.)			
N2	Location of Anchor Slots (from top)	+/- 1/2"	6"			
N3	Location of Anchor Slots (from top)	+/- 1/2"	6"			
O	Pan Dimension (from top & bottom)	+/- 1/4"	5"			
O1	Pan Dimension (from top & bottom)	+/- 1/4"	3"			
O2	Pan Dimension (bottom of gutter)	+/- 1/4"	4 1/2"			
P	Location of Pan (from sides)	+/- 1/8"	7 1/2"			
R1	Pan Dimension (outside)	+/- 1/4"	7 1/2"			
R2	Pan Dimension (grate pedestal)	+/- 1/4"	4"			
R3	Pan Dimension (inside)	+/- 1/4"	7 5/8"			

If required, are lifting device(s) either galvanized or plastic?  YES  NO

Frames exposed and galvanized?  YES  NO

Protective coating properly applied as per Sect 714.8(b) of PUB 408?  YES  NO

If tapered, is bottom dimension within 1 1/2" of top?  YES  NO

Reinforcement (proper type, size, grade, location) . . .  YES  NO

Minimum splice length of 16 inches?  YES  NO

Welded Cages: Was approved

WPS followed and welds acceptable?  YES  NO

Approved Shop Drawing?  YES  NO

RC Drawing?  YES  NO

Properly Repaired?  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

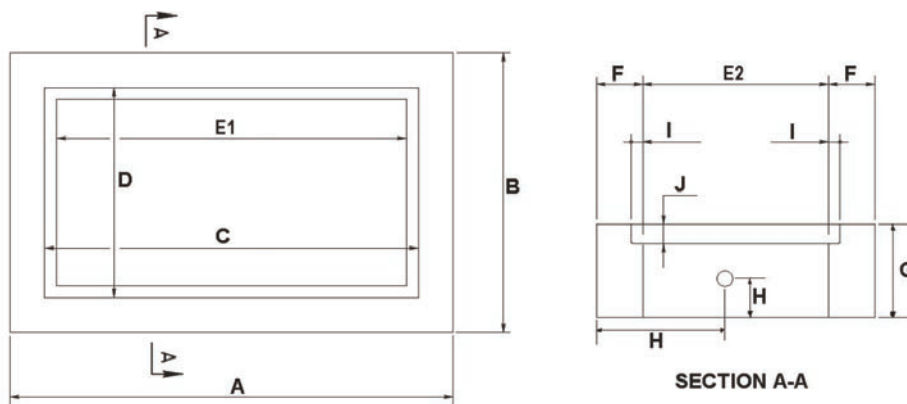
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-12 (1-19)



## RC 45M DIMENSIONAL REVIEW FOR PRECAST INLET TOP TYPE M

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
S-						
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	External Length	+/- 1/4"	57 1/4"			
B	External Width	+/- 1/4"	36"			
C	Internal Length (frame)	+/- 1/4"	48 1/4"			
D	Internal Width (frame)	+/- 1/4"	27"			
E1	Internal Dimension (length)	+/- 1/4"	45 1/4"			
E2	Internal Dimension (width)	+/- 1/4"	24"			
F	Wall Thickness	+/- 1/4"	6"			
G	Depth	+/- 1/4"	12"			
H	Lifting Eye Location (If required)	+/- 1/2"				
I	Frame Seat (width & length)	+/- 1/4"	1 1/2"			
J	Frame Seat (depth)	+/- 1/4"	2 1/2"			

If required, are lifting device(s) either galvanized or plastic:  YES  NO  N/A  
 Frames exposed and galvanized:  YES  NO  N/A  
 Protective coating properly applied as per Sect 714.8(b) of Pub. 408:  YES  NO  N/A  
 If tapered, is bottom dimension within 1 1/2" of top:  YES  NO  N/A  
 Reinforcement (size, grade, location):  YES  NO  N/A

Minimum splice length of 16 inches:  YES  NO  N/A  
 Welded Cages: Was approved  
 WPS followed? Welds acceptable?  YES  NO  N/A  
 Approved Shop Drawing:  YES  NO  N/A  
 RC - Drawing  YES  NO  N/A  
 Repaired Properly:  YES  NO  N/A

Date of Casting: \_\_\_\_\_

Date of Post-Pour Check: \_\_\_\_\_

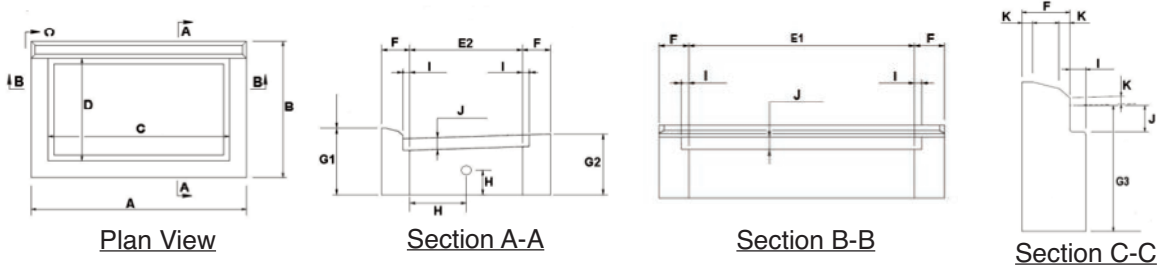
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-13 (1-19)



## RC 45M - DIMENSIONAL REVIEW FOR PRECAST INLET TOP TYPE S

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
S-						
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	External Length	+/- 1/4"	57 1/4"			
B	External Width	+/- 1/4"	36"			
C	Internal Length (frame)	+/- 1/4"	48 1/4"			
D	Internal Width (frame)	+/- 1/4"	27"			
E1	Internal Dimension (length)	+/- 1/4"	45 1/4"			
E2	Internal Dimension (length)	+/- 1/4"	24"			
F	Wall Thickness	+/- 1/4"	6"			
G1	Depth (back)	+/- 1/4"	14 1/4"			
G2	Depth (front)	+/- 1/4"	13"			
G3	Depth (gutter line)	+/- 1/4"	12" (min.)			
H	Lifting Eye Location	+/- 1/2"				
I	Frame Seat (width & length)	+/- 1/4"	1 1/2"			
J	Frame Seat (depth)	+/- 1/4"	2 1/2"			
K	Relief details per RC Stds or appr. shop drawings					

If required, are lifting device(s) either galvanized or plastic? . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A Frames exposed and galvanized? . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A Protective coating properly applied as per Sect 714.8(b) of PUB 408? . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A If tapered, is bottom dimension within 1 1/2" of top? . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A Reinforcement (proper type, size, grade, location) . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	Minimum splice length of 16 inches? . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A Welded Cages: Was approved WPS followed and welds acceptable? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A Approved Shop Drawing? . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A RC Drawing? . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A Properly Repaired? . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
---	--

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

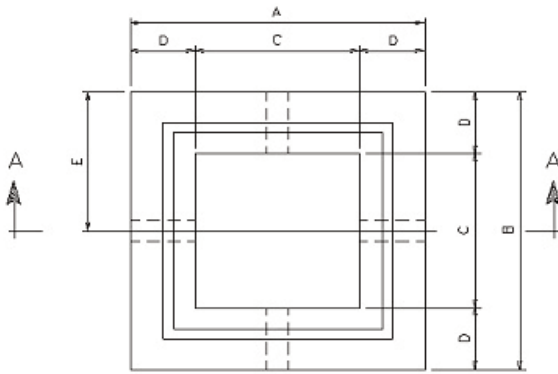
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-14 (1-19)

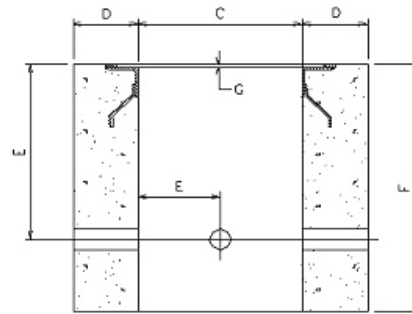


## RC-81M DIMENSIONAL REVIEW FOR PRECAST LIGHT DUTY JUNCTION BOX JB1/JB2

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



PLAN



SECTION A-A

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length	+/- 1/4"				
B	Width	+/- 1/4"				
C	Internal Dimension	+/- 1/4"				
D	Wall Thickness	+/- 1/4"				
E	Hole Location	+/- 1/2"				
F	Height (Max. variation from one side to the other: 1/4")	+/- 1/2"				
G	Depth of Angle	+/- 1/8"				

Frame Knockouts As Indicated:  YES  NO     
 Approved Shop Drawing:  YES  NO  
 Electrical ground per drawing:  YES  NO     
 RC - Drawing:  YES  NO  
 Reinforcement (size, grade, location):  YES  NO     
 Repaired Properly:  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

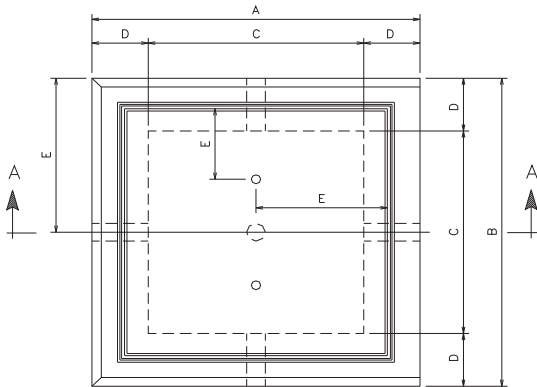
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-15 (1-19)

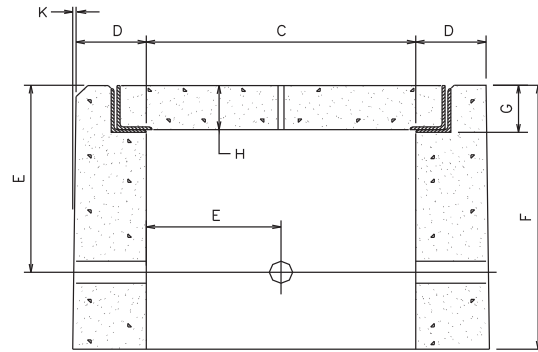


## RC-82M - DIMENSIONAL REVIEW FOR PRECAST HEAVY DUTY JUNCTION BOX JB11/JB12

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Plan View



Section A-A

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length	+/- 3/8"				
B	Width	+/- 3/8"				
C	Internal Dimension	+/- 1/4"				
D	Wall Thickness	+/- 1/4"				
E	Hole Location	+/- 1/2"				
F	Height (Max. variation from one side to the other: 1/4")	+/- 1/2"				
G	Depth of Angle	+/- 1/8"				
H	Lid Thickness	+/- 1/4"				
K	Relief Details	per approved shop drawing				
L	Location of hole drain	+/- 1/2"				

- Frame Knockouts as Indicated .....  YES     NO     N/A
- Electrical Ground Per Drawing .....  YES     NO     N/A
- Reinforcement (size, grade, location) .....  YES     NO     N/A
- Approved Shop Drawing .....  YES     NO     N/A
- RC Drawing .....  YES     NO     N/A
- Properly Repaired .....  YES     NO     N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

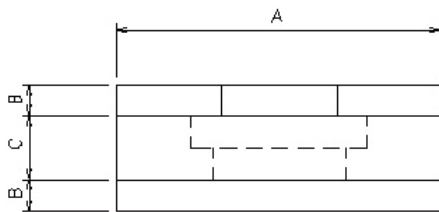
TR-16

TR-16 (1-19)

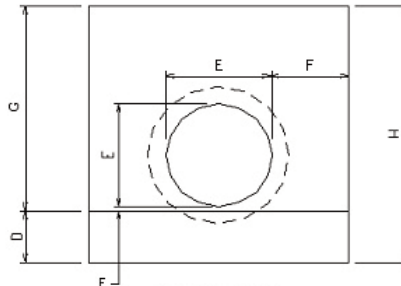


## DIMENSIONAL REVIEW FOR PRECAST "D" ENDWALL

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



PLAN



FRONT VIEW

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length of wall	<36" = +/- 1/4"    >36" = +/- 3/8"				
B	Base Flange Width	+/- 1/4"				
C	Wall Thickness	+/- 1/4"				
D	Base Thickness (Levelness of Bottom to be within 1/2")	+/- 1/4"				
E	Hole Size at discretion of manufacture					
F	Location of Openings Variation from one edge to another (of Centerline from one to another)	+/- 2"    +/- 3/4"				
G	Wall Height	<36" = +/- 1/4"    >36" = +/- 3/8"				
H	Overall Height Variation from one edge to the other	<36" = +/- 1/4"    >36" = +/- 3/8"				

Block out between 2" and 4" > pipe O.D: .....  YES     NO    RC - Drawing .....  YES     NO  
 Reinforcement (size, grade, location) .....  YES     NO    Repaired Properly .....  YES     NO  
 Approved Shop Drawing .....  YES     NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

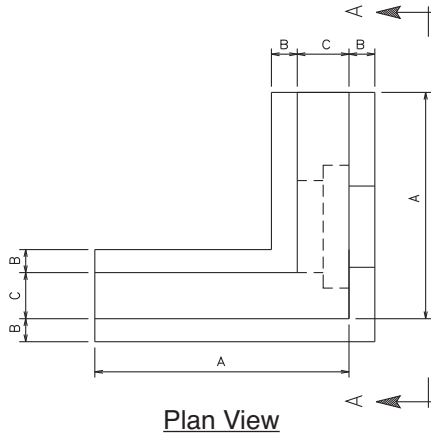


TR-17 (1-19)

