Analysis and Load Rating of Reinforced Concrete Box Culverts (RCBC) without Plans using Reinforcement Index to Estimate their Steel Reinforcements

By

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ABSTRACT

This study considers the analysis and load rating of reinforced concrete box culverts (RCBC) without structural plans using an inferred procedure based on the reinforcement index to estimate the type and location of the steel reinforcement. Existing reinforcement index parameter curves were developed by Virella and Wendichansky (2012) for a group of reinforced concrete box culverts built between 1946 and 1959. All of them have similar clear spans, clear height, and soil fills over the top slab be from 0ft to 5ft. The reinforcement index parameter curves were used to estimate typical steel reinforcements for structural elements of RCBC.

The main objective of this study is to recommend a methodology which provides a reliable estimate for the load rating (*LR*) of reinforced concrete box culverts (RCBC). The general objectives of this project are the following. 1) Validate a methodology to perform Load Rating of reinforced concrete box culvert (RCBC) based on reinforcement index. 2) Demonstrate the accuracy of the Reinforcement Index Parameter for Steel Reinforcement Estimation (RIPSRE) methodology approach. 3) Compute and compare the *LR* based on the Reinforcement Index parameter for steel reinforcement method (RIPSRE) with a proof load test (PLT).

The first stage compared the typical steel reinforcements and load rating of 8 RCBC previously rated with structural plans with the inferred methodology proposed by Virella and Wendichansky (2012), (RIPSRE). The second stage compared load rating of 7 RCBC load rated by proof load test with the RIPSRE methodology.

The RIPSRE methodology provides their curves to estimate steel reinforcement based on clear span length of the RCBC: a) Upper Bound Curve; b) Average Bound Curve; c) Lower Bound Curve. This study found that ratings for RCBC for which the steel reinforcement was estimated by using the lower bound curve, provide closer agreement with ratings from RCBC with structural drawings. In some cases, the use of the lower bound curve results in over conservative results, however, some guidelines are provided in this study for the estimation of the steel reinforcement for RCBC with no structural drawings, built on Puerto Rico from 1940's to 1980's.

RESUMEN

Este estudio considera el análisis y capacidad de carga (conocido como load rating en inglés) de atajeas de caja en hormigón reforzado (RCBC, por sus siglas en inglés) sin planos estructurales, usando un procedimiento inferido basado en el índice de refuerzo para estimar el tipo y la localización de los refuerzos de acero. Las curvas existentes sobre el parámetro de índice de refuerzo fueron desarrolladas por Virella y Wendichansky (2012) con un grupo de RCBC construidos entre 1946 y 1959. Todas estas atajeas tienen en común sus luces libres, alturas libres y suelo de relleno encima de la losa superior que va de 0ft a 5ft. Las curvas del parámetro de índice de refuerzo fueron usadas para estimar los aceros típicos de refuerzo en los elementos estructurales de los RCBC.

El objetivo principal de este estudio es, el recomendar una metodología el cual provea un estimado confiable del load rating (*LR* por sus siglas en ingles) de las atajeas cuadradas en hormigón reforzadas (RCBC). Los objetivos generales de este proyecto son los siguientes. 1) Validar una metodología para realizar *LR* de RCBC. 2) Demostrar la precisión de la metodología de los Parámetros de Índice de Refuerzo para el Estimado de los Aceros de Refuerzo (RIPSRE por sus siglas en inglés). 3) Calcular y comparar el *LR* basado en la metodología RIPSRE con la prueba de verificación de carga (PLT por sus siglas en ingles).

La primera etapa compara los aceros típicos de refuerzos y el load rating de 8 RCBC previamente calificados con los planos estructurales y con la metodología RIPSRE propuesta por Virella y Wendichansky (2012), (RIPSRE). La segunda etapa comparo los load ratings de 7 RCBC calificados por la prueba de verificación de carga con la metodología RIPSRE.

La metodología RIPSRE proporciona unas curvas de estimado de refuerzo de acero basado en la luz libre de los RCBC: a) curva límite superior; b) curva límite promedio; c) curva límite inferior. Este estudio encontró que la calificación para los RCBC para los aceros de refuerzos estimados por la curva límite inferior, proporciono el acuerdo más cercano con las calificaciones de los RCBC con planos estructurales. En algunos casos, el uso de la curva límite inferior resulto en un resultado sobre conservador, sin embargo, ciertas guías fueron provistas en este estudio para

el estimado de los aceros de refuerzo en RCBC sin planos estructurales, construidos en Puerto Rico en 1940 hasta 1980.

Quiero dedicar este trabajo a estas personas…

Abuela y Kike, la palabra GRACIAS es corta a lo que Yo debería decirles, simplemente estas palabras no dan abasto todo lo que ustedes han hecho por Mi. ¡GRACIAS! por siempre apoyarme en todo y creer en Mi siempre. Abuela, ¡GRACIAS! Por ser mi primera maestra, ¡GRACIAS! Por enseñarme a contar (del 1 al 12), las vocales, colores, etc…

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ACRONYMS

AASHTO	American Association of State Highway Transportation Officials
DL	Dead Load
FHWA	Federal Highway Administration
IRF	Inventory Rating Factor
LFD	Load Factor Design
LFR	Load Factor Rating
LL	Live Load
LR	Load Rating
MBE	Manual for Bridge Evaluation
MCEB	Manual for Condition Evaluation of Bridges
ORF	Operating Rating Factor
PLT	Proof Load Test
RCBC	Reinforced Concrete Box Culvert
RF	Rating Factor
RIPSRE	Reinforcement Index Parameter for Steel Reinforcement Estimation
RT	Rating Tonnage
SSHB	Standard Specifications for Highways and Bridges
USA	United States of America
USDOT	USA Department of Transportation

CHAPTER 1: INTRODUCTION

1.1 Background

Government (State and Federal) and Private entities inspect, monitor, study and evaluate structural conditions of their bridges. The strength capacity of bridges varies with construction materials, structural system, area characteristics and truckload inconsistency. The National Bridge Inspection Standards (*Code of Federal Regulations* 2004) stipulates that all vehicular bridges that are reportable (i.e., more than 20ft in total length) to FHWA for the National Bridge Inventory (NBI) maintain a 24-month interval inspection frequency for routine inspections. Additionally, these bridges shall have a load rating analysis on record.

The two main issues on bridge safety are the structural integrity of the elements that compose the bridge and traffic safety. Usually, the superstructure (i.e., deck and beams) undergoes faster degradation due to overloading, excessive use, impact loads and weathering, whereas the substructure is commonly affected by scouring, vehicle impacts, hydraulic dynamics (debris) and extreme events such as earthquakes. If one of those systems on the bridge collapses, it will trigger a major concern on the structural safety and in the worst cases, lives can be lost.

On August 1st, 2007, 35W Bridge in Minneapolis (I-35) fell into the Mississippi River (Figure 1). According to CBS Minnesota, an approximate 140,000 vehicles per day transited over this bridge; this accident resulted in 13 deaths and over 145 injuries. The National Transportation Safety Board cited a design flaw as the likely main cause of the collapsed bridge. The failure was because of a combination of overload and deficiencies on the design element connections (i.e., gusset plate) on the bridge (Jones 2007).

Figure 1: 35W Bridge Collapsed at Minnesota (Jones 2007)

The bridge load rating (*LR*) provides a basis for determining the safe live load (*LL*) carrying capacity of a bridge. It is commonly expressed as a rating factor (RF, Equation 1) or rating tonnage (*RT*). The *RF* represents the ratio between the available *LL* capacity and *LL* demand. If the *RF* results larger than one ($RF \geq 1$) the bridge resist the live loads demand but if the *RF* is less than one ($RF < 1$), the bridge has a live load deficiencies, requiring a load posting (i.e., load restrictions). The Inventory Rating (*IR*) represents the maximum truck load that can safely transit over the bridge for an indefinite number of passes without causing any structural damage. The Operating Rating (*OR*) is the maximum permissible truck load that may transit over the bridge for a limited number of passes. Current guidelines require that load ratings be performed following the Load and Resistance Factor Rating (LRFR) methodology as outlined in the AASHTO Manual for Bridge Evaluation (MBE 2013). The general equation (Equation 1) for rating factor is shown next.

$$RF = \frac{C - DL}{LL} \qquad (1)$$

Where:

C = Bridge capacity, based on design drawings and it would be Flexure, Shear or Thrust (i.e., axial) Capacity

DL = Dead Load, usually are all the elements that composed the bridge (e.g., railings, wearing surface, soil-fill, sidewalks, light poles, etc.)

LL = Live Load, this are the design truck load (e.g., HS-30 and HS-20)

The American Association of State Highway Transportation Officials (AASHTO) defines load rating regarding the HL-93 load designations. The HL-93 is a fictional truck which is composed of HS-20 truck load (see Figure 2) and a lane load. These are notional vehicular loads developed to provide a loading envelope of design and state legal loads. In Puerto Rico, the HS-30 was the design live load from 1996 to 2004. Since 2004, Puerto Rico Highway and Transportation Authority (PRHTA) adopted HL-93 design live load. At the present time, new bridges in Puerto Rico are load rated, with the HL-93 live load. Bridges built prior to 2004 are typically load rated in Puerto Rico with HS-30 design live load.

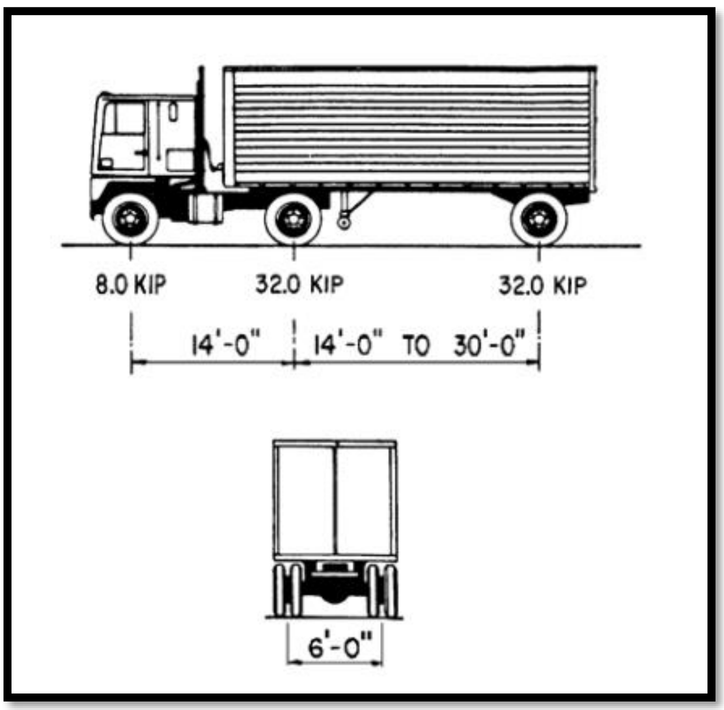

Figure 2: HS-20 Design Truck Load

However, significantly bridges in the US do not have a valid load rating or the as-built drawings required to perform this analysis. This is a critical issue considering that approximately

100,000 concrete bridges in the US were reported to the NBI as either not having a load rating or have a load rating based on engineering judgment. Bridges without plans are usually subjectively rated based on visual inspections or are rated with load tests. The bridge subjective rating is based on engineering judgment and doesn't represent the true performance of the bridge and its components. NCHRP-453 estimates that approximately 80% of bridges and culverts have a computed load ratings. According to the same source, an approximately 2% of bridge design information is either missing, miscoded or incomplete, meaning that load capacities are estimated from visual inspections of structures. Currently, 1% of structure load ratings are determined by load tests and 16% of structures do not have a load rating analysis (Hearn 2014).

A culvert can be defined as structures that allow water to flow under a roadway. Box culverts can be made on the construction site, known as cast-in-place, but also can be precast. These are typically embedded and backfilled by surrounding soil. Usually, culverts are made of concrete or steel, but they can also be constructed from other materials. If the culvert is fabricated from steel, aluminum or plastic, it is classified as a flexible culvert, but if it is made from concrete, it is classified as rigid culvert (ConnDOT 2008). Typically, the culverts span lengths are 6ft to 8ft. Nowadays the box culverts are used in a variety of applications such as bridges (e.g., over highways, waterways, railways, golf course, etc.), conveyance of storm water, sewage, and tunnels. Box culverts are usually economically feasible given their fast production and installation.

In Puerto Rico, there are approximately 2304 bridges according to the NBI 2014 Database. The NBI is a database compiled by the FHWA that contains information about all the US (50 states, one federal state, and five territories) bridges and tunnels, which are in service and have a structure length of more than 20ft. The oldest bridge in PR is from 1842, but most of the bridges were constructed by 1975. According to the NBI 2014 Database, PR had 332 culverts of which 320 are built from reinforced concrete. In some cases, box culverts with fill depths larger than 8ft are load rated based on engineering judgment. This assumption stems from the belief that the soil fill dissipates the truck loading enough to make it unnoticeable to the structure.

In some States DOT's do not have to solve the problem of not having structural drawings to load rate RCBC with soil fills larger than 8ft. This assumption simplifies their approach. However, PRHTA requires load rating of RCBC regardless of soil fill depth. In that regard, the problems of not having structural drawings to load rate RCBC is extended for the culverts inventory.

Using the NBI Database and SPSS IBM 23 software, a frequency histogram was developed to determine the quantity of RCBC in PR has the same operating rating capacity and to determine the distribution RCBC thought the operating rating capacity. The next figure (Figure 3) shown that Puerto Rico has approximately 75 Reinforce Concrete Box Culvert (RCBC) with an *OR* of 100 Metric Tons.

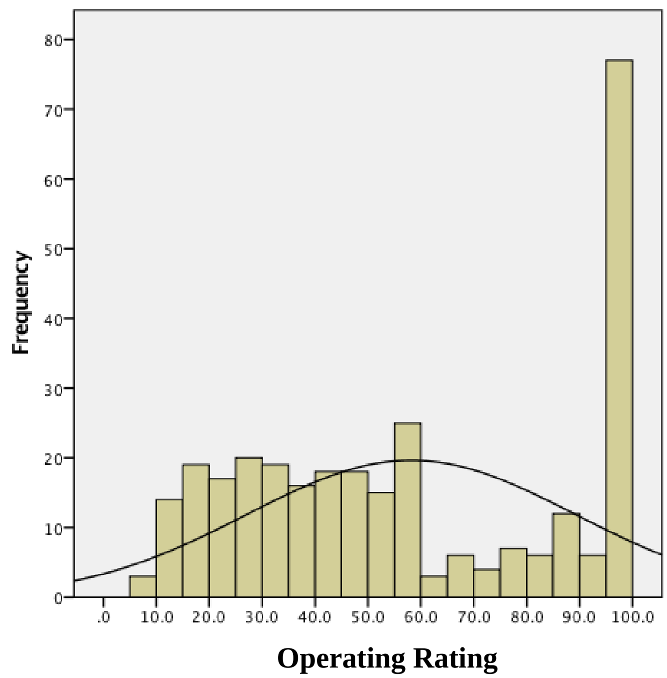

Figure 3: Operating Rating Histogram of RCBC in Puerto Rico

1.2 Problem Statement

When bridges are designed, it is required to provide documentation regarding. Usually, the documents related to the bridges are the architectural, surveying, foundations and structural plans. Also, specifications, inspection reports, and log which composed a fundamental part of such infrastructure regarding its structural integrity and capacity. The lack of an effective archival system of such vital documentation and the evolution of time leads to inconclusive information of the structures. The next statements summarize the problem statement.

- The inability to measure steel reinforcement within members of reinforced concrete culverts does not allow the estimation of it is load carrying capacity.

- The inability to estimate the structural capacity of concrete culverts without structural plans forces bridge owners to either incur on expensive studies (e.g., proof load test, destructive test or nondestructive test) to determine a load rating, provide a load rating based on engineering judgment, or not provide a load rating at all.

1.3 Literature Review

1.3.1 Typical Load Rating Methods with Structural Plans

Currently, three methods of load rating are used for bridge rating. Allowable Stress Rating (ASR), Load Factor Rating (LFR) and Load and Resistance Factor Rating (LRFR) as seen in Figure 4. ASR is a rating philosophy used by designers and raters, which is based on Allowable Stress Design (ASD). The principle on ASR is based on service loads, which do not exceed the allowable stresses. This philosophy is based on safety factors on stress remaining. The LFR method is based on Load Factor Design (LFD) philosophy. LFD uses amplification factors to increase demand loads. These factors do not represent a reliability safety issue or the adjusting in loads and resistance in materials. The LRFD design methodology introduces limit states (e.g., strength and serviceability) philosophy, which promotes and establishes some level of uniformity of reliability on bridges (Yihong Gao 2012).

LRFR method is based on the same principles of LRFD. Also, the *LR* based on LRFR method incorporates a condition factor. The condition factor is meant to provide a reduction in nominal resistance or capacity, to account for the uncertainty due to bridge member deterioration. The condition factor is based on the qualitative representation of field inspection, if the bridge shows deteriorations on their structural members, the condition factor of this member would probably be less than one (Moses 2001). LRFR rating method is used for new bridges (i.e., 2010 and after), complex bridges, existing bridges, permit truckload, tonnage rating, and major repairs. LFR usually is used on existing bridges, short-term repairs, and bridge posting. ASR is commonly used for rating timber bridges (Yihong Gao 2012).

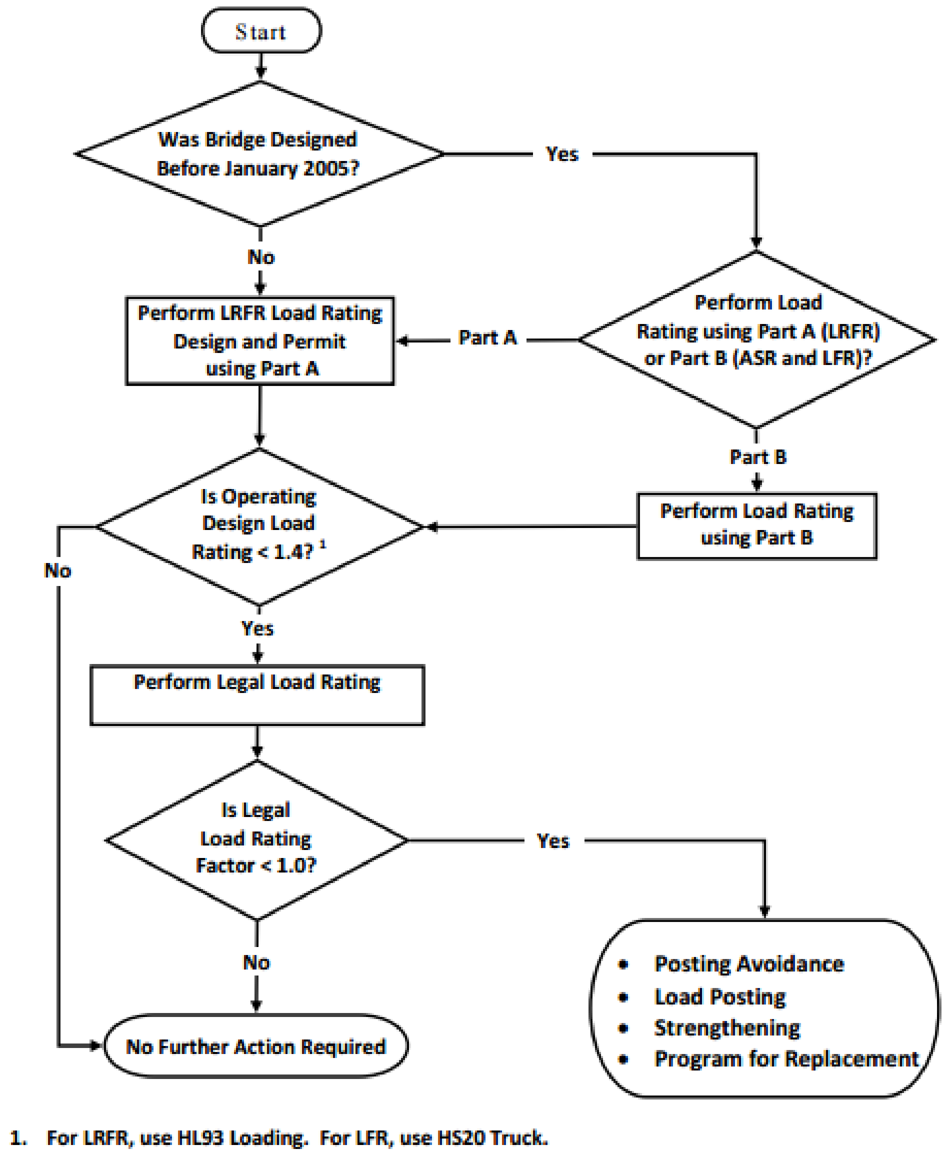

Figure 4: Load Rating Flowchart (Bridge Load Rating Manual FDOT)

Computational load rating is based on limit load cases and state loads. Typically, limit load cases are based on strength (e.g., moment, axial, torsion and shear), fatigue and serviceability (service). For concrete bridges, it is common to determine the limit load rating processes on strength or service load cases. For those bridges, the strength limit state is applicable at both operating and inventory level. Service limit states apply for inventory level only, and fatigue does not apply to concrete bridges. Furthermore, in the case of steel bridges usually, the controlling load rating case is fatigue. Strength and service limit load cases for steel bridges are applicable for operating and inventory level, and fatigue shall apply for inventory level (Hayworth, Huo, and Zheng 2008).

Table 1: Different Effects on Limit State Loads

Limit State Load	Truck Weight	Axle Distance
Moment	Sensitive	Sensitive
Shear	Sensitive	Not Very Sensitive
Service	Sensitive	Not Sensitive

$$LL \propto \frac{1}{RF} \,; Capacity\ and\ Dead\ Loads\ are\ Constant$$

Load Rating computations establish the live load capacity of the bridge, but also can determine the necessity for bridge repairs, transit limitations and even requirements for bridge closing. Heavier truckloads with shorter axle-to-axle distances typically control the *LR* for typical highway bridges (Hayworth, Huo, and Zheng 2008).

1.3.2 Load Rating without Structural Plans

There are no currently directed methodologies to perform or compute load rating of reinforced concrete box culverts without plans. Some procedure has been developed based on the load tests which contribute in estimating structural parameters necessary for load rating computations. It is a common practice to develop structural as built based on measurements of geometrical dimensions and estimation of reinforcement with destructive tests (DT) and non-destructive test (NDT).

Typically, to perform the *LR* calculations for bridges without structural plans, different NDT approach are feasible to determine LR of bridges without plans. Another load tests can establish the *LR* accurately, but do not indicate the amount of steel reinforcement within structural members. Huang and Shenton (2007) combine theoretical analysis and field test data to estimate steel reinforcement within the structural elements. The Steel Area Method (SAM) uses strain and displacement measurements from field-testing in conjunction with basic mechanics principles to estimate the unknown area of reinforcing steel in a concrete bridge. SAM is based on simple supported beam mechanics theory. Load test results provide the strain and displacements measurements of the bridge under loads, which are obtained from field inspection. This method can determine steel reinforced areas on the structural element of bridges. At the end, this method can estimate reinforced steel area based on the load-test results and mechanics principles. As a result, the bridge can be load rated with usual rating methodologies providing an estimate of it is capacity (Huang and Shenton 2009).

The same person does not perform the task of inspection, analysis and bridge rating in many of these cases. Bridge raters establish that the AASHTO methodology provides a conservative approach when the *LR* is computed. The experimental load test is the most accurate in determining the load-carrying bridge capacity. Delaware Department of Transportation used the Bridge Rating and Analysis of Structural Systems (BRASS) in 1994 to compare the bridge capacity from experimental load tests and by computational models. The *RF* in Delaware is computed with two-thirds of the Inventory Rating Factor plus one-third Operating Rating Factor. Diagnostic load test was used for a steel girder bridge rating in Delaware. Diagnostic tests provide an estimation of the bridge tons capacity with the advantages of having a lower cost, shorter testing time and less traffic interruption. The second model which provide intermediate stiffness, composite section and simply supported ends, resulted in the most appropriate for computing the *LR* (Chajes, Mertz, and Commander 1997).

State legal loads determine bridge posting sign. States selects different rating methods for bridges evaluations. This brings differences in the interpretation of when to use posting signs and their circumstances. The instrumented bridges used in this research have a load maximum deflections of about 25% to 50% more than the limit deflection stipulated by AASHTO Design and Specifications. Typically, on load tests, wheels and axle-to-axle distances are measured after each test truck pass over the bridge (Wang et al. 2011).

1.3.2.1 Bridge Computational Modeling

Load Rating of bridges without structural plans is attached to the accurate analytical representation (i.e., computational model), assumptions, computational analysis, and *LR* methods. The sophistication of the soil-structure computational model or frame model, have resulted in higher accuracy and precision of predicted values on RCBC. The Texas Department of Transportation (TxDOT) describes four types of levels in computational models. Level-1 is two-dimensional, simply supported structural-frame model. This model is based on 2D-frame analysis and balanced forces. Level-2 is a two-dimensional structural frame model with soil springs. This model is the same as Level-1, but use compression springs to represent vertical soil reaction on the structure. According to Dasgupta & Sengupta, 1991 soil arching must be considered in order to accurately describe culverts demands. Level-3 is a two-dimensional finite element soil-structure interaction model (LEFE). This model uses a finite element model with soil-structure interaction, on the global culvert system to consider the surrounding soil on the structure. Level-4 is a three-dimensional finite element soil-structure interaction model. This type of level model is based on finite element modeling. This is the most accurate and precise model, but imply high sophistication level modeling and is computationally time-consuming. All level models used AASHTO loading and parameters (Lawson et al. 2009). The objectives of a finite element model are; 1) to demands the computational model with load test results, 2) assist in diagnostic bridge ratings, 3) validate computational model (Wang et al. 2011).

Each modeling level has their sophistication regarding soil-structure interaction. Also, this sophistication can result in accuracy and precision. Typically, increasing the model sophistication would typically increase the RF of the model, but less sophistication in modeling levels would entail in over conservatism and additional uncertainties. Level-1 and Level-2 are not significantly different for the RF on culvert estimation. Comparing Level-1 and Level-3, it is expected that soil-structure interaction will predict culvert demands more accurately than frame structural-frame model (Wood et al. 2014, 2015).

Brass-Culvert™ is a software created by Wyoming Department of Transportation (WYDOT) with cooperative efforts of North Carolina Department of Transportation (NCDOT) and New York Department of Transportation (NYDOT). This software can design and analyze reinforced concrete box culverts from one to four cells. Brass-Culvert™ only considers prismatic members, all cells have the same length and perform a *LR* and culvert design in *ASD*, *LFD,* and *LFRD* methodologies. This software uses the stiffness method and plane frame elements to perform the *LR* of the RCBC. Nowadays Brass-Culvert™ is highly used to compute the culvert capacity and perform *LR* analysis.

1.3.2.2 Live Load Effect and Impact for Computational Modeling

The most notable characteristic of the culvert is soil filled depth. Live load effects are highly dependent on structural configuration and the location of the bridge. Soil fill distributes the *LL* on the roadway due to soil-structure interaction, through the fill and the culvert top slab. Fill depths are correlated to live load distribution factor (*LLDF*). The AASHTO SSHB does not consider an increase for tire contact area. *LLDF* factor has a value of 1.15 if the soil is granular and 1.0 for all other cases. If the case of LFD or LFR method the *LLDF* can be equal to 1.75 (see Figure 5) and not account for wheel contact area (AASHTO, SSHB 17Ed 2002; AASHTO, LRFD 2012).

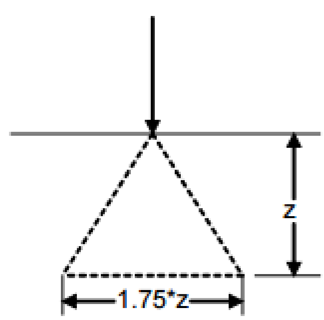

Figure 5: Live Load Distribution Factor (Design Live Loads on Box Culverts, FDOT)

Some researchers establish that the use of rectangular distribution area proposed by AASHTO is a conservative guide as seen in Figure 6. The use of conservative loads or distribution on culverts or in bridges, in general, mighty lead to unnecessary load posting, wrong replacements or extreme reparations. *LLDF* equal to 1.75 in AASHTO LFD is determinative for fill depth less or equal than 8ft but can result conservative for fill depth more than 8ft. If fill depth is more than 8ft, the live load is nearly negligible compared with the fill weight as a dead load (Abdel-Karim et. al. 1990). Also, this negligible *LL* was studied with finite element analysis and concludes that after 7ft of fill depth the *LL* is not significant (Awwad et. al. 2000). Also, some recommendations have been developed for *LL* distribution. The National Cooperative Highway Research Program proposed the addition of a term that would allow the *LL* distribution parallel to the axis of the culvert span length (Nelson et al. 2010). If the span length is longer, we can conclude that is a flexible span, and the *LL* distribution can extend more in the fill than culverts shorter spans. Strains on culverts depend on of fill depth (Orton et al. 2015).

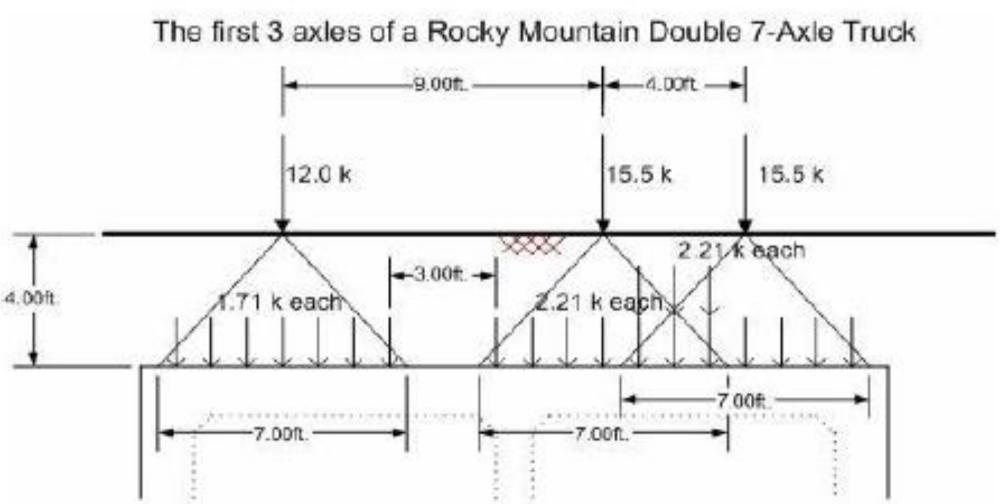

Figure 6: Longitudinal Live Load Distribution (WyDOT Brass Culvert Technical Manual)

Another parameter in *LL* is the Dynamic Amplification Factor (DAF). Dynamic response can result from resonant excitation of the bridge, imperfections on road surface, unleveled joints and trucks speed. The dynamic effects due to impact loads (e.g., trucks) amplify *LL* on the bridge.

DAFs and Impact Factors (*IM*) are based on Average Daily Traffic (*ADT*) and truck speed. The impact factor is established in AASHTO MCEB 2003 Section 3.7.4. If truck speed and truck *ADT* is low, it is assumed that *IM* is negligible (AASHTO, SSHB 17Ed 2002; AASHTO, MCEB 2003).

1.4 Objectives

The main objective of this engineering project is to recommend a methodology which provides a reliable estimate for the load ratings (*LR*) of reinforced concrete box culverts (RCBC). The general objectives of this project are the following:

1. Validate a methodology to perform Load Rating of reinforced concrete box culvert (RCBC) based on reinforcement index.

2. Demonstrate the accuracy of the Reinforcement Index Parameter for Steel Reinforcement Estimation (RIPSRE) methodology approach.

3. Compute and compare the *LR* based on the Reinforcement Index parameter for steel reinforcement method (RIPSRE) with a proof load test (PLT).

1.5 Justification

The problem with concrete bridges that do not have plans is based on the reliability of those bridges. The use of a conservative procedure, such as assuming the minimum reinforcement, does not provide a reliable load rating (*LR*) in the long term. However, this *LR* methodology with the minimum steel reinforcement cannot quantify the bridge safety and their structural risk. Usually, this problem causes engineers to compute a *LR* based on engineering judgment and in some cases not compute a *LR* at all. In the end, this problem generates added costs to the DOT’s trying to maintain bridges that don’t have a reliable load rating. This is more problematic for concrete bridges and especially older ones, because the mechanical material properties and the amount of reinforced steel may be unknown. Some current approaches that can be used to attempt to solve this issue are load tests and the use of destructive or non-destructive tests.

Load tests are very expensive, time-consuming and usually, need specialized crews to perform the tests. Destructive Tests (DT) are very expensive also, needs special equipment for sample extractions and can compromise elements integrity. It could be argued that due to recent advances in techniques and technologies in Non-Destructive Test (NDT), this would be a feasible approach for some DOT's or entities. NDT's can estimate the steel reinforcement within concrete elements, but the data depends obtained is highly dependent on personnel training, integrity, experience and imposing many limitations for these tests. NDTs are usually very expensive because specialized equipment and personnel are required for conducting these tests.

Summarizing, these current approaches which government and private entities use to deal with the load rating of concrete bridges without plans can result in many expensive, extensive procedures, and requiring specialized staff and considerable amounts of time.

CHAPTER 2: PROCEDURE TO PERFORM LOAD RATING OF RCBC WITHOUT STRUCTURAL PLANS – (RIPSRE METHODOLOGY)

In this chapter, the procedure to perform *LR* of RCBC without plans called herein RIPSRE methodology (see Appendix A) and the validation procedure of this methodology will be conducted by two different approaches. Figure 7 present a flowchart that summarizes the process of Load Rating RCBC without structural plans.

1) The first stage (shown in Chapter 5) will consist in comparing the typical steel reinforcement and LR of an existing RCBC having structural plans to validate the RIPSRE methodology. The steps described below were used.

   Step 1. Based on the clear span length obtained the reinforcement index parameter (ω) from the curves,

   Step 2. Compute the typical steel reinforcement based on the reinforcement parameter index,

   Step 3. Construct the computational model in Brass-Culvert ™,

   Step 4. Obtain the structural capacity, rating factor and load rating based on RIPSRE methodology from the Brass-Culvert ™ model,

   Step 5. Repeat Step 3 and Step 4 but using the structural plans steel reinforcing.

2) The second stage (shown in Chapter 5) consisted in computing the *LR* of a RCBC using the RIPSRE method and compared the *LR* based on the Proof Load Test (PLT).

   Step 1. Obtain the load rating from the Load Rating Reports of each RCBC analyze,

   Step 2. Construct the computational model the RCBC in Brass-Culvert ™ 2.3.2,

   Step 3. Compute a reinforcement index parameter (ω) from the graph, Step 4. Compute the steel reinforcement based in the ω obtained,

Step 5. Compute the Load Rating established by the RIPSRE methodology.

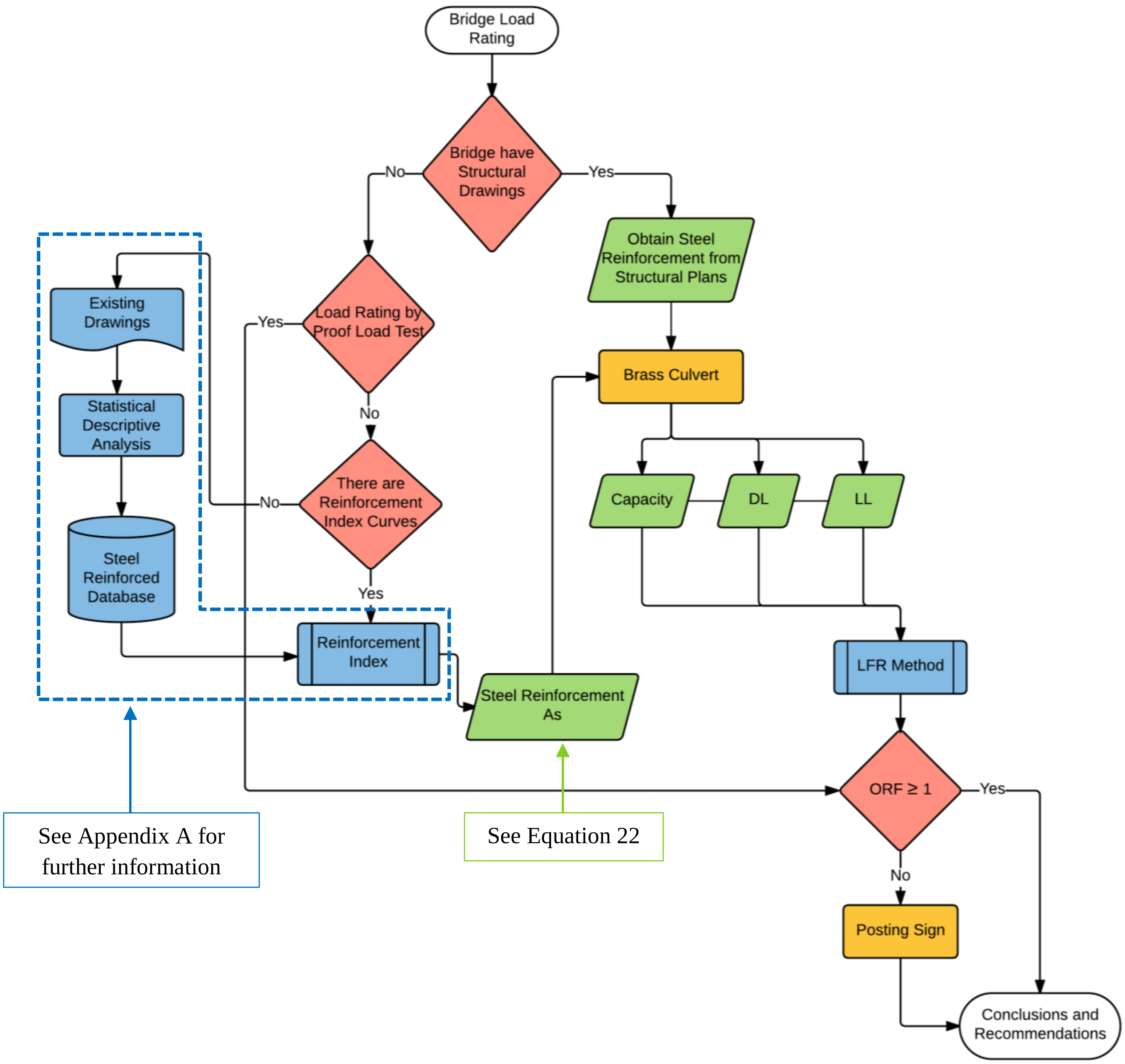

Figure 7: Flowchart for Load Rating without Structural Plans

The capacity of the bridge is defined by their structural reinforcement details and construction parameters. Commonly the moment is the internal controlling force on concrete bridges. That is why the Bending Moment Capacity (M_n) is usually used. It is necessary to compute the structural capacity (Bending, Shear or Axial) for each element on the bridge. The element with lower capacity is the controlling member.

Culvert capacity computation represents a high uncertainty computation when there is no structural information of the elements, the plans are incomplete or missing. Capacity computation is directly related to the plans and is needed to be able to do the bending, shear, and axial thrust capacity computation. To estimate steel reinforcements on structural elements the Virella and Wendichansky (2012) reinforcements index curves (See Appendix A) will be used as shows in Figure 9 to Figure 15. These curves are based on the reinforcement index parameter (ω), which considers the compressive strength at 28 days (f_c), tensile strength of the steel reinforcement (f_y), steel reinforcement area (A_s) and longitudinal reinforcement ratio (ρ). The development of these curves is the result of descriptive statistics analysis from 30 reinforced concrete box culverts with a fill depth less than 5ft, f'_c = 3ksi and f_y = 40 ksi. Each point of data represents a ω for each RCBC analyzed. When typical steel reinforcement was identified for each RCBC, a descriptive statistics analysis was conducted to determine the lower and upper-bound for ω, where each of the typical ω is enclosed within these two parameters. The lower or upper-bound for each of the 30 RCBC analyzed to provide a reinforcement index range where the engineer that will rate the RCBC can use any ω between by this lower and upper-bound. This ω range can serve as a range of uncertainty for bridge raters or engineers that compute the ω to indirectly steel reinforcements. Additionally, to provide trending and consistency when the ω is calculated, an average curve was added to establish coherence between the two limit ranges. A significant advantage of using the ω is that this parameter incorporates, material mechanical properties (i.e., $f'c$ and f_y), cross section (i.e., b and d) and the amount of steel reinforcing (A_s). The independent variable of RIPSRE graphs are the clear span length, and the dependent variable is ω.

Beam and slab theory determine the reinforcement index parameter as the ratio between steel and concrete mechanical and resistance properties. The curves developed to establish typical reinforcement steel used in the typical sections of the RCBC. The reinforcements index curves approach provides a deterministic estimation of the steel reinforcements on the RCBC. The reinforcement index (ω) is parameterized in clear span length (i.e., cell length). The ω shall be calculated for each box culvert and cells, and this parameter is expressed as follows:

$$\omega = \frac{f_y}{0.85\, f_c'} \rho \geq \omega_{min} \tag{2}$$

$$\rho = \frac{A_s}{b\, d} \tag{3}$$

$$\omega_{min} = \frac{f_y\, A_{s\ \min SSHB}}{0.85\, f_c'\, b\, d} \tag{4}$$

$$1.2\, M_{cr} = A_{s\, min\, SSHB}\, f_y\, d - \frac{A_{s\, min\, SSHB}^2\, f_y^2}{2\, b\, 0.85\, f_c'} \tag{5}$$

Where:

A_s = Steel reinforcement (in^2/ft)

$A_{s\ min\ SSHB}$ = Minimum steel reinforcement establish by AASHTO SSHB 17th 2002 (in^2/ft)

M_{cr} = crack moment (kip-ft)

b = section width = 12in (typically)

d = distance from extreme compression fiber to the steel tension centroid

f_y = specific yield strength of the steel reinforcement

f'_c = compressive concrete strength at 28 days

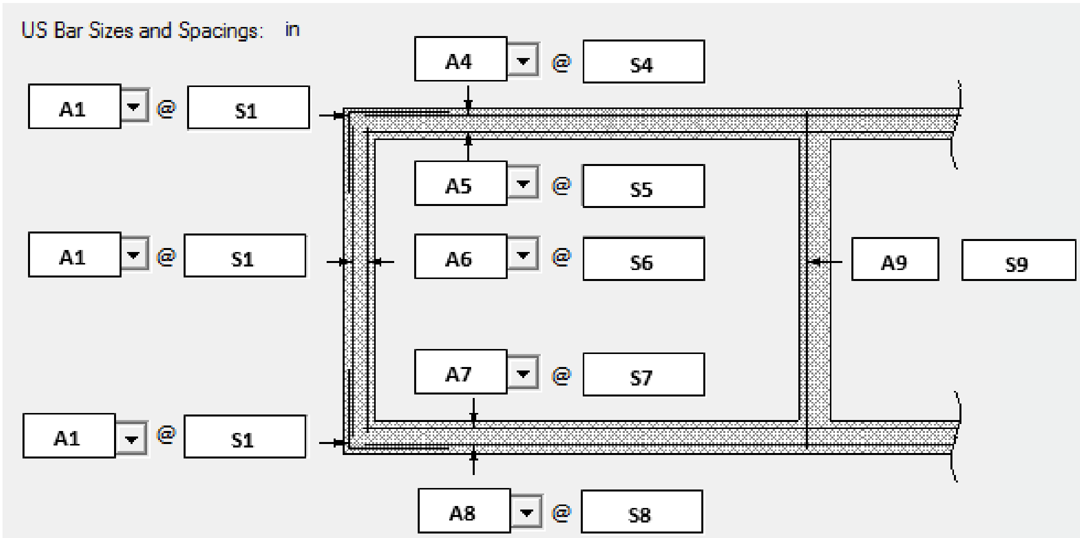

Figure 8: Typical Steel Reinforcement Section in Box Culverts

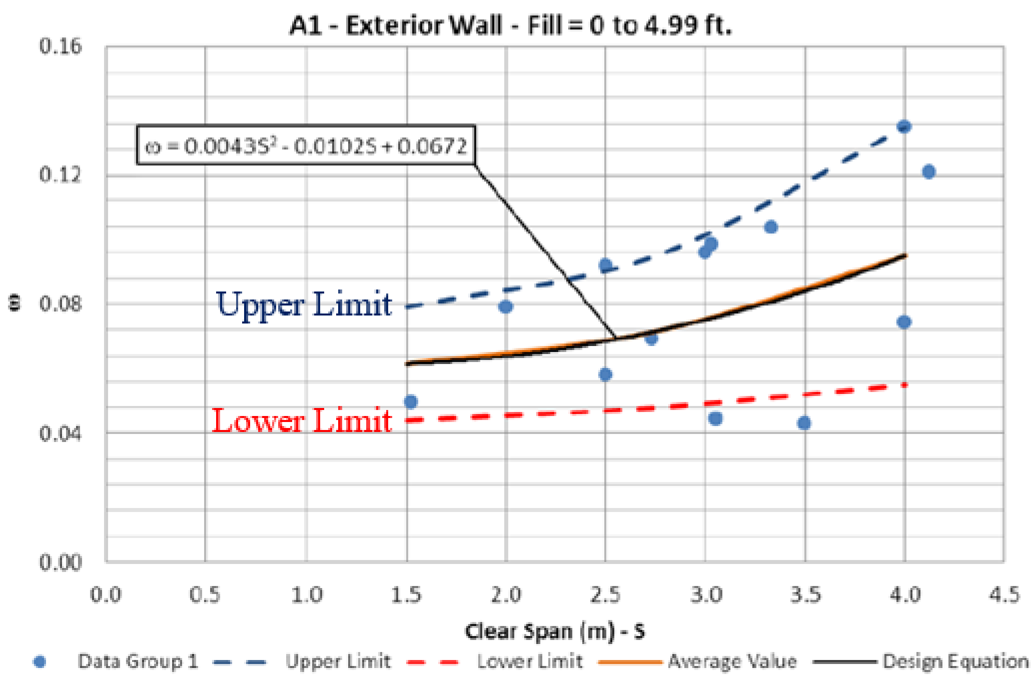

Figure 9: Reinforcement Index Curve for A1, A2, and A3 Typical Section (Virella and Wendichansky 2012)

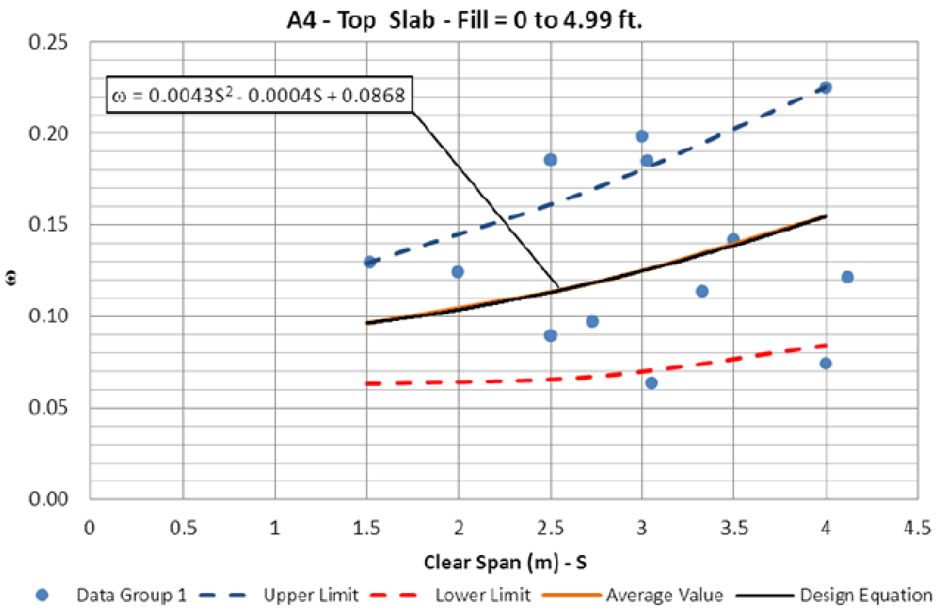

Figure 10: Reinforcement Index Curve for A4 Typical Section (Virella and Wendichansky 2012)

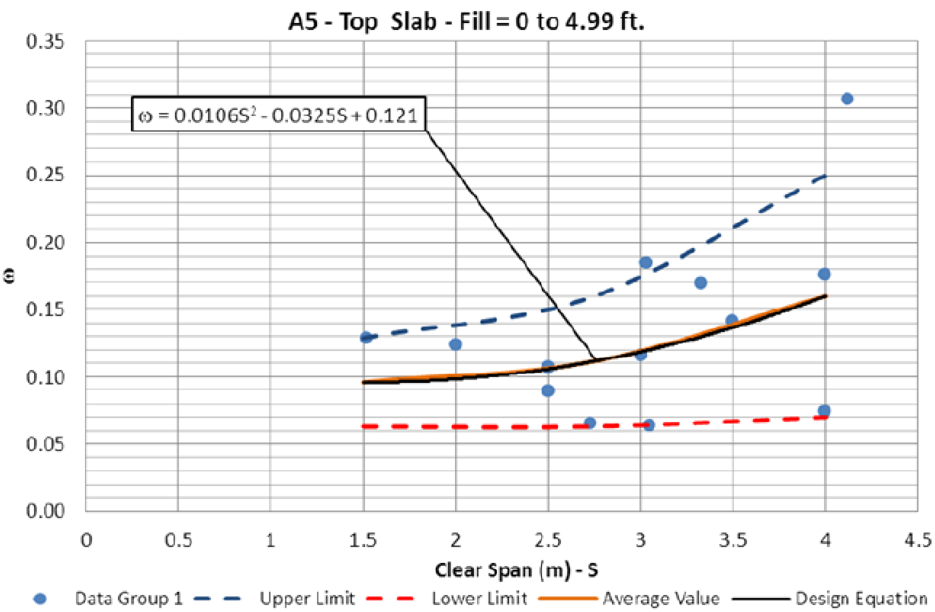

Figure 11: Reinforcement Index Curve for A5 Typical Section (Virella and Wendichansky 2012)

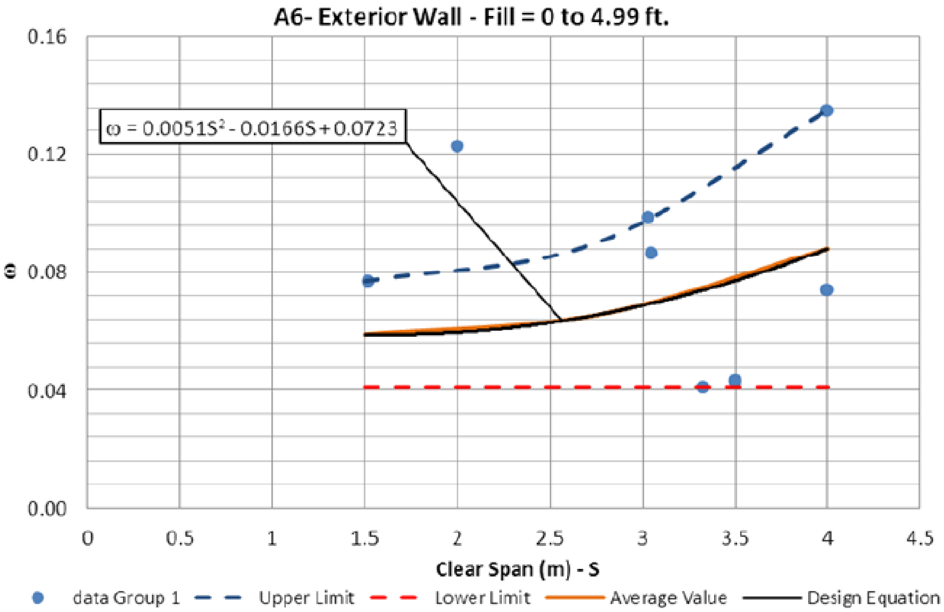

Figure 12: Reinforcement Index Curve for A6 Typical Section (Virella and Wendichansky 2012)

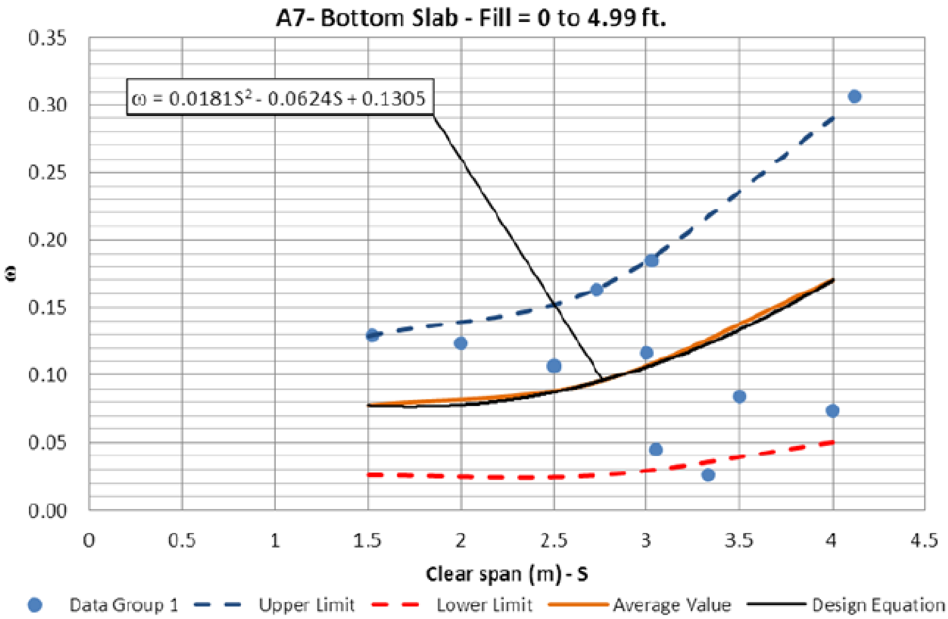

Figure 13: Reinforcement Index Curve for A7 Typical Section (Virella and Wendichansky 2012)

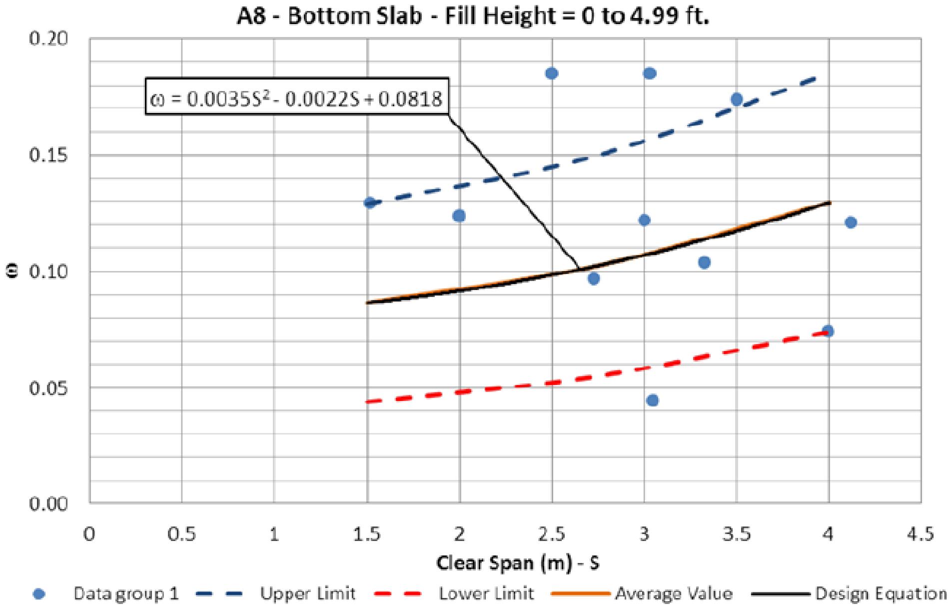

Figure 14: Reinforcement Index Curve for A8 Typical Section (Virella and Wendichansky 2012)

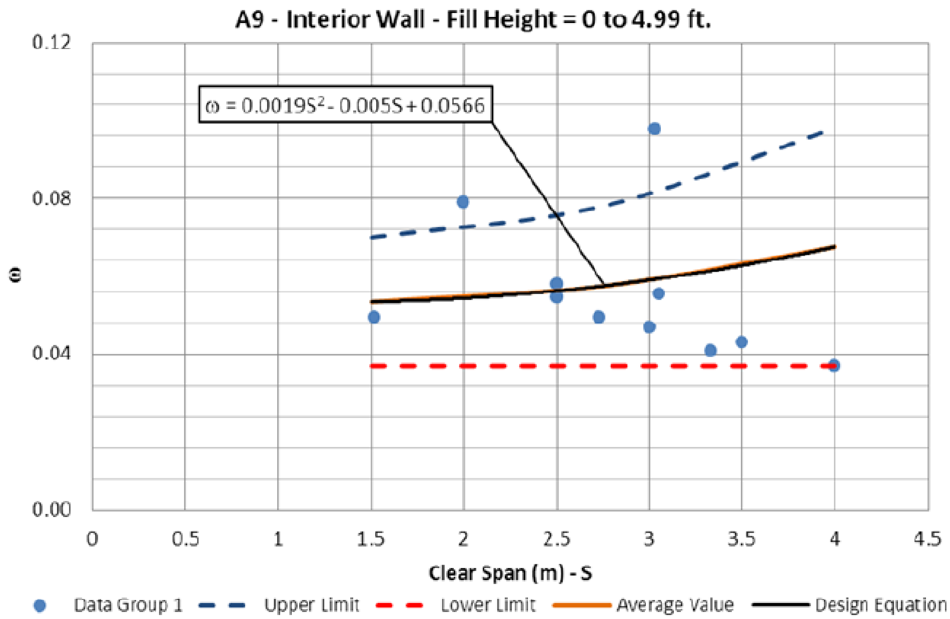

Figure 15: Reinforcement Index Curve for A9 Typical Section (Virella and Wendichansky 2012)

Independent variable *(ω)* are parameterized on the RIPSRE curve as clear span length *(S)* and which were employed in SI unit system. In Puerto Rico, the PRHTA required that all highways and bridge design plans must be drawn in metric system and dependent variable are unitless (i.e., ratio). Also to compute the ω_i the deterministic equation could be used for each curve as is shown in figures above (Figure 9 to Figure 15). The following equations (Equation 6 to Equation 12) are the average value of reinforcement index parameter using a deterministic equation, where *S* is the clear span length in meters of the RCBC. The reinforcement index parameter (ω) is directly related to the steel reinforcement on that specific typical RCBC section. Therefore the average curve is used to obtain the ω from which steel reinforcement is then derived.

$$\omega_{A1} = 0.0043\, S^2 - 0.0102\, S + 0.0672 \ \geq \ \omega_{min} \tag{6}$$

$$\omega_{A4} = 0.0043\, S^2 - 0.0004\, S + 0.0868 \ \geq \ \omega_{min} \tag{7}$$

$$\omega_{A5} = 0.0106\, S^2 - 0.0325\, S0.121 \ \geq \ \omega_{min} \tag{8}$$

$$\omega_{A6} = 0.0051\, S^2 - 0.0166\, S + 0.0723 \ \geq \ \omega_{min} \tag{9}$$

$$\omega_{A7} = 0.0181\, S^2 - 0.0624\, S + 0.1305 \ \geq \ \omega_{min} \tag{10}$$

$$\omega_{A8} = 0.0035\, S^2 - 0.0022\, S + 0.0818 \ \geq \ \omega_{min} \tag{11}$$

$$\omega_{A9} = 0.0019\, S^2 - 0.005\, S + 0.0566 \ \geq \ \omega_{min} \tag{12}$$

For bridges, it is common practice to determine internal forces at the critical section of each structural elements. Results from the dead load (*DL*) and live load (*LL*) analyses determine the moment and shear demand (M_u and V_u, respectively). RCBC contains three critical sections of each slab and walls, which are located at the middle and the two ends. Generally, for positive moments, the critical section is in the middle, where as for the top and bottom slab and top slab this critical section is located at the ends (negative moment). The critical section for external walls and top slab are commonly in the middle of the element for a positive moment. This is different from internal walls since the sign of the moment is insignificant due to the live load analysis, what is of importance is the internal moment magnitude (Wood et al. 2015). Figure 16 summarizes all critical sections in RCBC. The shear demand (V_u) on RCBC critical section is at the ends of the walls and slabs (Wood et al. 2014).

Box culvert load latings are usually controlled by flexure moment, based on their critical sections. This concept is accurate for flexure and axial analysis, but no for shear analysis. Based on beam and slab mechanics, it is common to calculate the shear at a *"d"* distance from the face of the wall or column, as shown in Figure 17.

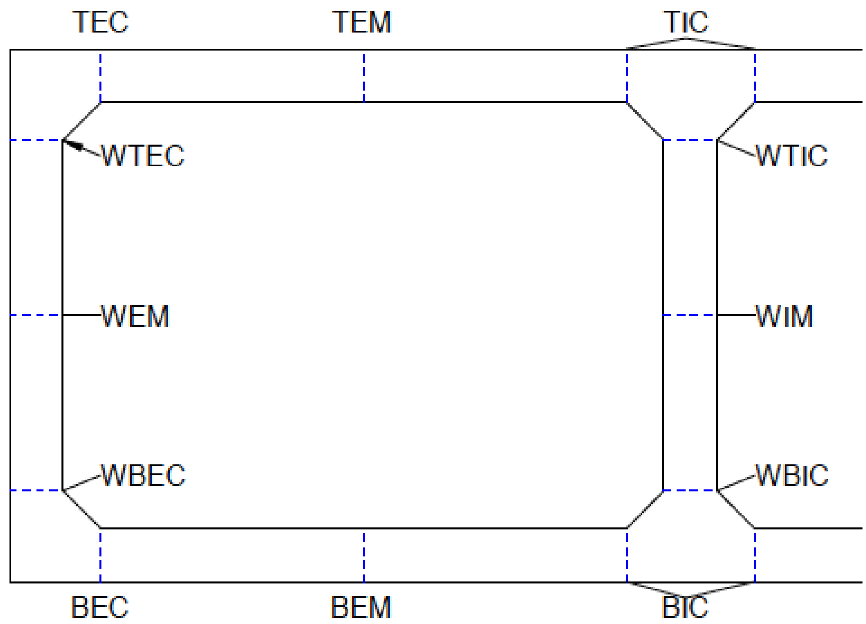

Figure 16: Critical Flexure Section for Box Culverts (Culvert Rating Guide, TxDOT)

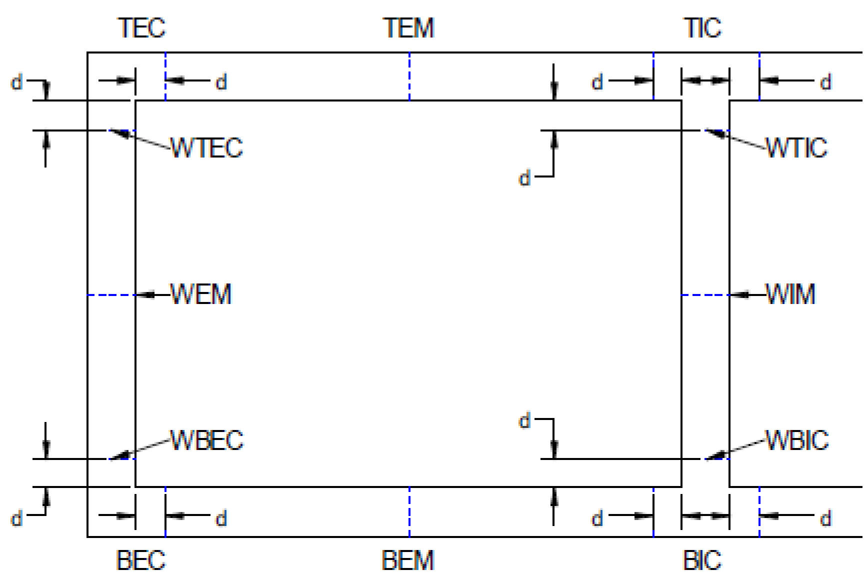

Figure 17: Shear Critical Sections for Box Culverts without Haunches (Culvert Rating Guide, TxDOT)

The letters in Figure 17 refer to the element position or node where; W = Wall, T = Top Slab, B = Bottom Slab, C = Corner, M = Midpoint, I = Interior, and E = Exterior. For example, WTEC = Wall Top Exterior Corner.

To compute *LR* on bridges, it is necessary to get familiarized with the Load Factor Design on bridges. The *RF* must be calculated for each critical section in the structure or element, as shown in Equation 13. The Manual gives guides on how to perform the load rating of the bridges using the LFR methodology for Bridge Evaluation 2nd Edition and Manual for Condition Bridge Evaluation, 2003 (AASHTO, MBE 2013; AASHTO, MCEB 2003). For the Rating Factor computation, the Brass Culvert software (2.3.2 version) was used. Brass Culvert provides design review and load rating analysis. Brass Culvert will be employed for the *LR* analysis for RCBC for culverts with plans and without plans. This *LR* software computes *RF* on ASR, LFR and LRFR methodology. Brass Culvert software used the AASHTO Standard Specification for Highway Bridges 17th 2002 guidance for rating parameters including dead loads, live loads, live load distribution factor, strength and reduction factors. Where fill depth is less than 2ft, the live load shall be distributed to the top slabs of culverts. Case 1 (Traffic Travels Parallel to Span) will be used to compute the equivalent strip width. The culvert slab is to be rated or design as a one-way slab (e.g. slab bridge).

$$RF = \frac{C - A_1 D}{A_2 LL(1 + I)} \tag{13}$$

Furthermore, each critical section on each type of element must be computed for bending moment, shear and axial loads. The critical section or the member with the lowest *RF* is the one that controls the *LR* on the bridge, in this case, is the RCBC. After obtaining the *RF* for the bridge and, if the *RF* is less than one, it is necessary to establish what allowable tons, that can transit over the bridge, this process is known as load posting. A load posting is a restriction of the vehicle weights, which are below legal loads. The *RF* is a proportion of the truck weight (e.g. Legal Loads, HS-20, HS-30, HS-20, Military Load) and the lowest *RF* of the bridge, which was determined in the *LR* methodology and methods. The *RT* equation is shown in Equation 14.

$$RT = RF \times Truck\ Weight \tag{14}$$

CHAPTER 3: LOAD RATING PROCEDURE USING BRASS-CULVERT™

This chapter describes the procedure to perform Load Ratings using the Brass-Culvert™ software to analyze the RCBCs and determine the safe tons that can transit on the bridges. When the LR is performed, the drawings, inspection report, structural plans, and pictures are needed to establish the necessary information to create the computational model which provides accuracy and specific bridge performance.

3.1 RCBC

As mentioned before a culvert can be defined as a structure that allows water to flow under a roadway. Box culverts can be made on the construction site, known as cast-in-place, but also can be precast. These are typically embedded and backfilled by surrounding soil. The RCBC that will be analyzed and rated have these conditions.

- One to four cells
- Reinforced Concrete
- Cast-In-Place

3.1.1 Bridge Inspection

The first step when the bridge does not have structural plans or this are missing is to perform a bridge inspection to provide information about bridge geometry, bridge elements, and bridge condition. Bridge inspections consist of a physical and functional evaluation for all bridge components to appraise their condition. The success of a bridge inspection is based on planning, adequate equipment and experienced and reliable personnel (i.e. inspectors). Federal law requires that all bridges on the National Bridge Inventory (NBI) have a load rating and at least one bridge inspection every 24 months. The bridge inspection team personnel should be composed of a minimum of two inspectors. National Bridge Inspection Standards (NBIS) was founded in 1971 and establish inspection procedures, frequency, and inventory. The bridge owner has the responsibility to maintain the public safety, public investments, provide bridge inspections and keep records of bridge data.

Field bridge inspections should be performed as referenced by the Bridge Inspector's Reference Manual (BIRM). Visual bridge inspection is the first method of inspection to find bridge material deficiencies. Some common concrete bridge deficiencies are delamination, spalls, minor cracks, and honeycombs. For the field inspection, it is common to reference previous inspection reports, bridge plans, inspection procedures, bridge load ratings and maintenance report. In the end, field bridge inspections evaluate all bridge components to determine the structural condition of the bridge based on qualitative observations and experience.

3.2 Structure Analysis using Brass-Culvert™

After the information is collected from the field inspection, an analytical model is constructed in order, to begin with bridge analysis, in this case, Brass-Culvert™ 2.3.2 version will be used to perform the *LR* analysis.

3.2.1 Brass-Culvert™ 2.3.2 Version

Brass-Culvert™ is a software created by Wyoming Department of Transportation (WYDOT) with cooperative efforts of North Carolina Department of Transportation (NCDOT) and New York Department of Transportation (NYDOT). This software designs, rates and analyzes box culverts that are either precast or cast-in-place. Brass-Culvert™ only considers prismatic members; All cells should be the same length and culverts must have from one to four cells. This software designs and rates box culvert using ASD, LFD, and LRFD design philosophy based on the AASHTO Standard Specification for the Design of Highway Bridges. Brass is programmed to use the stiffness method and plane frame elements to perform the design and rating analysis of box culverts. The input data and all computations are defined and performed in the US units system (i.e. inches and pounds).

The boundary conditions of the frame element are restrained against vertical displacement. The right nodes (upper and lower) are also restrained against horizontal displacement. The computer model considered that walls and slabs are completely horizontal and vertical respectively as shown in Figure 18. The culvert is modeled using the slabs and walls. Nodes start from left to right and bottom to top. The software analyses the whole model but only report the output using a symmetrical axis if there are load and geometric symmetry. Loads in the gravity direction are positive and upward direction is negative.

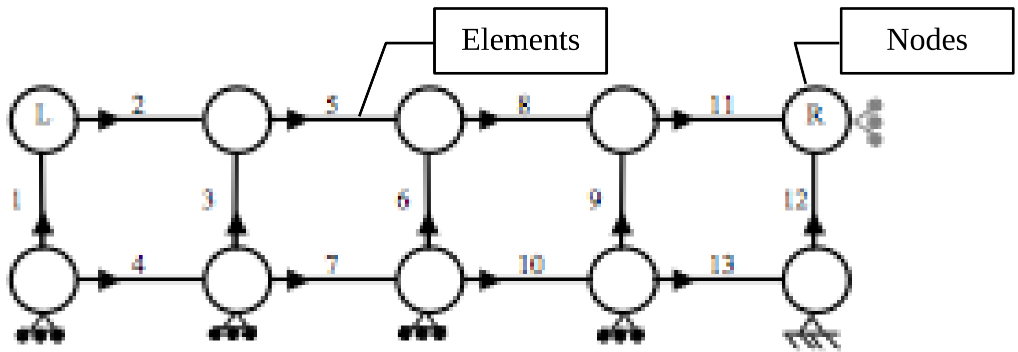

Figure 18: Culverts Nodes and Elements Representation (WyDOT Brass-Culvert^{TM})

Dead loads are defined by self-weight (150 lbs/ft^3), soil weight (120 lbs/ft^3) and wearing surface (145 lbs/ft^3). These dead loads are used in service load design and strength load design cases. Equivalent fluid weight for lateral earth pressure on walls is 60 lbs/ft^3. Also the maximum and minimum pressure on walls are used to determine the critical sections in the box culvert. Water pressure inside box culvert is not considered. Temperature effects are neglected. Slenderness effects usually are minimal and are typically neglect, but the software can include this computation. All RCBC were modeled on Brass Culvert 2.3.2 (Figure 19 presents an example). Figure 20 to Figure 29 show the procedure to model and analyze the load rating of the RCBCs. Design Control tab is negligible, due to the analysis being a Load Rating and Output Control is set as default (i.e., moments, shears and capacity).

