

IOWA DEPARTMENT OF TRANSPORTATION

To Office Bridges and Structures **Date** December 6, 2005
Attention All employees **Ref No.** 521.1
From Gary Novey
Office Bridges and Structures
Subject MM No. 125 (New Issue Precast Culvert Standards and Plan Development)

This memo describes the policies/practices for the use of Precast Concrete Culverts in Iowa DOT Primary Road Projects. It is the policy of the Iowa DOT to provide plans to allow alternate bids on culvert projects which meet the following criteria:

- Cast In Place culvert is an Iowa DOT standard size single box with standard size headwalls at both ends.
- The design earth fill heights allowed are from 2 feet (600 mm) to less than 20 feet (6000 mm).
- The anticipated culvert settlement is less than 6 inches (150 mm) under these fill heights.

Situations meeting these requirements will require the design plans to be developed showing 2 alternate designs. One for Cast In Place, and the other for Precast. The designer shall prepare the plan with details and quantities which address both alternates. The Office of Contracts will prepare the bidding documents to allow the contractor to bid on either plan alternate.

The following new Precast culvert standards have been issued in English only: 1080, 1081, 1082, 1083, 1084 and 1085 and are available in the standards directory. A Metric M1080 standard is issued for the quantities sheet on Metric projects. Paper copies will not be distributed. These standards are also available on the Internet at:

www.dot.state.ia.us/bridge/standard.htm

When developing projects with alternate Cast In Place and Precast culvert plans the following plan development guidelines should be used:

- The Preliminary Design of the TS&L plans will be prepared for a Cast In Place culvert.
- The Final Detailer will copy the Preliminary Cast In Place TS&L Cadd file or V8 model and prepare the Situation Plan/Longitudinal Section for the Cast In Place alternate design.
- The Final Detailer will copy the Situation Plan/Longitudinal Section for the Cast In Place alternate design and modify the details to show a Precast culvert and Precast headwalls for the Precast alternate design. Modifications will include:

- 1) Elimination of barrel joints since the number of sections is dependent on the box size and supplier
 - 2) Dimensions for back to back of parapet and Left and Right of center line will be adjusted. The Left and Right lengths will be increased 4'-9" divided by the cosine of the skew angle for the culvert to compensate for differences between the Cast In Place and Precast culvert headwall geometry. The Left and Right lengths will be rounded up to the nearest whole foot.
 - 3) Class E revetment will be shown around both headwalls as noted on Standard sheets 1080 and 1085.
- The design earth fill height depth shown on the plans for the Cast In Place culvert will remain the same for the Precast culvert.
 - One title sheet will be prepared with two alternate sets of detail plans, one for the Cast In Place culvert and one for the Precast culvert. Two sets of Estimated Quantities with notes will be prepared and noted on the "Index of Sheets" table on the title sheet. Cast In Place culvert details will be as normally shown with referral to the Iowa DOT Culvert Standards. The Precast culvert standard sheets will be included in the plan. The General Notes used for the Cast In Place will be repeated on the Precast Culvert Standard Sheet 1080 (M1080) under the General Notes heading and modified as needed for Precast versus Cast In Place wording. Other applicable notes included on the Cast In Place culvert design will be repeated on the Precast culvert design. The note allowing a curtain wall alternate will not be used on the Precast alternate design.
 - The Barrel Section and End Section Submittal Sheets (attached) will not be included in the plan but the information requested on these two sheets will be submitted as shop drawings to be approved by the Office of Bridges and Structures. These sheets may be used as part of the shop drawing submittal.
 - Projects with multiple culvert designs will include a culvert estimate sheet for each design (Precast and Cast In Place), the location of each "Estimated Quantity" table will be noted in the "Index of Sheets" on the "Title Sheet". For multiple Precast culvert designs, only one set of Precast culvert standards will be included in the plan which show the details for all Precast culvert sizes. The exception will be multiple 1080 (M1080) standards will be used (one for each design) in the plan.
 - Metric projects will use the English precast bid item descriptions for Precast Concrete Box Culvert ?' x ?' and Precast Concrete Box Culvert Straight End Section ?' x ?', but will use Metric quantities. Metric item code numbers have been assigned to the English Precast bid item descriptions and can be found in the Metric bid item list. Metric projects will determine the length of the Alternate Precast culvert by taking the Left and Right lengths for the Cast In Place culvert and converting them to feet. The Left and Right lengths will be increased 4'-9" divided by the Cosine of the skew and rounded up to the nearest whole foot. The

situation plan dimensions will be shown in Metric with the nearest whole foot dimensions soft converted to the nearest millimeter. Notes and details shown on the Precast standard sheet M1080 and the situation plan will be in Metric, except for the Precast culvert size will be given in English units. Except for Precast Standard Sheet M1080 the standard Precast culvert dimensions, notes and details will remain in English. The following note has been added to the M1080 sheet for Metric Precast culvert alternate design:

STANDARD PRECAST CULVERT SIZE IS SHOWN IN ENGLISH ON STANDARD SHEET M1080 AND SITUATION PLAN. STANDARD PRECAST DIMENSIONS, NOTES, AND DETAILS ARE SHOWN IN ENGLISH ON STANDARD SHEETS 1081, 1082, 1083, 1084, AND 1085.

- New V8 model naming conventions.
The Cast In Place naming convention will be CCDDDDSC01, CCDDDDSC02P, CCDDDDSC03, etc. The SC represents Sheet Cast In Place models.

New V8 Precast naming convention will be CCDDDDSP01, CCDDDDSP02P, CDDDDSP03, etc. The SP represents Sheet Precast model names.

- Both Cast In Place and Precast V8 models are in the same V8 file because all details are for the same project.
- Microstation V7 and V8 Transition file naming conventions when each detail sheet is a separate file.

The Cast In Place naming convention is HCCDDDD.SC01, HCCDDDD.SC02, HCCDDDD.SC03, etc. The SC represents Sheet Cast In Place file names.

The Precast naming convention is HCCDDDD.SP01, HCCDDDD.SP02, HCCDDDD.SP03, etc. The SP represents Sheet Precast file names.

The CC which is County Number and DDDD is Design Number would be the same for both Cast-In-Place and Precast plans.

If you have any questions please check with Thayne Sorenson or myself.

GAN/tos/bj
Attachment