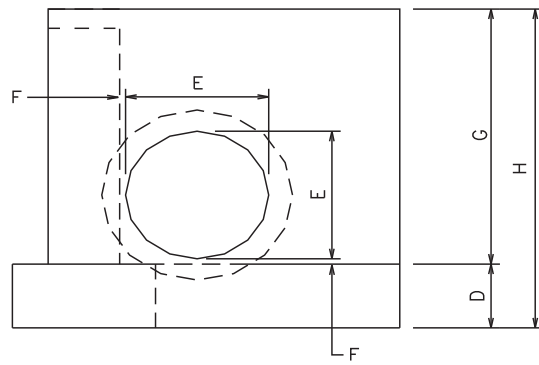


## DIMENSIONAL REVIEW FOR PRECAST D-E ENDWALL

FABRICATOR NAME:			FORM ID:			
PIECE MARK:						
PLANT JOB ID:	ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Plan View



View A-A

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length of Low Wall	< 36" = +/- 1/4" ≥ 36" = +/- 3/8"				
A	Length of High Wall	< 36" = +/- 1/4" ≥ 36" = +/- 3/8"				
B	Base Flange Width	+/- 1/4"				
C	Wall Thickness	+/- 1/4"				
D	Base Thickness (Levelness of Bottom to be within 1/2")	+/- 1/4"				
E	Hole Size at discretion of manufacturer					
F	Location of Openings - Variation from one edge to another (of Centerline from one to another)	+/- 2" +/- 3/4"				
G	Wall Height	< 36" = +/- 1/4" ≥ 36" = +/- 3/8"				
H	Overall Height Variation from one edge to the other	< 36" = +/- 1/4" ≥ 36" = +/- 3/8"				

- Block between 2" and 4" > pipe O.D. . . . . .  YES     NO     N/A
- Reinforcement (size, grade, location) . . . . .  YES     NO     N/A
- Approved Shop Drawing . . . . .  YES     NO     N/A
- RC Drawing . . . . .  YES     NO     N/A
- Properly Repaired . . . . .  YES     NO     N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

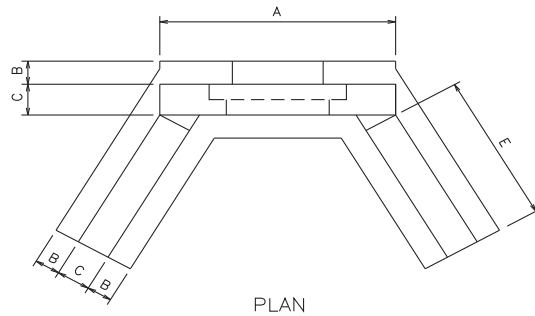
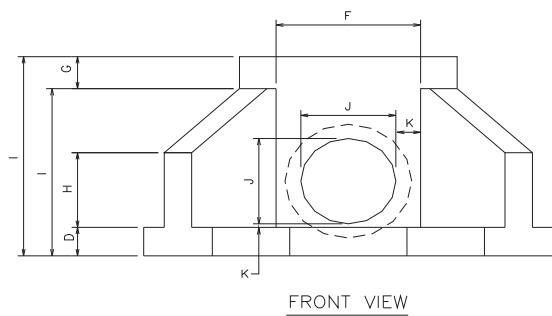
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-18 (1-19)



## DIMENSIONAL REVIEW FOR PRECAST DW ENDWALL

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			SR:		SEC:	COUNTY:
ECMS #:	STATE PROJECT #:		S-	PIECE MARK:		
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length of Back Wall	< 36" = +/- 1/4"    ≥ 36" = +/- 3/8"				
B	Base Flange Width	+/- 1/4"				
C	Wall Thickness	+/- 1/4"				
D	Base Thickness (Levelness of Bottom to be within 1/2")	+/- 1/4"				
E	Wing Wall Length Variation in length from one wall to the other: 1/2"	< 36" = +/- 1/4"    ≥ 36" = +/- 3/8"				
F	Dimension between Wing Walls	< 36" = +/- 1/4"    ≥ 36" = +/- 3/8"				
G	Top of Wing Wall to top of Back Wall Variation, (Right wall to Left wall)	+/- 1/2"    +/- 1/4"				
H	Face of Wing Wall Height	+/- 1/4"				
I	Overall Height	+/- 3/8"				
J	Hole sizes at discretion of manufacturer					
K	Location of Openings Variation from one edge to another (of Center-Line from one to the other) max. 3/4"	+/- 2"				

Block out between 2" and 4" > pipe O.D:     YES     NO    RC - Drawing     YES     NO  
 Reinforcement (size, grade, location)     YES     NO    Repaired Properly     YES     NO  
 Approved Shop Drawing     YES     NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

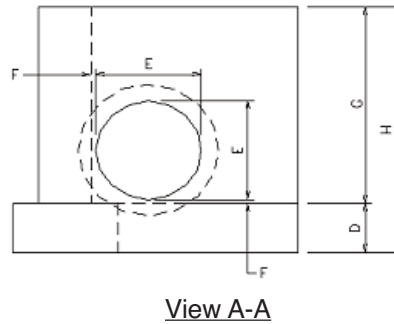
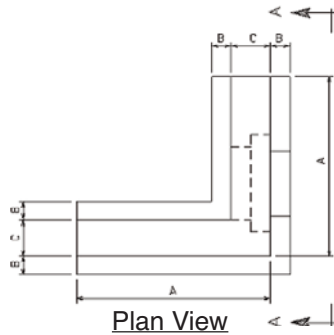
TR-19

TR-19 (1-19)



# DIMENSIONAL REVIEW FOR PRECAST E-S ENDWALL

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			PIECE MARK:			
ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-	
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length of Each Leg	< 36" = +/- 1/4" ≥ 36" = +/- 3/8"				
B	Base Flange Width	+/- 1/4"				
C	Wall Thickness	+/- 1/4"				
D	Base Thickness (Levelness of Bottom to be within 1/2")	+/- 1/4"				
E	Hole Sizes					
F	Location of Openings - Variation from one edge to another (of Centerline from one to another)	+/- 2" +/- 3/4"				
G	Wall Height	+/- 1/4"				
H	Overall Height	< 36" = +/- 1/4" ≥ 36" = +/- 3/8"				

- Block between 2" and 4" > pipe O.D. . . . . .  YES     NO     N/A
- Reinforcement (size, grade, location) . . . . .  YES     NO     N/A
- Approved Shop Drawing . . . . .  YES     NO     N/A
- RC Drawing . . . . .  YES     NO     N/A
- Properly Repaired . . . . .  YES     NO     N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

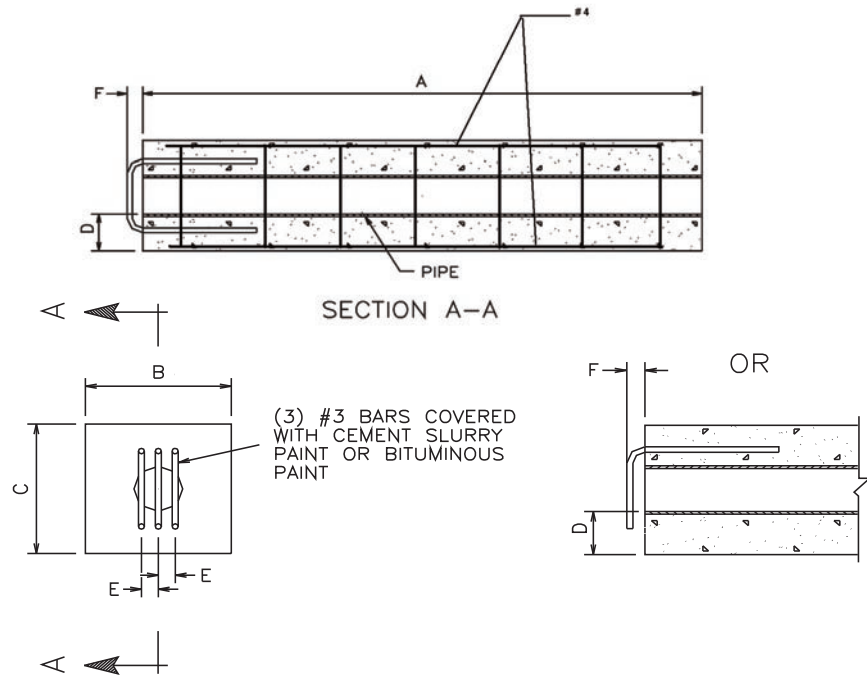
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-20 (1-19)



## DIMENSIONAL REVIEW FOR PRECAST SUBSURFACE DRAIN OUTLET ENDWALL

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length	+/- 3/8"				
B	Width	+/- 1/4"				
C	Depth	+/- 1/4"				
D	Void Location	+/- 1/4"				
E	Rebar Location	+/- 1/4"				
F	Rebar Extension from end of Drain Deviation from one bar to the other	+/- 1/2"    +/- 1/4"				

Protruding Bars Properly Coated:  YES  NO    RC - Drawing  YES  NO  
 Reinforcement (size, grade, location)  YES  NO    Repaired Properly  YES  NO  
 Approved Shop Drawing  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

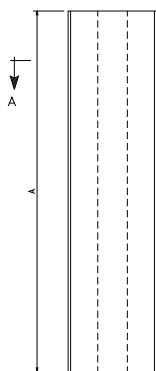
\_\_\_\_\_

TR-21 (7-20)

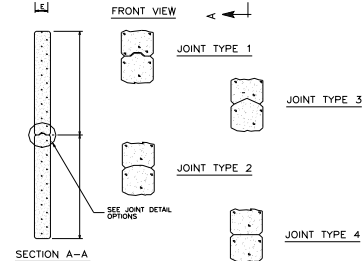
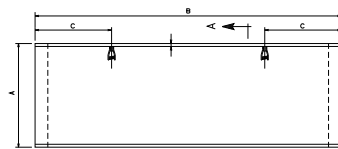
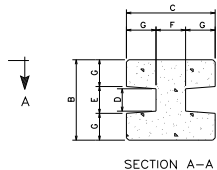


# DIMENSIONAL REVIEW FOR PRECAST SOUND BARRIER

FABRICATOR NAME:			FORM ID:					
PLANT JOB ID:			ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)	<input type="checkbox"/> QUALITY ASSURANCE (QA)		<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		



FRONT VIEW  
Precast Sound Barrier Post



SECTION A-A  
Precast Sound Barrier Panel

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
<b>1) Posts</b>						
A	Length	1/4" per 10' in length (3/4" max.)				
B	Depth	+/- 1/4"				
C	Width	+/- 1/4"				
D	Slot Height (inside)	+ 1/4", - 1/8"				
E	Slot Height (outside)	+ 1/4", - 1/8"				
F	Web Thickness	+/- 1/4"				
G	Slot Depth	+/- 1/8"				
<b>Out of Flatness</b>						
	Lengths to 8 feet	+/- 1/8"				
	Lengths over 8 feet	+/- 1/4"				
<b>2) Panels</b>						
A	Height	+/- 1/4"				
B	Length	+/- 1/4"				
C	Panel end to lifting hardware	(Symmetrical and +/- 4")				
D	Thickness (General)	+/- 1/4"				
	Thickness (at outer 5")	+/- 1/8"				
E	Border Width	+/- 1/4"				
<b>Out of Flatness</b>						
	Lengths to 8 feet	+/- 1/8"				
	Lengths over 8 feet	+/- 1/4"				

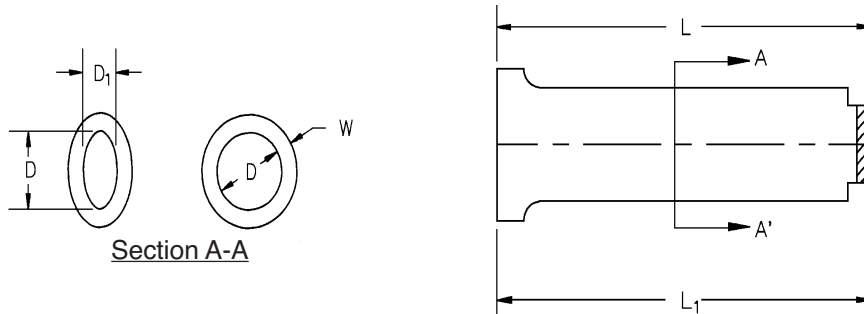
Architectural finish(es) meet sample panel:..... YES  NO      RC - Drawing..... YES  NO  
 Reinforcement (size, grade, location) ..... YES  NO      Repaired Properly..... YES  NO  
 Approved Shop Drawing ..... YES  NO  
 Date of Casting: \_\_\_\_\_      Date of Post-Pour Check: \_\_\_\_\_  
 Comments: \_\_\_\_\_

TR-22 (1-19)



## DIMENSIONAL REVIEW FOR REINFORCED CONCRETE PIPE

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Concrete Pipe Type .....  Circular or  Elliptical  
 Properly Repaired .....  YES     NO     N/A  
 Manufacture Date: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Quantity Made	DIA D		Paid Marking	Wall Thick (W) inch	Steel (inch) 2/Linear Foot			
	D1 (inch)	L1 (inch)			Inner Cage	Required	Outer Cage	Required

Comments and/or Waivers:

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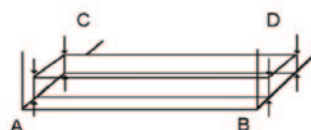
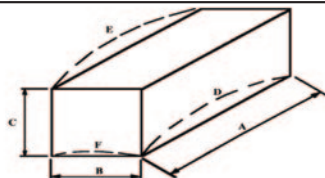
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TR-23 (6-19)