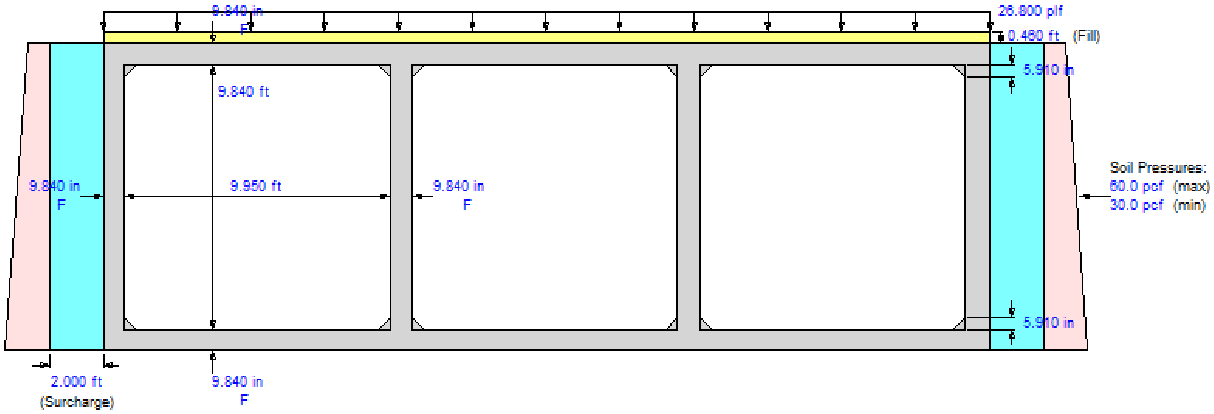

Figure 19: Brass Culvert 2.3.2 Bridge No. 1348 Model

Figure 21 shows a window on Brass-Culvert to provide the options for the analysis method for design, design review and load rating. In all bridge analysis cases, the option of Load Rating is selected. Also, the option cast-in-place from construction type and the design method as previously discussed is Load Factor. To build the model for the RCBCs on Brass-Culvert^{TM}, it is necessary to input some data such as (See Appendix C):

- Job description is shown in Figure 20,

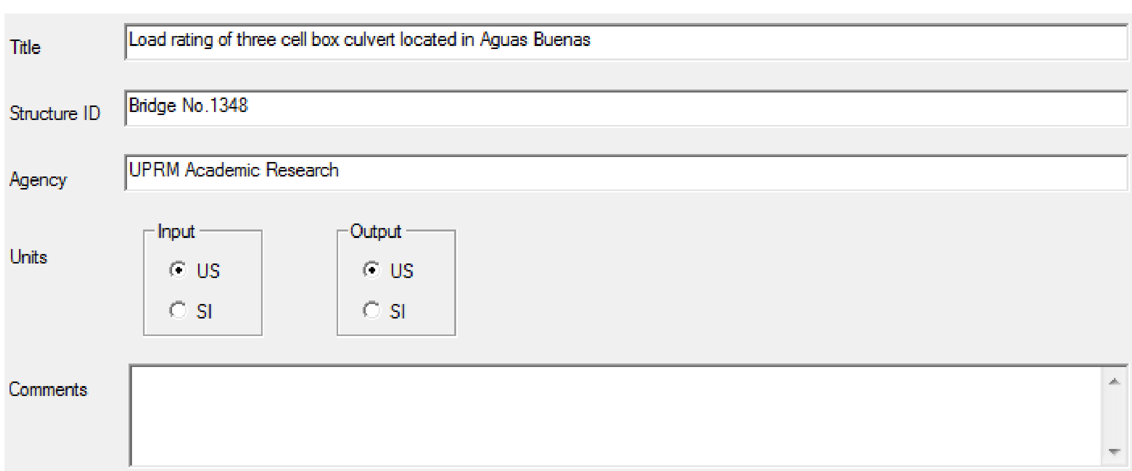

Figure 20: Job Description in Brass-Culvert 2.3.2

- Analysis Control shown in
- Figure 21,

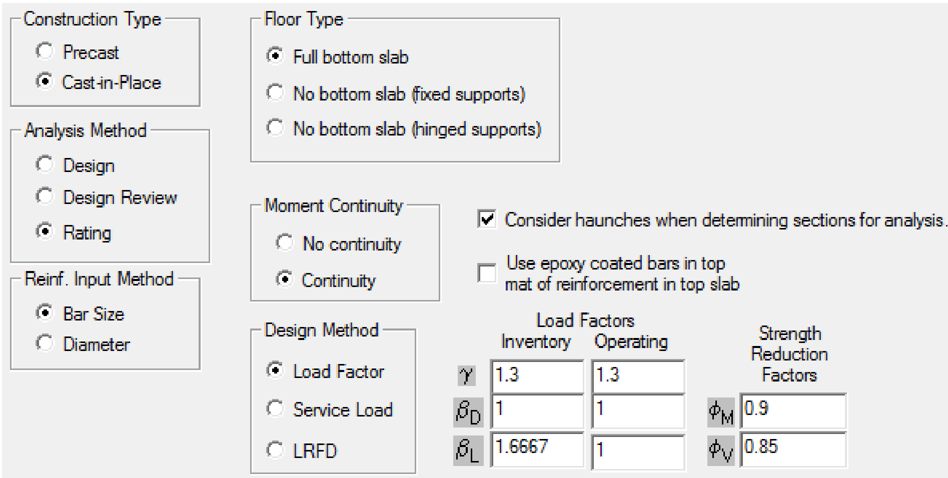

Figure 21: Analysis Control from Brass Culvert 2.3.2

- Design Control, this tab is not available since the analysis method is rating,
- Output Control,
- Material Properties are shown in Figure 22,

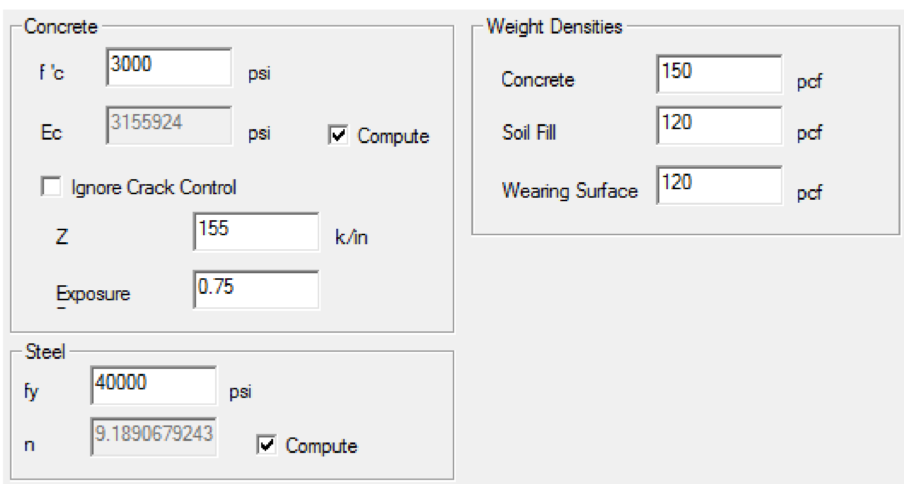

Figure 22: Mechanical Material Properties for RCBC in Brass-Culvert 2.3.2

- Box Geometry showed in Figure 23,

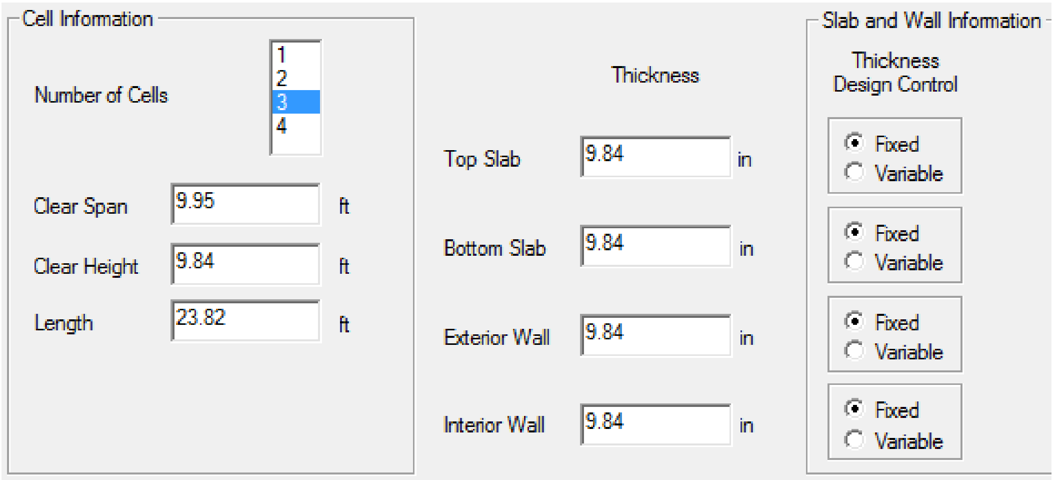

Figure 23: User Defined the Number of Cell in the RCBC and their Geometry

- Skew Angle is shown in Figure 24,

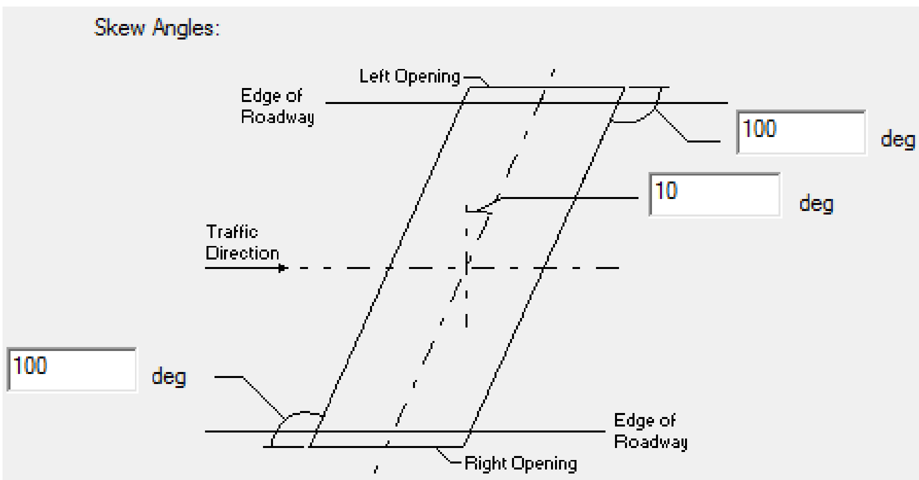

Figure 24: Skew Angle Input in Brass-Culvert 2.3.2

- Haunches are showed in Figure 25,

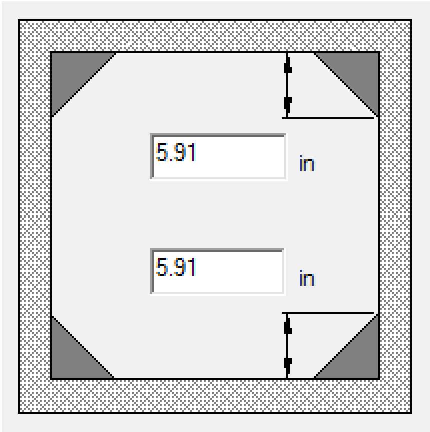

Figure 25: User Defined Height and Width of the Haunches

- Concrete Cover is shown in Figure 26,

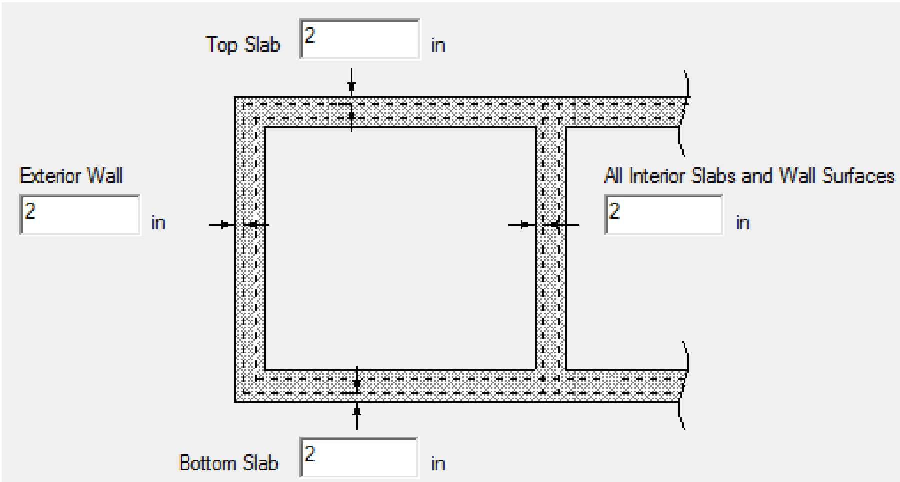

Figure 26: Concrete Cover Input for Walls and Slabs in Brass-Culvert 2.3.2

- Reinforcement Review showed in Figure 27,

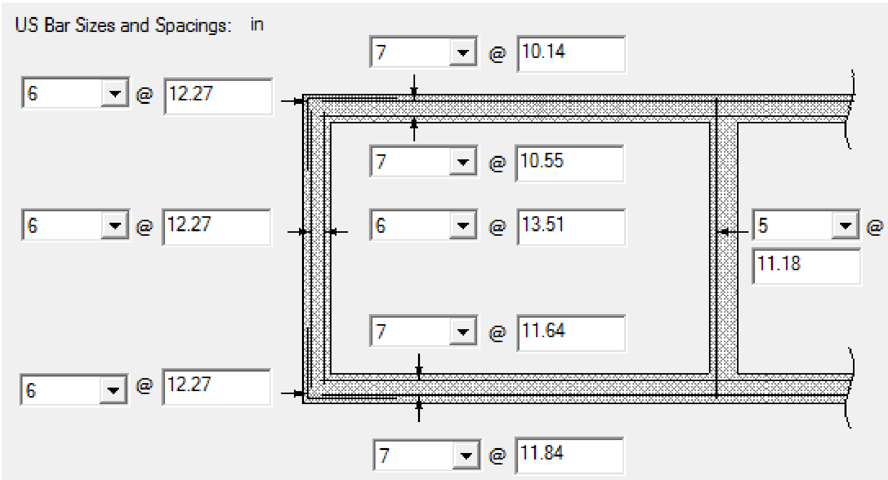

Figure 27: Steel Reinforcement Data Entry for RCBC Analyzed in Brass-Culvert 2.3.2

- Dead Loads showed in Figure 28,

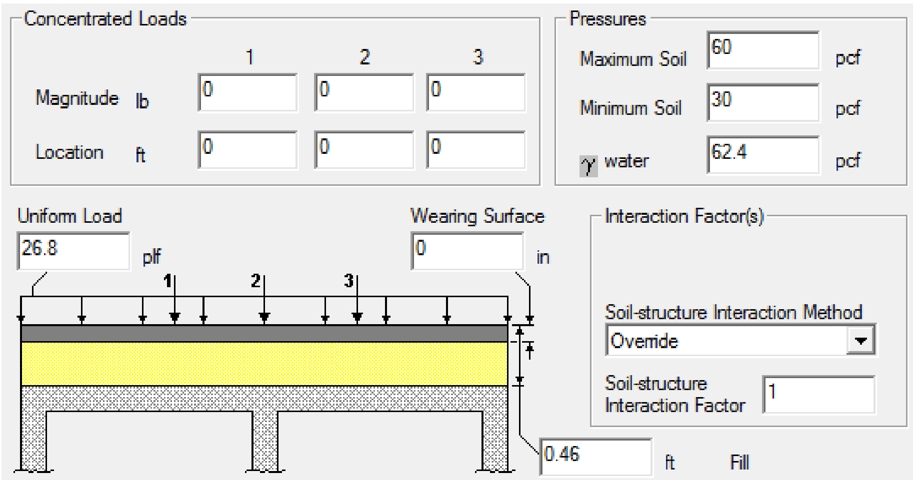

Figure 28: Dead Loads Input in Brass-Culvert 2.3.2.

- Live Loads shown in Figure 29.

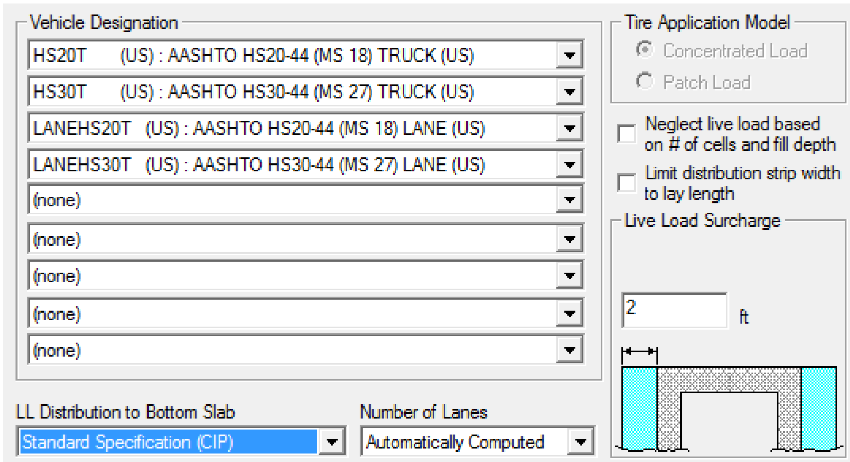

Figure 29: Live Load Selection for RCBC Analyze in Brass-Culvert 2.3.2

3.2.1.1 Assumptions used in Brass-Culvert™

This section provides some assumptions that Brass Culvert and LFR methodology assume when the computation of LR is performed.

- All box culverts are presumed that are designed with their standards and codes that were in place during the year built
- No compression steel is considered
- All tension steel is assumed to be in one layer
- Thermal effects are negligible
- Concrete covers are assumed 2in all around on the RCBC
- AASHTO loads are applied
- If fill depth is less than 2ft, a live load surcharge is used to simulate the highway live loads on the RCBC

- Brass software automatically computes the modular ratio and concrete modulus of elasticity
- All clear span lengths are equal
- RCBC have 1 to 4 cells
- If wearing surface depth is unknown, it is assumed that the wearing surface have the same unit weight of the soil fill
- RCBC haunches are considered rigid
- Soil stresses are dissipated through time and culverts installation
- The safe load capacity carried over the bridge is based on existing structural bridge conditions

3.2.1.2 Load Factor Rating (LFR) Method used in Brass-Culvert™

Currently, three methods of load rating are used for bridge rating. Allowable Stress Rating (ASR), Load Factor Rating (LFR) and Load and Resistance Factor Rating (LRFR). However, the Load Factor Rating (LFR) method will be used to analyze the RCBCs. The LFR applied different factors for each type of load, these factored loads are applied to the structure. Typically the analysis of the structure reflects the uncertainty inherent in the load computations. This method determines ratings on ultimate limit state due to design live loads, but the serviceability (service) limit state is also checked for compliance of design truck loads. As already discussed previously, the inventory rating factor is based on the live loads that can carry over the bridge for an indefinite frequency, while the operating rating factor is the live load which the bridge can carry that could deteriorate the bridge if used without restrictions. The factors used in this rating method depend on the forces subjected to the bridge (e.g. dead load, live load), internal reactions (e.g. flexure, shear, axial). Also, particular characteristics of construction (i.e. cast-in-place or pre-cast) and material specifications (i.e. reinforced concrete or prestressed).

The LFR rating method and bridge inspection are discussed in the Manual for Condition Evaluation of Evaluation (AASHTO, MCEB 2003) guidelines. MCEB defines the LFR in general terms as:

$$RF = \frac{C - A_1 D}{A_2 LL(1 + I)} \qquad (15)$$

Where:

C = Bridge capacity, nominal moment ($\phi c\ \phi Mn$) and nominal shear ($\phi c\ \phi Vn$)

A_1 = 1.3 = Factor for all loads other than live loads

D = Dead Load of structural components

A_2 = 2.17 = for Inventory, Level Live load factor (LFD Table 2.2-2)

= 1.3 for Operating Level

LL = Live load effect

I = Impact factor to be used with live load effect (LFD Section 3.8.2)

$$RF = \frac{\phi c\ \phi Rn - A_1(D + SD + W + EH + EV)}{A_2 LL(1 + I) + A_2 LS} \qquad (16)$$

Where:

R_n = Nominal member resistance, measured and calculated

Table 2 and Table 3 shows reduction and condition factor for bridge capacity, from SSHB 2003 Section 8.16.1.2 Design Strength.

Table 2: Condition Factors

Structural Member Condition	ϕ_C
Good	1.00
Satisfactory	1.00
Fair	0.95
Poor	0.85

Table 3: Reduction Factors

Limit State	ϕ
Flexure	0.90
Shear	0.85
Compression with ties	0.70

W = Effects due to water pressure

EH = Effects due to horizontal earth pressure

EV = Effects due to vertical earth pressure

SD = Superimposed dead loads (e.g. barriers, water pipes, sidewalks, and utilities)

LS = Effects due to living load surcharge

3.2.1.3 Dead Loads

Dead Load is composed of all permanent structural and non-structural components that cannot be moved. In Figure 30 the dead load computations for data entry into the Brass software are illustrated, and Figure 31 presents the window where the user defines the fill depth and other dead loads (See Appendix C). Typically dead loads that are present on RCBC are:

- self-weight
- sidewalks (if applicable)

- utilities
- soil fill (vertical and horizontal earth)
- rails
- wearing surface

Sidewalk:				***Parapet:***					
Width (ft)	Thick (ft)	L (ft)		width1 (ft)	Ht.1 (ft)	Length1 (ft)		Qty	Wt. [plf]
0.00	0.33	108.93		0.00	0.00	0.00		0	0.0
W sidewalk. [plf]				weight [plf]					
0.0				1.50	*http://guides.roadsafellc.com/bridgeRailGuide/index.php?action=view&railing=8*				
				width 3 (ft)	Ht.3 (ft)	Length3 (ft)			
				0.00	0.00	0.00			
Pipe utilities:									
In. Dia. (in)	Weight [lb/ft]	Water [lb/ft]	Wt. [plf]						
18	44.79	110.27	**1.4**	*** assumed a cast-iron 4in diameter water pipe					
Total SDL:									
Wt. [plf]									
1.4									

Figure 30: Dead Load Computations for each RCBC Analyzed in Brass-Culvert™

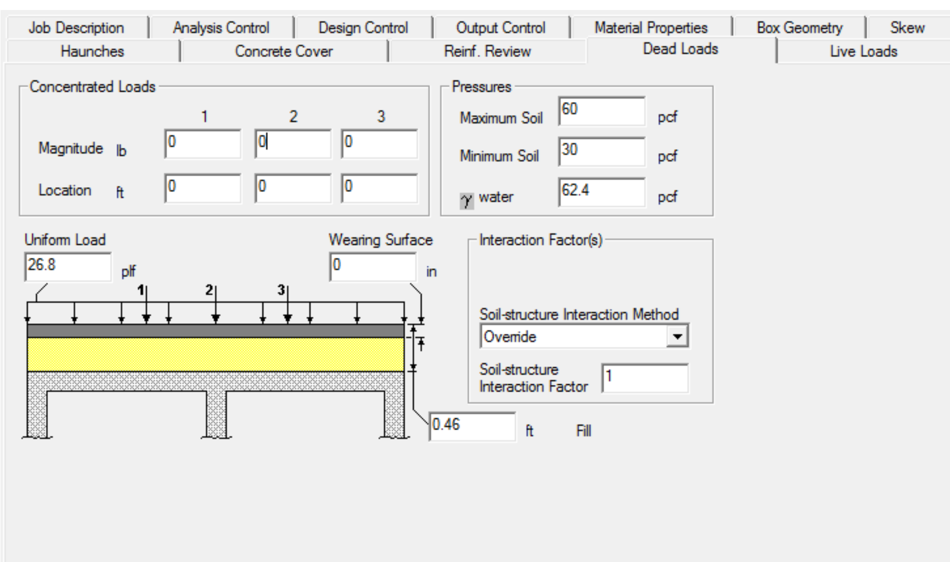

Figure 31: Dead Loads Input from Brass Culvert 2.3.2

3.2.1.4 Earth Pressures

Earth pressure on the top slab and exterior walls are considered on the LR analysis. Vertical and horizontal earth pressures are described in SSHB 17th Edition on Section 6.2.1. In this case, all RCBCs are culverts in the trench and yielding foundation, with a maximum and minimum earth pressure of:

- *Vertical earth pressure* = 120 lbs/ft^3
- *Max lateral earth pressure* = 60 lbs/ft^3
- *Min lateral earth pressure* = 30 lbs/ft^3

3.2.1.5 Live Loads used in Brass-Culvert™

In bridge design or bridge rating these loads represent the truck loads. Design truck loads or legal truck loads are not real-life trucks, this is imaginary trucks with dimensions similar to real trucks but are heavier than conventional truckloads (i.e. weight). Figure 32 shows the window where the design live load are used to analyzed the RCBC.

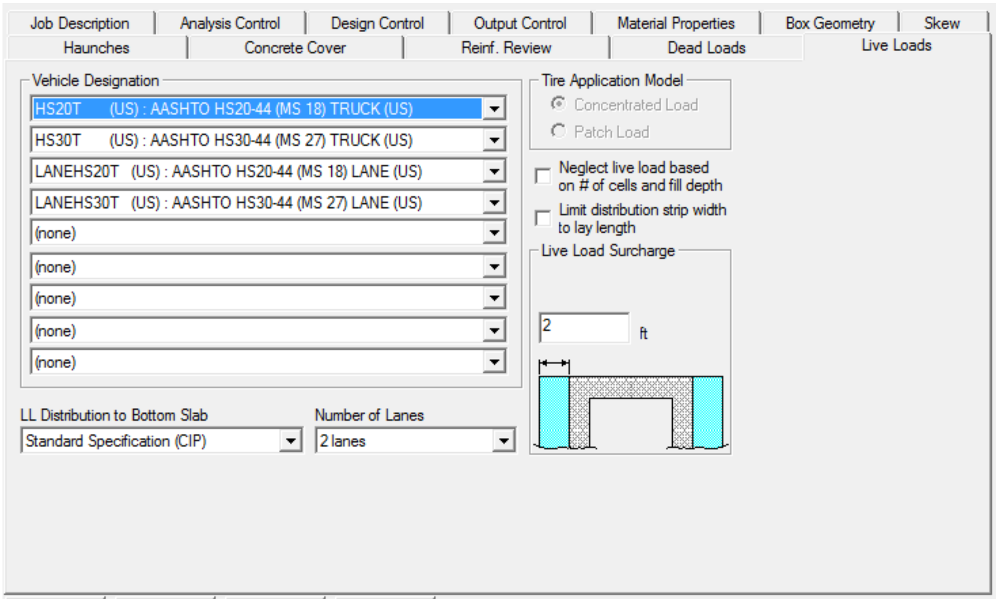

Figure 32: Live Load Truck Loads Input from Brass Culvert 2.3.2

3.2.1.5.1 Truck Loads on Brass-Culvert™

The live load is applied on the deck with the HS loading (i.e. truckload). The HS means tractor truck with a semi-trailer. The LFR uses an HS-20-44 truckload as shown in Figure 36. The number 44 is based on 1944 Edition publication. The minimum truckload on interstate and highways may carry the HS-20-44 design truck load which weights 36 English tons (i.e. 72 kips).

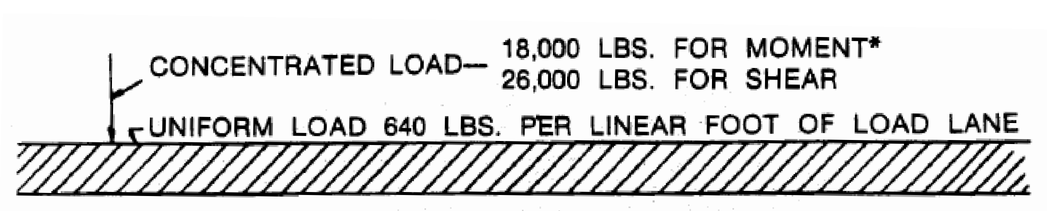

Figure 33: HS-20 Lane Load

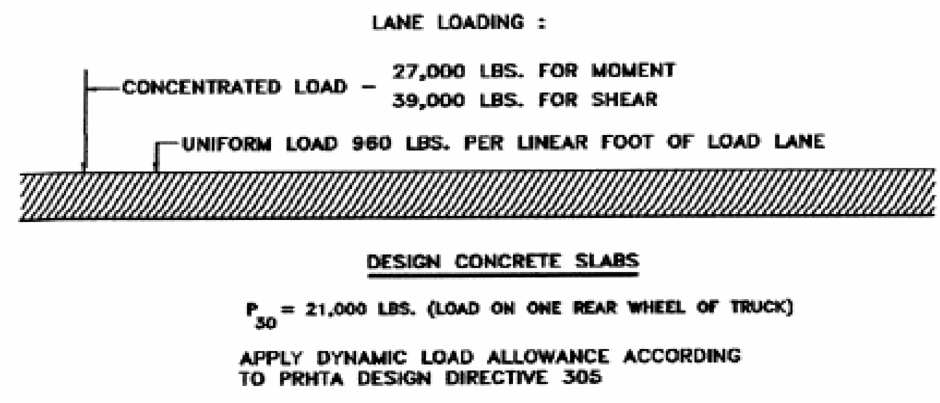

Figure 34: HS-30 Lane Load

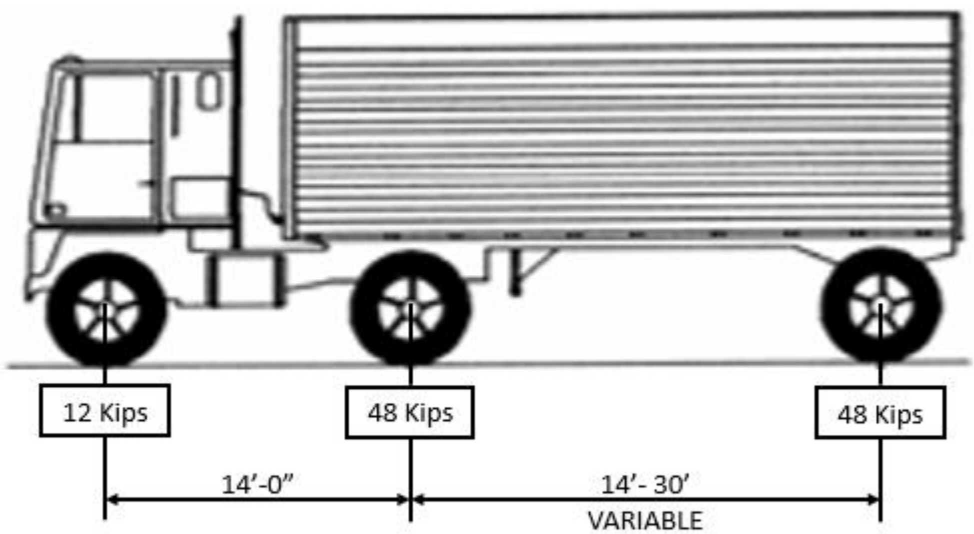

Figure 35: HS-30 Truck Load

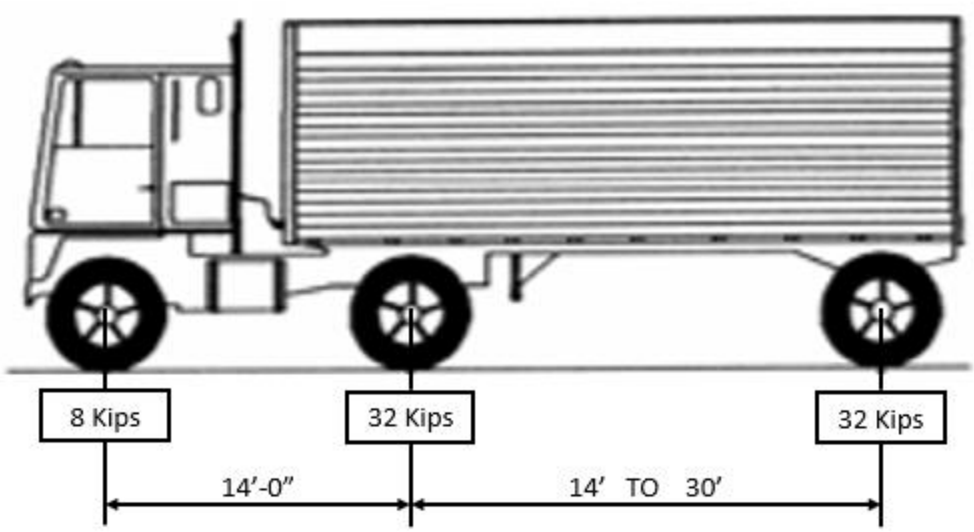

Figure 36: HS-20 Truck Loads

3.2.1.5.2 Live Load Distribution Factor

There are three cases of live load distribution in culverts. The first case is when the fill depth is less than 2ft; truckloads are distributed and applied directly to the top slab (e.g. slab bridge). The second case of live load distribution is when fill depth is equal to 2ft and less than 8ft, the SSHB 17th Section 6.4.1 stipulates that the live load shall be considered as uniformly distributed over a square with sides equal to 1.75H, where H is the fill depth. The live load distribution factor for RCBCs is presented in Equation 17. The third cases of live load distribution are when fill depth is more than 8ft and exceeds the span length, the effect of live load can be neglected according to SSHB 17th Section 6.4.2.

$$E = 4 + 0.06\ S \qquad (17)$$

Where:

E = Equivalent Strip Width for Culverts (ft)

S = perpendicular distance within walls centerline (ft)

3.2.1.5.3 Live Load Surcharge used by Brass-Culvert™

Live Load Surcharge is a lateral live load that it is applied to exterior walls, to simulate the highway live loads and conditions. Brass-Culvert™ used this load when fill depth is less than 2ft.

3.2.2 Load Cases used in the RCBC Analysis

This section describes the cases used for the loads reactions to provide the worst and best case in *LR* computation. Figure 37 shows the shear reactions that resulted from the dead load and live load cases from the HS-20 truckload.

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE Pos	LOADS Neg
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.08	2.59	1.29	0.32	-2.21	0.08	-0.43
1- 1	0.08	1.88	0.94	0.26	-1.59	0.08	-0.43
1- 2	0.08	1.25	0.62	0.19	-1.03	0.08	-0.43
1- 3	0.08	0.68	0.34	0.13	-0.54	0.08	-0.43
1- 4	0.08	0.18	0.09	0.06	-0.12	0.08	-0.43
1- 5	0.08	-0.25	-0.12	0.00	0.24	0.08	-0.43
1- 6	0.08	-0.61	-0.31	-0.06	0.54	0.08	-0.43
1- 7	0.08	-0.91	-0.45	-0.13	0.77	0.08	-0.43
1- 8	0.08	-1.13	-0.57	-0.19	0.93	0.08	-0.43
1- 9	0.08	-1.29	-0.65	-0.26	1.03	0.08	-0.43
1-10	0.08	-1.38	-0.69	-0.32	1.06	0.08	-0.43
EXTERIOR WALL TOP							

Figure 37: Shear Reactions Resulted from HS-20

3.2.2.1 Dead Load Cases Results from Brass-Culvert™

When a Load Rating calculation is performed maximum, and minimum cases of dead loads are used on the dead load rating variable to provide the worst and best load case. The load cases evaluated are shown below where:

D = dead loads + superimposed loads

E_{max} = max lateral earth pressures

W = hydrostatic force inside the culvert (e.g., water)

E_{min} = min lateral earth pressures

i. $D + E_{max} + W$

ii. $D + E_{min} + W$

iii. $D + E_{max}$

iv. $D + E_{min}$

3.2.2.2 Live Load Cases Results from Brass-Culvert™

The same principle as dead load cases is used for live load cases. The difference is that on these load cases the same load cases presented below are used for all the different truck loads to be considered *n* the rating analysis. The load cases evaluated are shown below where:

$LL_{surcharge}$ = Live load surcharge

LL^{+} = Positive state reaction (i.e., moment, shear, axial, etc.) load for a specific truckload

LL^- = Negative state reaction (i.e., moment, shear, axial, etc.) load for a specific truckload

i. $LL^+ + LL_{surcharge}$

ii. $LL^- + LL_{surcharge}$

iii. LL^+

iv. LL^-

CHAPTER 4: PROOF LOAD TEST

Chapter 4 describes the procedure provided by Virella-Crespo and Associates to perform the static test known as Proof Load Test (PLT) and the information on this project. Typically, when there is no *LR* computation, or there are no structural plans, a PLT is used to establish an experimental bridge capacity. The MBE 2nd Edition 2013 in Article 8.8.3 describes the procedure and equations needed to perform the PLT. According to the MBE 2nd Edition, a proof load test consists of the observation and measurement of the response of a bridge to controlled and predetermined live loads where the bridge behavior is maintained within the linear elastic range. A load test can be used to verify bridge elements and structural system performance under a known live load. The uncertainties in structural components are the basis for conservative assumptions on the load carrying capacity of the bridge which are used to compute the load rating of bridges analytically. In the proof load test, it is common for the actual load capacity to be higher than the analytical capacity. It is necessary to determine the truck weight to know the gross vehicle weight (GVW) and weight by axle as shown in Figure 38.

Figure 38: Truck on Portable Scales to Determine Gross Vehicle Weight (Virella Crespo and Associates)

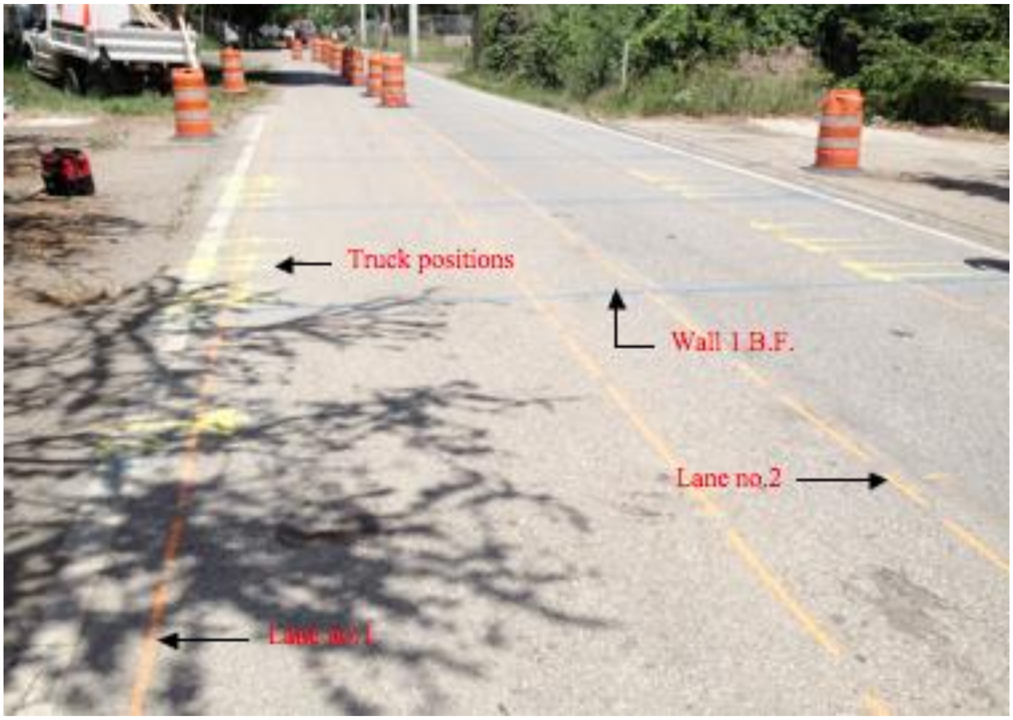

Figure 39: Truck Positions Painted on the Wearing Surface (Virella Crespo and Associates)

Figure 40: Trucks in Position at Paints Marks (Virella Crespo and Associates)

The Manual for Bridge Evaluation 2013 2nd Edition describes the static test and the dynamic test. A static load test is preferable for load test because this avoids vibrations and it is easier to control the loads, which allows for a highly accurately response on the field test. There are two types of the static nondestructive load test, the Diagnostic Load Test, and Proof Load Test. A proof load test is when the bridge is subjected to a known specific load. Observations and data are compiled from bridge instrumentation. It is common to paint the wearing surface (Figure 39) to establish where the truckload is going to stop (Figure 40). The location of walls, top slab center and other critical points in the RCBC are necessary to identify the structural elements on the wearing surface. The test truck is placed on the marks painted on the wearing surface. This process is used to determine the bridge behavior and performance in the predetermined critical sections.

The load should be applied in increments as recommended by the MBE 2013, the truckload is at crawl speed (i.e., an approximate 5 mph) to remove undesired vibrations and miscoded data, and bridge monitoring must be in real time to determine any distress or nonlinear behavior. The end of the proof test is when the maximum load has been reached, or the bridge presents a nonlinear behavior or visible signs of distress. MBE 2013 establishes that proof tests require experienced personnel. Also, caution is vital to avoid causing structural damage. Bridges with large dead loads are proper candidates for a proof load test. Culverts with a high fill depth are excellent candidates for the proof test, due to the uncertainty on live load distribution.

4.1 Operating Rating from Proof Load Test

Rating factor at operating level and operating level capacity (Equation 18) based on the proof load test are established by MBE 2013 2nd Edition Article 8.8.3.3 and can be computed as:

$$RF_0 = \frac{OP}{L_R(1+IM)} \qquad (18)$$

Where:

OP = Operating level capacity (Equation 19) of the bridge (MBE 2nd 2013 Art. 8.8.3.3.3)

L_R = Comparable factored live load due to the rating vehicle for the lanes loaded

IM = Dynamic load allowance (MBE 2nd 2013 Table 3.6.2.1-1)

The capacity of the bridge at operating level is found as follows:

$$OP = \frac{k_0 L_P}{X_{pA}} \tag{19}$$

Where:

k_0 = factor which takes into consideration how the proof load test was determined (MBE 2nd 2013 Table 8.8.3.3.3-1)

X_{pA} = target live load factor resulting from the adjustments (MBE 2nd 2013 Art. 8.8.3.3.2)

L_p = maximum proof live load applied to the bridge adjustments (MBE 2nd 2013 Art. 8.8.3.3.3)

The next equation (Equation 20) computes the load rating considering the test vehicles and truck design. The equation is expressed as follows:

$$RF_0 = \frac{M_{test-lane}}{M_{rating\ vehicle-lane}\ (1 + IM)\ X_{PA}} \tag{20}$$

The same equations can be used for areas of maximum shears. Lane shears would have to be included.

Where:

$M_{test-lane}$ = maximum lane moment induced by the test vehicle

$M_{\text{rating vehicle-lane}}$ = maximum lane moment induced by the rating vehicle (e.g. HS-30)

The selection of target proof load represents the maximum applied load on the bridge. This target proof load represents theoretically a rating factor at the operating level of 1.0. The target proof load should be selected with caution considering the existing structural condition (i.e. superstructure), and analytical LR computed. The equation for the target proof load (Equation 21) is found in the MBE 2nd Edition 2011 and is computed as follows:

$$L_T = X_{pA} L_R (1 + IM) \tag{21}$$

This target proof load considers the capacity to be in conformity or compliance with design vehicle or legal loads. In this study, the rated vehicle was HS-30 design live loads with a gross vehicle weight of 54 tons respectively (i.e., L_R = 54 Tons). Puerto Rico Highway and Transportation Authority (PRHTA) establishes a minimum LR of 5 Tons not to close the bridge for traffic (PRTHA and Commonwealth of Puerto Rico 1989).

4.1.1 Instruments for Data Collection

The proof load test requires that all elements (i.e. superstructure) have a linear elastic response to the applied loads. Personnel of Virella Crespo and Associates realized the proof load test (*PLT*). Typically, critical sections and elements that can control the load rating need to be instrumented to verify their linear elastic response. The instrumentation used for the data collection will be described in the following. The instrumentation used to collect data during the proof load test on the bridge were:

- Strain gauges
- LVDT (linear variable differential transformer)

The strain gauges used in the proof load test were the ST 350 (Figure 41) manufactured by Bridge Diagnostic Inc. Also, the LVDTs used were manufactured by Omega Engineering (Figure 42) and were excited using a regulated power supply. For reading the bridge response data, an analog-digital (A/D) converter was used (USB-1608G). The module enables the connection to a computer via USB port. To provide a signal amplification a DMD 4059 strain gauges to DC isolated remote transmitter were used. The manufacturer of these modules is Omega Engineering.

Figure 41: (left) Typical strain gauge used for the proof load test (right) strain gauge at top slab undersurface (Virella Crespo and Associates)

Figure 42: (left) Typical LVDT used for the proof load test (right) LVDT at top slab undersurface (Virella Crespo and Associates)

Virella Crespo and Associates used the Data Acquisition System Laboratory (DASYLab) Version 11.0 software to determine bridge response in real-time and process the data. National Instrument has developed this software, and it has the flexibility that allows developing custom worksheets for each application. During the experimental tests, the collected rate of values was as four sample/seconds, and the DAISYLab module “average” was used to continuously obtain the average of the last four samples/second.

CHAPTER 5: REINFORCEMENT INDEX CURVES VALIDATION (RIPSRE METHOD)

The validation of the reinforcement index curve and the RIPSRE method will be achieved in two stages as shown in Figure 43. The validation will follow the procedure presented in Figure 7, included in Chapter 2.

The first stage is based on the analysis and Load Rating of 8 RCBCs previously rated with structural plans for which the steel reinforcement will be compared to the estimated reinforcement resulting from the Virella and Wendichansky (2012) Reinforcement Index Parameter for Steel Reinforcement Estimation (RIPSRE) methodology.

The second stage is based on comparing results from 7 RCBCs previously rated by the Proof Load Tests. These will be load rated using the RIPSRE methodology to compare both load rating capacities.

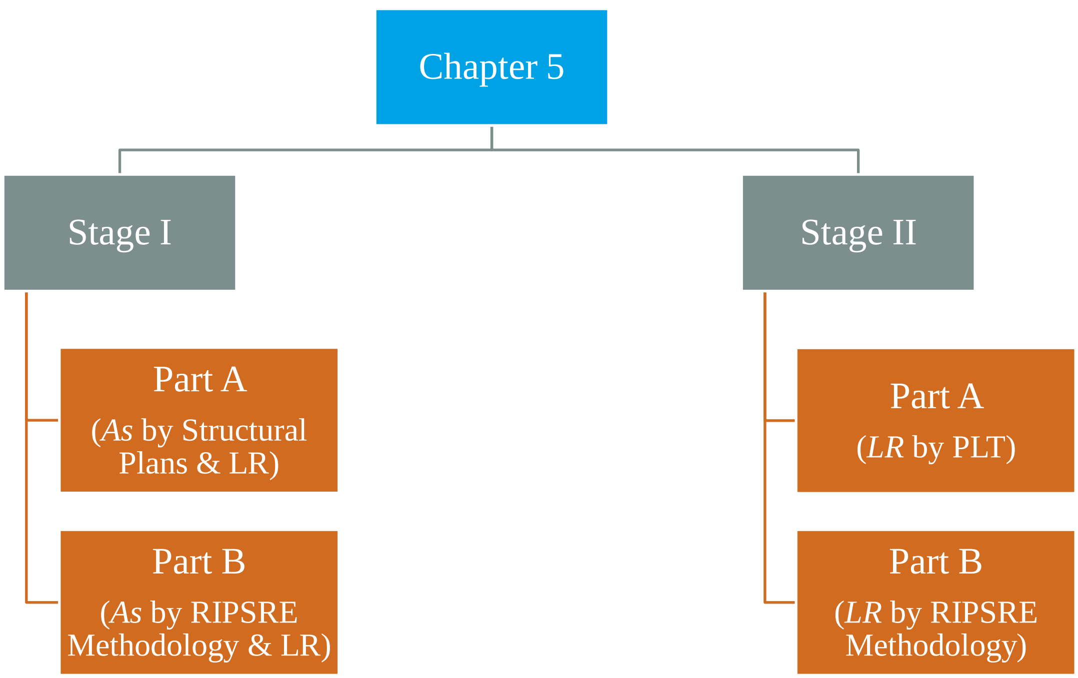

Figure 43: Hierarchy Analysis on Chapter 5

5.1 Stage I: Structural Drawings and Reinforcement Index (ω)

Stage I corresponds to the case where steel reinforcement obtained using RIPSRE procedure is compared with the steel reinforcements for bridges with structural plans. This Stage I is divided in two parts; Part-A and Part-B. Part-A consists of the *LR* computations using the structural plans information for each RCBC. Part-B consists of the computation of *LR* on RCBC analyzed with the RIPSRE methodology to estimate the steel reinforcement to validate the ω curves. Table 4 presents the RCBCs used for Stage I steel computation based on RIPSRE procedure. The bridges (i.e. No. 664, No. 799 and No. 1348) highlighted in yellow in Table 4 are bridges that were used when the reinforcement index parameter curves were developed (PRHTA and Virella-Crespo 2010).

Table 4: List of RCBC Analyzed in Stage I

Bridge	Municipality	Clear Span	Fill Depth	Year Built	Cells
(No.)		*(ft)*	*(ft)*		*(#)*
139	Coamo	13.25	11.48	1951	2
664	Coamo	8.95	0.00	1953	2
767	Coamo	13.59	9.19	1957	3
799	Dorado	14.98	5.42	1961	2
1108	Aguas Buenas	9.84	13.79	1968	2
1170	Coamo	12.7	12.13	1965	3
1348	Aguas Buenas	10.11	0.46	1968	3
1358	Aguas Buenas	11.48	5.00	1970	3

For Bridges No. 139, No. 767, No. 1108 and No. 1170 the fill depth exceeds the 5ft. Therefore, the inferred (RIPSRE) methodology by Virella and Wendichansky (2012) is not directly applicable to those RCBC.

5.1.1 Part-A: LR of RCBC based on Steel Reinforcements provided by Structural Plans

The steps for the computational model in Brass-Culvert^{TM} is the same for Part-A and Part-B. Brass-Culvert^{TM} Version 2.3.2 was used to analyze the RCBCs on this project based on a strip section width of 12in (Figure 44) as a slab bridge method.

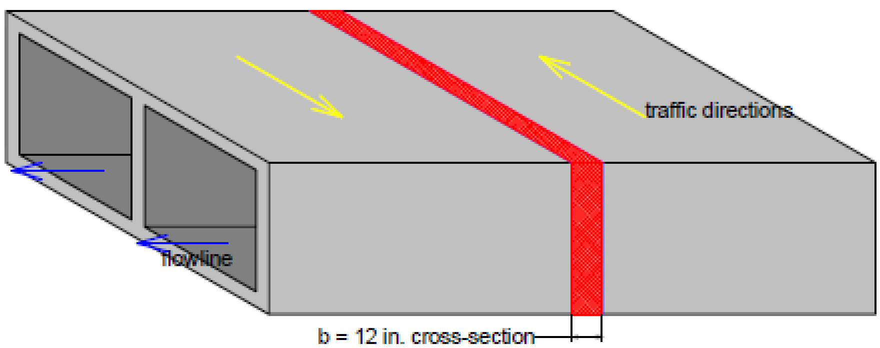

Figure 44: Strip Analysis Representation for a RCBC (Culvert Rating Guide, TxDOT)

The information for the development of the computational modeling is based on construction plans and field inspection reports for each RCBC. As already discussed in Chapter 3, all parameters and input data were used to perform the computational model and analysis in Brass-Culvert^{TM}. Outputs from this software are included in Appendix 3. From the output, only the unfactored moments and shears from both trucks loads and culvert capacity were used. The load rating is computed in a spreadsheet software developed for this project, to provide software computations validation.

HS-30 truckloads are the controlling loads compared with the HS-30 lane loads. Brass software computes moments and shear every 1/10 of the span length for each wall and slab element.

Output files contain the moments and shears for the effects of Dead Loads, Max Soil Pressures, Min Soil Pressures, Live Load Surcharges, Water Pressures, Negative Live Loads and

Positive Live Loads. Furthermore, these are the unfactored moments and shears that were used in the spreadsheet to validate Brass-Culvert™ output files (e.g. Figure 30).

Typically, RCBCs do not have problems in axial thrust capacity. Slabs and walls are subjected to moments and shears. For example, a cross-sectional area for a RCBC in a wall of 8in x 12in with a $4in^2$ steel reinforcement provides a 234kips of axial internal force resistance, by just considering the concrete material properties. In comparison, a column of soil ($120lbs/ft^3$) with a 20ft height and 3ft of soil interaction produces 7.3kips in compression force in the top of the wall.

Bridge capacity is based on plans, shop drawings, specifications and materials properties. Based on concrete mechanics of materials and slab/beam theory, the structural capacity of the structural element can be determined. The AASHTO Standard and Specifications of Highway Bridges (2002) discusses strength design philosophy in Section 8.16. The strength limit state must ensure the stability and strength of each structural member and bridge, as a global structure. Strength limit state provides resistance in significant load combinations. In this state, structural members experience structural damage and extensive distress, but ultimately the structural integrity of the bridge must be preserved.

5.1.2 Part-B: LR of RCBC based on RIPSRE Methodology

For Part-B the RIPSRE methodology was used to determine the typical steel reinforcement, in contrast to Part-A where the steel reinforcements are known from the structural plans of the RCBCs to be analyzed. The RIPSRE methodology provides the reinforcement index parameter (ω). As previously discussed in Chapter 2, the ω is directly related to the steel reinforcement (A_s). The value of ω is obtained from the graphs shown from Figure 9 to Figure 15. To compute the ω, the average curve was used with the deterministic curve equation for each of the typical reinforcements on the RCBC (see Figure 8).

The *LR* procedure will be shown for Bridge No. 1348 is located on PR-777, Km. 2.3 south of Aguas Buenas Municipality in Puerto Rico. This Bridge consists of a three cell RCBC built in 1968. The bridge has a length of 23.82ft and a deck width of 33.6ft with a fill depth of 0.46ft. The clear span length is 10.11ft, and the material properties are: f'_c = 3ksi and f_y = 60ksi. The latest inspection report establishes the condition rating (NBI item 62) as 6, which mean that a condition factor, ϕ_c = 1.0.

Figure 45: Upstream View to Bridge No. 1348 (Virella Crespo and Associates)

Knowing the clear span length, the ω_i can be determined for each typical steel reinforced section ($A_{s\ RIPSRE\ i}$) from Equation 6 to Equation 12. The results are shown in Table 5. For each typical steel reinforcement, there is a reinforcement index curve. In the case of typical steel reinforcement identification, A1 is equal to A2 and A3. The next computation shows the reinforcement index parameter for $\omega_{A1\ 2\ 3}$. For typical steel reinforcement location (see Figure 47) the reinforcement index is:

$$\omega_{A1\ 2\ 3} = 0.0043\ (3.08)^2 - 0.0102\ (3.08) + 0.0672 = 0.07661328\ \geq 0.061$$

The ω for that typical steel section is directly proportional to estimate the steel reinforcement. To estimate the steel reinforcement on that typical section, it is necessary to substitute Equation 6 into Equation 2 and solve for steel reinforcement (A_s), as shown in Equation 22.

Table 5: Bridge No.1348 Material Properties and Reinforcement Index

	Bridge Properties				Reinforcement Index	
Bridge	***Clear Span (ft)***	10.11	3.08m	**Steel Location**	ω	
(No.)	***fy (ksi)***	40			*ID*	
1348	***f′ c (ksi)***	3		Top Ext. Wall	1	0.07661328
	b (in)	12		Top Slab -	4	0.12641999
	d (in)	7.34		Top Middle Slab	5	0.12153189
	h (in)	9.84		Ext. Wall	6	0.069587
	d (in)	2.5		Bottom Slab +	7	0.1101257
	db (in²)	88.08		Bottom Slab -	8	0.10827128
				Int. Wall	9	0.0592397

$$A_{s\ RIPSRE\ i} = \frac{0.85\ f_c'\ b\ d_i\ \omega_i}{f_y} \quad (22)$$

Figure 46 shows the diameter, weights and the cross-sectional area for reinforcing bars.

TABLE A-1 Areas, Weights, and Dimensions of Reinforcing Bars

Bar Size Designation No.[b]	Grades[c]	Weight (lb/ft)	Nominal Dimensions[a] Diameter (in.)	Cross-Sectional Area (in.²)
3	40, 60	0.376	0.375	0.11
4	40, 60	0.668	0.500	0.20
5	40, 60	1.043	0.625	0.31
6	40, 60, 75	1.502	0.750	0.44
7	60, 75	2.044	0.875	0.60
8	60, 75	2.67	1.000	0.79
9	60, 75	3.40	1.128	1.00
10	60, 75	4.30	1.270	1.27
11	60, 75	5.31	1.410	1.56
14	60, 75	7.65	1.693	2.25
18	60, 75	13.60	2.257	4.00

[a]The nominal dimensions of a deformed bar are equivalent to those of a plain round bar having the same weight per foot as the deformed bar.
[b]Bar numbers are based on the number of eighths of an inch included in the nominal diameter.
[c]Grade is nominal yield strength in ksi.

Figure 46: Steel Reinforcement Areas (Reinforced Concrete, Wight and MacGregor)

Having determined the $A_{s\ RIPSRE,\ i}$, it is necessary to compute the steel reinforcement and spacing for the typical section, $A_{s\ i}$ is the steel reinforcement provided by the structural plans and the $A_{s\ RIPSRE,\ i}$ is the estimated steel reinforcement provided by the RIPSRE methodology. To do this the nearest steel reinforcement $A_{s\ i}$ from $A_{s\ RIPSRE\ i}$ was selected. For example, if $A_{s\ RIPSRE\ i}$ = 0.42in^2/ft and the real $A_{s\ i\ provided}$ = 0.44in^2/ft from bar diameter No.6, a No.6 rebar would be selected. However, since the steel reinforcement estimated by differs from a real bar size, an adjustment for steel reinforcement spacing is computed. This spacing will provide the exact bar No. and the exact steel reinforcement calculation from the RIPSRE methodology. The equation for the spacing of the $A_{s\ RIPSRE\ i}$ is shown in Equation 23.

The location ID for typical steel reinforcements match for their own steel reinforcement spacings and is shown in Figure 47. This steel reinforcement was computed by the RIPSRE methodology but is based on steel reinforcement area (e.g. as a virtual element concept). To convert the virtual concept to a constructability concept, it is necessary to modify the steel reinforcement area to a steel bar number with a specific spacing (e.g. No.7 @ 8in c.c.) as shown in Table 6. The rebar and spacing are the inputs for the reviewed reinforcement shown in Figure 48.

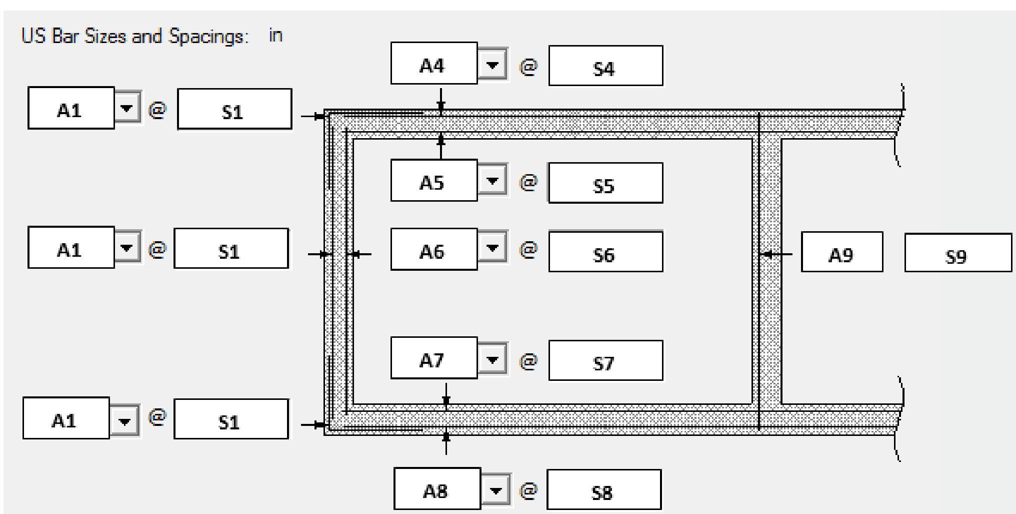

Figure 47: ID for Typical Steel Reinforcement for Stage I

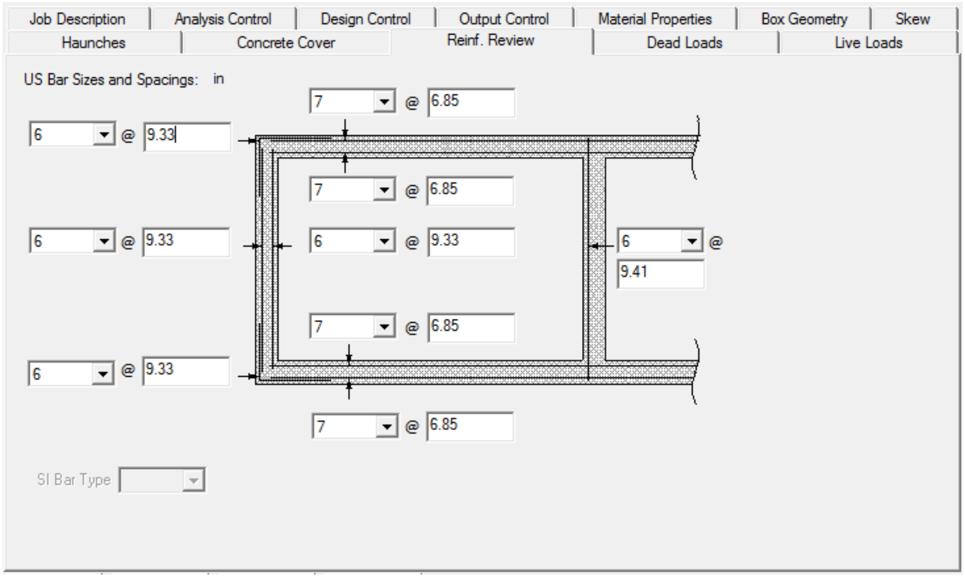

Figure 48: Steel Reinforcement Input Data from Brass Culvert 2.3.2

$$S = 12 \frac{A_{s\ provided\ i}}{A_{s\ RIPSRE\ i}} \tag{23}$$

Table 6: Steel Reinforcement for Each Typical Steel Section for Bridge No.1348

Reinforcement Index		Inferred Steel Reinforcements			
ω		As RIPSRE	As provided	As provided	Spacing RIPSRE
ID		*(in²/ft)*	*(in²/ft)*	*(#No)*	*(in)*
1	0.07661328	**0.430**	0.44	**6**	**12.27**
4	0.12641999	**0.710**	0.6	**7**	**10.14**
5	0.12153189	**0.682**	0.6	**7**	**10.55**
6	0.06958700	**0.391**	0.44	**6**	**13.51**
7	0.11012570	**0.618**	0.6	**7**	**11.64**
8	0.10827128	**0.608**	0.6	**7**	**11.84**
9	0.05923970	**0.333**	0.31	**5**	**11.18**

In order to provide consistency and a relation was investigated for steel reinforcements based on structural plans and RIPSRE methodology with the lower-bound and minimum reinforcements proposed by AASHTO SSHB 17th some iterations are performed. An example of the minimum reinforcement based on Equation 24 from SSHB 17th Ed Article 8.17.1 and the minimum steel reinforcement based on the RIPSRE methodology was determined with the lower-bound of the reinforcement index curves (Figure 9 to Figure 15) is presented in Figure 49. Table 7 presents steel reinforcements for Bridge No. 1348 based on structural plans, SSHB minimum, RIPSRE lower-bound and average curves.

$$M_{cr} = f_r \frac{I_g}{c_t} \qquad (24)$$

Where:

M_{cr} = Crack Flexural Moment (Article 8.17.1.1)

$f_r = 0.24\sqrt{f_c'} = \text{modulus of rupture for normal weight concrete}$ (Article 8.15.2.1.1)

I_g = Gross moment of inertia around the neutral axis

c_t = Vertical distance from the neutral axis to the extreme fiber in tension

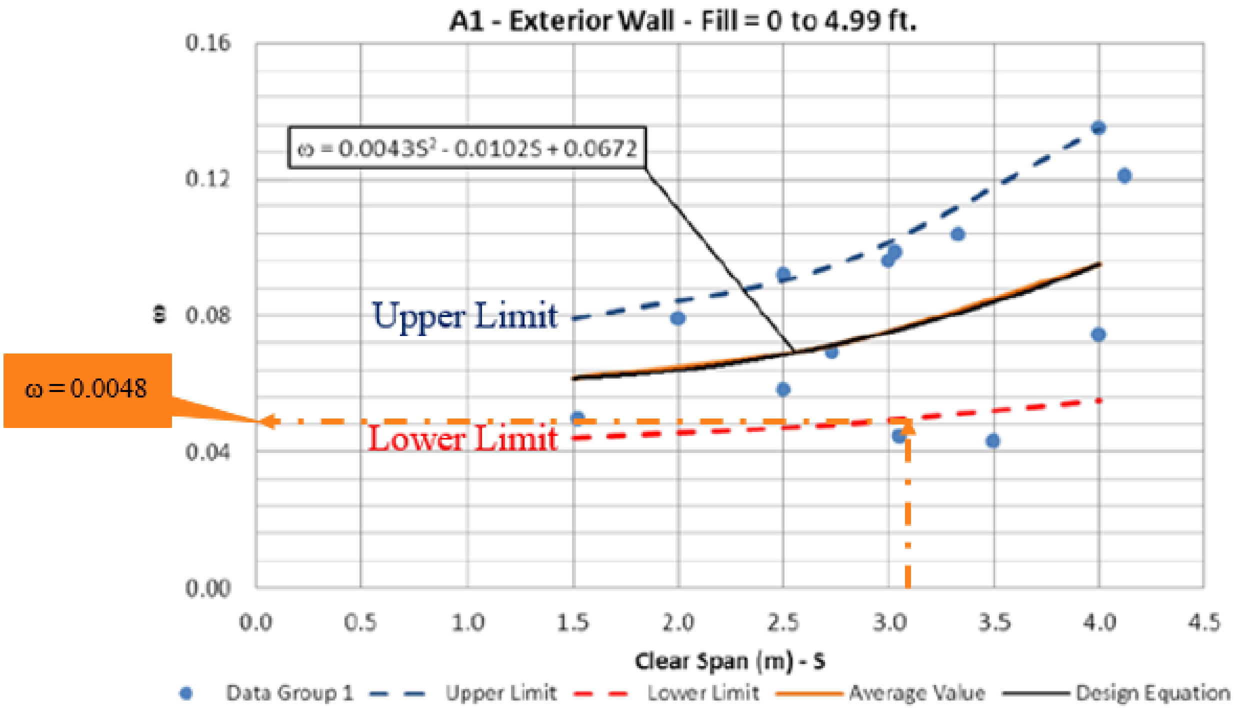

Figure 49: Reinforcement Index Curve for A1 using Lower-Bound Estimation

Table 7: Steel Reinforcements Computed by Structural Plans, SSHB Minimum, RIPSRE Average and RIPSRE Lower-Bound for Bridge No. 1348

	Steel Reinforcement					
Bridge	**Location**		**Plans**	**As min SSHB**	**RIPSRE Average**	**RIPSRE Lower**
(No.)		*(ID)*	*(in²/ft)*	*(in²/ft)*	*(in²/ft)*	*(in²/ft)*
1348	*Top Ext. Wall*	*A1*	0.566	0.35	0.430	0.270
	Top Slab -	A4	1.051	0.35	0.710	0.393
	Top Middle Slab	A5	1.051	0.35	0.682	0.365
	Ext. Wall	A6	0.566	0.35	0.391	0.225
	Bottom Slab +	A7	1.051	0.35	0.618	0.168
	Bottom Slab -	A8	1.051	0.35	0.608	0.337
	Int. Wall	A9	0.561	0.35	0.333	0.202

Note: RIPSRE = Reinforcement Index Parameter for Steel Reinforcement Estimation
SSHB = Standard Specifications for Highway and Bridges

It can be noticed from Table 7, that for some reinforcements ID, typical steel reinforcements computed by RIPSRE methodology are smaller than the minimum reinforcement stipulated by SSHB 17TH 2002. For Figure 50 to Figure 53 show the output of the unfactored moments and shears for HS-20 truckload, but also the software computes the unfactored internal reactions for all other truckloads, such as HS-30. Figure 54 shows output file for rating factor results and Figure 61 show the controlling rating factor for the entire bridge.

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-1.43	-2.41	-1.21	-0.36	1.86	0.83	-0.28
1- 1	-1.34	-0.04	-0.02	-0.05	-0.16	0.37	-0.20
1- 2	-1.26	1.62	0.81	0.19	-1.55	0.02	-0.22
1- 3	-1.17	2.64	1.32	0.36	-2.39	0.09	-0.56
1- 4	-1.08	3.10	1.55	0.46	-2.73	0.17	-1.02
1- 5	-1.00	3.05	1.53	0.49	-2.66	0.25	-1.47
1- 6	-0.91	2.59	1.29	0.46	-2.24	0.32	-1.93
1- 7	-0.82	1.77	0.89	0.36	-1.54	0.40	-2.38
1- 8	-0.74	0.68	0.34	0.19	-0.63	0.48	-2.84
1- 9	-0.65	-0.62	-0.31	-0.05	0.42	0.55	-3.30
1-10	-0.56	-2.05	-1.02	-0.36	1.54	0.63	-3.76
EXTERIOR WALL TOP							

Figure 50: Moments Resulted for Exterior Wall by HS-20 for Bridge No. 1348

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE Pos K	LOADS Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.08	2.59	1.29	0.32	-2.21	0.08	-0.43
1- 1	0.08	1.88	0.94	0.26	-1.59	0.08	-0.43
1- 2	0.08	1.25	0.62	0.19	-1.03	0.08	-0.43
1- 3	0.08	0.68	0.34	0.13	-0.54	0.08	-0.43
1- 4	0.08	0.18	0.09	0.06	-0.12	0.08	-0.43
1- 5	0.08	-0.25	-0.12	0.00	0.24	0.08	-0.43
1- 6	0.08	-0.61	-0.31	-0.06	0.54	0.08	-0.43
1- 7	0.08	-0.91	-0.45	-0.13	0.77	0.08	-0.43
1- 8	0.08	-1.13	-0.57	-0.19	0.93	0.08	-0.43
1- 9	0.08	-1.29	-0.65	-0.26	1.03	0.08	-0.43
1-10	0.08	-1.38	-0.69	-0.32	1.06	0.08	-0.43
EXTERIOR WALL TOP							

Figure 51: Shears Resulted for Exterior Wall by HS-20 for Bridge No. 1348

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE Pos Kft	LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-1.43	-2.41	-1.21	-0.36	1.86	1.25	-0.42
1- 1	-1.34	-0.04	-0.02	-0.05	-0.16	0.56	-0.30
1- 2	-1.26	1.62	0.81	0.19	-1.55	0.03	-0.32
1- 3	-1.17	2.64	1.32	0.36	-2.39	0.14	-0.85
1- 4	-1.08	3.10	1.55	0.46	-2.73	0.25	-1.53
1- 5	-1.00	3.05	1.53	0.49	-2.66	0.37	-2.21
1- 6	-0.91	2.59	1.29	0.46	-2.24	0.48	-2.89
1- 7	-0.82	1.77	0.89	0.36	-1.54	0.60	-3.58
1- 8	-0.74	0.68	0.34	0.19	-0.63	0.71	-4.26
1- 9	-0.65	-0.62	-0.31	-0.05	0.42	0.83	-4.95
1-10	-0.56	-2.05	-1.02	-0.36	1.54	0.94	-5.63
EXTERIOR WALL TOP							

Figure 52: Moments Resulted for Exterior Wall by HS-30 for Bridge No. 1348

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE Pos	LOADS Neg
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.08	2.59	1.29	0.32	-2.21	0.12	-0.65
1- 1	0.08	1.88	0.94	0.26	-1.59	0.12	-0.65
1- 2	0.08	1.25	0.62	0.19	-1.03	0.12	-0.65
1- 3	0.08	0.68	0.34	0.13	-0.54	0.12	-0.65
1- 4	0.08	0.18	0.09	0.06	-0.12	0.12	-0.65
1- 5	0.08	-0.25	-0.12	0.00	0.24	0.12	-0.65
1- 6	0.08	-0.61	-0.31	-0.06	0.54	0.12	-0.65
1- 7	0.08	-0.91	-0.45	-0.13	0.77	0.12	-0.65
1- 8	0.08	-1.13	-0.57	-0.19	0.93	0.12	-0.65
1- 9	0.08	-1.29	-0.65	-0.26	1.03	0.12	-0.65
1-10	0.08	-1.38	-0.69	-0.32	1.06	0.12	-0.65
EXTERIOR WALL TOP							

Figure 53: Shears Resulted for Exterior Wall by HS-30 for Bridge No. 1348

Factored Actions for Load Factor Design at Tenth Points (per unit design width)

M-Pt	+Moment (Kft)	-Moment (Kft)	+A.F. (Kips)	-A.F. (Kips)	+Shear (Kips)	-Shear (Kips)
EXTERIOR WALL BOTTOM						
1- 0	1.686	-6.696	-0.206	-15.863	4.427	-2.487
1- 1	-0.564	-2.768	-0.206	-15.863	3.374	-2.136
1- 2	0.933	-3.302	-0.206	-15.863	2.410	-1.826
1- 3	2.990	-4.741	-0.206	-15.863	1.534	-1.556
1- 4	4.161	-6.259	-0.206	-15.863	0.747	-1.327
1- 5	4.541	-7.560	-0.206	-15.863	0.527	-1.618
1- 6	4.223	-8.683	-0.206	-15.863	0.674	-2.227
1- 7	3.303	-9.670	-0.206	-15.863	0.780	-2.748
1- 8	1.874	-10.566	-0.206	-15.863	0.846	-3.181
1- 9	1.097	-12.482	-0.206	-15.863	0.871	-3.525
1-10	1.986	-16.383	-0.206	-15.863	0.855	-3.780
EXTERIOR WALL TOP						
TOP SLAB LEFT SIDE						
2- 0	1.986	-16.383	0.845	-3.775	16.135	0.205
2- 1	10.196	-6.506	0.845	-3.775	13.978	-1.015
2- 2	17.293	-1.351	0.845	-3.775	12.127	-2.631
2- 3	23.382	-1.269	0.845	-3.775	10.141	-4.380
2- 4	26.826	-1.601	0.845	-3.775	8.088	-6.208
2- 5	27.225	-2.242	0.845	-3.775	6.024	-8.080
2- 6	24.719	-3.191	0.845	-3.775	4.058	-9.934
2- 7	19.594	-4.450	0.845	-3.775	2.275	-11.720
2- 8	13.129	-7.099	0.845	-3.775	0.764	-13.422
2- 9	6.119	-13.331	0.845	-3.775	-0.431	-14.929
2-10	-0.506	-22.813	0.845	-3.775	-1.049	-15.699
TOP SLAB RIGHT SIDE						

Figure 54: Rating Factor for Bridge No. 1348 at Exterior Wall and Top Slab

The flexural moment, shear and axial capacity are computed based on Equation 25 to Equation 28. Figure 55 shows the box culvert capacity computed by Brass-Culvert software. The blue rectangle represents the element thickness and concrete cover; the green rectangle shows the moment capacity for each element and section (i.e. top, middle, bottom, left and right) and the red rectangle shows the shear capacity with the same section that the moment capacity.

$$C = \phi_C \phi Mn \quad and \quad \phi_C \phi Vn \quad and \quad \phi_C \phi Pn \qquad (25)$$

Where:

ϕ = 0.90, 0.85 or 0.70 (flexure, shear or axial with ties; respectively)

$$\phi Mn = \phi\left[(A_s - A'_s)f_y\left(d - \frac{a}{2}\right) + A'_s f_y(d - d')\right] \quad (26)$$

Where:

A_s = tensile steel reinforcement

A'_s = compression steel reinforcement

f_y = steel reinforcement yielding stress point

f'_c = maximum compressive strength at 28 days

d = distance from the extreme compression fiber to the centroid of tensile force

d' = distance from the extreme tension fiber to the centroid of the tensile force

$a = \frac{(A_s - A'_s)\, f_y}{0.85\, f'_c\, b}$ = depth of the equivalent stress block (i.e., Whitney's Stress)

$$\phi V_c = \phi\left(2.14\sqrt{f'_c} + 4{,}600\,\rho\,\frac{V_u\,d}{M_u}\right) bd \quad (27)$$

Where:

ρ = ratio between steel reinforcement and the sectional area

V_u = Factored Shear Demand

M_u = Factored Moment Demand

$$\phi P_{n\,max} = \phi\ 0.80\left[0.85 f_c'\left(A_g - A_s\right) + f_y A_s\right] \tag{28}$$

Where:

A_g = Sectional gross element area

```
Member No. - 1 EXTERIOR WALL     Thickness                 - 9.84 (in)
                                 Clear cover at end        - 2.00 (in)
                                 Clear cover at middle -   2.00 (in)
                                 Bar diameter (bot )       - 0.75 (in)
                                 Bar diameter (mid+)       - 0.75 (in)
                                 Bar diameter (mid-)       - 0.75 (in)
                                 Bar diameter (top )       - 0.75 (in)

             Coin.                   Resistance                                   Flexure      Shear
      Moment Axial Shear Shear  Po    Mu  Mbal  Pbal  Steel   Mom.  Des.   Ratings      Ratings
             Force Force Cap    Cap   Cap Cap   Cap   Area    Cap   Thk   Inv  Oper   Inv  Oper
       Kft   Kips  Kips  Kips   Kips  Kft Kft   Kips  In2     Kft   in
BOT    -4.9   0.2   3.4   8.4  225.6 12.0 24.7  77.3  0.5659  12.1  7.47   7.7 12.9   3.1   5.2
MID     4.5   0.2   0.5   8.3  225.6 12.0 24.7  77.3  0.5659  12.1  7.47   5.0  8.4   NA    NA
MID-   -7.6   0.2   1.6   8.3  225.6 12.0 24.7  77.3  0.5659  12.1  7.47   2.5  4.2   NA    NA
TOP   -14.6*  0.2   3.5   8.3  225.6 12.0 24.7  77.3  0.5659  12.1  7.47   0.9  1.5   2.0   3.3

Member No. - 2 TOP SLAB          Thickness                 - 9.84 (in)
                                 Clear cover at end        - 2.00 (in)
                                 Clear cover at middle -   2.00 (in)
                                 Bar diameter (lt  )       - 0.75 (in)
                                 Bar diameter (mid )       - 0.88 (in)
                                 Bar diameter (rt  )       - 0.88 (in)

LT    -11.9   0.8  14.0*  8.3  225.6 12.0 24.7  77.3  0.5659  12.2  7.47   1.2  2.1   0.8   1.3
MID    27.2*  0.8   6.0   8.3  238.3 21.2 27.4  62.9  1.0511  21.3  7.40   0.8  1.3   NA    NA
RT    -18.5   0.8  14.9*  8.3  238.3 21.2 27.4  62.9  1.0511  21.3  7.40   1.2  2.0   0.3   0.6

Member No. - 3 INTERIOR WALL     Thickness                 - 9.84 (in)
                                 Clear cover at end        - 2.00 (in)
                                 Clear cover at middle -   2.00 (in)
                                 Bar diameter (bot )       - 0.75 (in)
                                 Bar diameter (mid+)       - 0.75 (in)
                                 Bar diameter (mid-)       - 0.75 (in)
                                 Bar diameter (top )       - 0.75 (in)

BOT    -2.3   1.9   1.1   8.3  225.5 11.9 24.6  77.4  0.5611  12.3  7.47   5.3  8.9   4.6   7.6
MID     3.6   1.9   1.1   8.3  225.5 11.9 24.6  77.4  0.5611  12.3  7.47   3.9  6.6   NA    NA
MID-   -3.1   1.9   1.1   8.3  225.5 11.9 24.6  77.4  0.5611  12.3  7.47   4.0  6.6   NA    NA
TOP    -8.4   1.9   1.1   8.3  225.5 11.9 24.6  77.4  0.5611  12.3  7.47   1.5  2.5   4.6   7.6

Member No. - 4 BOTTOM SLAB       Thickness                 - 9.84 (in)
                                 Clear cover at end        - 2.00 (in)
                                 Clear cover at middle -   2.00 (in)
                                 Bar diameter (lt  )       - 0.75 (in)
                                 Bar diameter (mid )       - 0.88 (in)
                                 Bar diameter (rt  )       - 0.88 (in)

LT     -5.2   2.5   2.7   8.3  225.6 12.0 24.7  77.3  0.5659  12.5  7.47   7.9 13.2  16.6  27.6
MID     6.0   2.5   0.2   8.3  238.3 21.2 27.4  62.9  1.0511  21.4  7.40  10.1 16.9   NA    NA
RT     -7.0   2.5   3.5   8.6  238.3 21.2 27.4  62.9  1.0511  21.4  7.40   6.7 11.2   3.8   6.3
```

Figure 55: Output File for RCBC Capacity from Brass Culvert

To determine the accuracy and the procedure of Brass-Culvert™, hand computations were performed. The output of Brass-Culvert™ are the unfactored moments and shears from Brass-Culvert™ used to compute the load rating on each segment and critical section. A_1 factors moments and shears for all dead loads and A_2 for live loads. Each dead load and live load were multiplied by the $A_1 = 1.3$ factor for operating level rating. Operating level is used to establish the posting tons sign on the bridge. Also, the spreadsheet computes the LR at the inventory level, computing all dead loads multiplied by an A_1 factor and all live load multiplying by A_2 = 2.17 factor. The computations examples are only for the 0.3*clear span (i.e. the yellow highlighted strip in Table 8, Table 9 and Table 10). The next table (Table 8) shows the moment reaction for HS-20 truckload for the hand computations example. Also, these reactions will be combined to establish the worst-case dead and live load cases as shown in section 3.2.2.

Table 8: Brass Culvert Unfactored Moment Output of HS-30 are the Spreadsheets Inputs

BRASS-CULVERT Output (kip-ft/ft)

Current Live Load: HS-30T

Unfactored MOMENTS

Design Span	Element - Points	Dead Load	Soil Pressure		Surcharge	Max Water	Live Load		Capacity
			Max	Min	Height	Pressure	+	-	
ft		K-ft	K-ft	K-ft	K-ft	K-ft	K-ft	K-ft	K-ft
	EXTERIOR WALL BOTT(								
0.000	1-0	-1.43	-2.41	-1.21	-0.36	1.86	1.25	-0.42	9.3
1.066	1-1	-1.34	-0.04	-0.02	-0.05	-0.16	0.56	-0.3	9.3
2.132	1-2	-1.26	1.62	0.81	0.19	-1.55	0.03	-0.32	9.3
3.198	1-3	-1.17	2.64	1.32	0.36	-2.39	0.14	-0.85	9.3
4.264	1-4	-1.08	3.1	1.55	0.46	-2.73	0.25	-1.53	9.3
5.330	1-5	-1	3.05	1.53	0.49	-2.66	0.37	-2.21	9.3
6.396	1-6	-0.91	2.59	1.29	0.46	-2.24	0.48	-2.89	9.3
7.462	1-7	-0.82	1.77	0.89	0.36	-1.54	0.6	-3.58	9.3
8.528	1-8	-0.74	0.68	0.34	0.19	-0.63	0.71	-4.26	9.3
9.594	1-9	-0.65	-0.62	-0.31	-0.05	0.42	0.83	-4.95	9.3
10.660	1-10	-0.56	-2.05	-1.02	-0.36	1.54	0.94	-5.63	9.3
	EXTERIOR WALL TOP								

Table 9 shows the results of factored dead loads, which, are the worst dead loads cases. Also, the difference between the worst factored dead load cases and culvert capacity. These subsequent computations are the hand and examples computations, which are shown in Table 9.

Exterior wall bottom, Element-Point 1-3

✓ **Max Dead Load Cases**

i. $(D + E_{max} + W) \times A_1$

$(-1.17 \times 1.3) + (2.64 \times 1.3) + (-2.39 \times 1.3) = -1.2$

ii. $(D + E_{min} + W) \times A_1$

$(-1.17 \times 1.3) + (1.32 \times 1.3) + (-2.39 \times 1.3) = -2.9$

iii. $(D + E_{max}) \times A_1$

$(-1.17 \times 1.3) + (2.64 \times 1.3) = 1.9$

iv. $(D + E_{min}) \times A_1$

$(-1.17 \times 1.3) + (1.32 \times 1.3) = 0.2$

✓ **Max | A_1 x D_i |**

Max | -1.2 |, | -2.9 |, | 1.9 |, | 0.2 | = 2.9

✓ **C - Max | A_1 x D_i |**

9.3 – 2.9 = 6.39

Table 9: Dead Load Cases Results from Spreadsheet for Bridge No. 1348

Dead Load				Max A_1D	C-A_1D
Water +		No Water			
Max Soil	Min Soil	Max Soil	Min Soil		
A_1D					
-2.6	-1.0	-5.0	-3.4	5.0	4.31
-2.0	-2.0	-1.8	-1.8	2.0	7.30
-1.5	-2.6	0.5	-0.6	2.6	6.70
-1.2	**-2.9**	**1.9**	**0.2**	**2.9**	**6.39**
-0.9	-2.9	2.6	0.6	2.9	6.36
-0.8	-2.8	2.7	0.7	2.8	6.53
-0.7	-2.4	2.2	0.5	2.4	6.88
-0.8	-1.9	1.2	0.1	1.9	7.39
-0.9	-1.3	-0.1	-0.5	1.3	7.96
-1.1	-0.7	-1.7	-1.2	1.7	7.65
-1.4	-0.1	-3.4	-2.1	3.4	5.91

✓ **Max Live Load Cases**

i. $(LL^{+} \times 1.3) + (LL_{surcharge} \times 1.3)$

$(0.14 \times 1.3) + (0.36 \times 1.3) = 0.65$

ii. $(LL^{-} \times 1.3) + (LL_{surcharge} \times 1.3)$

$(-0.85 \times 1.3) + (0.36 \times 1.3) = -0.637$

iii. $(LL^{+} \times 1.3)$

$(0.14 \times 1.3) = 0.182$

iv. $(LL^{-} \times 1.3)$

(-0.85 x 1.3 = 1.105

✓ **Operating Rating Factor**

$$ORF_i = \frac{C - |Max(A_1 D_i)|}{Max(A_1 LL_i)}$$

$$ORF_i = \frac{9.3 - 2.9}{1.105} = \mathbf{5.78}$$

The Operating Rating Factor for each RCBC in flexure state load is the minimum of all operating rating factors considering each element and their rating factors computed every 1/10 length dimension. Not the same applied for shear state load for operating level. For shear state load the *ORF* were calculated based on the critical section as shown in Figure 56. For shear state load the ORF is calculated using linear interpolation (Equation 29) between the span length ranges.

$$RF_{CR} = RF_i + \frac{[(D_{cr} - D_i)(RF_{i+1} - RF_i)]}{(D_{i+1} - D_i)} \qquad (29)$$

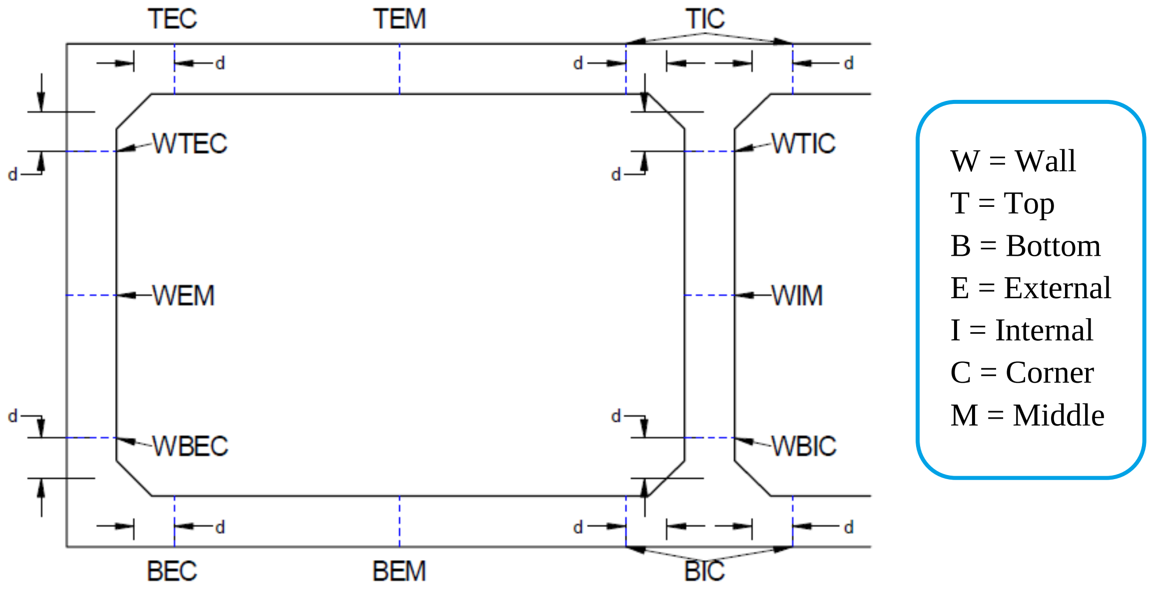

Figure 56: Shear Critical Sections for RCBC with Haunches (Culvert Rating Guide, TxDOT)

Table 10: Operating and Inventory Level Rating Factor from Spreadsheet for Bridge No. 1348

Live Load				ORF	Live Load				IRF
LL Surch		LL No Surch			LL Surch		LL No Surch		
+LL	-LL	+LL	-LL		+LL	-LL	+LL	-LL	
Operating Rating				Rating	Inventory Rating				Rating
3.72	4.25	2.65	7.89	2.65	2.23	2.55	1.59	4.73	1.59
11.01	16.04	10.02	18.71	10.02	6.59	9.61	6.01	11.21	6.01
23.43	39.64	171.79	16.11	16.11	14.03	23.75	102.92	9.65	9.65
9.83	10.03	35.10	5.78	**5.78**	5.89	6.01	21.03	3.46	**3.46**
6.89	4.57	19.58	3.20	3.20	4.13	2.74	11.73	1.92	1.92
5.84	2.92	13.58	2.27	2.27	3.50	1.75	8.13	1.36	1.36
5.63	2.18	11.03	1.83	1.83	3.37	1.31	6.61	1.10	1.10
5.92	1.77	9.47	1.59	1.59	3.55	1.06	5.68	0.95	0.95
6.80	1.50	8.63	1.44	1.44	4.08	0.90	5.17	0.86	0.86
7.54	1.18	7.09	1.19	1.18	4.52	0.70	4.25	0.71	0.70
7.83	0.76	4.83	0.81	0.76	4.69	0.45	2.90	0.48	0.45

Based on the recommendations of the Texas DOT Culvert Rating Guide from 2009, if the box culvert has haunches, the rating factor should be computed at 0.25 haunch base from the edge as shown in Figure 57 for the top and bottom slabs. The same recommendation applies to the culvert walls. For shear load state the TxDOT recommended that the critical section is taken at a distance *d* from the middle of the haunch, as shown in Figure 56 (above). The computations for rating factor at operating rating level for flexural state loads on haunches are shown in Figure 57. Shear state load and flexural haunches corrections are computed using linear interpolation (Equation 29), between critical distances and boundary ranges for each dead load (see Figure 58) and live loads forces (see Figure 57). At the end, the rating factor is the parameter which establishes the result for the structural condition on the RCBC. Figure 60 shows the *RF* for the haunches analysis.

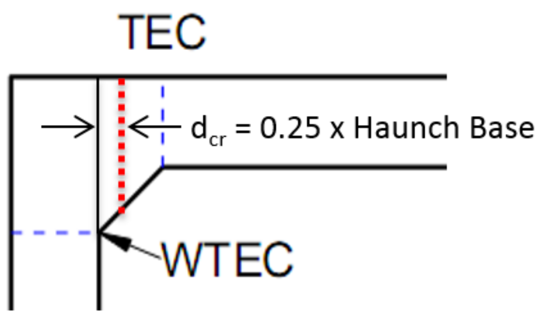

Figure 57: Distance for Critical Moment Sections for Haunches Box Culverts

Where:

D_{cr} = Critical section in absolute distance for each state load

D_i = Previously absolute $n_i/10$ length dimension

D_{i+1} = Next absolute distance of $n_{i+1}/10$ length dimension

RF_i = Previously rating factor for $n_i/10$ length dimension

RF_{i+1} = Next rating factor for $n_{i+1}/10$ length dimension

RF_{cr} = Rating factor for critical distance

Haunch Corrections									
		Dead Load	Soil Pressure		Surcharge	Max Water	Live Load		Capacity
			Max	Min	Height	Pressure	+	-	
Haunch Distance (ft)	EXTERIOR WALL BOTTOM								
0.533	1- B	-1.38	-1.22	-0.61	-0.20	0.85	0.60	-0.24	9.30
10.127	1- T	-0.61	-1.33	-0.66	-0.20	0.98	0.59	-3.53	9.30
	EXTERIOR WALL TOP								
Haunch Distance (ft)	TOP SLAB LEFT SIDE								
0.533	2- L	-0.12	-1.92	-0.96	-0.34	1.44	1.71	-2.50	9.40
10.237	2- R	-1.73	0.46	0.23	0.08	-0.34	1.31	-4.84	14.90
	TOP SLAB RIGHT SIDE								

Figure 58: Bridge No. 1348 Dead and Live Loads Maximum Moments for Exterior and Top Haunches

Water +		No Water			
Max Soil	Min Soil	Min Soil	Max Soil		
A_1D				Max A_1D	C-A_1D
-2.3	-1.5	-3.4	-2.6	3.4	5.91
-1.2	-0.4	-2.5	-1.7	2.5	6.78

A_1D				Max A_1D	C-A_1D
-0.8	0.5	-2.7	-1.4	2.7	6.75
-2.1	-2.4	-1.7	-2.0	2.4	12.50

Figure 59: Bridge No. 1348 Load Cases for Exterior and Top Haunches

LL Surch		LL No Surch			LL Surch		LL No Surch		
+LL	-LL	+LL	-LL		+LL	-LL	+LL	-LL	
Operating Rating				ORF	Inventory Rating				IRF
11.50	10.21	7.57	18.93	7.57	6.89	6.12	4.54	11.34	4.54
13.54	1.40	8.84	1.48	1.40	8.11	0.84	5.29	0.88	0.84

Operating Rating				ORF	Inventory Rating				IRF
3.76	1.83	3.03	2.08	1.83	2.25	1.10	1.81	1.24	1.10
6.91	2.02	7.33	1.99	1.99	4.14	1.21	4.39	1.19	1.19

Figure 60: Bridge No. 1348 HS-20 Rating Factors for Exterior and Top Haunches

```
                    *OPERATING RATING*


LOAD NO.  1: AASHTO HS20-44 (MS 18) TRUCK (US)
   TOTAL VEHICLE WT.   :      36.000 (TONS)
   CONTROLLING MEMBER  :       2
   CONTROLLING POINT   :       Right
   RATING FACTOR       :       0.859
   LOAD RATING         :      30.929 (TONS)
   ACTION TYPE         :       Shear

LOAD NO.  2: AASHTO HS30-44 (MS 27) TRUCK (US)
   TOTAL VEHICLE WT.   :      54.000 (TONS)
   CONTROLLING MEMBER  :       2
   CONTROLLING POINT   :       Right
   RATING FACTOR       :       0.575
   LOAD RATING         :      31.033 (TONS)
   ACTION TYPE         :       Shear
```

Figure 61: Controlling Rating Factor for HS-20 and HS-30

All *RF* provided by Brass-Culvert™ output files and *RF* based on the spreadsheet should be the same or very similar. The minimum *RF* value for each 1/10 iteration step element and state load of Bridge No. 1348 must match with the controlling *RF* provided by Brass-Culvert™ as shown in Figure 61. Table 11 present the controlling results of the ORF_{RIPSRE} and ORF_{Plans}. This ORF_{RIPSRE} was based on the average curve for all RCBC analyzed in Section 5.1.2. The bridges highlighted in yellow, are bridges that were used when for the development of the reinforcement index parameter curves.

Table 11: ORF for HS-30 Live Load Results for Structural Plans and RIPSRE Average Curve

			ORF $_{HS-30}$	
Bridge	**Fill Depth**		**Structural Plans**	**RIPSRE Average**
(No.)	*(ft)*		*(#)*	*(#)*
664	≤ 5 ft	0.00	0.59	0.66
1348	≤ 5 ft	0.46	1.31	0.78
1358	≤ 5 ft	5.00	0.11	0.00
139	> 5 ft	11.48	2.28	5.72
767	> 5 ft	9.19	1.94	2.00
799	> 5 ft	5.42	0.23	0.45
1108	> 5 ft	13.79	0.42	0.00
1170	> 5 ft	12.13	1.43	4.90

Bridges No. 139, 767, 1108 and 1170 will not show similar results for both methodologies since soil fill depth exceeds 5ft for those bridges. Bridge No. 139 results in an overestimation of the *ORF* based on RIPSRE methodology. To estimate the *ORF* with more accuracy, other iterations with steel reinforcement will be used as RIPSRE $_{\text{Lower Bound}}$ and SSHB $_{\text{min}}$. The table above (Table 11) presents the results of the *ORF* for Bridge No. 139 using the average steel curve. The RIPSRE $_{\text{Upper Bound}}$ was used to demonstrate that a larger steel reinforcement the RF increase on the RCBC. Typical steel reinforcement has a direct relationship with the flexural bridge capacity. In the end, a large *ORF* can result from computing steel reinforcement based on the Upper-Bound Curve. Table 12 present the results of ORF_{RIPSRE} and ORF_{Plans} on the same section (i.e. middle of the top slab) that are established in the Load Rating Report.

Table 12: ORF at Middle Top Slab Results in Function of Different Steel Reinforcement

	A_s	***ORF $_{HS\text{-}30}$ at 0.5 x Span Length***
	(in^2/ft)	*(#)*
Bridge No. 139	Structural Plans	1.53
	RIPSRE $_{Average}$	12.92
	RIPSRE $_{Lower\ Bound}$	2.39
	SSHB $_{min}$	0.00
	RIPSRE $_{Upper\ Bound}$	23.4

None of the methodologies applies for the steel reinforcement estimation gives good accurate results, because the RIPSRE method is not applicable to the bridge. However, the Lower Bound curve give the closest estimate in the *ORF* computation.

$$ORF = 0.0 \rightarrow (Capacity - Dead\ Load) \leq 0.0$$

The table above (Table 12) shows an *ORF* for Bridge No. 139 based on the minimum steel reinforcement established by SSHB 17th equals to 0.0. The meaning of an *ORF* of 0.0 is that the difference between the capacity and dead loads are less or equal to 0.0. However, an *ORF* of 0.0 with the analytical software does not necessarily mean that the bridge needs to be closed. Typically, the next step to provide a *LR* is to perform a load test (PLT).

5.2 Stage II: Reinforcement Index (ω) and Proof Load Test

In this section the load carrying capacity of each RCBC analyzed will be compared to the PLT carrying capacity reports. Table 13 lists the 8 RCBCs analyzed in this section. The RIPSRE methodology was compared with the RCBC capacity obtained by PLT. Also, this section describes how the data was obtained, processed and analyzed (PRHTA and Virella-Crespo 2012).

Table 13: List of RCBC Analyzed in Stage II

Bridge	Municipality	Clear Span	Fill Depth	Year Built	Cells
(No.)		*(ft)*	*(ft)*		*(#)*
658	Carolina	16.41	0.00	1953	1
752	Canovanas	9.84	6.00	1960	2
848	Guaynabo	11.08	8.90	1961	2
849	Caguas	11.42	0.83	1961	2
1359	Guayanilla	10.82	0.54	1935	4
2010	San Lorenzo	9.84	4.40	1971	2
2113	Bayamon	10.5	0.00	1955	3

Bridges No. 752 and 848 the RIPSRE methodology is not applicable since soil fill depth exceeds 5ft for those bridges. However, some iterations were provided to give closest *ORF* computation.

5.2.1 Part-A: LR of RCBC based on Proof Load Test

The RCBCs capacities in tons as obtained from the PLT reports from the Puerto Rico Highway Transportation Authority (PRHTA) are discussed in the following paragraphs. In Chapter 4 descriptions the instrumentation used on field, equations, and procedures to perform the PLT were discussed. For bridges without plans, a PLT is recommended to estimate the load rating of these. Personnel of Virella Crespo and Associates and Eng. Juan C. Virella-Crespo, Ph.D., PE performed the PLT and certified each PLT report and field test, include on this project.

Part-A of Stage II is focused on Bridge No. 1359. A PLT was conducted to estimate the maximum ton capacity or load rating to verify for PRHTA legal loads and design loads. This bridge is located in Guayanilla, Puerto Rico (see Figure 62) approximately 6 Km South from the Peñuelas township at PR-127 Km 19.1. PRHTA required to determine the maximum ton capacity since there are many petrochemicals plants near the area that are visited by heavy trucks (e.g., 3-S2) that transit (see Figure 63).

Figure 62: Front View of Bridge No. 1359 at Guayanilla, Puerto Rico (Virella Crespo and Associates)

Figure 63: Typical Truck Transit (FM-3-S2) near Bridge No. 1359 (Virella Crespo and Associates)

The RCBC tonnage capacity is known from PLT reports. Table 14 summarizes the load rating for each RCBC analyzed in this section. The first step is to weight the empty truck. The truck is filled and weighted incrementally as described by the MBE. The test truck is then transited over the bridge at very low speed to perform the PLT as discussed in section 4.1. The PLT stops when the bridge ceases to display elastic linear behavior, the personnel identifies cracks or when the target load is reached. The PLT is limited by the maximum weight of the truck is used for the test. Another potential limitation is the fill used to load the truck since the use of different fill materials will affect the weight of the truck. Reaching the target load noes not necessarily means that the rating tonnage is reached, since the bridge could have the remaining capacity. If the bridge is behaving in the elastic linear range since the structure could have significantly more capacity before changing to the non-linear range has not been reached. Table 14 shows the test truck weight and fill weight for each PLT on each RCBC analyzed by PLT.

Table 14: Rating Ton for each RCBC

Bridge	**LR Tons Establish by PLT reports**
(No.)	**(Tons)**
658	17.0
752	13.0
848	27.0
849	16.0
1359*	48.0
2010	13.0
2113	19.0

*Note: * The PLT of this bridge was based on two dump trucks side-by-side*

Table 15 shows the dump truck weights, how much fill was used for each RCBC and the gross vehicle weight (GVW) on each bridge. Bridge No. 1359 was tested with a large of weight which was represented in the field by two dump trucks.

Table 15: Dump trucks and Fill Weight for each RCBC in the PLT

Bridge	**No. of dump trucks**	**Dump Truck Weight**	**Fill Weight**	**Dump truck + Fill Weight (GVW)**	
(No.)		***(kips)***	***(kips)***	***(kips)***	***(Tons)***
658	1	26.6	46.9	73.5	**36.75**
752	1	26.8	23.6	50.4	**25.2**
848	1	26.3	49.6	75.9	**37.95**
849	1	26.4	34.2	60.6	**30.3**
1359	2	31.7	67.4	99.1	**49.55**
		29.2	71.9	101.1	**50.55**
2010	1	26.8	26.9	53.7	**26.85**
2113	1	26.3	50.1	76.4	**38.2**

5.2.2 Part-B: LR of RCBC without Structural Plans based on RIPSRE Methodology

To estimate the steel reinforcement of each RCBC, the RIPSRE methodology was used. Parameters and assumptions discussed in Chapter 3 and Section 5.1.1 also apply to this analysis. In the literature, there can be found some guidelines for structural and mechanical properties that could be used to make necessary assumptions to conduct the analyses. These guidelines are helpful to reduce uncertainty when the *LR* of a bridge is computed. Brass-Culvert™ was used to construct the computational model and to determine the *LR* of each RCBC.

Typically, the normal concrete unit weight is 150 lbs/ft^3, but the Bridge Design and Specifications 2012 provide a table with the unit weights of the most common materials (Figure 64). The unit weight is necessary to determine self-weight of the structure and other superimposed dead loads (e.g. *DL*, railings, sidewalks).

Table 3.5.1-1—Unit Weights

Material		Unit Weight (kcf)
Aluminum Alloys		0.175
Bituminous Wearing Surfaces		0.140
Cast Iron		0.450
Cinder Filling		0.060
Compacted Sand, Silt, or Clay		0.120
Concrete	Lightweight	0.110
	Sand-Lightweight	0.120
	Normal Weight with $f'_c \leq 5.0$ ksi	0.145
	Normal Weight with $5.0 < f'_c \leq 15.0$ ksi	$0.140 + 0.001 f'_c$
Loose Sand, Silt, or Gravel		0.100
Soft Clay		0.100
Rolled Gravel, Macadam, or Ballast		0.140
Steel		0.490
Stone Masonry		0.170
Wood	Hard	0.060
	Soft	0.050
Water	Fresh	0.0624
	Salt	0.0640
Item		Weight per Unit Length (klf)
Transit Rails, Ties, and Fastening per Track		0.200

Figure 64: Common Unit Weights (AASHTO LRFD Bridge 2012)

The MBE 2nd Edition 2013 provides guidelines to estimate material properties when the structural plans are not available. The next figures (see Figure 64 to Figure 67) provide some structural parameters which incorporate uncertainties in the structural capacity estimation when the structural plans are not available. Minimum compressive strength (f'_c) and yield strength (f_y) guidelines are presented in Figure 65 and Figure 66.

Table 6A.5.2.1-1—Minimum Compressive Strength of Concrete by Year of Construction

Year of Construction	Compressive Strength, f'_c, ksi
Prior to 1959	2.5
1959 and Later	3.0

Figure 65: Minimum Compressive Stress Concrete by Year of Construction (MBE 2nd Edition 2013)

Table 6A.5.2.2-1—Yield Strength of Reinforcing Steel

Type of Reinforcing Steel	Yield Strength, f_y, ksi
Unknown steel constructed prior to 1954	33.0
Structural grade	36.0
Billet or intermediate grade, Grade 40, and unknown steel constructed during or after 1954	40.0
Rail or hard grade, Grade 50	50.0
Grade 60	60.0

Figure 66: Yield Strength of Reinforcing Steel (MBE 2nd Edition 2013)

The concrete cover is another parameter that affects the flexural and shear state load capacity. The concrete cover is the distance between the concrete surface and the embedded steel reinforcement. This cover is required to provide durability in the steel reinforcement rebar and provide protection against the corrosion, fire and organic material. The LRFD Bridge Design and

Specifications 2012 provides a table (Figure 67) with guidelines of the minimum concrete cover that must be used in the bridge design. Typically the concrete cover used in RCBC is cast-in-place non-corrosive environment is 2in.

Table 5.12.3-1—Cover for Unprotected Main Reinforcing Steel (in.)

Situation	Cover (in.)
Direct exposure to salt water	4.0
Cast against earth	3.0
Coastal	3.0
Exposure to deicing salts	2.5
Deck surfaces subject to tire stud or chain wear	2.5
Exterior other than above	2.0
Interior other than above • Up to No. 11 bar • No. 14 and No. 18 bars	 1.5 2.0
Bottom of cast-in-place slabs • Up to No. 11 bar • No. 14 and No. 18 bars	 1.0 2.0
Precast soffit form panels	0.8
Precast reinforced piles • Noncorrosive environments • Corrosive environments	 2.0 3.0
Precast prestressed piles	2.0
Cast-in-place piles • Noncorrosive environments • Corrosive environments - General - Protected • Shells • Auger-cast, tremie concrete, or slurry construction	 2.0 3.0 3.0 2.0 3.0

Figure 67: Minimum Concrete Cover for Main Reinforcing (LRFD Bridge Design and Specifications 2012)

Bridge No. 1359 was used as an example case to determine the *LR* with RIPSRE methodology and compared with the PLT capacity. Bridge No. 1359 is a RCBC built in 1935 and consist of 4 spans with a clear span of 10.82ft (3.3m). The length of the bridge is 67.83ft, deck width of 44.61ft and a fill depth of 0.54ft. Using the MBE 2013 guidelines, the assumed materials properties for this structure are f'_c = 2.5ksi and f_y = 36ksi. The latest inspection report stated a condition rating (NBI item 62) as 6, which means that φc = 1.0.

Having the clear span, the reinforcement index was computed using Equation 6 to Equation 12. Additionally, reinforcement index parameter curves (Figure 9 to Figure 15) were used as shown in Figure 68. Figure 65 and Figure 66 were used to provide guidelines for the f'_c and f_y. Equation 22 and Equation 23 were used to compute the typical steel reinforcement based on the average parameter at Bridge No. 1359 (refer to Appendix 1).

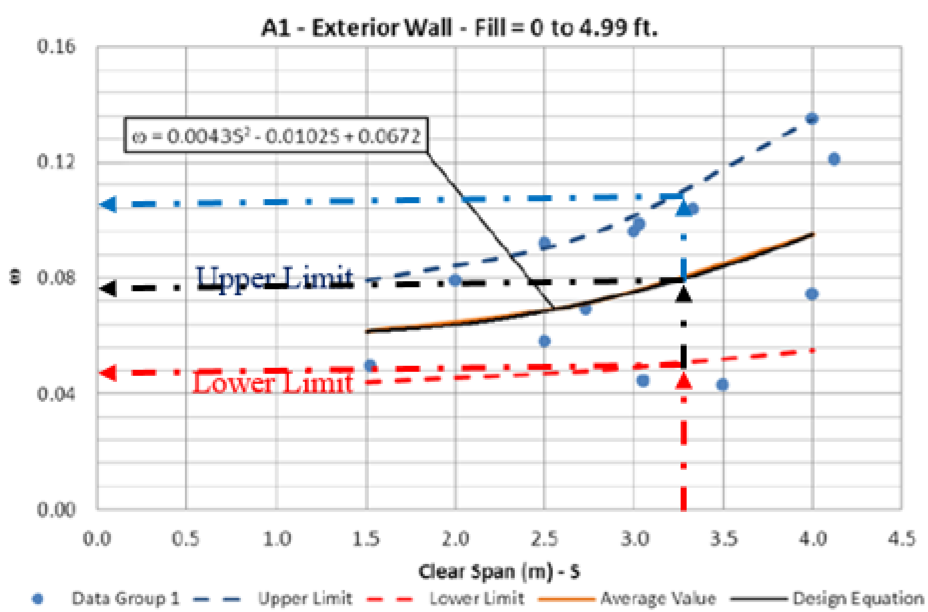

Figure 68: Reinforcement Index Curve for A1, A2, and A3 shows Graphically how to Determine *ω*

Table 16 shows the typical steel reinforcement estimation and rebar spacing for Bridge No. 1359. LRFD Bridge Design and Specifications and SSHB the minimum reinforcement (Equation 24) needed for the bridges is determined. The Lower-Bound curve is used to estimate the minimum typical steel reinforcement provided by the RIPSRE methodology.

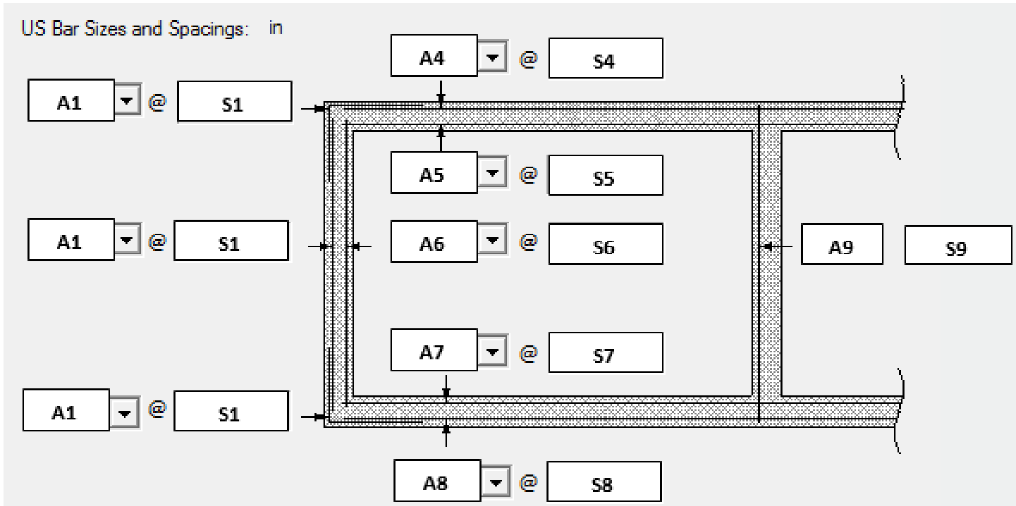

Figure 69: ID for Typical Steel Reinforcement for Stage II

Table 16: Bridge No. 1359 Typical Steel Reinforcement

Reinforcement Index		**RIPSRE Steel Reinforcements**			
ω		**As RIPSRE Ave**	**As provided**	**As provided**	**Spacing RIPSRE provided**
ID		*(in²/ft)*	*(in²/ft)*	*(#No)*	*(in)*
1	0.08045579	**0.583**	0.6	**7**	**12.36**
4	0.13244359	**0.959**	1	**9**	**12.51**
5	0.12936698	**0.937**	1	**9**	**12.81**
6	0.07314234	**0.334**	0.31	**5**	**11.14**
7	0.12196777	**0.883**	1	**9**	**13.59**
8	0.11275703	**0.817**	1	**9**	**14.70**
9	0.06082783	**0.278**	0.31	**5**	**13.40**

RIPSRE = Reinforcement Index Parameter for Steel Reinforcement Estimation

The location ID for typical steel reinforcements for Table 17 is shown in Figure 69.

Table 17: Steel Reinforcements Computed by Structural Plans, SSHB Minimum, RIPSRE Average and RIPSRE Lower-Bound for Bridge No. 1359

	Steel Reinforcement by:						
Bridge	**Location**		**Plans**	**As_{min} SSHB**	**RIPSRE Average**	**RIPSRE Lower**	**RIPSRE Upper**
(No.)		*(ID)*	*(in^2/ft)*	*(in^2/ft)*	*(in^2/ft)*	*(in^2/ft)*	*(in^2/ft)*
1359	*Top Ext. Wall*	*A1*	0.610	0.28	0.583	0.377	0.782
	Top Slab -	A4	0.796	0.28	0.959	0.521	1.376
	Top Middle Slab	A5	0.831	0.28	0.937	0.449	1.376
	Ext. Wall	A6	0.254	0.28	0.334	0.183	0.475
	Bottom Slab +	A7	0.831	0.28	0.883	0.239	1.521
	Bottom Slab -	A8	0.796	0.28	0.817	0.449	1.159
	Int. Wall	A9	0.378	0.28	0.278	0.164	0.402

Table 17 shows the different steel reinforcement used for the capacity iterations in the computational model. Brass-Culvert™ was used to compute the LR of each RCBC. Figure 70 presents the computational model for Bridge No. 1359. To determine the accuracy and exactitude of the RCBC in this Stage II, the computational model was run three times. The three iteration were:

- $A_{s\ Structural\ Plans}$ (green column),
- $A_{s\ min\ SSHB}$ (yellow column),
- $A_{s\ RIPSRE\ Average}$ (gray column),
- $A_{s\ RIPSRE\ Lower\ Bound}$ (orange column),
- $A_{s\ RIPSRE\ Upper\ Bound}$ (blue column).

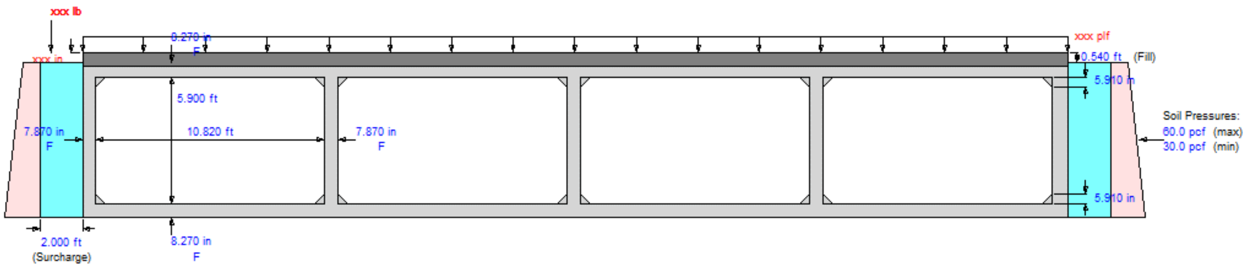

Figure 70: Brass-Culvert model for Bridge No. 1359

As discussed previously, the output file provides the unfactored moments and shears and *RF* coefficient based on the HS-30. Brass-Culvert^{TM} calculated the *RF* for HS-30 design live load. The HS-30 is the Puerto Rico legal load establish by PRHTA. Therefore only the results for the HS-30 loads were provided for Stage II. Table 18 presents the *RF* and *RT* for each RCBC using the RIPSRE methodology. RIPSRE methodology estimate a *RF* of 0.0 using the deterministic average equation for Bridges No. 752 and 848. The Lower-Bound would also result in a RF of 0.0 in these cases.

Table 18: RF and RT Capacity for each RCBC Analyzed with the RIPSRE Methodology

Bridge	**Controlling State** RIPSRE	**HS-30**	
(No.)	***(#)***	**ORF** RIPSRE	**RT** RIPSRE
658	*Flexure*	0.55	**29.7**
752	*Flexure*	0.00	**0.0**
848	*Flexure*	0.00	**0.0**
849	*Flexure*	0.49	**26.5**
1359	*Flexure*	0.56	**30.2**
2010	*Flexure*	0.37	**20.0**
2113	*Flexure*	0.84	**45.4**

Note: RIPSRE = Reinforcement Index Parameter for Steel Reinforcement Estimation
PLT = Proof Load Test

CHAPTER 6: DISCUSSION OF RESULTS

The analyses results for RCBC presented in Chapter 5 are discussed in Chapter 6. Comparison tables and percentages of difference were used to describe and analyze the results computed in the previous Chapter 5.

6.1 Stage I: Discussion of Results

This section discusses the results between *LR* and steel reinforcements of RCBC based on RIPSRE methodology, and structural plans for bridges presented in Stage I of Section 5.1.

6.1.1 Steel Reinforcements Analysis of RCBC Computed with the RIPSRE Methodology

Table 19 compares steel reinforcements obtained by structural plans and the RIPSRE methodology. The conservative column results of negative when the steel reinforcement calculated using the RIPSRE methodology is larger than the existing steel reinforcement on the bridge. On the other hand, if the steel reinforcement calculated from RIPSRE methodology were smaller than the existing steel reinforcement, the capacity would be under estimated, and a conservative approach is attained.

Table 19: Comparison of Steel Reinforcements by plans and RIPSRE for Bridge No.1348

Bridge	*d*	Fill Depth	Location		Steel by: Plans	Steel by: RIPSRE	Diff	Conservative
(No.)	*(in)*	*(ft)*		*(ID)*	*(in²/ft)*	*(in²/ft)*	*(%)*	
1348	7.3	0.46	*Top Ext. Wall*	*A1*	0.566	0.43	-24%	Yes
			Top Slab -	A4	1.051	0.71	-32%	Yes
			Top Middle Slab	A5	1.051	0.682	-35%	Yes
			Ext. Wall	A6	0.566	0.391	-31%	Yes
			Bottom Slab +	A7	1.051	0.618	-41%	Yes
			Bottom Slab -	A8	1.051	0.608	-42%	Yes
			Int. Wall	A9	0.561	0.333	-41%	Yes

In the case of Bridge No. 1348, the RIPSRE methodology resulted in a conservative approach for in all typical steel sections on the RCBC. However, this RCBC (No. 1348) was used to develop the reinforcement index parameter curves (see Appendix A). In all other RCBCs analyzed the RIPSRE methodology provided a different estimation on the typical steel reinforcement section as shown in Table 20. Table 19 shows Bridge No. 1648 has a 0.46ft of fill depth. This implies that *LL* are directly applied to the top slab.

Usually, the bottom slab and the internal walls do not control the *LR* in RCBC. For aged in-service RCBC when the soil has settled and consolidated, the bottom slab works as an elastic mat foundation. Due to the 2D rigid frame analysis, the elastic mat foundation behavior is not represented in the rigid analysis for the *LR* computation. Internal walls generally do not receive a significant magnitude in their internal forces. Table 20 shows the typical steel reinforcement comparison for RCBC.

Table 20a: Comparison between Steel Reinforcements by structural plans and RIPSRE

Typical Steel								
Bridge	**d**	**Fill Depth**	**Steel**		**Plans**	**RIPSRE**	**Diff.**	**Conservative**
(No.)	*(in)*	*(ft)*	*Location*	*(ID)*	*(in^2/ft)*	*(in^2/ft)*	*(%)*	
139	15.2	11.48	*Top Ext. Wall*	*A1*	1.02	1.12	10%	No
			Top Slab -	A4	1.34	1.81	35%	No
			Top Middle Slab	A5	0.75	1.89	154%	No
			Ext. Wall	A6	0.23	1.03	356%	No
			Bottom Slab +	A7	1.02	2.02	99%	No
			Bottom Slab -	A8	1.34	1.51	13%	No
			Int. Wall	A9	0.23	0.79	247%	No
767	12.5	9.19	*Top Ext. Wall*	*A1*	1.72	0.94	-45%	Yes
			Top Slab -	A4	1.47	1.52	3%	No
			Top Middle Slab	A5	0.96	1.60	68%	No
			Ext. Wall	A6	0.22	0.87	298%	No
			Bottom Slab +	A7	0.96	1.74	82%	No
			Bottom Slab -	A8	1.09	1.27	16%	No
			Int. Wall	A9	0.34	0.65	93%	No
1108	10.5	13.79	*Top Ext. Wall*	*A1*	0.64	0.60	-5%	Yes
			Top Slab -	A4	1.15	1.00	-13%	Yes
			Top Middle Slab	A5	0.75	0.95	28%	No
	12.1		Ext. Wall	A6	0.20	0.63	211%	No
	10.5		Bottom Slab +	A7	0.75	0.85	14%	No
			Bottom Slab -	A8	1.15	0.86	-25%	Yes
			Int. Wall	A9	0.20	0.47	132%	No
1170	15.6	12.13	*Top Ext. Wall*	*A1*	1.60	1.10	-31%	Yes
			Top Slab -	A4	1.60	1.79	11%	No
			Top Middle Slab	A5	0.73	1.84	151%	No
			Ext. Wall	A6	0.32	1.01	220%	No
			Bottom Slab +	A7	0.73	1.91	161%	No
			Bottom Slab -	A8	1.60	1.50	-6%	Yes
			Int. Wall	A9	0.32	0.79	149%	No

Table 21b: Comparison between Steel Reinforcements by structural plans and RIPSRE

Typical Steel								
Bridge	**d**	**Fill Depth**	**Steel**		**Plans**	**RIPSRE**	**Diff.**	**Conservative**
(No.)	*(in)*	*(ft)*	*Location*	*(ID)*	*(in²/ft)*	*(in²/ft)*	*(%)*	
664	6.2	0.00	*Top Ext. Wall*	*A1*	0.34	0.34	-1%	Yes
			Top Slab -	A4	0.47	0.56	17%	No
			Top Middle Slab	A5	0.32	0.52	63%	No
	11.3		Ext. Wall	A6	0.32	0.56	75%	No
	6.2		Bottom Slab +	A7	0.32	0.45	40%	No
			Bottom Slab -	A8	0.47	0.48	1%	No
	4.2		Int. Wall	A9	0.24	0.18	-25%	Yes
799	9.3	5.42	*Top Ext. Wall*	*A1*	0.87	0.79	-10%	Yes
			Top Slab -	A4	0.87	1.24	43%	No
			Top Middle Slab	A5	2.18	1.38	-37%	Yes
			Ext. Wall	A6	N/A	0.73	-	Yes
			Bottom Slab +	A7	2.18	1.59	-27%	Yes
			Bottom Slab -	A8	0.87	1.03	18%	No
			Int. Wall	A9	0.61	0.52	-14%	Yes
1348	7.3	0.46	*Top Ext. Wall*	*A1*	0.57	0.43	-24%	Yes
			Top Slab -	A4	1.05	0.71	-32%	Yes
			Top Middle Slab	A5	1.05	0.68	-35%	Yes
			Ext. Wall	A6	0.57	0.39	-31%	Yes
			Bottom Slab +	A7	1.05	0.62	-41%	Yes
			Bottom Slab -	A8	1.05	0.61	-42%	Yes
			Int. Wall	A9	0.56	0.33	-41%	Yes
1358	6.5	5.00	*Top Ext. Wall*	*A1*	0.50	0.42	-16%	Yes
			Top Slab -	A4	0.96	0.69	-29%	Yes
			Top Middle Slab	A5	0.64	0.68	7%	No
			Ext. Wall	A6	0.20	0.38	88%	No
			Bottom Slab +	A7	0.64	0.67	4%	No
			Bottom Slab -	A8	0.96	0.58	-40%	Yes
			Int. Wall	A9	0.20	0.31	53%	No

Bridge No. 139, No. 1170 and No. 1358 were used to performed more iterations to computed the *LR* with the other curves to establish a more reliable *LR*. The result of the ORF for bridges mentioned above is shown in Table 22.

Table 22: Closest Operating Rating Level for RCBC with Different Steel Iterations

No.	Steel Reinforcement	Controlling State	$ORF_{HS\text{-}30}$	Location
139**	Structural Plans		**2.31**	**TSM**
	$A_{s\ min\ SSHB}$		0.0	EWB
	$RIPSRE_{Average}$***		8.47	TSR
	$RIPSRE_{Lower\ Bound}$		**3.38**	**BSM**
	$RIPSRE_{Upper\ Bound}$		7.70	BSM
1358	Structural Plans		**0.11**	**TSM**
	$A_{s\ min\ SSHB}$		0.0	EWB
	$RIPSRE_{Average}$		0.0	BSR
	$RIPSRE_{Lower\ Bound}$		**0.0**	**EWM+**
	$RIPSRE_{Upper\ Bound}$		0.67	BSR
1170**	Structural Plans		**1.41**	**BSM**
	$A_{s\ min\ SSHB}$		0.0	TSM
	$RIPSRE_{Average}$		7.27	BSL
	$RIPSRE_{Lower\ Bound}$		**0.0**	**BSM**
	$RIPSRE_{Upper\ Bound}$		-	-

*** Soil fill depth > 5ft*

**** The controlling ORF is in Shear State Load*

Bridge No.139 is outside the scope of the inferred. Additional analyses were performed to provide a better estimate of $ORF_{HS\text{-}30}$, to establish a typical steel reinforcement estimation range. Bridge No. 139 results in further analysis, because soil fill depth is larger than 5ft. In this case, it is interesting to determine which of the bound in the RIPSRE methodology give a closer estimation. This estimate range can provide a higher level of reliability and accuracy for the RCBC *LR* computation. The Lower-Zone (i.e. within average and lower bound) for Bridge No. 139 and Bridge No. 1170 demonstrate that the Average and Lower-Bound curve provide a range where the estimated typical steel reinforcement is closer to the existing steel reinforcement in the RCBC. For Bridge No. 1358, the Upper-Zone (i.e. within average and upper bound) shows that this Upper-Zone range provides the closest estimation between typical steel reinforcement from RIPSRE and existing steel reinforcement in the RCBC.

The *RF* Bridge No. 139 is controlled by the top and bottom slab elements. For Bridge No.1170 the controlling element is the bottom slab. Reinforcement from top and bottom locations were identified as A5 and A7 respectively. For Bridge No.1358 the Upper-Zone shows a significant degree of accuracy between the Upper-Bound and the Average curve. However, the controlling element in Bridge No. 1358 is the external wall (A1 is the typical steel reinforcement identification) and the top slab in the middle section. Figure 71 to Figure 73 illustrates the range where the estimated typical steel reinforcement converges with the existing typical steel reinforcement for Bridges No. 139, No. 1178 and No. 1358 respectively.

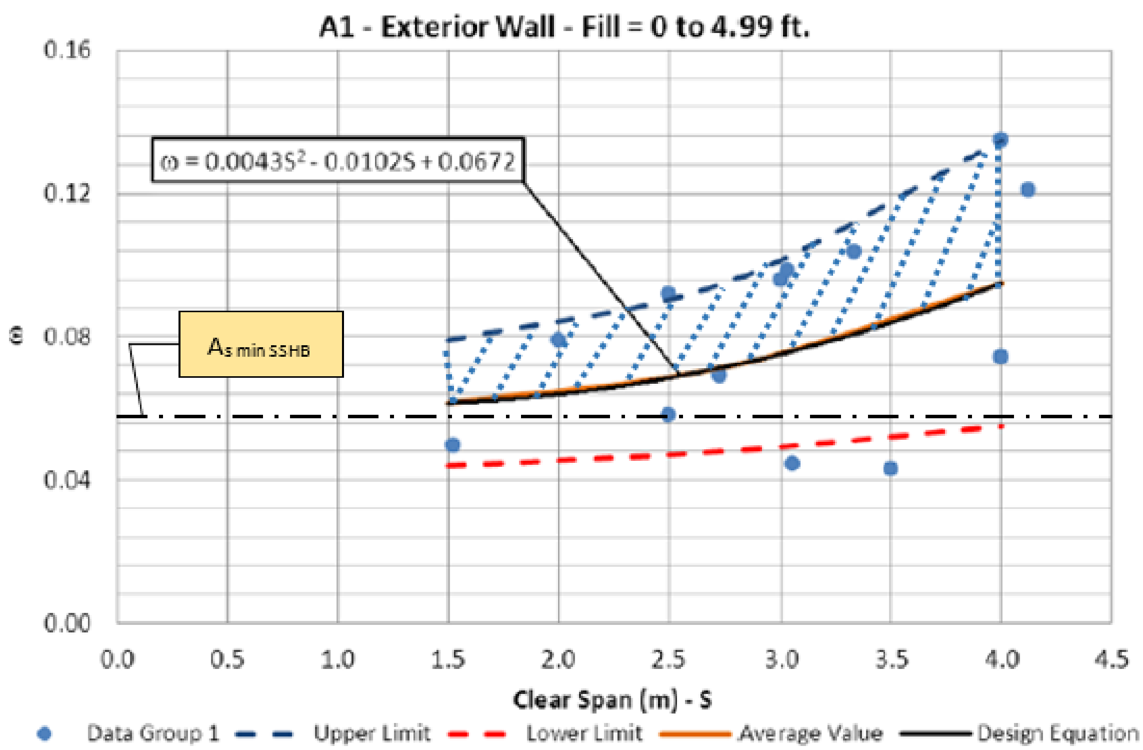

Figure 71: Controlling Typical Steel Reinforcement for Bridge No. 1358

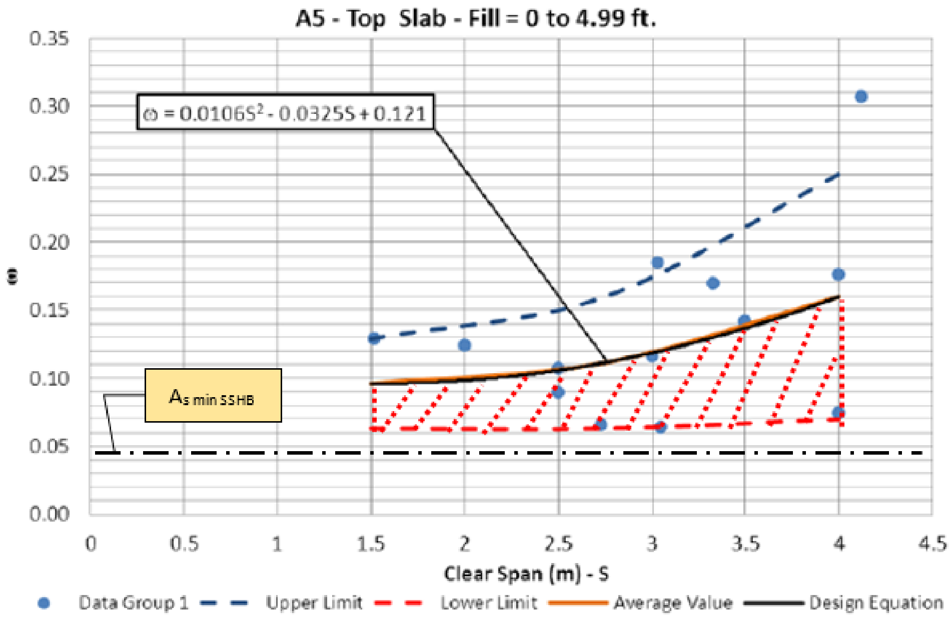

Figure 72: Controlling Typical Steel Reinforcement for Bridge No. 139 and No. 1170

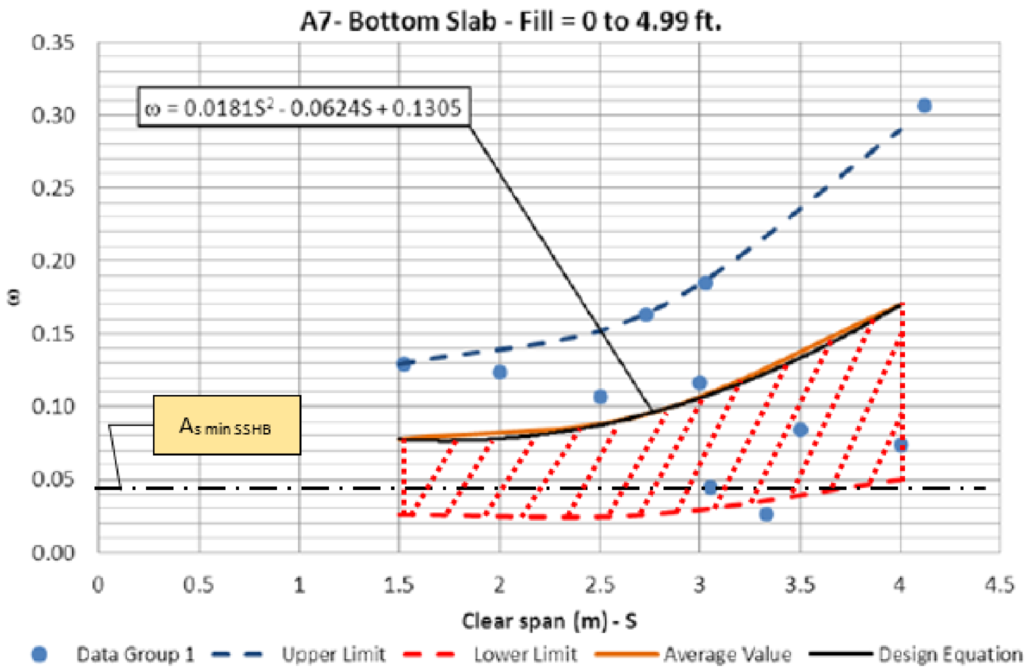

Figure 73: Controlling Typical Steel Reinforcement for Bridge No. 139 and No. 1170

Typically, on *LR* analysis in RCBC, negative moments in the top slab and exterior wall commonly control the *LR*. Based on steel reinforcement analysis, it can be established that the typical reinforcing steel A1 (e.g., the negative moment at top corner slab), constitutes the most accurate estimated approach for typical steel reinforcement. Similar results were obtained for 7 out of 8 typical steel reinforcement results which demonstrated a conservative approach by using the RIPSRE methodology from Stage I.

Typical, steel reinforcement A1 approximately provides a conservative value in 87% of the RCBC analyzed. Also, typical steel A7 and A4 provide a conservative steel reinforcement in 50% and 37% respectively, as shown in Table 23. The RIPSRE methodology provides in typical top slab steel (negative moment) reinforcement an accurate estimation tool for the flexural steel and state in RCBC for a negative moment on the top corner slab.

Table 23: Most Conservative Typical Steel Reinforcements in Stage I

RCBC Location	How many RCBC from 8	Conservative Approach
Top Slab Corner (M-)	7	87.5%
Bottom Slab Middle (M-)	4	50.0%
Top Slab Middle (M-)	3	37.5%
External Wall Moment	1	12.5%

6.1.2 Operating Load Rating Analysis Computed by Brass-Culvert™

To determine, if conservative or non-conservative results for steel reinforcement on structural elements of the RCBC have an inverse or indirect effect in the steels reinforcements calculated by the RIPSRE methodology, the *RF* of the structural elements were computed and compared to those obtained from structural plans. The *RF* of RCBC based on the RIPSRE methodology and existing structural plans will be compared to each point analyzed, i.e., $n_i / 10$, for all structural elements, to determine a direct relationship between the steel reinforcement computation by RIPSRE and the *RF* of the RCBC. Table 24 summarizes the *RF* for RIPSRE results based on RCBC with structural plans.

Table 24a: Operating Rating Factor for Bridge No. 1348 for each Structural Element Based on RIPSRE Methodology

Element		Point	Flexure HS-30		
			ORF Plans	ORF RIPSRE Average	Diff.
			(#)	(#)	(%)
Slab Cell 1	Top	0.000	0.75	0.51	-32%
		1.077	1.25	0.91	-27%
		2.154	0.75	0.55	-27%
		3.231	1.00	0.64	-36%
		4.308	0.86	0.55	-36%
		5.385	0.85	0.54	-36%
		6.462	0.95	0.61	-35%
		7.539	1.21	0.80	-34%
		8.616	1.79	1.25	-30%
		9.693	1.86	1.26	-32%
		10.770	1.03	0.66	-35%
	Bottom	0.000	3.08	1.93	-37%
		1.077	4.10	2.95	-28%
		2.154	4.19	3.03	-28%
		3.231	7.75	4.33	-44%
		4.308	8.37	4.61	-45%
		5.385	9.50	5.27	-45%
		6.462	11.54	6.60	-43%
		7.539	15.25	9.13	-40%
		8.616	18.65	11.40	-39%
		9.693	9.83	5.54	-44%
		10.770	5.27	2.55	-52%

Table 25b: Operating Rating Factor for Bridge No. 1348 for each Structural Element Based on RIPSRE Methodology

Element		Point	Flexure HS-30 ORF Plans (#)	ORF RIPSRE Average (#)	Diff. (%)
Slab Cell 2	Top	0.000	0.55	0.38	-30%
		1.077	1.02	0.75	-26%
		2.154	0.97	0.74	-24%
		3.231	1.22	0.81	-34%
		4.308	0.99	0.65	-34%
		5.385	0.93	0.61	-35%
		6.462	0.99	0.65	-34%
		7.539	1.22	0.81	-34%
		8.616	1.72	1.19	-31%
		9.693	1.89	1.27	-32%
		10.770	1.08	0.70	-35%
	Bottom	0.000	2.50	1.58	-37%
		1.077	4.70	3.38	-28%
		2.154	8.34	6.37	-24%
		3.231	16.40	9.89	-40%
		4.308	14.39	8.44	-41%
		5.385	14.18	8.23	-42%
		6.462	14.60	8.56	-41%
		7.539	17.24	10.40	-40%
		8.616	14.79	8.94	-40%
		9.693	8.97	5.07	-43%
		10.770	5.45	2.74	-50%

Table 26c: Operating Rating Factor for Bridge No. 1348 for each Structural Element Based on RIPSRE Methodology

Element		Point	Flexure HS-30 ORF $_{Plans}$ (#)	Flexure HS-30 ORF $_{RIPSRE\ Average}$ (#)	Flexure HS-30 Diff. (%)
Wall	Exterior	0.000	2.92	1.77	-39%
		1.066	9.25	6.69	-28%
		2.132	15.23	10.74	-29%
		3.198	5.55	3.86	-30%
		4.264	3.07	2.13	-31%
		5.330	2.17	1.52	-30%
		6.396	1.72	1.22	-29%
		7.462	1.46	1.06	-27%
		8.528	1.30	0.96	-26%
		9.594	1.07	0.78	-27%
		10.660	0.75	0.51	-32%
	Interior	0.000	4.68	2.85	-39%
		1.066	7.55	4.60	-39%
		2.132	18.34	11.18	-39%
		3.198	15.16	9.26	-39%
		4.264	6.53	4.00	-39%
		5.330	4.18	2.56	-39%
		6.396	3.06	1.88	-39%
		7.462	2.42	1.49	-39%
		8.528	2.00	1.23	-38%
		9.594	1.70	1.05	-38%
		10.660	1.49	0.92	-38%

Table 27 shows the *RF* computed by structural plans and RIPSRE methodology and their difference percentages. If the percentage difference is negative, this implies, that the rating factors computed by RIPSRE methodology are underestimated (i.e. conservative) in compared to the real or existing rating factor of the RCBC. Table 27 shows the results of the controlling operating level *RF* based on HS-30 truckload for each RCBC analyses.

Table 27: Controlling Rating Factor at Operating Level for each RCBC Analyzed in Stage I

Bridge	Fill Depth	Controlling State	Controlling Rating Factors HS-30 ORF Plans	ORF RIPSRE Average	Difference
(No.)	(ft)		(#)	(#)	(%)
664	0.00	Flexure	0.59	0.66	12%
1348	0.46	Flexure*	1.31	0.78	-40%
1358	5.00	Flexure	0.11	0.00	-100%
139	11.48	Flexure	2.28	5.72	151%
767	9.19	Flexure	1.94	2.00	3%
799	5.42	Flexure	0.23	0.45	96%
1108	13.79	Flexure	0.42	0.00	-100%
1170	12.13	Flexure	1.43	4.90	243%

**The controlling state is shear based on structural plans*

RIPSRE = Reinforcement Index Parameter for Steel Reinforcement Estimation

Table 27 discuss the *ORF* for each RCBC, and it can be denoted that if the RCBC has an ORF > 1 the ORF computed with RIPSRE has also an *ORF > 1* and respectively occurs if the *ORF < 1* the *ORF* based on RIPSRE < 1. However, for the yellow highlight ORF for bridge 1348, the *ORF* based on RIPSRE is less than the one, which the *ORF* provided in the load rating reports is greater than one. This result may be due that the controlling *ORF* provided in the *LR* reports was the shear limit state, and the controlling shear rating was not computed or based in the critical section.

Steel reinforcements computed by RIPSRE methodology can be conservative or non-conservative for each typical steel reinforcement on the RCBC, but not necessarily the rating factors has to be conservative or non-conservative. So that mean that the steel reinforcement computed with the RIPSRE does not have a direct relationship with the *RF* of the RCBC elements, since that the structural capacity is the same for each section of the structural element, but the internal forces change according to the dimension axis of the element and truck load direction.

6.2 Stage II: Discussion of Results

Proof load test (PLT) required determining the load rating of a bridge are very expensive. Typically, this PLT are used to reach a pre-establish maximum live load which for RCBC could represent in a LR smaller than it is a real value. These limitations usually arise because DOT's do not want to compromise the their integrity of the structure nor induced distresses in order to reach the actual capacity of the bridge. This is fundamental because results from PLT do not represent necessarily their maximum tons carrying capacity. For the specific case of Bridge No. 1359, in Guayanilla the PLT determined it is maximum ton carrying capacity. Table 28 shows the gross vehicle weight used in each PLT for each RCBC.

Table 28: Gross Vehicle Weight (GVW) used on every PLT

Bridge	Number of Trucks	GVW	
(No.)	*(#)*	*(kips)*	*(Tons)*
658	1	73.5	36.8
752	1	50.4	25.2
848	1	75.9	38.0
849	1	60.6	30.3
1359	2	99.1	49.6
		101.1	50.6
2010	1	53.7	26.9
2113	1	76.4	38.2

The PLT for Guayanilla Bridge (Bridge No. 1359) was performed with two dump trucks. Typically, the RCBC are continuous members, which have redundancy due to their geometric configuration that contributes in distributing live loads on the large stress of the structure. The PLT estimate the tons carrying capacity over the bridge. Furthermore, the comparisons between the PLT and ORF_{RIPSRE} are in tons. ORF PLT based on HS-30 is on the reports. These values could be included in the table. Table 29 shows the difference percentage for each RCBC analyzed on Section 5.2.

Table 29: Comparison between Controlling ORF by PLT and RIPSRE using the Average Curve

Bridge	**Controlling State** RIPSRE Average	**Fill Depth**	**HS-30**			**% Difference**
(No.)	*(#)*	*(ft)*	**ORF** RIPSRE	**Ton** RIPSRE	**Ton** PLT	
658	*Flexure*	0.0	0.55	**29.7**	17.0	75%
752	*Flexure*	6.0	0.00	**0.0**	13.0	-100%
848	*Flexure*	8.9	0.00	**0.0**	27.0	-100%
849	*Flexure*	0.83	0.49	**26.5**	16.0	65%
1359	*Flexure*	0.54	0.56	**30.2**	48.0	-37%
2010	*Flexure*	4.4	0.37	**20.0**	13.0	54%
2113	*Flexure*	0.0	0.84	**45.4**	19.0	139%

Note: RIPSRE = Reinforcement Index Parameter for Steel Reinforcement Estimation
PLT = Proof Load Test

Table 29 (above) shows that for Bridge No. 658, 849, 2010, and 2113, the RIPSRE methodology provided a larger *RT* carrying capacity than the PLT, while for Bridge No. 1359 the PLT estimate a *RT* capacity equal to 48 tons vs 30.2 tons by RIPSRE. Bridge No. 1359 is the only relevant case for this project. For that particular bridge, the PLT determine the bridge *LR*. RIPSRE $_{\text{average curve}}$ provides a conservative approach for Bridge No. 1359, but, as previously discussed the PLT of Bridge No. 1359 was performed with two test trucks.

As presented in Table 29, all RCBC analyzed using the RIPSRE average curve methodology provide some inconsistencies for the *LR* estimation when compared with the PLT. Considering the Bridge No. 1359 special PLT, because the PLT was performed with two dump trucks, it possible that all RCBC which there *RT* carrying capacity by PLT are less than *RT* capacity by RIPSRE $_{\text{average curve}}$ can develop more tons capacity that was developed using a single test truck.

Direct comparisons cannot be performed for bridges No. 752, No. 2010 and NO, 849 for which the RIPSRE methodology did not yield conservative results since the actual *LR* for the PLT was not reached. PLT for those bridges mentioned above ended when the target load was reached, but additional capacity remained.

Additional analysis was performed with Lower and Upper Bound for Bridge No. 2113 and Bridge No. 848 (RIPSRE methodology) to estimate the *RT* carrying capacity for RCBC. As shown in Table 29 shows for Bridge No. 848 and No. 2113 that the tons carrying capacity is smaller than the ones from PLT and over tons capacity establishes by the PLT respectively. For Bridge No. 848, the Upper-Bound is going to be used, and for Bridge No. 2113 the Lower-Bound and the minimum reinforcement establish by the SSHB 17th 2002. Table 30 shows the *RT* carrying-capacity for RCBC which are selected for the typical steel reinforcement estimation to compute the *LR*.

Table 30: Controlling and Different Estimation Approaches for Load Rating

Bridge No.	***Steel Reinforcement Use***	***RT*** $_{HS\text{-}30}$	***Location***
1359	PLT **	**48**	-
	NDT *	22.8	TSR
	$A_{s\ min\ SSHB}$	11.6	TSM
	RIPSRE $_{Average}$ *	30.2	TSL
	RIPSRE $_{Lower\ Bound}$	8.8	TSR
	RIPSRE $_{Upper\ Bound}$	**41.1**	**TSL-Cell 2**
2113	**PLT ** **	**19**	-
	$A_{s\ min\ SSHB}$	**26.5**	**TSR**
	RIPSRE $_{Average}$ *	45.4	TSR
	RIPSRE $_{Lower\ Bound}$ *	32	TSR
	RIPSRE $_{Upper\ Bound}$	-	-
848	**PLT ** **	**27**	-
	$A_{s\ min\ SSHB}$	0.0	EWB
	RIPSRE $_{Average}$	0.0	EWB
	RIPSRE $_{Lower\ Bound}$	0.0	EWB
	RIPSRE $_{Upper\ Bound}$	0.0	TSR

*Note: * The Controlling Carrying-Capacity is in Shear State Load*

*** The Carrying-Capacity was obtained from the PLT Report of the PRHTA and Performed by VC and Associates*

Table 30 shows the different analyses performed to estimate the *LR* for RCBC. Bridge No.1359 results in 30.2 tons carrying capacity based on RIPSRE average band and 48 tons with the PLT. For Bridge No.2113 the closest carrying ton capacity was calculated about 26.5 tons by $A_{s\ min\ SSHB}$ versus 19 tons by PLT. Also, for Bridges No. 1359 and No. 2113, the controlling structural element for the *LR* estimation was the top middle slab. Bridge No. 848 is a case that the RIPSRE methodology does not estimate the LR at all. Bridge No. 848 has a soil fill depth equal to 11.08ft. However, for bridges with 5ft soil fill depth or more and that the Lower-Zone does not estimate a *LR* at all, the PLT results in an approach to give a *LR* estimation.

The difference between the RT by PLT and RIPSRE Upper Bound is about 14.3%, (see Figure 74). Figure 74 shows the distribution in a graphical approach of the difference in *RT* for Bridge No. 1359 with respect to all different methods used to estimate *LR* of RCBC. For Bridge No. 2113 a direct comparison could not be performed since the actual *LR* for the RCBC is not obtained by the PLT.

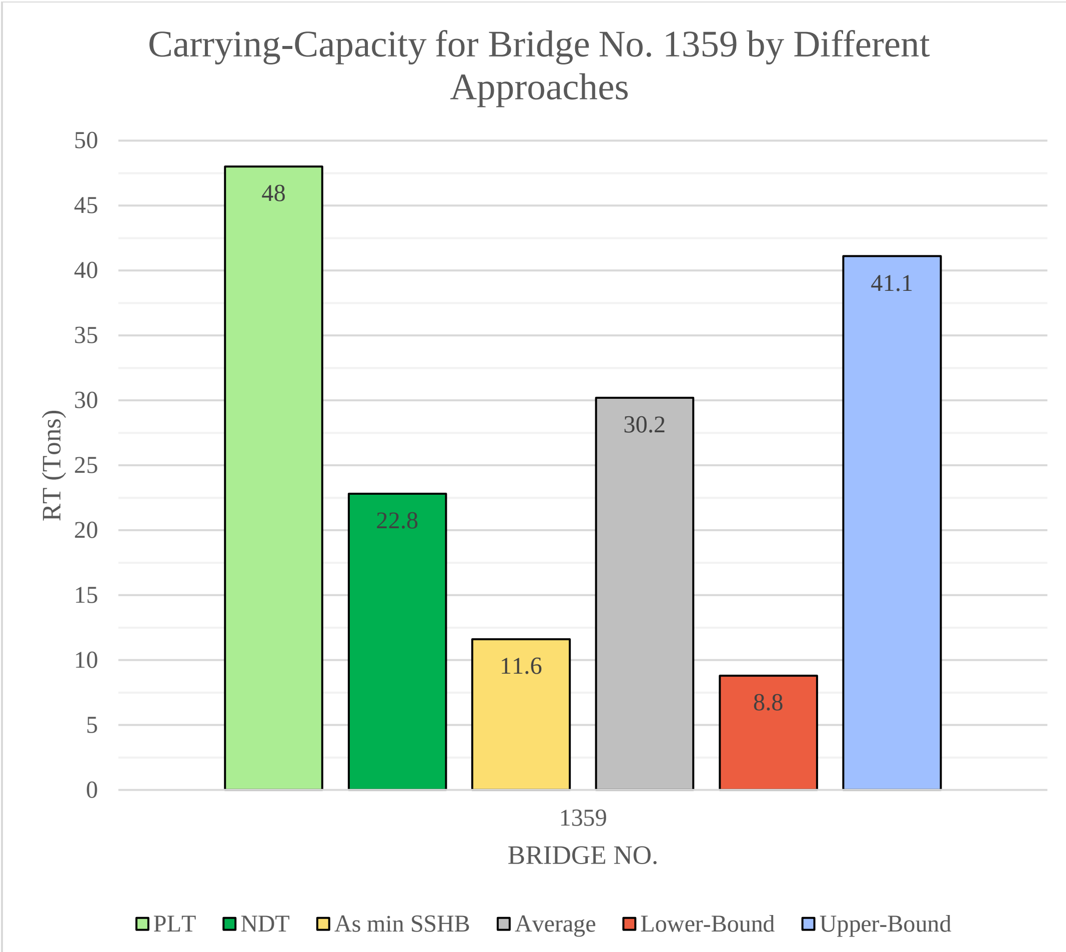

Figure 74: Graphical Visualization of LR for Bridge No. 1359

Summarizing from Stage, I from 8 RCBC analyzed just 2 resulted with a *ORF* of 0.0. About a 75% of the RCBC analyzed lead to a good *ORF* estimation with the *ORF* based on Load Rating Reports. Also, for Stage II from 7 RCBC analyzed just 2 RCBC resulted in a *RT* carrying capacity based on the Upper-Bound of the reinforcement index parameter curve. The Upper-Bound shows good comparison with the *RT* of Bridge No. 1359 obtained by PLT. If the 15 RCBC analyzed in both Stages were RCBC without structural plans, only 4 RCBC should use the Upper-Bound to provide the maximum *RT* capacity. Then about a 75% of the RCBC analyzed in both Stages determine a reliable *RT*.

At the end, the engineer in charge of computing the *LR* of the RCBC will have to choose any of the reinforcement index curves available to estimate the typical steel reinforcement on the RCBC. However, some with the reinforcement index curves are recommended as part of the *LR* process. Furthermore, parametric analyses within the bands (region within curves) are needed to increase the reliability of the estimated of *LR* for RCBC.

CHAPTER 7: CONCLUSIONS

The findings of the validation of eight RCBC and the estimation of seven RCBC to compute typical steel reinforcement for *LR* analyses showed that the Lower-Zone provided the closest estimation in the *LR* of RCBC.

7.1 Conclusions Summary

- The reinforcement index parameter (ω) results, extremely useful to estimate reinforcement for RCBC. This parameter considers material mechanical properties (i.e., $f'c$ and f_y), cross section (i.e., b and d) and the amount of steel reinforcing (A_s).

- For RCBC with soil fill depths larger than 8ft, load rating was typically controlled by flexure in the top slab were obtained for bridges for bridges rated with structural plans and those rated by RIPSRE methodology, using the lower bound curve.

- Regardless of soil fill depth, the top exterior corner slab/wall steel reinforcement (A1) provided a conservative estimation of steel reinforcement for RCBC (See Table 20).

- Load rating for RCBC with soil fill depths smaller than 8ft, controlled by the negative moment at the top exterior wall for which the flexural resistance is obtained from reinforcement ω_{A1}. Similar results were obtained for RCBC load rated with RIPSRE methodology (average curve) and those which have structural plans.

- Exterior wall steel reinforcement (A6) for positive moment results in the least conservative steel reinforcement compared to RCBC with structural drawings. However, steel reinforcement A6 give the closest estimation for soil fill depth less than 5ft.

- The reinforcement index parameter (ω) based on a deterministic average equation give the closest estimation for steel reinforcement in RCBC with fill depth less than 5ft. The analyses performed, results on a reliable LR computation for RCBC.

- The Lower-Bound of the reinforcement index curves is in close agreement with the minimum steel reinforcement for RCBC. However, in some cases, the Lower-Bound curve (as seen in Figure 71 to Figure 73) gives less reinforcement than the minimum code requirements for RCBC.

$$A_s\,(RIPSRE_{\;Lower\;Bound}) \approx A_S\,(SSHB_{\;min})$$

- At the end, the Lower-Zone (zone within the Average curve and the Lower-Bound) provided the closest estimation of the Load Rating on the RCBC. The Lower-Zone give a close estimation of steel reinforcement for RCBC with structural plans which have more than 5ft of soil fill depth. Although, this recommendation results in some cases, in conservative estimates of *LR* for RCBC.

7.2 Recommendations and Future Work

The RIPSRE methodology provides a quantitative and precise approach for RCBC without structural plans. However, the following recommendations are suggested, to improve the reliability of this methodology.

- Expand the RCBC number of sample that was used to create the reinforcement index parameter curve to updated the RIPSRE methodology. This can be based to establish the minimum statistical sampling corresponding with the RCBC population in Puerto Rico. Also, the new or updated inferred methodology shall be based on different soil fill depth ranges.

- Conduct a statistical assessment to provide reliability parameters to improve the steel reinforcement computation with the RIPSRE methodology.

- Divide the RCBC into two slab and wall thickness categories which are $t \leq 12$in and $t > 12$in. This can be done to attempt in a higher reliability and accuracy in the estimation of the typical steel reinforcement estimation. The database for development the RIPSRE methodology considered RCBC with slabs and walls having a maximum thickness of 15 inches. It is recommended to extend the study to verify if this methodology provides conservative results for RCBC with larger thickness dimensions (e.g., wall or slab thickness larger than 18inches). The necessity for developing new reinforcement index curves for massive RCBC (e.g., thickness > 18 inches) would be investigated with the proposed study.

- Perform the *LR* based on the RIPSRE methodology using the lower and upper limit, to establish the reinforcement index parameter in RCBC special cases, as when steel reinforcement is non-conservative in all typical steel section.

- Generate the minimum and maximum steel reinforcement based on the LFR and LRFD rating methodology, to overlap the reinforcement index curves, and this can provide a range where the steel reinforcement is within the analytical methodology (i.e., RIPSRE) and the mandatory methodology (i.e., LRFD and LFR).

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Appendix A: RIPSRE Methodology (Inferred Method for Load Rating a Box Culvert)

Inferred Load Rating
Evaluation of
Reinforced Concrete Box Culverts Structural Criteria

PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY

PREPARED BY:

URS

MARCH, 2012

1. GENERAL REQUIREMENTS

1.1 Introduction

This Inferred Load Rating Criteria defines how the structural integrity of a reinforced concrete culvert shall be evaluated for the effects of design vehicles for those bridges without design or as-built plans. The live load effect is compared to the structural capacity available beyond permanent load effects for the two following criteria:

1.1.1 Longitudinal Moment
1.1.2 Longitudinal Shear

1.2 Codes, Standards and Specifications

1.2.1 AASHTO "The Manual for Bridge Evaluation", 2nd Edition, 2011.

1.2.2 AASHTO LRFD Bridge Design Specifications - Customary U.S.
Units, Fifth Edition, 2010.

1.2.3 AASHTO "Standard Specifications for Highway Bridges", 17th Edition, 2002.

1.2.4 Commonwealth of Puerto Rico, Puerto Rico Highway and Transportation Authority, Standard Specifications for Road and Bridge Construction, 1989.

1.3 Basis of Inferred Load Rating Analysis

1.3.1 In cases where construction or as-built plans were not available, URS shall use an inferred procedure to estimate the type and location of the steel reinforcement. URS cannot assume responsibility for the accuracy of the analysis since the factual basis for our recommendations is inferred; our inferences are based upon engineering judgment but actual conditions at those locations where as-builts are not available may differ from the inferences made.

1.3.2 The quantity of the main longitudinal reinforcement of the structural elements used in the Inferred Load Rating Analysis shall be estimated based on information from culverts with available existing bridge plans obtained from the database available to URS through PRHTA.
1.3.3 All bridges in a database are grouped by height of soil fill over the top of slab.
1.3.4 To be able to use the bridge database, it is necessary to assume that the bridges in need of analysis conform to the basic structural details of the bridges in the database. It is assumed, therefore, that

The original designers had an identical design methodology for those bridges with and without plans.
The codes used for the design utilize the same design procedures, engineering principles and provide similar capacities and deformations.
The reinforcing steel distribution and layout is similar for the bridges with and without plans.
The materials used are similar for bridges with and without plans.
Each wall of the box culvert has two layers of reinforcement (one along each face).
All reinforcement used is properly developed and anchored.

1.3.5 BRASS culvert program Version 2.3.3a4 shall be used to define nine types of steel reinforcement (Bars A1 to A9) shown in Figure 1.3-1.

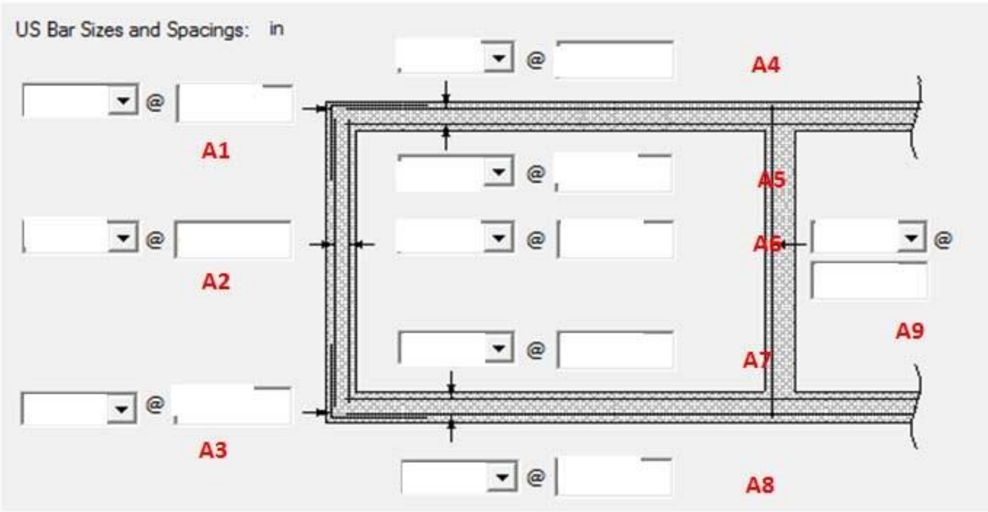


Figure 1.3-1: Designations of Bar Types for a Box Culvert

1.3.6 URS Corporation strongly recommends that PRHTA allows the performance of NDT techniques on those structures where no construction plans are available to find the type and location of reinforcement present and to validate the inferred rating. It is essential for an accurate load rating analysis to use the correct structural dimensions and reinforcement.
1.3.7 By adopting this inferred load rating procedure, neither URS Corporation nor any of its subconsultants will accept any professional or public liability regarding the inferred load rating capacity for bridges where there were no construction plans available.

2. METHODOLOGY

2.1 Introduction

From individual group information gathered from the bridge database, the reinforcement index, ω, shall be calculated for each box culvert. From reinforced concrete theory, this index is expressed as:

$$\omega = \frac{f_y}{0.85f'_c}\rho$$

where:

$\rho = \frac{A_s}{bd}$ = longitudinal tension reinforcement ratio

A_s = steel reinforcement, in^2/ft,

b = analysis section width = 12 in

d = distance from the extreme fiber in compression to the centroid of the steel on the tension side of the member

f_y = specified yield strength of the reinforcement

f'_c = design 28 day compressive strength of concrete

The advantage of using the reinforcing index is that it incorporates the cross section geometry (b and d), material information (f'_c and f_y), amount of reinforcing steel (A_s), and is linked directly to the moment capacity.

2.2 Group Classification

Box culverts shall be classified according to the soil fill over the top slab:
0 ft – 4.99 ft
5.00 ft – 9.99 ft
10.00 ft – 20.00 ft

2.3 Selection

The box culverts which have structural drawings, with fill height of 0 to 5 feet are shown in Table 3.1-1 below. Most of these culverts were built between 1946 and 1959 with similar clear spans and clear heights. In addition to the restriction in soil fill over top slab, the culverts that were selected share the following characteristics:

(a) $f'_c \leq 3.0\ ksi$
(b) $f_y = 40\ ksi$
(c) Have more than two barrels

Have more than two barrels

Bridge	Year	f'c	fy	No.	Clear	Clear ht.	Soil fill	skew	Top slab	Bottom slab	Ext. wall	Int. wall	Top	Bottom	Clear covers	
	built	[ksi]	[ksi]	barrels	Span [m]	[m]	[m]	Deg.	[m]	[m]	[m]	[m]	[m]	[m]	Slab	Wall
B-1421	1951	2.5	40	5	1.52	1.50	0.00	10	0.22	0.20	0.183	0.183	0.20	0.20	0.05	0.05
B-686	1953	2.5	40	4	2.00	1.96	0.00	32	0.21	0.20	0.20	0.20	0.15	0.15	0.05	0.05
B-1573	1959	3.0	40	2	2.50	2.50	0.20	35	0.18	0.18	0.18	0.18	0.15	0.15	0.05	0.05
B-695	1953	3.0	40	2	2.50	2.00	0.91	41.5	0.25	0.25	0.25	0.25	0.15	0.15	0.05	0.05
B-664	1953	3.0	40	2	2.73	2.57	0.00	0	0.22	0.22	0.35	0.22	0.21	0.21	0.05	0.05
B-781	1955	3.0	40	2	3.00	3.00	1.14	30	0.20	0.20	0.20	0.20	0.15	0.15	0.05	0.05
B-1348	1968	3.0	40	3	3.03	3.00	0.08	10	0.25	0.25	0.25	0.25	0.15	0.15	0.05	0.05
B-195	1946	2.5	40	9	3.05	3.66	0.00	0	0.3	0.25	0.30	0.30	0.25	0.25	0.05	0.05
B-1196	1971	3.0	40	2	3.33	3.33	0.00	40	0.26	0.24	0.26	0.26	0.15	0.15	0.05	0.05
B-1362	1971	3.0	40	2	3.50	3.50	0.00	10.5	0.35	0.30	0.30	0.30	0.15	0.15	0.05	0.05
B-605	1949	2.5	40	2	4.00	4.00	1.00	30	0.30	0.30	0.30	0.30	0.30	0.30	0.05	0.05
B-800	1958	2.5	40	2	4.00	4.00	1.00	41.65	0.30	N/A	0.30	0.30	0.15	0.15	0.05	0.05
B-799	1958	3.0	40	2	4.12	1.60	1.55	39	0.3	0.3	0.3	0.3	0.15	0.15	0.05	0.05

Table 3.1-1: Database for Culverts from 0 ft. to 5 ft. of Fill

3. INFERRED CRITERIA FOR CULVERTS WITH 0 FEET TO 4.99 FEET OF FILL

3.1 Approach to Estimating Steel Reinforcement

The approach to estimating reinforcing steel is deterministic and based upon the analysis of bridge culverts with plans, engineering judgment and the report “Criteria for Estimating Reinforcement of Box Culverts without Structural Plans”, JO Virella and Associates, January, 2012 (provided in the bridge report CD). From the information gathered from the bridge database, a reinforcing index design curve was computed for each culvert. The curves illustrated in Figures 3.2-1 to 3.2-7 for the culverts of Table 3.1-1 show the relation between the computed ω values for each element of the culverts versus the clear span of culvert barrels. Frequently, designers would use the same reinforcement at the top, the center and the bottom of the exterior face of the exterior walls; therefore, this approach considers the same reinforcement for bar types A1 to A3 (Figure 1.3-1). Some extremely large and small values were discarded from the sample.