## DIMENSIONAL REVIEW FOR PRESTRESSED ADJACENT BOX BEAMS

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
S-						
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length	+ 1/2", -1"				
B	Width	+/- 1/4"				
C	Height	+1/2", -1/4"				
D	Vertical Camber	1" or > +/- 50%, < 1" +/- 1/2"				
E	Horizontal Camber	Up to 40': 1/4", 40' to 60': 3/8", > 60': 1/2"				
F	Bearing Area Flatness	+/- 1/8"				
G	Insert Placement	+/- 1/2"				
H	Stirrup Projection	+/- 1/4"				
J	Dowell Holes	+/- 1/2"				
K	Tie Rod Holes	+/- 1/2"				
	Out of Square	+/- 1/2"				
	Cracks or Spall					
	Miscellaneous					
	Top Slab (in)	+ 1/2", - 1/8"				
	Sidewall Thickness (in)	+ 3/8", - 1/8"				
	Location of Strand	+/- 1/4"				
	Debonding of Strand					
	Skew of Beam End	+/- 1/2"				
	Vertical and Slanted Ends (Deviation From Plan)	+/- 3/8" ≤48" Beam Height +/- 5/8" >48" Beam Height				
	Safety Post Location					
	Parapet Projections	- 0", + 1"				
	Horizontal Form Misalignment	+/- 3/16"				
	Positive Moment Steel Location					
	<b>Bearing Area with Daps</b>	<b>Tolerance</b>	<b>Design</b>	<b>Prepour</b>	<b>Actual</b>	<b>Deviation</b>
	Marked End A	+/- 1/8"				
	Marked End B	+/- 1/8"				
	Marked End C	+/- 1/8"				
	Marked End D	+/- 1/8"				
	Unmarked End A	+/- 1/8"				
	Unmarked End B	+/- 1/8"				
	Unmarked End C	+/- 1/8"				
	Unmarked End D	+/- 1/8"				

Reinforcement (size, grade, location) . . . . .  YES     NO    RC - Drawing . . . . .  YES     NO  
 Approved Shop Drawing . . . . .  YES     NO    Repaired Properly . . . . .  YES     NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

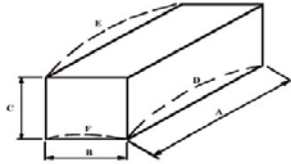
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-24 (1-19)

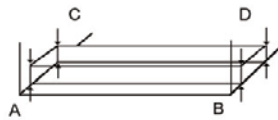


## DIMENSIONAL REVIEW FOR PRESTRESSED SPREAD BOX BEAMS

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



DAP DETAIL



Piece Mark:						
Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length	+ 1/2", -1"				
B	Width	+/- 1/4"				
C	Height	+1/2", -1/4"				
D	Vertical Camber	1" or > +/- 50%, < 1" +/- 1/2"				
E	Horizontal Camber	Up to 40':1/4", 40' to 60':3/8", >60':1/2"				
F	Bearing Area Flatness	+/- 1/8"				
G	Insert Placement	+/- 1/2"				
H	Stirrup Projection	+/- 3/4"				
J	Dowel Holes	+/- 1/2"				
K	Tie Rod Holes	+/- 1/2"				
	Out Of Square	+/- 1/2"				
	Cracks Or Spalls					
	Miscellaneous					
	Top Slab (in)	+/- 1/2"				
	Sidewalls Thickness (in)	+ 3/8", - 1/8"				
	Location of Strand	+/- 1/4"				
	Debonding of Strand					
	Skew of beam end	+/- 1/2"				
	Vertical and Slanted Ends (Deviation From Plan)	+/- 3/8" <=48" Beam Height +/- 5/8" >48" Beam Height				
	Safety Post location					
	Parapet protections (S2)	- 0, + 1"				
	Horizontal form mis-alignment	+/- 3/16"				
	Positive moment steel location					
	Bearing Area with Daps	Tolerance	Design	Prepour	Actual	Deviation
	Marked End A	+/- 1/8"				
	Marked End B	+/- 1/8"				
	Marked End C	+/- 1/8"				
	Marked End D	+/- 1/8"				
	Unmarked End A	+/- 1/8"				
	Unmarked End B	+/- 1/8"				
	Unmarked End C	+/- 1/8"				
	Unmarked End D	+/- 1/8"				
				Yes	No	
Reinforcement (size, grade, location):						
Date of Casting:			Approved Shop Drawing:			
Date of Post-Pour Check:			RC - Drawing:			
Properly Repaired:						

**Remarks and/or Waivers:**

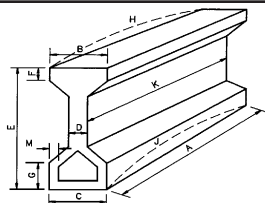


TR-25 (11-23)



## DIMENSIONAL REVIEW FOR PRESTRESSED I-BEAM

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE			



DAP Detail



PIECE MARK:

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Length	+ 1/2", -1"				
B	Width-Top Flange	+ 3/8", - 1/4"				
C	Width-Bottom Flange	+ 3/8", - 1/4"				
D	Width-Web	+ 3/8", - 1/4"				
E	Height-Beam	+ 1/2", - 1/4"				
F	Height-Top Flange	+/- 1/4"				
G	Height-Bottom Flange	+/- 1/4"				
H	Sweep	+/- 1/8" per 10ft				
J	Vertical Camber	≥1" +/- 50%, <1" +/- 1/2"				
	Bearing Area Flatness	+/- 1/16"				
	Plate Location	+/- 3/4"				
	Stirrup Projection	+/- 3/4"				
	Stirrup Coating Condition					
M	Strand Cover					
	Miscellaneous					
	Location of Strand	+/-1/4"				
	Debonding of Strand					
	Exposed Beam Ends Skew (Horizontal)	+/-1/4"				
	Exposed Beam Ends (Vertical)	+/- 1/8" per 1" of height (Max 1/2" for 63" height, max 3/4" > 63" height)				
	Safety Post Location					
	Hold Down Location	+/- 10"				
	Horizontal Form Misalignment	+/- 3/16"				
	Cracks or Spalls					
	Positive Movement Steel Location					
	<b>Bearing Area With Daps</b>	<b>Tolerance</b>	<b>Design</b>	<b>Prepour</b>	<b>Actual</b>	<b>Deviation</b>
	Marked End A	+/-1/8"				
	Marked End B	+/-1/8"				
	Marked End C	+/-1/8"				
	Marked End D	+/-1/8"				
	Unmarked End A	+/-1/8"				
	Unmarked End B	+/-1/8"				
	Unmarked End C	+/-1/8"				
	Unmarked End D	+/-1/8"				

Reinforcement (size, grade, location) .....  YES  NO  N/A

Approved Shop Drawing .....  YES  NO  N/A

RC Drawing .....  YES  NO  N/A

Properly Repaired .....  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

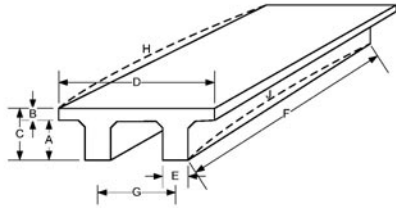
Comments and/or Waivers:

TR-26 (1-19)

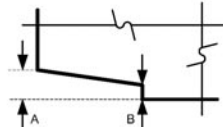


## DIMENSIONAL REVIEW FOR PRECAST NEXT BEAM

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



**DAP DETAIL**



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A1	Depth - Stem & Fillets	+/- 1/4"				
A2	Depth - Stem & Fillets	+/- 1/4"				
B	Thickness - Top Flange	+ 1/4" - 1/8"				
C	Depth - Overall	+/- 1/4"				
D	Width - Flanges	+/- 1/4"				
E1	Width - Stem	+/- 1/8"				
E2	Width - Stem	+/- 1/8"				
F	Length	+ 1/2", - 1"				
G	Center to center of bearings	+/- 1/2"				
	Centerline-bearing to beam end	+/- 3/4"				
	Stem perpendicularity	1/8" per vertical foot				
	Distance between stems	+/- 1/4"				
	Exposed Beam Ends -deviation from square/designated skew	horizontal ± 1/4"				
		vert ±1/8" per 1', max 1/2"				
	Deviations of ends (vert. batter)	± 3/8"				
	Debonding of strand		Per Drawing			
	Inserts	± 1/2"				
	Bearing Area Flatness	Mark end ± 1/16"	0"	0"		
		Non-Mark end ± 1/16"	0"	0"		
	Stirrup bars (projection)	± 3/4"				
	Stirrup bars (longitudinal)	<12" ±1/2", ≥12" +1"/- 2"				
H	Horizontal alignment (sweep)	± 1/8" Per 10 ft				
	Horizontal Form Misalignment	± 3/16"				
	Location of Strand	± 1/4"				
	Position - post-tensioning duct	± 1/4"				
	Longitudinal position of lifters	± 6"				
J	Camber differential (adjacent)	1/4" per 10', max 3/4"	Show on framing plan			
	Positive Moment Steel Location	± 3/8"				
	Projection from end of beam	± 1/2"				
	Cracks or Spalls					

TR-26 (cont'd)

TR-26 (1-19) continued

	Bearing Area with Daps	Tolerance	Design	Prepour	Actual	Deviation
	Marked End Nearside A	+/- 1/8"				
	Marked End Nearside B	+/- 1/8"				
	Marked End Farside A	+/- 1/8"				
	Marked End Farside B	+/- 1/8"				
	Unmarked End Nearside A	+/- 1/8"				
	Unmarked End Nearside B	+/- 1/8"				
	Unmarked End Farside A	+/- 1/8"				
	Unmarked End Farside B	+/- 1/8"				

Reinforcement (size, grade, location) .....  YES  NO Chamfers ground and sealed .....  YES  NO  
 Approved Shop Drawing .....  YES  NO Repaired Properly .....  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

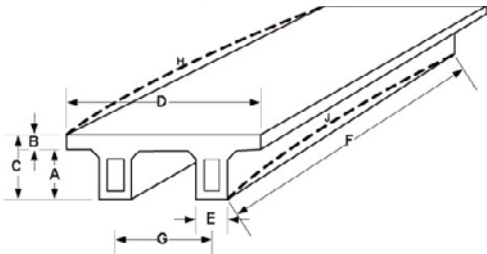
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-27 (1-19)

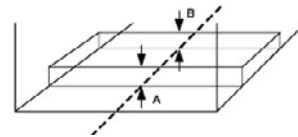


## DIMENSIONAL REVIEW FOR PRESTRESSED NEXT BEAMS

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



**DAP DETAIL**



Piece Mark:							
Dim	Dimensions	Tolerance	Design		Prepour	Actual	Deviation
A1	Depth - Stem & Fillets	± 1/4"					
A2	Depth-Stem & Fillets	± 1/4"					
B	Thickness - Top Flange	+ 1/4", - 1/8"					
C	Depth - Overall	± 1/4"					
D	Width - Flanges	± 1/4"					
E1	Width - Stem	± 1/8"					
E2	Width - Stem	± 1/8"					
F	Length	+ 1/2", - 1"					
G	Center to center of bearings	± 1/2"					
	Centerline-bearing to beam end	± 3/4"					
	Stem perpendicularity	1/8" per vertical foot					
	Distance between stems	± 1/4"					
	Exposed Beam Ends - Square	horizontal ± 1/4"					
		vert ± 1/8"=1', max 1/2"					
	Inserts	± 1/2"					
	Bearing Area Flatness	Mark end ± 1/16"	0"	0"			
		Non-Mark end ± 1/16"	0"	0"			
	Stirrup bars (projection)	± 3/4"					
	Stirrup bars (longitudinal)	<12" ±1/2', ≥12" -2" +1"					
H	Horizontal alignment	± 1/8" Per 10 ft					
	Horizontal Form Misalignment	± 3/16"					
	Location of Strand	± 1/4"					
	Position - post-tensioning duct						
	Longitudinal position of lifters						
J	Camber differential (adjacent)	1/4" =10', max 3/4"					
	Positive Moment Steel Location	± 3/8"					
	Projection from end of beam	± 1/2"					
	Cracks or Spalls						

TR-27 (cont'd)

TR-27 (1-19) continued

Piece Mark:						
	Bearing Area with Daps	Tolerance	Design	Prepour	Actual	Deviation
	Marked End A	± 1/8"				
	Marked End B	± 1/8"				
	Marked End C	± 1/8"				
	Marked End D	± 1/8"				
	Unmarked End A	± 1/8"				
	Unmarked End B	± 1/8"				
	Unmarked End C	± 1/8"				
	Unmarked End D	± 1/8"				
					<b>Yes</b>	<b>No</b>
Date of Casting:		Reinforcement (size, grade, location):				
Date of Post-Pour Check		Approved Shop Drawing				
Properly Repaired:		Chamfers ground and sealed				

Remarks And/or Waivers:

Plumbness Pre:  
Post:

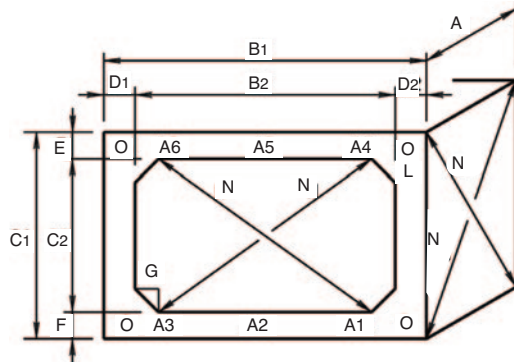
TR-28 (7-20)



## DIMENSIONAL REVIEW FOR BOX CULVERT

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	

Segment Lay Lengths						
Dim	Desc.	Tol.	Design	Pre-Pour	Post-Pour	Dev.
A1	Length - Right, Middle, Left (Bottom and Top)	See A Below				
A2						
A3						
A4						
A5						
A6						



Dim	Description	Tolerance	Design	Pre-Pour	Actual	Deviation
A	Lay Length	1/8"/FT of Length (1/2" Max.)				
B1	Width - Outside					
B2	Width - Inside	+/- 1% (1" Max.)				
C1	Height - Outside					
C2	Height - Inside	+/- 1% (1" Max.)				
D1	Wall Thickness	+ 1/2" / - 3/16"				
D2	Wall Thickness	+ 1/2" / - 3/16"				
E	Top Slab Thickness	+ 1/2" / - 3/16"				
F	Base Slab Thickness	+ 1/2" / - 3/16"				
G	Haunch	+ 1/4"				
H	Weep Holes	+/- 2"				
K	Inserts					
L	Post Tension Duct	+/- 1/4" (at ends only)				
M	Length of Opposite Surfaces	1/8"/FT of Internal Span (5/8" Max.)				
N	Internal / External Diagonal	+/- 1% (1" Max.)				
O	Mating Surface (pallet and hand finished joint)	< 10 FT: +/- 1/4" 10 FT to 20 FT: +/- 3/8" > 20 FT: +/- 1/2" Max.				