The upper and lower limits represent the maximum and minimum value of the parameter ω provided in culverts by other designers.

Because of the limited database and high scatter in the sample, the criteria proposed in this document bracket the data points within upper and lower limits based on sound engineering judgment and fit a curve to the average of the upper and lower limits. This provides consistency and a rational approach for developing an inferred reinforcing index curve for each structural element within the culvert.

The geometrics of culverts are determined based on several factors such as clearance, capacity, construction and structural considerations. It would be generally expected that the designer would set the member depths for a range of culvert spans and increase the amount of reinforcing to meet the design requirements. The reinforcing indices for the longer span lengths tend to be larger than for the shorter spans and the scatter increases along with span length. Therefore, it would be acceptable to find in a large number of data points a correlation between increasing reinforcing index with increasing span length. The inferred design curves of these criteria are postulated on this observation.

3.2 ω Curves

The curves illustrated in Figures 3.2-1 to 3.2-7 show the relationship between the reinforcement index for each element of the culverts and the clear span of barrels. A design equation for the reinforcement index is provided for each inferred layer of reinforcement, A1 to A9. These equations are only applicable for clear spans ranging from 1.5 meters to 4 meters.

Once the inferred reinforcing index is obtained, the area of steel required can be computed for each bar type using the equations provided in Section 2.1. The final step would be to then follow the "Load Rating Evaluation - Reinforced Concrete Box Culvert Structural Criteria", enter the pertinent culvert information into the BRASS software and process the load rating results.

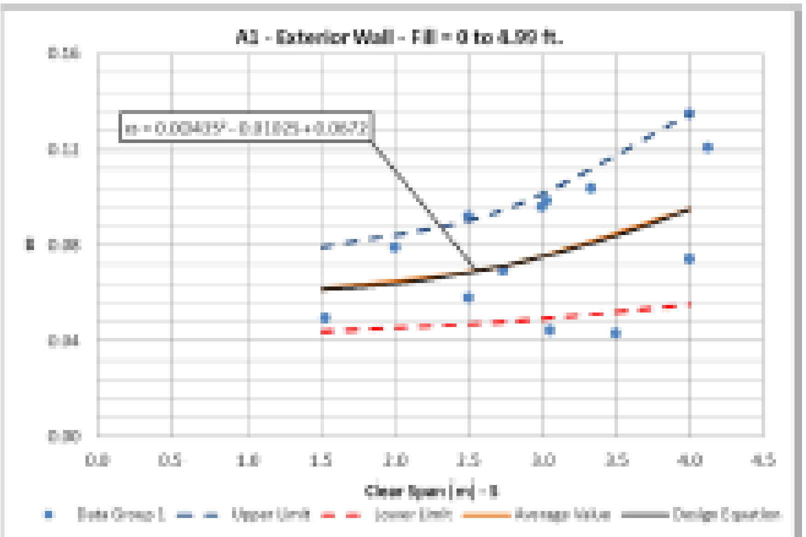


Figure 3.2-1: Reinforcement, Bar Type A1 at Exterior Wall

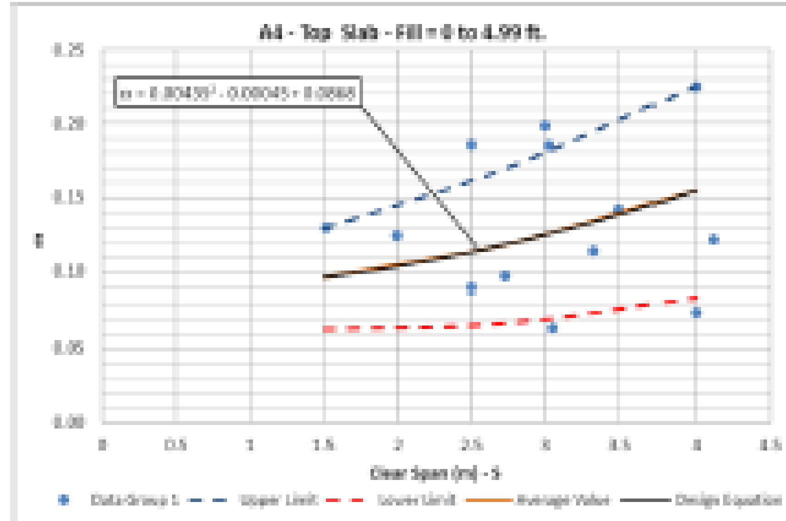


Figure 3.2-2: Reinforcement, Bar Type A4 at Top Slab.

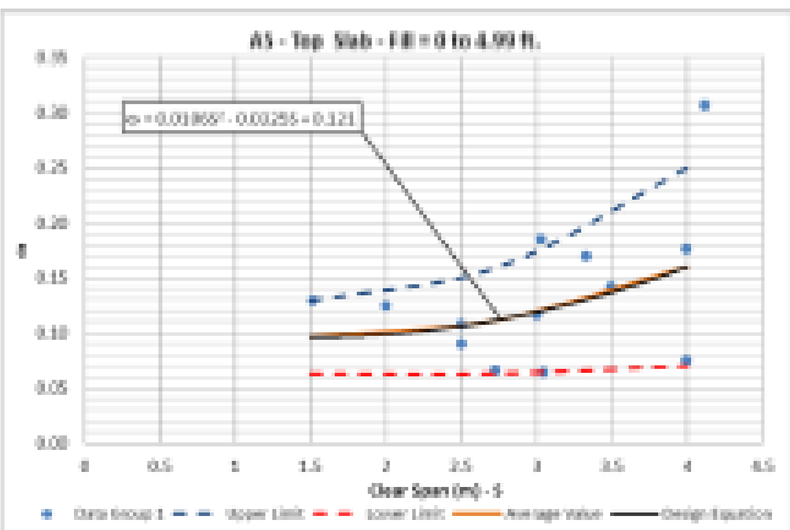


Figure 3.2-3: Reinforcement, Bar Type A5 at Top Slab

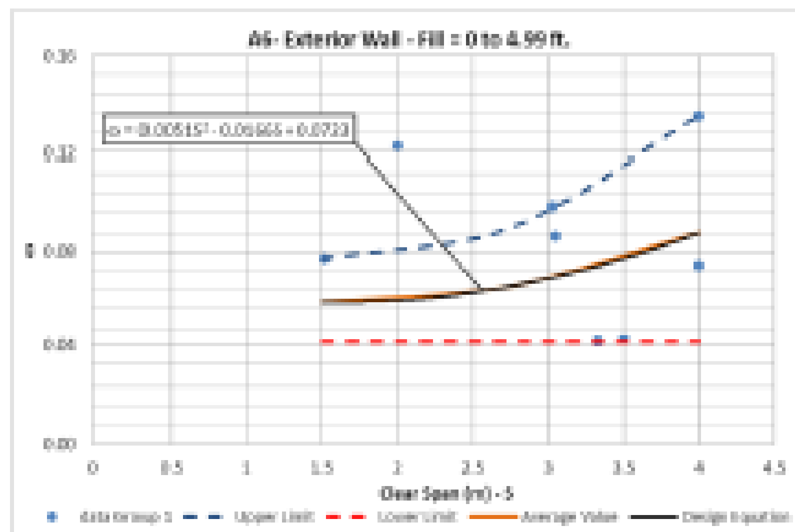


Figure 3.2-4: Reinforcement, Bar Type A6 at Exterior Wall

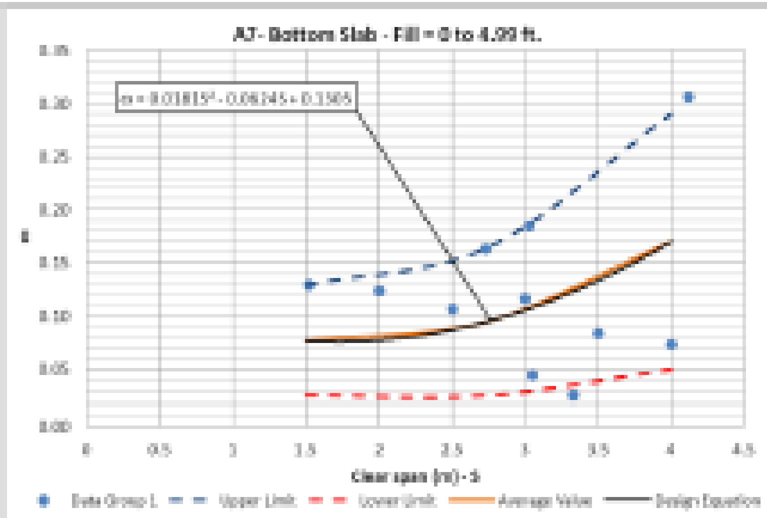


Figure 3.2-5: Reinforcement, Bar Type A7 at Bottom Slab

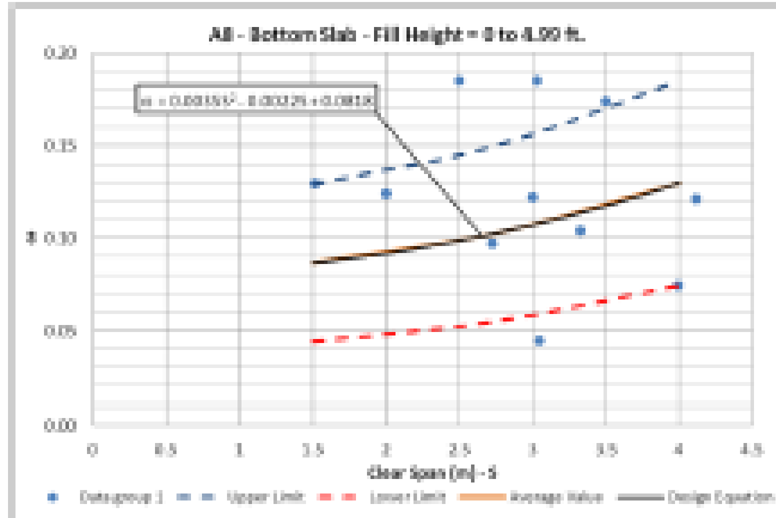


Figure 3.2-6: Reinforcement, Bar Type A8 at Bottom Slab

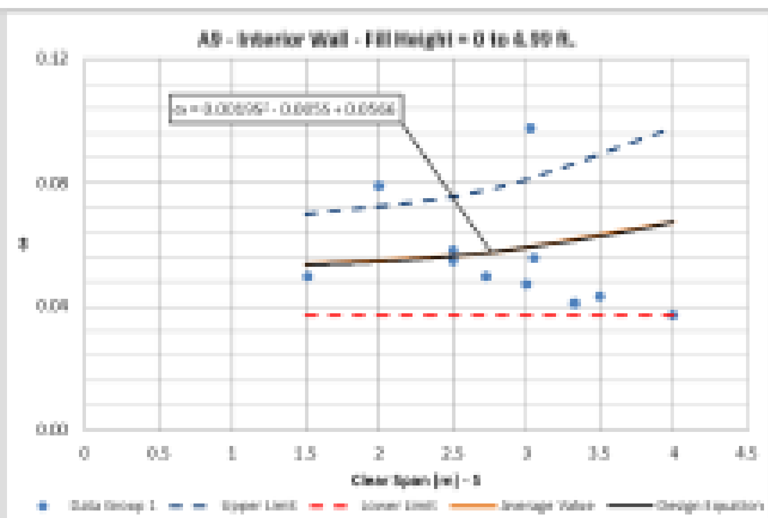


Figure 3.2-7: Reinforcement, Bar Type A9 at Interior Wall

Appendix B: Steel Reinforcement Computation based on RIPSRE Methodology

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	13.25	4.04	**Steel Location**	*ω*		**As inf**	**As pro**	**As pro**	**Spacing inf**	**As pro plans**	**Spacing plans**	**As plans**	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
139 Lower Bound	**f' c (ksi)**	3		Top Ext. Wall	1	0.056	**0.652**	0.6	**7**	**11.04**	7	7.09	**1.016**	*-35.8%*
	b (in)	12		Top Slab -	4	0.085	**0.990**	1	**9**	**12.13**	8	7.09	**1.337**	*-26.0%*
	d (in)	15.22		Top Middle Slab	5	0.07	**0.815**	1	**9**	**14.72**	6	7.09	**0.745**	*9.4%*
	h (in)	17.72		Ext. Wall	6	0.04	**0.466**	0.44	**6**	**11.34**	4	10.63	**0.226**	*106.3%*
	d (in)	2.5		Bottom Slab +	7	0.06	**0.699**	0.79	**8**	**13.57**	7	7.09	**1.016**	*-31.2%*
	db (in^2)	182.64		Bottom Slab -	8	0.075	**0.873**	1	**9**	**13.74**	8	7.09	**1.337**	*-34.7%*
				Int. Wall	9	0.036	**0.419**	0.44	**6**	**12.60**	4	10.63	**0.226**	*85.7%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	13.25	4.04	**Steel Location**	*ω*		**As RIPSRE**	**As provided**	**As provided**	**Spacing RIPSRE**	**As pro plans**	**Spacing plans**	**As plans**	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
139 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.0961659	**1.120**	1	**9**	**10.72**	7	7.09	**1.016**	*10.3%*
	b (in)	12		Top Slab -	4	0.15535432	**1.809**	1	**9**	**6.63**	8	7.09	**1.337**	*35.3%*
	d (in)	15.22		Top Middle Slab	5	0.16268952	**1.894**	1	**9**	**6.33**	6	7.09	**0.745**	*154.4%*
	h (in)	17.72		Ext. Wall	6	0.08846716	**1.030**	1	**9**	**11.65**	4	10.63	**0.226**	*356.2%*
	d (in)	2.5		Bottom Slab +	7	0.17379429	**2.024**	1	**9**	**5.93**	7	7.09	**1.016**	*99.3%*
	db (in^2)	182.64		Bottom Slab -	8	0.13002806	**1.514**	1	**9**	**7.93**	8	7.09	**1.337**	*13.2%*
				Int. Wall	9	0.06740725	**0.785**	0.79	**8**	**12.08**	4	10.63	**0.226**	*247.6%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	13.25	4.04	**Steel Location**	*ω*		**As inf**	**As pro**	**As pro**	**Spacing inf**	**As pro plans**	**Spacing plans**	**As plans**	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
139 Upper Bound	**f' c (ksi)**	3		Top Ext. Wall	1	0.136	**1.583**	1	**9**	**7.58**	7	7.09	**1.016**	*55.9%*
	b (in)	12		Top Slab -	4	0.225	**2.620**	1	**9**	**4.58**	8	7.09	**1.337**	*95.9%*
	d (in)	15.22		Top Middle Slab	5	0.25	**2.911**	1	**9**	**4.12**	6	7.09	**0.745**	*290.9%*
	h (in)	17.72		Ext. Wall	6	0.125	**1.455**	1	**9**	**8.25**	4	10.63	**0.226**	*544.6%*
	d (in)	2.5		Bottom Slab +	7	0.31	**3.609**	1	**9**	**3.32**	7	7.09	**1.016**	*255.4%*
	db (in^2)	182.64		Bottom Slab -	8	0.185	**2.154**	1	**9**	**5.57**	8	7.09	**1.337**	*61.1%*
				Int. Wall	9	0.104	**1.211**	1	**9**	**9.91**	4	10.63	**0.226**	*436.3%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	8.95	2.73	**Steel Location**	**ω**		**As inf**	**As pro**	**As pro**	**Spacing inf**	**As pro plans**	**Spacing plans**	**As plans**	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
664 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.07138367	**0.336**	0.31	**5**	**11.06**	5	11.02	**0.338**	*-0.3%*
	b (in)	12		Top Slab -	4	0.11772452	**0.555**	0.44	**6**	**9.52**	5	7.87	**0.473**	*17.4%*
	d (in)	11.28		Top Middle Slab	5	0.11124172	**0.524**	0.44	**6**	**10.07**	4	7.48	**0.321**	*63.4%*
	h (in)	13.78		Ext. Wall	6	0.06497671	**0.561**	0.44	**6**	**9.42**	4	7.48	**0.321**	*74.8%*
	d (in)	2.5		Bottom Slab +	7	0.09499666	**0.448**	0.44	**6**	**11.79**	4	7.48	**0.321**	*39.5%*
	db (in^2)	135.36		Bottom Slab -	8	0.10185647	**0.480**	0.44	**6**	**11.00**	5	7.87	**0.473**	*1.5%*
				Int. Wall	9	0.0571033	**0.183**	0.2	**4**	**13.11**	4	9.84	**0.244**	*-25.0%*

t slab	8.66	6.16	*in*
t ext wall	13.78	11.28	*in*
t int wall	6.69	4.19	*in*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	13.59	4.14	**Steel Location**	**ω**		**As inf**	**As pro**	**As pro**	**Spacing inf**	**As pro plans**	**Spacing plans**	**As plans**	***% Difference***
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
767 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.09875597	**0.941**	1	**9**	**12.75**	8	5.51	**1.721**	*-45.3%*
	b (in)	12		Top Slab -	4	0.15896024	**1.515**	1	**9**	**7.92**	9	8.16	**1.471**	*3.0%*
	d (in)	12.46		Top Middle Slab	5	0.16831185	**1.604**	1	**9**	**7.48**	7	7.54	**0.955**	*68.0%*
	h (in)	14.96		Ext. Wall	6	0.0910724	**0.868**	1	**9**	**13.82**	4	11.02	**0.218**	*298.6%*
	d (in)	2.5		Bottom Slab +	7	0.18267896	**1.741**	1	**9**	**6.89**	7	7.54	**0.955**	*82.4%*
	db (in^2)	149.52		Bottom Slab -	8	0.13276882	**1.266**	1	**9**	**9.48**	9	11.02	**1.089**	*16.2%*
				Int. Wall	9	0.0685006	**0.653**	0.6	**7**	**11.03**	5	11.02	**0.338**	*93.4%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	14.98	4.57	**Steel Location**	**ω**		**As inf**	**As pro**	**As pro**	**Spacing inf**	**As pro plans**	**Spacing plans**	**As plans**	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
799 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.11030593	**0.786**	0.79	**8**	**12.07**	7	8.27	**0.871**	*-9.8%*
	b (in)	12		Top Slab -	4	0.17466325	**1.244**	1	**9**	**9.65**	7	8.27	**0.871**	*42.9%*
	d (in)	9.31		Top Middle Slab	5	0.19366659	**1.379**	1	**9**	**8.70**	9	5.51	**2.178**	*-36.7%*
	h (in)	11.81		Ext. Wall	6	0.10286319	**0.733**	0.79	**8**	**12.94**	4	0	**-**	*-*
	d (in)	2.5		Bottom Slab +	7	0.22304728	**1.589**	1	**9**	**7.55**	9	5.51	**2.178**	*-27.1%*
	db (in^2)	111.72		Bottom Slab -	8	0.14475599	**1.031**	1	**9**	**11.64**	7	8.27	**0.871**	*18.4%*
				Int. Wall	9	0.07339513	**0.523**	0.6	**7**	**13.77**	7	11.81	**0.610**	*-14.3%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	9.84	3.00	**Steel Location**	***ω** mean*		**As** inf	**As** pro	**As** pro	**Spacing** inf	**As** pro plans	**Spacing** plans	**As** plans	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in² /ft*	*in² /ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in² /ft*	*(%)*
1108 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.0753	**0.604**	0.6	**7**	**11.92**	6	8.27	**0.638**	*-5.4%*
	b (in)	12		Top Slab -	4	0.1243	**0.997**	1	**9**	**12.03**	8	8.27	**1.146**	*-13.0%*
	d (in)	6.5		Top Middle Slab	5	0.1189	**0.954**	1	**9**	**12.58**	6	7.09	**0.745**	*28.1%*
	h (in)	9		Ext. Wall	6	0.0684	**0.632**	0.6	**7**	**11.40**	4	11.81	**0.203**	*210.8%*
	d (in)	2.5		Bottom Slab +	7	0.1062	**0.852**	0.79	**8**	**11.12**	6	7.09	**0.745**	*14.4%*
	db (in²)	78		Bottom Slab -	8	0.1067	**0.856**	0.79	**8**	**11.07**	8	8.27	**1.146**	*-25.3%*
				Int. Wall	9	0.0587	**0.471**	0.44	**6**	**11.21**	4	11.81	**0.203**	*131.8%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	12.7	3.87	**Steel Location**	***ω***		**As** inf	**As** pro	**As** pro	**Spacing** inf	**As** pro plans	**Spacing** plans	**As** plans	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in² /ft*	*in² /ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in² /ft*	*(%)*
1170 Lower Bound	**f' c (ksi)**	3		Top Ext. Wall	1	0.05333333	**0.637**	0.6	**7**	**11.30**	8	5.91	**1.604**	*-60.3%*
	b (in)	12		Top Slab -	4	0.082	**0.979**	1	**9**	**12.25**	8	5.91	**1.604**	*-39.0%*
	d (in)	15.61		Top Middle Slab	5	0.07	**0.836**	1	**9**	**14.36**	7	9.84	**0.732**	*14.2%*
	h (in)	18.11		Ext. Wall	6	0.04	**0.478**	0.44	**6**	**11.05**	5	11.81	**0.315**	*51.6%*
	d (in)	2.5		Bottom Slab +	7	0.045	**0.537**	0.6	**7**	**13.40**	7	9.84	**0.732**	*-26.6%*
	db (in²)	187.32		Bottom Slab -	8	0.072	**0.860**	1	**9**	**13.96**	8	5.91	**1.604**	*-46.4%*
				Int. Wall	9	0.036	**0.430**	0.44	**6**	**12.28**	5	11.82	**0.315**	*36.6%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	12.7	3.87	**Steel Location**	***ω***		**As** inf	**As** pro	**As** pro	**Spacing** inf	**As** pro plans	**Spacing** plans	**As** plans	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in² /ft*	*in² /ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in² /ft*	*(%)*
1170 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.09217172	**1.101**	1	**9**	**10.90**	8	5.91	**1.604**	*-31.4%*
	b (in)	12		Top Slab -	4	0.14971685	**1.788**	1	**9**	**6.71**	8	5.91	**1.604**	*11.5%*
	d (in)	15.61		Top Middle Slab	5	0.15407685	**1.840**	1	**9**	**6.52**	7	9.84	**0.732**	*151.5%*
	h (in)	18.11		Ext. Wall	6	0.08448484	**1.009**	1	**9**	**11.89**	5	11.81	**0.315**	*220.3%*
	d (in)	2.5		Bottom Slab +	7	0.16024556	**1.914**	1	**9**	**6.27**	7	9.84	**0.732**	*161.5%*
	db (in²)	187.32		Bottom Slab -	8	0.12575373	**1.502**	1	**9**	**7.99**	8	5.91	**1.604**	*-6.4%*
				Int. Wall	9	0.06572506	**0.785**	0.6	**7**	**9.17**	5	11.82	**0.315**	*149.4%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	10.11	3.08	**Steel Location**	ω		As_{inf}	As_{pro}	As_{pro}	Spacing $_{inf}$	$As_{pro\ plans}$	Spacing $_{plans}$	As_{plans}	*%Difference*
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
1348 Lower Bound	**f' c (ksi)**	3		Top Ext. Wall	1	0.048	**0.270**	0.31	**5**	**13.80**	6	9.33	**0.566**	*-52.4%*
	b (in)	12		Top Slab -	4	0.07	**0.393**	0.44	**6**	**13.43**	7	6.85	**1.051**	*-62.6%*
	d (in)	7.34		Top Middle Slab	5	0.065	**0.365**	0.44	**6**	**14.47**	7	6.85	**1.051**	*-65.3%*
	h (in)	9.84		Ext. Wall	6	0.04	**0.225**	0.2	**4**	**10.69**	6	9.33	**0.566**	*-60.3%*
	d (in)	2.5		Bottom Slab +	7	0.03	**0.168**	0.2	**4**	**14.25**	7	6.85	**1.051**	*-84.0%*
	db (in^2)	88.08		Bottom Slab -	8	0.06	**0.337**	0.31	**5**	**11.04**	7	6.85	**1.051**	*-67.9%*
				Int. Wall	9	0.036	**0.202**	0.2	**4**	**11.87**	6	9.41	**0.561**	*-64.0%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	10.11	3.08	**Steel Location**	ω		As_{inf}	As_{pro}	As_{pro}	Spacing $_{inf}$	$As_{pro\ plans}$	Spacing $_{plans}$	As_{plans}	*%Difference*
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
1348 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.07661328	**0.430**	0.44	**6**	**12.27**	6	9.33	**0.566**	*-24.0%*
	b (in)	12		Top Slab -	4	0.12641999	**0.710**	0.6	**7**	**10.14**	7	6.85	**1.051**	*-32.5%*
	d (in)	7.34		Top Middle Slab	5	0.12153189	**0.682**	0.6	**7**	**10.55**	7	6.85	**1.051**	*-35.1%*
	h (in)	9.84		Ext. Wall	6	0.069587	**0.391**	0.44	**6**	**13.51**	6	9.33	**0.566**	*-31.0%*
	d (in)	2.5		Bottom Slab +	7	0.1101257	**0.618**	0.6	**7**	**11.64**	7	6.85	**1.051**	*-41.2%*
	db (in^2)	88.08		Bottom Slab -	8	0.10827128	**0.608**	0.6	**7**	**11.84**	7	6.85	**1.051**	*-42.2%*
				Int. Wall	9	0.0592397	**0.333**	0.31	**5**	**11.18**	6	9.41	**0.561**	*-40.7%*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	**Span (ft)**	11.48	3.50	**Steel Location**	ω		As_{inf}	As_{pro}	As_{pro}	Spacing $_{inf}$	$As_{pro\ plans}$	Spacing $_{plans}$	As_{plans}	*%Difference*
(No.)	**fy(ksi)**	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in^2/ft*	*(%)*
1358 Lower Bound	**f' c (ksi)**	3		Top Ext. Wall	1	0.052	**0.377**	0.31	**5**	**9.87**	5	7.48	**0.497**	*-24.2%*
	b (in)	12		Top Slab -	4	0.075	**0.521**	0.6	**7**	**13.82**	7	7.48	**0.963**	*-45.9%*
	d (in)	6.5		Top Middle Slab	5	0.06	**0.449**	0.44	**6**	**11.76**	6	8.27	**0.638**	*-29.7%*
	h (in)	9		Ext. Wall	6	0.04	**0.183**	0.2	**4**	**13.11**	4	11.81	**0.203**	*-9.9%*
	d (in)	2.5		Bottom Slab +	7	0.04	**0.239**	0.2	**4**	**10.04**	6	8.27	**0.638**	*-62.6%*
	db (in^2)	78		Bottom Slab -	8	0.065	**0.449**	0.44	**6**	**11.76**	7	7.48	**0.963**	*-53.4%*
				Int. Wall	9	0.036	**0.164**	0.2	**4**	**14.63**	4	11.81	**0.203**	*-19.3%*

	Bridge Properties				**Reinforcement Index**		**Inferred Steel Reinforcements**				**Provided Steel Reinforcements**			
Bridge	**Span (ft)**	11.48	3.50	**Steel Location**	***ω***		**As** $_{inf}$	**As** $_{pro}$	**As** $_{pro}$	**Spacing** $_{inf}$	**As** $_{pro\ plans}$	**Spacing** $_{plans}$	**As** $_{plans}$	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in* ^{2} */ft*	*in* ^{2} */ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in* ^{2} */ft*	*(%)*
1358 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.084175	**0.419**	0.44	**6**	**12.61**	5	7.48	**0.497**	*-15.8%*
	b (in)	12		Top Slab -	4	0.138075	**0.687**	0.6	**7**	**10.49**	7	7.48	**0.963**	*-28.7%*
	d (in)	6.5		Top Middle Slab	5	0.1371	**0.682**	0.6	**7**	**10.56**	6	8.27	**0.638**	*6.8%*
	h (in)	9		Ext. Wall	6	0.076675	**0.381**	0.31	**5**	**9.76**	4	11.81	**0.203**	*87.6%*
	d (in)	2.5		Bottom Slab +	7	0.133825	**0.665**	0.6	**7**	**10.82**	6	8.27	**0.638**	*4.2%*
	db (in ^{2} **)**	78		Bottom Slab -	8	0.116975	**0.582**	0.6	**7**	**12.38**	7	7.48	**0.963**	*-39.6%*
				Int. Wall	9	0.062375	**0.310**	0.31	**5**	**11.99**	4	11.81	**0.203**	*52.6%*

	Bridge Properties				**Reinforcement Index**		**Inferred Steel Reinforcements**				**Provided Steel Reinforcements**			
Bridge	**Span (ft)**	11.48	3.50	**Steel Location**	***ω***		**As** $_{inf}$	**As** $_{pro}$	**As** $_{pro}$	**Spacing** $_{inf}$	**As** $_{pro\ plans}$	**Spacing** $_{plans}$	**As** $_{plans}$	***%Difference***
(No.)	**fy(ksi)**	40			*ID*		*in* ^{2} */ft*	*in* ^{2} */ft*	*#No.*	*(in)*	*#No.*	*(in)*	*in* ^{2} */ft*	*(%)*
1358 Upper Bound	**f' c (ksi)**	3		Top Ext. Wall	1	0.116	**0.577**	0.6	**7**	**12.48**	5	7.48	**0.497**	*16.0%*
	b (in)	12		Top Slab -	4	0.2	**0.995**	1	**9**	**12.07**	7	7.48	**0.963**	*3.3%*
	d (in)	6.5		Top Middle Slab	5	0.21	**1.044**	1	**9**	**11.49**	6	8.27	**0.638**	*63.6%*
	h (in)	9		Ext. Wall	6	0.112	**0.557**	0.6	**7**	**12.93**	4	11.81	**0.203**	*174.1%*
	d (in)	2.5		Bottom Slab +	7	0.23	**1.144**	1	**9**	**10.49**	6	8.27	**0.638**	*79.1%*
	db (in ^{2} **)**	78		Bottom Slab -	8	0.17	**0.845**	1	**9**	**14.20**	7	7.48	**0.963**	*-12.2%*
				Int. Wall	9	0.088	**0.438**	0.44	**6**	**12.07**	4	11.81	**0.203**	*115.3%*

	Bridge Properties				**Reinforcement Index**		**Inferred Steel Reinforcements**			
Bridge	**Span (ft)**	16.41	5.00	**Steel Location**	***ω***		**As** $_{inf}$	**As** $_{pro}$	**As** $_{pro}$	**Spacing** $_{inf}$
(No.)	**fy(ksi)**	33			*ID*		*in* ^{2} */ft*	*in* ^{2} */ft*	*#No.*	*(in)*
664 Average Curve	**f' c (ksi)**	2.5		Top Ext. Wall	1	0.12380004	**0.909**	1	**9**	**13.20**
	b (in)	12		Top Slab -	4	0.19242992	**1.413**	1	**9**	**8.49**
	d (in)	9.5		Top Middle Slab	5	0.22372418	**1.642**	1	**9**	**7.31**
	h (in)	12		Ext. Wall	6	0.11690493	**0.858**	1	**9**	**13.98**
	d (in)	2.5		Bottom Slab +	7	0.27136175	**1.992**	1	**9**	**6.02**
	db (in ^{2} **)**	114		Bottom Slab -	8	0.15840003	**1.163**	1	**9**	**10.32**
				Int. Wall	9	0.07914270	**0.581**	0.6	**7**	**12.39**

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	**Span (ft)**	9.84	3.00	**Steel Location**	**ω**		**As inf**	**As pro**	**As pro**	**Spacing inf**
(No.)	**fy(ksi)**	40			*ID*		*in²/ft*	*in²/ft*	*#No.*	*(in)*
752 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.0753	**0.309**	0.31	**5**	**12.03**
	b (in)	12		Top Slab -	4	0.1243	**0.511**	0.44	**6**	**10.34**
	d (in)	5.37		Top Middle Slab	5	0.1189	**0.488**	0.44	**6**	**10.81**
	h (in)	7.87		Ext. Wall	6	0.0684	**0.281**	0.31	**5**	**13.24**
	d (in)	2.5		Bottom Slab +	7	0.1062	**0.436**	0.44	**6**	**12.10**
	db (in^2)	64.44		Bottom Slab -	8	0.1067	**0.438**	0.44	**6**	**12.05**
				Int. Wall	9	0.0587	**0.241**	0.2	**4**	**9.95**

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	**Span (ft)**	11.08	3.38	**Steel Location**	**ω**		**As inf**	**As pro**	**As pro**	**Spacing inf**
(No.)	**fy(ksi)**	33			*ID*		*in²/ft*	*in²/ft*	*#No.*	*(in)*
848 Lower Bound	**f' c (ksi)**	3		Top Ext. Wall	1	0.048	**0.309**	0.31	**5**	**12.03**
	b (in)	12		Top Slab -	4	0.07	**0.451**	0.44	**6**	**11.70**
	d (in)	9.5		Top Middle Slab	5	0.062	**0.400**	0.44	**6**	**13.21**
	h (in)	12		Ext. Wall	6	0.04	**0.243**	0.21	**9**	**10.36**
	d (in)	2.5		Bottom Slab +	7	0.03	**0.193**	0.21	**9**	**13.03**
	db (in^2)	114		Bottom Slab -	8	0.06	**0.387**	0.31	**5**	**9.62**
				Int. Wall	9	0.03600000	**0.232**	0.21	**9**	**10.86**

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	**Span (ft)**	11.08	3.38	**Steel Location**	**ω**		**As inf**	**As pro**	**As pro**	**Spacing inf**
(No.)	**fy(ksi)**	33			*ID*		*in²/ft*	*in²/ft*	*#No.*	*(in)*
848 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.08181212	**0.527**	0.6	**7**	**13.66**
	b (in)	12		Top Slab -	4	0.134517	**0.867**	1	**9**	**13.84**
	d (in)	9.5		Top Middle Slab	5	0.13217228	**0.852**	1	**9**	**14.09**
	h (in)	12		Ext. Wall	6	0.07442158	**0.453**	0.44	**6**	**11.66**
	d (in)	2.5		Bottom Slab +	7	0.12625272	**0.814**	1	**9**	**14.75**
	db (in^2)	114		Bottom Slab -	8	0.11430754	**0.737**	0.79	**8**	**12.87**
				Int. Wall	9	0.06139106	**0.396**	0.44	**6**	**13.35**

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	**Span (ft)**	11.08	3.38	**Steel Location**	ω		**As** inf	**As** pro	**As** pro	**Spacing** inf
(No.)	**fy(ksi)**	33			*ID*		*in*^{2}*/ft*	*in*^{2}*/ft*	*#No.*	*(in)*
848 Upper Bound	**f' c (ksi)**	3		Top Ext. Wall	1	0.108	**0.696**	0.79	**8**	**13.62**
	b (in)	12		Top Slab -	4	0.19	**1.224**	1	**9**	**9.80**
	d (in)	9.5		Top Middle Slab	5	0.19	**1.224**	1	**9**	**9.80**
	h (in)	12		Ext. Wall	6	0.104	**0.633**	0.6	**7**	**11.38**
	d (in)	2.5		Bottom Slab +	7	0.21	**1.353**	1	**9**	**8.87**
	db (in^2)	114		Bottom Slab -	8	0.16	**1.031**	0.79	**8**	**9.19**
				Int. Wall	9	0.08800000	**0.567**	0.6	**7**	**12.70**

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	**Span (ft)**	11.42	3.48	**Steel Location**	ω		**As** inf	**As** pro	**As** pro	**Spacing** inf
(No.)	**fy(ksi)**	33			*ID*		*in*^{2}*/ft*	*in*^{2}*/ft*	*#No.*	*(in)*
849 Average Curve	**f' c (ksi)**	3		Top Ext. Wall	1	0.08381241	**0.540**	0.6	**7**	**13.33**
	b (in)	12		Top Slab -	4	0.13753315	**0.886**	1	**9**	**13.54**
	d (in)	6.95		Top Middle Slab	5	0.13634074	**0.879**	1	**9**	**13.66**
	h (in)	9.45		Ext. Wall	6	0.07632732	**0.492**	0.44	**6**	**10.73**
	d (in)	2.5		Bottom Slab +	7	0.13265484	**0.855**	1	**9**	**14.04**
	db (in^2)	83.4		Bottom Slab -	8	0.11656824	**0.751**	0.79	**8**	**12.62**
				Int. Wall	9	0.06222381	**0.401**	0.44	**6**	**13.17**

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	Span (ft)	10.84	3.30	Steel Location	ω		As RIPSRE	As pro	As pro	Spacing RIPSRE	As pro plans	Spacing plans	As plans	%Difference
(No.)	fy(ksi)	30			ID		in^2/ft	in^2/ft	#No.	(in)	#No.	(in)	in^2/ft	(%)
1359 Lower Bound	f' c (ksi)	2.5		Top Ext. Wall	1	0.048	**0.348**	0.31	**5**	**10.70**	6	8.66	**0.610**	-43.0%
	b (in)	12		Top Slab -	4	0.07	**0.507**	0.6	**7**	**14.20**	7	9.05	**0.796**	-36.3%
	d (in)	5.37		Top Middle Slab	5	0.062	**0.449**	0.44	**6**	**11.76**	7	8.66	**0.831**	-46.0%
	h (in)	7.87		Ext. Wall	6	0.04	**0.183**	0.2	**4**	**13.14**	4	9.44	**0.254**	-28.2%
	d (in)	2.5		Bottom Slab +	7	0.03	**0.217**	0.2	**4**	**11.05**	7	8.66	**0.831**	-73.9%
	db (in^2)	64.44		Bottom Slab -	8	0.06	**0.435**	0.44	**6**	**12.15**	7	9.05	**0.796**	-45.4%
				Int. Wall	9	0.036	**0.164**	0.2	**4**	**14.61**	5	9.84	**0.378**	-56.5%

t slab	11.02	8.52	in
t ext wall	7.87	5.37	in
t int wall	7.87	5.37	in

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	Span (ft)	10.84	3.30	Steel Location	ω		As RIPSRE	As pro	As pro	Spacing RIPSRE	As pro plans	Spacing plans	As plans	%Difference
(No.)	fy(ksi)	30			ID		in^2/ft	in^2/ft	#No.	(in)	#No.	(in)	in^2/ft	(%)
1359 Average Curve	f' c (ksi)	2.5		Top Ext. Wall	1	0.08045579	**0.583**	0.6	**7**	**12.36**	6	8.66	**0.610**	-4.4%
	b (in)	12		Top Slab -	4	0.13244359	**0.959**	1	**9**	**12.51**	7	9.05	**0.796**	20.6%
	d (in)	5.37		Top Middle Slab	5	0.12936698	**0.937**	1	**9**	**12.81**	7	8.66	**0.831**	12.7%
	h (in)	7.87		Ext. Wall	6	0.07314234	**0.334**	0.31	**5**	**11.14**	4	9.44	**0.254**	31.3%
	d (in)	2.5		Bottom Slab +	7	0.12196777	**0.883**	1	**9**	**13.59**	7	8.66	**0.831**	6.2%
	db (in^2)	64.44		Bottom Slab -	8	0.11275703	**0.817**	1	**9**	**14.70**	7	9.05	**0.796**	2.6%
				Int. Wall	9	0.06082783	**0.278**	0.31	**5**	**13.40**	5	9.84	**0.378**	-26.6%

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements				Provided Steel Reinforcements			
Bridge	Span (ft)	10.84	3.30	Steel Location	ω		As RIPSRE	As pro	As pro	Spacing RIPSRE	As pro plans	Spacing plans	As plans	%Difference
(No.)	fy(ksi)	30			ID		in^2/ft	in^2/ft	#No.	(in)	#No.	(in)	in^2/ft	(%)
1359 Upper Bound	f' c (ksi)	2.5		Top Ext. Wall	1	0.108	**0.782**	0.79	**8**	**12.12**	6	8.66	**0.610**	28.3%
	b (in)	12		Top Slab -	4	0.19	**1.376**	1	**9**	**8.72**	7	9.05	**0.796**	73.0%
	d (in)	5.37		Top Middle Slab	5	0.19	**1.376**	1	**9**	**8.72**	7	8.66	**0.831**	65.5%
	h (in)	7.87		Ext. Wall	6	0.104	**0.475**	0.44	**6**	**11.12**	4	9.44	**0.254**	86.7%
	d (in)	2.5		Bottom Slab +	7	0.21	**1.521**	1	**9**	**7.89**	7	8.66	**0.831**	82.9%
	db (in^2)	64.44		Bottom Slab -	8	0.16	**1.159**	1	**9**	**10.36**	7	9.05	**0.796**	45.6%
				Int. Wall	9	0.088	**0.402**	0.44	**6**	**13.14**	5	9.84	**0.378**	6.2%

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	Span (ft)	22.8	6.95	Steel Location	ω		As inf	As pro	As pro	Spacing inf
(No.)	fy(ksi)	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*
1878 Average Curve	f' c (ksi)	3		Top Ext. Wall	1	0.20407121	**1.951**	1	**9**	**6.15**
	b (in)	12		Top Slab -	4	0.29179316	**2.790**	1	**9**	**4.30**
	d (in)	6.95		Top Middle Slab	5	0.40727156	**3.895**	1	**9**	**3.08**
	h (in)	9.45		Ext. Wall	6	0.20333896	**2.256**	1	**9**	**5.32**
	d (in)	2.5		Bottom Slab +	7	0.571326	**5.463**	1	**9**	**2.20**
	db (in^2)	83.4		Bottom Slab -	8	0.2356254	**2.253**	1	**9**	**5.33**
				Int. Wall	9	0.11365086	**1.261**	1	**9**	**9.52**

t slab	15	12.5	*in*
t ext wall	17	14.5	*in*
t int wall	17	14.5	*in*

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	Span (ft)	9.84	3.00	Steel Location	ω		As inf	As pro	As pro	Spacing inf
(No.)	fy(ksi)	40			*ID*		*in^2/ft*	*in^2/ft*	*#No.*	*(in)*
2010 Average Curve	f' c (ksi)	3		Top Ext. Wall	1	0.0753	**0.309**	0.31	**5**	**12.03**
	b (in)	12		Top Slab -	4	0.1243	**0.511**	0.44	**6**	**10.34**
	d (in)	5.37		Top Middle Slab	5	0.1189	**0.488**	0.44	**6**	**10.81**
	h (in)	7.87		Ext. Wall	6	0.0684	**0.281**	0.2	**4**	**8.54**
	d (in)	2.5		Bottom Slab +	7	0.1062	**0.436**	0.44	**6**	**12.10**
	db (in^2)	64.44		Bottom Slab -	8	0.1067	**0.438**	0.44	**6**	**12.05**
				Int. Wall	9	0.0587	**0.241**	0.2	**4**	**9.95**

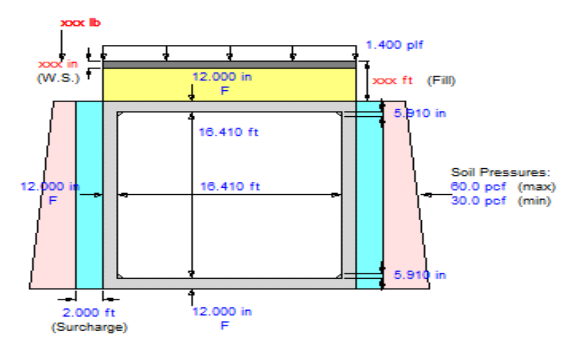
	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	**Span (ft)**	10.5	3.20	**Steel Location**	*ω*		**As** inf	**As** pro	**As** pro	**Spacing** inf
(No.)	**fy(ksi)**	33			*ID*		*in² /ft*	*in² /ft*	*#No.*	*(in)*
2113 Lower Bound	**f' c (ksi)**	2.5		Top Ext. Wall	1	0.048	**0.315**	0.31	**5**	**11.80**
	b (in)	12		Top Slab -	4	0.06	**0.394**	0.31	**5**	**9.44**
	d (in)	8.5		Top Middle Slab	5	0.062	**0.407**	0.44	**6**	**12.97**
	h (in)	11		Ext. Wall	6	0.04	**0.263**	0.2	**4**	**9.13**
	d (in)	2.5		Bottom Slab +	7	0.03	**0.197**	0.21	**9**	**12.79**
	db (in^2)	102		Bottom Slab -	8	0.06	**0.394**	0.44	**6**	**13.40**
				Int. Wall	9	0.036	**0.236**	0.2	**4**	**10.15**

	Bridge Properties				Reinforcement Index		Inferred Steel Reinforcements			
Bridge	**Span (ft)**	10.5	3.20	**Steel Location**	*ω*		**As** inf	**As** pro	**As** pro	**Spacing** inf
(No.)	**fy(ksi)**	33			*ID*		*in² /ft*	*in² /ft*	*#No.*	*(in)*
2113 Average Curve	**f' c (ksi)**	2.5		Top Ext. Wall	1	0.07861313	**0.516**	0.6	**7**	**13.94**
	b (in)	12		Top Slab -	4	0.12958508	**0.851**	1	**9**	**14.10**
	d (in)	8.5		Top Middle Slab	5	0.12558711	**0.825**	1	**9**	**14.55**
	h (in)	11		Ext. Wall	6	0.07142357	**0.469**	0.44	**6**	**11.26**
	d (in)	2.5		Bottom Slab +	7	0.1162292	**0.763**	0.79	**8**	**12.42**
	db (in^2)	102		Bottom Slab -	8	0.11062464	**0.727**	0.79	**8**	**13.05**
				Int. Wall	9	0.06006473	**0.395**	0.44	**6**	**13.38**

Appendix C: Design Criteria for Brass-Culvert^{TM} Model

Bridge	No. 658 at Carolina, PR
Year built	1953

1. Analyisis Control Data



a. Construction type =	cast-in-place
b. Analysis method =	rating
c. Reinf. Input method =	bar size
d. Floor type =	full slab
e. Moment continuity =	continuity
f. Design method =	LFD
g. Consider fatigue in analysis =	yes
h. Consider haunches for determining section for analysis =	yes
i. Use epoxy coated bars in top mat of reinf. In top slab =	no
j. Design Method =	Load factor

	Inventory	Operating
g =	1.3	1.3
b D =	1	1
b L =	1.667	1

l.1 Strength reduction factors

F M =	0.90
F V =	0.85

I.2 Condition factor:

F c =	1.00

l.3 Input strength reduction factors (Note1)

F cF M =	0.90
F cF V =	0.85

Note 1: The condition factor on the element is taken into accout by reducing the strength reduction factors.

Actual geometry of box culvert

t-ext wall	Clear spans [ft]		t-int wall	Width
[in]	1	2	[in]	[ft]
12.00	16.41	0.00	0.00	18.41

Note:

As only one clear span is allowed in Brass Culvert software, the largest (10.04 ft) was used in the load rating model. This conservative approach is reasonable.

2. Material properties

a. Concrete f'c (psi) =	2500	
b. Weight densities =		
b.1 Concrete	150	pcf
b.2 Soil fill	120	pcf
b.3 Wearing surface	145	pcf
c. Steel fy (psi) =	60000	psi

3. Box Geometry

a. Number of cells =	1		
b. Clear span =	16.41	ft	(From Inspection Report Sketches)
c. Clear height =	16.41	ft	(From Inspection Report Sketches)
d. Length =	108.93	ft	(From Inspection Report Sketches)

f. Thickness (in)

f.1 Top slab =	12.00	in
f.2 Bottom slab =	12.00	in
f.3 Exterior wall =	12.00	in
f.4 Interior wall =	0.00	in

4. Skew

a. Left opening angle =	138	deg	
b. Skew (center culvert)	48	deg	(From Inspection Report Sketches)
c. Right opening angle =	138	deg	

5. Haunches

a. Top (in) =	5.91	*** assumed as typical
b. Bottom (in) =	5.91	*** assumed as typical

6. Concrete cover

a. Top slab (in) =	2.0	in
b. Bottom slab (in) =	2.0	in
c. Interior walls (in) =	2.0	in
d. Exterior walls (in) =	2.0	in

7. Reinforcement

Id	No. Bars	Spacing
a. A1 =	9	13.20
b. A2 =	9	13.20
c. A3 =	9	13.20
d. A4 =	9	8.49
e. A5 =	9	7.31
f. A6 =	9	13.98
g. A7 =	9	6.02
h. A8 =	9	10.32
i. A9 =	7	12.39

Design Data for Box Culverts

8. Dead Loads

a. Soil weight

*1 Soil unit wt. [pcf]	*3 Fill, h [ft]	*2 Soil struct. Int. Factor, Fe
120	2.07	Override

b. Uniform load

R/C unit wt. [pcf]	t-slab [in]	W-slab [psf]
150	0	0

c. Wearing surface

t-W.S. [in]
0

Fe = 1 + 0.20(H/Bc); H = height of fill above top of box culvert, Bc = Box culvert length (in direction of traffic)*

Max Fe = 1.15 for installations with compacted fill at sides of box section; 1.40 for uncompacted fill at sides of box.

H [ft]	Bc [ft]	Compacted soil	Fe
0.00	33.14	yes	1.00

**1 = Default by Brass software*

*** = compacted soil*

**2 = LRFD soil unit weights are adjusted by soil structure interaction factor.*

**3 = thickness of asphalt included in soil fill.*

Length =	108.93	ft
Width =	18.41	ft

Sidewalk:

Width (ft)	Thick (ft)	L (ft)
0.00	0.33	108.93

W sidewalk. [plf]
0.0

Parapet:

width1 (ft)	Ht.1 (ft)	Length1 (ft)	Qty	Wt. [plf]
0.00	0.00	0.00	0	0.0

weight [plf]	
1.50	*http://guides.roadsafellc.com/bridgeRailGuide/index.php?action=view&railing=8*

width 3 (ft)	Ht.3 (ft)	Length3 (ft)
0.00	0.00	0.00

Pipe utilities:

In. Dia. (in)	Weight [lb/ft]	Water [lb/ft]	Wt. [plf]	
18	44.79	110.27	**1.4**	*** assumed a cast-iron 4in diameter water pipe

Total SDL:

Wt. [plf]
1.4

9. Soil loads:

a. Lateral Earth pressure:

Max. soil [pcf]	*3 Min. soil [pcf]	*4 Fe
60	30	1.00

** 3 = condition of submerged soil pressure (one half earth pressure on outside walls)*

**4 = for embankment installations, modification of earth loads for SSI (Fe) which accounts for type and condition of installation, STD 16.6.4.2, 16.7.4.2, LRFD 12.11.2.2.*

10. Water Pressure:

γ water *6 [pcf]
62.4

**6 = Water pressure due to a water surface at the top of the culvert. If "0" no water pressure is considered. If water pressure is entered, two loading cases are considered (Water, No water)*

11. Temperature loads:

- Not considered by BRASS software.

12. Live loads:

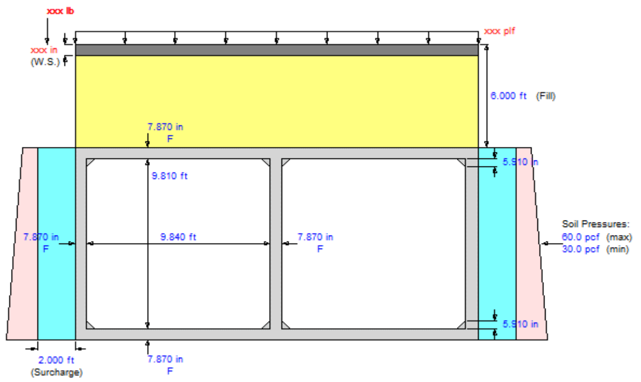
a. Live load surcharge

Note: LFD adds two ft load surcharge to the lateral load to simulate highway live loads when the cover is less than 2 ft. An equivalent surcharge depth can be used also.

LL surch [ft]
2

Bridge	No. 752 at Canovanas, PR
Year built	1963

1. Analyisis Control Data



a. Construction type =	cast-in-place
b. Analysis method =	rating
c. Reinf. Input method =	bar size
d. Floor type =	full slab
e. Moment continuity =	continuity
f. Design method =	LFD
g. Consider fatigue in analysis =	yes
h. Consider haunches for determining section for analysis =	yes
i. Use epoxy coated bars in top mat of reinf. In top slab =	no
j. Design Method =	Load factor

	Inventory	Operating
g =	1.3	1.3
b D =	1	1
b L =	1.667	1

I.1 Strength reduction factors

F M =	0.90
F V =	0.85

I.2 Condition factor:

F c =	1.00

I.3 Input strength reduction factors (Note1)

F cF M =	0.90
F cF V =	0.85

Note 1: The condition factor on the element is taken into accout by reducing the strength reduction factors.

Actual geometry of box culvert

t-ext wall	Clear spans [ft]		t-int wall	Width
[in]	1	2	[in]	[ft]
7.87	9.84	9.84	7.87	21.65

Note:
As only one clear span is allowed in Brass Culvert software, the largest (10.04 ft) was used in the load rating model. This conservative approach is reasonable.

2. Material properties

a. Concrete f'c (psi) =	3000	
b. Weight densities =		
b.1 Concrete	150	pcf
b.2 Soil fill	120	pcf
b.3 Wearing surface	120	pcf
c. Steel fy (psi) =	40000	psi

3. Box Geometry

a. Number of cells =	2		
b. Clear span =	9.84	ft	(From Inspection Report Sketches)
c. Clear height =	9.84	ft	(From Inspection Report Sketches)
d. Length =	38.00	ft	(From Inspection Report Sketches)

f. Thickness (in)

f.1 Top slab =	7.87	in
f.2 Bottom slab =	7.87	in
f.3 Exterior wall =	7.87	in
f.4 Interior wall =	7.87	in

4. Skew

a. Left opening angle =	90	deg	
b. Skew (center culvert)	0	deg	(From Inspection Report Sketches)
c. Right opening angle =	90	deg	

5. Haunches

a. Top (in) =	5.91	*** assumed as typical
b. Bottom (in) =	5.91	*** assumed as typical

6. Concrete cover

a. Top slab (in) =	2.0	in
b. Bottom slab (in) =	2.0	in
c. Interior walls (in) =	2.0	in
d. Exterior walls (in) =	2.0	in

7. Reinforcement

Id	No. Bars	Spacing
a. A1 =	5	12.03
b. A2 =	5	12.03
c. A3 =	5	12.03
d. A4 =	6	10.34
e. A5 =	6	10.81
f. A6 =	5	13.24
g. A7 =	6	12.10
h. A8 =	6	12.05
i. A9 =	4	9.95

Design Data for Box Culverts

8. Dead Loads

a. Soil weight

*1 Soil unit wt. [pcf]	*3 Fill, h [ft]	*2 Soil struct. Int. Factor, Fe
120	2.07	Override

b. Uniform load

R/C unit wt. [pcf]	t-slab [in]	W-slab [psf]
150	0	0

c. Wearing surface

t-W.S. [in]
0

Fe = 1 + 0.20(H/Bc); H = height of fill above top of box culvert, Bc = Box culvert length (in direction of traffic)*
Max Fe = 1.15 for installations with compacted fill at sides of box section; 1.40 for uncompacted fill at sides of box.

H [ft]	Bc [ft]	Compacted soil	Fe
6.00	33.14	yes	1.04

1 = Default by Brass software* * = compacted soil*
**2 = LRFD soil unit weights are adjusted by soil structure interaction factor.*
**3 = thickness of asphalt included in soil fill.*

Length = 38.00 ft
Width = 21.65 ft

Sidewalk:

Width [ft]	Thick [ft]	L [ft]
0.00	0.33	38.00

W sidewalk. [plf]
0.0

Parapet:

width1 [ft]	Ht.1 [ft]	Length1 [ft]
0.00	0.00	0.00

Qty	Wt. [plf]
0	0.0

weight [plf]
1.50

http://guides.roadsafellc.com/bridgeRailGuide/index.php?action=view&railing=8

width3 [ft]	Ht.3 [ft]	Length3 [ft]
0.00	0.00	0.00

Pipe utilities:

In. Dia. [in]	(Cast iron) Weight [lb/ft]	Water [lb/ft]	Wt. [plf]
0	0.61	0.00	0.0

*** assumed a 4in diamter water pipe

Total SDL:

Wt. [plf]
0.0

9. Soil loads:

a. Lateral Earth pressure:

Max. soil [pcf]	*3 Min. soil [pcf]	*4 Fe
60	30	1.04

** 3 = condition of submerged soil pressure (one half earth pressure on outside walls)*
**4 = for embankment installations, modification of earth loads for SSI (Fe) which accounts for type and condition of installation, STD 16.6.4.2, 16.7.4.2, LRFD 12.11.2.2.*

10. Water Pressure:

γ water *6 [pcf]
62.4

**6 = Water pressure due to a water surface at the top of the culvert. If "0" no water pressure is considered. If water pressure is entered, two loading cases are considered (Water, No water)*

11. Temperature loads:

- Not considered by BRASS software.

12. Live loads:

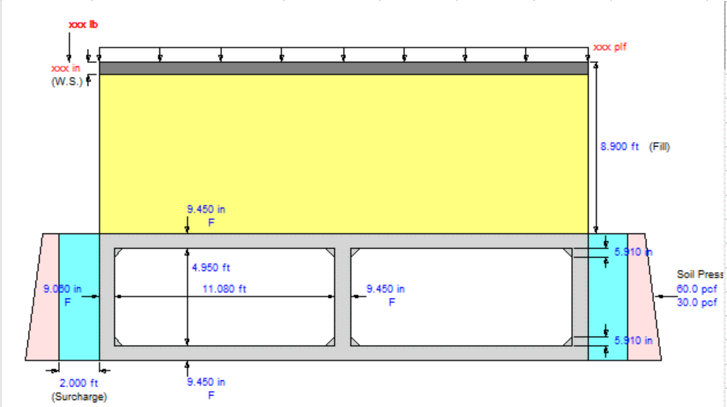
a. Live load surcharge

Note: LFD adds two ft load surcharge to the lateral load to simulate highway live loads when the cover is less than 2 ft. An equivalent surcharge depth can be used also.

LL surch [ft]
2

Bridge	No. 848 at Guaynabo, PR
Year built	1961

1. Analyisis Control Data



a. Construction type =	cast-in-place
b. Analysis method =	rating
c. Reinf. Input method =	bar size
d. Floor type =	full slab
e. Moment continuity =	continuity
f. Design method =	LFD
g. Consider fatigue in analysis =	yes
h. Consider haunches for determining section for analysis =	yes
i. Use epoxy coated bars in top mat of reinf. In top slab =	no
j. Design Method =	Load factor

	Inventory	**Operating**
g =	1.3	1.3
b D =	1	1
b L =	1.667	1

l.1 Strength reduction factors

F M =	0.90
F V =	0.85

l.2 Condition factor:

F c =	1.00

l.3 Input strength reduction factors (Note1)

F cF M =	0.90
F cF V =	0.85

Note 1: The condition factor on the element is taken into accout by reducing the strength reduction factors.

Actual geometry of box culvert

t-ext wall	Clear spans [ft]		t-int wall	Width
[in]	1	2	[in]	[ft]
9.06	11.08	11.08	9.45	24.46

Note:
As only one clear span is allowed in Brass Culvert software, the largest (10.04 ft) was used in the load rating model. This conservative approach is reasonable.

2. Material properties

a. Concrete f'c (psi) =	3000	
b. Weight densities =		
b.1 Concrete	150	pcf
b.2 Soil fill	120	pcf
b.3 Wearing surface	145	pcf
c. Steel fy (psi) =	40000	psi

3. Box Geometry

a. Number of cells =	2		
b. Clear span =	11.08	ft	(From Inspection Report Sketches)
c. Clear height =	4.95	ft	(From Inspection Report Sketches)
d. Length =	56.30	ft	(From Inspection Report Sketches)

f. Thickness (in)		
f.1 Top slab =	9.45	in
f.2 Bottom slab =	9.45	in
f.3 Exterior wall =	9.06	in
f.4 Interior wall =	9.45	in

4. Skew

a. Left opening angle =	90	deg	
b. Skew (center culvert)	0	deg	(From Inspection Report Sketches)
c. Right opening angle =	90	deg	

5. Haunches

a. Top (in) =	5.91	*** assumed as typical
b. Bottom (in) =	5.91	*** assumed as typical

6. Concrete cover

a. Top slab (in) =	2.0	in
b. Bottom slab (in) =	2.0	in
c. Interior walls (in) =	2.0	in
d. Exterior walls (in) =	2.0	in

7. Reinforcement

Id	No. Bars	Spacing
a. A1 =	7	13.66
b. A2 =	7	13.66
c. A3 =	7	13.66
d. A4 =	9	13.84
e. A5 =	9	14.09
f. A6 =	6	11.66
g. A7 =	9	14.75
h. A8 =	8	12.87
i. A9 =	6	13.35

Design Data for Box Culverts

8. Dead Loads

a. Soil weight

*1 Soil unit wt. [pcf]	*3 Fill, h [ft]	*2 Soil struct. Int. Factor, Fe
120	2.07	Override

b. Uniform load

R/C unit wt. [pcf]	t-slab [in]	W-slab [psf]
150	0	0

c. Wearing surface

t-W.S. [in]
0

Fe = 1 + 0.20(H/Bc); H = height of fill above top of box culvert, Bc = Box culvert length (in direction of traffic)*

Max Fe = 1.15 for installations with compacted fill at sides of box section; 1.40 for uncompacted fill at sides of box.

H [ft]	Bc [ft]	Compacted soil	Fe
8.90	33.14	yes	1.05

**1 = Default by Brass software*

*** = compacted soil*

**2 = LRFD soil unit weights are adjusted by soil structure interaction factor.*

**3 = thickness of asphalt included in soil fill.*

Length =	56.30	ft
Width =	24.46	ft

Sidewalk:

Width [ft]	Thick [ft]	L [ft]
0.00	0.33	56.30

W sidewalk. [plf]
0.0

Parapet:

width1 [ft]	Ht.1 [ft]	Length1 [ft]
0.00	0.00	0.00

Qty	Wt. [plf]
0	0.0

weight [plf]
1.50

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width3 [ft]	Ht.3 [ft]	Length3 [ft]
0.00	0.00	0.00

Pipe utilities:

In. Dia. [in]	(Cast iron) Weight [lb/ft]	Water [lb/ft]	Wt. [plf]
0	0.61	0.00	0.0

*** assumed a 4in diamter water pipe

Total SDL:

Wt. [plf]
0.0

9. Soil loads:

a. Lateral Earth pressure:

Max. soil [pcf]	*3 Min. soil [pcf]	*4 Fe
60	30	1.05

** 3 = condition of submerged soil pressure (one half earth pressure on outside walls)*

**4 = for embankment installations, modification of earth loads for SSI (Fe) which accounts for type and condition of installation, STD 16.6.4.2, 16.7.4.2, LRFD 12.11.2.2.*

10. Water Pressure:

γ water *6 [pcf]
62.4

**6 = Water pressure due to a water surface at the top of the culvert. If "0" no water pressure is considered. If water pressure is entered, two loading cases are considered (Water, No water)*

11. Temperature loads:

- Not considered by BRASS software.

12. Live loads:

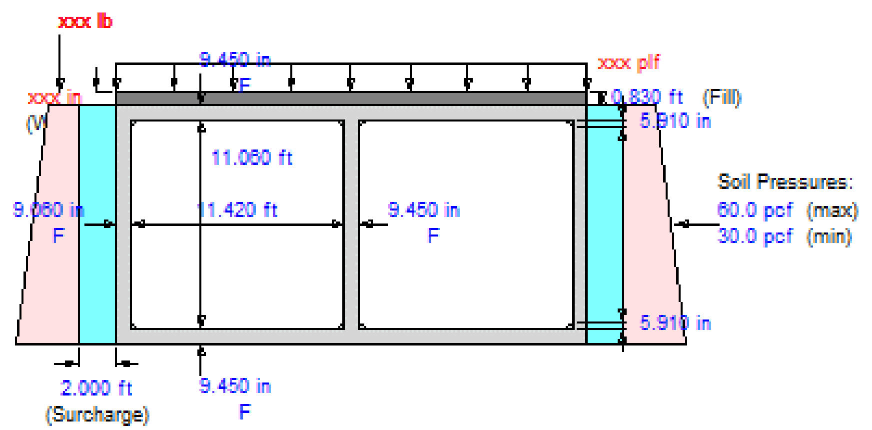
a. Live load surcharge

Note: LFD adds two ft load surcharge to the lateral load to simulate highway live loads when the cover is less than 2 ft. An equivalent surcharge depth can be used also.

LL surch [ft]
2

Bridge	No. 849 at Caguas, PR
Year built	1961

1. Analyisis Control Data



a. Construction type =	cast-in-place
b. Analysis method =	rating
c. Reinf. Input method =	bar size
d. Floor type =	full slab
e. Moment continuity =	continuity
f. Design method =	LFD
g. Consider fatigue in analysis =	yes
h. Consider haunches for determining section for analysis =	yes
i. Use epoxy coated bars in top mat of reinf. In top slab =	no
j. Design Method =	Load factor

	Inventory	**Operating**
γ =	1.3	1.3
β_D =	1	1
β_L =	1.667	1

I.1 Strength reduction factors

ϕ_M =	0.90
ϕ_V =	0.85

I.2 Condition factor:

ϕ_c =	1.00

I.3 Input strength reduction factors (Note1)

$\phi_c\phi_M$ =	0.90
$\phi_c\phi_V$ =	0.85

Note 1: The condition factor on the element is taken into accout by reducing the strength reduction factors.

Actual geometry of box culvert

t-ext wall	Clear spans [ft]		t-int wall	Width
[in]	1	2	[in]	[ft]
9.45	11.42	11.42	9.45	25.20

Note:

As only one clear span is allowed in Brass Culvert software, the largest (10.04 ft) was used in the load rating model. This conservative approach is reasonable.

2. Material properties

a. Concrete f'c (psi) =	3000	
b. Weight densities =		
b.1 Concrete	150	pcf
b.2 Soil fill	120	pcf
b.3 Wearing surface	145	pcf
c. Steel fy (psi) =	40000	psi

3. Box Geometry			
a. Number of cells =	2		
b. Clear span =	11.42	ft	(From Inspection Report Sketches)
c. Clear height =	11.06	ft	(From Inspection Report Sketches)
d. Length =	28.61	ft	(From Inspection Report Sketches)
f. Thickness (in)			
f.1 Top slab =	9.45	in	
f.2 Bottom slab =	9.45	in	
f.3 Exterior wall =	9.45	in	
f.4 Interior wall =	9.45	in	
4. Skew			
a. Left opening angle =	90	deg	
b. Skew (center culvert)	0	deg	(From Inspection Report Sketches)
c. Right opening angle =	90	deg	
5. Haunches			
a. Top (in) =	5.91	*** assumed as typical	
b. Bottom (in) =	5.91	*** assumed as typical	
6. Concrete cover			
a. Top slab (in) =	2.0	in	
b. Bottom slab (in) =	2.0	in	
c. Interior walls (in) =	2.0	in	
d. Exterior walls (in) =	2.0	in	

7. Reinforcement

Id	No. Bars	Spacing
a. A1 =	7	13.33
b. A2 =	7	13.33
c. A3 =	7	13.33
d. A4 =	9	13.54
e. A5 =	9	13.66
f. A6 =	6	10.73
g. A7 =	9	14.04
h. A8 =	8	12.62
i. A9 =	6	13.17

Design Data for Box Culverts

8. Dead Loads

a. Soil weight

*1 Soil unit wt. [pcf]	*3 Fill, h [ft]	*2 Soil struct. Int. Factor, Fe
120	2.07	Override

b. Uniform load

R/C unit wt. [pcf]	t-slab [in]	W-slab [psf]
150	0	0

c. Wearing surface

t-W.S. [in]
0

Fe = 1 + 0.20(H/Bc); H = height of fill above top of box culvert, Bc = Box culvert length (in direction of traffic)*

Max Fe = 1.15 for installations with compacted fill at sides of box section; 1.40 for uncompacted fill at sides of box.

H [ft]	Bc [ft]	Compacted soil	Fe
0.83	33.14	yes	1.01

**1 = Default by Brass software*

*** = compacted soil*

**2 = LRFD soil unit weights are adjusted by soil structure interaction factor.*

**3 = thickness of asphalt included in soil fill.*

Length =	28.61	ft
Width =	25.20	ft

Sidewalk:

Width [ft]	Thick [ft]	L [ft]
0.00	0.33	28.61

W sidewalk. [plf]
0.0

Parapet:

width1 [ft]	Ht.1 [ft]	Length1 [ft]
0.00	0.00	0.00

Qty	Wt. [plf]
0	0.0

weight [plf]
1.50

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width3 [ft]	Ht.3 [ft]	Length3 [ft]
0.00	0.00	0.00

Pipe utilities:

In. Dia. [in]	(Cast iron) Weight [lb/ft]	Water [lb/ft]	Wt. [plf]
0	0.61	0.00	0.0

*** assumed a 4in diamter water pipe

Total SDL:

Wt. [plf]
0.0

9. Soil loads:

a. Lateral Earth pressure:

Max. soil [pcf]	*3 Min. soil [pcf]	*4 Fe
60	30	1.01

** 3 = condition of submerged soil pressure (one half earth pressure on outside walls)*

**4 = for embankment installations, modification of earth loads for SSI (Fe) which accounts for type and condition of installation, STD 16.6.4.2, 16.7.4.2, LRFD 12.11.2.2.*

10. Water Pressure:

γ water *6 [pcf]
62.4

**6 = Water pressure due to a water surface at the top of the culvert. If "0" no water pressure is considered. If water pressure is entered, two loading cases are considered (Water, No water)*

11. Temperature loads:

- Not considered by BRASS software.

12. Live loads:

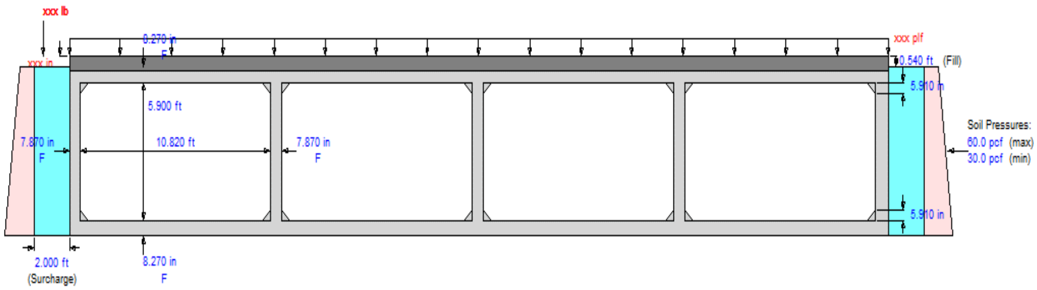
a. Live load surcharge

Note: LFD adds two ft load surcharge to the lateral load to simulate highway live loads when the cover is less than 2 ft. An equivalent surcharge depth can be used also.

LL surch [ft]
2

Bridge	No. 1359 at Guayanilla, PR		
Year built	1935		

1. Analyisis Control Data



a. Construction type =	cast-in-place
b. Analysis method =	rating
c. Reinf. Input method =	bar size
d. Floor type =	full slab
e. Moment continuity =	continuity
f. Design method =	LFD
g. Consider fatigue in analysis =	yes
h. Consider haunches for determining section for analysis =	yes
i. Use epoxy coated bars in top mat of reinf. In top slab =	no
j. Design Method =	Load factor

	Inventory	Operating
γ =	1.3	1.3
β_D =	1	1
β_L =	1.667	1

1.1 Strength reduction factors

Φ_M =	0.90
Φ_V =	0.85

I.2 Condition factor:

Φ_c =	1.00

1.3 Input strength reduction factors (Note1)

$\Phi_c\Phi_M$ =	0.90
$\Phi_c\Phi_V$ =	0.85

Note 1: The condition factor on the element is taken into accout by reducing the strength reduction factors.

Actual geometry of box culvert

t-ext wall	Clear spans [ft]		t-int wall	Width
[in]	1	2	[in]	[ft]
7.87	10.82	10.82	7.87	46.58

Note:
As only one clear span is allowed in Brass Culvert software, the largest (10.04 ft) was used in the load rating model. This conservative approach is reasonable.

2. Material properties

a. Concrete f'c (psi) =	2500		
b. Weight densities =			
b.1 Concrete	150	pcf	
b.2 Soil fill	120	pcf	
b.3 Wearing surface	145	pcf	
c. Steel fy (psi) =	36000	psi	
3. Box Geometry			
a. Number of cells =	4		
b. Clear span =	10.82	ft	(From Inspection Report Sketches)
c. Clear height =	5.90	ft	(From Inspection Report Sketches)
d. Length =	67.94	ft	(From Inspection Report Sketches)

f. Thickness (in)			
f.1 Top slab =	8.27	in	*** assumed the as the bottom slab
f.2 Bottom slab =	8.27	in	
f.3 Exterior wall =	7.87	in	
f.4 Interior wall =	7.87	in	
4. Skew			
a. Left opening angle =	90	deg	
b. Skew (center culvert)	0	deg	(From Inspection Report Sketches)
c. Right opening angle =	90	deg	
5. Haunches			
a. Top (in) =	0.00		
b. Bottom (in) =	0.00		
6. Concrete cover			
a. Top slab (in) =	2.0	in	
b. Bottom slab (in) =	2.0	in	
c. Interior walls (in) =	2.0	in	
d. Exterior walls (in) =	2.0	in	

7. Reinforcement

Id	No. Bars	Spacing
a. A1 =	7	12.36
b. A2 =	7	12.36
c. A3 =	7	12.36
d. A4 =	9	12.51
e. A5 =	9	12.81
f. A6 =	5	11.14
g. A7 =	9	13.59
h. A8 =	9	14.70
i. A9 =	5	13.40

plans or ferro-scan

Id	No. Bars	Spacing
a. A1 =	6	8.66
b. A2 =	6	8.66
c. A3 =	6	8.66
d. A4 =	7	9.05
e. A5 =	7	8.66
f. A6 =	4	9.44
g. A7 =	7	8.66
h. A8 =	7	9.05
i. A9 =	5	9.84

Design Data for Box Culverts

8. Dead Loads

a. Soil weight

*1 Soil unit wt. [pcf]	*3 Fill, h [ft]	*2 Soil struct. Int. Factor, Fe
120	2.07	Override

b. Uniform load

R/C unit wt. [pcf]	t-slab [in]	W-slab [psf]
150	0	0

c. Wearing surface

t-W.S. [in]
0

Fe = 1 + 0.20(H/Bc); H = height of fill above top of box culvert, Bc = Box culvert length (in direction of traffic)*
Max Fe = 1.15 for installations with compacted fill at sides of box section; 1.40 for uncompacted fill at sides of box.

H [ft]	Bc [ft]	Compacted soil	Fe
0.54	33.14	yes	1.00

1 = Default by Brass software* * = compacted soil*
**2 = LRFD soil unit weights are adjusted by soil structure interaction factor.*
**3 = thickness of asphalt included in soil fill.*

Length =	67.94	ft
Width =	46.58	ft

Sidewalk:

Width [ft]	Thick [ft]	L [ft]
0.00	0.33	67.94

W sidewalk. [plf]
0.0

Parapet:

width1 [ft]	Ht.1 [ft]	Length1 [ft]
0.00	0.00	0.00

Qty	Wt. [plf]
0	0.0

weight [plf]
1.50

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width3 [ft]	Ht.3 [ft]	Length3 [ft]
0.00	0.00	0.00

Pipe utilities:

In. Dia. [in]	(Cast iron) Weight [lb/ft]	Water [lb/ft]	Wt. [plf]
0	0.61	0.00	0.0

*** assumed a 4in diamter water pipe

Total SDL:

Wt. [plf]
0.0

9. Soil loads:

a. Lateral Earth pressure:

Max. soil [pcf]	*3 Min. soil [pcf]	*4 Fe
60	30	1.00

** 3 = condition of submerged soil pressure (one half earth pressure on outside walls)*
**4 = for embankment installations, modification of earth loads for SSI (Fe) which accounts for type and condition of installation, STD 16.6.4.2, 16.7.4.2, LRFD 12.11.2.2.*

10. Water Pressure:

γ water *6 [pcf]
62.4

**6 = Water pressure due to a water surface at the top of the culvert. If "0" no water pressure is considered. If water pressure is entered, two loading cases are considered (Water, No water)*

11. Temperature loads:

- Not considered by BRASS software.

12. Live loads:

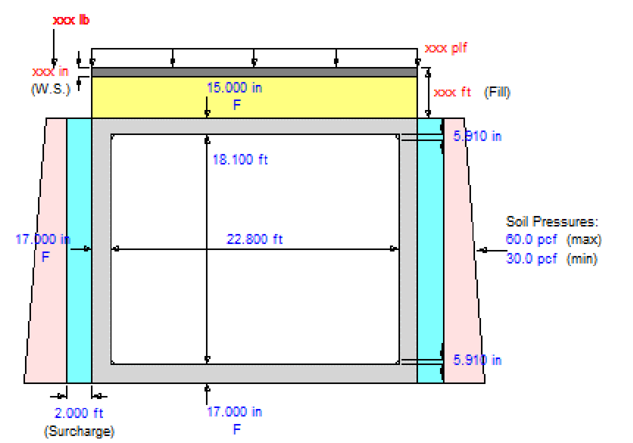
a. Live load surcharge

Note: LFD adds two ft load surcharge to the lateral load to simulate highway live loads when the cover is less than 2 ft. An equivalent surcharge depth can be used also.

LL surch [ft]
2

Bridge	No. 1878 at Bayamon, PR
Year built	1986

1. Analyisis Control Data



a. Construction type =	cast-in-place
b. Analysis method =	rating
c. Reinf. Input method =	bar size
d. Floor type =	full slab
e. Moment continuity =	continuity
f. Design method =	LFD
g. Consider fatigue in analysis =	yes
h. Consider haunches for determining section for analysis =	yes
i. Use epoxy coated bars in top mat of reinf. In top slab =	no
j. Design Method =	Load factor

	Inventory	Operating
γ =	1.3	1.3
β_D =	1	1
β_L =	1.667	1

1.1 Strength reduction factors

Φ_M =	0.90
Φ_V =	0.85

1.2 Condition factor:

Φ_c =	1.00

1.3 Input strength reduction factors (Note1)

$\Phi_c\Phi_M$ =	0.90
$\Phi_c\Phi_V$ =	0.85

Note 1: The condition factor on the element is taken into accout by reducing the strength reduction factors.

Actual geometry of box culvert

t-ext wall	Clear spans [ft]		t-int wall	Width
[in]	1	2	[in]	[ft]
17.00	22.80	0.00	17.00	25.63

Note:

As only one clear span is allowed in Brass Culvert software, the largest (10.04 ft) was used in the load rating model. This conservative approach is reasonable.