- Protective coating properly applied . . . . .  YES  NO  N/A
- Reinforcement (size, grade, location) . . . . .  YES  NO  N/A
- Approved Shop Drawing . . . . .  YES  NO  N/A
- Properly Repaired . . . . .  YES  NO  N/A
- Bottom of culvert acceptable / free of defects . . . . .  YES  NO  N/A
- Post-tension duct adequately secured (bowing/sway requires Engineer approval) . . . . .  YES  NO  N/A
- Dry fit performed . . . . .  YES  NO  N/A
- Features (inserts, key joints, fish baffles, etc.) +/- 1/2" on CL between adjacent segments . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Name: \_\_\_\_\_

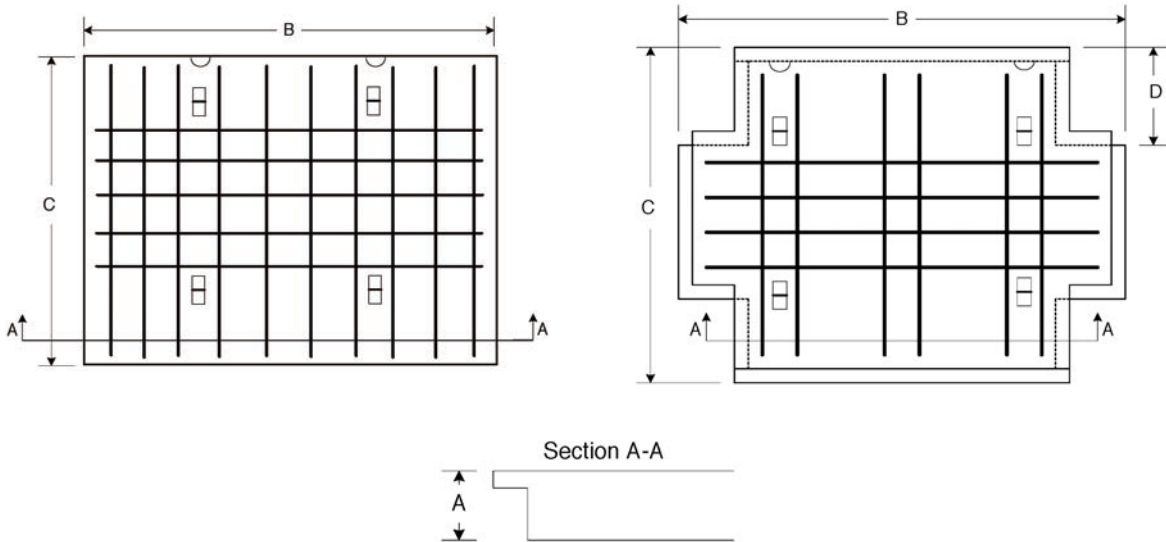
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-29 (1-19)



## DIMENSIONAL REVIEW FOR MSE WALL PANELS

FABRICATOR NAME:			FORM ID:			
PIECE MARK:						
PLANT JOB ID:	ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Thickness	+/- 1/4"				
B	Width	+/- 1/4"				
C	Height	+/- 1/4"				
D	Wing to Corner	+/- 1/4"				

- |  |   |
|--|---|
| Reinforcement (size, grade, location) . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO | Grout Leaks . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                    |
| Top Finish . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                            | Exposed Rebar . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                  |
| Bottom Finish . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                         | Exposed Chairs . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                 |
| Surface Texture . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                       | Openings / Block-outs . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO          |
| Cracks / Spalls . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                       | 1/8" alignment for clevis loop . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO |
| Squareness . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                            | Approved Shop Drawing . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO          |
| Chamfers . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                              | RC - Drawing . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                   |
| Honeycomb . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO                             | Repaired Properly . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO              |

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_

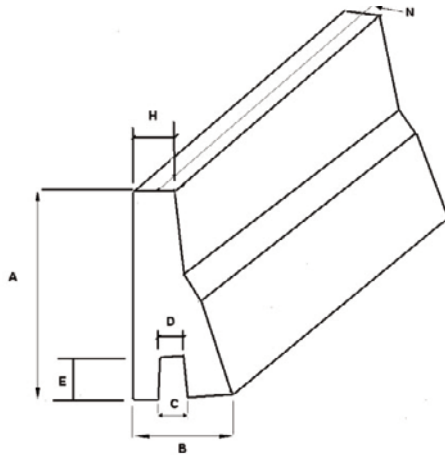
\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-30 (1-19)

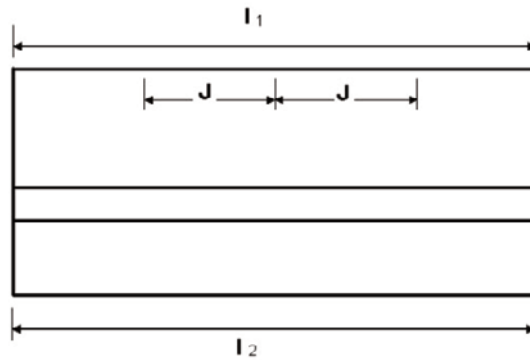


## DIMENSIONAL REVIEW FOR PARAPET BARRIER

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



**TYPICAL END VIEW**



**TYPICAL ELEVATION**

Dim	Dimensions	Tolerance	Design	Prepour	Actual	Deviation
A	Overall Height	± 1/4"				
B	Bottom Width	± 1/4"				
C	Knockout Bottom Width	± 1/4"				
D	Knockout Top Width	± 1/4"				
E	Knockout Depth	- 0", + 1"				
H	Top Width	± 1/4"				
I1	Top Length	1/4" per 10' of length (1/2" Max.)				
I2	Bottom Length	1/4" per 10' of length (1/2" Max.)				
J	Location of Lifting Hardware	(symmetrical and +/- 4")				
N	Twist	1/4" per 10' of length				

Protective coating properly applied .....  YES  NO      Approved Shop Drawing .....  YES  NO  
 Reinforcement (size, grade) .....  YES  NO      RC - Drawing .....  YES  NO  
 Projection Top Location .....  YES  NO      Properly Repaired: .....  YES  NO  
 Projection Bottom Location .....  YES  NO  
 (Maximum = 1/4" / 10ft) Glare Screen:  
     Check For twist .....  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

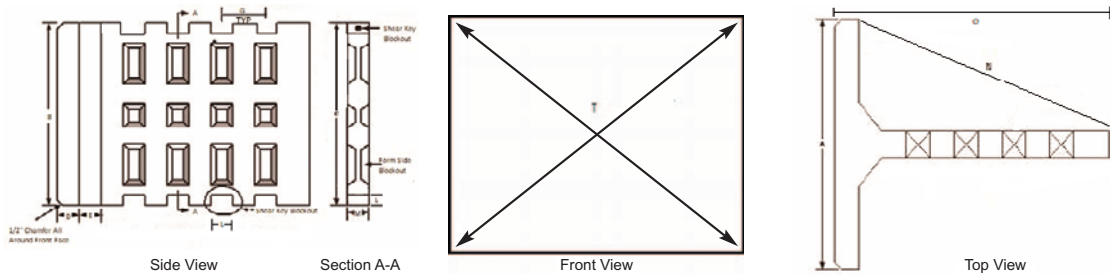


TR-31 (9-21)



## DIMENSIONAL REVIEW FOR T-WALL

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
S-						
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Face Width	+/- 3/16"				
B	Face Height	+/- 3/16"				
C	Stem Height	+/- 3/16"				
D	Face Thickness	- 1/4", + 1/2"				
E	Haunch Width	+/- 1/2"				
G	CL to CL blockouts (Typ.)	+/- 1/2"				
L	Shear Key Blockout to Dimension (Typ.)	+/- 1/2"				
M	Stem Thickness	- 1/4", +1/2"				
N	Face Perpendicular to Stem (difference between diagonals on both sides from the stem)	+/- 1/2"				
O	Length of Stem	+/-1"				
T	Front Face Square (measured from corner to corner) at all four corners	+/-1/4"				
**	Planarity and Plumbness	+/-1/4"				
	Weephole Location When Required	+/- 1/2"				

\*\* Vertical face plane is checking the face with a straight edge across the entire face to ensure flatness (at increments of 24") with a 5' straightedge.

- Reinforcement as per Design .....  YES     NO     N/A
- Clearance to Stem. ....  YES     NO     N/A
- Clearance to Face. ....  YES     NO     N/A
- Clearance to Haunch. ....  YES     NO     N/A
- Approved Shop Drawing . ....  YES     NO     N/A
- Properly Repaired . ....  YES     NO     N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TR-32 (1-19)

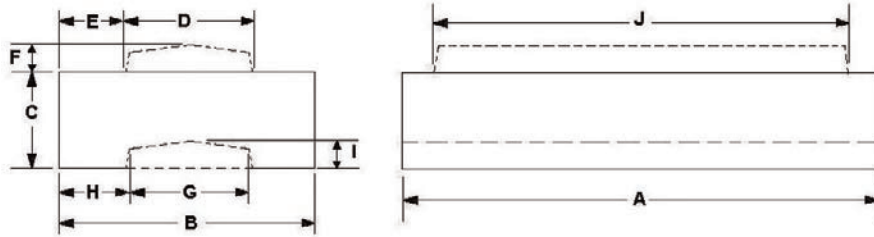


## DIMENSIONAL REVIEW FOR DURA-HOLD UNITS

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

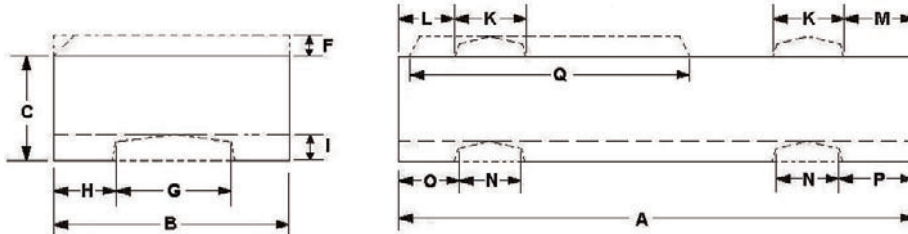
**Applies to:**

- Standard Unit
- Coping Unit
- Right Corner Coping Unit
- Left Corner Coping Unit
- Half Unit
- Half Unit Coping Unit



**Applies to:**

- Tie-Back Unit
- Right Corner Unit
- Left Corner Unit



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Overall Length	+/- 1/8"				
B	Overall Width	+/- 1/8"	2" - 0"			
C	Block Height	+/- 1/8"	1" - 0"			
D	Longitudinal Tongue Width	- 1/8"	6"			
E	Longitudinal Tongue Distance	+/- 1/8"	9 3/4"			
F	Tongue Height	- 1/8"	2"			
G	Longitudinal Groove Width	+ 1/8"	6"			
H	Longitudinal Groove Distance	+/- 1/8"	8 1/4"			
I	Longitudinal Groove Height	+/- 1/8"	2"			
J	Longitudinal Tongue Length	+/- 1/8"				
K	Transverse Tongue Width	- 1/8"	6"			
L	Left Transverse Tongue Distance	+/- 1/8"				
M	Right Transverse Tongue Distance	+/- 1/8"				
N	Transverse Groove Width	+ 1/8"	6"			
O	Left Transverse Groove Distance	+/- 1/8"				
P	Right Transverse Groove Distance	+/- 1/8"				
Q	Partial Tongue Length	+/- 1/8"				
R	Deviation From Square Along Base Diagonal	+/- 1/8"	0"			

- Markings Properly Applied . . . . .  YES     NO     N/A  
 Architectural Grooves Properly Sized and Spaced . . . . .  YES     NO     N/A  
 Proper Concrete Color Applied . . . . .  YES     NO     N/A  
 Reinforcement (size, grade, location) . . . . .  YES     NO     N/A  
 Approved Shop Drawing . . . . .  YES     NO     N/A  
 Properly Repaired . . . . .  YES     NO     N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

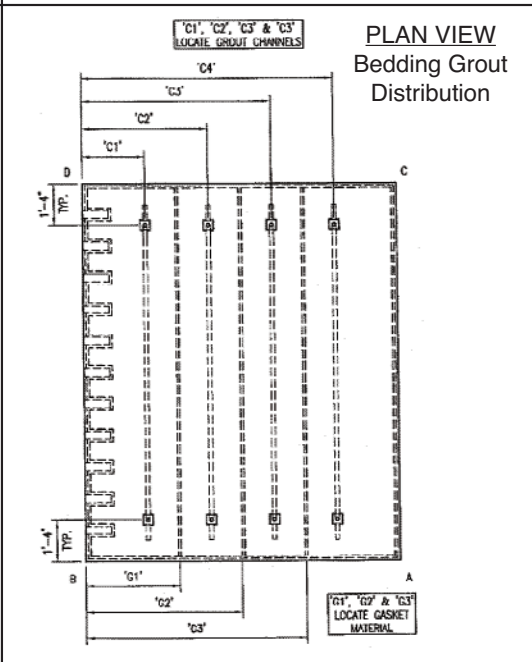
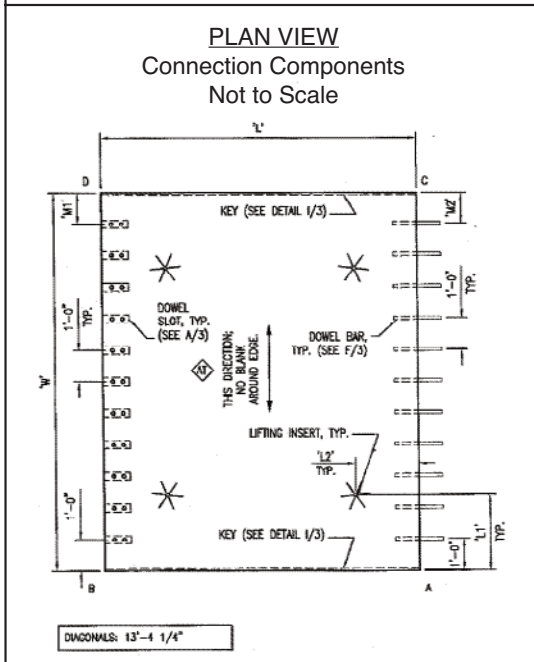
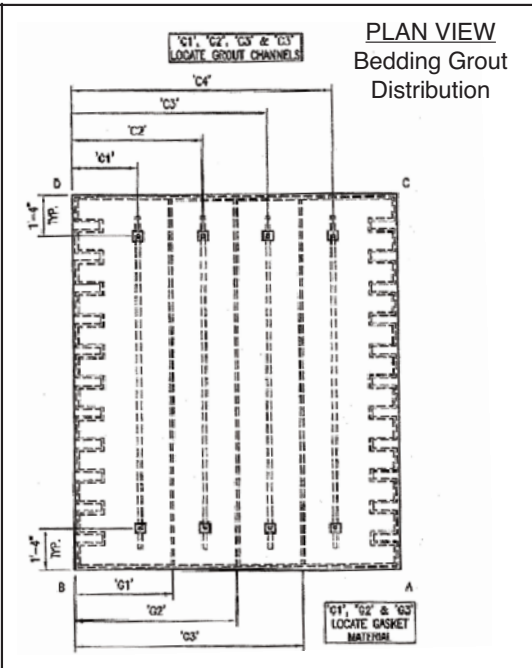
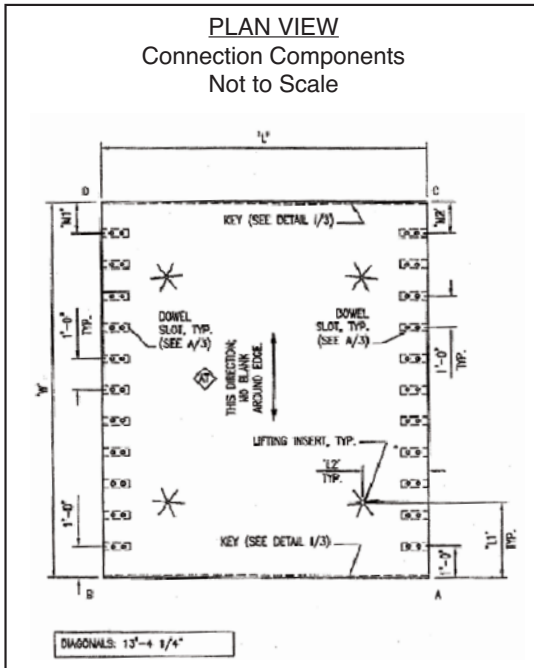
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-33 (7-20)



# SUPER SLAB DIMENSIONAL REVIEW

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



TR-33 (cont'd)

TR-33 (7-20) continued

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
W	Width	+/- 3/16"				
L	Length	+/- 3/16"				
	Slab Diagonals (Square) A-D	+/- 3/16"				
	Form Depth (Slab Thickness)	+/- 1/8"				
L1	Lifting Insert Number 1, 2, 3, 4					
2	Lifting Insert Number 1, 2, 3, 4					
M1	Dowel or Bedding Grout Ports	+/- 1/8"				
M2	Dowel or Bedding Grout Ports	+/- 1/8"				
C1	Grout Channels					
C2	Grout Channels					
C3	Grout Channels					
C4	Grout Channels					
G1	Gasket Material Location					
G2	Gasket Material Location					
G3	Gasket Material Location					
	Keyway Location A-B					
	Keyway Location C-D					
	Keyway Dimension A-B					
	Keyway Dimension C-D					
	Cont. Slots Location A-C					
	Cont. Slots Location B-D					
	Cont. Slots Spacing A-C					
	Cont. Slots Spacing B-D					
	Cont. Slots Dimension A-C					
	Cont. Slots Dimension B-D					
	Dowel Embedment Level A-C	+/- 1/8"				
	M/F Connection Dowel Projection					
	F/F Connection Port Recess					

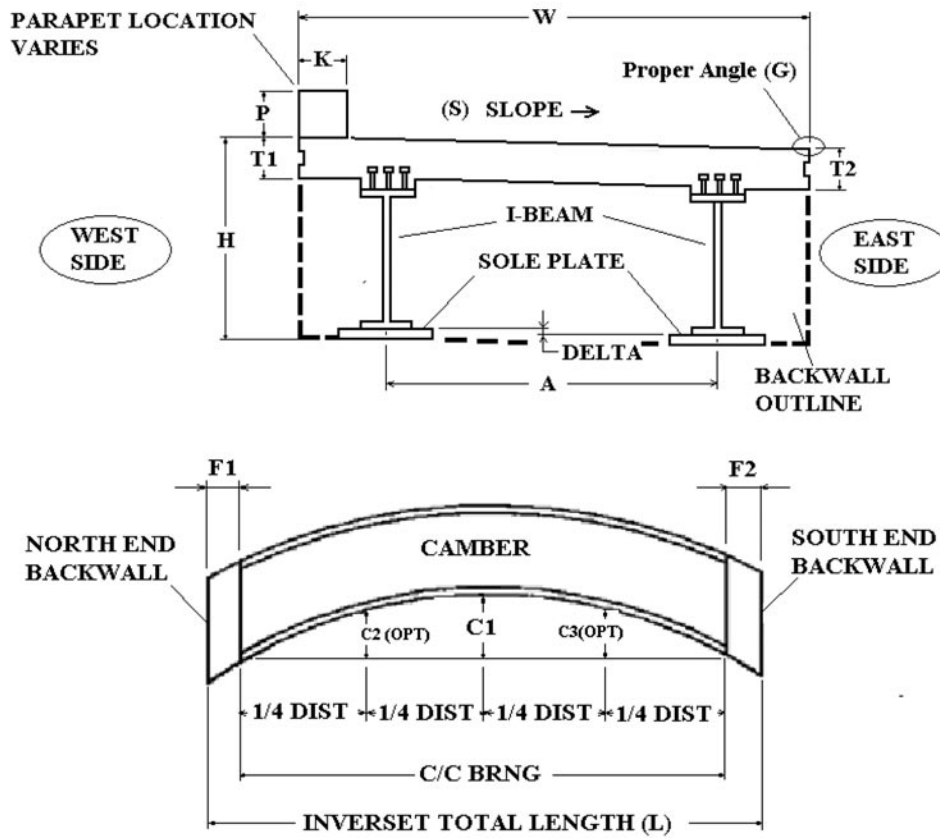
- Connection Type . . . . .  M/F  F/F
- 1"x1" Chamfer along all bottom edges . . . . .  YES  NO Comments: \_\_\_\_\_
- 1"x1" Chamfer along all dowel slots . . . . .  YES  NO Comments: \_\_\_\_\_
- Blank edges per drawing detail . . . . .  YES  NO Comments: \_\_\_\_\_
- Reinforcement Top Clearance 2 1/2". . . . .  YES  NO Comments: \_\_\_\_\_
- Reinforcement Bottom Clearance 2" . . . . .  YES  NO Comments: \_\_\_\_\_
- Reinforcement Bottom Clearance 3" . . . . .  YES  NO Comments: \_\_\_\_\_

TR-34 (1-19)



# INVERSESET DIMENSIONAL REVIEW SHEET

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
S-						
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
L1	Deck overall length (along the East side)	+/- 1/2"				
L2	Deck overall length (along the West side)	+/- 1/2"				
C/C	Center to center of bearings	+/- 1/2"				
W	Deck Top Width	+/- 1/4"				
H1	Overall Height (North End Backwall-East)	+/- 1/4"				
H2	Overall Height (North End Backwall-West)	+/- 1/4"				
H3	Overall Height (South End Backwall-East)	+/- 1/4"				
H4	Overall Height (South End Backwall-West)	+/- 1/4"				

TR-34 (cont'd)

TR-34 (1-19) continued

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A1	Distance between I-Beams (North End)					
A2	Distance between I-Beams (South End)					
	Deck Diagonals	+/- 1/2"				
T1	Deck Thickness (average on East side)	+/- 1/4"				
T2	Deck Thickness (average on West side)	+/- 1/4"				
	Delta					
	Horizontal Sweep (measured from concrete decking centerline)	+/- 1/4"				
C1E	Vertical Camber (midspan at East side)	+1/4" -3/8"				
C1W	Vertical Camber (midspan at West side)	+1/4" -3/8"				
	I-Beam Camber (East side, pre-load)					
	I-Beam Camber (West side, pre-load)					
	Flange tilting (East side beam, pre-load)					
	Flange tilting (West side beam, pre-load)					
S	Deck Slope (at Unit's midspan)	+/- 1/2 %				
P	Parapet Height	+/- 1/4"				
K	Parapet Width	+/- 1/4"				
F1	North Backwall Thickness	+/- 1/4"				
F2	South Backwall Thickness	+/- 1/4"				
	North Backwall End - Batter	+/- 1/2"				
	North Backwall End - Planar Surface	+/- 1/4"				
	Proper Angle to Deck (West side)	+/- 1/4"				
	South Backwall End - Batter	+/- 1/2"				
	South Backwall End - Planar Surface	+/- 1/4"				
	Proper Angle to Deck (East side)	+/- 1/4"				

- Joint (size, location) .....  YES  NO      Protective coating properly applied .....  YES  NO  
 Haunches (size, location) .....  YES  NO      Reinforcement (size, grade, location) .....  YES  NO  
 Lift Holes (size, location) .....  YES  NO      Approved Shop Drawing .....  YES  NO  
 Backwalls steel plates (size, location) .....  YES  NO      Chamfers ground and sealed .....  YES  NO  
 Inserts, Studs (type, size, location) .....  YES  NO      Repaired Properly .....  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

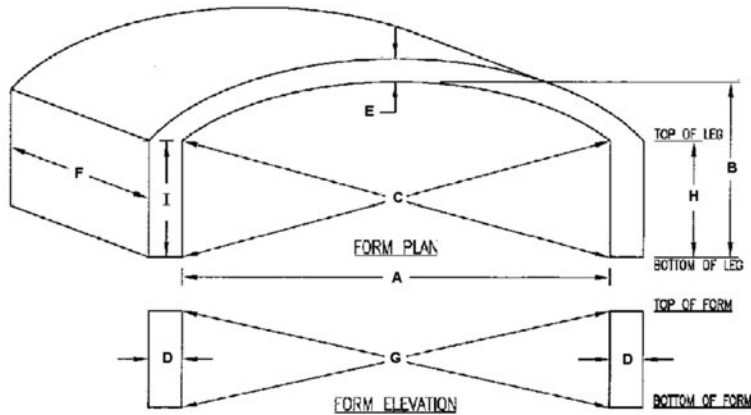
\_\_\_\_\_

TR-35 (1-19)



## DIMENSIONAL REVIEW FOR CON/SPAN ARCH STRUCTURE

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Span	+/- 1/2"				
B	Rise	+/- 1/2"				
C	Square (Plan)	+/- 1/2"				
D	Wall Thickness	+/- 1/4"				
E	Slab Thickness	+/- 1/4"				
F	Unit Lay Length (Max.)	+/- 1/2"				
F	Unit Lay Length (Min.)	+/- 1/2"				
G	Square Elevation	+/- 1/2"				
H	Leg Length	+/- 1/2"				
I	Leg Length	+/- 1/2"				

Markings properly applied? . . . . .  YES  NO  N/A  
 Sheathing duct diameters as specified on drawings? . . . . .  YES  NO  N/A  
 Sheathing ducts located within specified tolerances (1/4" unless otherwise specified), both ends? . . . . .  YES  NO  N/A  
 Post-tensioning recess as specified on drawings? . . . . .  YES  NO  N/A  
 Coatings properly applied? . . . . .  YES  NO  N/A

Do special items (block outs, access openings, skews, etc.) comply with drawings? . . . . .  YES  NO  N/A  
 Reinforcement (size, grade, location): . . . . .  YES  NO  N/A  
 Wingwalls in accordance with approved shop drawings? . . . . .  YES  NO  N/A  
 Wingwall anchors in accordance with approved shop drawings? . . . . .  YES  NO  N/A  
 Approved Shop Drawing . . . . .  YES  NO  N/A  
 RC - Drawing . . . . .  YES  NO  N/A  
 Repaired Properly . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