2. Material properties

a. Concrete f'c (psi) =	3000	
b. Weight densities =		
b.1 Concrete	150	pcf
b.2 Soil fill	120	pcf
b.3 Wearing surface	145	pcf
c. Steel fy (psi) =	40000	psi

3. Box Geometry

a. Number of cells =	1		
b. Clear span =	22.80	ft	(From Inspection Report Sketches)
c. Clear height =	18.10	ft	(From Inspection Report Sketches)
d. Length =	110.30	ft	(From Inspection Report Sketches)
f. Thickness (in)			
f.1 Top slab =	15.00	in	*** assumed the as the bottom slab
f.2 Bottom slab =	17.00	in	
f.3 Exterior wall =	17.00	in	
f.4 Interior wall =	17.00	in	

4. Skew

a. Left opening angle =	107	deg	
b. Skew (center culvert)	17	deg	(From Inspection Report Sketches)
c. Right opening angle =	107	deg	

5. Haunches

a. Top (in) =	3.95
b. Bottom (in) =	3.95

6. Concrete cover

a. Top slab (in) =	2.0	in
b. Bottom slab (in) =	2.0	in
c. Interior walls (in) =	2.0	in
d. Exterior walls (in) =	2.0	in

7. Reinforcement

Id	No. Bars	Spacing
a. A1 =	9	6.15
b. A2 =	9	6.15
c. A3 =	9	6.15
d. A4 =	9	4.30
e. A5 =	9	3.08
f. A6 =	9	5.32
g. A7 =	9	2.20
h. A8 =	9	5.33
i. A9 =	9	9.52

Design Data for Box Culverts

8. Dead Loads

a. Soil weight

*1 Soil unit wt. [pcf]	*3 Fill, h [ft]	*2 Soil struct. Int. Factor, Fe
120	2.07	Override

b. Uniform load

R/C unit wt. [pcf]	t-slab [in]	W-slab [psf]
150	0	0

c. Wearing surface

t-W.S. [in]
0

Fe = 1 + 0.20(H/Bc); H = height of fill above top of box culvert, Bc = Box culvert length (in direction of traffic)*
Max Fe = 1.15 for installations with compacted fill at sides of box section; 1.40 for uncompacted fill at sides of box.

H [ft]	Bc [ft]	Compacted soil	Fe
0.00	33.14	yes	1.00

1 = Default by Brass software* * = compacted soil*
**2 = LRFD soil unit weights are adjusted by soil structure interaction factor.*
**3 = thickness of asphalt included in soil fill.*

Length = 110.30 ft
Width = 25.63 ft

Sidewalk:

Width [ft]	Thick [ft]	L [ft]
0.00	0.33	110.30

W sidewalk. [plf]
0.0

Parapet:

width1 [ft]	Ht.1 [ft]	Length1 [ft]
0.00	0.00	0.00

Qty	Wt. [plf]
0	0.0

weight [plf]
1.50

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width3 [ft]	Ht.3 [ft]	Length3 [ft]
0.00	0.00	0.00

Pipe utilities:

In. Dia. [in]	(Cast iron) Weight [lb/ft]	Water [lb/ft]	Wt. [plf]
0	0.61	0.00	0.0

*** assumed a 4in diamter water pipe

Total SDL:

Wt. [plf]
0.0

9. Soil loads:

a. Lateral Earth pressure:

Max. soil [pcf]	*3 Min. soil [pcf]	*4 Fe
60	30	1.00

** 3 = condition of submerged soil pressure (one half earth pressure on outside walls)*
**4 = for embankment installations, modification of earth loads for SSI (Fe) which accounts for type and condition of installation, STD 16.6.4.2, 16.7.4.2, LRFD 12.11.2.2.*

10. Water Pressure:

γ water *6 [pcf]
62.4

**6 = Water pressure due to a water surface at the top of the culvert. If "0" no water pressure is considered. If water pressure is entered, two loading cases are considered (Water, No water)*

11. Temperature loads:

- Not considered by BRASS software.

12. Live loads:

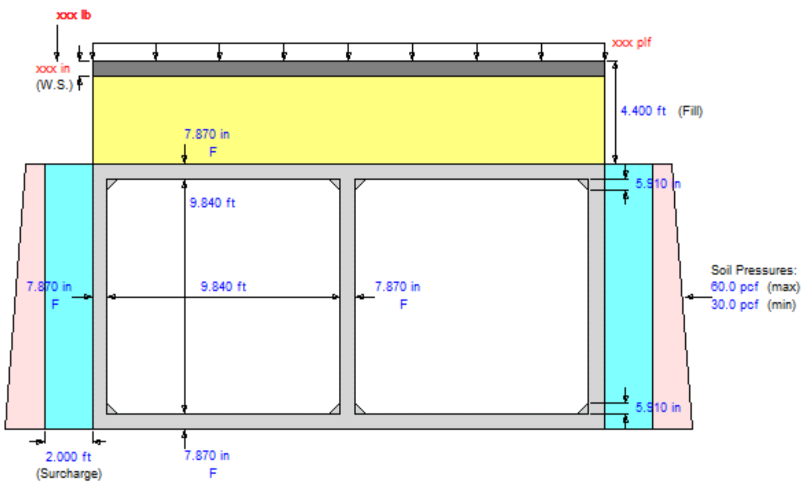
a. Live load surcharge

Note: LFD adds two ft load surcharge to the lateral load to simulate highway live loads when the cover is less than 2 ft. An equivalent surcharge depth can be used also.

LL surch [ft]
2

Bridge	No. 2010 at San Lorenzo, PR	
Year built	1971	

1. Analysis Control Data



a. Construction type =	cast-in-place
b. Analysis method =	rating
c. Reinf. Input method =	bar size
d. Floor type =	full slab
e. Moment continuity =	continuity
f. Design method =	LFD
g. Consider fatigue in analysis =	yes
h. Consider haunches for determining section for analysis =	yes
i. Use epoxy coated bars in top mat of reinf. In top slab =	no
j. Design Method =	Load factor

	Inventory	**Operating**
g =	1.3	1.3
b D =	1	1
b L =	1.667	1

I.1 Strength reduction factors

F M =	0.90
F V =	0.85

I.2 Condition factor:

F c =	1.00

I.3 Input strength reduction factors (Note1)

F cF M =	0.90
F cF V =	0.85

Note 1: The condition factor on the element is taken into accout by reducing the strength reduction factors.

Actual geometry of box culvert

t-ext wall	Clear spans [ft]		t-int wall	Width
[in]	1	2	[in]	[ft]
7.87	9.84	9.84	7.87	21.65

Note:

As only one clear span is allowed in Brass Culvert software, the largest (10.04 ft) was used in the load rating model. This conservative approach is reasonable.

2. Material properties

a. Concrete f'c (psi) =	3000	
b. Weight densities =		
b.1 Concrete	150	pcf
b.2 Soil fill	120	pcf
b.3 Wearing surface	145	pcf
c. Steel fy (psi) =	40000	psi

3. Box Geometry

14.25 *** last barrel span length

a. Number of cells =	2		
b. Clear span =	9.84	ft	(From Inspection Report Sketches)
c. Clear height =	9.84	ft	(From Inspection Report Sketches)
d. Length =	25.00	ft	(From Inspection Report Sketches)
f. Thickness (in)			
f.1 Top slab =	7.87	in	
f.2 Bottom slab =	7.87	in	
f.3 Exterior wall =	7.87	in	
f.4 Interior wall =	7.87	in	

4. Skew

a. Left opening angle =	116	deg	
b. Skew (center culvert)	26	deg	(From Inspection Report Sketches)
c. Right opening angle =	116	deg	

5. Haunches

a. Top (in) =	5.91
b. Bottom (in) =	5.91

6. Concrete cover

a. Top slab (in) =	2.0	in
b. Bottom slab (in) =	2.0	in
c. Interior walls (in) =	2.0	in
d. Exterior walls (in) =	2.0	in

7. Reinforcement

Id	No. Bars	Spacing
a. A1 =	5	12.03
b. A2 =	5	12.03
c. A3 =	5	12.03
d. A4 =	6	10.34
e. A5 =	6	10.81
f. A6 =	4	8.54
g. A7 =	6	12.10
h. A8 =	6	12.05
i. A9 =	4	9.95

Design Data for Box Culverts

8. Dead Loads

a. Soil weight

*1 Soil unit wt. [pcf]	*3 Fill, h [ft]	*2 Soil struct. Int. Factor, Fe
120	2.07	Override

b. Uniform load

R/C unit wt. [pcf]	t-slab [in]	W-slab [psf]
150	0	0

c. Wearing surface

t-W.S. [in]
0

Fe = 1 + 0.20(H/Bc); H = height of fill above top of box culvert, Bc = Box culvert length (in direction of traffic)*
Max Fe = 1.15 for installations with compacted fill at sides of box section; 1.40 for uncompacted fill at sides of box.

H [ft]	Bc [ft]	Compacted soil	Fe
4.40	33.14	yes	1.03

**1 = Default by Brass software*

*** = compacted soil*

**2 = LRFD soil unit weights are adjusted by soil structure interaction factor.*

**3 = thickness of asphalt included in soil fill.*

Length = 25.00 ft
Width = 21.65 ft

Sidewalk:

Width [ft]	Thick [ft]	L [ft]
0.00	0.33	25.00

W sidewalk. [plf]
0.0

Parapet:

width1 [ft]	Ht.1 [ft]	Length1 [ft]
0.00	0.00	0.00

Qty	Wt. [plf]
0	0.0

weight [plf]
1.50

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width3 [ft]	Ht.3 [ft]	Length3 [ft]
0.00	0.00	0.00

Pipe utilities:

In. Dia. [in]	(Cast iron) Weight [lb/ft]	Water [lb/ft]	Wt. [plf]
0	0.61	0.00	0.0

*** assumed a 4in diamter water pipe

Total SDL:

Wt. [plf]
0.0

9. Soil loads:

a. Lateral Earth pressure:

Max. soil [pcf]	*3 Min. soil [pcf]	*4 Fe
60	30	1.03

** 3 = condition of submerged soil pressure (one half earth pressure on outside walls)*
**4 = for embankment installations, modification of earth loads for SSI (Fe) which accounts for type and condition of installation, STD 16.6.4.2, 16.7.4.2, LRFD 12.11.2.2.*

10. Water Pressure:

γ water *6 [pcf]
62.4

**6 = Water pressure due to a water surface at the top of the culvert. If "0" no water pressure is considered. If water pressure is entered, two loading cases are considered (Water, No water)*

11. Temperature loads:

- Not considered by BRASS software.

12. Live loads:

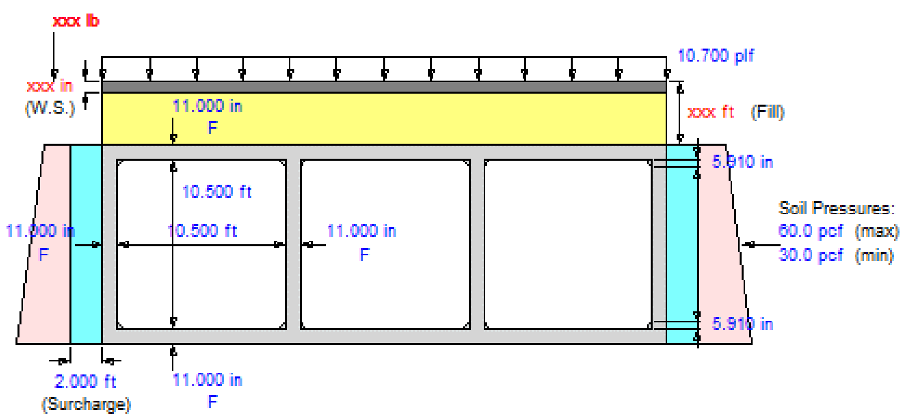
a. Live load surcharge

Note: LFD adds two ft load surcharge to the lateral load to simulate highway live loads when the cover is less than 2 ft. An equivalent surcharge depth can be used also.

LL surch [ft]
2

Bridge	No. 2113 at BAYAMON, PR
Year built	1955

1. Analyisis Control Data



a. Construction type =	cast-in-place
b. Analysis method =	rating
c. Reinf. Input method =	bar size
d. Floor type =	full slab
e. Moment continuity =	continuity
f. Design method =	LFD
g. Consider fatigue in analysis =	yes
h. Consider haunches for determining section for analysis =	yes
i. Use epoxy coated bars in top mat of reinf. In top slab =	no
j. Design Method =	Load factor

	Inventory	Operating
γ =	1.3	1.3
β_D =	1	1
β_L =	1.667	1

I.1 Strength reduction factors

Φ_M =	0.90
Φ_V =	0.85

I.2 Condition factor:

Φ_c =	1.00

I.3 Input strength reduction factors (Note1)

$\Phi_c\Phi_M$ =	0.90
$\Phi_c\Phi_V$ =	0.85

Note 1: The condition factor on the element is taken into accout by reducing the strength reduction factors.

Actual geometry of box culvert

t-ext wall	Clear spans [ft]		t-int wall	Width
[in]	1	2	[in]	[ft]
11.00	10.50	10.50	11.00	35.17

Note:

As only one clear span is allowed in Brass Culvert software, the largest (10.04 ft) was used in the load rating model. This conservative approach is reasonable.

2. Material properties

a. Concrete f'c (psi) =	2500	
b. Weight densities =		
b.1 Concrete	150	pcf
b.2 Soil fill	120	pcf
b.3 Wearing surface	145	pcf
c. Steel fy (psi) =	40000	psi

3. Box Geometry

			14.25 *** last barrel span length
a. Number of cells =	3		
b. Clear span =	10.50	ft	(From Inspection Report Sketches)
c. Clear height =	10.50	ft	(From Inspection Report Sketches)
d. Length =	65.72	ft	(From Inspection Report Sketches)
f. Thickness (in)			
f.1 Top slab =	11.00	in	
f.2 Bottom slab =	11.00	in	
f.3 Exterior wall =	11.00	in	
f.4 Interior wall =	11.00	in	

4. Skew

a. Left opening angle =	110	deg	
b. Skew (center culvert)	20	deg	(From Inspection Report Sketches)
c. Right opening angle =	110	deg	

5. Haunches

a. Top (in) =	5.91	***assumed
b. Bottom (in) =	5.91	

6. Concrete cover

a. Top slab (in) =	2.0	in
b. Bottom slab (in) =	2.0	in
c. Interior walls (in) =	2.0	in
d. Exterior walls (in) =	2.0	in

7. Reinforcement

Id	No. Bars	Spacing
a. A1 =	7	13.94
b. A2 =	7	13.94
c. A3 =	7	13.94
d. A4 =	9	14.10
e. A5 =	9	14.55
f. A6 =	6	11.26
g. A7 =	8	12.42
h. A8 =	8	13.05
i. A9 =	6	13.38

Design Data for Box Culverts

8. Dead Loads

a. Soil weight

*1 Soil unit wt. [pcf]	*3 Fill, h [ft]	*2 Soil struct. Int. Factor, Fe
120	2.07	Override

b. Uniform load

R/C unit wt. [pcf]	t-slab [in]	W-slab [psf]
150	0	0

c. Wearing surface

t-W.S. [in]
0

Fe = 1 + 0.20(H/Bc); H = height of fill above top of box culvert, Bc = Box culvert length (in direction of traffic)*
Max Fe = 1.15 for installations with compacted fill at sides of box section; 1.40 for uncompacted fill at sides of box.

H [ft]	Bc [ft]	Compacted soil	Fe
0.00	33.14	yes	1.00

**1 = Default by Brass software*
*** = compacted soil*
**2 = LRFD soil unit weights are adjusted by soil structure interaction factor.*
**3 = thickness of asphalt included in soil fill.*

Length =	65.72	ft
Width =	35.17	ft

Sidewalk:

Width [ft]	Thick [ft]	L [ft]
5.00	0.33	65.72

W sidewalk. [plf]
3.8

Parapet:

width1 [ft]	Ht.1 [ft]	Length1 [ft]
1.00	3.00	35.20

Qty	Wt. [plf]
1	6.9

weight [plf]
1.50

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width3 [ft]	Ht.3 [ft]	Length3 [ft]
0.00	0.00	0.00

Pipe utilities:

In. Dia. [in]	(Cast iron) Weight [lb/ft]	Water [lb/ft]	Wt. [plf]
0	0.61	0.00	0.0

*** assumed a 4in diamter water pipe

Total SDL:

Wt. [plf]
10.7

9. Soil loads:

a. Lateral Earth pressure:

Max. soil [pcf]	*3 Min. soil [pcf]	*4 Fe
60	30	1.00

** 3 = condition of submerged soil pressure (one half earth pressure on outside walls)*
**4 = for embankment installations, modification of earth loads for SSI (Fe) which accounts for type and condition of installation, STD 16.6.4.2, 16.7.4.2, LRFD 12.11.2.2.*

10. Water Pressure:

γ water *6 [pcf]
62.4

**6 = Water pressure due to a water surface at the top of the culvert. If "0" no water pressure is considered. If water pressure is entered, two loading cases are considered (Water, No water)*

11. Temperature loads:

- Not considered by BRASS software.

12. Live loads:

a. Live load surcharge

Note: LFD adds two ft load surcharge to the lateral load to simulate highway live loads when the cover is less than 2 ft. An equivalent surcharge depth can be used also.

LL surch [ft]
2

Appendix D: Brass-Culvert™ (2.3.2 Version) Output Files

Bridge No. 139

Member No. = 1 EXTERIOR WALL

Thickness = 17.72 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 1.13 (in)
Bar diameter (mid+) = 1.13 (in)
Bar diameter (mid-) = 1.13 (in)
Bar diameter (top) = 1.13 (in)

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-21.4	14.2	9.4	20.5	408.9	48.4	86.5	157.7	1.1194	51.9	15.16	49.7	82.8	4.8	8.0
MID	9.5	14.2	0.5	18.4	406.6	44.8	85.2	160.2	1.0300	48.3	15.16	21.0	35.0	NA	NA
MID-	-13.6	14.2	0.4	18.3	408.9	48.4	86.5	157.7	1.1194	51.9	15.16	n/a	n/a	NA	NA
TOP	-20.4	14.2	8.0	20.3	408.9	48.4	86.5	157.7	1.1194	51.9	15.16	32.7	54.5	8.7	14.5

Member No. = 2 TOP SLAB

Thickness = 17.72 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-14.0	2.1	11.5	22.5	408.9	48.4	86.5	157.7	1.1194	48.9	15.16	26.6	44.4	17.6	29.4
MID	28.7	2.1	0.7	18.4	429.3	79.1	97.9	136.0	1.8957	79.4	15.16	77.8	99.0	NA	NA
RT	-29.9	2.1	14.8	22.5	427.0	75.9	96.6	138.4	1.8100	76.2	15.16	n/a	n/a	18.0	30.0

Member No. = 3 INTERIOR WALL

Thickness = 17.72 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 1.00 (in)
Bar diameter (mid+) = 1.00 (in)
Bar diameter (mid-) = 1.00 (in)
Bar diameter (top) = 1.00 (in)

BOT	-0.1	34.8	0.1	19.9	400.1	34.6	81.7	167.9	0.7848	44.4	15.22	n/a	n/a	233.8	389.8
MID	0.2	34.8	0.1	19.3	400.1	34.6	81.7	167.9	0.7848	44.4	15.22	n/a	n/a	NA	NA
MID-	-0.2	34.8	0.1	19.3	400.1	34.6	81.7	167.9	0.7848	44.4	15.22	n/a	n/a	NA	NA
TOP	-0.7	34.8	0.1	18.6	400.1	34.6	81.7	167.9	0.7848	44.4	15.22	86.7	99.0	219.4	365.7

Member No. = 4 BOTTOM SLAB

Thickness = 17.72 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-15.4	1.2	13.0	22.5	408.9	48.4	86.5	157.7	1.1194	48.7	15.16	29.6	49.3	36.3	60.6
MID	32.4	1.2	1.1	18.5	432.6	84.0	99.8	132.4	2.0236	84.1	15.16	n/a	n/a	NA	NA
RT	-35.2	1.2	17.0	21.7	419.2	64.3	92.3	146.7	1.5132	64.5	15.16	n/a	n/a	34.2	57.1

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-12.79	-14.33	-7.17	-0.71	4.74	0.09	-0.36
1- 1	-12.55	-1.87	-0.94	-0.13	-0.31	0.00	-0.34
1- 2	-12.32	7.34	3.67	0.31	-3.80	0.00	-0.38
1- 3	-12.08	13.51	6.75	0.63	-5.89	0.00	-0.44
1- 4	-11.85	16.80	8.40	0.83	-6.75	0.00	-0.54
1- 5	-11.61	17.42	8.71	0.89	-6.57	0.03	-0.66
1- 6	-11.38	15.53	7.77	0.83	-5.52	0.07	-0.79
1- 7	-11.15	11.34	5.67	0.64	-3.77	0.13	-0.93
1- 8	-10.91	5.03	2.52	0.32	-1.50	0.19	-1.07
1- 9	-10.68	-3.21	-1.61	-0.13	1.12	0.25	-1.20
1-10	-10.44	-13.21	-6.60	-0.70	3.92	0.31	-1.34
EXTERIOR WALL TOP							
BOTTOM SLAB LEFT SIDE							
4- 0	-12.79	-14.33	-7.17	-0.71	4.74	0.09	-0.36
4- 1	3.41	-12.18	-6.09	-0.60	4.03	0.30	-0.03
4- 2	15.22	-10.04	-5.02	-0.50	3.32	0.59	0.00
4- 3	22.63	-7.89	-3.94	-0.39	2.61	0.78	0.00
4- 4	25.64	-5.74	-2.87	-0.28	1.90	0.86	0.00
4- 5	24.26	-3.59	-1.80	-0.18	1.20	0.80	0.00
4- 6	18.49	-1.45	-0.72	-0.07	0.49	0.61	0.00
4- 7	8.33	0.70	0.35	0.04	-0.22	0.31	-0.03
4- 8	-6.23	2.85	1.42	0.14	-0.93	0.04	-0.28
4- 9	-25.19	5.00	2.50	0.25	-1.64	0.00	-0.86
4-10	-48.54	7.14	3.57	0.36	-2.35	0.00	-1.61
BOTTOM SLAB RIGHT SIDE							

```
TOP SLAB LEFT SIDE
    2- 0   -10.44   -13.21    -6.60    -0.70     3.92     0.31    -1.34
    2- 1     3.39   -11.24    -5.62    -0.60     3.33     0.35    -0.33
    2- 2    13.47    -9.27    -4.64    -0.49     2.75     1.04     0.00
    2- 3    19.79    -7.30    -3.65    -0.39     2.16     1.68    -0.09
    2- 4    22.37    -5.33    -2.67    -0.28     1.58     2.04    -0.22
    2- 5    21.19    -3.36    -1.68    -0.18     0.99     2.12    -0.36
    2- 6    16.26    -1.39    -0.70    -0.07     0.40     1.89    -0.49
    2- 7     7.58     0.57     0.29     0.03    -0.18     1.38    -0.63
    2- 8    -4.86     2.54     1.27     0.13    -0.77     0.66    -0.82
    2- 9   -21.04     4.51     2.26     0.24    -1.35     0.16    -1.44
    2-10   -40.98     6.48     3.24     0.34    -1.94     0.01    -2.78
TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM
    3- 0     0.02     0.12     0.06     0.00    -0.11     0.30    -0.31
    3- 1     0.01     0.10     0.05     0.00    -0.09     0.17    -0.17
    3- 2     0.01     0.07     0.04     0.00    -0.07     0.03    -0.04
    3- 3     0.01     0.05     0.02     0.00    -0.05     0.11    -0.11
    3- 4     0.00     0.02     0.01     0.00    -0.02     0.25    -0.25
    3- 5     0.00     0.00     0.00     0.00     0.00     0.38    -0.38
    3- 6     0.00    -0.02    -0.01     0.00     0.02     0.52    -0.52
    3- 7    -0.01    -0.05    -0.02     0.00     0.05     0.66    -0.66
    3- 8    -0.01    -0.07    -0.04     0.00     0.07     0.80    -0.80
    3- 9    -0.01    -0.10    -0.05     0.00     0.09     0.94    -0.93
    3-10    -0.02    -0.12    -0.06     0.00     0.11     1.07    -1.07
INTERIOR WALL TOP
```

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.16	9.69	4.84	0.44	-4.04	0.04	-0.10
1- 1	0.16	7.40	3.70	0.35	-2.90	0.04	-0.10
1- 2	0.16	5.25	2.62	0.26	-1.89	0.04	-0.10
1- 3	0.16	3.22	1.61	0.18	-0.99	0.04	-0.10
1- 4	0.16	1.32	0.66	0.09	-0.22	0.04	-0.10
1- 5	0.16	-0.46	-0.23	0.00	0.44	0.04	-0.10
1- 6	0.16	-2.10	-1.05	-0.09	0.98	0.04	-0.10
1- 7	0.16	-3.62	-1.81	-0.17	1.40	0.04	-0.10
1- 8	0.16	-5.01	-2.50	-0.26	1.70	0.04	-0.10
1- 9	0.16	-6.27	-3.14	-0.35	1.88	0.04	-0.10
1-10	0.16	-7.40	-3.70	-0.44	1.94	0.04	-0.10
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	10.67	1.34	0.67	0.07	-0.40	1.05	-0.09
2- 1	8.12	1.34	0.67	0.07	-0.40	0.79	-0.09
2- 2	5.57	1.34	0.67	0.07	-0.40	0.63	-0.12
2- 3	3.02	1.34	0.67	0.07	-0.40	0.47	-0.17
2- 4	0.47	1.34	0.67	0.07	-0.40	0.34	-0.26
2- 5	-2.07	1.34	0.67	0.07	-0.40	0.22	-0.38
2- 6	-4.62	1.34	0.67	0.07	-0.40	0.13	-0.52
2- 7	-7.17	1.34	0.67	0.07	-0.40	0.06	-0.68
2- 8	-9.72	1.34	0.67	0.07	-0.40	0.02	-0.85
2- 9	-12.26	1.34	0.67	0.07	-0.40	0.00	-1.02
2-10	-14.81	1.34	0.67	0.07	-0.40	0.00	-1.11
INTERIOR WALL BOTTOM							
3- 0	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 1	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 2	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 3	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 4	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 5	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 6	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 7	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 8	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3- 9	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
3-10	0.00	-0.02	-0.01	0.00	0.02	0.09	-0.09
INTERIOR WALL TOP							

BOTTOM SLAB LEFT SIDE							
4- 0	12.49	1.46	0.73	0.07	-0.48	0.38	0.00
4- 1	9.51	1.46	0.73	0.07	-0.48	0.29	0.00
4- 2	6.52	1.46	0.73	0.07	-0.48	0.20	0.00
4- 3	3.54	1.46	0.73	0.07	-0.48	0.10	0.00
4- 4	0.56	1.46	0.73	0.07	-0.48	0.01	-0.01
4- 5	-2.43	1.46	0.73	0.07	-0.48	0.00	-0.09
4- 6	-5.41	1.46	0.73	0.07	-0.48	0.00	-0.18
4- 7	-8.39	1.46	0.73	0.07	-0.48	0.00	-0.28
4- 8	-11.38	1.46	0.73	0.07	-0.48	0.00	-0.37
4- 9	-14.36	1.46	0.73	0.07	-0.48	0.00	-0.46
4-10	-17.35	1.46	0.73	0.07	-0.48	0.00	-0.56
BOTTOM SLAB RIGHT SIDE							

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE Pos Kft	LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-12.79	-14.33	-7.17	-0.71	4.74	0.14	-0.53
1- 1	-12.55	-1.87	-0.94	-0.13	-0.31	0.00	-0.50
1- 2	-12.32	7.34	3.67	0.31	-3.80	0.00	-0.57
1- 3	-12.08	13.51	6.75	0.63	-5.89	0.00	-0.66
1- 4	-11.85	16.80	8.40	0.83	-6.75	0.00	-0.82
1- 5	-11.61	17.42	8.71	0.89	-6.57	0.04	-0.99
1- 6	-11.38	15.53	7.77	0.83	-5.52	0.11	-1.19
1- 7	-11.15	11.34	5.67	0.64	-3.77	0.20	-1.39
1- 8	-10.91	5.03	2.52	0.32	-1.50	0.28	-1.60
1- 9	-10.68	-3.21	-1.61	-0.13	1.12	0.38	-1.81
1-10	-10.44	-13.21	-6.60	-0.70	3.92	0.47	-2.02
EXTERIOR WALL TOP							

TOP SLAB LEFT SIDE

2- 0	-10.44	-13.21	-6.60	-0.70	3.92	0.47	-2.02
2- 1	3.39	-11.24	-5.62	-0.60	3.33	0.53	-0.49
2- 2	13.47	-9.27	-4.64	-0.49	2.75	1.53	0.00
2- 3	19.79	-7.30	-3.65	-0.39	2.16	2.50	-0.14
2- 4	22.37	-5.33	-2.67	-0.28	1.58	3.03	-0.34
2- 5	21.19	-3.36	-1.68	-0.18	0.99	3.14	-0.54
2- 6	16.26	-1.39	-0.70	-0.07	0.40	2.80	-0.74
2- 7	7.58	0.57	0.29	0.03	-0.18	2.03	-0.94
2- 8	-4.86	2.54	1.27	0.13	-0.77	0.94	-1.23
2- 9	-21.04	4.51	2.26	0.24	-1.35	0.22	-2.14
2-10	-40.98	6.48	3.24	0.34	-1.94	0.01	-4.15

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.02	0.12	0.06	0.00	-0.11	0.45	-0.46
3- 1	0.01	0.10	0.05	0.00	-0.09	0.25	-0.25
3- 2	0.01	0.07	0.04	0.00	-0.07	0.05	-0.05
3- 3	0.01	0.05	0.02	0.00	-0.05	0.16	-0.17
3- 4	0.00	0.02	0.01	0.00	-0.02	0.37	-0.37
3- 5	0.00	0.00	0.00	0.00	0.00	0.58	-0.58
3- 6	0.00	-0.02	-0.01	0.00	0.02	0.78	-0.78
3- 7	-0.01	-0.05	-0.02	0.00	0.05	0.99	-0.99
3- 8	-0.01	-0.07	-0.04	0.00	0.07	1.20	-1.19
3- 9	-0.01	-0.10	-0.05	0.00	0.09	1.40	-1.40
3-10	-0.02	-0.12	-0.06	0.00	0.11	1.61	-1.60

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-12.79	-14.33	-7.17	-0.71	4.74	0.14	-0.53
4- 1	3.41	-12.18	-6.09	-0.60	4.03	0.46	-0.04
4- 2	15.22	-10.04	-5.02	-0.50	3.32	0.88	0.00
4- 3	22.63	-7.89	-3.94	-0.39	2.61	1.16	0.00
4- 4	25.64	-5.74	-2.87	-0.28	1.90	1.28	0.00
4- 5	24.26	-3.59	-1.80	-0.18	1.20	1.20	0.00
4- 6	18.49	-1.45	-0.72	-0.07	0.49	0.91	0.00
4- 7	8.33	0.70	0.35	0.04	-0.22	0.46	-0.05
4- 8	-6.23	2.85	1.42	0.14	-0.93	0.06	-0.43
4- 9	-25.19	5.00	2.50	0.25	-1.64	0.00	-1.27
4-10	-48.54	7.14	3.57	0.36	-2.35	0.00	-2.37

BOTTOM SLAB RIGHT SIDE

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE Pos	LOADS Neg
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.16	9.69	4.84	0.44	-4.04	0.06	-0.14
1- 1	0.16	7.40	3.70	0.35	-2.90	0.06	-0.14
1- 2	0.16	5.25	2.62	0.26	-1.89	0.06	-0.14
1- 3	0.16	3.22	1.61	0.18	-0.99	0.06	-0.14
1- 4	0.16	1.32	0.66	0.09	-0.22	0.06	-0.14
1- 5	0.16	-0.46	-0.23	0.00	0.44	0.06	-0.14
1- 6	0.16	-2.10	-1.05	-0.09	0.98	0.06	-0.14
1- 7	0.16	-3.62	-1.81	-0.17	1.40	0.06	-0.14
1- 8	0.16	-5.01	-2.50	-0.26	1.70	0.06	-0.14
1- 9	0.16	-6.27	-3.14	-0.35	1.88	0.06	-0.14
1-10	0.16	-7.40	-3.70	-0.44	1.94	0.06	-0.14
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	10.67	1.34	0.67	0.07	-0.40	1.55	-0.14
2- 1	8.12	1.34	0.67	0.07	-0.40	1.16	-0.14
2- 2	5.57	1.34	0.67	0.07	-0.40	0.91	-0.17
2- 3	3.02	1.34	0.67	0.07	-0.40	0.68	-0.25
2- 4	0.47	1.34	0.67	0.07	-0.40	0.48	-0.39
2- 5	-2.07	1.34	0.67	0.07	-0.40	0.32	-0.57
2- 6	-4.62	1.34	0.67	0.07	-0.40	0.19	-0.79
2- 7	-7.17	1.34	0.67	0.07	-0.40	0.09	-1.03
2- 8	-9.72	1.34	0.67	0.07	-0.40	0.03	-1.28
2- 9	-12.26	1.34	0.67	0.07	-0.40	0.01	-1.53
2-10	-14.81	1.34	0.67	0.07	-0.40	0.00	-1.66
TOP SLAB RIGHT SIDE							

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INTERIOR WALL BOTTOM
    3- 0    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 1    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 2    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 3    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 4    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 5    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 6    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 7    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 8    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3- 9    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
    3-10    0.00   -0.02   -0.01    0.00    0.02    0.14   -0.14
INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE
    4- 0   12.49    1.46    0.73    0.07   -0.48    0.56    0.00
    4- 1    9.51    1.46    0.73    0.07   -0.48    0.43    0.00
    4- 2    6.52    1.46    0.73    0.07   -0.48    0.29    0.00
    4- 3    3.54    1.46    0.73    0.07   -0.48    0.15    0.00
    4- 4    0.56    1.46    0.73    0.07   -0.48    0.02   -0.01
    4- 5   -2.43    1.46    0.73    0.07   -0.48    0.00   -0.13
    4- 6   -5.41    1.46    0.73    0.07   -0.48    0.00   -0.27
    4- 7   -8.39    1.46    0.73    0.07   -0.48    0.00   -0.41
    4- 8  -11.38    1.46    0.73    0.07   -0.48    0.00   -0.54
    4- 9  -14.36    1.46    0.73    0.07   -0.48    0.00   -0.68
    4-10  -17.35    1.46    0.73    0.07   -0.48    0.00   -0.82
BOTTOM SLAB RIGHT SIDE
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Bridge No. 664

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL

Thickness = 13.78 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.62 (in)
Bar diameter (mid+) = 0.75 (in)
Bar diameter (mid-) = 0.62 (in)
Bar diameter (top) = 0.62 (in)

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-4.3	0.0	2.4	12.8	304.0	11.3	45.9	133.6	0.3363	11.4	11.47	8.1	13.5	4.7	7.8
MID	3.5	0.0	0.7	12.7	309.9	18.6	48.2	126.6	0.5605	18.6	11.40	8.4	14.1	NA	NA
MID-	-9.0	0.0	1.5	12.8	304.0	11.3	45.9	133.6	0.3363	11.4	11.47	1.7	2.9	NA	NA
TOP	-13.3*	0.0	2.8	12.8	304.0	11.3	45.9	133.6	0.3363	11.4	11.47	0.9	1.5	3.6	6.0

Member No. = 2 TOP SLAB

Thickness = 8.66 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.62 (in)
Bar diameter (mid) = 0.75 (in)
Bar diameter (rt) = 0.75 (in)

LT	-7.8*	1.0	9.7*	7.1	194.3	6.2	18.0	69.8	0.3363	6.3	6.35	0.9	1.5	1.0	1.7
MID	15.4*	1.0	4.7	7.0	199.2	9.3	18.7	63.7	0.5243	9.5	6.28	0.6	1.0	NA	NA
RT	-7.8	1.0	10.1*	7.0	200.0	9.9	18.9	62.9	0.5546	10.0	6.28	1.4	2.3	0.4	0.7

Member No. = 3 INTERIOR WALL

Thickness = 6.69 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.50 (in)
Bar diameter (mid+) = 0.50 (in)
Bar diameter (mid-) = 0.50 (in)
Bar diameter (top) = 0.50 (in)

BOT	-0.8	1.8	0.5	5.0	148.1	2.4	9.9	50.3	0.1831	2.6	4.44	3.4	5.6	6.6	11.0
MID	0.9	1.8	0.5	5.0	148.1	2.4	9.9	50.3	0.1831	2.6	4.44	2.9	4.8	NA	NA
MID-	-0.9	1.8	0.5	5.0	148.1	2.4	9.9	50.3	0.1831	2.6	4.44	2.9	4.8	NA	NA
TOP	-2.6	1.8	0.5	5.0	148.1	2.4	9.9	50.3	0.1831	2.6	4.44	1.0	1.7	6.6	11.0

Member No. = 4 BOTTOM SLAB

Thickness = 8.66 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.62 (in)
Bar diameter (mid) = 0.75 (in)
Bar diameter (rt) = 0.75 (in)

LT	-2.3	2.2	2.2	7.1	194.3	6.2	18.0	69.8	0.3363	6.6	6.35	9.0	15.1	4.7	7.9
MID	3.4	2.2	0.0	7.0	197.2	8.1	18.4	65.9	0.4478	8.4	6.28	5.3	8.8	NA	NA
RT	-4.5	2.2	2.9	7.0	198.1	8.6	18.5	64.9	0.4800	8.9	6.28	3.9	6.5	4.2	7.0

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-1.97	-0.68	-0.34	-0.13	0.56	0.41	-0.64
1- 1	-1.85	0.72	0.36	0.09	-0.70	0.00	-0.83
1- 2	-1.72	1.68	0.84	0.27	-1.57	0.10	-1.57
1- 3	-1.60	2.26	1.13	0.40	-2.08	0.28	-2.38
1- 4	-1.48	2.50	1.25	0.47	-2.28	0.47	-3.20
1- 5	-1.36	2.45	1.22	0.50	-2.22	0.66	-4.09
1- 6	-1.23	2.15	1.07	0.47	-1.94	0.85	-4.99
1- 7	-1.11	1.64	0.82	0.40	-1.48	1.04	-5.89
1- 8	-0.99	0.98	0.49	0.27	-0.89	1.23	-6.79
1- 9	-0.87	0.21	0.10	0.09	-0.21	1.43	-7.69
1-10	-0.75	-0.63	-0.31	-0.13	0.51	1.62	-8.59
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-0.75	-0.63	-0.31	-0.13	0.51	1.62	-8.59
2- 1	-0.15	-0.53	-0.27	-0.11	0.44	2.98	-4.36
2- 2	0.29	-0.44	-0.22	-0.09	0.36	5.01	-1.24
2- 3	0.59	-0.35	-0.17	-0.07	0.28	7.17	-0.10
2- 4	0.74	-0.25	-0.13	-0.05	0.21	9.04	-0.67
2- 5	0.74	-0.16	-0.08	-0.03	0.13	9.93	-1.24
2- 6	0.60	-0.07	-0.03	-0.01	0.05	9.67	-1.81
2- 7	0.31	0.03	0.01	0.01	-0.02	8.27	-2.38
2- 8	-0.13	0.12	0.06	0.03	-0.10	5.93	-2.95
2- 9	-0.71	0.21	0.11	0.05	-0.18	3.04	-3.52
2-10	-1.45	0.31	0.15	0.06	-0.25	0.17	-6.16
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.00	0.01	0.01	0.00	-0.01	0.78	-0.80
3- 1	0.00	0.01	0.00	0.00	-0.01	0.50	-0.51
3- 2	0.00	0.01	0.00	0.00	-0.01	0.22	-0.23
3- 3	0.00	0.00	0.00	0.00	0.00	0.07	-0.08
3- 4	0.00	0.00	0.00	0.00	0.00	0.35	-0.35
3- 5	0.00	0.00	0.00	0.00	0.00	0.63	-0.63
3- 6	0.00	0.00	0.00	0.00	0.00	0.92	-0.92
3- 7	0.00	0.00	0.00	0.00	0.00	1.21	-1.20
3- 8	0.00	-0.01	0.00	0.00	0.01	1.49	-1.49
3- 9	0.00	-0.01	0.00	0.00	0.01	1.78	-1.77
3-10	0.00	-0.01	-0.01	0.00	0.01	2.07	-2.05
INTERIOR WALL TOP							

BOTTOM SLAB LEFT SIDE							
4- 0	-1.97	-0.68	-0.34	-0.13	0.56	0.41	-0.64
4- 1	-0.62	-0.58	-0.29	-0.11	0.47	0.57	-0.23
4- 2	0.41	-0.48	-0.24	-0.09	0.39	0.72	0.00
4- 3	1.11	-0.37	-0.19	-0.07	0.31	0.86	0.00
4- 4	1.48	-0.27	-0.14	-0.05	0.22	0.91	0.00
4- 5	1.53	-0.17	-0.08	-0.03	0.14	0.89	0.00
4- 6	1.26	-0.07	-0.03	-0.01	0.06	0.76	-0.08
4- 7	0.67	0.03	0.02	0.01	-0.03	0.53	-0.24
4- 8	-0.25	0.14	0.07	0.03	-0.11	0.27	-0.49
4- 9	-1.50	0.24	0.12	0.05	-0.19	0.05	-0.98
4-10	-3.07	0.34	0.17	0.07	-0.28	0.00	-1.61
BOTTOM SLAB RIGHT SIDE							

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE Pos Kft	LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-1.97	-0.68	-0.34	-0.13	0.56	0.27	-0.42
1- 1	-1.85	0.72	0.36	0.09	-0.70	0.00	-0.55
1- 2	-1.72	1.68	0.84	0.27	-1.57	0.06	-1.05
1- 3	-1.60	2.26	1.13	0.40	-2.08	0.19	-1.59
1- 4	-1.48	2.50	1.25	0.47	-2.28	0.32	-2.13
1- 5	-1.36	2.45	1.22	0.50	-2.22	0.44	-2.73
1- 6	-1.23	2.15	1.07	0.47	-1.94	0.57	-3.33
1- 7	-1.11	1.64	0.82	0.40	-1.48	0.70	-3.93
1- 8	-0.99	0.98	0.49	0.27	-0.89	0.82	-4.53
1- 9	-0.87	0.21	0.10	0.09	-0.21	0.95	-5.13
1-10	-0.75	-0.63	-0.31	-0.13	0.51	1.08	-5.73
EXTERIOR WALL TOP							

TOP SLAB LEFT SIDE

2- 0	-0.75	-0.63	-0.31	-0.13	0.51	1.08	-5.73
2- 1	-0.15	-0.53	-0.27	-0.11	0.44	1.99	-2.90
2- 2	0.29	-0.44	-0.22	-0.09	0.36	3.34	-0.83
2- 3	0.59	-0.35	-0.17	-0.07	0.28	4.78	-0.07
2- 4	0.74	-0.25	-0.13	-0.05	0.21	6.03	-0.44
2- 5	0.74	-0.16	-0.08	-0.03	0.13	6.62	-0.82
2- 6	0.60	-0.07	-0.03	-0.01	0.05	6.45	-1.20
2- 7	0.31	0.03	0.01	0.01	-0.02	5.51	-1.59
2- 8	-0.13	0.12	0.06	0.03	-0.10	3.96	-1.97
2- 9	-0.71	0.21	0.11	0.05	-0.18	2.03	-2.35
2-10	-1.45	0.31	0.15	0.06	-0.25	0.11	-4.11

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	0.01	0.01	0.00	-0.01	0.52	-0.53
3- 1	0.00	0.01	0.00	0.00	-0.01	0.33	-0.34
3- 2	0.00	0.01	0.00	0.00	-0.01	0.15	-0.15
3- 3	0.00	0.00	0.00	0.00	0.00	0.05	-0.05
3- 4	0.00	0.00	0.00	0.00	0.00	0.23	-0.23
3- 5	0.00	0.00	0.00	0.00	0.00	0.42	-0.42
3- 6	0.00	0.00	0.00	0.00	0.00	0.61	-0.61
3- 7	0.00	0.00	0.00	0.00	0.00	0.80	-0.80
3- 8	0.00	-0.01	0.00	0.00	0.01	1.00	-0.99
3- 9	0.00	-0.01	0.00	0.00	0.01	1.19	-1.18
3-10	0.00	-0.01	-0.01	0.00	0.01	1.38	-1.37

5 INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.97	-0.68	-0.34	-0.13	0.56	0.27	-0.42
4- 1	-0.62	-0.58	-0.29	-0.11	0.47	0.38	-0.16
4- 2	0.41	-0.48	-0.24	-0.09	0.39	0.48	0.00
4- 3	1.11	-0.37	-0.19	-0.07	0.31	0.57	0.00
4- 4	1.48	-0.27	-0.14	-0.05	0.22	0.61	0.00
4- 5	1.53	-0.17	-0.08	-0.03	0.14	0.59	0.00
4- 6	1.26	-0.07	-0.03	-0.01	0.06	0.51	-0.05
4- 7	0.67	0.03	0.02	0.01	-0.03	0.35	-0.16
4- 8	-0.25	0.14	0.07	0.03	-0.11	0.18	-0.33
4- 9	-1.50	0.24	0.12	0.05	-0.19	0.04	-0.66
4-10	-3.07	0.34	0.17	0.07	-0.28	0.00	-1.08

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.13	1.78	0.89	0.27	-1.61	0.17	-0.66
1- 1	0.13	1.28	0.64	0.22	-1.15	0.17	-0.66
1- 2	0.13	0.84	0.42	0.16	-0.74	0.17	-0.66
1- 3	0.13	0.44	0.22	0.11	-0.38	0.17	-0.66
1- 4	0.13	0.09	0.05	0.06	-0.07	0.17	-0.66
1- 5	0.13	-0.20	-0.10	0.00	0.20	0.17	-0.66
1- 6	0.13	-0.45	-0.22	-0.05	0.41	0.17	-0.66
1- 7	0.13	-0.65	-0.32	-0.11	0.58	0.17	-0.66
1- 8	0.13	-0.79	-0.40	-0.16	0.70	0.17	-0.66
1- 9	0.13	-0.89	-0.44	-0.22	0.77	0.17	-0.66
1-10	0.13	-0.93	-0.47	-0.27	0.80	0.17	-0.66
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	0.68	0.10	0.05	0.02	-0.08	4.52	-0.39
2- 1	0.53	0.10	0.05	0.02	-0.08	4.15	-0.55
2- 2	0.38	0.10	0.05	0.02	-0.08	3.75	-0.82
2- 3	0.23	0.10	0.05	0.02	-0.08	3.26	-1.18
2- 4	0.08	0.10	0.05	0.02	-0.08	2.70	-1.63
2- 5	-0.07	0.10	0.05	0.02	-0.08	2.13	-2.13
2- 6	-0.22	0.10	0.05	0.02	-0.08	1.55	-2.68
2- 7	-0.37	0.10	0.05	0.02	-0.08	1.01	-3.24
2- 8	-0.52	0.10	0.05	0.02	-0.08	0.54	-3.76
2- 9	-0.67	0.10	0.05	0.02	-0.08	0.16	-4.19
2-10	-0.82	0.10	0.05	0.02	-0.08	0.02	-4.37
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 1	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 2	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 3	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 4	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 5	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 6	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 7	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 8	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 9	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3-10	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
INTERIOR WALL TOP							

BOTTOM SLAB LEFT SIDE

4- 0	1.54	0.10	0.05	0.02	-0.08	0.32	0.00
4- 1	1.21	0.10	0.05	0.02	-0.08	0.25	0.00
4- 2	0.88	0.10	0.05	0.02	-0.08	0.17	0.00
4- 3	0.55	0.10	0.05	0.02	-0.08	0.10	0.00
4- 4	0.22	0.10	0.05	0.02	-0.08	0.04	-0.03
4- 5	-0.11	0.10	0.05	0.02	-0.08	0.00	-0.11
4- 6	-0.44	0.10	0.05	0.02	-0.08	0.00	-0.18
4- 7	-0.77	0.10	0.05	0.02	-0.08	0.00	-0.26
4- 8	-1.10	0.10	0.05	0.02	-0.08	0.00	-0.33
4- 9	-1.43	0.10	0.05	0.02	-0.08	0.00	-0.41
4-10	-1.77	0.10	0.05	0.02	-0.08	0.00	-0.48

BOTTOM SLAB RIGHT SIDE

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL

Thickness = 14.96 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 1.13 (in)
Bar diameter (mid+) = 1.13 (in)
Bar diameter (mid-) = 1.13 (in)
Bar diameter (top) = 1.13 (in)

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-22.1	11.5	7.2	16.1	345.1	33.3	60.7	128.3	0.9412	35.7	12.40	9.5	15.8	29.3	48.9
MID	3.1	11.5	0.1	14.9	343.2	30.8	59.8	130.3	0.8683	33.4	12.40	19.9	33.2	NA	NA
MID-	-7.9	11.5	0.6	15.1	345.1	33.3	60.7	128.3	0.9412	35.7	12.40	n/a	n/a	NA	NA
TOP	-22.3	11.5	6.2	15.9	345.1	33.3	60.7	128.3	0.9412	35.7	12.40	4.6	7.7	5.7	9.5

Member No. = 2 TOP SLAB

Thickness = 14.96 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-18.9	3.1	11.0	17.0	345.1	33.3	60.7	128.3	0.9412	33.9	12.40	5.6	9.3	32.5	54.2
MID	26.1	3.1	0.2	14.9	362.5	54.6	68.3	109.7	1.6043	55.0	12.40	7.6	12.6	NA	NA
RT	-33.0	3.1	13.5	17.3	360.2	51.8	67.3	112.2	1.5152	52.3	12.40	5.2	8.7	3.8	6.4

Member No. = 3 INTERIOR WALL

Thickness = 14.96 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.88 (in)
Bar diameter (mid+) = 0.88 (in)
Bar diameter (mid-) = 0.88 (in)
Bar diameter (top) = 0.88 (in)

BOT	1.4	26.9	0.2	15.3	337.6	23.7	57.6	137.9	0.6528	30.3	12.52	44.7	74.4	35.0	58.3
MID	3.4	26.9	0.2	15.1	337.6	23.7	57.6	137.9	0.6528	30.3	12.52	32.8	54.6	NA	NA
MID-	0.6	26.9	0.2	15.8	337.6	23.7	57.6	137.9	0.6528	30.3	12.52	29.0	48.4	NA	NA
TOP	-1.3	26.9	0.3	15.6	337.6	23.7	57.6	137.9	0.6528	30.3	12.52	11.7	19.5	35.7	59.5

Member No. = 4 BOTTOM SLAB

Thickness = 14.96 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-19.5	4.5	11.1	17.0	345.1	33.3	60.7	128.3	0.9412	34.2	12.40	9.8	16.3	82.6	137.6
MID	25.7	4.5	0.9	15.1	366.1	58.8	69.9	105.8	1.7417	59.3	12.40	27.7	46.2	NA	NA
RT	-34.6	4.5	13.7	16.8	353.6	43.9	64.4	119.2	1.2658	44.7	12.40	6.8	11.3	8.8	14.7

Member No. = 5 TOP SLAB

Thickness = 14.96 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

	Moment	Coin. Axial Force	Shear Force	Shear Cap	Resistance Po Cap	Mu Cap	Mbal Cap	Pbal Cap	Steel Area	Mom. Cap	Des. Thk	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
	Kft	Kips	Kips	Kips	Kips	Kft	Kft	Kips	In2	Kft	in				
LT	-31.8	3.6	12.0	17.1	360.2	51.8	67.3	112.2	1.5152	52.3	12.40	5.4	8.9	46.0	76.7
MID	19.2	3.6	0.7	15.1	362.5	54.6	68.3	109.7	1.6043	55.1	12.40	8.9	14.8	NA	NA
RT	-31.7	3.6	12.2	17.2	360.2	51.8	67.3	112.2	1.5152	52.3	12.40	5.4	9.0	4.3	7.1

Member No. = 7 BOTTOM SLAB

Thickness = 14.96 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-32.4	4.8	12.1	16.7	353.6	43.9	64.4	119.2	1.2658	44.8	12.40	7.8	13.0	56.3	93.9
MID	18.0	4.8	0.0	14.8	366.1	58.8	69.9	105.8	1.7417	59.3	12.40	36.2	60.4	NA	NA
RT	-32.5	4.8	12.1	16.7	353.6	43.9	64.4	119.2	1.2658	44.8	12.40	7.7	12.9	11.5	19.2

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	Kft	Kft	Kft	Kft	Kft	Kft	Kft
EXTERIOR WALL BOTTOM							
1- 0	-11.57	-8.10	-4.05	-0.47	0.00	0.14	-0.52
1- 1	-11.37	-0.24	-0.12	-0.05	0.00	0.01	-0.44
1- 2	-11.18	5.56	2.78	0.28	0.00	0.00	-0.41
1- 3	-10.98	9.41	4.70	0.51	0.00	0.00	-0.49
1- 4	-10.78	11.44	5.72	0.65	0.00	0.00	-0.59
1- 5	-10.59	11.78	5.89	0.70	0.00	0.04	-0.74
1- 6	-10.39	10.54	5.27	0.65	0.00	0.08	-0.90
1- 7	-10.20	7.86	3.93	0.51	0.00	0.13	-1.06
1- 8	-10.00	3.85	1.93	0.28	0.00	0.19	-1.22
1- 9	-9.80	-1.36	-0.68	-0.05	0.00	0.25	-1.38
1-10	-9.61	-7.64	-3.82	-0.47	0.00	0.31	-1.54
EXTERIOR WALL TOP							

TOP SLAB LEFT SIDE

2- 0	-9.61	-7.64	-3.82	-0.47	0.00	0.31	-1.54
2- 1	1.75	-6.65	-3.33	-0.41	0.00	0.36	-0.41
2- 2	10.17	-5.66	-2.83	-0.35	0.00	1.02	0.00
2- 3	15.63	-4.67	-2.33	-0.29	0.00	1.72	-0.08
2- 4	18.14	-3.68	-1.84	-0.23	0.00	2.13	-0.20
2- 5	17.70	-2.69	-1.34	-0.16	0.00	2.22	-0.32
2- 6	14.31	-1.70	-0.85	-0.10	0.00	2.00	-0.45
2- 7	7.97	-0.70	-0.35	-0.04	0.00	1.46	-0.57
2- 8	-1.32	0.29	0.14	0.02	0.00	0.71	-0.77
2- 9	-13.56	1.28	0.64	0.08	0.00	0.23	-1.50
2-10	-28.76	2.27	1.13	0.14	0.00	0.15	-2.99

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	2.79	-1.20	-0.60	-0.07	0.00	0.40	-0.29
3- 1	2.73	-1.21	-0.61	-0.07	0.00	0.26	-0.14
3- 2	2.66	-1.22	-0.61	-0.07	0.00	0.13	-0.01
3- 3	2.60	-1.23	-0.62	-0.07	0.00	0.17	-0.08
3- 4	2.53	-1.24	-0.62	-0.07	0.00	0.33	-0.23
3- 5	2.46	-1.25	-0.62	-0.07	0.00	0.48	-0.38
3- 6	2.40	-1.26	-0.63	-0.07	0.00	0.63	-0.54
3- 7	2.33	-1.26	-0.63	-0.07	0.00	0.78	-0.69
3- 8	2.26	-1.27	-0.64	-0.07	0.00	0.94	-0.84
3- 9	2.20	-1.28	-0.64	-0.07	0.00	1.09	-1.00
3-10	2.13	-1.29	-0.64	-0.07	0.00	1.24	-1.15

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-11.57	-8.10	-4.05	-0.47	0.00	0.14	-0.52
4- 1	1.47	-7.05	-3.53	-0.41	0.00	0.30	-0.07
4- 2	11.13	-6.01	-3.00	-0.35	0.00	0.53	0.00
4- 3	17.41	-4.96	-2.48	-0.29	0.00	0.74	0.00
4- 4	20.32	-3.92	-1.96	-0.23	0.00	0.83	0.00
4- 5	19.85	-2.87	-1.43	-0.16	0.00	0.78	0.00
4- 6	16.01	-1.82	-0.91	-0.10	0.00	0.62	0.00
4- 7	8.79	-0.78	-0.39	-0.04	0.00	0.34	-0.03
4- 8	-1.80	0.27	0.14	0.02	0.00	0.10	-0.20
4- 9	-15.77	1.32	0.66	0.08	0.00	0.00	-0.66
4-10	-33.11	2.36	1.18	0.14	0.00	0.00	-1.32

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-26.62	0.98	0.49	0.06	0.00	0.33	-2.91
5- 1	-13.34	0.99	0.50	0.06	0.00	0.28	-1.51
5- 2	-3.01	1.00	0.50	0.06	0.00	0.70	-0.83
5- 3	4.36	1.01	0.51	0.06	0.00	1.38	-0.65
5- 4	8.79	1.02	0.51	0.06	0.00	1.86	-0.53
5- 5	10.27	1.03	0.52	0.06	0.00	2.03	-0.42
5- 6	8.80	1.04	0.52	0.06	0.00	1.87	-0.53
5- 7	4.37	1.05	0.53	0.06	0.00	1.40	-0.65
5- 8	-3.00	1.06	0.53	0.06	0.00	0.71	-0.83
5- 9	-13.33	1.07	0.54	0.06	0.00	0.29	-1.52
5-10	-26.61	1.08	0.54	0.06	0.00	0.33	-2.91

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE							
7- 0	-30.32	1.16	0.58	0.06	0.00	0.00	-1.21
7- 1	-15.13	1.15	0.57	0.06	0.00	0.00	-0.62
7- 2	-3.32	1.14	0.57	0.06	0.00	0.09	-0.26
7- 3	5.12	1.13	0.56	0.06	0.00	0.28	-0.08
7- 4	10.18	1.12	0.56	0.06	0.00	0.43	0.00
7- 5	11.86	1.11	0.55	0.06	0.00	0.48	0.00
7- 6	10.18	1.10	0.55	0.06	0.00	0.43	0.00
7- 7	5.11	1.09	0.54	0.06	0.00	0.28	-0.08
7- 8	-3.33	1.08	0.54	0.06	0.00	0.09	-0.25
7- 9	-15.15	1.07	0.53	0.06	0.00	0.00	-0.62
7-10	-30.34	1.06	0.53	0.06	0.00	0.00	-1.20
BOTTOM SLAB RIGHT SIDE							

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	LIVE LOADS Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.15	7.02	3.51	0.37	0.00	0.06	-0.13
1- 1	0.15	5.35	2.67	0.29	0.00	0.06	-0.13
1- 2	0.15	3.77	1.89	0.22	0.00	0.06	-0.13
1- 3	0.15	2.30	1.15	0.15	0.00	0.06	-0.13
1- 4	0.15	0.92	0.46	0.07	0.00	0.06	-0.13
1- 5	0.15	-0.37	-0.18	0.00	0.00	0.06	-0.13
1- 6	0.15	-1.56	-0.78	-0.07	0.00	0.06	-0.13
1- 7	0.15	-2.64	-1.32	-0.15	0.00	0.06	-0.13
1- 8	0.15	-3.64	-1.82	-0.22	0.00	0.06	-0.13
1- 9	0.15	-4.53	-2.27	-0.29	0.00	0.06	-0.13
1-10	0.15	-5.33	-2.67	-0.37	0.00	0.06	-0.13
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	8.65	0.67	0.33	0.04	0.00	1.11	-0.08
2- 1	6.66	0.67	0.33	0.04	0.00	0.83	-0.09
2- 2	4.68	0.67	0.33	0.04	0.00	0.65	-0.12
2- 3	2.69	0.67	0.33	0.04	0.00	0.50	-0.18
2- 4	0.70	0.67	0.33	0.04	0.00	0.36	-0.29
2- 5	-1.29	0.67	0.33	0.04	0.00	0.25	-0.42
2- 6	-3.28	0.67	0.33	0.04	0.00	0.15	-0.56
2- 7	-5.27	0.67	0.33	0.04	0.00	0.08	-0.73
2- 8	-7.26	0.67	0.33	0.04	0.00	0.04	-0.91
2- 9	-9.25	0.67	0.33	0.04	0.00	0.01	-1.09
2-10	-11.23	0.67	0.33	0.04	0.00	0.01	-1.19
TOP SLAB RIGHT SIDE							

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-11.57	-8.10	-4.05	-0.47	0.00	0.22	-0.77
1- 1	-11.37	-0.24	-0.12	-0.05	0.00	0.01	-0.66
1- 2	-11.18	5.56	2.78	0.28	0.00	0.00	-0.62
1- 3	-10.98	9.41	4.70	0.51	0.00	0.00	-0.72
1- 4	-10.78	11.44	5.72	0.65	0.00	0.01	-0.91
1- 5	-10.59	11.78	5.89	0.70	0.00	0.06	-1.14
1- 6	-10.39	10.54	5.27	0.65	0.00	0.13	-1.38
1- 7	-10.20	7.86	3.93	0.51	0.00	0.21	-1.62
1- 8	-10.00	3.85	1.93	0.28	0.00	0.29	-1.87
1- 9	-9.80	-1.36	-0.68	-0.05	0.00	0.38	-2.12
1-10	-9.61	-7.64	-3.82	-0.47	0.00	0.48	-2.37
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-9.61	-7.64	-3.82	-0.47	0.00	0.48	-2.37
2- 1	1.75	-6.65	-3.33	-0.41	0.00	0.56	-0.64
2- 2	10.17	-5.66	-2.83	-0.35	0.00	1.60	0.00
2- 3	15.63	-4.67	-2.33	-0.29	0.00	2.67	-0.12
2- 4	18.14	-3.68	-1.84	-0.23	0.00	3.30	-0.31
2- 5	17.70	-2.69	-1.34	-0.16	0.00	3.44	-0.50
2- 6	14.31	-1.70	-0.85	-0.10	0.00	3.08	-0.69
2- 7	7.97	-0.70	-0.35	-0.04	0.00	2.25	-0.88
2- 8	-1.32	0.29	0.14	0.02	0.00	1.11	-1.17
2- 9	-13.56	1.28	0.64	0.08	0.00	0.32	-2.25
2-10	-28.76	2.27	1.13	0.14	0.00	0.24	-4.52
TOP SLAB RIGHT SIDE							

INTERIOR WALL BOTTOM

3- 0	2.79	-1.20	-0.60	-0.07	0.00	0.62	-0.45
3- 1	2.73	-1.21	-0.61	-0.07	0.00	0.39	-0.22
3- 2	2.66	-1.22	-0.61	-0.07	0.00	0.19	-0.01
3- 3	2.60	-1.23	-0.62	-0.07	0.00	0.27	-0.12
3- 4	2.53	-1.24	-0.62	-0.07	0.00	0.50	-0.35
3- 5	2.46	-1.25	-0.62	-0.07	0.00	0.73	-0.59
3- 6	2.40	-1.26	-0.63	-0.07	0.00	0.97	-0.82
3- 7	2.33	-1.26	-0.63	-0.07	0.00	1.20	-1.06
3- 8	2.26	-1.27	-0.64	-0.07	0.00	1.43	-1.30
3- 9	2.20	-1.28	-0.64	-0.07	0.00	1.67	-1.53
3-10	2.13	-1.29	-0.64	-0.07	0.00	1.90	-1.77

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-11.57	-8.10	-4.05	-0.47	0.00	0.22	-0.77
4- 1	1.47	-7.05	-3.53	-0.41	0.00	0.46	-0.09
4- 2	11.13	-6.01	-3.00	-0.35	0.00	0.79	0.00
4- 3	17.41	-4.96	-2.48	-0.29	0.00	1.09	0.00
4- 4	20.32	-3.92	-1.96	-0.23	0.00	1.22	0.00
4- 5	19.85	-2.87	-1.43	-0.16	0.00	1.17	0.00
4- 6	16.01	-1.82	-0.91	-0.10	0.00	0.92	0.00
4- 7	8.79	-0.78	-0.39	-0.04	0.00	0.51	-0.04
4- 8	-1.80	0.27	0.14	0.02	0.00	0.15	-0.30
4- 9	-15.77	1.32	0.66	0.08	0.00	0.00	-0.97
4-10	-33.11	2.36	1.18	0.14	0.00	0.00	-1.97

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-26.62	0.98	0.49	0.06	0.00	0.51	-4.39
5- 1	-13.34	0.99	0.50	0.06	0.00	0.41	-2.25
5- 2	-3.01	1.00	0.50	0.06	0.00	1.11	-1.27
5- 3	4.36	1.01	0.51	0.06	0.00	2.16	-1.00
5- 4	8.79	1.02	0.51	0.06	0.00	2.89	-0.82
5- 5	10.27	1.03	0.52	0.06	0.00	3.14	-0.64
5- 6	8.80	1.04	0.52	0.06	0.00	2.89	-0.82
5- 7	4.37	1.05	0.53	0.06	0.00	2.16	-1.00
5- 8	-3.00	1.06	0.53	0.06	0.00	1.11	-1.27
5- 9	-13.33	1.07	0.54	0.06	0.00	0.41	-2.26
5-10	-26.61	1.08	0.54	0.06	0.00	0.51	-4.39

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	-30.32	1.16	0.58	0.06	0.00	0.00	-1.79
7- 1	-15.13	1.15	0.57	0.06	0.00	0.00	-0.91
7- 2	-3.32	1.14	0.57	0.06	0.00	0.15	-0.39
7- 3	5.12	1.13	0.56	0.06	0.00	0.41	-0.12
7- 4	10.18	1.12	0.56	0.06	0.00	0.64	0.00
7- 5	11.86	1.11	0.55	0.06	0.00	0.71	0.00
7- 6	10.18	1.10	0.55	0.06	0.00	0.64	0.00
7- 7	5.11	1.09	0.54	0.06	0.00	0.41	-0.12
7- 8	-3.33	1.08	0.54	0.06	0.00	0.14	-0.39
7- 9	-15.15	1.07	0.53	0.06	0.00	0.00	-0.91
7-10	-30.34	1.06	0.53	0.06	0.00	0.00	-1.79

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE Pos	LOADS Neg
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.15	7.02	3.51	0.37	0.00	0.09	-0.20
1- 1	0.15	5.35	2.67	0.29	0.00	0.09	-0.20
1- 2	0.15	3.77	1.89	0.22	0.00	0.09	-0.20
1- 3	0.15	2.30	1.15	0.15	0.00	0.09	-0.20
1- 4	0.15	0.92	0.46	0.07	0.00	0.09	-0.20
1- 5	0.15	-0.37	-0.18	0.00	0.00	0.09	-0.20
1- 6	0.15	-1.56	-0.78	-0.07	0.00	0.09	-0.20
1- 7	0.15	-2.64	-1.32	-0.15	0.00	0.09	-0.20
1- 8	0.15	-3.64	-1.82	-0.22	0.00	0.09	-0.20
1- 9	0.15	-4.53	-2.27	-0.29	0.00	0.09	-0.20
1-10	0.15	-5.33	-2.67	-0.37	0.00	0.09	-0.20
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	8.65	0.67	0.33	0.04	0.00	1.69	-0.13
2- 1	6.66	0.67	0.33	0.04	0.00	1.30	-0.13
2- 2	4.68	0.67	0.33	0.04	0.00	1.04	-0.17
2- 3	2.69	0.67	0.33	0.04	0.00	0.79	-0.28
2- 4	0.70	0.67	0.33	0.04	0.00	0.57	-0.42
2- 5	-1.29	0.67	0.33	0.04	0.00	0.39	-0.63
2- 6	-3.28	0.67	0.33	0.04	0.00	0.24	-0.86
2- 7	-5.27	0.67	0.33	0.04	0.00	0.13	-1.12
2- 8	-7.26	0.67	0.33	0.04	0.00	0.05	-1.39
2- 9	-9.25	0.67	0.33	0.04	0.00	0.02	-1.67
2-10	-11.23	0.67	0.33	0.04	0.00	0.01	-1.81
TOP SLAB RIGHT SIDE							

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INTERIOR WALL BOTTOM
    3- 0   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 1   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 2   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 3   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 4   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 5   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 6   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 7   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 8   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3- 9   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
    3-10   -0.05   -0.01    0.00    0.00    0.00    0.12   -0.12
INTERIOR WALL TOP
BOTTOM SLAB LEFT SIDE
    4- 0    9.92    0.71    0.35    0.04    0.00    0.37    0.00
    4- 1    7.65    0.71    0.35    0.04    0.00    0.28    0.00
    4- 2    5.37    0.71    0.35    0.04    0.00    0.20    0.00
    4- 3    3.10    0.71    0.35    0.04    0.00    0.11    0.00
    4- 4    0.82    0.71    0.35    0.04    0.00    0.03   -0.01
    4- 5   -1.45    0.71    0.35    0.04    0.00    0.00   -0.07
    4- 6   -3.73    0.71    0.35    0.04    0.00    0.00   -0.16
    4- 7   -6.00    0.71    0.35    0.04    0.00    0.00   -0.24
    4- 8   -8.28    0.71    0.35    0.04    0.00    0.00   -0.32
    4- 9  -10.55    0.71    0.35    0.04    0.00    0.00   -0.41
    4-10  -12.83    0.71    0.35    0.04    0.00    0.00   -0.49
BOTTOM SLAB RIGHT SIDE
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TOP SLAB LEFT SIDE
    5- 0    9.95    0.01    0.00    0.00    0.00    1.23   -0.09
    5- 1    7.96    0.01    0.00    0.00    0.00    0.95   -0.10
    5- 2    5.97    0.01    0.00    0.00    0.00    0.76   -0.12
    5- 3    3.98    0.01    0.00    0.00    0.00    0.60   -0.17
    5- 4    1.99    0.01    0.00    0.00    0.00    0.44   -0.26
    5- 5    0.00    0.01    0.00    0.00    0.00    0.31   -0.39
    5- 6   -1.99    0.01    0.00    0.00    0.00    0.20   -0.53
    5- 7   -3.98    0.01    0.00    0.00    0.00    0.14   -0.69
    5- 8   -5.97    0.01    0.00    0.00    0.00    0.10   -0.87
    5- 9   -7.95    0.01    0.00    0.00    0.00    0.09   -1.06
    5-10   -9.94    0.01    0.00    0.00    0.00    0.09   -1.15
TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE
    7- 0   11.37   -0.01    0.00    0.00    0.00    0.44    0.00
    7- 1    9.10   -0.01    0.00    0.00    0.00    0.35    0.00
    7- 2    6.82   -0.01    0.00    0.00    0.00    0.27    0.00
    7- 3    4.55   -0.01    0.00    0.00    0.00    0.18    0.00
    7- 4    2.27   -0.01    0.00    0.00    0.00    0.10    0.00
    7- 5    0.00   -0.01    0.00    0.00    0.00    0.02   -0.02
    7- 6   -2.28   -0.01    0.00    0.00    0.00    0.00   -0.10
    7- 7   -4.55   -0.01    0.00    0.00    0.00    0.00   -0.18
    7- 8   -6.83   -0.01    0.00    0.00    0.00    0.00   -0.27
    7- 9   -9.10   -0.01    0.00    0.00    0.00    0.00   -0.35
    7-10  -11.38   -0.01    0.00    0.00    0.00    0.00   -0.44
BOTTOM SLAB RIGHT SIDE
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INTERIOR WALL BOTTOM
    3- 0   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 1   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 2   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 3   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 4   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 5   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 6   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 7   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 8   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3- 9   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
    3-10   -0.05   -0.01    0.00    0.00    0.00    0.18   -0.19
INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE
    4- 0    9.92    0.71    0.35    0.04    0.00    0.55    0.00
    4- 1    7.65    0.71    0.35    0.04    0.00    0.43    0.00
    4- 2    5.37    0.71    0.35    0.04    0.00    0.30    0.00
    4- 3    3.10    0.71    0.35    0.04    0.00    0.17    0.00
    4- 4    0.82    0.71    0.35    0.04    0.00    0.05   -0.01
    4- 5   -1.45    0.71    0.35    0.04    0.00    0.00   -0.10
    4- 6   -3.73    0.71    0.35    0.04    0.00    0.00   -0.23
    4- 7   -6.00    0.71    0.35    0.04    0.00    0.00   -0.36
    4- 8   -8.28    0.71    0.35    0.04    0.00    0.00   -0.48
    4- 9  -10.55    0.71    0.35    0.04    0.00    0.00   -0.61
    4-10  -12.83    0.71    0.35    0.04    0.00    0.00   -0.74
BOTTOM SLAB RIGHT SIDE


TOP SLAB LEFT SIDE
    5- 0    9.95    0.01    0.00    0.00    0.00    1.90   -0.14
    5- 1    7.96    0.01    0.00    0.00    0.00    1.48   -0.15
    5- 2    5.97    0.01    0.00    0.00    0.00    1.19   -0.17
    5- 3    3.98    0.01    0.00    0.00    0.00    0.93   -0.25
    5- 4    1.99    0.01    0.00    0.00    0.00    0.69   -0.38
    5- 5    0.00    0.01    0.00    0.00    0.00    0.50   -0.57
    5- 6   -1.99    0.01    0.00    0.00    0.00    0.33   -0.81
    5- 7   -3.98    0.01    0.00    0.00    0.00    0.20   -1.06
    5- 8   -5.97    0.01    0.00    0.00    0.00    0.15   -1.34
    5- 9   -7.95    0.01    0.00    0.00    0.00    0.14   -1.62
    5-10   -9.94    0.01    0.00    0.00    0.00    0.14   -1.76
TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE
    7- 0   11.37   -0.01    0.00    0.00    0.00    0.65    0.00
    7- 1    9.10   -0.01    0.00    0.00    0.00    0.53    0.00
    7- 2    6.82   -0.01    0.00    0.00    0.00    0.40    0.00
    7- 3    4.55   -0.01    0.00    0.00    0.00    0.27    0.00
    7- 4    2.27   -0.01    0.00    0.00    0.00    0.15    0.00
    7- 5    0.00   -0.01    0.00    0.00    0.00    0.04   -0.04
    7- 6   -2.28   -0.01    0.00    0.00    0.00    0.00   -0.15
    7- 7   -4.55   -0.01    0.00    0.00    0.00    0.00   -0.27
    7- 8   -6.83   -0.01    0.00    0.00    0.00    0.00   -0.40
    7- 9   -9.10   -0.01    0.00    0.00    0.00    0.00   -0.53
    7-10  -11.38   -0.01    0.00    0.00    0.00    0.00   -0.65
BOTTOM SLAB RIGHT SIDE
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Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL

Thickness = 11.81 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 1.00 (in)
Bar diameter (mid+) = 1.00 (in)
Bar diameter (mid-) = 1.00 (in)
Bar diameter (top) = 1.00 (in)

	Moment	Coin. Axial Force	Shear Force	Shear Cap	Resistance Po Cap	Mu Cap	Mbal Cap	Pbal Cap	Steel Area	Mom. Cap	Des. Thk	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
	Kft	Kips	Kips	Kips	Kips	Kft	Kft	Kips	In2	Kft	in				
BOT	-18.6	7.2	2.5	11.5	273.6	20.7	37.2	94.1	0.7854	22.0	9.31	1.8	3.0	3.3	5.5
MID	0.0	7.2	1.0	11.4	272.2	19.4	36.7	95.6	0.7326	20.7	9.31	70.7	99.0	NA	NA
MID-	-19.1	7.2	1.4	11.3	273.6	20.7	37.2	94.1	0.7854	22.0	9.31	1.6	2.6	NA	NA
TOP	-22.5*	7.2	2.7	11.4	273.6	20.7	37.2	94.1	0.7854	22.0	9.31	1.0	1.6	3.2	5.4

Member No. = 2 TOP SLAB

Thickness = 11.81 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.00 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-18.8	0.5	10.8	12.5	273.6	20.7	37.2	94.1	0.7854	20.8	9.31	1.3	2.1	4.8	8.0
MID	23.9	0.5	0.3	11.1	289.1	34.5	41.6	76.7	1.3793	34.6	9.25	2.1	3.4	NA	NA
RT	-37.5*	0.5	13.4*	12.4	285.6	31.5	40.6	80.5	1.2435	31.5	9.25	0.6	1.0	1.3	2.2

Member No. = 3 INTERIOR WALL

Thickness = 11.81 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.88 (in)
Bar diameter (mid+) = 0.88 (in)
Bar diameter (mid-) = 0.88 (in)
Bar diameter (top) = 0.88 (in)

BOT	-0.8	18.7	1.6	13.2	266.7	14.2	35.2	102.3	0.5229	18.0	9.37	21.9	36.4	4.8	8.0
MID	3.5	18.7	1.6	12.0	266.7	14.2	35.2	102.3	0.5229	18.0	9.37	5.1	8.5	NA	NA
MID-	-3.5	18.7	1.6	12.0	266.7	14.2	35.2	102.3	0.5229	18.0	9.37	5.1	8.5	NA	NA
TOP	-7.9	18.7	1.7	11.5	266.7	14.2	35.2	102.3	0.5229	18.0	9.37	2.3	3.8	4.2	7.0

Member No. = 4 BOTTOM SLAB

Thickness = 11.81 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.00 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-14.9	0.9	9.0	12.6	273.6	20.7	37.2	94.1	0.7854	20.9	9.31	2.7	4.5	9.1	15.1
MID	20.0	0.9	0.9	11.3	294.6	39.1	43.3	70.8	1.5894	39.2	9.25	5.1	8.5	NA	NA
RT	-33.4*	0.9	11.5	12.1	280.0	26.5	38.9	86.5	1.0309	26.6	9.25	0.2	0.3	2.3	3.9

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE Pos Kft	LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-10.78	-0.76	-0.38	-0.09	0.18	0.00	-1.39
1- 1	-10.67	0.27	0.14	0.02	-0.18	0.00	-1.34
1- 2	-10.57	1.04	0.52	0.10	-0.42	0.00	-1.44
1- 3	-10.46	1.55	0.77	0.16	-0.57	0.00	-1.59
1- 4	-10.35	1.82	0.91	0.19	-0.62	0.00	-1.75
1- 5	-10.24	1.86	0.93	0.21	-0.60	0.00	-1.90
1- 6	-10.13	1.70	0.85	0.19	-0.52	0.05	-2.10
1- 7	-10.03	1.34	0.67	0.16	-0.38	0.16	-2.35
1- 8	-9.92	0.79	0.40	0.10	-0.20	0.29	-2.61
1- 9	-9.81	0.08	0.04	0.02	-0.01	0.41	-2.88
1-10	-9.70	-0.78	-0.39	-0.09	0.21	0.55	-3.16
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-9.70	-0.78	-0.39	-0.09	0.21	0.55	-3.16
2- 1	-1.45	-0.66	-0.33	-0.07	0.18	0.54	-1.21
2- 2	4.72	-0.54	-0.27	-0.06	0.14	1.26	-0.10
2- 3	8.79	-0.43	-0.21	-0.05	0.11	2.27	0.00
2- 4	10.77	-0.31	-0.15	-0.03	0.08	2.95	-0.17
2- 5	10.67	-0.19	-0.10	-0.02	0.05	3.12	-0.34
2- 6	8.47	-0.07	-0.04	-0.01	0.02	2.78	-0.52
2- 7	4.18	0.04	0.02	0.00	-0.01	1.95	-0.69
2- 8	-2.19	0.16	0.08	0.02	-0.05	0.80	-1.15
2- 9	-10.66	0.28	0.14	0.03	-0.08	0.15	-2.80
2-10	-21.22	0.39	0.20	0.04	-0.11	0.00	-5.09
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.03	0.03	0.02	0.00	-0.03	0.48	-0.50
3- 1	0.02	0.03	0.01	0.00	-0.02	0.17	-0.19
3- 2	0.02	0.02	0.01	0.00	-0.02	0.14	-0.16
3- 3	0.01	0.01	0.01	0.00	-0.01	0.45	-0.46
3- 4	0.01	0.01	0.00	0.00	-0.01	0.77	-0.77
3- 5	0.00	0.00	0.00	0.00	0.00	1.08	-1.08
3- 6	-0.01	-0.01	0.00	0.00	0.01	1.40	-1.40
3- 7	-0.01	-0.01	-0.01	0.00	0.01	1.72	-1.71
3- 8	-0.02	-0.02	-0.01	0.00	0.02	2.04	-2.02
3- 9	-0.02	-0.03	-0.01	0.00	0.02	2.35	-2.34
3-10	-0.03	-0.03	-0.02	0.00	0.03	2.67	-2.65
INTERIOR WALL TOP							