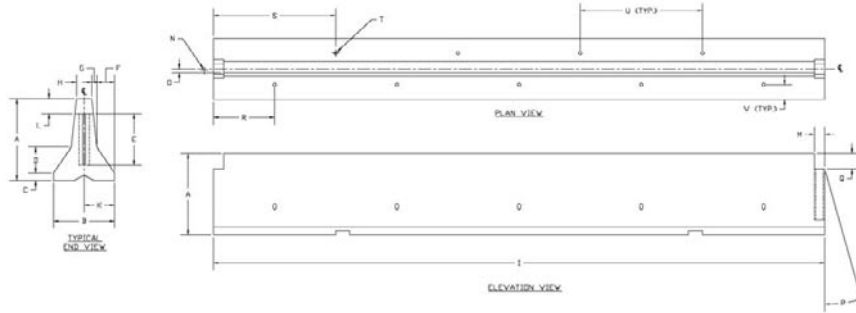
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-57 (6-20)



## DIMENSIONAL REVIEW FOR BARRIER 32" MEDIAN DOUBLE FACE

FABRICATOR NAME:			FORM ID:					
PLANT JOB ID:			ECMS #:		STATE PROJECT #:		PIECE MARK:	
SR:		SEC:		COUNTY:		S-		
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)								



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Overall Height	+/- 1/4"				
B	Bottom Width	+/- 1/4"				
C	Reveal Height	+/- 1/4"				
D	Sloped Vertical Dimension	+/- 1/4"				
E	Key Height	+/- 1/4"				
F	Sloped Horizontal Dimension	+/- 1/4"				
G	Sloped Horizontal Dimension	+/- 1/4"				
H	Top Width	+/- 1/4"				
I	Overall Length	1/4" per 10' of length (1/2" Max.)				
J	Location of Lifting Hardware	(symmetrical and +/- 4")				
K	Location of Key (Horizontal)	+/- 1/4"				
L	Location of Key (Vertical)	+/- 1/4"				
M	Key Notch Depth	+/- 1/4"				
N	Twist	1/4" per 10' of length				
O	Sweep (measured from centerline)	+/- 1/4"				
P	End Skew	+/- 3/8"				
Q	Key Notch Height	+/- 1/4"				
R	Anchor Pin Hole Form End	+/- 1/4"				
S	Anchor Pin Hole Form End	+/- 1/4"				
T	Anchor Pin Hole Diameter	+/- 1/4"				
U	Anchor Pin Hole Spacing	+/- 1/4"				
V	Anchor Pin Hole Location	+/- 1/4"				

If with drainage slots,  
 block out or weep holes per drawing . . .  YES  NO  N/A  
 If, With transition piece per drawing . . .  YES  NO  N/A  
 Protective coating properly applied . . .  YES  NO  N/A

Reinforcement (size, grade, location) .  YES  NO  N/A  
 Approved Shop Drawing . . . . .  YES  NO  N/A  
 RC - Drawing . . . . .  YES  NO  N/A  
 Repaired Properly . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

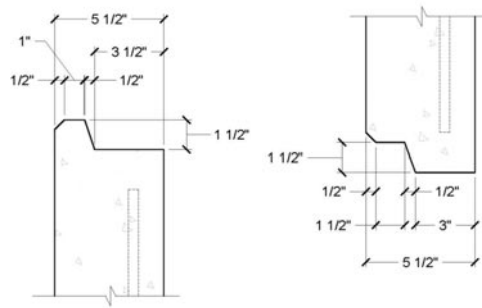
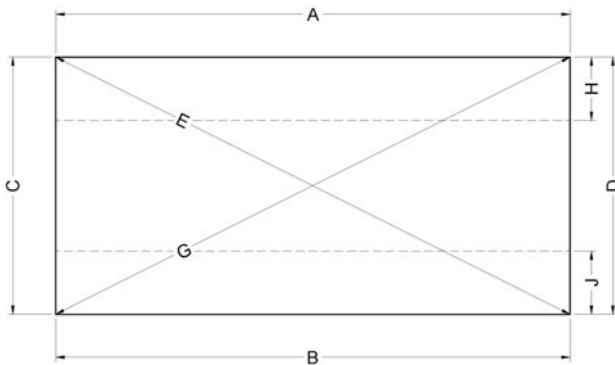


TR-58 (3-19)



## DIMENSIONAL REVIEW FOR SINE WALL MSE PANELS

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



Section F

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
F	Thickness	+/- .55"				
A/B	Width	+/- .25"				
C/D	Height	+/- .25"				
E/G	Corner to Corner	+/- .50"				

- |  |   |
|--|---|
| Reinforcement (size, grade, location) . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Top Finish . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Bottom Finish. . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Surface Texture . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Cracks / Spalls . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Squareness . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Chamfers . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Honeycomb. . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Grout Leaks . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A | Exposed Rebar . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Exposed Chairs . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Openings / Block-outs. . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>1" alignment for clevis loop. . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>+/- 1/8" projection of clevis . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Approved Shop Drawing. . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>RC - Drawing . . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A<br>Repaired Properly. . . . . <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A |
|--|---|

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

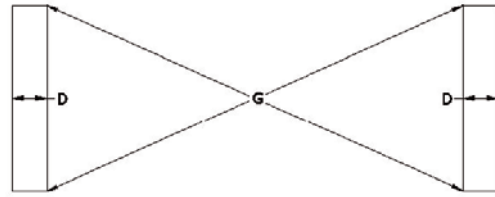
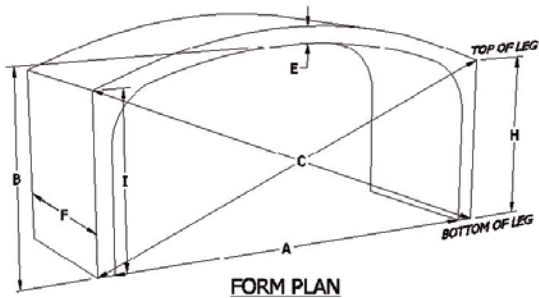
TR-59 (12-19)



## DIMENSIONAL REVIEW FOR ECO-SPAN ARCH CULVERT

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

LIFT INSERT DETAILS			
EDGE, TYPE:	CAPACITY:	ARCH, TYPE:	CAPACITY:
ADD. REINFORCING:		ADD. REINFORCING:	



**NOTE:** Any tolerances not specified below are to be +/- 1/2"

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Span	+/- 1/2"				
B	Rise	+/- 1/2"				
C	Square (Plan)	+/- 1/2"				
D	Wall Thickness	+/- 1/4"				
E	Slab Thickness	+/- 1/4"				
F	Unit Lay Length (Max.)	+/- 1/2"				
G	Unit Lay Length (Min.)	+/- 1/2"				
H	Leg Length	+/- 1/2"				
I	Leg Length	+/- 1/4"				

Markings properly applied? . . . . .  YES  NO  N/A  
 Sheathing duct diameters as specified on drawings? . . . . .  YES  NO  N/A  
 Sheathing ducts located within Specified tolerances (1/4" unless otherwise specified), both ends? . . . .  YES  NO  N/A  
 Post-tensioning recess as Specified on drawings? . . . . .  YES  NO  N/A  
 Coatings properly applied? . . . . .  YES  NO  N/A

Do special items (block outs, access openings, skews, etc.) comply with drawings? . . . . .  YES  NO  N/A  
 Reinforcement (size, grade, location): .  YES  NO  N/A  
 Wingwalls in accordance with approved shop drawings? . . . . .  YES  NO  N/A  
 Wingwall anchors in accordance with approved shop drawings? . . . . .  YES  NO  N/A  
 Approved shop drawing . . . . .  YES  NO  N/A  
 RC - Drawing . . . . .  YES  NO  N/A  
 Repaired Property. . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-60 (2-19)

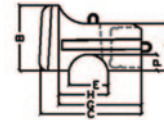
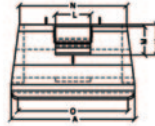
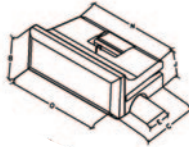


## DIMENSIONAL REVIEW FOR REDI-ROCK GRAVITY WALL UNITS

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	

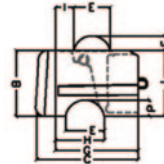
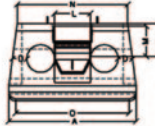
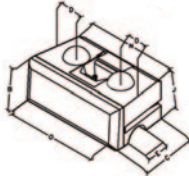
**Applies to:**

- 28" Full Top
- 28" Half Top



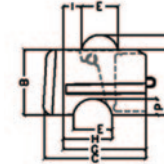
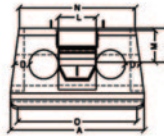
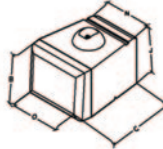
**Applies to:**

- 28" Full Middle
- 28" Full Bottom
- 41" Full Middle
- 41" Full Bottom
- 60" Full Middle



**Applies to:**

- 28" Half Middle
- 28" Half Bottom
- 41" Half Middle
- 41" Half Bottom
- 60" Half Middle
- 60" Half Bottom



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Overall Length	± 1/4"				
B	Overall Height	± 1/4"				
C	Overall Width	± 1/4"				
D	Longitudal Shear Knob Distance	± 1/4"				
E	Shear Knob Diameter	± 1/4"				
F	Height of Shear Knob	± 1/4"				
G	Transverse Distance to Back of Face	± 1/4"				
H	Transverse Distance to Back of Shear Channel	± 1/4"				
I	Transverse Distance to Shear Knob	± 1/4"				
J	Top Block Back Height	± 1/4"				
K	Positive Connection Cutout	± 1/4"				
L	Positive Connection Width	± 1/4"				
M	Positive Connection Cutout	± 1/4"				
N	Taper Back	± 1/4"				
O	Taper Front	± 1/4"				
P	Height of Knob Channel	± 1/4"				

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES       NO       N/A
- Proper Concrete Color Applied .....  YES       NO       N/A
- Approved Shop Drawing .....  YES       NO       N/A
- Properly Repaired .....  YES       NO       N/A
- Locations of Embedments ± 1/4" .....  YES       NO       N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

TR-61 (7-20)

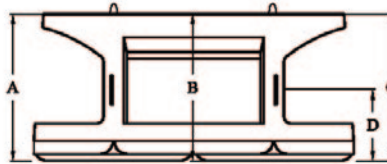


## DIMENSIONAL REVIEW FOR STONE-STRONG GRAVITY WALL UNITS

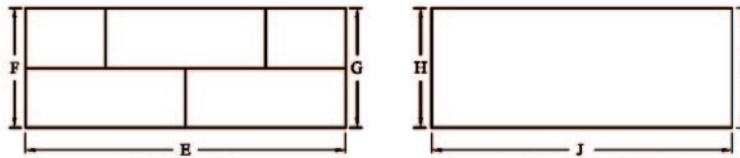
FABRICATOR NAME:			FORM ID:							
PLANT JOB ID:			ECMS #:		STATE PROJECT #:		SR:	SEC:	COUNTY:	S-
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)		<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)			

Applies to:

- (Z) 24 SF UNIT
- (Y) 24 SF TOP UNIT



**PLAN VIEW**



**ELEVATION**

**REAR ELEVATION**

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	44"			
B	Center Overall Depth	+/-1/4"	44"			
C	Right Overall Depth	+/-1/4"	44"			
D	Lifter Dimension	+/-1/4"	21-3/16"			
E	Front Width	+/-1/4"	96"			
F	Left Face Height	+/-1/8"	36"			
G	Right Face Height	+/-1/8"	36"			
H	Left Rear Height	+/-1/8"	36" (Z), 28" (Y)			
I	Right Rear Height	+/-1/8"	36" (Z), 28" (Y)			
J	Rear Width	+/-1/4"	90"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES       NO       N/A
- Reinforcement (size, grade, location) .....  YES       NO       N/A
- Approved Shop Drawing .....  YES       NO       N/A
- Properly Repaired .....  YES       NO       N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

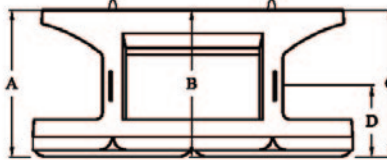
Comments: \_\_\_\_\_

**TR-61 (cont'd)**

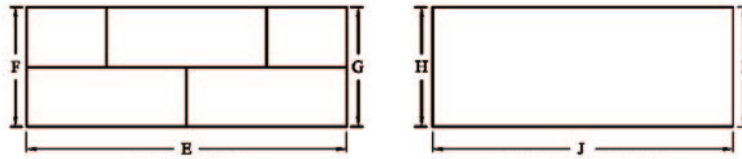
TR-61 (continued)

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			PIECE MARK:			
ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-	
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

Applies to:  
 (Z12) 24 SF MASS  
 EXTENDER UNIT



**PLAN VIEW**



**ELEVATION**

**REAR ELEVATION**

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	44"			
B	Center Overall Depth	+/-1/4"	44"			
C	Right Overall Depth	+/-1/4"	44"			
D	Lifter Dimension	+/-1/4"	21-3/16"			
E	Front Width	+/-1/4"	96"			
F	Left Face Height	+/-1/8"	36"			
G	Right Face Height	+/-1/8"	36"			
H	Left Rear Height	+/-1/8"	36"			
I	Right Rear Height	+/-1/8"	36"			
J	Rear Width	+/-1/4"	90"			
K	ME Depth	+/-1/4"	12"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES                       NO                       N/A
- Reinforcement (size, grade, location) .....  YES                       NO                       N/A
- Approved Shop Drawing .....  YES                       NO                       N/A
- Properly Repaired .....  YES                       NO                       N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