BOTTOM SLAB LEFT SIDE							
4- 0	-10.78	-0.76	-0.38	-0.09	0.18	0.00	-1.39
4- 1	-1.77	-0.65	-0.32	-0.07	0.16	0.16	-0.29
4- 2	4.97	-0.53	-0.27	-0.06	0.13	0.76	0.00
4- 3	9.43	-0.42	-0.21	-0.05	0.10	1.29	0.00
4- 4	11.61	-0.31	-0.15	-0.03	0.08	1.53	0.00
4- 5	11.52	-0.19	-0.10	-0.02	0.05	1.49	0.00
4- 6	9.16	-0.08	-0.04	-0.01	0.02	1.18	0.00
4- 7	4.52	0.03	0.02	0.00	0.00	0.58	0.00
4- 8	-2.40	0.15	0.07	0.02	-0.03	0.07	-0.40
4- 9	-11.59	0.26	0.13	0.03	-0.06	0.00	-1.49
4-10	-23.06	0.37	0.19	0.04	-0.09	0.00	-2.94
BOTTOM SLAB RIGHT SIDE							

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE Pos	LOADS Neg
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.17	1.88	0.94	0.19	-0.68	0.24	-0.45
1- 1	0.17	1.44	0.72	0.15	-0.48	0.24	-0.45
1- 2	0.17	1.02	0.51	0.11	-0.31	0.24	-0.45
1- 3	0.17	0.62	0.31	0.07	-0.16	0.24	-0.45
1- 4	0.17	0.25	0.12	0.04	-0.02	0.24	-0.45
1- 5	0.17	-0.10	-0.05	0.00	0.09	0.24	-0.45
1- 6	0.17	-0.43	-0.21	-0.04	0.18	0.24	-0.45
1- 7	0.17	-0.73	-0.36	-0.07	0.25	0.24	-0.45
1- 8	0.17	-1.01	-0.50	-0.11	0.30	0.24	-0.45
1- 9	0.17	-1.26	-0.63	-0.15	0.33	0.24	-0.45
1-10	0.17	-1.50	-0.75	-0.19	0.34	0.24	-0.45
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	5.82	0.07	0.04	0.01	-0.02	1.73	-0.11
2- 1	4.52	0.07	0.04	0.01	-0.02	1.31	-0.11
2- 2	3.21	0.07	0.04	0.01	-0.02	1.04	-0.16
2- 3	1.90	0.07	0.04	0.01	-0.02	0.77	-0.25
2- 4	0.59	0.07	0.04	0.01	-0.02	0.53	-0.38
2- 5	-0.72	0.07	0.04	0.01	-0.02	0.33	-0.57
2- 6	-2.03	0.07	0.04	0.01	-0.02	0.19	-0.81
2- 7	-3.34	0.07	0.04	0.01	-0.02	0.09	-1.09
2- 8	-4.65	0.07	0.04	0.01	-0.02	0.03	-1.37
2- 9	-5.96	0.07	0.04	0.01	-0.02	0.00	-1.64
2-10	-7.27	0.07	0.04	0.01	-0.02	0.00	-1.76
TOP SLAB RIGHT SIDE							

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INTERIOR WALL BOTTOM
    3- 0   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 1   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 2   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 3   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 4   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 5   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 6   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 7   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 8   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3- 9   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
    3-10   -0.01   -0.01   -0.01    0.00    0.01    0.51   -0.50
INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE
    4- 0    6.36    0.07    0.04    0.01   -0.02    0.80    0.00
    4- 1    4.93    0.07    0.04    0.01   -0.02    0.62    0.00
    4- 2    3.51    0.07    0.04    0.01   -0.02    0.44    0.00
    4- 3    2.08    0.07    0.04    0.01   -0.02    0.26    0.00
    4- 4    0.66    0.07    0.04    0.01   -0.02    0.08    0.00
    4- 5   -0.77    0.07    0.04    0.01   -0.02    0.00   -0.11
    4- 6   -2.19    0.07    0.04    0.01   -0.02    0.00   -0.29
    4- 7   -3.62    0.07    0.04    0.01   -0.02    0.00   -0.47
    4- 8   -5.05    0.07    0.04    0.01   -0.02    0.00   -0.64
    4- 9   -6.47    0.07    0.04    0.01   -0.02    0.00   -0.82
    4-10   -7.90    0.07    0.04    0.01   -0.02    0.00   -1.00
BOTTOM SLAB RIGHT SIDE
```

Current Live Load: HS30T

Unfactored   MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE Pos Kft	LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-10.78	-0.76	-0.38	-0.09	0.18	0.00	-2.08
1- 1	-10.67	0.27	0.14	0.02	-0.18	0.00	-2.01
1- 2	-10.57	1.04	0.52	0.10	-0.42	0.00	-2.16
1- 3	-10.46	1.55	0.77	0.16	-0.57	0.00	-2.39
1- 4	-10.35	1.82	0.91	0.19	-0.62	0.00	-2.62
1- 5	-10.24	1.86	0.93	0.21	-0.60	0.00	-2.85
1- 6	-10.13	1.70	0.85	0.19	-0.52	0.07	-3.15
1- 7	-10.03	1.34	0.67	0.16	-0.38	0.25	-3.52
1- 8	-9.92	0.79	0.40	0.10	-0.20	0.43	-3.92
1- 9	-9.81	0.08	0.04	0.02	-0.01	0.62	-4.32
1-10	-9.70	-0.78	-0.39	-0.09	0.21	0.82	-4.74
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-9.70	-0.78	-0.39	-0.09	0.21	0.82	-4.74
2- 1	-1.45	-0.66	-0.33	-0.07	0.18	0.80	-1.82
2- 2	4.72	-0.54	-0.27	-0.06	0.14	1.89	-0.15
2- 3	8.79	-0.43	-0.21	-0.05	0.11	3.40	0.00
2- 4	10.77	-0.31	-0.15	-0.03	0.08	4.43	-0.25
2- 5	10.67	-0.19	-0.10	-0.02	0.05	4.67	-0.51
2- 6	8.47	-0.07	-0.04	-0.01	0.02	4.18	-0.78
2- 7	4.18	0.04	0.02	0.00	-0.01	2.94	-1.04
2- 8	-2.19	0.16	0.08	0.02	-0.05	1.21	-1.73
2- 9	-10.66	0.28	0.14	0.03	-0.08	0.23	-4.20
2-10	-21.22	0.39	0.20	0.04	-0.11	0.00	-7.63
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.03	0.03	0.02	0.00	-0.03	0.72	-0.75
3- 1	0.02	0.03	0.01	0.00	-0.02	0.26	-0.28
3- 2	0.02	0.02	0.01	0.00	-0.02	0.20	-0.24
3- 3	0.01	0.01	0.01	0.00	-0.01	0.68	-0.69
3- 4	0.01	0.01	0.00	0.00	-0.01	1.15	-1.16
3- 5	0.00	0.00	0.00	0.00	0.00	1.63	-1.63
3- 6	-0.01	-0.01	0.00	0.00	0.01	2.10	-2.09
3- 7	-0.01	-0.01	-0.01	0.00	0.01	2.58	-2.56
3- 8	-0.02	-0.02	-0.01	0.00	0.02	3.05	-3.03
3- 9	-0.02	-0.03	-0.01	0.00	0.02	3.53	-3.50
3-10	-0.03	-0.03	-0.02	0.00	0.03	4.01	-3.97
INTERIOR WALL TOP							
BOTTOM SLAB LEFT SIDE							
4- 0	-10.78	-0.76	-0.38	-0.09	0.18	0.00	-2.08
4- 1	-1.77	-0.65	-0.32	-0.07	0.16	0.25	-0.43
4- 2	4.97	-0.53	-0.27	-0.06	0.13	1.14	0.00
4- 3	9.43	-0.42	-0.21	-0.05	0.10	1.93	0.00
4- 4	11.61	-0.31	-0.15	-0.03	0.08	2.30	0.00
4- 5	11.52	-0.19	-0.10	-0.02	0.05	2.24	0.00
4- 6	9.16	-0.08	-0.04	-0.01	0.02	1.76	0.00
4- 7	4.52	0.03	0.02	0.00	0.00	0.87	0.00
4- 8	-2.40	0.15	0.07	0.02	-0.03	0.10	-0.59
4- 9	-11.59	0.26	0.13	0.03	-0.06	0.00	-2.23
4-10	-23.06	0.37	0.19	0.04	-0.09	0.00	-4.41
BOTTOM SLAB RIGHT SIDE							

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE Pos	LOADS Neg
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.17	1.88	0.94	0.19	-0.68	0.36	-0.67
1- 1	0.17	1.44	0.72	0.15	-0.48	0.36	-0.67
1- 2	0.17	1.02	0.51	0.11	-0.31	0.36	-0.67
1- 3	0.17	0.62	0.31	0.07	-0.16	0.36	-0.67
1- 4	0.17	0.25	0.12	0.04	-0.02	0.36	-0.67
1- 5	0.17	-0.10	-0.05	0.00	0.09	0.36	-0.67
1- 6	0.17	-0.43	-0.21	-0.04	0.18	0.36	-0.67
1- 7	0.17	-0.73	-0.36	-0.07	0.25	0.36	-0.67
1- 8	0.17	-1.01	-0.50	-0.11	0.30	0.36	-0.67
1- 9	0.17	-1.26	-0.63	-0.15	0.33	0.36	-0.67
1-10	0.17	-1.50	-0.75	-0.19	0.34	0.36	-0.67
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	5.82	0.07	0.04	0.01	-0.02	2.60	-0.17
2- 1	4.52	0.07	0.04	0.01	-0.02	1.99	-0.17
2- 2	3.21	0.07	0.04	0.01	-0.02	1.57	-0.25
2- 3	1.90	0.07	0.04	0.01	-0.02	1.16	-0.38
2- 4	0.59	0.07	0.04	0.01	-0.02	0.80	-0.59
2- 5	-0.72	0.07	0.04	0.01	-0.02	0.51	-0.87
2- 6	-2.03	0.07	0.04	0.01	-0.02	0.29	-1.23
2- 7	-3.34	0.07	0.04	0.01	-0.02	0.14	-1.62
2- 8	-4.65	0.07	0.04	0.01	-0.02	0.05	-2.04
2- 9	-5.96	0.07	0.04	0.01	-0.02	0.01	-2.45
2-10	-7.27	0.07	0.04	0.01	-0.02	0.00	-2.63
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 1	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 2	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 3	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 4	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 5	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 6	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 7	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 8	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3- 9	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
3-10	-0.01	-0.01	-0.01	0.00	0.01	0.76	-0.75
INTERIOR WALL TOP							
BOTTOM SLAB LEFT SIDE							
4- 0	6.36	0.07	0.04	0.01	-0.02	1.20	0.00
4- 1	4.93	0.07	0.04	0.01	-0.02	0.93	0.00
4- 2	3.51	0.07	0.04	0.01	-0.02	0.66	0.00
4- 3	2.08	0.07	0.04	0.01	-0.02	0.39	0.00
4- 4	0.66	0.07	0.04	0.01	-0.02	0.13	0.00
4- 5	-0.77	0.07	0.04	0.01	-0.02	0.00	-0.17
4- 6	-2.19	0.07	0.04	0.01	-0.02	0.00	-0.44
4- 7	-3.62	0.07	0.04	0.01	-0.02	0.00	-0.70
4- 8	-5.05	0.07	0.04	0.01	-0.02	0.00	-0.97
4- 9	-6.47	0.07	0.04	0.01	-0.02	0.00	-1.23
4-10	-7.90	0.07	0.04	0.01	-0.02	0.00	-1.50
BOTTOM SLAB RIGHT SIDE							

Member No. = 1 EXTERIOR WALL

Thickness = 14.57 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.88 (in)
Bar diameter (mid+) = 0.88 (in)
Bar diameter (mid-) = 0.88 (in)
Bar diameter (top) = 0.88 (in)

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-20.9	10.5	7.0	15.3	327.9	21.3	54.2	134.4	0.6040	23.8	12.13	4.2	7.0	49.7	82.9
MID	0.9	10.5	0.4	15.6	328.6	22.2	54.5	133.6	0.6316	24.7	12.13	24.0	40.0	NA	NA
MID-	-10.3	10.5	0.4	14.6	327.9	21.3	54.2	134.4	0.6040	23.8	12.13	n/a	n/a	NA	NA
TOP	-20.8	10.5	6.2	15.2	327.9	21.3	54.2	134.4	0.6040	23.8	12.13	3.1	5.1	6.2	10.4

Member No. = 2 TOP SLAB

Thickness = 12.99 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-16.9	2.1	10.4	13.9	294.1	18.4	43.3	114.7	0.6040	18.9	10.55	3.1	5.2	7.8	13.0
MID	15.6	2.1	0.8	12.6	303.3	28.1	46.2	103.3	0.9539	28.4	10.43	9.8	16.3	NA	NA
RT	-34.3*	2.1	14.4*	13.9	304.4	29.2	46.6	102.1	0.9975	29.6	10.43	0.5	0.8	4.1	6.9

Member No. = 1 EXTERIOR WALL

Thickness = 14.57 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.88 (in)
Bar diameter (mid+) = 0.88 (in)
Bar diameter (mid-) = 0.88 (in)
Bar diameter (top) = 0.88 (in)

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-20.9	10.5	7.0	15.3	327.9	21.3	54.2	134.4	0.6040	23.8	12.13	4.2	7.0	49.7	82.9
MID	0.9	10.5	0.4	15.6	328.6	22.2	54.5	133.6	0.6316	24.7	12.13	24.0	40.0	NA	NA
MID-	-10.3	10.5	0.4	14.6	327.9	21.3	54.2	134.4	0.6040	23.8	12.13	n/a	n/a	NA	NA
TOP	-20.8	10.5	6.2	15.2	327.9	21.3	54.2	134.4	0.6040	23.8	12.13	3.1	5.1	6.2	10.4

Member No. = 2 TOP SLAB

Thickness = 12.99 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-16.9	2.1	10.4	13.9	294.1	18.4	43.3	114.7	0.6040	18.9	10.55	3.1	5.2	7.8	13.0
MID	15.6	2.1	0.8	12.6	303.3	28.1	46.2	103.3	0.9539	28.4	10.43	9.8	16.3	NA	NA
RT	-34.3*	2.1	14.4*	13.9	304.4	29.2	46.6	102.1	0.9975	29.6	10.43	0.5	0.8	4.1	6.9

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Member No. = 3 INTERIOR WALL      Thickness             = 12.99 (in)
                                  Clear cover at end    =  2.00 (in)
                                  Clear cover at middle =  2.00 (in)
                                  Bar diameter (bot )   =  0.75 (in)
                                  Bar diameter (mid+)   =  0.75 (in)
                                  Bar diameter (mid-)   =  0.75 (in)
                                  Bar diameter (top )   =  0.75 (in)

BOT    -0.4    28.6   0.2   13.4  290.6 14.6 42.1 119.2  0.4710   21.2 10.61  57.0  95.0  47.6  79.4
MID     0.5    28.6   0.2   13.3  290.6 14.6 42.1 119.2  0.4710   21.2 10.61  46.5  77.5   NA    NA
MID-   -0.5    28.6   0.2   13.3  290.6 14.6 42.1 119.2  0.4710   21.2 10.61  46.5  77.5   NA    NA
TOP    -1.4    28.6   0.2   12.9  290.6 14.6 42.1 119.2  0.4710   21.2 10.61  16.5  27.5  45.9  76.5

Member No. = 4 BOTTOM SLAB        Thickness             = 12.99 (in)
                                  Clear cover at end    =  2.00 (in)
                                  Clear cover at middle =  2.00 (in)
                                  Bar diameter (lt  )   =  0.88 (in)
                                  Bar diameter (mid )   =  1.00 (in)
                                  Bar diameter (rt  )   =  1.00 (in)

LT    -17.4     1.6  11.0   13.9  294.1 18.4 43.3 114.7  0.6040   18.8 10.55   4.1   6.8  14.8  24.7
MID    16.8     1.6   1.3   12.8  300.6 25.4 45.5 107.0  0.8525   25.7 10.49  11.5  19.2   NA    NA
RT    -38.7*    1.6  15.7*  13.7  300.7 25.5 45.5 106.9  0.8564   25.8 10.49   0.0   0.0   5.0   8.4
```

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Kft	Water Hgt. Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	-9.38	-9.01	-4.50	-0.45	2.46	0.02	-0.42
1- 1	-9.29	-2.15	-1.08	-0.12	0.36	0.00	-0.39
1- 2	-9.20	2.98	1.49	0.13	-1.10	0.00	-0.39
1- 3	-9.11	6.48	3.24	0.31	-1.97	0.00	-0.42
1- 4	-9.02	8.41	4.21	0.41	-2.34	0.00	-0.46
1- 5	-8.93	8.86	4.43	0.45	-2.26	0.03	-0.51
1- 6	-8.84	7.90	3.95	0.41	-1.83	0.08	-0.58
1- 7	-8.75	5.61	2.81	0.31	-1.11	0.14	-0.65
1- 8	-8.66	2.07	1.03	0.13	-0.16	0.21	-0.72
1- 9	-8.57	-2.65	-1.33	-0.12	0.92	0.29	-0.80
1-10	-8.48	-8.47	-4.23	-0.44	2.09	0.36	-0.88
EXTERIOR WALL TOP							

TOP SLAB LEFT SIDE

2- 0	-8.48	-8.47	-4.23	-0.44	2.09	0.36	-0.88
2- 1	0.15	-7.11	-3.55	-0.37	1.75	0.29	-0.30
2- 2	6.35	-5.75	-2.88	-0.30	1.42	0.37	-0.01
2- 3	10.12	-4.39	-2.20	-0.23	1.08	0.63	0.00
2- 4	11.44	-3.04	-1.52	-0.16	0.75	0.79	-0.07
2- 5	10.33	-1.68	-0.84	-0.09	0.41	0.82	-0.18
2- 6	6.78	-0.32	-0.16	-0.02	0.08	0.70	-0.29
2- 7	0.80	1.04	0.52	0.05	-0.26	0.42	-0.39
2- 8	-7.63	2.39	1.20	0.12	-0.59	0.15	-0.60
2- 9	-18.48	3.75	1.88	0.19	-0.93	0.03	-1.00
2-10	-31.78	5.11	2.55	0.26	-1.26	0.00	-1.76

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.01	0.08	0.04	0.00	-0.07	0.21	-0.21
3- 1	0.01	0.06	0.03	0.00	-0.06	0.13	-0.13
3- 2	0.01	0.05	0.02	0.00	-0.04	0.05	-0.05
3- 3	0.00	0.03	0.02	0.00	-0.03	0.04	-0.04
3- 4	0.00	0.02	0.01	0.00	-0.01	0.13	-0.13
3- 5	0.00	0.00	0.00	0.00	0.00	0.21	-0.21
3- 6	0.00	-0.02	-0.01	0.00	0.01	0.29	-0.29
3- 7	0.00	-0.03	-0.02	0.00	0.03	0.38	-0.38
3- 8	-0.01	-0.05	-0.02	0.00	0.04	0.46	-0.46
3- 9	-0.01	-0.06	-0.03	0.00	0.06	0.55	-0.55
3-10	-0.01	-0.08	-0.04	0.00	0.07	0.63	-0.63

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-9.38	-9.01	-4.50	-0.45	2.46	0.02	-0.42
4- 1	0.19	-7.56	-3.78	-0.37	2.07	0.16	-0.09
4- 2	7.03	-6.10	-3.05	-0.30	1.67	0.40	0.00
4- 3	11.16	-4.65	-2.32	-0.23	1.27	0.59	0.00
4- 4	12.57	-3.19	-1.60	-0.16	0.88	0.65	0.00
4- 5	11.25	-1.74	-0.87	-0.09	0.48	0.59	0.00
4- 6	7.22	-0.29	-0.14	-0.01	0.08	0.42	0.00
4- 7	0.46	1.17	0.58	0.06	-0.31	0.17	-0.06
4- 8	-9.02	2.62	1.31	0.13	-0.71	0.00	-0.38
4- 9	-21.21	4.07	2.04	0.20	-1.11	0.00	-0.91

4-10	-36.13	5.53	2.76	0.27	-1.51	0.00	-1.56

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Press K	Water Hgt. K	LIVE LOADS Press (Max) Pos K	Neg
EXTERIOR WALL BOTTOM							
1- 0	0.08	7.11	3.55	0.33	-2.26	0.07	-0.08
1- 1	0.08	5.49	2.75	0.26	-1.62	0.07	-0.08
1- 2	0.08	3.95	1.98	0.20	-1.06	0.07	-0.08
1- 3	0.08	2.48	1.24	0.13	-0.56	0.07	-0.08
1- 4	0.08	1.08	0.54	0.07	-0.12	0.07	-0.08
1- 5	0.08	-0.25	-0.12	0.00	0.24	0.07	-0.08
1- 6	0.08	-1.50	-0.75	-0.06	0.54	0.07	-0.08
1- 7	0.08	-2.69	-1.34	-0.13	0.78	0.07	-0.08
1- 8	0.08	-3.80	-1.90	-0.20	0.94	0.07	-0.08
1- 9	0.08	-4.85	-2.42	-0.26	1.04	0.07	-0.08
1-10	0.08	-5.82	-2.91	-0.33	1.08	0.07	-0.08
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	8.97	1.24	0.62	0.06	-0.30	0.71	-0.10
2- 1	6.75	1.24	0.62	0.06	-0.30	0.52	-0.10
2- 2	4.53	1.24	0.62	0.06	-0.30	0.39	-0.11
2- 3	2.32	1.24	0.62	0.06	-0.30	0.28	-0.13
2- 4	0.10	1.24	0.62	0.06	-0.30	0.19	-0.18
2- 5	-2.12	1.24	0.62	0.06	-0.30	0.12	-0.26
2- 6	-4.34	1.24	0.62	0.06	-0.30	0.06	-0.35
2- 7	-6.56	1.24	0.62	0.06	-0.30	0.03	-0.46
2- 8	-8.77	1.24	0.62	0.06	-0.30	0.01	-0.59
2- 9	-10.99	1.24	0.62	0.06	-0.30	0.00	-0.72
2-10	-13.21	1.24	0.62	0.06	-0.30	0.00	-0.79

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 1	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 2	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 3	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 4	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 5	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 6	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 7	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 8	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3- 9	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08
3-10	0.00	-0.01	-0.01	0.00	0.01	0.08	-0.08

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	9.95	1.32	0.66	0.07	-0.36	0.44	0.00
4- 1	7.47	1.32	0.66	0.07	-0.36	0.33	0.00
4- 2	4.99	1.32	0.66	0.07	-0.36	0.22	0.00
4- 3	2.52	1.32	0.66	0.07	-0.36	0.12	0.00
4- 4	0.04	1.32	0.66	0.07	-0.36	0.02	-0.01
4- 5	-2.43	1.32	0.66	0.07	-0.36	0.00	-0.11
4- 6	-4.91	1.32	0.66	0.07	-0.36	0.00	-0.21
4- 7	-7.39	1.32	0.66	0.07	-0.36	0.00	-0.32
4- 8	-9.86	1.32	0.66	0.07	-0.36	0.00	-0.43
4- 9	-12.34	1.32	0.66	0.07	-0.36	0.00	-0.54
4-10	-14.81	1.32	0.66	0.07	-0.36	0.00	-0.65

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Press	Water Hgt. Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	Kft	Kft	Kft	Kft	Kft	Kft	Kft

EXTERIOR WALL BOTTOM

1- 0	-9.38	-9.01	-4.50	-0.45	2.46	0.03	-0.64
1- 1	-9.29	-2.15	-1.08	-0.12	0.36	0.00	-0.58
1- 2	-9.20	2.98	1.49	0.13	-1.10	0.00	-0.58
1- 3	-9.11	6.48	3.24	0.31	-1.97	0.00	-0.63
1- 4	-9.02	8.41	4.21	0.41	-2.34	0.00	-0.67
1- 5	-8.93	8.86	4.43	0.45	-2.26	0.04	-0.74
1- 6	-8.84	7.90	3.95	0.41	-1.83	0.12	-0.84
1- 7	-8.75	5.61	2.81	0.31	-1.11	0.21	-0.94
1- 8	-8.66	2.07	1.03	0.13	-0.16	0.31	-1.04
1- 9	-8.57	-2.65	-1.33	-0.12	0.92	0.42	-1.15
1-10	-8.48	-8.47	-4.23	-0.44	2.09	0.52	-1.27

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	-8.48	-8.47	-4.23	-0.44	2.09	0.52	-1.27
2- 1	0.15	-7.11	-3.55	-0.37	1.75	0.43	-0.44
2- 2	6.35	-5.75	-2.88	-0.30	1.42	0.54	-0.02
2- 3	10.12	-4.39	-2.20	-0.23	1.08	0.91	0.00
2- 4	11.44	-3.04	-1.52	-0.16	0.75	1.14	-0.11
2- 5	10.33	-1.68	-0.84	-0.09	0.41	1.19	-0.26
2- 6	6.78	-0.32	-0.16	-0.02	0.08	1.01	-0.41
2- 7	0.80	1.04	0.52	0.05	-0.26	0.61	-0.57
2- 8	-7.63	2.39	1.20	0.12	-0.59	0.21	-0.87
2- 9	-18.48	3.75	1.88	0.19	-0.93	0.05	-1.44
2-10	-31.78	5.11	2.55	0.26	-1.26	0.00	-2.55

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.01	0.08	0.04	0.00	-0.07	0.31	-0.31
3- 1	0.01	0.06	0.03	0.00	-0.06	0.19	-0.19
3- 2	0.01	0.05	0.02	0.00	-0.04	0.07	-0.07
3- 3	0.00	0.03	0.02	0.00	-0.03	0.06	-0.06
3- 4	0.00	0.02	0.01	0.00	-0.01	0.18	-0.18
3- 5	0.00	0.00	0.00	0.00	0.00	0.30	-0.30
3- 6	0.00	-0.02	-0.01	0.00	0.01	0.43	-0.43
3- 7	0.00	-0.03	-0.02	0.00	0.03	0.55	-0.55
3- 8	-0.01	-0.05	-0.02	0.00	0.04	0.67	-0.67
3- 9	-0.01	-0.06	-0.03	0.00	0.06	0.80	-0.79

3-10	-0.01	-0.08	-0.04	0.00	0.07	0.92	-0.92

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-9.38	-9.01	-4.50	-0.45	2.46	0.03	-0.64
4- 1	0.19	-7.56	-3.78	-0.37	2.07	0.23	-0.13
4- 2	7.03	-6.10	-3.05	-0.30	1.67	0.59	0.00
4- 3	11.16	-4.65	-2.32	-0.23	1.27	0.86	0.00
4- 4	12.57	-3.19	-1.60	-0.16	0.88	0.96	0.00
4- 5	11.25	-1.74	-0.87	-0.09	0.48	0.88	0.00
4- 6	7.22	-0.29	-0.14	-0.01	0.08	0.62	0.00
4- 7	0.46	1.17	0.58	0.06	-0.31	0.24	-0.09
4- 8	-9.02	2.62	1.31	0.13	-0.71	0.00	-0.55
4- 9	-21.21	4.07	2.04	0.20	-1.11	0.00	-1.34
4-10	-36.13	5.53	2.76	0.27	-1.51	0.00	-2.31

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Press	Water Hgt.	LIVE LOADS Press (Max)	Pos	Neg
	K	K	K	K	K	K	K	

EXTERIOR WALL BOTTOM

1- 0	0.08	7.11	3.55	0.33	-2.26	0.10	-0.11
1- 1	0.08	5.49	2.75	0.26	-1.62	0.10	-0.11
1- 2	0.08	3.95	1.98	0.20	-1.06	0.10	-0.11
1- 3	0.08	2.48	1.24	0.13	-0.56	0.10	-0.11
1- 4	0.08	1.08	0.54	0.07	-0.12	0.10	-0.11
1- 5	0.08	-0.25	-0.12	0.00	0.24	0.10	-0.11
1- 6	0.08	-1.50	-0.75	-0.06	0.54	0.10	-0.11
1- 7	0.08	-2.69	-1.34	-0.13	0.78	0.10	-0.11
1- 8	0.08	-3.80	-1.90	-0.20	0.94	0.10	-0.11
1- 9	0.08	-4.85	-2.42	-0.26	1.04	0.10	-0.11
1-10	0.08	-5.82	-2.91	-0.33	1.08	0.10	-0.11

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	8.97	1.24	0.62	0.06	-0.30	1.03	-0.14
2- 1	6.75	1.24	0.62	0.06	-0.30	0.75	-0.15
2- 2	4.53	1.24	0.62	0.06	-0.30	0.57	-0.17
2- 3	2.32	1.24	0.62	0.06	-0.30	0.41	-0.20
2- 4	0.10	1.24	0.62	0.06	-0.30	0.28	-0.27
2- 5	-2.12	1.24	0.62	0.06	-0.30	0.17	-0.37
2- 6	-4.34	1.24	0.62	0.06	-0.30	0.09	-0.51
2- 7	-6.56	1.24	0.62	0.06	-0.30	0.04	-0.67
2- 8	-8.77	1.24	0.62	0.06	-0.30	0.01	-0.84
2- 9	-10.99	1.24	0.62	0.06	-0.30	0.00	-1.04
2-10	-13.21	1.24	0.62	0.06	-0.30	0.00	-1.14

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 1	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 2	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 3	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 4	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 5	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 6	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 7	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 8	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3- 9	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11
3-10	0.00	-0.01	-0.01	0.00	0.01	0.11	-0.11

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	9.95	1.32	0.66	0.07	-0.36	0.65	0.00
4- 1	7.47	1.32	0.66	0.07	-0.36	0.49	0.00
4- 2	4.99	1.32	0.66	0.07	-0.36	0.33	0.00
4- 3	2.52	1.32	0.66	0.07	-0.36	0.17	0.00
4- 4	0.04	1.32	0.66	0.07	-0.36	0.02	-0.01
4- 5	-2.43	1.32	0.66	0.07	-0.36	0.00	-0.15
4- 6	-4.91	1.32	0.66	0.07	-0.36	0.00	-0.32
4- 7	-7.39	1.32	0.66	0.07	-0.36	0.00	-0.48
4- 8	-9.86	1.32	0.66	0.07	-0.36	0.00	-0.64

4- 9	-12.34	1.32	0.66	0.07	-0.36	0.00	-0.80
4-10	-14.81	1.32	0.66	0.07	-0.36	0.00	-0.96

BOTTOM SLAB RIGHT SIDE

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  Output at Critical Sections  (per unit design width)

 Member No. = 1 EXTERIOR WALL     Thickness            = 18.11 (in)
                                  Clear cover at end   =  2.00 (in)
                                  Clear cover at middle =  2.00 (in)
                                  Bar diameter (bot )  =  1.13 (in)
                                  Bar diameter (mid+)  =  1.13 (in)
                                  Bar diameter (mid-)  =  1.13 (in)
                                  Bar diameter (top )  =  1.13 (in)

             Coin.                   Resistance                            Flexure        Shear
      Moment Axial  Shear Shear   Po    Mu Mbal  Pbal   Steel   Mom.  Des.   Ratings       Ratings
             Force  Force  Cap    Cap  Cap  Cap   Cap   Area    Cap   Thk   Inv   Oper   Inv  Oper
        Kft   Kips  Kips  Kips   Kips  Kft  Kft  Kips    In2    Kft    in
 BOT   -25.3   14.3   7.9   19.3  416.8 46.5 89.9 163.1  1.1009   50.3 15.55  20.4  34.1  26.1  43.6
 MID     4.9   14.3   0.5   18.2  414.4 42.8 88.5 165.6  1.0093   46.8 15.55  25.5  42.6   NA    NA
 MID-  -14.7   14.3   0.5   17.9  416.8 46.5 89.9 163.1  1.1009   50.3 15.55   n/a   n/a   NA    NA
 TOP   -25.1   14.3   7.1   19.2  416.8 46.5 89.9 163.1  1.1009   50.3 15.55   9.6  15.9   6.8  11.4

 Member No. = 2 TOP SLAB          Thickness            = 18.11 (in)
                                  Clear cover at end   =  2.00 (in)
                                  Clear cover at middle =  2.00 (in)
                                  Bar diameter (lt  )  =  1.13 (in)
                                  Bar diameter (mid )  =  1.13 (in)
                                  Bar diameter (rt  )  =  1.13 (in)

 LT    -20.2    2.1  12.1   20.9  416.8 46.5 89.9 163.1  1.1009   47.1 15.55  11.9  19.8  18.1  30.1
 MID    31.3    2.1   0.4   17.8  436.2 75.2101.1 142.4  1.8405   75.6 15.55  13.1  21.8   NA    NA
 RT    -35.6    2.1  15.3   21.4  434.8 73.3100.3 143.8  1.7884   73.7 15.55  11.9  19.8   5.4   8.9

Member No. = 3 INTERIOR WALL      Thickness             = 18.11 (in)
                                  Clear cover at end    =  2.00 (in)
                                  Clear cover at middle =  2.00 (in)
                                  Bar diameter (bot )   =  0.88 (in)
                                  Bar diameter (mid+)   =  0.88 (in)
                                  Bar diameter (mid-)   =  0.88 (in)
                                  Bar diameter (top )   =  0.88 (in)
BOT     1.8    34.4   0.1   18.1  408.5 33.9 85.3 173.5  0.7852   44.1 15.67  73.4  99.0  50.7  84.6
MID     4.1    34.4   0.1   17.9  408.5 33.9 85.3 173.5  0.7852   44.1 15.67  62.1  99.0   NA    NA
MID-    0.9    34.4   0.1   18.4  408.5 33.9 85.3 173.5  0.7852   44.1 15.67  49.1  81.8   NA    NA
TOP    -1.0    34.4   0.3   19.0  408.5 33.9 85.3 173.5  0.7852   44.1 15.67  20.3  33.9  53.4  89.0
Member No. = 4 BOTTOM SLAB        Thickness             = 18.11 (in)
                                  Clear cover at end    =  2.00 (in)
                                  Clear cover at middle =  2.00 (in)
                                  Bar diameter (lt  )   =  1.13 (in)
                                  Bar diameter (mid )   =  1.13 (in)
                                  Bar diameter (rt  )   =  1.13 (in)
LT    -20.8     1.4  12.5   20.8  416.8 46.5 89.9 163.1  1.1009   46.9 15.55  20.4  34.1  44.3  73.8
MID    32.3     1.4   1.1   18.0  438.1 78.0102.2 140.3  1.9139   78.2 15.55  52.6  87.6   NA    NA
RT    -38.7     1.4  16.0   20.7  427.3 62.3 95.9 151.8  1.5019   62.6 15.55  17.8  29.7  12.2  20.3
Member No. = 5 TOP SLAB           Thickness             = 18.11 (in)
                                  Clear cover at end    =  2.00 (in)
                                  Clear cover at middle =  2.00 (in)
                                  Bar diameter (lt  )   =  1.13 (in)
                                  Bar diameter (mid )   =  1.13 (in)
                                  Bar diameter (rt  )   =  1.13 (in)
            Coin.                   Resistance                              Flexure        Shear
     Moment Axial  Shear Shear   Po    Mu Mbal  Pbal   Steel   Mom.  Des.    Ratings       Ratings
            Force  Force  Cap    Cap  Cap  Cap   Cap   Area    Cap   Thk    Inv   Oper   Inv  Oper
       Kft   Kips  Kips  Kips   Kips  Kft  Kft  Kips    In2    Kft    in
LT    -34.3     2.4  13.2   21.0  434.8 73.3100.3 143.8  1.7884   73.7 15.55  12.0  20.1  24.8  41.4
MID    21.8     2.4   0.6   17.9  436.2 75.2101.1 142.4  1.8405   75.7 15.55  14.9  24.8   NA    NA
RT    -34.3     2.4  13.4   21.0  434.8 73.3100.3 143.8  1.7884   73.7 15.55  12.0  20.0   6.0  10.1
```

```
Member No. = 7 BOTTOM SLAB       Thickness            = 18.11 (in)
                                 Clear cover at end    =  2.00 (in)
                                 Clear cover at middle =  2.00 (in)
                                 Bar diameter (lt  )   =  1.13 (in)
                                 Bar diameter (mid )   =  1.13 (in)
                                 Bar diameter (rt  )   =  1.13 (in)

LT    -36.3     1.6  13.7   20.4  427.3 62.3 95.9 151.8  1.5019   62.7 15.55  20.5  34.1 261.6 436.1
MID    21.4     1.6   0.1   17.7  438.1 78.0102.2 140.3  1.9139   78.2 15.55  56.8  94.7   NA    NA
RT    -36.3     1.6  13.7   20.4  427.3 62.3 95.9 151.8  1.5019   62.7 15.55  20.5  34.1  16.8  28.0
```

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	-13.31	-10.57	-5.28	-0.53	2.99	0.12	-0.39
1- 1	-13.12	-0.67	-0.33	-0.07	-0.59	0.01	-0.35
1- 2	-12.92	6.68	3.34	0.29	-3.05	0.00	-0.33
1- 3	-12.73	11.61	5.80	0.55	-4.52	0.00	-0.38
1- 4	-12.53	14.26	7.13	0.71	-5.11	0.00	-0.49
1- 5	-12.33	14.77	7.39	0.76	-4.96	0.03	-0.61
1- 6	-12.14	13.27	6.64	0.71	-4.18	0.07	-0.74
1- 7	-11.94	9.90	4.95	0.55	-2.90	0.11	-0.88
1- 8	-11.74	4.79	2.40	0.30	-1.24	0.15	-1.01
1- 9	-11.55	-1.92	-0.96	-0.06	0.66	0.20	-1.15
1-10	-11.35	-10.09	-5.05	-0.53	2.68	0.26	-1.29
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-11.35	-10.09	-5.05	-0.53	2.68	0.26	-1.29
2- 1	2.41	-8.79	-4.39	-0.46	2.33	0.30	-0.34
2- 2	12.59	-7.48	-3.74	-0.39	1.98	0.88	0.00
2- 3	19.20	-6.18	-3.09	-0.33	1.63	1.48	-0.08
2- 4	22.23	-4.88	-2.44	-0.26	1.28	1.82	-0.18
2- 5	21.68	-3.57	-1.79	-0.19	0.93	1.90	-0.29
2- 6	17.56	-2.27	-1.14	-0.12	0.58	1.70	-0.39

2- 7	9.87	-0.97	-0.48	-0.05	0.23	1.24	-0.50
2- 8	-1.41	0.34	0.17	0.02	-0.12	0.58	-0.67
2- 9	-16.26	1.64	0.82	0.08	-0.47	0.17	-1.23
2-10	-34.68	2.94	1.47	0.15	-0.82	0.13	-2.45

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	3.36	-1.47	-0.73	-0.08	0.32	0.35	-0.25
3- 1	3.26	-1.48	-0.74	-0.08	0.34	0.22	-0.13
3- 2	3.16	-1.50	-0.75	-0.08	0.36	0.11	-0.01
3- 3	3.06	-1.52	-0.76	-0.08	0.38	0.14	-0.06
3- 4	2.96	-1.53	-0.77	-0.08	0.41	0.26	-0.19
3- 5	2.86	-1.55	-0.78	-0.08	0.43	0.39	-0.31
3- 6	2.77	-1.57	-0.78	-0.08	0.45	0.52	-0.44
3- 7	2.67	-1.58	-0.79	-0.08	0.47	0.65	-0.57
3- 8	2.57	-1.60	-0.80	-0.08	0.49	0.77	-0.70
3- 9	2.47	-1.62	-0.81	-0.08	0.51	0.90	-0.83
3-10	2.37	-1.63	-0.82	-0.08	0.53	1.03	-0.96

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-13.31	-10.57	-5.28	-0.53	2.99	0.12	-0.39
4- 1	2.34	-9.21	-4.60	-0.46	2.61	0.26	-0.04
4- 2	13.92	-7.85	-3.92	-0.40	2.23	0.45	0.00
4- 3	21.43	-6.49	-3.24	-0.33	1.85	0.59	0.00
4- 4	24.86	-5.13	-2.57	-0.26	1.47	0.66	0.00
4- 5	24.22	-3.77	-1.89	-0.19	1.09	0.63	0.00
4- 6	19.51	-2.41	-1.21	-0.12	0.71	0.50	0.00
4- 7	10.72	-1.05	-0.53	-0.05	0.33	0.29	-0.02
4- 8	-2.14	0.31	0.15	0.02	-0.06	0.08	-0.17
4- 9	-19.08	1.66	0.83	0.09	-0.44	0.00	-0.56
4-10	-40.09	3.02	1.51	0.16	-0.82	0.00	-1.12

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-32.31	1.31	0.65	0.07	-0.29	0.27	-2.37
5- 1	-16.22	1.32	0.66	0.07	-0.30	0.22	-1.23
5- 2	-3.70	1.34	0.67	0.07	-0.32	0.59	-0.72
5- 3	5.24	1.35	0.68	0.07	-0.33	1.18	-0.57
5- 4	10.61	1.37	0.68	0.07	-0.34	1.59	-0.46

5- 5	12.40	1.38	0.69	0.07	-0.36	1.73	-0.37
5- 6	10.61	1.40	0.70	0.07	-0.37	1.59	-0.47
5- 7	5.25	1.41	0.71	0.07	-0.38	1.19	-0.57
5- 8	-3.69	1.43	0.71	0.07	-0.40	0.59	-0.72
5- 9	-16.20	1.44	0.72	0.07	-0.41	0.22	-1.24
5-10	-32.29	1.45	0.73	0.07	-0.42	0.27	-2.38

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	-36.73	1.56	0.78	0.07	-0.50	0.00	-0.97
7- 1	-18.40	1.54	0.77	0.07	-0.48	0.00	-0.52
7- 2	-4.14	1.53	0.76	0.07	-0.47	0.08	-0.22
7- 3	6.04	1.51	0.76	0.07	-0.46	0.23	-0.07
7- 4	12.15	1.50	0.75	0.07	-0.44	0.35	0.00
7- 5	14.19	1.48	0.74	0.07	-0.43	0.40	0.00
7- 6	12.15	1.47	0.73	0.07	-0.42	0.35	0.00
7- 7	6.03	1.45	0.73	0.07	-0.40	0.23	-0.07
7- 8	-4.15	1.44	0.72	0.07	-0.39	0.08	-0.22
7- 9	-18.41	1.42	0.71	0.07	-0.38	0.00	-0.51
7-10	-36.75	1.41	0.70	0.07	-0.36	0.00	-0.97

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored   SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	Neg
EXTERIOR WALL BOTTOM							
1- 0	0.15	8.55	4.27	0.39	-3.19	0.05	-0.11
1- 1	0.15	6.55	3.28	0.32	-2.29	0.05	-0.11
1- 2	0.15	4.66	2.33	0.24	-1.48	0.05	-0.11
1- 3	0.15	2.87	1.44	0.16	-0.77	0.05	-0.11
1- 4	0.15	1.19	0.59	0.08	-0.15	0.05	-0.11
1- 5	0.15	-0.39	-0.20	0.00	0.37	0.05	-0.11

1- 6	0.15	-1.87	-0.94	-0.08	0.80	0.05	-0.11
1- 7	0.15	-3.25	-1.62	-0.16	1.13	0.05	-0.11
1- 8	0.15	-4.52	-2.26	-0.24	1.37	0.05	-0.11
1- 9	0.15	-5.69	-2.85	-0.31	1.51	0.05	-0.11
1-10	0.15	-6.76	-3.38	-0.39	1.56	0.05	-0.11

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	10.94	0.92	0.46	0.05	-0.25	0.98	-0.07
2- 1	8.43	0.92	0.46	0.05	-0.25	0.75	-0.08
2- 2	5.91	0.92	0.46	0.05	-0.25	0.59	-0.10
2- 3	3.39	0.92	0.46	0.05	-0.25	0.44	-0.15
2- 4	0.87	0.92	0.46	0.05	-0.25	0.32	-0.24
2- 5	-1.64	0.92	0.46	0.05	-0.25	0.20	-0.35
2- 6	-4.16	0.92	0.46	0.05	-0.25	0.12	-0.49
2- 7	-6.68	0.92	0.46	0.05	-0.25	0.06	-0.64
2- 8	-9.19	0.92	0.46	0.05	-0.25	0.02	-0.79
2- 9	-11.71	0.92	0.46	0.05	-0.25	0.01	-0.96
2-10	-14.23	0.92	0.46	0.05	-0.25	0.01	-1.04

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 1	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 2	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 3	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 4	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 5	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 6	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 7	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 8	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3- 9	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10
3-10	-0.08	-0.01	-0.01	0.00	0.02	0.10	-0.10

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	12.45	0.96	0.48	0.05	-0.27	0.32	0.00
4- 1	9.58	0.96	0.48	0.05	-0.27	0.25	0.00
4- 2	6.72	0.96	0.48	0.05	-0.27	0.17	0.00
4- 3	3.85	0.96	0.48	0.05	-0.27	0.10	0.00

4- 4	0.98	0.96	0.48	0.05	-0.27	0.03	-0.01
4- 5	-1.88	0.96	0.48	0.05	-0.27	0.00	-0.06
4- 6	-4.75	0.96	0.48	0.05	-0.27	0.00	-0.13
4- 7	-7.62	0.96	0.48	0.05	-0.27	0.00	-0.21
4- 8	-10.49	0.96	0.48	0.05	-0.27	0.00	-0.28
4- 9	-13.35	0.96	0.48	0.05	-0.27	0.00	-0.36
4-10	-16.22	0.96	0.48	0.05	-0.27	0.00	-0.43

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	12.59	0.01	0.01	0.00	-0.01	1.09	-0.08
5- 1	10.07	0.01	0.01	0.00	-0.01	0.84	-0.08
5- 2	7.55	0.01	0.01	0.00	-0.01	0.67	-0.10
5- 3	5.03	0.01	0.01	0.00	-0.01	0.52	-0.13
5- 4	2.52	0.01	0.01	0.00	-0.01	0.38	-0.22
5- 5	0.00	0.01	0.01	0.00	-0.01	0.27	-0.33
5- 6	-2.52	0.01	0.01	0.00	-0.01	0.18	-0.45
5- 7	-5.03	0.01	0.01	0.00	-0.01	0.12	-0.60
5- 8	-7.55	0.01	0.01	0.00	-0.01	0.09	-0.76
5- 9	-10.07	0.01	0.01	0.00	-0.01	0.08	-0.92
5-10	-12.58	0.01	0.01	0.00	-0.01	0.08	-1.01

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	14.33	-0.01	-0.01	0.00	0.01	0.38	0.00
7- 1	11.47	-0.01	-0.01	0.00	0.01	0.30	0.00
7- 2	8.60	-0.01	-0.01	0.00	0.01	0.23	0.00
7- 3	5.73	-0.01	-0.01	0.00	0.01	0.15	0.00
7- 4	2.87	-0.01	-0.01	0.00	0.01	0.08	0.00
7- 5	0.00	-0.01	-0.01	0.00	0.01	0.02	-0.02
7- 6	-2.87	-0.01	-0.01	0.00	0.01	0.00	-0.08
7- 7	-5.74	-0.01	-0.01	0.00	0.01	0.00	-0.15
7- 8	-8.60	-0.01	-0.01	0.00	0.01	0.00	-0.23
7- 9	-11.47	-0.01	-0.01	0.00	0.01	0.00	-0.30
7-10	-14.34	-0.01	-0.01	0.00	0.01	0.00	-0.38

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)

due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	Kft	Kft	Kft	Kft	Kft	Kft	Kft
EXTERIOR WALL BOTTOM							
1- 0	-13.31	-10.57	-5.28	-0.53	2.99	0.18	-0.58
1- 1	-13.12	-0.67	-0.33	-0.07	-0.59	0.01	-0.51
1- 2	-12.92	6.68	3.34	0.29	-3.05	0.00	-0.49
1- 3	-12.73	11.61	5.80	0.55	-4.52	0.00	-0.57
1- 4	-12.53	14.26	7.13	0.71	-5.11	0.00	-0.73
1- 5	-12.33	14.77	7.39	0.76	-4.96	0.04	-0.91
1- 6	-12.14	13.27	6.64	0.71	-4.18	0.10	-1.11
1- 7	-11.94	9.90	4.95	0.55	-2.90	0.16	-1.31
1- 8	-11.74	4.79	2.40	0.30	-1.24	0.23	-1.51
1- 9	-11.55	-1.92	-0.96	-0.06	0.66	0.30	-1.71
1-10	-11.35	-10.09	-5.05	-0.53	2.68	0.38	-1.92
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-11.35	-10.09	-5.05	-0.53	2.68	0.38	-1.92
2- 1	2.41	-8.79	-4.39	-0.46	2.33	0.44	-0.50
2- 2	12.59	-7.48	-3.74	-0.39	1.98	1.31	0.00
2- 3	19.20	-6.18	-3.09	-0.33	1.63	2.19	-0.11
2- 4	22.23	-4.88	-2.44	-0.26	1.28	2.70	-0.27
2- 5	21.68	-3.57	-1.79	-0.19	0.93	2.80	-0.43
2- 6	17.56	-2.27	-1.14	-0.12	0.58	2.50	-0.59
2- 7	9.87	-0.97	-0.48	-0.05	0.23	1.81	-0.75
2- 8	-1.41	0.34	0.17	0.02	-0.12	0.83	-1.00
2- 9	-16.26	1.64	0.82	0.08	-0.47	0.25	-1.82
2-10	-34.68	2.94	1.47	0.15	-0.82	0.19	-3.64
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	3.36	-1.47	-0.73	-0.08	0.32	0.52	-0.37
3- 1	3.26	-1.48	-0.74	-0.08	0.34	0.33	-0.19
3- 2	3.16	-1.50	-0.75	-0.08	0.36	0.16	-0.01

3- 3	3.06	-1.52	-0.76	-0.08	0.38	0.21	-0.09
3- 4	2.96	-1.53	-0.77	-0.08	0.41	0.40	-0.28
3- 5	2.86	-1.55	-0.78	-0.08	0.43	0.58	-0.47
3- 6	2.77	-1.57	-0.78	-0.08	0.45	0.77	-0.66
3- 7	2.67	-1.58	-0.79	-0.08	0.47	0.96	-0.85
3- 8	2.57	-1.60	-0.80	-0.08	0.49	1.15	-1.04
3- 9	2.47	-1.62	-0.81	-0.08	0.51	1.35	-1.24
3-10	2.37	-1.63	-0.82	-0.08	0.53	1.54	-1.43

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-13.31	-10.57	-5.28	-0.53	2.99	0.18	-0.58
4- 1	2.34	-9.21	-4.60	-0.46	2.61	0.39	-0.06
4- 2	13.92	-7.85	-3.92	-0.40	2.23	0.68	0.00
4- 3	21.43	-6.49	-3.24	-0.33	1.85	0.89	0.00
4- 4	24.86	-5.13	-2.57	-0.26	1.47	0.98	0.00
4- 5	24.22	-3.77	-1.89	-0.19	1.09	0.93	0.00
4- 6	19.51	-2.41	-1.21	-0.12	0.71	0.75	0.00
4- 7	10.72	-1.05	-0.53	-0.05	0.33	0.43	-0.02
4- 8	-2.14	0.31	0.15	0.02	-0.06	0.12	-0.25
4- 9	-19.08	1.66	0.83	0.09	-0.44	0.00	-0.84
4-10	-40.09	3.02	1.51	0.16	-0.82	0.00	-1.67

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-32.31	1.31	0.65	0.07	-0.29	0.41	-3.52
5- 1	-16.22	1.32	0.66	0.07	-0.30	0.33	-1.82
5- 2	-3.70	1.34	0.67	0.07	-0.32	0.86	-1.08
5- 3	5.24	1.35	0.68	0.07	-0.33	1.74	-0.85
5- 4	10.61	1.37	0.68	0.07	-0.34	2.34	-0.69
5- 5	12.40	1.38	0.69	0.07	-0.36	2.54	-0.55
5- 6	10.61	1.40	0.70	0.07	-0.37	2.35	-0.70
5- 7	5.25	1.41	0.71	0.07	-0.38	1.74	-0.85
5- 8	-3.69	1.43	0.71	0.07	-0.40	0.85	-1.08
5- 9	-16.20	1.44	0.72	0.07	-0.41	0.33	-1.83
5-10	-32.29	1.45	0.73	0.07	-0.42	0.40	-3.52

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	-36.73	1.56	0.78	0.07	-0.50	0.00	-1.44

7- 1	-18.40	1.54	0.77	0.07	-0.48	0.00	-0.77
7- 2	-4.14	1.53	0.76	0.07	-0.47	0.12	-0.33
7- 3	6.04	1.51	0.76	0.07	-0.46	0.34	-0.10
7- 4	12.15	1.50	0.75	0.07	-0.44	0.52	0.00
7- 5	14.19	1.48	0.74	0.07	-0.43	0.60	0.00
7- 6	12.15	1.47	0.73	0.07	-0.42	0.52	0.00
7- 7	6.03	1.45	0.73	0.07	-0.40	0.35	-0.10
7- 8	-4.15	1.44	0.72	0.07	-0.39	0.12	-0.32
7- 9	-18.41	1.42	0.71	0.07	-0.38	0.00	-0.77
7-10	-36.75	1.41	0.70	0.07	-0.36	0.00	-1.44

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Press K	Water Hgt. K	LIVE LOADS Press (Max) Pos K	LIVE LOADS Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.15	8.55	4.27	0.39	-3.19	0.07	-0.16
1- 1	0.15	6.55	3.28	0.32	-2.29	0.07	-0.16
1- 2	0.15	4.66	2.33	0.24	-1.48	0.07	-0.16
1- 3	0.15	2.87	1.44	0.16	-0.77	0.07	-0.16
1- 4	0.15	1.19	0.59	0.08	-0.15	0.07	-0.16
1- 5	0.15	-0.39	-0.20	0.00	0.37	0.07	-0.16
1- 6	0.15	-1.87	-0.94	-0.08	0.80	0.07	-0.16
1- 7	0.15	-3.25	-1.62	-0.16	1.13	0.07	-0.16
1- 8	0.15	-4.52	-2.26	-0.24	1.37	0.07	-0.16
1- 9	0.15	-5.69	-2.85	-0.31	1.51	0.07	-0.16
1-10	0.15	-6.76	-3.38	-0.39	1.56	0.07	-0.16
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	10.94	0.92	0.46	0.05	-0.25	1.47	-0.11
2- 1	8.43	0.92	0.46	0.05	-0.25	1.10	-0.12

2- 2	5.91	0.92	0.46	0.05	-0.25	0.86	-0.15
2- 3	3.39	0.92	0.46	0.05	-0.25	0.64	-0.22
2- 4	0.87	0.92	0.46	0.05	-0.25	0.45	-0.34
2- 5	-1.64	0.92	0.46	0.05	-0.25	0.30	-0.51
2- 6	-4.16	0.92	0.46	0.05	-0.25	0.18	-0.72
2- 7	-6.68	0.92	0.46	0.05	-0.25	0.09	-0.94
2- 8	-9.19	0.92	0.46	0.05	-0.25	0.04	-1.18
2- 9	-11.71	0.92	0.46	0.05	-0.25	0.01	-1.43
2-10	-14.23	0.92	0.46	0.05	-0.25	0.01	-1.55

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 1	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 2	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 3	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 4	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 5	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 6	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 7	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 8	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3- 9	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15
3-10	-0.08	-0.01	-0.01	0.00	0.02	0.14	-0.15

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	12.45	0.96	0.48	0.05	-0.27	0.48	0.00
4- 1	9.58	0.96	0.48	0.05	-0.27	0.37	0.00
4- 2	6.72	0.96	0.48	0.05	-0.27	0.26	0.00
4- 3	3.85	0.96	0.48	0.05	-0.27	0.15	0.00
4- 4	0.98	0.96	0.48	0.05	-0.27	0.04	-0.01
4- 5	-1.88	0.96	0.48	0.05	-0.27	0.00	-0.09
4- 6	-4.75	0.96	0.48	0.05	-0.27	0.00	-0.20
4- 7	-7.62	0.96	0.48	0.05	-0.27	0.00	-0.31
4- 8	-10.49	0.96	0.48	0.05	-0.27	0.00	-0.42
4- 9	-13.35	0.96	0.48	0.05	-0.27	0.00	-0.53
4-10	-16.22	0.96	0.48	0.05	-0.27	0.00	-0.65

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	12.59	0.01	0.01	0.00	-0.01	1.61	-0.12
5- 1	10.07	0.01	0.01	0.00	-0.01	1.24	-0.13
5- 2	7.55	0.01	0.01	0.00	-0.01	1.00	-0.15
5- 3	5.03	0.01	0.01	0.00	-0.01	0.76	-0.21
5- 4	2.52	0.01	0.01	0.00	-0.01	0.55	-0.31
5- 5	0.00	0.01	0.01	0.00	-0.01	0.39	-0.46
5- 6	-2.52	0.01	0.01	0.00	-0.01	0.26	-0.66
5- 7	-5.03	0.01	0.01	0.00	-0.01	0.17	-0.89
5- 8	-7.55	0.01	0.01	0.00	-0.01	0.14	-1.13
5- 9	-10.07	0.01	0.01	0.00	-0.01	0.12	-1.38
5-10	-12.58	0.01	0.01	0.00	-0.01	0.12	-1.50

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	14.33	-0.01	-0.01	0.00	0.01	0.56	0.00
7- 1	11.47	-0.01	-0.01	0.00	0.01	0.45	0.00
7- 2	8.60	-0.01	-0.01	0.00	0.01	0.34	0.00
7- 3	5.73	-0.01	-0.01	0.00	0.01	0.22	0.00
7- 4	2.87	-0.01	-0.01	0.00	0.01	0.12	0.00
7- 5	0.00	-0.01	-0.01	0.00	0.01	0.03	-0.03
7- 6	-2.87	-0.01	-0.01	0.00	0.01	0.00	-0.12
7- 7	-5.74	-0.01	-0.01	0.00	0.01	0.00	-0.22
7- 8	-8.60	-0.01	-0.01	0.00	0.01	0.00	-0.34
7- 9	-11.47	-0.01	-0.01	0.00	0.01	0.00	-0.45
7-10	-14.34	-0.01	-0.01	0.00	0.01	0.00	-0.56

BOTTOM SLAB RIGHT SIDE

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL

```
Thickness              =  9.84 (in)
Clear cover at end     =  2.00 (in)
Clear cover at middle  =  2.00 (in)
Bar diameter (bot )    =  0.75 (in)
Bar diameter (mid+)    =  0.75 (in)
Bar diameter (mid-)    =  0.75 (in)
Bar diameter (top )    =  0.75 (in)
```

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-4.6	0.5	3.3	8.3	222.1	9.3	23.9	81.1	0.4303	9.4	7.47	7.0	11.7	4.6	7.6
MID	4.3	0.5	0.4	8.3	221.0	8.5	23.6	82.2	0.3908	8.5	7.47	3.7	6.1	NA	NA
MID-	-6.0	0.5	1.2	8.3	222.1	9.3	23.9	81.1	0.4303	9.4	7.47	3.1	5.2	NA	NA
TOP	-10.7*	0.5	3.1	8.3	222.1	9.3	23.9	81.1	0.4303	9.4	7.47	1.0	1.7	2.5	4.2

Member No. = 2 TOP SLAB

```
Thickness              =  9.84 (in)
Clear cover at end     =  2.00 (in)
Clear cover at middle  =  2.00 (in)
Bar diameter (lt  )    =  0.75 (in)
Bar diameter (mid )    =  0.88 (in)
Bar diameter (rt  )    =  0.88 (in)
```

LT	-9.1	0.8	9.8*	8.3	222.1	9.3	23.9	81.1	0.4303	9.4	7.47	1.4	2.3	1.2	2.0
MID	18.9*	0.8	4.1	8.3	228.7	14.2	25.2	73.2	0.6825	14.4	7.40	0.7	1.2	NA	NA
RT	-13.1	0.8	10.4*	8.3	229.4	14.8	25.4	72.4	0.7101	14.9	7.40	1.2	2.0	0.5	0.9

Member No. = 3 INTERIOR WALL

```
Thickness              =  9.84 (in)
Clear cover at end     =  2.00 (in)
Clear cover at middle  =  2.00 (in)
Bar diameter (bot )    =  0.62 (in)
Bar diameter (mid+)    =  0.62 (in)
Bar diameter (mid-)    =  0.62 (in)
Bar diameter (top )    =  0.62 (in)
```

BOT	-1.5	2.3	0.7	8.4	219.5	7.3	23.4	84.6	0.3327	7.7	7.53	4.8	8.1	6.9	11.6
MID	2.5	2.3	0.7	8.4	219.5	7.3	23.4	84.6	0.3327	7.7	7.53	3.8	6.3	NA	NA
MID-	-2.2	2.3	0.7	8.4	219.5	7.3	23.4	84.6	0.3327	7.7	7.53	3.7	6.1	NA	NA
TOP	-5.7	2.3	0.7	8.4	219.5	7.3	23.4	84.6	0.3327	7.7	7.53	1.4	2.3	6.9	11.6

Member No. = 4 BOTTOM SLAB

```
Thickness              =  9.84 (in)
Clear cover at end     =  2.00 (in)
Clear cover at middle  =  2.00 (in)
Bar diameter (lt  )    =  0.75 (in)
Bar diameter (mid )    =  0.88 (in)
Bar diameter (rt  )    =  0.88 (in)
```

LT	-5.0	2.0	2.5	8.3	222.1	9.3	23.9	81.1	0.4303	9.6	7.47	6.9	11.6	21.4	35.7
MID	5.2	2.0	0.2	8.3	227.0	13.0	24.9	75.0	0.6186	13.3	7.40	9.3	15.4	NA	NA
RT	-6.0	2.0	3.2	8.3	226.7	12.8	24.8	75.3	0.6081	13.1	7.40	5.5	9.2	5.3	8.8

Member No. = 5 TOP SLAB

```
Thickness              =  9.84 (in)
Clear cover at end     =  2.00 (in)
Clear cover at middle  =  2.00 (in)
Bar diameter (lt  )    =  0.88 (in)
Bar diameter (mid )    =  0.88 (in)
Bar diameter (rt  )    =  0.88 (in)
```

	Moment	Coin. Axial Force	Shear Force	Shear Cap	Resistance Po Cap	Mu Cap	Mbal Cap	Pbal Cap	Steel Area	Mom. Cap	Des. Thk	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
	Kft	Kips	Kips	Kips	Kips	Kft	Kft	Kips	In2	Kft	in				
LT	-12.6	0.4	9.8*	8.3	229.4	14.8	25.4	72.4	0.7101	14.8	7.40	1.2	2.1	1.0	1.6
MID	17.3*	0.4	4.6	8.3	228.7	14.2	25.2	73.2	0.6825	14.3	7.40	0.8	1.4	NA	NA
RT	-12.7	0.4	10.1*	8.3	229.4	14.8	25.4	72.4	0.7101	14.8	7.40	1.2	2.1	0.5	0.9

Member No. = 7 BOTTOM SLAB

Thickness = 9.84 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 0.88 (in)
Bar diameter (rt) = 0.88 (in)

LT	-5.8	0.8	2.6	8.3	226.7	12.8	24.8	75.3	0.6081	12.9	7.40	5.1	8.5	21.4	35.7
MID	3.4	0.8	0.2	8.3	227.0	13.0	24.9	75.0	0.6186	13.1	7.40	10.8	18.0	NA	NA
RT	-5.7	0.8	2.6	8.3	226.7	12.8	24.8	75.3	0.6081	12.9	7.40	5.1	8.5	7.3	12.2

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	Kft	Kft	Kft	Kft	Kft	Kft	Kft
EXTERIOR WALL BOTTOM							
1- 0	-1.43	-2.41	-1.21	-0.36	1.86	0.83	-0.28
1- 1	-1.34	-0.04	-0.02	-0.05	-0.16	0.37	-0.20
1- 2	-1.26	1.62	0.81	0.19	-1.55	0.02	-0.22
1- 3	-1.17	2.64	1.32	0.36	-2.39	0.09	-0.56
1- 4	-1.08	3.10	1.55	0.46	-2.73	0.17	-1.02
1- 5	-1.00	3.05	1.53	0.49	-2.66	0.25	-1.47
1- 6	-0.91	2.59	1.29	0.46	-2.24	0.32	-1.93
1- 7	-0.82	1.77	0.89	0.36	-1.54	0.40	-2.38
1- 8	-0.74	0.68	0.34	0.19	-0.63	0.48	-2.84
1- 9	-0.65	-0.62	-0.31	-0.05	0.42	0.55	-3.30
1-10	-0.56	-2.05	-1.02	-0.36	1.54	0.63	-3.76
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-0.56	-2.05	-1.02	-0.36	1.54	0.63	-3.76
2- 1	0.33	-1.79	-0.89	-0.31	1.34	2.82	-1.21

2- 2	0.98	-1.52	-0.76	-0.27	1.15	4.77	-0.02
2- 3	1.40	-1.26	-0.63	-0.22	0.95	6.51	-0.30
2- 4	1.58	-1.00	-0.50	-0.17	0.75	7.52	-0.61
2- 5	1.52	-0.73	-0.37	-0.13	0.55	7.70	-0.92
2- 6	1.22	-0.47	-0.23	-0.08	0.35	7.07	-1.23
2- 7	0.68	-0.21	-0.10	-0.04	0.15	5.73	-1.54
2- 8	-0.09	0.06	0.03	0.01	-0.05	4.04	-2.14
2- 9	-1.10	0.32	0.16	0.06	-0.24	2.16	-3.63
2-10	-2.35	0.59	0.29	0.10	-0.44	0.48	-6.02

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.33	-0.33	-0.17	-0.05	0.25	0.86	-0.82
3- 1	0.32	-0.33	-0.16	-0.05	0.25	0.53	-0.46
3- 2	0.30	-0.33	-0.16	-0.05	0.25	0.22	-0.11
3- 3	0.28	-0.32	-0.16	-0.05	0.25	0.26	-0.20
3- 4	0.26	-0.32	-0.16	-0.05	0.25	0.62	-0.55
3- 5	0.24	-0.32	-0.16	-0.05	0.24	0.97	-0.90
3- 6	0.22	-0.32	-0.16	-0.05	0.24	1.33	-1.25
3- 7	0.21	-0.32	-0.16	-0.05	0.24	1.69	-1.60
3- 8	0.19	-0.31	-0.16	-0.05	0.24	2.05	-1.95
3- 9	0.17	-0.31	-0.16	-0.05	0.24	2.40	-2.30
3-10	0.15	-0.31	-0.15	-0.05	0.24	2.76	-2.65

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.43	-2.41	-1.21	-0.36	1.86	0.83	-0.28
4- 1	0.16	-2.10	-1.05	-0.31	1.62	0.83	-0.09
4- 2	1.34	-1.79	-0.90	-0.27	1.38	0.82	-0.06
4- 3	2.11	-1.48	-0.74	-0.22	1.14	0.80	-0.05
4- 4	2.47	-1.17	-0.59	-0.17	0.90	0.73	-0.07
4- 5	2.42	-0.86	-0.43	-0.13	0.66	0.65	-0.12
4- 6	1.95	-0.55	-0.28	-0.08	0.43	0.56	-0.18
4- 7	1.07	-0.24	-0.12	-0.04	0.19	0.44	-0.27
4- 8	-0.22	0.07	0.03	0.01	-0.05	0.30	-0.39
4- 9	-1.92	0.38	0.19	0.06	-0.29	0.18	-0.66
4-10	-4.03	0.69	0.34	0.10	-0.53	0.05	-1.03

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-2.20	0.28	0.14	0.05	-0.20	0.89	-5.78
5- 1	-1.13	0.28	0.14	0.05	-0.21	2.44	-3.57
5- 2	-0.29	0.28	0.14	0.05	-0.21	4.10	-2.24
5- 3	0.30	0.29	0.14	0.05	-0.21	5.72	-1.64
5- 4	0.66	0.29	0.15	0.05	-0.22	6.90	-1.30
5- 5	0.78	0.29	0.15	0.05	-0.22	7.30	-1.21
5- 6	0.66	0.30	0.15	0.05	-0.22	6.88	-1.30
5- 7	0.30	0.30	0.15	0.05	-0.23	5.70	-1.64
5- 8	-0.29	0.30	0.15	0.05	-0.23	4.10	-2.25
5- 9	-1.12	0.31	0.15	0.05	-0.23	2.43	-3.58
5-10	-2.19	0.31	0.16	0.05	-0.24	0.90	-5.80

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	-3.70	0.36	0.18	0.05	-0.28	0.18	-1.04
7- 1	-1.84	0.35	0.18	0.05	-0.27	0.26	-0.73
7- 2	-0.40	0.35	0.18	0.05	-0.27	0.32	-0.49
7- 3	0.62	0.35	0.17	0.05	-0.27	0.38	-0.35
7- 4	1.24	0.34	0.17	0.05	-0.27	0.43	-0.24
7- 5	1.45	0.34	0.17	0.05	-0.26	0.43	-0.15
7- 6	1.24	0.34	0.17	0.05	-0.26	0.42	-0.24
7- 7	0.62	0.33	0.17	0.05	-0.26	0.37	-0.35
7- 8	-0.41	0.33	0.16	0.05	-0.25	0.32	-0.48
7- 9	-1.85	0.33	0.16	0.05	-0.25	0.26	-0.72
7-10	-3.70	0.32	0.16	0.05	-0.25	0.19	-1.03

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	LIVE LOADS Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.08	2.59	1.29	0.32	-2.21	0.08	-0.43

1- 1	0.08	1.88	0.94	0.26	-1.59	0.08	-0.43
1- 2	0.08	1.25	0.62	0.19	-1.03	0.08	-0.43
1- 3	0.08	0.68	0.34	0.13	-0.54	0.08	-0.43
1- 4	0.08	0.18	0.09	0.06	-0.12	0.08	-0.43
1- 5	0.08	-0.25	-0.12	0.00	0.24	0.08	-0.43
1- 6	0.08	-0.61	-0.31	-0.06	0.54	0.08	-0.43
1- 7	0.08	-0.91	-0.45	-0.13	0.77	0.08	-0.43
1- 8	0.08	-1.13	-0.57	-0.19	0.93	0.08	-0.43
1- 9	0.08	-1.29	-0.65	-0.26	1.03	0.08	-0.43
1-10	0.08	-1.38	-0.69	-0.32	1.06	0.08	-0.43

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	0.94	0.24	0.12	0.04	-0.18	4.46	-0.29
2- 1	0.72	0.24	0.12	0.04	-0.18	3.89	-0.57
2- 2	0.50	0.24	0.12	0.04	-0.18	3.41	-0.98
2- 3	0.28	0.24	0.12	0.04	-0.18	2.88	-1.43
2- 4	0.05	0.24	0.12	0.04	-0.18	2.34	-1.91
2- 5	-0.17	0.24	0.12	0.04	-0.18	1.79	-2.39
2- 6	-0.39	0.24	0.12	0.04	-0.18	1.28	-2.88
2- 7	-0.61	0.24	0.12	0.04	-0.18	0.82	-3.34
2- 8	-0.83	0.24	0.12	0.04	-0.18	0.44	-3.77
2- 9	-1.05	0.24	0.12	0.04	-0.18	0.16	-4.15
2-10	-1.27	0.24	0.12	0.04	-0.18	0.06	-4.30

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 1	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 2	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 3	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 4	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 5	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 6	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 7	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 8	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3- 9	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33
3-10	-0.02	0.00	0.00	0.00	0.00	0.34	-0.33

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	1.67	0.29	0.14	0.04	-0.22	0.22	0.00
4- 1	1.29	0.29	0.14	0.04	-0.22	0.17	-0.01
4- 2	0.91	0.29	0.14	0.04	-0.22	0.13	-0.04
4- 3	0.52	0.29	0.14	0.04	-0.22	0.08	-0.06
4- 4	0.14	0.29	0.14	0.04	-0.22	0.04	-0.10
4- 5	-0.24	0.29	0.14	0.04	-0.22	0.01	-0.15
4- 6	-0.62	0.29	0.14	0.04	-0.22	0.00	-0.20
4- 7	-1.01	0.29	0.14	0.04	-0.22	0.00	-0.25
4- 8	-1.39	0.29	0.14	0.04	-0.22	0.00	-0.30
4- 9	-1.77	0.29	0.14	0.04	-0.22	0.00	-0.35
4-10	-2.15	0.29	0.14	0.04	-0.22	0.00	-0.40

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	1.10	0.00	0.00	0.00	0.00	4.45	-0.34
5- 1	0.88	0.00	0.00	0.00	0.00	4.00	-0.56
5- 2	0.66	0.00	0.00	0.00	0.00	3.56	-0.91
5- 3	0.44	0.00	0.00	0.00	0.00	3.09	-1.32
5- 4	0.22	0.00	0.00	0.00	0.00	2.61	-1.78
5- 5	0.00	0.00	0.00	0.00	0.00	2.11	-2.27
5- 6	-0.22	0.00	0.00	0.00	0.00	1.63	-2.76
5- 7	-0.44	0.00	0.00	0.00	0.00	1.19	-3.23
5- 8	-0.66	0.00	0.00	0.00	0.00	0.79	-3.70
5- 9	-0.88	0.00	0.00	0.00	0.00	0.46	-4.11
5-10	-1.10	0.00	0.00	0.00	0.00	0.33	-4.27

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	1.91	0.00	0.00	0.00	0.00	0.33	0.00
7- 1	1.53	0.00	0.00	0.00	0.00	0.28	0.00
7- 2	1.15	0.00	0.00	0.00	0.00	0.23	0.00
7- 3	0.76	0.00	0.00	0.00	0.00	0.19	-0.03
7- 4	0.38	0.00	0.00	0.00	0.00	0.14	-0.05
7- 5	0.00	0.00	0.00	0.00	0.00	0.10	-0.10
7- 6	-0.38	0.00	0.00	0.00	0.00	0.06	-0.14
7- 7	-0.76	0.00	0.00	0.00	0.00	0.03	-0.19
7- 8	-1.15	0.00	0.00	0.00	0.00	0.00	-0.24
7- 9	-1.53	0.00	0.00	0.00	0.00	0.00	-0.29
7-10	-1.91	0.00	0.00	0.00	0.00	0.00	-0.34

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	-1.43	-2.41	-1.21	-0.36	1.86	1.25	-0.42
1- 1	-1.34	-0.04	-0.02	-0.05	-0.16	0.56	-0.30
1- 2	-1.26	1.62	0.81	0.19	-1.55	0.03	-0.32
1- 3	-1.17	2.64	1.32	0.36	-2.39	0.14	-0.85
1- 4	-1.08	3.10	1.55	0.46	-2.73	0.25	-1.53
1- 5	-1.00	3.05	1.53	0.49	-2.66	0.37	-2.21
1- 6	-0.91	2.59	1.29	0.46	-2.24	0.48	-2.89
1- 7	-0.82	1.77	0.89	0.36	-1.54	0.60	-3.58
1- 8	-0.74	0.68	0.34	0.19	-0.63	0.71	-4.26
1- 9	-0.65	-0.62	-0.31	-0.05	0.42	0.83	-4.95
1-10	-0.56	-2.05	-1.02	-0.36	1.54	0.94	-5.63
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-0.56	-2.05	-1.02	-0.36	1.54	0.94	-5.63
2- 1	0.33	-1.79	-0.89	-0.31	1.34	4.24	-1.81
2- 2	0.98	-1.52	-0.76	-0.27	1.15	7.16	-0.03
2- 3	1.40	-1.26	-0.63	-0.22	0.95	9.76	-0.45
2- 4	1.58	-1.00	-0.50	-0.17	0.75	11.28	-0.91
2- 5	1.52	-0.73	-0.37	-0.13	0.55	11.54	-1.38
2- 6	1.22	-0.47	-0.23	-0.08	0.35	10.60	-1.84
2- 7	0.68	-0.21	-0.10	-0.04	0.15	8.60	-2.30
2- 8	-0.09	0.06	0.03	0.01	-0.05	6.07	-3.21
2- 9	-1.10	0.32	0.16	0.06	-0.24	3.23	-5.44
2-10	-2.35	0.59	0.29	0.10	-0.44	0.72	-9.03
TOP SLAB RIGHT SIDE							

INTERIOR WALL BOTTOM

3- 0	0.33	-0.33	-0.17	-0.05	0.25	1.29	-1.23
3- 1	0.32	-0.33	-0.16	-0.05	0.25	0.80	-0.70
3- 2	0.30	-0.33	-0.16	-0.05	0.25	0.33	-0.17
3- 3	0.28	-0.32	-0.16	-0.05	0.25	0.40	-0.30
3- 4	0.26	-0.32	-0.16	-0.05	0.25	0.93	-0.82
3- 5	0.24	-0.32	-0.16	-0.05	0.24	1.46	-1.34
3- 6	0.22	-0.32	-0.16	-0.05	0.24	2.00	-1.87
3- 7	0.21	-0.32	-0.16	-0.05	0.24	2.53	-2.39
3- 8	0.19	-0.31	-0.16	-0.05	0.24	3.07	-2.92
3- 9	0.17	-0.31	-0.16	-0.05	0.24	3.61	-3.45
3-10	0.15	-0.31	-0.15	-0.05	0.24	4.14	-3.97

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.43	-2.41	-1.21	-0.36	1.86	1.25	-0.42
4- 1	0.16	-2.10	-1.05	-0.31	1.62	1.25	-0.14
4- 2	1.34	-1.79	-0.90	-0.27	1.38	1.24	-0.09
4- 3	2.11	-1.48	-0.74	-0.22	1.14	1.20	-0.08
4- 4	2.47	-1.17	-0.59	-0.17	0.90	1.09	-0.11
4- 5	2.42	-0.86	-0.43	-0.13	0.66	0.97	-0.17
4- 6	1.95	-0.55	-0.28	-0.08	0.43	0.83	-0.27
4- 7	1.07	-0.24	-0.12	-0.04	0.19	0.67	-0.41
4- 8	-0.22	0.07	0.03	0.01	-0.05	0.45	-0.58
4- 9	-1.92	0.38	0.19	0.06	-0.29	0.27	-0.98
4-10	-4.03	0.69	0.34	0.10	-0.53	0.07	-1.55

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-2.20	0.28	0.14	0.05	-0.20	1.33	-8.67
5- 1	-1.13	0.28	0.14	0.05	-0.21	3.66	-5.36
5- 2	-0.29	0.28	0.14	0.05	-0.21	6.16	-3.36
5- 3	0.30	0.29	0.14	0.05	-0.21	8.58	-2.45
5- 4	0.66	0.29	0.15	0.05	-0.22	10.35	-1.95
5- 5	0.78	0.29	0.15	0.05	-0.22	10.94	-1.81
5- 6	0.66	0.30	0.15	0.05	-0.22	10.32	-1.94
5- 7	0.30	0.30	0.15	0.05	-0.23	8.55	-2.46
5- 8	-0.29	0.30	0.15	0.05	-0.23	6.15	-3.37
5- 9	-1.12	0.31	0.15	0.05	-0.23	3.65	-5.37

5-10	-2.19	0.31	0.16	0.05	-0.24	1.35	-8.70

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	-3.70	0.36	0.18	0.05	-0.28	0.28	-1.55
7- 1	-1.84	0.35	0.18	0.05	-0.27	0.39	-1.09
7- 2	-0.40	0.35	0.18	0.05	-0.27	0.48	-0.73
7- 3	0.62	0.35	0.17	0.05	-0.27	0.58	-0.53
7- 4	1.24	0.34	0.17	0.05	-0.27	0.64	-0.36
7- 5	1.45	0.34	0.17	0.05	-0.26	0.64	-0.23
7- 6	1.24	0.34	0.17	0.05	-0.26	0.63	-0.36
7- 7	0.62	0.33	0.17	0.05	-0.26	0.55	-0.52
7- 8	-0.41	0.33	0.16	0.05	-0.25	0.49	-0.72
7- 9	-1.85	0.33	0.16	0.05	-0.25	0.40	-1.08
7-10	-3.70	0.32	0.16	0.05	-0.25	0.28	-1.55

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored   SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	Neg

EXTERIOR WALL BOTTOM

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	Neg
1- 0	0.08	2.59	1.29	0.32	-2.21	0.12	-0.65
1- 1	0.08	1.88	0.94	0.26	-1.59	0.12	-0.65
1- 2	0.08	1.25	0.62	0.19	-1.03	0.12	-0.65
1- 3	0.08	0.68	0.34	0.13	-0.54	0.12	-0.65
1- 4	0.08	0.18	0.09	0.06	-0.12	0.12	-0.65
1- 5	0.08	-0.25	-0.12	0.00	0.24	0.12	-0.65
1- 6	0.08	-0.61	-0.31	-0.06	0.54	0.12	-0.65
1- 7	0.08	-0.91	-0.45	-0.13	0.77	0.12	-0.65
1- 8	0.08	-1.13	-0.57	-0.19	0.93	0.12	-0.65
1- 9	0.08	-1.29	-0.65	-0.26	1.03	0.12	-0.65
1-10	0.08	-1.38	-0.69	-0.32	1.06	0.12	-0.65

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	0.94	0.24	0.12	0.04	-0.18	6.69	-0.43
2- 1	0.72	0.24	0.12	0.04	-0.18	5.83	-0.86
2- 2	0.50	0.24	0.12	0.04	-0.18	5.11	-1.47
2- 3	0.28	0.24	0.12	0.04	-0.18	4.32	-2.15
2- 4	0.05	0.24	0.12	0.04	-0.18	3.51	-2.86
2- 5	-0.17	0.24	0.12	0.04	-0.18	2.69	-3.59
2- 6	-0.39	0.24	0.12	0.04	-0.18	1.91	-4.32
2- 7	-0.61	0.24	0.12	0.04	-0.18	1.22	-5.01
2- 8	-0.83	0.24	0.12	0.04	-0.18	0.66	-5.66
2- 9	-1.05	0.24	0.12	0.04	-0.18	0.24	-6.22
2-10	-1.27	0.24	0.12	0.04	-0.18	0.09	-6.45

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 1	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 2	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 3	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 4	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 5	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 6	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 7	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 8	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3- 9	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49
3-10	-0.02	0.00	0.00	0.00	0.00	0.50	-0.49

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	1.67	0.29	0.14	0.04	-0.22	0.32	0.00
4- 1	1.29	0.29	0.14	0.04	-0.22	0.26	-0.02
4- 2	0.91	0.29	0.14	0.04	-0.22	0.19	-0.05
4- 3	0.52	0.29	0.14	0.04	-0.22	0.13	-0.09
4- 4	0.14	0.29	0.14	0.04	-0.22	0.06	-0.16
4- 5	-0.24	0.29	0.14	0.04	-0.22	0.01	-0.22
4- 6	-0.62	0.29	0.14	0.04	-0.22	0.00	-0.30
4- 7	-1.01	0.29	0.14	0.04	-0.22	0.00	-0.37
4- 8	-1.39	0.29	0.14	0.04	-0.22	0.00	-0.45

4- 9	-1.77	0.29	0.14	0.04	-0.22	0.00	-0.52
4-10	-2.15	0.29	0.14	0.04	-0.22	0.00	-0.59

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	1.10	0.00	0.00	0.00	0.00	6.68	-0.50
5- 1	0.88	0.00	0.00	0.00	0.00	6.00	-0.83
5- 2	0.66	0.00	0.00	0.00	0.00	5.34	-1.36
5- 3	0.44	0.00	0.00	0.00	0.00	4.63	-1.98
5- 4	0.22	0.00	0.00	0.00	0.00	3.91	-2.67
5- 5	0.00	0.00	0.00	0.00	0.00	3.17	-3.40
5- 6	-0.22	0.00	0.00	0.00	0.00	2.45	-4.14
5- 7	-0.44	0.00	0.00	0.00	0.00	1.78	-4.85
5- 8	-0.66	0.00	0.00	0.00	0.00	1.18	-5.55
5- 9	-0.88	0.00	0.00	0.00	0.00	0.69	-6.16
5-10	-1.10	0.00	0.00	0.00	0.00	0.50	-6.41

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	1.91	0.00	0.00	0.00	0.00	0.50	0.00
7- 1	1.53	0.00	0.00	0.00	0.00	0.42	0.00
7- 2	1.15	0.00	0.00	0.00	0.00	0.35	-0.01
7- 3	0.76	0.00	0.00	0.00	0.00	0.28	-0.04
7- 4	0.38	0.00	0.00	0.00	0.00	0.22	-0.08
7- 5	0.00	0.00	0.00	0.00	0.00	0.15	-0.15
7- 6	-0.38	0.00	0.00	0.00	0.00	0.08	-0.21
7- 7	-0.76	0.00	0.00	0.00	0.00	0.04	-0.28
7- 8	-1.15	0.00	0.00	0.00	0.00	0.01	-0.35
7- 9	-1.53	0.00	0.00	0.00	0.00	0.00	-0.43
7-10	-1.91	0.00	0.00	0.00	0.00	0.00	-0.50

BOTTOM SLAB RIGHT SIDE

Bridge No. 1358

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL

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Thickness             =  9.00 (in)
Clear cover at end    =  2.00 (in)
Clear cover at middle =  2.00 (in)
Bar diameter (bot )   =  0.75 (in)
Bar diameter (mid+)   =  0.62 (in)
Bar diameter (mid-)   =  0.75 (in)
Bar diameter (top )   =  0.75 (in)
```

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-11.7*	4.6	6.2	8.4	203.8	8.0	19.8	70.9	0.4190	8.7	6.62	0.6	1.1	9.6	16.0
MID	6.3	4.6	0.5	8.1	202.8	7.4	19.7	72.7	0.3811	8.1	6.69	2.2	3.7	NA	NA
MID-	-6.8	4.6	0.7	8.0	203.8	8.0	19.8	70.9	0.4187	8.7	6.62	6.7	11.2	NA	NA
TOP	-13.4*	4.6	4.9	8.3	203.8	8.0	19.8	70.9	0.4187	8.7	6.62	0.5	0.8	2.2	3.7

Member No. = 2 TOP SLAB

```
Thickness             =  9.00 (in)
Clear cover at end    =  2.00 (in)
Clear cover at middle =  2.00 (in)
Bar diameter (lt  )   =  0.75 (in)
Bar diameter (mid )   =  0.88 (in)
Bar diameter (rt  )   =  0.88 (in)
```

LT	-12.1*	0.1	8.2	8.5	203.8	8.0	19.8	70.9	0.4187	8.0	6.62	0.7	1.2	6.0	10.1
MID	14.7*	0.1	0.8	7.9	210.7	12.5	20.9	62.8	0.6818	12.5	6.56	0.7	1.2	NA	NA
RT	-20.2*	0.1	9.8*	8.6	210.8	12.6	21.0	62.6	0.6864	12.6	6.56	0.2	0.3	1.1	1.9

Member No. = 3 INTERIOR WALL

```
Thickness             =  9.00 (in)
Clear cover at end    =  2.00 (in)
Clear cover at middle =  2.00 (in)
Bar diameter (bot )   =  0.62 (in)
Bar diameter (mid+)   =  0.62 (in)
Bar diameter (mid-)   =  0.62 (in)
Bar diameter (top )   =  0.62 (in)
```

BOT	-0.8	11.8	0.3	8.3	200.9	6.0	19.3	74.7	0.3103	8.1	6.69	10.6	17.7	14.5	24.2
MID	1.2	11.8	0.3	8.2	200.9	6.0	19.3	74.7	0.3103	8.1	6.69	7.0	11.7	NA	NA
MID-	-1.2	11.8	0.3	8.2	200.9	6.0	19.3	74.7	0.3103	8.1	6.69	7.0	11.7	NA	NA
TOP	-3.1	11.8	0.3	8.1	200.9	6.0	19.3	74.7	0.3103	8.1	6.69	2.6	4.4	14.1	23.6

Member No. = 4 BOTTOM SLAB

```
Thickness             =  9.00 (in)
Clear cover at end    =  2.00 (in)
Clear cover at middle =  2.00 (in)
Bar diameter (lt  )   =  0.75 (in)
Bar diameter (mid )   =  0.88 (in)
Bar diameter (rt  )   =  0.88 (in)
```

LT	-11.5*	0.9	6.9	8.5	203.8	8.0	19.8	70.9	0.4190	8.1	6.62	1.3	2.2	28.6	47.6
MID	12.6*	0.9	0.1	7.9	210.2	12.2	20.9	63.2	0.6654	12.3	6.56	1.9	3.2	NA	NA
RT	-19.1*	0.9	8.7*	8.4	208.0	10.8	20.5	65.6	0.5816	10.9	6.56	0.0	0.0	2.5	4.1

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	-3.97	-6.07	-3.03	-0.50	3.10	0.17	-0.37
1- 1	-3.86	-0.70	-0.35	-0.10	-0.01	0.01	-0.35
1- 2	-3.75	3.20	1.60	0.22	-2.17	0.00	-0.45
1- 3	-3.65	5.74	2.87	0.44	-3.46	0.00	-0.57
1- 4	-3.54	7.02	3.51	0.58	-4.00	0.00	-0.70
1- 5	-3.43	7.17	3.58	0.62	-3.91	0.06	-0.89
1- 6	-3.32	6.28	3.14	0.58	-3.27	0.13	-1.09
1- 7	-3.21	4.48	2.24	0.44	-2.21	0.21	-1.30
1- 8	-3.10	1.86	0.93	0.22	-0.82	0.29	-1.51
1- 9	-3.00	-1.46	-0.73	-0.09	0.77	0.37	-1.72
1-10	-2.89	-5.37	-2.69	-0.50	2.48	0.44	-1.93
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-2.89	-5.37	-2.69	-0.50	2.48	0.44	-1.93
2- 1	1.15	-4.57	-2.28	-0.42	2.11	0.62	-0.47
2- 2	4.08	-3.76	-1.88	-0.35	1.74	1.48	0.00
2- 3	5.90	-2.96	-1.48	-0.27	1.37	2.35	-0.14
2- 4	6.62	-2.16	-1.08	-0.20	0.99	2.88	-0.33
2- 5	6.23	-1.35	-0.68	-0.13	0.62	2.96	-0.52
2- 6	4.74	-0.55	-0.27	-0.05	0.25	2.65	-0.71
2- 7	2.14	0.26	0.13	0.02	-0.12	1.91	-0.91
2- 8	-1.57	1.06	0.53	0.10	-0.49	0.86	-1.26
2- 9	-6.39	1.86	0.93	0.17	-0.86	0.19	-2.46
2-10	-12.31	2.67	1.33	0.25	-1.23	0.00	-4.09
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.00	0.03	0.01	0.00	-0.03	0.43	-0.43
3- 1	0.00	0.02	0.01	0.00	-0.02	0.24	-0.24
3- 2	0.00	0.02	0.01	0.00	-0.02	0.06	-0.06
3- 3	0.00	0.01	0.01	0.00	-0.01	0.15	-0.15
3- 4	0.00	0.01	0.00	0.00	-0.01	0.34	-0.34

3- 5	0.00	0.00	0.00	0.00	0.00	0.54	-0.54
3- 6	0.00	-0.01	0.00	0.00	0.01	0.73	-0.73
3- 7	0.00	-0.01	-0.01	0.00	0.01	0.92	-0.92
3- 8	0.00	-0.02	-0.01	0.00	0.02	1.11	-1.11
3- 9	0.00	-0.02	-0.01	0.00	0.02	1.31	-1.31
3-10	0.00	-0.03	-0.01	0.00	0.03	1.50	-1.50

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-3.97	-6.07	-3.03	-0.50	3.10	0.17	-0.37
4- 1	0.99	-5.16	-2.58	-0.42	2.64	0.44	-0.04
4- 2	4.61	-4.25	-2.12	-0.35	2.17	0.79	0.00
4- 3	6.88	-3.34	-1.67	-0.27	1.71	1.02	0.00
4- 4	7.81	-2.43	-1.21	-0.20	1.24	1.10	0.00
4- 5	7.40	-1.52	-0.76	-0.12	0.78	1.01	0.00
4- 6	5.65	-0.61	-0.30	-0.05	0.31	0.77	0.00
4- 7	2.55	0.30	0.15	0.02	-0.15	0.40	-0.07
4- 8	-1.89	1.21	0.60	0.10	-0.62	0.07	-0.39
4- 9	-7.68	2.12	1.06	0.17	-1.08	0.00	-1.11
4-10	-14.81	3.03	1.51	0.25	-1.55	0.00	-2.03

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	Neg
	K	K	K	K	K	K	K

EXTERIOR WALL BOTTOM

1- 0	0.09	5.02	2.51	0.37	-2.97	0.07	-0.17
1- 1	0.09	3.77	1.89	0.29	-2.14	0.07	-0.17
1- 2	0.09	2.62	1.31	0.22	-1.39	0.07	-0.17
1- 3	0.09	1.55	0.77	0.15	-0.74	0.07	-0.17
1- 4	0.09	0.57	0.29	0.07	-0.17	0.07	-0.17
1- 5	0.09	-0.32	-0.16	0.00	0.31	0.07	-0.17

1- 6	0.09	-1.12	-0.56	-0.07	0.71	0.07	-0.17
1- 7	0.09	-1.82	-0.91	-0.15	1.02	0.07	-0.17
1- 8	0.09	-2.44	-1.22	-0.22	1.23	0.07	-0.17
1- 9	0.09	-2.97	-1.49	-0.29	1.37	0.07	-0.17
1-10	0.09	-3.41	-1.71	-0.37	1.41	0.07	-0.17

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	3.75	0.66	0.33	0.06	-0.30	1.82	-0.16
2- 1	2.85	0.66	0.33	0.06	-0.30	1.39	-0.19
2- 2	1.94	0.66	0.33	0.06	-0.30	1.10	-0.26
2- 3	1.04	0.66	0.33	0.06	-0.30	0.82	-0.36
2- 4	0.13	0.66	0.33	0.06	-0.30	0.57	-0.53
2- 5	-0.77	0.66	0.33	0.06	-0.30	0.37	-0.74
2- 6	-1.67	0.66	0.33	0.06	-0.30	0.21	-0.98
2- 7	-2.58	0.66	0.33	0.06	-0.30	0.11	-1.25
2- 8	-3.48	0.66	0.33	0.06	-0.30	0.04	-1.52
2- 9	-4.39	0.66	0.33	0.06	-0.30	0.01	-1.78
2-10	-5.29	0.66	0.33	0.06	-0.30	0.00	-1.90

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 1	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 2	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 3	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 4	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 5	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 6	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 7	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 8	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3- 9	0.00	0.00	0.00	0.00	0.00	0.16	-0.16
3-10	0.00	0.00	0.00	0.00	0.00	0.16	-0.16

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	4.61	0.74	0.37	0.06	-0.38	0.54	0.00
4- 1	3.51	0.74	0.37	0.06	-0.38	0.40	0.00
4- 2	2.41	0.74	0.37	0.06	-0.38	0.27	0.00
4- 3	1.31	0.74	0.37	0.06	-0.38	0.13	0.00

4- 4	0.21	0.74	0.37	0.06	-0.38	0.02	-0.02
4- 5	-0.89	0.74	0.37	0.06	-0.38	0.00	-0.15
4- 6	-1.98	0.74	0.37	0.06	-0.38	0.00	-0.29
4- 7	-3.08	0.74	0.37	0.06	-0.38	0.00	-0.42
4- 8	-4.18	0.74	0.37	0.06	-0.38	0.00	-0.55
4- 9	-5.28	0.74	0.37	0.06	-0.38	0.00	-0.69
4-10	-6.38	0.74	0.37	0.06	-0.38	0.00	-0.82

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	Kft	Kft	Kft	Kft	Kft	Kft	Kft
EXTERIOR WALL BOTTOM							
1- 0	-3.97	-6.07	-3.03	-0.50	3.10	0.26	-0.56
1- 1	-3.86	-0.70	-0.35	-0.10	-0.01	0.01	-0.53
1- 2	-3.75	3.20	1.60	0.22	-2.17	0.00	-0.68
1- 3	-3.65	5.74	2.87	0.44	-3.46	0.00	-0.85
1- 4	-3.54	7.02	3.51	0.58	-4.00	0.00	-1.06
1- 5	-3.43	7.17	3.58	0.62	-3.91	0.09	-1.33
1- 6	-3.32	6.28	3.14	0.58	-3.27	0.20	-1.64
1- 7	-3.21	4.48	2.24	0.44	-2.21	0.32	-1.95
1- 8	-3.10	1.86	0.93	0.22	-0.82	0.43	-2.26
1- 9	-3.00	-1.46	-0.73	-0.09	0.77	0.55	-2.58
1-10	-2.89	-5.37	-2.69	-0.50	2.48	0.67	-2.89
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-2.89	-5.37	-2.69	-0.50	2.48	0.67	-2.89
2- 1	1.15	-4.57	-2.28	-0.42	2.11	0.94	-0.71
2- 2	4.08	-3.76	-1.88	-0.35	1.74	2.23	0.00
2- 3	5.90	-2.96	-1.48	-0.27	1.37	3.53	-0.20
2- 4	6.62	-2.16	-1.08	-0.20	0.99	4.32	-0.49

2- 5	6.23	-1.35	-0.68	-0.13	0.62	4.44	-0.78
2- 6	4.74	-0.55	-0.27	-0.05	0.25	3.97	-1.07
2- 7	2.14	0.26	0.13	0.02	-0.12	2.86	-1.36
2- 8	-1.57	1.06	0.53	0.10	-0.49	1.29	-1.90
2- 9	-6.39	1.86	0.93	0.17	-0.86	0.28	-3.69
2-10	-12.31	2.67	1.33	0.25	-1.23	0.00	-6.14

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	0.03	0.01	0.00	-0.03	0.64	-0.65
3- 1	0.00	0.02	0.01	0.00	-0.02	0.36	-0.36
3- 2	0.00	0.02	0.01	0.00	-0.02	0.08	-0.09
3- 3	0.00	0.01	0.01	0.00	-0.01	0.23	-0.23
3- 4	0.00	0.01	0.00	0.00	-0.01	0.51	-0.52
3- 5	0.00	0.00	0.00	0.00	0.00	0.80	-0.80
3- 6	0.00	-0.01	0.00	0.00	0.01	1.09	-1.09
3- 7	0.00	-0.01	-0.01	0.00	0.01	1.38	-1.38
3- 8	0.00	-0.02	-0.01	0.00	0.02	1.67	-1.67
3- 9	0.00	-0.02	-0.01	0.00	0.02	1.96	-1.96
3-10	0.00	-0.03	-0.01	0.00	0.03	2.25	-2.25

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-3.97	-6.07	-3.03	-0.50	3.10	0.26	-0.56
4- 1	0.99	-5.16	-2.58	-0.42	2.64	0.66	-0.07
4- 2	4.61	-4.25	-2.12	-0.35	2.17	1.19	0.00
4- 3	6.88	-3.34	-1.67	-0.27	1.71	1.54	0.00
4- 4	7.81	-2.43	-1.21	-0.20	1.24	1.64	0.00
4- 5	7.40	-1.52	-0.76	-0.12	0.78	1.52	0.00
4- 6	5.65	-0.61	-0.30	-0.05	0.31	1.15	0.00
4- 7	2.55	0.30	0.15	0.02	-0.15	0.60	-0.10
4- 8	-1.89	1.21	0.60	0.10	-0.62	0.11	-0.58
4- 9	-7.68	2.12	1.06	0.17	-1.08	0.00	-1.66
4-10	-14.81	3.03	1.51	0.25	-1.55	0.00	-3.04

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	Neg
EXTERIOR WALL BOTTOM							
1- 0	0.09	5.02	2.51	0.37	-2.97	0.10	-0.26
1- 1	0.09	3.77	1.89	0.29	-2.14	0.10	-0.26
1- 2	0.09	2.62	1.31	0.22	-1.39	0.10	-0.26
1- 3	0.09	1.55	0.77	0.15	-0.74	0.10	-0.26
1- 4	0.09	0.57	0.29	0.07	-0.17	0.10	-0.26
1- 5	0.09	-0.32	-0.16	0.00	0.31	0.10	-0.26
1- 6	0.09	-1.12	-0.56	-0.07	0.71	0.10	-0.26
1- 7	0.09	-1.82	-0.91	-0.15	1.02	0.10	-0.26
1- 8	0.09	-2.44	-1.22	-0.22	1.23	0.10	-0.26
1- 9	0.09	-2.97	-1.49	-0.29	1.37	0.10	-0.26
1-10	0.09	-3.41	-1.71	-0.37	1.41	0.10	-0.26
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	3.75	0.66	0.33	0.06	-0.30	2.72	-0.24
2- 1	2.85	0.66	0.33	0.06	-0.30	2.08	-0.29
2- 2	1.94	0.66	0.33	0.06	-0.30	1.64	-0.39
2- 3	1.04	0.66	0.33	0.06	-0.30	1.23	-0.54
2- 4	0.13	0.66	0.33	0.06	-0.30	0.85	-0.79
2- 5	-0.77	0.66	0.33	0.06	-0.30	0.55	-1.11
2- 6	-1.67	0.66	0.33	0.06	-0.30	0.32	-1.47
2- 7	-2.58	0.66	0.33	0.06	-0.30	0.16	-1.88
2- 8	-3.48	0.66	0.33	0.06	-0.30	0.06	-2.28
2- 9	-4.39	0.66	0.33	0.06	-0.30	0.01	-2.67
2-10	-5.29	0.66	0.33	0.06	-0.30	0.00	-2.85
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3- 1	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3- 2	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3- 3	0.00	0.00	0.00	0.00	0.00	0.24	-0.24

3- 4	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3- 5	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3- 6	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3- 7	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3- 8	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3- 9	0.00	0.00	0.00	0.00	0.00	0.24	-0.24
3-10	0.00	0.00	0.00	0.00	0.00	0.24	-0.24

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	4.61	0.74	0.37	0.06	-0.38	0.81	0.00
4- 1	3.51	0.74	0.37	0.06	-0.38	0.60	0.00
4- 2	2.41	0.74	0.37	0.06	-0.38	0.40	0.00
4- 3	1.31	0.74	0.37	0.06	-0.38	0.20	0.00
4- 4	0.21	0.74	0.37	0.06	-0.38	0.03	-0.03
4- 5	-0.89	0.74	0.37	0.06	-0.38	0.00	-0.23
4- 6	-1.98	0.74	0.37	0.06	-0.38	0.00	-0.43
4- 7	-3.08	0.74	0.37	0.06	-0.38	0.00	-0.63
4- 8	-4.18	0.74	0.37	0.06	-0.38	0.00	-0.83
4- 9	-5.28	0.74	0.37	0.06	-0.38	0.00	-1.03
4-10	-6.38	0.74	0.37	0.06	-0.38	0.00	-1.23

BOTTOM SLAB RIGHT SIDE

Bridge No. 658

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL

Thickness = 12.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 1.13 (in)
Bar diameter (mid+) = 1.13 (in)
Bar diameter (mid-) = 1.13 (in)
Bar diameter (top) = 1.13 (in)

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-34.3*	7.6	8.9	9.6	238.3	23.8	33.9	72.6	0.9091	24.8	9.44	0.9	1.5	3.5	5.8
MID	15.2	7.6	1.8	9.6	237.0	22.6	33.5	74.0	0.8584	23.7	9.44	3.7	6.2	NA	NA
MID-	-25.3*	7.6	0.9	9.6	238.3	23.8	33.9	72.6	0.9091	24.8	9.44	1.5	2.6	NA	NA
TOP	-22.7	7.6	5.0	9.6	238.3	23.8	33.9	72.6	0.9091	24.8	9.44	1.6	2.7	1.7	2.8

Member No. = 2 TOP SLAB

Thickness = 12.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-21.8	3.0	10.0*	9.6	238.3	23.8	33.9	72.6	0.9091	24.2	9.44	1.9	3.1	1.3	2.2
MID	36.5	3.0	3.8	9.6	257.7	40.1	39.7	52.1	1.6416	40.1	9.44	1.2	2.0	NA	NA
RT	-21.8	3.0	10.0*	9.6	238.3	23.8	33.9	72.6	0.9091	24.2	9.44	1.9	3.1	0.6	1.0

Member No. = 4 BOTTOM SLAB

Thickness = 12.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-33.0*	3.7	10.1*	9.6	238.3	23.8	33.9	72.6	0.9091	24.3	9.44	1.1	1.8	1.9	3.1
MID	31.7	3.7	0.2	9.6	267.0	47.1	42.6	42.3	1.9934	46.7	9.44	2.7	4.5	NA	NA
RT	-33.1*	3.7	10.1*	9.6	238.3	23.8	33.9	72.6	0.9091	24.3	9.44	1.1	1.8	0.9	1.5

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	LIVE LOADS Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.35	6.40	3.20	0.52	-6.02	0.41	-0.22
1- 1	0.35	4.62	2.31	0.42	-4.32	0.41	-0.22
1- 2	0.35	3.02	1.51	0.31	-2.81	0.41	-0.22

1- 3	0.35	1.61	0.80	0.21	-1.47	0.41	-0.22
1- 4	0.35	0.37	0.19	0.10	-0.31	0.41	-0.22
1- 5	0.35	-0.68	-0.34	0.00	0.67	0.41	-0.22
1- 6	0.35	-1.55	-0.78	-0.10	1.47	0.41	-0.22
1- 7	0.35	-2.24	-1.12	-0.21	2.09	0.41	-0.22
1- 8	0.35	-2.75	-1.37	-0.31	2.54	0.41	-0.22
1- 9	0.35	-3.07	-1.54	-0.42	2.81	0.41	-0.22
1-10	0.35	-3.22	-1.61	-0.52	2.90	0.41	-0.22

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	1.32	0.00	0.00	0.00	0.00	4.68	0.00
2- 1	1.06	0.00	0.00	0.00	0.00	3.74	-0.27
2- 2	0.79	0.00	0.00	0.00	0.00	3.24	-0.64
2- 3	0.53	0.00	0.00	0.00	0.00	2.77	-1.07
2- 4	0.26	0.00	0.00	0.00	0.00	2.27	-1.52
2- 5	0.00	0.00	0.00	0.00	0.00	1.76	-2.02
2- 6	-0.26	0.00	0.00	0.00	0.00	1.27	-2.53
2- 7	-0.53	0.00	0.00	0.00	0.00	0.85	-3.02
2- 8	-0.79	0.00	0.00	0.00	0.00	0.44	-3.45
2- 9	-1.05	0.00	0.00	0.00	0.00	0.13	-4.06
2-10	-1.32	0.00	0.00	0.00	0.00	0.00	-4.69

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

4- 0	3.78	0.00	0.00	0.00	0.00	3.24	0.00
4- 1	3.02	0.00	0.00	0.00	0.00	2.61	0.00
4- 2	2.27	0.00	0.00	0.00	0.00	1.97	0.00
4- 3	1.51	0.00	0.00	0.00	0.00	1.34	0.00
4- 4	0.76	0.00	0.00	0.00	0.00	0.70	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.08	-0.08
4- 6	-0.76	0.00	0.00	0.00	0.00	0.00	-0.71
4- 7	-1.51	0.00	0.00	0.00	0.00	0.00	-1.34
4- 8	-2.27	0.00	0.00	0.00	0.00	0.00	-1.97
4- 9	-3.02	0.00	0.00	0.00	0.00	0.00	-2.61
4-10	-3.78	0.00	0.00	0.00	0.00	0.00	-3.24

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	-7.09	-8.31	-4.15	-0.83	7.74	0.00	-11.47
1- 1	-6.48	1.26	0.63	-0.01	-1.24	0.00	-10.44
1- 2	-5.87	7.88	3.94	0.63	-7.42	0.00	-9.40
1- 3	-5.26	11.89	5.94	1.08	-11.12	0.00	-8.49
1- 4	-4.65	13.58	6.79	1.36	-12.65	0.00	-8.06
1- 5	-4.04	13.28	6.64	1.45	-12.31	0.00	-7.67
1- 6	-3.42	11.31	5.66	1.36	-10.42	0.00	-7.27
1- 7	-2.81	7.98	3.99	1.08	-7.29	0.00	-7.34
1- 8	-2.20	3.61	1.81	0.63	-3.23	0.00	-7.91
1- 9	-1.59	-1.48	-0.74	-0.01	1.45	0.65	-8.48
1-10	-0.98	-6.98	-3.49	-0.83	6.44	1.39	-9.05
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-0.98	-6.98	-3.49	-0.83	6.44	1.39	-9.05
2- 1	1.08	-6.97	-3.49	-0.83	6.43	6.40	-2.76
2- 2	2.69	-6.97	-3.48	-0.83	6.43	11.61	0.00
2- 3	3.84	-6.96	-3.48	-0.83	6.42	14.73	0.00
2- 4	4.53	-6.96	-3.48	-0.83	6.41	17.39	0.00
2- 5	4.76	-6.95	-3.48	-0.83	6.41	18.37	0.00
2- 6	4.53	-6.95	-3.47	-0.83	6.40	17.44	0.00
2- 7	3.85	-6.94	-3.47	-0.83	6.40	14.78	0.00
2- 8	2.70	-6.93	-3.47	-0.83	6.39	11.55	0.00
2- 9	1.09	-6.93	-3.46	-0.83	6.39	6.45	-2.77
2-10	-0.97	-6.92	-3.46	-0.83	6.38	1.40	-9.06
TOP SLAB RIGHT SIDE							
BOTTOM SLAB LEFT SIDE							
4- 0	-7.09	-8.31	-4.15	-0.83	7.74	0.00	-11.47
4- 1	-1.17	-8.31	-4.16	-0.83	7.74	0.25	-3.84

4- 2	3.44	-8.32	-4.16	-0.83	7.75	3.25	0.00
4- 3	6.73	-8.32	-4.16	-0.83	7.75	7.20	0.00
4- 4	8.70	-8.33	-4.16	-0.83	7.76	9.50	0.00
4- 5	9.35	-8.33	-4.17	-0.83	7.77	10.26	0.00
4- 6	8.70	-8.34	-4.17	-0.83	7.77	9.50	0.00
4- 7	6.72	-8.35	-4.17	-0.83	7.78	7.19	0.00
4- 8	3.43	-8.35	-4.18	-0.83	7.78	3.23	0.00
4- 9	-1.18	-8.36	-4.18	-0.83	7.79	0.25	-3.86
4-10	-7.10	-8.36	-4.18	-0.83	7.79	0.00	-11.51

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	K	K	K	K	K	K	
EXTERIOR WALL BOTTOM							
1- 0	0.35	6.40	3.20	0.52	-6.02	0.62	-0.33
1- 1	0.35	4.62	2.31	0.42	-4.32	0.62	-0.33
1- 2	0.35	3.02	1.51	0.31	-2.81	0.62	-0.33
1- 3	0.35	1.61	0.80	0.21	-1.47	0.62	-0.33
1- 4	0.35	0.37	0.19	0.10	-0.31	0.62	-0.33
1- 5	0.35	-0.68	-0.34	0.00	0.67	0.62	-0.33
1- 6	0.35	-1.55	-0.78	-0.10	1.47	0.62	-0.33
1- 7	0.35	-2.24	-1.12	-0.21	2.09	0.62	-0.33
1- 8	0.35	-2.75	-1.37	-0.31	2.54	0.62	-0.33
1- 9	0.35	-3.07	-1.54	-0.42	2.81	0.62	-0.33
1-10	0.35	-3.22	-1.61	-0.52	2.90	0.62	-0.33
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	1.32	0.00	0.00	0.00	0.00	7.02	0.00
2- 1	1.06	0.00	0.00	0.00	0.00	5.61	-0.41
2- 2	0.79	0.00	0.00	0.00	0.00	4.85	-0.95
2- 3	0.53	0.00	0.00	0.00	0.00	4.16	-1.60
2- 4	0.26	0.00	0.00	0.00	0.00	3.40	-2.28

2- 5	0.00	0.00	0.00	0.00	0.00	2.64	-3.04
2- 6	-0.26	0.00	0.00	0.00	0.00	1.90	-3.79
2- 7	-0.53	0.00	0.00	0.00	0.00	1.27	-4.52
2- 8	-0.79	0.00	0.00	0.00	0.00	0.67	-5.18
2- 9	-1.05	0.00	0.00	0.00	0.00	0.19	-6.09
2-10	-1.32	0.00	0.00	0.00	0.00	0.00	-7.03

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

4- 0	3.78	0.00	0.00	0.00	0.00	4.86	0.00
4- 1	3.02	0.00	0.00	0.00	0.00	3.91	0.00
4- 2	2.27	0.00	0.00	0.00	0.00	2.96	0.00
4- 3	1.51	0.00	0.00	0.00	0.00	2.01	0.00
4- 4	0.76	0.00	0.00	0.00	0.00	1.06	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.11	-0.11
4- 6	-0.76	0.00	0.00	0.00	0.00	0.00	-1.06
4- 7	-1.51	0.00	0.00	0.00	0.00	0.00	-2.01
4- 8	-2.27	0.00	0.00	0.00	0.00	0.00	-2.96
4- 9	-3.02	0.00	0.00	0.00	0.00	0.00	-3.91
4-10	-3.78	0.00	0.00	0.00	0.00	0.00	-4.87

BOTTOM SLAB RIGHT SIDE

INVENTORY RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.591
LOAD RATING : 21.266 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.394
LOAD RATING : 21.266 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Top
RATING FACTOR : 2.968
LOAD RATING : 106.849 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 2.604
LOAD RATING : 140.614 (TONS)
ACTION TYPE : Shear

OPERATING RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.985
LOAD RATING : 35.450 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.656
LOAD RATING : 35.450 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Top

RATING FACTOR : 4.948
LOAD RATING : 178.117 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 4.341
LOAD RATING : 234.404 (TONS)
ACTION TYPE : Shear

Bridge No. 752

Member No. = 1 EXTERIOR WALL
Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.62 (in)
Bar diameter (mid+) = 0.62 (in)
Bar diameter (mid-) = 0.62 (in)
Bar diameter (top) = 0.62 (in)

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Flexure Ratings Oper	Shear Ratings Inv	Shear Ratings Oper
BOT	-10.5*	1.9	5.3	6.9	176.7	5.0	14.6	60.7	0.3092	5.3	5.56	0.0	0.0	14.3	23.8
MID	3.0	1.9	0.4	6.7	175.9	4.5	14.4	61.4	0.2810	4.8	5.56	3.1	5.1	NA	NA
MID-	-4.8	1.9	0.4	6.7	176.7	5.0	14.6	60.7	0.3092	5.3	5.56	3.8	6.3	NA	NA
TOP	-10.5*	1.9	4.2	6.9	176.7	5.0	14.6	60.7	0.3092	5.3	5.56	0.0	0.0	2.3	3.8

Member No. = 2 TOP SLAB
Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.62 (in)
Bar diameter (mid) = 0.75 (in)
Bar diameter (rt) = 0.75 (in)

LT	-9.4*	0.3	6.6	7.0	176.7	5.0	14.6	60.7	0.3092	5.0	5.56	0.2	0.3	3.8	6.3
MID	8.9*	0.3	0.2	6.6	181.4	7.6	15.1	54.9	0.4884	7.6	5.49	0.8	1.4	NA	NA
RT	-18.1*	0.3	8.7*	7.0	182.0	7.9	15.2	54.2	0.5106	8.0	5.49	0.0	0.0	1.3	2.2

Member No. = 3 INTERIOR WALL
Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.50 (in)
Bar diameter (mid+) = 0.50 (in)
Bar diameter (mid-) = 0.50 (in)
Bar diameter (top) = 0.50 (in)

BOT	-0.6	8.5	0.3	6.9	174.9	4.0	14.4	63.3	0.2412	5.4	5.62	9.6	16.0	15.6	25.9
MID	0.7	8.5	0.3	6.9	174.9	4.0	14.4	63.3	0.2412	5.4	5.62	7.6	12.6	NA	NA
MID-	-0.7	8.5	0.3	6.9	174.9	4.0	14.4	63.3	0.2412	5.4	5.62	7.6	12.6	NA	NA
TOP	-2.0	8.5	0.3	6.8	174.9	4.0	14.4	63.3	0.2412	5.4	5.62	2.7	4.5	15.2	25.4

Member No. = 4 BOTTOM SLAB
Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.62 (in)
Bar diameter (mid) = 0.75 (in)
Bar diameter (rt) = 0.75 (in)

LT	-9.9*	0.2	6.8	7.0	176.7	5.0	14.6	60.7	0.3092	5.0	5.56	0.0	0.0	8.0	13.4
MID	9.3*	0.2	0.2	6.6	180.0	6.8	14.9	56.3	0.4364	6.9	5.49	0.7	1.1	NA	NA
RT	-19.8*	0.2	9.3*	6.9	180.1	6.8	14.9	56.3	0.4382	6.9	5.49	0.0	0.0	1.5	2.4

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Press Kft	Water Hgt. Kft	LIVE LOADS Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg

EXTERIOR WALL BOTTOM

1- 0	-3.14	-5.39	-2.69	-0.44	2.53	0.05	-0.55
1- 1	-3.07	-1.50	-0.75	-0.15	0.56	0.00	-0.49
1- 2	-2.99	1.35	0.68	0.08	-0.80	0.00	-0.51
1- 3	-2.92	3.24	1.62	0.25	-1.62	0.00	-0.54
1- 4	-2.84	4.23	2.12	0.35	-1.98	0.00	-0.57
1- 5	-2.77	4.39	2.20	0.38	-1.93	0.03	-0.63
1- 6	-2.69	3.80	1.90	0.35	-1.55	0.10	-0.70
1- 7	-2.62	2.51	1.25	0.25	-0.90	0.18	-0.79
1- 8	-2.54	0.60	0.30	0.09	-0.05	0.27	-0.89
1- 9	-2.47	-1.87	-0.93	-0.14	0.94	0.37	-0.99
1-10	-2.40	-4.82	-2.41	-0.44	1.99	0.47	-1.09

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	-2.40	-4.82	-2.41	-0.44	1.99	0.47	-1.09
2- 1	0.83	-4.05	-2.02	-0.37	1.67	0.46	-0.29
2- 2	3.11	-3.28	-1.64	-0.30	1.35	0.71	0.00
2- 3	4.44	-2.51	-1.25	-0.23	1.04	1.07	-0.01
2- 4	4.83	-1.74	-0.87	-0.16	0.72	1.30	-0.15
2- 5	4.27	-0.97	-0.48	-0.09	0.40	1.32	-0.29
2- 6	2.77	-0.20	-0.10	-0.02	0.08	1.11	-0.44
2- 7	0.32	0.57	0.28	0.05	-0.24	0.68	-0.59
2- 8	-3.08	1.34	0.67	0.12	-0.56	0.24	-0.97
2- 9	-7.42	2.11	1.05	0.19	-0.87	0.05	-1.77
2-10	-12.70	2.88	1.44	0.26	-1.19	0.00	-2.83

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	0.03	0.01	0.00	-0.03	0.32	-0.32
3- 1	0.00	0.02	0.01	0.00	-0.02	0.19	-0.19
3- 2	0.00	0.02	0.01	0.00	-0.02	0.07	-0.07
3- 3	0.00	0.01	0.01	0.00	-0.01	0.07	-0.07
3- 4	0.00	0.01	0.00	0.00	-0.01	0.20	-0.20
3- 5	0.00	0.00	0.00	0.00	0.00	0.33	-0.33
3- 6	0.00	-0.01	0.00	0.00	0.01	0.46	-0.45
3- 7	0.00	-0.01	-0.01	0.00	0.01	0.58	-0.58
3- 8	0.00	-0.02	-0.01	0.00	0.02	0.71	-0.71
3- 9	0.00	-0.02	-0.01	0.00	0.02	0.84	-0.84
3-10	0.00	-0.03	-0.01	0.00	0.03	0.97	-0.97

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-3.14	-5.39	-2.69	-0.44	2.53	0.05	-0.55
4- 1	0.65	-4.53	-2.26	-0.37	2.12	0.29	-0.08
4- 2	3.34	-3.66	-1.83	-0.30	1.72	0.71	0.00
4- 3	4.94	-2.80	-1.40	-0.23	1.31	0.99	0.00
4- 4	5.44	-1.94	-0.97	-0.16	0.91	1.08	0.00
4- 5	4.84	-1.07	-0.54	-0.09	0.50	0.97	0.00
4- 6	3.14	-0.21	-0.11	-0.02	0.10	0.67	0.00
4- 7	0.35	0.65	0.33	0.05	-0.30	0.24	-0.11
4- 8	-3.55	1.51	0.76	0.12	-0.71	0.00	-0.65
4- 9	-8.54	2.38	1.19	0.20	-1.11	0.00	-1.54
4-10	-14.62	3.24	1.62	0.27	-1.52	0.00	-2.64

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Press K	Water Hgt. K	LIVE LOADS Press (Max) Pos K	Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.07	4.23	2.12	0.31	-2.19	0.10	-0.10
1- 1	0.07	3.21	1.61	0.25	-1.58	0.10	-0.10
1- 2	0.07	2.25	1.13	0.19	-1.03	0.10	-0.10
1- 3	0.07	1.36	0.68	0.13	-0.55	0.10	-0.10
1- 4	0.07	0.54	0.27	0.06	-0.14	0.10	-0.10
1- 5	0.07	-0.22	-0.11	0.00	0.22	0.10	-0.10
1- 6	0.07	-0.91	-0.46	-0.06	0.50	0.10	-0.10
1- 7	0.07	-1.54	-0.77	-0.13	0.73	0.10	-0.10
1- 8	0.07	-2.10	-1.05	-0.19	0.89	0.10	-0.10
1- 9	0.07	-2.60	-1.30	-0.25	0.98	0.10	-0.10
1-10	0.07	-3.03	-1.51	-0.31	1.02	0.10	-0.10
EXTERIOR WALL TOP							

TOP SLAB LEFT SIDE

2- 0	3.52	0.73	0.37	0.07	-0.30	1.10	-0.14
2- 1	2.62	0.73	0.37	0.07	-0.30	0.78	-0.16
2- 2	1.72	0.73	0.37	0.07	-0.30	0.59	-0.20
2- 3	0.82	0.73	0.37	0.07	-0.30	0.43	-0.26
2- 4	-0.08	0.73	0.37	0.07	-0.30	0.29	-0.36
2- 5	-0.98	0.73	0.37	0.07	-0.30	0.18	-0.48
2- 6	-1.88	0.73	0.37	0.07	-0.30	0.10	-0.62
2- 7	-2.78	0.73	0.37	0.07	-0.30	0.05	-0.79
2- 8	-3.68	0.73	0.37	0.07	-0.30	0.01	-0.97
2- 9	-4.59	0.73	0.37	0.07	-0.30	0.00	-1.16
2-10	-5.49	0.73	0.37	0.07	-0.30	0.00	-1.26

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 1	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 2	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 3	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 4	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 5	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 6	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 7	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 8	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3- 9	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12
3-10	0.00	-0.01	0.00	0.00	0.00	0.12	-0.12

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	4.13	0.82	0.41	0.07	-0.39	0.73	0.00
4- 1	3.09	0.82	0.41	0.07	-0.39	0.55	0.00
4- 2	2.04	0.82	0.41	0.07	-0.39	0.36	0.00
4- 3	1.00	0.82	0.41	0.07	-0.39	0.18	0.00
4- 4	-0.05	0.82	0.41	0.07	-0.39	0.02	-0.02
4- 5	-1.09	0.82	0.41	0.07	-0.39	0.00	-0.21
4- 6	-2.14	0.82	0.41	0.07	-0.39	0.00	-0.39
4- 7	-3.19	0.82	0.41	0.07	-0.39	0.00	-0.58
4- 8	-4.23	0.82	0.41	0.07	-0.39	0.00	-0.76
4- 9	-5.28	0.82	0.41	0.07	-0.39	0.00	-0.95
4-10	-6.32	0.82	0.41	0.07	-0.39	0.00	-1.13

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	-3.14	-5.39	-2.69	-0.44	2.53	0.08	-0.82
1- 1	-3.07	-1.50	-0.75	-0.15	0.56	0.00	-0.73
1- 2	-2.99	1.35	0.68	0.08	-0.80	0.00	-0.76
1- 3	-2.92	3.24	1.62	0.25	-1.62	0.00	-0.81
1- 4	-2.84	4.23	2.12	0.35	-1.98	0.00	-0.86
1- 5	-2.77	4.39	2.20	0.38	-1.93	0.04	-0.94
1- 6	-2.69	3.80	1.90	0.35	-1.55	0.14	-1.05
1- 7	-2.62	2.51	1.25	0.25	-0.90	0.27	-1.18
1- 8	-2.54	0.60	0.30	0.09	-0.05	0.41	-1.33
1- 9	-2.47	-1.87	-0.93	-0.14	0.94	0.56	-1.48
1-10	-2.40	-4.82	-2.41	-0.44	1.99	0.70	-1.63
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-2.40	-4.82	-2.41	-0.44	1.99	0.70	-1.63
2- 1	0.83	-4.05	-2.02	-0.37	1.67	0.69	-0.43
2- 2	3.11	-3.28	-1.64	-0.30	1.35	1.06	0.00
2- 3	4.44	-2.51	-1.25	-0.23	1.04	1.60	-0.02
2- 4	4.83	-1.74	-0.87	-0.16	0.72	1.96	-0.22
2- 5	4.27	-0.97	-0.48	-0.09	0.40	1.98	-0.44
2- 6	2.77	-0.20	-0.10	-0.02	0.08	1.67	-0.66
2- 7	0.32	0.57	0.28	0.05	-0.24	1.02	-0.89
2- 8	-3.08	1.34	0.67	0.12	-0.56	0.36	-1.45
2- 9	-7.42	2.11	1.05	0.19	-0.87	0.08	-2.66
2-10	-12.70	2.88	1.44	0.26	-1.19	0.00	-4.24
TOP SLAB RIGHT SIDE							

INTERIOR WALL BOTTOM

3- 0	0.00	0.03	0.01	0.00	-0.03	0.48	-0.48
3- 1	0.00	0.02	0.01	0.00	-0.02	0.28	-0.28
3- 2	0.00	0.02	0.01	0.00	-0.02	0.11	-0.11
3- 3	0.00	0.01	0.01	0.00	-0.01	0.10	-0.10
3- 4	0.00	0.01	0.00	0.00	-0.01	0.30	-0.30
3- 5	0.00	0.00	0.00	0.00	0.00	0.49	-0.49
3- 6	0.00	-0.01	0.00	0.00	0.01	0.68	-0.68
3- 7	0.00	-0.01	-0.01	0.00	0.01	0.88	-0.88
3- 8	0.00	-0.02	-0.01	0.00	0.02	1.07	-1.07
3- 9	0.00	-0.02	-0.01	0.00	0.02	1.26	-1.26
3-10	0.00	-0.03	-0.01	0.00	0.03	1.46	-1.46

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-3.14	-5.39	-2.69	-0.44	2.53	0.08	-0.82
4- 1	0.65	-4.53	-2.26	-0.37	2.12	0.43	-0.12
4- 2	3.34	-3.66	-1.83	-0.30	1.72	1.07	0.00
4- 3	4.94	-2.80	-1.40	-0.23	1.31	1.49	0.00
4- 4	5.44	-1.94	-0.97	-0.16	0.91	1.62	0.00
4- 5	4.84	-1.07	-0.54	-0.09	0.50	1.46	0.00
4- 6	3.14	-0.21	-0.11	-0.02	0.10	1.01	0.00
4- 7	0.35	0.65	0.33	0.05	-0.30	0.36	-0.16
4- 8	-3.55	1.51	0.76	0.12	-0.71	0.00	-0.97
4- 9	-8.54	2.38	1.19	0.20	-1.11	0.00	-2.32
4-10	-14.62	3.24	1.62	0.27	-1.52	0.00	-3.95

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	Neg
	K	K	K	K	K	K	K

EXTERIOR WALL BOTTOM

1- 0	0.07	4.23	2.12	0.31	-2.19	0.14	-0.15
1- 1	0.07	3.21	1.61	0.25	-1.58	0.14	-0.15
1- 2	0.07	2.25	1.13	0.19	-1.03	0.14	-0.15
1- 3	0.07	1.36	0.68	0.13	-0.55	0.14	-0.15
1- 4	0.07	0.54	0.27	0.06	-0.14	0.14	-0.15
1- 5	0.07	-0.22	-0.11	0.00	0.22	0.14	-0.15
1- 6	0.07	-0.91	-0.46	-0.06	0.50	0.14	-0.15
1- 7	0.07	-1.54	-0.77	-0.13	0.73	0.14	-0.15
1- 8	0.07	-2.10	-1.05	-0.19	0.89	0.14	-0.15
1- 9	0.07	-2.60	-1.30	-0.25	0.98	0.14	-0.15
1-10	0.07	-3.03	-1.51	-0.31	1.02	0.14	-0.15

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	3.52	0.73	0.37	0.07	-0.30	1.64	-0.22
2- 1	2.62	0.73	0.37	0.07	-0.30	1.17	-0.24
2- 2	1.72	0.73	0.37	0.07	-0.30	0.89	-0.30
2- 3	0.82	0.73	0.37	0.07	-0.30	0.65	-0.39
2- 4	-0.08	0.73	0.37	0.07	-0.30	0.44	-0.53
2- 5	-0.98	0.73	0.37	0.07	-0.30	0.27	-0.71
2- 6	-1.88	0.73	0.37	0.07	-0.30	0.15	-0.94
2- 7	-2.78	0.73	0.37	0.07	-0.30	0.07	-1.19
2- 8	-3.68	0.73	0.37	0.07	-0.30	0.02	-1.46
2- 9	-4.59	0.73	0.37	0.07	-0.30	0.00	-1.75
2-10	-5.49	0.73	0.37	0.07	-0.30	0.00	-1.90

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 1	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 2	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 3	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 4	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 5	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 6	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 7	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 8	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3- 9	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18
3-10	0.00	-0.01	0.00	0.00	0.00	0.18	-0.18

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	4.13	0.82	0.41	0.07	-0.39	1.10	0.00
4- 1	3.09	0.82	0.41	0.07	-0.39	0.82	0.00
4- 2	2.04	0.82	0.41	0.07	-0.39	0.54	0.00
4- 3	1.00	0.82	0.41	0.07	-0.39	0.27	0.00
4- 4	-0.05	0.82	0.41	0.07	-0.39	0.02	-0.04
4- 5	-1.09	0.82	0.41	0.07	-0.39	0.00	-0.31
4- 6	-2.14	0.82	0.41	0.07	-0.39	0.00	-0.59
4- 7	-3.19	0.82	0.41	0.07	-0.39	0.00	-0.87
4- 8	-4.23	0.82	0.41	0.07	-0.39	0.00	-1.14
4- 9	-5.28	0.82	0.41	0.07	-0.39	0.00	-1.42
4-10	-6.32	0.82	0.41	0.07	-0.39	0.00	-1.70

BOTTOM SLAB RIGHT SIDE

INVENTORY RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000

LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

OPERATING RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)

TOTAL VEHICLE WT.	:	54.000 (TONS)
CONTROLLING MEMBER	:	1
CONTROLLING POINT	:	Bottom
RATING FACTOR	:	0.000
LOAD RATING	:	0.000 (TONS)
ACTION TYPE	:	Flexure

Bridge No. 848

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL

Thickness = 9.06 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.88 (in)
Bar diameter (mid+) = 0.75 (in)
Bar diameter (mid-) = 0.88 (in)
Bar diameter (top) = 0.88 (in)

	Moment Kft	Coin. Axial Force Kips	Shear Force Kips	Shear Cap Kips	Resistance Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Steel Area In2	Mom. Cap Kft	Des. Thk in	Flexure Ratings Inv	Oper	Shear Ratings Inv	Oper
BOT	-12.9*	6.0	2.6	8.1	207.9	9.9	20.5	67.8	0.5271	10.9	6.62	0.0	0.0	4.3	7.1
MID	0.0	6.0	0.6	8.2	205.9	8.7	20.2	70.7	0.4528	9.7	6.69	58.6	97.7	NA	NA
MID-	-11.7*	6.0	0.4	8.0	207.9	9.9	20.5	67.8	0.5271	10.9	6.62	0.7	1.2	NA	NA
TOP	-13.4*	6.0	2.3	8.1	207.9	9.9	20.5	67.8	0.5271	10.9	6.62	0.2	0.3	4.8	7.9

Member No. = 2 TOP SLAB

Thickness = 9.45 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-10.6*	0.4	8.5	9.3	216.2	10.5	22.4	72.7	0.5271	10.6	7.01	1.1	1.9	19.0	31.7
MID	12.6	0.4	0.9	8.4	224.7	16.2	23.8	62.0	0.8517	16.2	6.89	2.7	4.6	NA	NA
RT	-27.5*	0.4	11.7*	9.1	225.1	16.4	23.8	61.6	0.8671	16.5	6.89	0.0	0.0	2.4	4.0

Member No. = 3 INTERIOR WALL

Thickness = 9.45 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.75 (in)
Bar diameter (mid+) = 0.75 (in)

BOT	-0.4	19.0	0.6	9.8	212.8	8.1	21.8	77.2	0.3955	11.5	7.07	26.6	44.4	9.2	15.4
MID	1.1	19.0	0.6	9.0	212.8	8.1	21.8	77.2	0.3955	11.5	7.07	10.3	17.2	NA	NA
MID-	-1.1	19.0	0.6	9.0	212.8	8.1	21.8	77.2	0.3955	11.5	7.07	10.3	17.2	NA	NA
TOP	-2.7	19.0	0.7	8.7	212.8	8.1	21.8	77.2	0.3955	11.5	7.07	4.4	7.3	8.1	13.6

Member No. = 4 BOTTOM SLAB

Thickness = 9.45 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.00 (in)

LT	-10.2	0.4	8.4	9.4	216.2	10.5	22.4	72.7	0.5271	10.6	7.01	1.5	2.6	48.2	80.4
MID	12.6	0.4	1.4	8.4	223.7	15.5	23.6	63.1	0.8136	15.6	6.89	3.2	5.3	NA	NA
RT	-28.3*	0.4	11.8*	9.0	221.7	14.3	23.3	66.1	0.7366	14.3	6.95	0.0	0.0	2.8	4.7

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

Dead Soil Soil Surch Water LIVE LOADS

M-PT	Load	Press (Max)	Press (Min)	Hgt.	Press (Max)	Pos	Neg
	Kft	Kft	Kft	Kft	Kft	Kft	Kft
EXTERIOR WALL BOTTOM							
1- 0	-8.30	-1.31	-0.65	-0.11	0.28	0.00	-0.80
1- 1	-8.24	-0.16	-0.08	-0.02	-0.01	0.00	-0.80
1- 2	-8.17	0.71	0.35	0.05	-0.21	0.00	-0.81
1- 3	-8.11	1.29	0.65	0.10	-0.33	0.00	-0.81
1- 4	-8.05	1.62	0.81	0.13	-0.37	0.00	-0.82
1- 5	-7.99	1.70	0.85	0.14	-0.35	0.00	-0.86
1- 6	-7.93	1.53	0.76	0.13	-0.29	0.05	-0.94
1- 7	-7.87	1.13	0.57	0.10	-0.18	0.12	-1.04
1- 8	-7.81	0.52	0.26	0.05	-0.04	0.20	-1.15
1- 9	-7.75	-0.30	-0.15	-0.02	0.12	0.29	-1.26
1-10	-7.68	-1.31	-0.65	-0.11	0.28	0.39	-1.37
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-7.68	-1.31	-0.65	-0.11	0.28	0.39	-1.37
2- 1	-1.11	-1.10	-0.55	-0.09	0.24	0.35	-0.55
2- 2	3.70	-0.89	-0.45	-0.07	0.19	0.52	-0.07
2- 3	6.72	-0.68	-0.34	-0.06	0.15	0.89	0.00
2- 4	7.98	-0.47	-0.24	-0.04	0.10	1.10	-0.04
2- 5	7.45	-0.26	-0.13	-0.02	0.06	1.14	-0.14
2- 6	5.15	-0.05	-0.03	0.00	0.01	0.96	-0.24
2- 7	1.08	0.16	0.08	0.01	-0.04	0.59	-0.35
2- 8	-4.77	0.36	0.18	0.03	-0.08	0.23	-0.67
2- 9	-12.39	0.57	0.29	0.05	-0.13	0.05	-1.43
2-10	-21.79	0.78	0.39	0.06	-0.17	0.00	-2.52
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.02	0.03	0.02	0.00	-0.03	0.34	-0.34
3- 1	0.02	0.03	0.01	0.00	-0.02	0.18	-0.18
3- 2	0.01	0.02	0.01	0.00	-0.02	0.05	-0.06
3- 3	0.01	0.01	0.01	0.00	-0.01	0.18	-0.18
3- 4	0.00	0.01	0.00	0.00	-0.01	0.34	-0.34
3- 5	0.00	0.00	0.00	0.00	0.00	0.51	-0.51
3- 6	0.00	-0.01	0.00	0.00	0.01	0.68	-0.68

3- 7	-0.01	-0.01	-0.01	0.00	0.01	0.85	-0.85
3- 8	-0.01	-0.02	-0.01	0.00	0.02	1.02	-1.02
3- 9	-0.02	-0.03	-0.01	0.00	0.02	1.19	-1.19
3-10	-0.02	-0.03	-0.02	0.00	0.03	1.36	-1.36

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-8.30	-1.31	-0.65	-0.11	0.28	0.00	-0.80
4- 1	-1.32	-1.10	-0.55	-0.09	0.23	0.13	-0.20
4- 2	3.77	-0.89	-0.45	-0.07	0.19	0.43	0.00
4- 3	6.99	-0.68	-0.34	-0.06	0.15	0.75	0.00
4- 4	8.34	-0.47	-0.24	-0.04	0.10	0.89	0.00
4- 5	7.80	-0.27	-0.13	-0.02	0.06	0.85	0.00
4- 6	5.40	-0.06	-0.03	0.00	0.01	0.62	0.00
4- 7	1.11	0.15	0.07	0.01	-0.03	0.25	-0.07
4- 8	-5.05	0.36	0.18	0.03	-0.07	0.00	-0.48
4- 9	-13.09	0.56	0.28	0.05	-0.12	0.00	-1.28
4-10	-23.00	0.77	0.39	0.06	-0.16	0.00	-2.27

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.11	2.26	1.13	0.17	-0.59	0.18	-0.21
1- 1	0.11	1.75	0.87	0.14	-0.42	0.18	-0.21
1- 2	0.11	1.26	0.63	0.10	-0.27	0.18	-0.21
1- 3	0.11	0.79	0.40	0.07	-0.14	0.18	-0.21
1- 4	0.11	0.35	0.17	0.03	-0.02	0.18	-0.21
1- 5	0.11	-0.08	-0.04	0.00	0.08	0.18	-0.21
1- 6	0.11	-0.49	-0.25	-0.03	0.15	0.18	-0.21
1- 7	0.11	-0.88	-0.44	-0.07	0.22	0.18	-0.21

1- 8	0.11	-1.25	-0.63	-0.10	0.26	0.18	-0.21
1- 9	0.11	-1.60	-0.80	-0.14	0.29	0.18	-0.21
1-10	0.11	-1.93	-0.96	-0.17	0.30	0.18	-0.21

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	6.30	0.18	0.09	0.01	-0.04	0.95	-0.09
2- 1	4.80	0.18	0.09	0.01	-0.04	0.72	-0.09
2- 2	3.30	0.18	0.09	0.01	-0.04	0.57	-0.12
2- 3	1.81	0.18	0.09	0.01	-0.04	0.43	-0.16
2- 4	0.31	0.18	0.09	0.01	-0.04	0.30	-0.25
2- 5	-1.19	0.18	0.09	0.01	-0.04	0.19	-0.37
2- 6	-2.69	0.18	0.09	0.01	-0.04	0.11	-0.50
2- 7	-4.19	0.18	0.09	0.01	-0.04	0.05	-0.65
2- 8	-5.68	0.18	0.09	0.01	-0.04	0.01	-0.80
2- 9	-7.18	0.18	0.09	0.01	-0.04	0.00	-0.96
2-10	-8.68	0.18	0.09	0.01	-0.04	0.00	-1.04

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 1	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 2	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 3	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 4	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 5	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 6	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 7	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 8	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3- 9	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29
3-10	-0.01	-0.01	-0.01	0.00	0.01	0.29	-0.29

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	6.68	0.18	0.09	0.01	-0.04	0.67	0.00
4- 1	5.09	0.18	0.09	0.01	-0.04	0.52	0.00
4- 2	3.51	0.18	0.09	0.01	-0.04	0.36	0.00
4- 3	1.93	0.18	0.09	0.01	-0.04	0.20	0.00
4- 4	0.34	0.18	0.09	0.01	-0.04	0.04	0.00
4- 5	-1.24	0.18	0.09	0.01	-0.04	0.00	-0.12

4- 6	-2.82	0.18	0.09	0.01	-0.04	0.00	-0.28
4- 7	-4.41	0.18	0.09	0.01	-0.04	0.00	-0.44
4- 8	-5.99	0.18	0.09	0.01	-0.04	0.00	-0.60
4- 9	-7.57	0.18	0.09	0.01	-0.04	0.00	-0.76
4-10	-9.16	0.18	0.09	0.01	-0.04	0.00	-0.91

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-8.30	-1.31	-0.65	-0.11	0.28	0.00	-1.21
1- 1	-8.24	-0.16	-0.08	-0.02	-0.01	0.00	-1.21
1- 2	-8.17	0.71	0.35	0.05	-0.21	0.00	-1.21
1- 3	-8.11	1.29	0.65	0.10	-0.33	0.00	-1.22
1- 4	-8.05	1.62	0.81	0.13	-0.37	0.00	-1.24
1- 5	-7.99	1.70	0.85	0.14	-0.35	0.00	-1.29
1- 6	-7.93	1.53	0.76	0.13	-0.29	0.07	-1.41
1- 7	-7.87	1.13	0.57	0.10	-0.18	0.18	-1.56
1- 8	-7.81	0.52	0.26	0.05	-0.04	0.30	-1.72
1- 9	-7.75	-0.30	-0.15	-0.02	0.12	0.44	-1.89
1-10	-7.68	-1.31	-0.65	-0.11	0.28	0.58	-2.06
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-7.68	-1.31	-0.65	-0.11	0.28	0.58	-2.06
2- 1	-1.11	-1.10	-0.55	-0.09	0.24	0.53	-0.82
2- 2	3.70	-0.89	-0.45	-0.07	0.19	0.76	-0.10
2- 3	6.72	-0.68	-0.34	-0.06	0.15	1.31	0.00
2- 4	7.98	-0.47	-0.24	-0.04	0.10	1.64	-0.06
2- 5	7.45	-0.26	-0.13	-0.02	0.06	1.70	-0.20
2- 6	5.15	-0.05	-0.03	0.00	0.01	1.44	-0.36

2- 7	1.08	0.16	0.08	0.01	-0.04	0.87	-0.52
2- 8	-4.77	0.36	0.18	0.03	-0.08	0.33	-1.00
2- 9	-12.39	0.57	0.29	0.05	-0.13	0.08	-2.15
2-10	-21.79	0.78	0.39	0.06	-0.17	0.00	-3.77

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.02	0.03	0.02	0.00	-0.03	0.50	-0.50
3- 1	0.02	0.03	0.01	0.00	-0.02	0.27	-0.26
3- 2	0.01	0.02	0.01	0.00	-0.02	0.08	-0.08
3- 3	0.01	0.01	0.01	0.00	-0.01	0.26	-0.27
3- 4	0.00	0.01	0.00	0.00	-0.01	0.52	-0.52
3- 5	0.00	0.00	0.00	0.00	0.00	0.77	-0.77
3- 6	0.00	-0.01	0.00	0.00	0.01	1.02	-1.02
3- 7	-0.01	-0.01	-0.01	0.00	0.01	1.27	-1.27
3- 8	-0.01	-0.02	-0.01	0.00	0.02	1.53	-1.53
3- 9	-0.02	-0.03	-0.01	0.00	0.02	1.78	-1.78
3-10	-0.02	-0.03	-0.02	0.00	0.03	2.03	-2.03

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-8.30	-1.31	-0.65	-0.11	0.28	0.00	-1.21
4- 1	-1.32	-1.10	-0.55	-0.09	0.23	0.19	-0.30
4- 2	3.77	-0.89	-0.45	-0.07	0.19	0.65	0.00
4- 3	6.99	-0.68	-0.34	-0.06	0.15	1.13	0.00
4- 4	8.34	-0.47	-0.24	-0.04	0.10	1.34	0.00
4- 5	7.80	-0.27	-0.13	-0.02	0.06	1.27	0.00
4- 6	5.40	-0.06	-0.03	0.00	0.01	0.92	0.00
4- 7	1.11	0.15	0.07	0.01	-0.03	0.37	-0.11
4- 8	-5.05	0.36	0.18	0.03	-0.07	0.01	-0.72
4- 9	-13.09	0.56	0.28	0.05	-0.12	0.00	-1.94
4-10	-23.00	0.77	0.39	0.06	-0.16	0.00	-3.43

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Press K	Water Hgt. K	LIVE LOADS Press (Max) Pos K	Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.11	2.26	1.13	0.17	-0.59	0.26	-0.31
1- 1	0.11	1.75	0.87	0.14	-0.42	0.26	-0.31
1- 2	0.11	1.26	0.63	0.10	-0.27	0.26	-0.31
1- 3	0.11	0.79	0.40	0.07	-0.14	0.26	-0.31
1- 4	0.11	0.35	0.17	0.03	-0.02	0.26	-0.31
1- 5	0.11	-0.08	-0.04	0.00	0.08	0.26	-0.31
1- 6	0.11	-0.49	-0.25	-0.03	0.15	0.26	-0.31
1- 7	0.11	-0.88	-0.44	-0.07	0.22	0.26	-0.31
1- 8	0.11	-1.25	-0.63	-0.10	0.26	0.26	-0.31
1- 9	0.11	-1.60	-0.80	-0.14	0.29	0.26	-0.31
1-10	0.11	-1.93	-0.96	-0.17	0.30	0.26	-0.31
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	6.30	0.18	0.09	0.01	-0.04	1.42	-0.13
2- 1	4.80	0.18	0.09	0.01	-0.04	1.07	-0.14
2- 2	3.30	0.18	0.09	0.01	-0.04	0.84	-0.18
2- 3	1.81	0.18	0.09	0.01	-0.04	0.63	-0.25
2- 4	0.31	0.18	0.09	0.01	-0.04	0.44	-0.39
2- 5	-1.19	0.18	0.09	0.01	-0.04	0.28	-0.56
2- 6	-2.69	0.18	0.09	0.01	-0.04	0.17	-0.75
2- 7	-4.19	0.18	0.09	0.01	-0.04	0.08	-0.97
2- 8	-5.68	0.18	0.09	0.01	-0.04	0.02	-1.21
2- 9	-7.18	0.18	0.09	0.01	-0.04	0.00	-1.44
2-10	-8.68	0.18	0.09	0.01	-0.04	0.00	-1.56
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3- 1	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3- 2	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3- 3	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3- 4	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3- 5	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44

3- 6	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3- 7	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3- 8	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3- 9	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44
3-10	-0.01	-0.01	-0.01	0.00	0.01	0.44	-0.44

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	6.68	0.18	0.09	0.01	-0.04	1.01	0.00
4- 1	5.09	0.18	0.09	0.01	-0.04	0.77	0.00
4- 2	3.51	0.18	0.09	0.01	-0.04	0.54	0.00
4- 3	1.93	0.18	0.09	0.01	-0.04	0.30	0.00
4- 4	0.34	0.18	0.09	0.01	-0.04	0.06	0.00
4- 5	-1.24	0.18	0.09	0.01	-0.04	0.00	-0.19
4- 6	-2.82	0.18	0.09	0.01	-0.04	0.00	-0.43
4- 7	-4.41	0.18	0.09	0.01	-0.04	0.00	-0.67
4- 8	-5.99	0.18	0.09	0.01	-0.04	0.00	-0.91
4- 9	-7.57	0.18	0.09	0.01	-0.04	0.00	-1.15
4-10	-9.16	0.18	0.09	0.01	-0.04	0.00	-1.38

BOTTOM SLAB RIGHT SIDE

INVENTORY RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)

TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)

TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

OPERATING RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2

CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

Bridge No. 849

Member No. = 1 EXTERIOR WALL Thickness = 9.06 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.88 (in)
Bar diameter (mid+) = 0.75 (in)
Bar diameter (mid-) = 0.88 (in)
Bar diameter (top) = 0.88 (in)

	Coin. Moment Kft	Axial Force Kips	Shear Force Kips	Resistance Shear Cap Kips	Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Flexure Steel Area In2	Shear Mom. Cap Kft	Des. Thk in	Ratings Inv	Ratings Oper	Ratings Inv	Ratings Oper
BOT	-13.6*	15.5	5.1	7.4	208.2	10.2	20.5	67.5	0.5401	12.6	6.62	1.3	2.2	2.8	4.7
MID	4.5	15.5	1.3	7.5	207.0	9.4	20.4	69.6	0.4921	11.9	6.69	5.7	9.5	NA	NA
MID-	-9.2	15.5	1.6	7.4	208.2	10.2	20.5	67.5	0.5401	12.6	6.62	1.8	3.0	NA	NA
TOP	-18.9*	15.5	4.0	7.4	208.2	10.2	20.5	67.5	0.5401	12.6	6.62	0.8	1.3	1.5	2.5

Member No. = 2 TOP SLAB Thickness = 9.45 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-16.3*	1.7	14.5*	7.8	216.6	10.8	22.4	72.3	0.5401	11.1	7.01	0.9	1.4	0.6	1.0
MID	28.5*	1.7	5.7	7.7	225.4	16.6	23.9	61.3	0.8785	16.8	6.89	0.6	0.9	NA	NA
RT	-32.8*	1.7	16.0*	7.7	225.7	16.8	23.9	61.1	0.8863	17.0	6.89	0.5	0.8	0.3	0.5

Member No. = 3 INTERIOR WALL Thickness = 9.45 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.75 (in)
Bar diameter (mid+) = 0.75 (in)
Bar diameter (mid-) = 0.75 (in)
Bar diameter (top) = 0.75 (in)

BOT	-3.7	11.1	1.4	7.9	212.9	8.2	21.8	77.0	0.4009	10.2	7.07	2.7	4.5	3.3	5.5
MID	4.1	11.1	1.4	7.9	212.9	8.2	21.8	77.0	0.4009	10.2	7.07	2.5	4.1	NA	NA

MID-	-4.1	11.1	1.4	7.9	212.9	8.2	21.8	77.0	0.4009	10.2	7.07	2.5	4.1	NA	NA
TOP	-11.9*	11.1	1.4	7.9	212.9	8.2	21.8	77.0	0.4009	10.2	7.07	0.9	1.4	3.3	5.5

Member No. = 4 BOTTOM SLAB Thickness = 9.45 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.00 (in)

LT	-13.3*	2.7	6.3	7.8	216.6	10.8	22.4	72.3	0.5401	11.2	7.01	1.4	2.3	15.0	25.0
MID	9.5	2.7	0.3	7.7	224.8	16.2	23.8	62.0	0.8547	16.5	6.89	3.6	6.0	NA	NA
RT	-30.2*	2.7	9.7*	7.8	222.1	14.6	23.4	65.7	0.7512	14.9	6.95	0.4	0.6	0.6	1.0

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Press Kft	Water Hgt. (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-1.73	-4.52	-2.26	-0.57	3.71	0.46	-2.17
1- 1	-1.61	-1.13	-0.57	-0.19	0.87	0.00	-1.80
1- 2	-1.49	1.26	0.63	0.10	-1.10	0.00	-1.57
1- 3	-1.37	2.75	1.37	0.31	-2.30	0.00	-1.42
1- 4	-1.24	3.43	1.72	0.44	-2.81	0.00	-1.61
1- 5	-1.12	3.42	1.71	0.48	-2.75	0.16	-1.97
1- 6	-1.00	2.80	1.40	0.44	-2.20	0.41	-2.45
1- 7	-0.87	1.68	0.84	0.31	-1.26	0.67	-2.94
1- 8	-0.75	0.16	0.08	0.10	-0.03	0.92	-3.42
1- 9	-0.63	-1.67	-0.83	-0.19	1.39	1.18	-3.91
1-10	-0.51	-3.69	-1.85	-0.57	2.91	1.51	-4.40
EXTERIOR WALL TOP							

TOP SLAB LEFT SIDE

2- 0	-0.51	-3.69	-1.85	-0.57	2.91	1.51	-4.40
2- 1	0.56	-3.11	-1.55	-0.48	2.45	3.67	-1.44
2- 2	1.30	-2.52	-1.26	-0.39	1.98	5.47	0.00
2- 3	1.71	-1.93	-0.97	-0.30	1.52	6.88	-0.14
2- 4	1.80	-1.34	-0.67	-0.21	1.06	7.89	-0.65
2- 5	1.56	-0.76	-0.38	-0.12	0.60	7.96	-1.17
2- 6	1.00	-0.17	-0.09	-0.03	0.13	7.11	-1.69
2- 7	0.12	0.42	0.21	0.06	-0.33	5.47	-2.21
2- 8	-1.09	1.00	0.50	0.15	-0.79	3.39	-3.86
2- 9	-2.62	1.59	0.80	0.24	-1.25	1.35	-6.44
2-10	-4.48	2.18	1.09	0.33	-1.72	0.00	-9.71

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.01	0.04	0.02	0.00	-0.04	1.36	-1.36
3- 1	0.00	0.03	0.02	0.00	-0.03	0.85	-0.84
3- 2	0.00	0.02	0.01	0.00	-0.02	0.40	-0.40
3- 3	0.00	0.02	0.01	0.00	-0.02	0.27	-0.28
3- 4	0.00	0.01	0.00	0.00	-0.01	0.75	-0.75
3- 5	0.00	0.00	0.00	0.00	0.00	1.27	-1.27
3- 6	0.00	-0.01	0.00	0.00	0.01	1.79	-1.79
3- 7	0.00	-0.02	-0.01	0.00	0.02	2.30	-2.30
3- 8	0.00	-0.02	-0.01	0.00	0.02	2.83	-2.83
3- 9	0.00	-0.03	-0.02	0.00	0.03	3.35	-3.35
3-10	-0.01	-0.04	-0.02	0.00	0.04	3.87	-3.88

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.73	-4.52	-2.26	-0.57	3.71	0.46	-2.17
4- 1	0.22	-3.80	-1.90	-0.48	3.12	1.01	-0.80
4- 2	1.62	-3.08	-1.54	-0.39	2.53	1.35	-0.07
4- 3	2.47	-2.36	-1.18	-0.30	1.94	1.66	0.00
4- 4	2.75	-1.64	-0.82	-0.21	1.35	1.62	0.00
4- 5	2.48	-0.92	-0.46	-0.12	0.76	1.24	-0.05
4- 6	1.65	-0.20	-0.10	-0.03	0.17	0.74	-0.46
4- 7	0.27	0.52	0.26	0.07	-0.42	0.15	-1.28
4- 8	-1.67	1.24	0.62	0.16	-1.01	0.00	-2.96
4- 9	-4.17	1.96	0.98	0.25	-1.60	0.00	-5.08
4-10	-7.23	2.68	1.34	0.34	-2.19	0.00	-7.62

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	0.10	3.31	1.66	0.36	-2.79	0.31	-0.41
1- 1	0.10	2.43	1.21	0.28	-2.02	0.31	-0.41
1- 2	0.10	1.62	0.81	0.21	-1.32	0.31	-0.41
1- 3	0.10	0.90	0.45	0.14	-0.71	0.31	-0.41
1- 4	0.10	0.27	0.13	0.07	-0.18	0.31	-0.41
1- 5	0.10	-0.28	-0.14	0.00	0.27	0.31	-0.41
1- 6	0.10	-0.75	-0.37	-0.07	0.64	0.31	-0.41
1- 7	0.10	-1.13	-0.56	-0.14	0.93	0.31	-0.41
1- 8	0.10	-1.43	-0.71	-0.21	1.13	0.31	-0.41
1- 9	0.10	-1.64	-0.82	-0.28	1.25	0.31	-0.41
1-10	0.10	-1.77	-0.88	-0.36	1.30	0.31	-0.41
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	1.01	0.48	0.24	0.07	-0.38	4.33	-0.43
2- 1	0.74	0.48	0.24	0.07	-0.38	3.80	-0.78
2- 2	0.47	0.48	0.24	0.07	-0.38	3.33	-1.15
2- 3	0.21	0.48	0.24	0.07	-0.38	2.79	-1.66
2- 4	-0.06	0.48	0.24	0.07	-0.38	2.21	-2.18
2- 5	-0.33	0.48	0.24	0.07	-0.38	1.64	-2.70
2- 6	-0.59	0.48	0.24	0.07	-0.38	1.11	-3.15
2- 7	-0.86	0.48	0.24	0.07	-0.38	0.63	-3.59
2- 8	-1.12	0.48	0.24	0.07	-0.38	0.27	-3.96
2- 9	-1.39	0.48	0.24	0.07	-0.38	0.03	-4.26
2-10	-1.66	0.48	0.24	0.07	-0.38	0.00	-4.37
TOP SLAB RIGHT SIDE							

INTERIOR WALL BOTTOM

3- 0	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 1	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 2	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 3	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 4	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 5	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 6	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 7	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 8	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3- 9	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44
3-10	0.00	-0.01	0.00	0.00	0.01	0.44	-0.44

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	1.83	0.59	0.30	0.08	-0.48	1.36	0.00
4- 1	1.38	0.59	0.30	0.08	-0.48	1.02	0.00
4- 2	0.92	0.59	0.30	0.08	-0.48	0.68	0.00
4- 3	0.46	0.59	0.30	0.08	-0.48	0.34	0.00
4- 4	0.01	0.59	0.30	0.08	-0.48	0.02	-0.23
4- 5	-0.45	0.59	0.30	0.08	-0.48	0.00	-0.57
4- 6	-0.91	0.59	0.30	0.08	-0.48	0.00	-0.91
4- 7	-1.36	0.59	0.30	0.08	-0.48	0.00	-1.25
4- 8	-1.82	0.59	0.30	0.08	-0.48	0.00	-1.58
4- 9	-2.28	0.59	0.30	0.08	-0.48	0.00	-1.92
4-10	-2.73	0.59	0.30	0.08	-0.48	0.00	-2.26

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	Kft	Kft	Kft	Kft	Kft	Kft	Kft