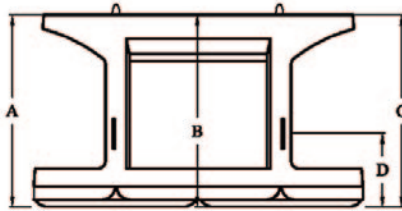
TR-61 (cont'd)

TR-61 (continued)

FABRICATOR NAME:			FORM ID:					
PLANT JOB ID:			ECMS #:		STATE PROJECT #:		PIECE MARK:	
SR:			SEC:		COUNTY:		S-	
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)								

Applies to:

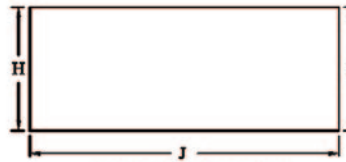
- (Z62) 24 SF-62 UNIT
- (Z86) 24 SF-86 UNIT



**PLAN VIEW**



**ELEVATION**



**REAR ELEVATION**

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	62" (Z62), 86" (Z86)			
B	Center Overall Depth	+/-1/4"	62" (Z62), 86" (Z86)			
C	Right Overall Depth	+/-1/4"	62" (Z62), 86" (Z86)			
D	Lifter Dimension	+/-1/4"	21-3/16"			
E	Front Width	+/-1/4"	96"			
F	Left Face Height	+/-1/8"	36"			
G	Right Face Height	+/-1/8"	36"			
H	Left Rear Height	+/-1/8"	36"			
I	Right Rear Height	+/-1/8"	36"			
J	Rear Width	+/-1/4"	90"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES  NO  N/A
- Reinforcement (size, grade, location) .....  YES  NO  N/A
- Approved Shop Drawing .....  YES  NO  N/A
- Properly Repaired .....  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

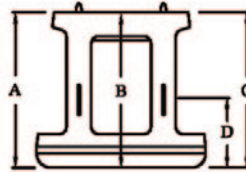
\_\_\_\_\_

TR-61 (cont'd)

TR-61 (continued)

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

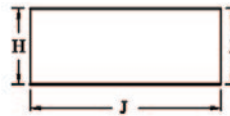
- Applies to:
- (X) 6 SF UNIT
  - (W) 6 SF TOP UNIT



**PLAN VIEW**



**ELEVATION**



**REAR ELEVATION**

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	44"			
B	Center Overall Depth	+/-1/4"	44"			
C	Right Overall Depth	+/-1/4"	44"			
D	Lifter Dimension	+/-1/4"	21-3/16"			
E	Front Width	+/-1/4"	48"			
F	Left Face Height	+/-1/8"	18"			
G	Right Face Height	+/-1/8"	18"			
H	Left Rear Height	+/-1/8"	18" (X), 13" (W)			
I	Right Rear Height	+/-1/8"	18" (X), 13" (W)			
J	Rear Width	+/-1/4"	38"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced . . . . .  YES  NO  N/A
- Reinforcement (size, grade, location) . . . . .  YES  NO  N/A
- Approved Shop Drawing . . . . .  YES  NO  N/A
- Properly Repaired . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

TR-61 (cont'd)

TR-61 (continued)

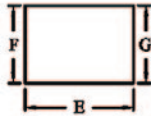
FABRICATOR NAME:			FORM ID:							
PLANT JOB ID:			ECMS #:		STATE PROJECT #:		SR:	SEC:	COUNTY:	S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)										

Applies to:

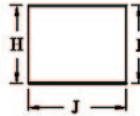
- (V) 3 SF UNIT
- (U) 3 SF TOP UNIT



**PLAN VIEW**



**ELEVATION**



**REAR ELEVATION**

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	44"			
B	-	-	-			
C	Right Overall Depth	+/-1/4"	44"			
D	Lifter Dimension	+/-1/4"	21-3/16"			
E	Front Width	+/-1/4"	24"			
F	Left Face Height	+/-1/8"	18"			
G	Right Face Height	+/-1/8"	18"			
H	Left Rear Height	+/-1/8"	18" (V), 13" (U)			
I	Right Rear Height	+/-1/8"	18" (V), 13" (U)			
J	Rear Width	+/-1/4"	14"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES  NO  N/A
- Reinforcement (size, grade, location) .....  YES  NO  N/A
- Approved Shop Drawing .....  YES  NO  N/A
- Properly Repaired .....  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_



TR-61 (cont'd)

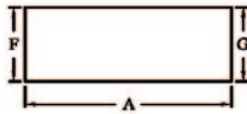
TR-61 (continued)

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			PIECE MARK:			
ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-	
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

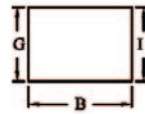
Applies to:  
 (T) END UNIT



PLAN VIEW



48" ELEVATION



24" ELEVATION

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Wide Side Width	+/-1/4"	48"			
B	Short Side Width	+/-1/4"	24"			
C	Lifter Dimension	+/-1/4"	11"			
D	Lifter Dimension	+/-1/4"	23"			
E	Wide Side Depth	+/-1/4"	24"			
F	Left Face Height	+/-1/8"	18"			
G	Corner Face Height	+/-1/8"	18"			
H	Short Side Depth	+/-1/8"	48"			
I	Right Face Height	+/-1/8"	18"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES  NO  N/A
- Reinforcement (size, grade, location) .....  YES  NO  N/A
- Approved Shop Drawing .....  YES  NO  N/A
- Properly Repaired .....  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TR-61 (cont'd)

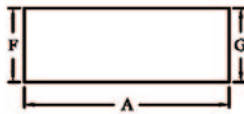
TR-61 (continued)

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			PIECE MARK:			
ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-	
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

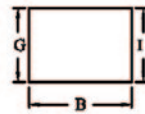
Applies to:  
 (S) TOP END UNIT



**PLAN VIEW**



**48" ELEVATION**



**24" ELEVATION**

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Wide Side Width	+/-1/4"	48"			
B	Short Side Width	+/-1/4"	24"			
C	Lifter Dimension	+/-1/4"	11"			
D	Lifter Dimension	+/-1/4"	23"			
E	Wide Side Depth	+/-1/4"	24"			
F	Left Face Height	+/-1/8"	18"			
G	Corner Face Height	+/-1/8"	18"			
H	Short Side Depth	+/-1/8"	48"			
I	Right Face Height	+/-1/8"	18"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced . . . . .  YES  NO  N/A  
 Reinforcement (size, grade, location) . . . . .  YES  NO  N/A  
 Approved Shop Drawing . . . . .  YES  NO  N/A  
 Properly Repaired . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

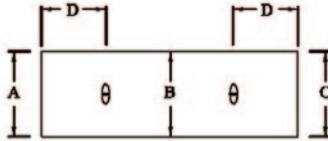
\_\_\_\_\_

TR-61 (cont'd)

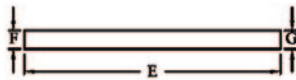
TR-61 (continued)

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

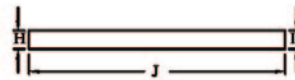
Applies to:  
 (P) CAP STEP BLOCK



PLAN VIEW



ELEVATION



REAR ELEVATION

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	32"			
B	Center Overall Depth	+/-1/4"	32"			
C	Right Overall Depth	+/-1/4"	32"			
D	Lifter Dimension	+/-1/4"	24"			
E	Front Width	+/-1/4"	96"			
F	Left Face Height	+/-1/8"	7"			
G	Right Face Height	+/-1/8"	7"			
H	Left Rear Height	+/-1/8"	7"			
I	Right Rear Height	+/-1/8"	7"			
J	Rear Width	+/-1/4"	96"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES  NO  N/A  
 Reinforcement (size, grade, location) .....  YES  NO  N/A  
 Approved Shop Drawing .....  YES  NO  N/A  
 Properly Repaired .....  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

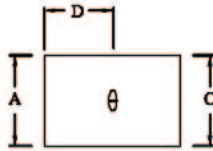
**TR-61 (cont'd)**

TR-61 (continued)

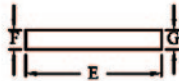
FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			PIECE MARK:			
ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-	
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

Applies to:

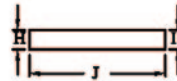
(P5) CAP STEP HALF BLOCK



**PLAN VIEW**



**ELEVATION**



**REAR ELEVATION**

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	32"			
B	-	-	-			
C	Right Overall Depth	+/-1/4"	32"			
D	Lifter Dimension	+/-1/4"	24"			
E	Front Width	+/-1/4"	48"			
F	Left Face Height	+/-1/8"	7"			
G	Right Face Height	+/-1/8"	7"			
H	Left Rear Height	+/-1/8"	7"			
I	Right Rear Height	+/-1/8"	7"			
J	Rear Width	+/-1/4"	48"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced . . . . .  YES                       NO                       N/A
- Reinforcement (size, grade, location) . . . . .  YES                       NO                       N/A
- Approved Shop Drawing . . . . .  YES                       NO                       N/A
- Properly Repaired . . . . .  YES                       NO                       N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

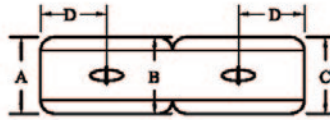
TR-61 (cont'd)

TR-61 (continued)

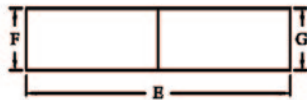
FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

Applies to:

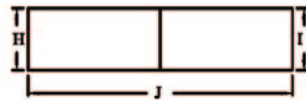
- (Q) DUAL FACE UNIT
- (QS) 24 DUAL FACE UNIT



PLAN VIEW



ELEVATION



REAR ELEVATION

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	28"			
B	Center Overall Depth	+/-1/4"	28"			
C	Right Overall Depth	+/-1/4"	28"			
D	Lifter Dimension	+/-1/4"	24"			
E	Front Width	+/-1/4"	96"			
F	Left Face Height	+/-1/8"	18"			
G	Right Face Height	+/-1/8"	18"			
H	Left Rear Height	+/-1/8"	18"			
I	Right Rear Height	+/-1/8"	18"			
J	Rear Width	+/-1/4"	96"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced . . . . .  YES  NO  N/A
- Reinforcement (size, grade, location) . . . . .  YES  NO  N/A
- Approved Shop Drawing . . . . .  YES  NO  N/A
- Properly Repaired . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

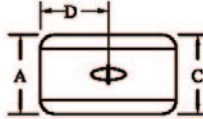
TR-61 (cont'd)

TR-61 (continued)

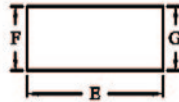
FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

Applies to:

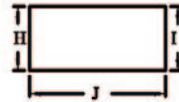
(Q5) DUAL FACE HALF UNIT



PLAN VIEW



ELEVATION



REAR ELEVATION

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Left Overall Depth	+/-1/4"	28"			
B	Center Overall Depth	+/-1/4"	28"			
C	Right Overall Depth	+/-1/4"	28"			
D	Lifter Dimension	+/-1/4"	24"			
E	Front Width	+/-1/4"	48"			
F	Left Face Height	+/-1/8"	18"			
G	Right Face Height	+/-1/8"	18"			
H	Left Rear Height	+/-1/8"	18"			
I	Right Rear Height	+/-1/8"	18"			
J	Rear Width	+/-1/4"	48"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES  NO  N/A
- Reinforcement (size, grade, location) .....  YES  NO  N/A
- Approved Shop Drawing .....  YES  NO  N/A
- Properly Repaired .....  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

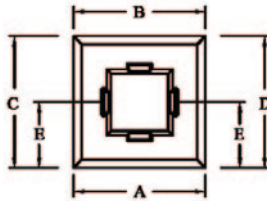
\_\_\_\_\_

TR-61 (cont'd)

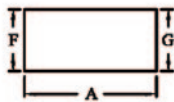
TR-61 (continued)

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

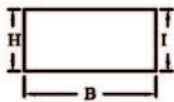
Applies to:  
 (C) 90 DEGREE CORNER UNIT



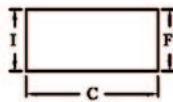
PLAN VIEW



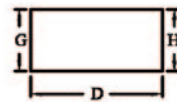
FRONT ELEVATION



FRONT REAR ELEVATION



SIDE ELEVATION



SIDE REAR ELEVATION

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Front Width	+/-1/4"	48"			
B	Rear Width	+/-1/4"	48"			
C	Side Width	+/-1/4"	48"			
D	Side Rear Width	+/-1/4"	48"			
E	Lifter Dimension	+/-1/4"	24"			
F	Corner Height	+/-1/8"	18"			
G	Corner Height	+/-1/8"	18"			
H	Corner Height	+/-1/8"	18"			
I	Corner Height	+/-1/8"	18"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced . . . . .  YES  NO  N/A  
 Reinforcement (size, grade, location) . . . . .  YES  NO  N/A  
 Approved Shop Drawing . . . . .  YES  NO  N/A  
 Properly Repaired . . . . .  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

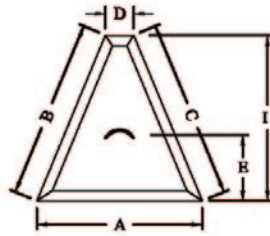
TR-61 (cont'd)

TR-61 (continued)

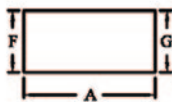
FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			PIECE MARK:			
ECMS #:	STATE PROJECT #:	SR:	SEC:	COUNTY:	S-	
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						

Applies to:

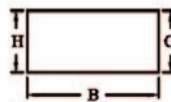
(R) 45 DEGREE CORNER UNIT



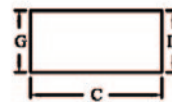
PLAN VIEW



FRONT ELEVATION



LEFT SIDE ELEVATION



RIGHT SIDE ELEVATION

Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Front Width	+/-1/4"	48"			
B	Left Side Width	+/-1/4"	51-15/16"			
C	Right Side Width	+/-1/4"	51-15/16"			
D	Rear Width	+/-1/4"	8-1/4"			
E	Lifter Dimension	+/-1/4"	16"			
F	Corner Height	+/-1/8"	18"			
G	Corner Height	+/-1/8"	18"			
H	Corner Height	+/-1/8"	18"			
I	Corner Height	+/-1/8"	18"			
J	Depth	+/-1/4"	48"			

Markings properly Applied

- Architectural Grooves Properly Sized and Spaced .....  YES  NO  N/A
- Reinforcement (size, grade, location) .....  YES  NO  N/A
- Approved Shop Drawing .....  YES  NO  N/A
- Properly Repaired .....  YES  NO  N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

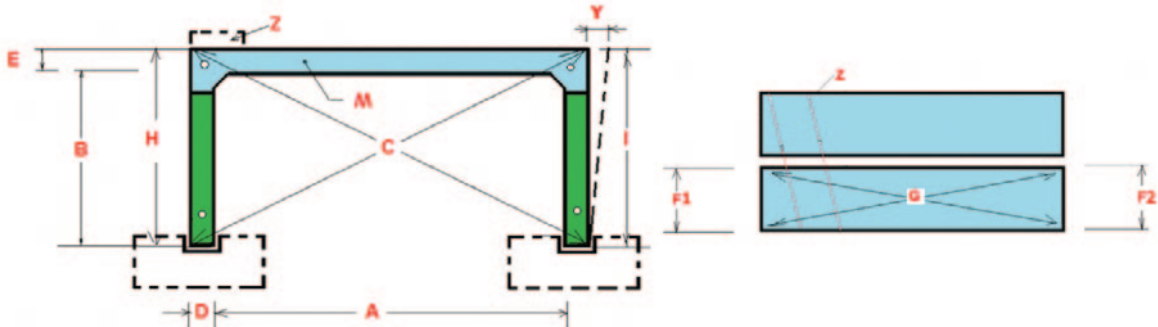


TR-72 (4-19)



## DIMENSIONAL REVIEW FOR THREE-SIDED RIGID FRAME

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



Dim	Description	Tolerance	Design	Prepour	Actual	Deviation
A	Span – Inside	+/- 1/2"				
B	Rise	+/- 1/8"				
C	Square (Plan)	+/- 1/2"				
D	Wall Thickness	+ 1/2" -3/16"				
E	Slab Thickness	+ 1/2" -3/16"				
F1	Left Face Height	+/- 1/4"				
F1	Right Face Height	+/- 1/4"				
F2	Left Rear Height	+/- 1/4"				
F2	Right Rear Height	+/- 1/4"				
G	Square Elevation	+/- 1/2"				
H	Leg Length – Left	1/8"/FT of Length (1/2" max)				
I	Leg Length – Right	1/8"/FT of Length (1/2" max)				
K	Weep Holes	+/- 2"				
L	Haunch	+/- 1/4"				
M	Smoothness of mating surface	1/8" in 10 ft. (1/4" max)				
Y	Variate from wall plum height	1/8" in 10 ft.				
Z	Adjacent feature alignment	+/- 1/2" on CL				

- Protective coating properly applied . . . . .  YES       NO       N/A
- Reinforcement (size, grade, location) . . . . .  YES       NO       N/A
- Approved Shop Drawing . . . . .  YES       NO       N/A
- Properly Repaired . . . . .  YES       NO       N/A
- Post Tension duct(s) location variation from design (+/- 1/4") . . . . .  YES       NO       N/A
- Post-tension duct adequately secured (bowing/sway requires Engineer approval). . . . .  YES       NO       N/A
- Dry fit performed . . . . .  YES       NO       N/A
- Adjacent feature alignment (inserts, key joints, fish baffles, etc.) between sections. . . . .  YES       NO       N/A

Date of Casting: \_\_\_\_\_ Date of Post Check: \_\_\_\_\_

Name: \_\_\_\_\_

Comments: \_\_\_\_\_

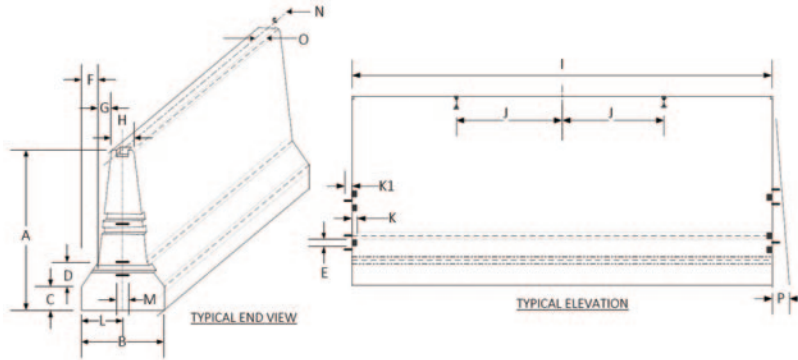
TR-73

TR-73 (11-23)



**DIMENSIONAL REVIEW FOR 32" MASH  
2016, F-SHAPE MEDIAN BARRIER**

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



Dim	Description	Tolerance	Design	Pre-pour	Actual	Deviation
A	Overall Height	+/- 3/8"				
B	Bottom Width	+/- 1/4"				
C	Reveal Height	+/- 1/4"				
D	Sloped Vertical	+/- 1/4"				
E	Slot Height	- 0", + 1/4"				
F	Sloped Horizontal Dimension	+/- 1/4"				
G	Sloped Horizontal Dimension	+/- 1/4"				
H	Top Width	+/- 1/4"				
I	Overall Length	1/4" per 10' of length (1/2" max.)				
J	Location of Lifting Hardware	(symmetrical and +/- 4")				
K; K1	Slot Depth; Loops Protrusion	-0", + 1/4"; +/- 1/4"				
L	Loops Center Location	+/- 1/4"				
M	Loops Width (as shown on standard drawing RC-57M)					
N	Twist	1/4" per 10' of length				
O	Sweep (measured from centerline)	+/- 1/4"				
P	End Plumbness	+/- 3/8"				

If, With drainage slots, block out or weep holes per drawing . . .  YES  NO      Glare Screen: Check for twist . . . . .  YES  NO  
 If, With transition piece per drawing . . . .  YES  NO      Approved Shop Drawing . . . . .  YES  NO  
 Protective coating properly applied . . . .  YES  NO      RC- Drawing . . . . .  YES  NO  
 Reinforcement (size, grade, location) . . .  YES  NO      Properly Repaired . . . . .  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

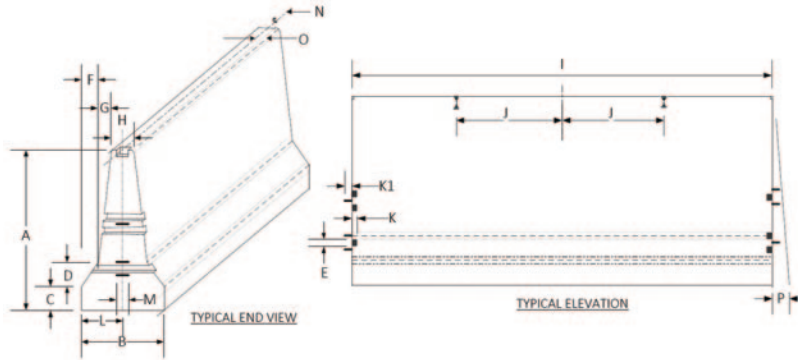
TR-74

TR-74 (11-23)



**DIMENSIONAL REVIEW FOR 42" MASH  
2016, F-SHAPE MEDIAN BARRIER**

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:			SEC:		COUNTY:	
REVIEW TYPE:			<input type="checkbox"/> QUALITY CONTROL (QC)		<input type="checkbox"/> QUALITY ASSURANCE (QA)	
			<input type="checkbox"/> INDEPENDENT ASSURANCE (IA)		S-	



Dim	Description	Tolerance	Design	Pre-pour	Actual	Deviation
A	Overall Height	+/- 3/8"				
B	Bottom Width	+/- 1/4"				
C	Reveal Height	+/- 1/4"				
D	Sloped Vertical	+/- 1/4"				
E	Slot Height	- 0", + 1/4"				
F	Sloped Horizontal Dimension	+/- 1/4"				
G	Sloped Horizontal Dimension	+/- 1/4"				
H	Top Width	+/- 1/4"				
I	Overall Length	1/4" per 10' of length (1/2" max.)				
J	Location of Lifting Hardware	(symmetrical and +/- 4")				
K; K1	Slot Depth; Loops Protrusion	-0", + 1/4"; +/- 1/4"				
L	Loops Center Location	+/- 1/4"				
M	Loops Width (as shown on standard drawing RC-57M)					
N	Twist	1/4" per 10' of length				
O	Sweep (measured from centerline)	+/- 1/4"				
P	End Plumbness	+/- 3/8"				

If, With drainage slots, block out or weep holes per drawing . . .  YES  NO      Glare Screen: Check for twist . . . . .  YES  NO  
 If, With transition piece per drawing . . . .  YES  NO      Approved Shop Drawing . . . . .  YES  NO  
 Protective coating properly applied . . . .  YES  NO      RC- Drawing . . . . .  YES  NO  
 Reinforcement (size, grade, location) . . .  YES  NO      Properly Repaired . . . . .  YES  NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

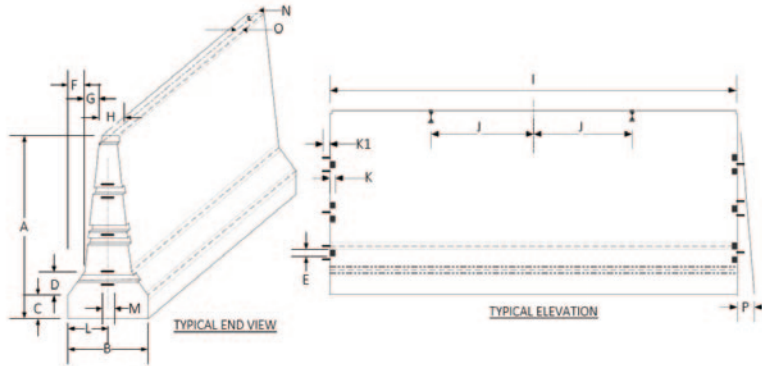
Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TR-75 (11-23)



## DIMENSIONAL REVIEW FOR 50" MASH 2016, F-SHAPE MEDIAN BARRIER

FABRICATOR NAME:			FORM ID:			
PLANT JOB ID:			ECMS #:		STATE PROJECT #:	
SR:		SEC:		COUNTY:		S-
REVIEW TYPE: <input type="checkbox"/> QUALITY CONTROL (QC) <input type="checkbox"/> QUALITY ASSURANCE (QA) <input type="checkbox"/> INDEPENDENT ASSURANCE (IA)						



Dim	Description	Tolerance	Design	Pre-pour	Actual	Deviation
A	Overall Height	+/- 3/8"				
B	Bottom Width	+/- 1/4"				
C	Reveal Height	+/- 1/4"				
D	Sloped Vertical	+/- 1/4"				
E	Slot Height	- 0", + 1/4"				
F	Sloped Horizontal Dimension	+/- 1/4"				
G	Sloped Horizontal Dimension	+/- 1/4"				
H	Top Width	+/- 1/4"				
I	Overall Length	1/4" per 10' of length (1/2" max.)				
J	Location of Lifting Hardware	(symmetrical and +/- 4")				
K; K1	Slot Depth; Loops Protrusion	-0", + 1/4"; +/- 1/4"				
L	Loops Center Location	+/- 1/4"				
M	Loops Width (as shown on standard drawing RC-57M)					
N	Twist	1/4" per 10' of length				
O	Sweep (measured from centerline)	+/- 1/4"				
P	End Plumbness	+/- 3/8"				

If, With drainage slots, block out or weep holes per drawing . . . .  YES     NO                      Glare Screen: Check for twist . . . . .  YES     NO

If, With transition piece per drawing . . . .  YES     NO                      Approved Shop Drawing . . . . .  YES     NO

Protective coating properly applied . . . .  YES     NO                      RC- Drawing . . . . .  YES     NO

Reinforcement (size, grade, location) . . .  YES     NO                      Properly Repaired . . . . .  YES     NO

Date of Casting: \_\_\_\_\_ Date of Post-Pour Check: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## SECTION IV – ARCHIVED FORMS

The Production Tolerance Details contained in the 2012 version of Pub 145 was suspended for use when production dimensional review forms were developed. While those details were suspended from use, the details were retained. However, as part of this revision, the following Production Tolerance Details were suspended and archived. Contact SMS to obtain copies of archived details if needed.

TR-4218	Notice of Approval & Shipment of P/S Concrete Bridge Beams
A1.	Precast 52" Glare Screen
B1/B3.	Precast 34" and 41" Single Face Median Barrier
B2.	Precast 34" Double Face Median Barrier
C.	Precast Manhole
D1/D2/D3/D4.	Precast Inlet for Rehab Projects
D5/D6.	Precast Type C and Type C Alternative Inlet Top for Rehab Projects
D7.	Precast Type M Inlet Top Unit for Rehab Projects
D8.	Precast Type S Inlet Top Unit for Rehab Projects
E1/E2.	Precast Light Duty Junction Box
E3/E4.	Precast Heavy-Duty Junction Box
F1.	Precast D Endwall
F2.	Precast D-E Endwall
F3.	Precast D-W Endwall
F4.	Precast E-S Endwall
F5.	Precast Subsurface Drain Outlet Endwall
G1.	Precast Sound Barrier Post
G2.	Precast Sound Barrier Panel