EXTERIOR WALL BOTTOM

1- 0	-1.73	-4.52	-2.26	-0.57	3.71	0.70	-3.26
1- 1	-1.61	-1.13	-0.57	-0.19	0.87	0.00	-2.71
1- 2	-1.49	1.26	0.63	0.10	-1.10	0.00	-2.36
1- 3	-1.37	2.75	1.37	0.31	-2.30	0.00	-2.13
1- 4	-1.24	3.43	1.72	0.44	-2.81	0.00	-2.42
1- 5	-1.12	3.42	1.71	0.48	-2.75	0.24	-2.95
1- 6	-1.00	2.80	1.40	0.44	-2.20	0.62	-3.68
1- 7	-0.87	1.68	0.84	0.31	-1.26	1.00	-4.41
1- 8	-0.75	0.16	0.08	0.10	-0.03	1.38	-5.14
1- 9	-0.63	-1.67	-0.83	-0.19	1.39	1.76	-5.87
1-10	-0.51	-3.69	-1.85	-0.57	2.91	2.27	-6.60

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	-0.51	-3.69	-1.85	-0.57	2.91	2.27	-6.60
2- 1	0.56	-3.11	-1.55	-0.48	2.45	5.51	-2.16
2- 2	1.30	-2.52	-1.26	-0.39	1.98	8.20	0.00
2- 3	1.71	-1.93	-0.97	-0.30	1.52	10.32	-0.20
2- 4	1.80	-1.34	-0.67	-0.21	1.06	11.84	-0.98
2- 5	1.56	-0.76	-0.38	-0.12	0.60	11.94	-1.76
2- 6	1.00	-0.17	-0.09	-0.03	0.13	10.66	-2.54
2- 7	0.12	0.42	0.21	0.06	-0.33	8.20	-3.32
2- 8	-1.09	1.00	0.50	0.15	-0.79	5.08	-5.79
2- 9	-2.62	1.59	0.80	0.24	-1.25	2.02	-9.66
2-10	-4.48	2.18	1.09	0.33	-1.72	0.00	-14.56

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.01	0.04	0.02	0.00	-0.04	2.05	-2.04
3- 1	0.00	0.03	0.02	0.00	-0.03	1.27	-1.26
3- 2	0.00	0.02	0.01	0.00	-0.02	0.59	-0.60
3- 3	0.00	0.02	0.01	0.00	-0.02	0.41	-0.42
3- 4	0.00	0.01	0.00	0.00	-0.01	1.12	-1.12
3- 5	0.00	0.00	0.00	0.00	0.00	1.90	-1.90
3- 6	0.00	-0.01	0.00	0.00	0.01	2.68	-2.68
3- 7	0.00	-0.02	-0.01	0.00	0.02	3.46	-3.46
3- 8	0.00	-0.02	-0.01	0.00	0.02	4.24	-4.24
3- 9	0.00	-0.03	-0.02	0.00	0.03	5.02	-5.03
3-10	-0.01	-0.04	-0.02	0.00	0.04	5.81	-5.81

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.73	-4.52	-2.26	-0.57	3.71	0.70	-3.26
4- 1	0.22	-3.80	-1.90	-0.48	3.12	1.52	-1.19
4- 2	1.62	-3.08	-1.54	-0.39	2.53	2.03	-0.10
4- 3	2.47	-2.36	-1.18	-0.30	1.94	2.50	0.00
4- 4	2.75	-1.64	-0.82	-0.21	1.35	2.43	0.00
4- 5	2.48	-0.92	-0.46	-0.12	0.76	1.86	-0.08
4- 6	1.65	-0.20	-0.10	-0.03	0.17	1.11	-0.69
4- 7	0.27	0.52	0.26	0.07	-0.42	0.22	-1.92
4- 8	-1.67	1.24	0.62	0.16	-1.01	0.00	-4.45
4- 9	-4.17	1.96	0.98	0.25	-1.60	0.00	-7.63
4-10	-7.23	2.68	1.34	0.34	-2.19	0.00	-11.43

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	K	K	K	K	K	K	

EXTERIOR WALL BOTTOM

1- 0	0.10	3.31	1.66	0.36	-2.79	0.47	-0.62
1- 1	0.10	2.43	1.21	0.28	-2.02	0.47	-0.62
1- 2	0.10	1.62	0.81	0.21	-1.32	0.47	-0.62
1- 3	0.10	0.90	0.45	0.14	-0.71	0.47	-0.62
1- 4	0.10	0.27	0.13	0.07	-0.18	0.47	-0.62
1- 5	0.10	-0.28	-0.14	0.00	0.27	0.47	-0.62
1- 6	0.10	-0.75	-0.37	-0.07	0.64	0.47	-0.62
1- 7	0.10	-1.13	-0.56	-0.14	0.93	0.47	-0.62
1- 8	0.10	-1.43	-0.71	-0.21	1.13	0.47	-0.62
1- 9	0.10	-1.64	-0.82	-0.28	1.25	0.47	-0.62
1-10	0.10	-1.77	-0.88	-0.36	1.30	0.47	-0.62

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	1.01	0.48	0.24	0.07	-0.38	6.50	-0.64
2- 1	0.74	0.48	0.24	0.07	-0.38	5.71	-1.16
2- 2	0.47	0.48	0.24	0.07	-0.38	4.99	-1.73
2- 3	0.21	0.48	0.24	0.07	-0.38	4.18	-2.49
2- 4	-0.06	0.48	0.24	0.07	-0.38	3.32	-3.27
2- 5	-0.33	0.48	0.24	0.07	-0.38	2.47	-4.04
2- 6	-0.59	0.48	0.24	0.07	-0.38	1.66	-4.72
2- 7	-0.86	0.48	0.24	0.07	-0.38	0.95	-5.38
2- 8	-1.12	0.48	0.24	0.07	-0.38	0.40	-5.94
2- 9	-1.39	0.48	0.24	0.07	-0.38	0.04	-6.39
2-10	-1.66	0.48	0.24	0.07	-0.38	0.00	-6.55

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 1	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 2	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 3	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 4	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 5	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 6	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 7	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 8	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3- 9	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66
3-10	0.00	-0.01	0.00	0.00	0.01	0.66	-0.66

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	1.83	0.59	0.30	0.08	-0.48	2.04	0.00
4- 1	1.38	0.59	0.30	0.08	-0.48	1.53	0.00
4- 2	0.92	0.59	0.30	0.08	-0.48	1.02	0.00
4- 3	0.46	0.59	0.30	0.08	-0.48	0.52	0.00
4- 4	0.01	0.59	0.30	0.08	-0.48	0.03	-0.35
4- 5	-0.45	0.59	0.30	0.08	-0.48	0.00	-0.86
4- 6	-0.91	0.59	0.30	0.08	-0.48	0.00	-1.36
4- 7	-1.36	0.59	0.30	0.08	-0.48	0.00	-1.87
4- 8	-1.82	0.59	0.30	0.08	-0.48	0.00	-2.38
4- 9	-2.28	0.59	0.30	0.08	-0.48	0.00	-2.88

4-10   -2.73   0.59   0.30   0.08   -0.48   0.00   -3.39

BOTTOM SLAB RIGHT SIDE

INVENTORY RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT.   :   36.000 (TONS)
CONTROLLING MEMBER :   2
CONTROLLING POINT   :   Right
RATING FACTOR   :   0.445
LOAD RATING   :   16.011 (TONS)
ACTION TYPE   :   Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT.   :   54.000 (TONS)
CONTROLLING MEMBER :   2
CONTROLLING POINT   :   Right
RATING FACTOR   :   0.298
LOAD RATING   :   16.102 (TONS)
ACTION TYPE   :   Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT.   :   36.000 (TONS)
CONTROLLING MEMBER :   2
CONTROLLING POINT   :   Right
RATING FACTOR   :   2.881
LOAD RATING   :   103.718 (TONS)
ACTION TYPE   :   Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT.   :   54.000 (TONS)
CONTROLLING MEMBER :   2
CONTROLLING POINT   :   Right
RATING FACTOR   :   1.993
LOAD RATING   :   107.638 (TONS)
ACTION TYPE   :   Shear

OPERATING RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.741
LOAD RATING : 26.691 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.497
LOAD RATING : 26.842 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 4.803
LOAD RATING : 172.898 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 3.323
LOAD RATING : 179.433 (TONS)
ACTION TYPE : Shear

Bridge No. 1359

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.88 (in)
Bar diameter (mid+) = 0.62 (in)
Bar diameter (mid-) = 0.88 (in)
Bar diameter (top) = 0.88 (in)

	Coin. Moment Kft	Axial Force Kips	Shear Force Kips	Resistance Shear Cap Kips	Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Flexure Steel Area In2	Shear Mom. Cap Kft	Des. Thk in	Ratings Inv	Ratings Oper	Ratings Inv	Ratings Oper
BOT	-4.3	0.5	1.9	5.5	154.3	7.9	13.0	43.6	0.5825	8.0	5.43	2.6	4.4	1.8	3.0
MID	0.6	0.5	0.8	5.8	148.4	4.8	12.4	51.2	0.3339	4.9	5.56	6.3	10.6	NA	NA
MID-	-6.2	0.5	1.7	5.5	154.3	7.9	13.0	43.6	0.5825	8.0	5.43	1.5	2.6	NA	NA
TOP	-10.8*	0.5	2.6	5.5	154.3	7.9	13.0	43.6	0.5825	8.0	5.43	0.7	1.2	1.4	2.4

Member No. = 2 TOP SLAB Thickness = 8.27 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-9.6*	0.8	9.7*	5.9	161.4	8.5	14.5	47.9	0.5825	8.6	5.83	0.9	1.6	0.5	0.9
MID	18.7*	0.8	3.9	5.8	169.8	12.8	15.4	37.6	0.9368	12.8	5.71	0.7	1.1	NA	NA
RT	-15.5*	0.8	10.3*	5.8	170.4	13.0	15.5	37.1	0.9592	13.1	5.71	0.8	1.4	0.4	0.6

Member No. = 3 INTERIOR WALL Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.62 (in)
Bar diameter (mid+) = 0.62 (in)
Bar diameter (mid-) = 0.62 (in)

Bar diameter (top) = 0.62 (in)

BOT	-1.2	2.1	1.4	5.7	147.1	4.0	12.2	52.6	0.2776	4.3	5.56	3.0	5.0	2.4	3.9
MID	3.2	2.1	1.4	5.7	147.1	4.0	12.2	52.6	0.2776	4.3	5.56	1.4	2.4	NA	NA
MID-	-2.5	2.1	1.4	5.7	147.1	4.0	12.2	52.6	0.2776	4.3	5.56	1.6	2.6	NA	NA
TOP	-6.9*	2.1	1.5	5.7	147.1	4.0	12.2	52.6	0.2776	4.3	5.56	0.6	1.0	2.3	3.9

Member No. = 4 BOTTOM SLAB Thickness = 8.27 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-3.9	1.9	3.0	6.1	161.4	8.5	14.5	47.9	0.5825	8.8	5.83	3.5	5.8	4.8	7.9
MID	5.7	1.9	0.1	5.8	168.6	12.1	15.3	39.0	0.8830	12.3	5.71	3.2	5.3	NA	NA
RT	-8.4	1.9	3.9	5.9	167.0	11.3	15.0	40.7	0.8163	11.5	5.71	1.7	2.8	1.4	2.4

Member No. = 5 TOP SLAB Thickness = 8.27 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

	Coin. Moment Kft	Axial Force Kips	Shear Force Kips	Resistance Shear Cap Kips	Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Flexure Steel Area In2	Mom. Cap Kft	Shear Des. Thk in	Ratings Inv	Ratings Oper	Ratings Inv	Ratings Oper
LT	-15.0*	0.2	10.0*	5.9	170.4	13.0	15.5	37.1	0.9592	13.0	5.71	0.9	1.4	0.5	0.9
MID	17.4*	0.2	4.6	5.9	169.8	12.8	15.4	37.6	0.9368	12.8	5.71	0.7	1.2	NA	NA
RT	-14.2*	0.2	10.1*	5.9	170.4	13.0	15.5	37.1	0.9592	13.0	5.71	0.9	1.5	0.4	0.6

Member No. = 6 INTERIOR WALL Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.62 (in)
Bar diameter (mid+) = 0.62 (in)
Bar diameter (mid-) = 0.62 (in)
Bar diameter (top) = 0.62 (in)

BOT	-1.6	1.6	1.4	5.7	147.1	4.0	12.2	52.6	0.2776	4.3	5.56	2.6	4.4	2.4	4.0
MID	2.6	1.6	1.4	5.7	147.1	4.0	12.2	52.6	0.2776	4.3	5.56	1.6	2.7	NA	NA
MID-	-2.6	1.6	1.4	5.7	147.1	4.0	12.2	52.6	0.2776	4.3	5.56	1.6	2.7	NA	NA
TOP	-6.9*	1.6	1.4	5.7	147.1	4.0	12.2	52.6	0.2776	4.3	5.56	0.6	1.0	2.4	4.0

Member No. = 7 BOTTOM SLAB Thickness = 8.27 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-8.1	0.0	3.5	5.9	167.0	11.3	15.0	40.7	0.8163	11.3	5.71	1.7	2.8	3.1	5.1
MID	4.0	0.0	0.3	5.8	168.6	12.1	15.3	39.0	0.8830	12.1	5.71	4.4	7.4	NA	NA
RT	-7.0	0.0	3.4	5.9	167.0	11.3	15.0	40.7	0.8163	11.3	5.71	2.0	3.3	1.7	2.8

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Press Kft	Water Hgt. Kft	LIVE LOADS Press (Max) Pos Kft	Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-1.23	-0.51	-0.25	-0.12	0.33	0.41	-1.11
1- 1	-1.18	0.09	0.04	0.00	-0.12	0.00	-0.97
1- 2	-1.13	0.51	0.25	0.09	-0.44	0.00	-0.93
1- 3	-1.09	0.76	0.38	0.15	-0.62	0.00	-1.28
1- 4	-1.04	0.88	0.44	0.19	-0.70	0.03	-1.66
1- 5	-1.00	0.86	0.43	0.21	-0.67	0.16	-2.11
1- 6	-0.95	0.74	0.37	0.19	-0.57	0.29	-2.59
1- 7	-0.90	0.53	0.27	0.15	-0.40	0.41	-3.07
1- 8	-0.86	0.24	0.12	0.09	-0.19	0.54	-3.55
1- 9	-0.81	-0.10	-0.05	0.00	0.06	0.67	-4.04
1-10	-0.76	-0.49	-0.24	-0.12	0.32	0.83	-4.53

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	-0.76	-0.49	-0.24	-0.12	0.32	0.83	-4.53
2- 1	0.09	-0.42	-0.21	-0.10	0.28	2.79	-1.70
2- 2	0.72	-0.35	-0.18	-0.09	0.23	4.75	-0.10
2- 3	1.13	-0.29	-0.14	-0.07	0.19	6.50	-0.15
2- 4	1.32	-0.22	-0.11	-0.05	0.14	7.61	-0.46
2- 5	1.28	-0.15	-0.08	-0.04	0.10	7.87	-0.77
2- 6	1.03	-0.09	-0.04	-0.02	0.05	7.25	-1.08
2- 7	0.55	-0.02	-0.01	-0.01	0.01	5.84	-1.40
2- 8	-0.15	0.05	0.02	0.01	-0.03	3.92	-2.21
2- 9	-1.07	0.11	0.06	0.03	-0.08	1.87	-4.05
2-10	-2.21	0.18	0.09	0.04	-0.12	0.32	-6.77

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.22	-0.05	-0.02	-0.02	0.02	1.06	-0.84
3- 1	0.21	-0.05	-0.03	-0.02	0.03	0.65	-0.41
3- 2	0.21	-0.06	-0.03	-0.02	0.03	0.26	0.00
3- 3	0.20	-0.06	-0.03	-0.02	0.04	0.48	-0.33
3- 4	0.19	-0.07	-0.03	-0.02	0.04	0.91	-0.77
3- 5	0.18	-0.07	-0.04	-0.02	0.05	1.34	-1.21
3- 6	0.17	-0.08	-0.04	-0.02	0.05	1.78	-1.65
3- 7	0.16	-0.09	-0.04	-0.02	0.06	2.21	-2.08
3- 8	0.15	-0.09	-0.05	-0.02	0.07	2.64	-2.52
3- 9	0.14	-0.10	-0.05	-0.02	0.07	3.08	-2.96
3-10	0.14	-0.10	-0.05	-0.02	0.08	3.51	-3.41

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.23	-0.51	-0.25	-0.12	0.33	0.41	-1.11
4- 1	-0.03	-0.44	-0.22	-0.10	0.29	0.72	-0.24
4- 2	0.86	-0.37	-0.19	-0.09	0.24	1.15	0.00
4- 3	1.44	-0.31	-0.15	-0.07	0.20	1.47	0.00
4- 4	1.72	-0.24	-0.12	-0.05	0.16	1.59	0.00
4- 5	1.69	-0.17	-0.09	-0.04	0.11	1.51	0.00
4- 6	1.36	-0.10	-0.05	-0.02	0.07	1.24	0.00
4- 7	0.73	-0.04	-0.02	-0.01	0.03	0.79	-0.13
4- 8	-0.22	0.03	0.02	0.01	-0.02	0.27	-0.49

4- 9	-1.46	0.10	0.05	0.03	-0.06	0.00	-1.46
4-10	-3.01	0.17	0.08	0.04	-0.11	0.00	-2.68

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-2.07	0.08	0.04	0.02	-0.05	0.82	-6.59
5- 1	-1.04	0.07	0.03	0.02	-0.04	2.20	-3.97
5- 2	-0.23	0.06	0.03	0.02	-0.03	4.02	-2.26
5- 3	0.36	0.04	0.02	0.01	-0.03	5.82	-1.48
5- 4	0.72	0.03	0.02	0.01	-0.02	7.08	-1.14
5- 5	0.87	0.02	0.01	0.01	-0.01	7.51	-0.85
5- 6	0.79	0.01	0.01	0.00	-0.01	7.07	-1.08
5- 7	0.49	0.00	0.00	0.00	0.00	5.81	-1.40
5- 8	-0.03	-0.01	0.00	0.00	0.00	4.18	-2.12
5- 9	-0.77	-0.02	-0.01	-0.01	0.01	2.42	-3.79
5-10	-1.73	-0.03	-0.02	-0.01	0.02	0.95	-6.40

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

6- 0	0.01	0.02	0.01	0.00	-0.02	0.94	-0.96
6- 1	0.01	0.02	0.01	0.00	-0.02	0.53	-0.56
6- 2	0.00	0.01	0.01	0.00	-0.01	0.16	-0.17
6- 3	0.00	0.01	0.00	0.00	-0.01	0.36	-0.36
6- 4	0.00	0.00	0.00	0.00	0.00	0.79	-0.79
6- 5	0.00	0.00	0.00	0.00	0.00	1.22	-1.22
6- 6	0.00	0.00	0.00	0.00	0.00	1.65	-1.65
6- 7	0.00	-0.01	0.00	0.00	0.01	2.08	-2.08
6- 8	0.00	-0.01	-0.01	0.00	0.01	2.51	-2.52
6- 9	-0.01	-0.02	-0.01	0.00	0.02	2.94	-2.95
6-10	-0.01	-0.02	-0.01	0.00	0.02	3.37	-3.38

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

7- 0	-2.79	0.12	0.06	0.02	-0.08	0.00	-2.60
7- 1	-1.38	0.10	0.05	0.02	-0.07	0.00	-1.47
7- 2	-0.28	0.08	0.04	0.02	-0.06	0.29	-0.58
7- 3	0.52	0.06	0.03	0.01	-0.04	0.69	-0.22
7- 4	1.02	0.05	0.02	0.01	-0.03	0.99	0.00
7- 5	1.21	0.03	0.01	0.01	-0.02	1.09	0.00
7- 6	1.09	0.01	0.00	0.00	0.00	1.00	0.00

7- 7	0.67	-0.01	-0.01	0.00	0.01	0.74	-0.13
7- 8	-0.05	-0.03	-0.01	0.00	0.02	0.33	-0.43
7- 9	-1.08	-0.05	-0.02	-0.01	0.03	0.02	-1.22
7-10	-2.42	-0.07	-0.03	-0.01	0.05	0.00	-2.28

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

	Dead	Soil	Soil	Surch	Water	LIVE	LOADS
M-PT	Load	Press	Press	Hgt.	Press	Pos	Neg
		(Max)	(Min)		(Max)		
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.07	1.05	0.52	0.20	-0.81	0.29	-0.75
1- 1	0.07	0.76	0.38	0.16	-0.58	0.29	-0.75
1- 2	0.07	0.51	0.25	0.12	-0.37	0.29	-0.75
1- 3	0.07	0.28	0.14	0.08	-0.19	0.29	-0.75
1- 4	0.07	0.07	0.04	0.04	-0.03	0.29	-0.75
1- 5	0.07	-0.11	-0.05	0.00	0.10	0.29	-0.75
1- 6	0.07	-0.26	-0.13	-0.04	0.21	0.29	-0.75
1- 7	0.07	-0.38	-0.19	-0.08	0.29	0.29	-0.75
1- 8	0.07	-0.48	-0.24	-0.12	0.35	0.29	-0.75
1- 9	0.07	-0.56	-0.28	-0.16	0.39	0.29	-0.75
1-10	0.07	-0.61	-0.30	-0.20	0.40	0.29	-0.75
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	0.84	0.06	0.03	0.01	-0.04	4.40	-0.27
2- 1	0.65	0.06	0.03	0.01	-0.04	3.89	-0.56
2- 2	0.45	0.06	0.03	0.01	-0.04	3.43	-0.97
2- 3	0.26	0.06	0.03	0.01	-0.04	2.91	-1.43
2- 4	0.07	0.06	0.03	0.01	-0.04	2.36	-1.91
2- 5	-0.13	0.06	0.03	0.01	-0.04	1.81	-2.42
2- 6	-0.32	0.06	0.03	0.01	-0.04	1.28	-2.91
2- 7	-0.51	0.06	0.03	0.01	-0.04	0.80	-3.38

2- 8	-0.71	0.06	0.03	0.01	-0.04	0.39	-3.80
2- 9	-0.90	0.06	0.03	0.01	-0.04	0.11	-4.16
2-10	-1.09	0.06	0.03	0.01	-0.04	0.03	-4.31

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 1	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 2	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 3	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 4	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 5	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 6	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 7	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 8	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3- 9	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67
3-10	-0.01	-0.01	0.00	0.00	0.01	0.66	-0.67

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	1.17	0.06	0.03	0.01	-0.04	0.89	0.00
4- 1	0.91	0.06	0.03	0.01	-0.04	0.69	0.00
4- 2	0.64	0.06	0.03	0.01	-0.04	0.50	0.00
4- 3	0.38	0.06	0.03	0.01	-0.04	0.31	0.00
4- 4	0.11	0.06	0.03	0.01	-0.04	0.12	-0.03
4- 5	-0.16	0.06	0.03	0.01	-0.04	0.00	-0.21
4- 6	-0.42	0.06	0.03	0.01	-0.04	0.00	-0.40
4- 7	-0.69	0.06	0.03	0.01	-0.04	0.00	-0.60
4- 8	-0.95	0.06	0.03	0.01	-0.04	0.00	-0.79
4- 9	-1.22	0.06	0.03	0.01	-0.04	0.00	-0.98
4-10	-1.48	0.06	0.03	0.01	-0.04	0.00	-1.17

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	1.00	-0.01	0.00	0.00	0.01	4.43	-0.28
5- 1	0.80	-0.01	0.00	0.00	0.01	4.00	-0.49
5- 2	0.61	-0.01	0.00	0.00	0.01	3.58	-0.86
5- 3	0.42	-0.01	0.00	0.00	0.01	3.12	-1.29
5- 4	0.22	-0.01	0.00	0.00	0.01	2.63	-1.77
5- 5	0.03	-0.01	0.00	0.00	0.01	2.12	-2.28

5- 6	-0.16	-0.01	0.00	0.00	0.01	1.62	-2.79
5- 7	-0.36	-0.01	0.00	0.00	0.01	1.15	-3.28
5- 8	-0.55	-0.01	0.00	0.00	0.01	0.73	-3.73
5- 9	-0.74	-0.01	0.00	0.00	0.01	0.41	-4.12
5-10	-0.94	-0.01	0.00	0.00	0.01	0.30	-4.28

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

6- 0	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 1	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 2	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 3	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 4	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 5	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 6	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 7	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 8	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6- 9	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66
6-10	0.00	-0.01	0.00	0.00	0.01	0.65	-0.66

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

7- 0	1.36	-0.02	-0.01	0.00	0.01	1.08	0.00
7- 1	1.10	-0.02	-0.01	0.00	0.01	0.88	0.00
7- 2	0.83	-0.02	-0.01	0.00	0.01	0.69	0.00
7- 3	0.56	-0.02	-0.01	0.00	0.01	0.50	0.00
7- 4	0.30	-0.02	-0.01	0.00	0.01	0.31	0.00
7- 5	0.03	-0.02	-0.01	0.00	0.01	0.12	-0.07
7- 6	-0.23	-0.02	-0.01	0.00	0.01	0.00	-0.26
7- 7	-0.50	-0.02	-0.01	0.00	0.01	0.00	-0.46
7- 8	-0.76	-0.02	-0.01	0.00	0.01	0.00	-0.65
7- 9	-1.03	-0.02	-0.01	0.00	0.01	0.00	-0.84
7-10	-1.30	-0.02	-0.01	0.00	0.01	0.00	-1.03

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored   MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	Neg
EXTERIOR WALL BOTTOM							
1- 0	-1.23	-0.51	-0.25	-0.12	0.33	0.62	-1.66
1- 1	-1.18	0.09	0.04	0.00	-0.12	0.00	-1.45
1- 2	-1.13	0.51	0.25	0.09	-0.44	0.00	-1.40
1- 3	-1.09	0.76	0.38	0.15	-0.62	0.00	-1.92
1- 4	-1.04	0.88	0.44	0.19	-0.70	0.05	-2.49
1- 5	-1.00	0.86	0.43	0.21	-0.67	0.24	-3.17
1- 6	-0.95	0.74	0.37	0.19	-0.57	0.43	-3.89
1- 7	-0.90	0.53	0.27	0.15	-0.40	0.62	-4.61
1- 8	-0.86	0.24	0.12	0.09	-0.19	0.81	-5.33
1- 9	-0.81	-0.10	-0.05	0.00	0.06	1.01	-6.06
1-10	-0.76	-0.49	-0.24	-0.12	0.32	1.25	-6.80
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-0.76	-0.49	-0.24	-0.12	0.32	1.25	-6.80
2- 1	0.09	-0.42	-0.21	-0.10	0.28	4.18	-2.55
2- 2	0.72	-0.35	-0.18	-0.09	0.23	7.13	-0.15
2- 3	1.13	-0.29	-0.14	-0.07	0.19	9.76	-0.22
2- 4	1.32	-0.22	-0.11	-0.05	0.14	11.42	-0.69
2- 5	1.28	-0.15	-0.08	-0.04	0.10	11.80	-1.16
2- 6	1.03	-0.09	-0.04	-0.02	0.05	10.87	-1.63
2- 7	0.55	-0.02	-0.01	-0.01	0.01	8.76	-2.09
2- 8	-0.15	0.05	0.02	0.01	-0.03	5.87	-3.32
2- 9	-1.07	0.11	0.06	0.03	-0.08	2.81	-6.08
2-10	-2.21	0.18	0.09	0.04	-0.12	0.48	-10.15
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.22	-0.05	-0.02	-0.02	0.02	1.59	-1.26
3- 1	0.21	-0.05	-0.03	-0.02	0.03	0.98	-0.61
3- 2	0.21	-0.06	-0.03	-0.02	0.03	0.38	0.00
3- 3	0.20	-0.06	-0.03	-0.02	0.04	0.72	-0.50
3- 4	0.19	-0.07	-0.03	-0.02	0.04	1.37	-1.15

3- 5	0.18	-0.07	-0.04	-0.02	0.05	2.02	-1.81
3- 6	0.17	-0.08	-0.04	-0.02	0.05	2.66	-2.47
3- 7	0.16	-0.09	-0.04	-0.02	0.06	3.31	-3.13
3- 8	0.15	-0.09	-0.05	-0.02	0.07	3.97	-3.79
3- 9	0.14	-0.10	-0.05	-0.02	0.07	4.62	-4.45
3-10	0.14	-0.10	-0.05	-0.02	0.08	5.27	-5.11

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.23	-0.51	-0.25	-0.12	0.33	0.62	-1.66
4- 1	-0.03	-0.44	-0.22	-0.10	0.29	1.08	-0.36
4- 2	0.86	-0.37	-0.19	-0.09	0.24	1.72	0.00
4- 3	1.44	-0.31	-0.15	-0.07	0.20	2.21	0.00
4- 4	1.72	-0.24	-0.12	-0.05	0.16	2.38	0.00
4- 5	1.69	-0.17	-0.09	-0.04	0.11	2.26	0.00
4- 6	1.36	-0.10	-0.05	-0.02	0.07	1.87	0.00
4- 7	0.73	-0.04	-0.02	-0.01	0.03	1.19	-0.19
4- 8	-0.22	0.03	0.02	0.01	-0.02	0.40	-0.74
4- 9	-1.46	0.10	0.05	0.03	-0.06	0.00	-2.20
4-10	-3.01	0.17	0.08	0.04	-0.11	0.00	-4.02

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-2.07	0.08	0.04	0.02	-0.05	1.24	-9.89
5- 1	-1.04	0.07	0.03	0.02	-0.04	3.31	-5.96
5- 2	-0.23	0.06	0.03	0.02	-0.03	6.03	-3.40
5- 3	0.36	0.04	0.02	0.01	-0.03	8.72	-2.22
5- 4	0.72	0.03	0.02	0.01	-0.02	10.62	-1.71
5- 5	0.87	0.02	0.01	0.01	-0.01	11.26	-1.27
5- 6	0.79	0.01	0.01	0.00	-0.01	10.60	-1.62
5- 7	0.49	0.00	0.00	0.00	0.00	8.72	-2.10
5- 8	-0.03	-0.01	0.00	0.00	0.00	6.27	-3.18
5- 9	-0.77	-0.02	-0.01	-0.01	0.01	3.63	-5.69
5-10	-1.73	-0.03	-0.02	-0.01	0.02	1.43	-9.60

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

6- 0	0.01	0.02	0.01	0.00	-0.02	1.41	-1.44
6- 1	0.01	0.02	0.01	0.00	-0.02	0.80	-0.85
6- 2	0.00	0.01	0.01	0.00	-0.01	0.24	-0.26

6- 3	0.00	0.01	0.00	0.00	-0.01	0.54	-0.54
6- 4	0.00	0.00	0.00	0.00	0.00	1.19	-1.18
6- 5	0.00	0.00	0.00	0.00	0.00	1.83	-1.83
6- 6	0.00	0.00	0.00	0.00	0.00	2.48	-2.48
6- 7	0.00	-0.01	0.00	0.00	0.01	3.12	-3.13
6- 8	0.00	-0.01	-0.01	0.00	0.01	3.77	-3.77
6- 9	-0.01	-0.02	-0.01	0.00	0.02	4.41	-4.42
6-10	-0.01	-0.02	-0.01	0.00	0.02	5.06	-5.07

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

7- 0	-2.79	0.12	0.06	0.02	-0.08	0.00	-3.89
7- 1	-1.38	0.10	0.05	0.02	-0.07	0.00	-2.21
7- 2	-0.28	0.08	0.04	0.02	-0.06	0.44	-0.87
7- 3	0.52	0.06	0.03	0.01	-0.04	1.04	-0.34
7- 4	1.02	0.05	0.02	0.01	-0.03	1.49	0.00
7- 5	1.21	0.03	0.01	0.01	-0.02	1.63	0.00
7- 6	1.09	0.01	0.00	0.00	0.00	1.50	0.00
7- 7	0.67	-0.01	-0.01	0.00	0.01	1.11	-0.20
7- 8	-0.05	-0.03	-0.01	0.00	0.02	0.49	-0.65
7- 9	-1.08	-0.05	-0.02	-0.01	0.03	0.02	-1.83
7-10	-2.42	-0.07	-0.03	-0.01	0.05	0.00	-3.42

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	K	K	K	K	K	K	K

EXTERIOR WALL BOTTOM

1- 0	0.07	1.05	0.52	0.20	-0.81	0.44	-1.13
1- 1	0.07	0.76	0.38	0.16	-0.58	0.44	-1.13
1- 2	0.07	0.51	0.25	0.12	-0.37	0.44	-1.13
1- 3	0.07	0.28	0.14	0.08	-0.19	0.44	-1.13

1- 4	0.07	0.07	0.04	0.04	-0.03	0.44	-1.13
1- 5	0.07	-0.11	-0.05	0.00	0.10	0.44	-1.13
1- 6	0.07	-0.26	-0.13	-0.04	0.21	0.44	-1.13
1- 7	0.07	-0.38	-0.19	-0.08	0.29	0.44	-1.13
1- 8	0.07	-0.48	-0.24	-0.12	0.35	0.44	-1.13
1- 9	0.07	-0.56	-0.28	-0.16	0.39	0.44	-1.13
1-10	0.07	-0.61	-0.30	-0.20	0.40	0.44	-1.13

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	0.84	0.06	0.03	0.01	-0.04	6.60	-0.41
2- 1	0.65	0.06	0.03	0.01	-0.04	5.84	-0.83
2- 2	0.45	0.06	0.03	0.01	-0.04	5.15	-1.45
2- 3	0.26	0.06	0.03	0.01	-0.04	4.37	-2.14
2- 4	0.07	0.06	0.03	0.01	-0.04	3.54	-2.87
2- 5	-0.13	0.06	0.03	0.01	-0.04	2.71	-3.62
2- 6	-0.32	0.06	0.03	0.01	-0.04	1.91	-4.37
2- 7	-0.51	0.06	0.03	0.01	-0.04	1.20	-5.07
2- 8	-0.71	0.06	0.03	0.01	-0.04	0.59	-5.71
2- 9	-0.90	0.06	0.03	0.01	-0.04	0.17	-6.24
2-10	-1.09	0.06	0.03	0.01	-0.04	0.04	-6.46

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 1	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 2	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 3	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 4	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 5	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 6	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 7	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 8	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3- 9	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00
3-10	-0.01	-0.01	0.00	0.00	0.01	0.99	-1.00

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	1.17	0.06	0.03	0.01	-0.04	1.33	0.00
4- 1	0.91	0.06	0.03	0.01	-0.04	1.04	0.00

4- 2	0.64	0.06	0.03	0.01	-0.04	0.75	0.00
4- 3	0.38	0.06	0.03	0.01	-0.04	0.47	0.00
4- 4	0.11	0.06	0.03	0.01	-0.04	0.18	-0.05
4- 5	-0.16	0.06	0.03	0.01	-0.04	0.00	-0.32
4- 6	-0.42	0.06	0.03	0.01	-0.04	0.00	-0.61
4- 7	-0.69	0.06	0.03	0.01	-0.04	0.00	-0.90
4- 8	-0.95	0.06	0.03	0.01	-0.04	0.00	-1.18
4- 9	-1.22	0.06	0.03	0.01	-0.04	0.00	-1.47
4-10	-1.48	0.06	0.03	0.01	-0.04	0.00	-1.76

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	1.00	-0.01	0.00	0.00	0.01	6.65	-0.41
5- 1	0.80	-0.01	0.00	0.00	0.01	6.00	-0.73
5- 2	0.61	-0.01	0.00	0.00	0.01	5.37	-1.28
5- 3	0.42	-0.01	0.00	0.00	0.01	4.68	-1.94
5- 4	0.22	-0.01	0.00	0.00	0.01	3.94	-2.66
5- 5	0.03	-0.01	0.00	0.00	0.01	3.18	-3.42
5- 6	-0.16	-0.01	0.00	0.00	0.01	2.43	-4.19
5- 7	-0.36	-0.01	0.00	0.00	0.01	1.72	-4.92
5- 8	-0.55	-0.01	0.00	0.00	0.01	1.10	-5.60
5- 9	-0.74	-0.01	0.00	0.00	0.01	0.61	-6.19
5-10	-0.94	-0.01	0.00	0.00	0.01	0.45	-6.41

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

6- 0	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 1	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 2	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 3	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 4	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 5	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 6	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 7	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 8	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6- 9	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98
6-10	0.00	-0.01	0.00	0.00	0.01	0.98	-0.98

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

7- 0	1.36	-0.02	-0.01	0.00	0.01	1.61	0.00
7- 1	1.10	-0.02	-0.01	0.00	0.01	1.33	0.00
7- 2	0.83	-0.02	-0.01	0.00	0.01	1.04	0.00
7- 3	0.56	-0.02	-0.01	0.00	0.01	0.75	0.00
7- 4	0.30	-0.02	-0.01	0.00	0.01	0.46	0.00
7- 5	0.03	-0.02	-0.01	0.00	0.01	0.17	-0.11
7- 6	-0.23	-0.02	-0.01	0.00	0.01	0.00	-0.40
7- 7	-0.50	-0.02	-0.01	0.00	0.01	0.00	-0.68
7- 8	-0.76	-0.02	-0.01	0.00	0.01	0.00	-0.97
7- 9	-1.03	-0.02	-0.01	0.00	0.01	0.00	-1.26
7-10	-1.30	-0.02	-0.01	0.00	0.01	0.00	-1.55

BOTTOM SLAB RIGHT SIDE

INVENTORY RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.372
LOAD RATING : 13.379 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.248
LOAD RATING : 13.393 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 2.894
LOAD RATING : 104.168 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 1.945
LOAD RATING : 105.056 (TONS)
ACTION TYPE : Shear

OPERATING RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.620
LOAD RATING : 22.302 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.413
LOAD RATING : 22.326 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 4.824
LOAD RATING : 173.647 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right

RATING FACTOR	:	3.243
LOAD RATING	:	175.129 (TONS)
ACTION TYPE	:	Shear

Bridge No. 1878

Member No. = 1 EXTERIOR WALL Thickness = 17.00 (in)

Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 1.13 (in)
Bar diameter (mid+) = 1.13 (in)
Bar diameter (mid-) = 1.13 (in)
Bar diameter (top) = 1.13 (in)

	Coin. Moment Kft	Axial Force Kips	Shear Force Kips	Resistance Shear Cap Kips	Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Flexure Steel Area In2	Mom. Cap Kft	Shear Des. Thk in	Ratings Inv	Ratings Oper	Ratings Inv	Ratings Oper
BOT	-51.5	7.6	10.1	15.0	355.2	75.5	80.8	95.4	1.9512	76.0	14.44	2.6	4.3	8.0	13.3
MID	17.4	7.6	1.9	14.7	363.3	85.7	85.0	86.9	2.2556	85.7	14.44	16.6	27.7	NA	NA
MID-	-47.0	7.6	0.9	14.7	355.2	75.5	80.8	95.4	1.9512	76.0	14.44	3.1	5.2	NA	NA
TOP	-37.3	7.6	5.8	14.8	355.2	75.5	80.8	95.4	1.9512	76.0	14.44	2.8	4.7	3.1	5.1

Member No. = 2 TOP SLAB Thickness = 15.00 (in)

Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-33.8	3.4	12.3	12.7	319.5	63.8	64.3	74.6	1.9512	63.9	12.44	2.8	4.7	1.6	2.7
MID	45.7	3.4	3.5	12.7	371.0	109.6	86.7	20.2	3.8961	105.8	12.44	3.1	5.2	NA	NA
RT	-33.7	3.4	12.3	12.7	319.5	63.8	64.3	74.6	1.9512	63.9	12.44	2.8	4.7	0.7	1.2

Member No. = 4 BOTTOM SLAB Thickness = 17.00 (in)

Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-48.1	4.5	12.1	15.2	355.2	75.5	80.8	95.4	1.9512	75.8	14.44	3.2	5.4	3.4	5.6
MID	52.8	4.5	0.2	14.7	448.1	166.2	129.3	-2.7	5.4545	127.2	14.44	5.5	9.2	NA	NA
RT	-48.2	4.5	12.1	15.2	355.2	75.5	80.8	95.4	1.9512	75.8	14.44	3.3	5.4	1.5	2.5

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	-16.60	-10.48	-5.24	-0.94	9.58	0.00	-9.24
1- 1	-15.43	3.09	1.55	0.10	-2.94	0.00	-8.99
1- 2	-14.26	12.57	6.28	0.92	-11.61	0.00	-8.80
1- 3	-13.08	18.37	9.19	1.51	-16.88	0.00	-9.07
1- 4	-11.91	20.96	10.48	1.88	-19.16	0.00	-9.34
1- 5	-10.74	20.76	10.38	2.02	-18.88	0.00	-9.61
1- 6	-9.56	18.21	9.11	1.93	-16.47	0.00	-9.88
1- 7	-8.39	13.77	6.88	1.62	-12.36	0.00	-10.14
1- 8	-7.22	7.86	3.93	1.08	-6.96	0.00	-10.41
1- 9	-6.04	0.93	0.46	0.31	-0.71	0.11	-10.68
1-10	-4.87	-6.59	-3.29	-0.68	5.97	0.81	-10.95
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-4.87	-6.59	-3.29	-0.68	5.97	0.81	-10.95
2- 1	0.08	-6.58	-3.29	-0.69	5.96	3.78	-4.04
2- 2	3.94	-6.57	-3.28	-0.69	5.95	7.70	-0.14
2- 3	6.69	-6.56	-3.28	-0.69	5.94	12.11	0.00
2- 4	8.34	-6.55	-3.27	-0.69	5.93	14.25	0.00
2- 5	8.90	-6.54	-3.27	-0.69	5.92	14.17	0.00
2- 6	8.35	-6.53	-3.26	-0.69	5.91	14.14	0.00
2- 7	6.70	-6.51	-3.26	-0.69	5.90	11.93	0.00
2- 8	3.96	-6.50	-3.25	-0.69	5.88	7.57	-0.14
2- 9	0.11	-6.49	-3.25	-0.69	5.87	3.85	-4.05
2-10	-4.83	-6.48	-3.24	-0.69	5.86	0.82	-10.94
TOP SLAB RIGHT SIDE							

BOTTOM SLAB LEFT SIDE

4- 0	-16.60	-10.48	-5.24	-0.94	9.58	0.00	-9.24
4- 1	-3.28	-10.49	-5.25	-0.94	9.59	0.07	-2.77
4- 2	7.09	-10.51	-5.25	-0.94	9.61	3.10	0.00
4- 3	14.49	-10.52	-5.26	-0.94	9.62	6.65	0.00
4- 4	18.93	-10.53	-5.27	-0.94	9.63	8.79	0.00
4- 5	20.41	-10.54	-5.27	-0.94	9.64	9.50	0.00
4- 6	18.92	-10.55	-5.28	-0.94	9.65	8.79	0.00
4- 7	14.47	-10.57	-5.28	-0.94	9.66	6.66	0.00
4- 8	7.06	-10.58	-5.29	-0.94	9.68	3.10	0.00
4- 9	-3.31	-10.59	-5.29	-0.94	9.69	0.09	-2.72
4-10	-16.64	-10.60	-5.30	-0.94	9.70	0.00	-9.19

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Press	Water Hgt.	LIVE LOADS Press (Max) Pos	Neg
	K	K	K	K	K	K	K

EXTERIOR WALL BOTTOM

1- 0	0.60	8.12	4.06	0.60	-7.50	0.30	-0.35
1- 1	0.60	5.89	2.95	0.48	-5.42	0.30	-0.35
1- 2	0.60	3.89	1.95	0.36	-3.55	0.30	-0.35
1- 3	0.60	2.12	1.06	0.25	-1.91	0.30	-0.35
1- 4	0.60	0.58	0.29	0.13	-0.48	0.30	-0.35
1- 5	0.60	-0.74	-0.37	0.01	0.73	0.30	-0.35
1- 6	0.60	-1.84	-0.92	-0.10	1.72	0.30	-0.35
1- 7	0.60	-2.70	-1.35	-0.22	2.48	0.30	-0.35
1- 8	0.60	-3.34	-1.67	-0.34	3.03	0.30	-0.35
1- 9	0.60	-3.75	-1.88	-0.45	3.36	0.30	-0.35
1-10	0.60	-3.94	-1.97	-0.57	3.47	0.30	-0.35

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	2.27	0.00	0.00	0.00	0.00	5.29	0.00
2- 1	1.82	0.00	0.00	0.00	0.00	4.23	-0.21
2- 2	1.36	0.00	0.00	0.00	0.00	3.47	-0.53
2- 3	0.91	0.00	0.00	0.00	0.00	2.74	-0.94
2- 4	0.46	0.00	0.00	0.00	0.00	2.13	-1.35
2- 5	0.00	0.00	0.00	0.00	0.00	1.63	-1.84
2- 6	-0.45	0.00	0.00	0.00	0.00	1.14	-2.36
2- 7	-0.91	0.00	0.00	0.00	0.00	0.70	-3.05
2- 8	-1.36	0.00	0.00	0.00	0.00	0.36	-3.80
2- 9	-1.81	0.00	0.00	0.00	0.00	0.09	-4.55
2-10	-2.27	0.00	0.00	0.00	0.00	0.00	-5.24

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

4- 0	6.11	0.00	0.00	0.00	0.00	2.97	0.00
4- 1	4.89	0.00	0.00	0.00	0.00	2.38	0.00
4- 2	3.67	0.00	0.00	0.00	0.00	1.79	0.00
4- 3	2.44	0.00	0.00	0.00	0.00	1.21	0.00
4- 4	1.22	0.00	0.00	0.00	0.00	0.62	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.08	-0.08
4- 6	-1.23	0.00	0.00	0.00	0.00	0.00	-0.62
4- 7	-2.45	0.00	0.00	0.00	0.00	0.00	-1.20
4- 8	-3.67	0.00	0.00	0.00	0.00	0.00	-1.79
4- 9	-4.89	0.00	0.00	0.00	0.00	0.00	-2.38
4-10	-6.12	0.00	0.00	0.00	0.00	0.00	-2.96

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	Kft	Kft	Kft	Kft	Kft	Kft	Kft

EXTERIOR WALL BOTTOM

1- 0	-16.60	-10.48	-5.24	-0.94	9.58	0.00	-13.87
1- 1	-15.43	3.09	1.55	0.10	-2.94	0.00	-13.49
1- 2	-14.26	12.57	6.28	0.92	-11.61	0.00	-13.21
1- 3	-13.08	18.37	9.19	1.51	-16.88	0.00	-13.61
1- 4	-11.91	20.96	10.48	1.88	-19.16	0.00	-14.01
1- 5	-10.74	20.76	10.38	2.02	-18.88	0.00	-14.41
1- 6	-9.56	18.21	9.11	1.93	-16.47	0.00	-14.81
1- 7	-8.39	13.77	6.88	1.62	-12.36	0.00	-15.21
1- 8	-7.22	7.86	3.93	1.08	-6.96	0.00	-15.62
1- 9	-6.04	0.93	0.46	0.31	-0.71	0.16	-16.02
1-10	-4.87	-6.59	-3.29	-0.68	5.97	1.21	-16.42

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	-4.87	-6.59	-3.29	-0.68	5.97	1.21	-16.42
2- 1	0.08	-6.58	-3.29	-0.69	5.96	5.67	-6.07
2- 2	3.94	-6.57	-3.28	-0.69	5.95	11.55	-0.20
2- 3	6.69	-6.56	-3.28	-0.69	5.94	18.17	0.00
2- 4	8.34	-6.55	-3.27	-0.69	5.93	21.37	0.00
2- 5	8.90	-6.54	-3.27	-0.69	5.92	21.26	0.00
2- 6	8.35	-6.53	-3.26	-0.69	5.91	21.22	0.00
2- 7	6.70	-6.51	-3.26	-0.69	5.90	17.90	0.00
2- 8	3.96	-6.50	-3.25	-0.69	5.88	11.35	-0.21
2- 9	0.11	-6.49	-3.25	-0.69	5.87	5.78	-6.08
2-10	-4.83	-6.48	-3.24	-0.69	5.86	1.23	-16.41

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

4- 0	-16.60	-10.48	-5.24	-0.94	9.58	0.00	-13.87
4- 1	-3.28	-10.49	-5.25	-0.94	9.59	0.11	-4.16
4- 2	7.09	-10.51	-5.25	-0.94	9.61	4.65	0.00
4- 3	14.49	-10.52	-5.26	-0.94	9.62	9.98	0.00
4- 4	18.93	-10.53	-5.27	-0.94	9.63	13.18	0.00
4- 5	20.41	-10.54	-5.27	-0.94	9.64	14.24	0.00
4- 6	18.92	-10.55	-5.28	-0.94	9.65	13.18	0.00
4- 7	14.47	-10.57	-5.28	-0.94	9.66	9.98	0.00
4- 8	7.06	-10.58	-5.29	-0.94	9.68	4.65	0.00
4- 9	-3.31	-10.59	-5.29	-0.94	9.69	0.13	-4.08
4-10	-16.64	-10.60	-5.30	-0.94	9.70	0.00	-13.78

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Press K	Water Hgt. K	LIVE LOADS Press (Max) Pos K	LIVE LOADS Neg K
EXTERIOR WALL BOTTOM							
1- 0	0.60	8.12	4.06	0.60	-7.50	0.46	-0.52
1- 1	0.60	5.89	2.95	0.48	-5.42	0.46	-0.52
1- 2	0.60	3.89	1.95	0.36	-3.55	0.46	-0.52
1- 3	0.60	2.12	1.06	0.25	-1.91	0.46	-0.52
1- 4	0.60	0.58	0.29	0.13	-0.48	0.46	-0.52
1- 5	0.60	-0.74	-0.37	0.01	0.73	0.46	-0.52
1- 6	0.60	-1.84	-0.92	-0.10	1.72	0.46	-0.52
1- 7	0.60	-2.70	-1.35	-0.22	2.48	0.46	-0.52
1- 8	0.60	-3.34	-1.67	-0.34	3.03	0.46	-0.52
1- 9	0.60	-3.75	-1.88	-0.45	3.36	0.46	-0.52
1-10	0.60	-3.94	-1.97	-0.57	3.47	0.46	-0.52
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	2.27	0.00	0.00	0.00	0.00	7.93	0.00
2- 1	1.82	0.00	0.00	0.00	0.00	6.34	-0.32
2- 2	1.36	0.00	0.00	0.00	0.00	5.21	-0.80
2- 3	0.91	0.00	0.00	0.00	0.00	4.12	-1.41
2- 4	0.46	0.00	0.00	0.00	0.00	3.19	-2.02
2- 5	0.00	0.00	0.00	0.00	0.00	2.44	-2.77
2- 6	-0.45	0.00	0.00	0.00	0.00	1.71	-3.54
2- 7	-0.91	0.00	0.00	0.00	0.00	1.06	-4.58
2- 8	-1.36	0.00	0.00	0.00	0.00	0.54	-5.70
2- 9	-1.81	0.00	0.00	0.00	0.00	0.14	-6.83
2-10	-2.27	0.00	0.00	0.00	0.00	0.00	-7.86
TOP SLAB RIGHT SIDE							

BOTTOM SLAB LEFT SIDE

4- 0	6.11	0.00	0.00	0.00	0.00	4.45	0.00
4- 1	4.89	0.00	0.00	0.00	0.00	3.57	0.00
4- 2	3.67	0.00	0.00	0.00	0.00	2.69	0.00
4- 3	2.44	0.00	0.00	0.00	0.00	1.81	0.00
4- 4	1.22	0.00	0.00	0.00	0.00	0.93	0.00
4- 5	0.00	0.00	0.00	0.00	0.00	0.12	-0.12
4- 6	-1.23	0.00	0.00	0.00	0.00	0.00	-0.93
4- 7	-2.45	0.00	0.00	0.00	0.00	0.00	-1.81
4- 8	-3.67	0.00	0.00	0.00	0.00	0.00	-2.69
4- 9	-4.89	0.00	0.00	0.00	0.00	0.00	-3.57
4-10	-6.12	0.00	0.00	0.00	0.00	0.00	-4.45

BOTTOM SLAB RIGHT SIDE

INVENTORY RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.698
LOAD RATING : 25.144 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.464
LOAD RATING : 25.065 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 4.154
LOAD RATING : 149.531 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)

TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 2.741
LOAD RATING : 148.010 (TONS)
ACTION TYPE : Shear

OPERATING RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 1.164
LOAD RATING : 41.915 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.774
LOAD RATING : 41.783 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 6.924
LOAD RATING : 249.267 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 4.569
LOAD RATING : 246.733 (TONS)
ACTION TYPE : Shear

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.62 (in)
Bar diameter (mid+) = 0.50 (in)
Bar diameter (mid-) = 0.62 (in)
Bar diameter (top) = 0.62 (in)

	Coin. Moment	Axial Force	Shear Force	Resistance Shear Cap	Po Cap	Mu Cap	Mbal Cap	Pbal Cap	Flexure Steel Area	Mom. Cap	Shear Des. Thk	Ratings Inv	Ratings Oper	Ratings Inv	Ratings Oper
	Kft	Kips	Kips	Kips	Kips	Kft	Kft	Kips	In2	Kft	in				
BOT	-9.2*	0.4	4.9	6.9	176.7	5.0	14.6	60.7	0.3092	5.0	5.56	0.0	0.0	10.3	17.2
MID	3.1	0.4	0.5	6.8	175.9	4.6	14.5	62.2	0.2810	4.6	5.62	2.7	4.5	NA	NA
MID-	-4.6	0.4	0.5	6.7	176.7	5.0	14.6	60.7	0.3092	5.0	5.56	2.3	3.9	NA	NA
TOP	-10.0*	0.4	3.8	6.9	176.7	5.0	14.6	60.7	0.3092	5.0	5.56	0.2	0.4	2.4	4.0

Member No. = 2 TOP SLAB Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.62 (in)
Bar diameter (mid) = 0.75 (in)
Bar diameter (rt) = 0.75 (in)

LT	-8.9*	0.0	6.4	7.0	176.7	5.0	14.6	60.7	0.3092	5.0	5.56	0.5	0.9	4.0	6.6
MID	8.7*	0.0	0.6	6.6	181.4	7.6	15.1	54.9	0.4884	7.6	5.49	0.9	1.5	NA	NA
RT	-16.1*	0.0	8.1*	7.0	182.0	7.9	15.2	54.2	0.5106	7.9	5.49	0.0	0.0	1.0	1.7

Member No. = 3 INTERIOR WALL Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.50 (in)
Bar diameter (mid+) = 0.50 (in)
Bar diameter (mid-) = 0.50 (in)

Bar diameter (top) = 0.50 (in)

BOT	-0.8	4.5	0.4	6.9	174.9	4.0	14.4	63.3	0.2412	4.7	5.62	5.9	9.9	11.3	18.8
MID	1.0	4.5	0.4	6.9	174.9	4.0	14.4	63.3	0.2412	4.7	5.62	4.9	8.2	NA	NA
MID-	-1.0	4.5	0.4	6.9	174.9	4.0	14.4	63.3	0.2412	4.7	5.62	4.9	8.2	NA	NA
TOP	-2.7	4.5	0.4	6.8	174.9	4.0	14.4	63.3	0.2412	4.7	5.62	1.7	2.9	11.1	18.4

Member No. = 4 BOTTOM SLAB Thickness = 7.87 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.62 (in)
Bar diameter (mid) = 0.75 (in)
Bar diameter (rt) = 0.75 (in)

LT	-8.8*	0.6	6.0	7.0	176.7	5.0	14.6	60.7	0.3092	5.1	5.56	0.6	1.0	6.8	11.3
MID	8.5*	0.6	0.0	6.6	180.0	6.8	14.9	56.3	0.4364	6.9	5.49	1.1	1.8	NA	NA
RT	-17.8*	0.6	8.3*	6.9	180.1	6.8	14.9	56.3	0.4382	6.9	5.49	0.0	0.0	1.2	2.1

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Hgt. Kft	Water Press (Max) Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	-2.52	-4.72	-2.36	-0.44	2.55	0.08	-0.61
1- 1	-2.45	-1.28	-0.64	-0.15	0.57	0.00	-0.54
1- 2	-2.37	1.22	0.61	0.08	-0.80	0.00	-0.59
1- 3	-2.29	2.86	1.43	0.25	-1.64	0.00	-0.66
1- 4	-2.21	3.70	1.85	0.35	-2.00	0.00	-0.73
1- 5	-2.14	3.81	1.90	0.38	-1.95	0.04	-0.82
1- 6	-2.06	3.26	1.63	0.35	-1.56	0.14	-0.94
1- 7	-1.98	2.12	1.06	0.25	-0.91	0.25	-1.08
1- 8	-1.90	0.46	0.23	0.09	-0.05	0.36	-1.23
1- 9	-1.82	-1.65	-0.83	-0.14	0.95	0.48	-1.39

1-10	-1.75	-4.15	-2.07	-0.44	2.01	0.60	-1.54

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	-1.75	-4.15	-2.07	-0.44	2.01	0.60	-1.54
2- 1	0.68	-3.48	-1.74	-0.37	1.69	0.61	-0.42
2- 2	2.39	-2.82	-1.41	-0.30	1.37	0.98	0.00
2- 3	3.38	-2.16	-1.08	-0.23	1.05	1.47	-0.02
2- 4	3.67	-1.50	-0.75	-0.16	0.72	1.81	-0.21
2- 5	3.24	-0.83	-0.42	-0.09	0.40	1.84	-0.41
2- 6	2.09	-0.17	-0.09	-0.02	0.08	1.56	-0.61
2- 7	0.23	0.49	0.25	0.05	-0.24	0.97	-0.81
2- 8	-2.34	1.15	0.58	0.12	-0.56	0.34	-1.30
2- 9	-5.62	1.82	0.91	0.19	-0.88	0.08	-2.14
2-10	-9.62	2.48	1.24	0.26	-1.20	0.00	-3.38

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	0.03	0.01	0.00	-0.03	0.45	-0.45
3- 1	0.00	0.02	0.01	0.00	-0.02	0.27	-0.27
3- 2	0.00	0.02	0.01	0.00	-0.02	0.10	-0.10
3- 3	0.00	0.01	0.01	0.00	-0.01	0.09	-0.09
3- 4	0.00	0.01	0.00	0.00	-0.01	0.27	-0.27
3- 5	0.00	0.00	0.00	0.00	0.00	0.44	-0.44
3- 6	0.00	-0.01	0.00	0.00	0.01	0.62	-0.62
3- 7	0.00	-0.01	-0.01	0.00	0.01	0.80	-0.80
3- 8	0.00	-0.02	-0.01	0.00	0.02	0.98	-0.98
3- 9	0.00	-0.02	-0.01	0.00	0.02	1.15	-1.15
3-10	0.00	-0.03	-0.01	0.00	0.03	1.33	-1.33

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-2.52	-4.72	-2.36	-0.44	2.55	0.08	-0.61
4- 1	0.47	-3.96	-1.98	-0.37	2.14	0.41	-0.10
4- 2	2.61	-3.21	-1.60	-0.30	1.73	0.91	0.00
4- 3	3.87	-2.45	-1.23	-0.23	1.33	1.24	0.00
4- 4	4.27	-1.70	-0.85	-0.16	0.92	1.33	0.00
4- 5	3.81	-0.94	-0.47	-0.09	0.51	1.18	0.00
4- 6	2.48	-0.19	-0.09	-0.02	0.10	0.81	0.00
4- 7	0.28	0.57	0.28	0.05	-0.31	0.31	-0.15

4- 8	-2.79	1.33	0.66	0.13	-0.72	0.00	-0.79
4- 9	-6.72	2.08	1.04	0.20	-1.12	0.00	-1.88
4-10	-11.51	2.84	1.42	0.27	-1.53	0.00	-3.21

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	K	K	K	K	K	K	K
EXTERIOR WALL BOTTOM							
1- 0	0.07	3.75	1.87	0.32	-2.20	0.11	-0.15
1- 1	0.07	2.82	1.41	0.25	-1.59	0.11	-0.15
1- 2	0.07	1.96	0.98	0.19	-1.04	0.11	-0.15
1- 3	0.07	1.17	0.58	0.13	-0.56	0.11	-0.15
1- 4	0.07	0.44	0.22	0.06	-0.14	0.11	-0.15
1- 5	0.07	-0.22	-0.11	0.00	0.22	0.11	-0.15
1- 6	0.07	-0.82	-0.41	-0.06	0.51	0.11	-0.15
1- 7	0.07	-1.35	-0.67	-0.13	0.73	0.11	-0.15
1- 8	0.07	-1.81	-0.90	-0.19	0.89	0.11	-0.15
1- 9	0.07	-2.20	-1.10	-0.25	0.99	0.11	-0.15
1-10	0.07	-2.54	-1.27	-0.31	1.02	0.11	-0.15
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	2.65	0.63	0.32	0.07	-0.31	1.53	-0.19
2- 1	1.97	0.63	0.32	0.07	-0.31	1.12	-0.22
2- 2	1.29	0.63	0.32	0.07	-0.31	0.86	-0.27
2- 3	0.61	0.63	0.32	0.07	-0.31	0.62	-0.36
2- 4	-0.07	0.63	0.32	0.07	-0.31	0.42	-0.50
2- 5	-0.75	0.63	0.32	0.07	-0.31	0.26	-0.66
2- 6	-1.43	0.63	0.32	0.07	-0.31	0.14	-0.86
2- 7	-2.11	0.63	0.32	0.07	-0.31	0.07	-1.08
2- 8	-2.79	0.63	0.32	0.07	-0.31	0.02	-1.31

2- 9	-3.47	0.63	0.32	0.07	-0.31	0.00	-1.55
2-10	-4.15	0.63	0.32	0.07	-0.31	0.00	-1.67

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 1	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 2	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 3	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 4	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 5	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 6	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 7	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 8	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3- 9	0.00	0.00	0.00	0.00	0.00	0.17	-0.17
3-10	0.00	0.00	0.00	0.00	0.00	0.17	-0.17

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	3.27	0.72	0.36	0.07	-0.39	0.87	0.00
4- 1	2.44	0.72	0.36	0.07	-0.39	0.65	0.00
4- 2	1.62	0.72	0.36	0.07	-0.39	0.42	0.00
4- 3	0.79	0.72	0.36	0.07	-0.39	0.20	0.00
4- 4	-0.03	0.72	0.36	0.07	-0.39	0.02	-0.04
4- 5	-0.86	0.72	0.36	0.07	-0.39	0.00	-0.26
4- 6	-1.68	0.72	0.36	0.07	-0.39	0.00	-0.48
4- 7	-2.51	0.72	0.36	0.07	-0.39	0.00	-0.71
4- 8	-3.33	0.72	0.36	0.07	-0.39	0.00	-0.93
4- 9	-4.16	0.72	0.36	0.07	-0.39	0.00	-1.15
4-10	-4.98	0.72	0.36	0.07	-0.39	0.00	-1.38

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press	Soil Press	Surch Hgt.	Water Press	LIVE LOADS Pos	Neg

			(Max)	(Min)		(Max)	
	Kft	Kft	Kft	Kft	Kft	Kft	Kft
EXTERIOR WALL BOTTOM							
1- 0	-2.52	-4.72	-2.36	-0.44	2.55	0.12	-0.91
1- 1	-2.45	-1.28	-0.64	-0.15	0.57	0.00	-0.81
1- 2	-2.37	1.22	0.61	0.08	-0.80	0.00	-0.88
1- 3	-2.29	2.86	1.43	0.25	-1.64	0.00	-0.98
1- 4	-2.21	3.70	1.85	0.35	-2.00	0.00	-1.08
1- 5	-2.14	3.81	1.90	0.38	-1.95	0.06	-1.22
1- 6	-2.06	3.26	1.63	0.35	-1.56	0.21	-1.41
1- 7	-1.98	2.12	1.06	0.25	-0.91	0.38	-1.62
1- 8	-1.90	0.46	0.23	0.09	-0.05	0.54	-1.85
1- 9	-1.82	-1.65	-0.83	-0.14	0.95	0.71	-2.08
1-10	-1.75	-4.15	-2.07	-0.44	2.01	0.88	-2.31
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-1.75	-4.15	-2.07	-0.44	2.01	0.88	-2.31
2- 1	0.68	-3.48	-1.74	-0.37	1.69	0.90	-0.63
2- 2	2.39	-2.82	-1.41	-0.30	1.37	1.45	0.00
2- 3	3.38	-2.16	-1.08	-0.23	1.05	2.21	-0.03
2- 4	3.67	-1.50	-0.75	-0.16	0.72	2.72	-0.31
2- 5	3.24	-0.83	-0.42	-0.09	0.40	2.74	-0.61
2- 6	2.09	-0.17	-0.09	-0.02	0.08	2.33	-0.91
2- 7	0.23	0.49	0.25	0.05	-0.24	1.46	-1.21
2- 8	-2.34	1.15	0.58	0.12	-0.56	0.51	-1.94
2- 9	-5.62	1.82	0.91	0.19	-0.88	0.12	-3.21
2-10	-9.62	2.48	1.24	0.26	-1.20	0.00	-5.08
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.00	0.03	0.01	0.00	-0.03	0.67	-0.67
3- 1	0.00	0.02	0.01	0.00	-0.02	0.41	-0.41
3- 2	0.00	0.02	0.01	0.00	-0.02	0.15	-0.15
3- 3	0.00	0.01	0.01	0.00	-0.01	0.14	-0.14
3- 4	0.00	0.01	0.00	0.00	-0.01	0.40	-0.40
3- 5	0.00	0.00	0.00	0.00	0.00	0.66	-0.66
3- 6	0.00	-0.01	0.00	0.00	0.01	0.93	-0.93
3- 7	0.00	-0.01	-0.01	0.00	0.01	1.20	-1.20

3- 8	0.00	-0.02	-0.01	0.00	0.02	1.47	-1.46
3- 9	0.00	-0.02	-0.01	0.00	0.02	1.73	-1.73
3-10	0.00	-0.03	-0.01	0.00	0.03	2.00	-2.00

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-2.52	-4.72	-2.36	-0.44	2.55	0.12	-0.91
4- 1	0.47	-3.96	-1.98	-0.37	2.14	0.61	-0.15
4- 2	2.61	-3.21	-1.60	-0.30	1.73	1.36	0.00
4- 3	3.87	-2.45	-1.23	-0.23	1.33	1.85	0.00
4- 4	4.27	-1.70	-0.85	-0.16	0.92	1.98	0.00
4- 5	3.81	-0.94	-0.47	-0.09	0.51	1.77	0.00
4- 6	2.48	-0.19	-0.09	-0.02	0.10	1.20	0.00
4- 7	0.28	0.57	0.28	0.05	-0.31	0.46	-0.23
4- 8	-2.79	1.33	0.66	0.13	-0.72	0.00	-1.19
4- 9	-6.72	2.08	1.04	0.20	-1.12	0.00	-2.82
4-10	-11.51	2.84	1.42	0.27	-1.53	0.00	-4.81

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch	Water Hgt.	LIVE LOADS Press (Max) Pos	Neg
	K	K	K	K	K	K	K

EXTERIOR WALL BOTTOM

1- 0	0.07	3.75	1.87	0.32	-2.20	0.17	-0.22
1- 1	0.07	2.82	1.41	0.25	-1.59	0.17	-0.22
1- 2	0.07	1.96	0.98	0.19	-1.04	0.17	-0.22
1- 3	0.07	1.17	0.58	0.13	-0.56	0.17	-0.22
1- 4	0.07	0.44	0.22	0.06	-0.14	0.17	-0.22
1- 5	0.07	-0.22	-0.11	0.00	0.22	0.17	-0.22
1- 6	0.07	-0.82	-0.41	-0.06	0.51	0.17	-0.22
1- 7	0.07	-1.35	-0.67	-0.13	0.73	0.17	-0.22
1- 8	0.07	-1.81	-0.90	-0.19	0.89	0.17	-0.22

1- 9	0.07	-2.20	-1.10	-0.25	0.99	0.17	-0.22
1-10	0.07	-2.54	-1.27	-0.31	1.02	0.17	-0.22

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	2.65	0.63	0.32	0.07	-0.31	2.29	-0.28
2- 1	1.97	0.63	0.32	0.07	-0.31	1.68	-0.32
2- 2	1.29	0.63	0.32	0.07	-0.31	1.28	-0.39
2- 3	0.61	0.63	0.32	0.07	-0.31	0.94	-0.55
2- 4	-0.07	0.63	0.32	0.07	-0.31	0.64	-0.75
2- 5	-0.75	0.63	0.32	0.07	-0.31	0.40	-1.00
2- 6	-1.43	0.63	0.32	0.07	-0.31	0.22	-1.29
2- 7	-2.11	0.63	0.32	0.07	-0.31	0.10	-1.62
2- 8	-2.79	0.63	0.32	0.07	-0.31	0.03	-1.98
2- 9	-3.47	0.63	0.32	0.07	-0.31	0.00	-2.33
2-10	-4.15	0.63	0.32	0.07	-0.31	0.00	-2.51

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 1	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 2	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 3	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 4	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 5	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 6	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 7	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 8	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3- 9	0.00	0.00	0.00	0.00	0.00	0.25	-0.25
3-10	0.00	0.00	0.00	0.00	0.00	0.25	-0.25

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	3.27	0.72	0.36	0.07	-0.39	1.31	0.00
4- 1	2.44	0.72	0.36	0.07	-0.39	0.97	0.00
4- 2	1.62	0.72	0.36	0.07	-0.39	0.63	0.00
4- 3	0.79	0.72	0.36	0.07	-0.39	0.30	0.00
4- 4	-0.03	0.72	0.36	0.07	-0.39	0.03	-0.05
4- 5	-0.86	0.72	0.36	0.07	-0.39	0.00	-0.39
4- 6	-1.68	0.72	0.36	0.07	-0.39	0.00	-0.72

4- 7	-2.51	0.72	0.36	0.07	-0.39	0.00	-1.06
4- 8	-3.33	0.72	0.36	0.07	-0.39	0.00	-1.40
4- 9	-4.16	0.72	0.36	0.07	-0.39	0.00	-1.73
4-10	-4.98	0.72	0.36	0.07	-0.39	0.00	-2.07

BOTTOM SLAB RIGHT SIDE

INVENTORY RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

OPERATING RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 1
CONTROLLING POINT : Bottom
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.000
LOAD RATING : 0.000 (TONS)
ACTION TYPE : Flexure

Bridge No. 2113

Output at Critical Sections (per unit design width)

Member No. = 1 EXTERIOR WALL Thickness = 11.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.88 (in)
Bar diameter (mid+) = 0.75 (in)
Bar diameter (mid-) = 0.88 (in)
Bar diameter (top) = 0.88 (in)

	Coin. Moment Kft	Axial Force Kips	Shear Force Kips	Resistance Shear Cap Kips	Po Cap Kips	Mu Cap Kft	Mbal Cap Kft	Pbal Cap Kips	Flexure Steel Area In2	Mom. Cap Kft	Shear Des. Thk in	Ratings Inv	Ratings Oper	Ratings Inv	Ratings Oper
BOT	-9.2	10.5	3.9	8.7	210.0	12.6	26.0	74.5	0.5165	14.5	8.56	2.8	4.6	4.4	7.3
MID	4.1	10.5	0.9	8.8	208.8	11.6	25.7	76.5	0.4689	13.5	8.62	7.3	12.1	NA	NA
MID-	-7.0	10.5	1.2	8.7	210.0	12.6	26.0	74.5	0.5165	14.5	8.56	3.6	6.0	NA	NA
TOP	-13.3	10.5	3.2	8.7	210.0	12.6	26.0	74.5	0.5165	14.5	8.56	1.4	2.3	2.5	4.1

Member No. = 2 TOP SLAB Thickness = 11.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

LT	-11.6	1.4	9.6*	8.7	210.0	12.6	26.0	74.5	0.5165	12.9	8.56	1.5	2.5	0.9	1.6
MID	18.0	1.4	4.0	8.6	218.2	19.3	27.9	64.6	0.8247	19.5	8.44	1.1	1.9	NA	NA
RT	-17.5	1.4	10.5*	8.6	218.9	19.8	28.1	63.9	0.8511	20.0	8.44	1.2	2.0	0.5	0.9

Member No. = 3 INTERIOR WALL Thickness = 11.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (bot) = 0.75 (in)
Bar diameter (mid+) = 0.75 (in)
Bar diameter (mid-) = 0.75 (in)
Bar diameter (top) = 0.75 (in)

BOT	-2.3	8.0	0.9	8.8	206.8	9.8	25.2	78.6	0.3946	11.4	8.62	4.9	8.2	5.6	9.3
MID	3.3	8.0	0.9	8.8	206.8	9.8	25.2	78.6	0.3946	11.4	8.62	4.6	7.6	NA	NA
MID-	-2.5	8.0	0.9	8.8	206.8	9.8	25.2	78.6	0.3946	11.4	8.62	4.9	8.2	NA	NA
TOP	-7.6	8.0	1.0	8.8	206.8	9.8	25.2	78.6	0.3946	11.4	8.62	1.6	2.6	5.6	9.3

Member No. = 4 BOTTOM SLAB Thickness = 11.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 0.88 (in)
Bar diameter (mid) = 1.00 (in)
Bar diameter (rt) = 1.00 (in)

LT	-9.3	2.3	3.8	8.7	210.0	12.6	26.0	74.5	0.5165	13.1	8.56	2.9	4.8	21.2	35.3
MID	6.6	2.3	0.3	8.7	216.6	18.1	27.6	67.0	0.7633	18.4	8.50	7.2	12.0	NA	NA
RT	-14.8	2.3	5.5	8.7	215.6	17.3	27.4	68.0	0.7264	17.6	8.50	1.4	2.4	1.4	2.3

Member No. = 5 TOP SLAB Thickness = 11.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.13 (in)
Bar diameter (mid) = 1.13 (in)
Bar diameter (rt) = 1.13 (in)

	Coin.			Resistance					Flexure		Shear				
	Moment	Axial	Shear	Shear	Po	Mu	Mbal	Pbal	Steel	Mom.	Des.	Ratings		Ratings	
		Force	Force	Cap	Cap	Cap	Cap	Cap	Area	Cap	Thk	Inv	Oper	Inv	Oper
	Kft	Kips	Kips	Kips	Kips	Kft	Kft	Kips	In2	Kft	in				
LT	-16.9	0.4	9.7*	8.6	218.9	19.8	28.1	63.9	0.8511	19.9	8.44	1.2	2.1	0.8	1.3
MID	15.9	0.4	4.7	8.6	218.2	19.3	27.9	64.6	0.8247	19.3	8.44	1.3	2.1	NA	NA
RT	-17.0	0.4	10.0*	8.6	218.9	19.8	28.1	63.9	0.8511	19.9	8.44	1.2	2.1	0.6	0.9

Member No. = 7 BOTTOM SLAB Thickness = 11.00 (in)
Clear cover at end = 2.00 (in)
Clear cover at middle = 2.00 (in)
Bar diameter (lt) = 1.00 (in)
Bar diameter (mid) = 1.00 (in)
Bar diameter (rt) = 1.00 (in)

LT	-13.7	0.6	4.4	8.7	215.6	17.3	27.4	68.0	0.7264	17.4	8.50	1.5	2.5	6.9	11.5

MID	3.0	0.6	0.4	8.7	216.6	18.1	27.6	67.0	0.7633	18.2	8.50	16.0	26.6	NA	NA
RT	-13.6	0.6	4.4	8.7	215.6	17.3	27.4	68.0	0.7264	17.4	8.50	1.5	2.5	1.8	3.0

Current Live Load: HS20T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load Kft	Soil Press (Max) Kft	Soil Press (Min) Kft	Surch Press Kft	Water Hgt. Kft	LIVE LOADS Pos Kft	LIVE LOADS Neg Kft
EXTERIOR WALL BOTTOM							
1- 0	-1.59	-3.32	-1.66	-0.49	2.96	0.73	-1.83
1- 1	-1.46	-0.56	-0.28	-0.14	0.48	0.21	-1.53
1- 2	-1.34	1.36	0.68	0.13	-1.24	0.00	-1.23
1- 3	-1.21	2.53	1.26	0.33	-2.27	0.00	-1.30
1- 4	-1.08	3.04	1.52	0.45	-2.71	0.00	-1.59
1- 5	-0.95	2.97	1.49	0.49	-2.63	0.21	-1.99
1- 6	-0.83	2.43	1.21	0.45	-2.13	0.42	-2.50
1- 7	-0.70	1.49	0.75	0.33	-1.28	0.64	-3.00
1- 8	-0.57	0.25	0.12	0.13	-0.18	0.85	-3.51
1- 9	-0.44	-1.21	-0.60	-0.14	1.09	1.07	-4.03
1-10	-0.31	-2.79	-1.39	-0.49	2.45	1.35	-4.56
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-0.31	-2.79	-1.39	-0.49	2.45	1.35	-4.56
2- 1	0.36	-2.42	-1.21	-0.42	2.12	3.30	-1.67
2- 2	0.84	-2.04	-1.02	-0.36	1.80	4.94	0.00
2- 3	1.13	-1.67	-0.84	-0.29	1.47	6.32	-0.09
2- 4	1.23	-1.30	-0.65	-0.23	1.15	7.29	-0.54
2- 5	1.13	-0.93	-0.47	-0.16	0.82	7.39	-1.00
2- 6	0.84	-0.56	-0.28	-0.10	0.49	6.60	-1.46
2- 7	0.35	-0.19	-0.09	-0.03	0.17	5.08	-1.92
2- 8	-0.32	0.18	0.09	0.03	-0.16	3.24	-3.06
2- 9	-1.19	0.55	0.28	0.10	-0.49	1.73	-5.16
2-10	-2.26	0.92	0.46	0.16	-0.81	0.76	-8.07

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	0.49	-0.55	-0.27	-0.08	0.49	1.71	-1.14
3- 1	0.45	-0.54	-0.27	-0.08	0.48	1.25	-0.68
3- 2	0.42	-0.54	-0.27	-0.08	0.48	0.81	-0.22
3- 3	0.39	-0.53	-0.26	-0.08	0.47	0.39	0.00
3- 4	0.35	-0.52	-0.26	-0.08	0.46	0.76	-0.46
3- 5	0.32	-0.52	-0.26	-0.08	0.46	1.20	-0.96
3- 6	0.29	-0.51	-0.26	-0.08	0.45	1.66	-1.46
3- 7	0.25	-0.50	-0.25	-0.08	0.45	2.13	-1.96
3- 8	0.22	-0.50	-0.25	-0.08	0.44	2.59	-2.45
3- 9	0.19	-0.49	-0.25	-0.08	0.43	3.06	-2.95
3-10	0.15	-0.48	-0.24	-0.08	0.43	3.53	-3.45

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.59	-3.32	-1.66	-0.49	2.96	0.73	-1.83
4- 1	-0.05	-2.88	-1.44	-0.43	2.57	1.04	-0.77
4- 2	1.09	-2.43	-1.22	-0.36	2.17	1.24	-0.16
4- 3	1.80	-1.99	-0.99	-0.30	1.77	1.44	0.00
4- 4	2.11	-1.54	-0.77	-0.23	1.38	1.44	0.00
4- 5	2.01	-1.10	-0.55	-0.16	0.98	1.19	-0.08
4- 6	1.49	-0.65	-0.33	-0.10	0.58	0.74	-0.31
4- 7	0.55	-0.21	-0.10	-0.03	0.19	0.32	-0.76
4- 8	-0.79	0.24	0.12	0.03	-0.21	0.00	-1.87
4- 9	-2.55	0.68	0.34	0.10	-0.61	0.00	-3.33
4-10	-4.72	1.13	0.56	0.17	-1.00	0.00	-5.11

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-2.10	0.44	0.22	0.08	-0.38	1.53	-7.84
5- 1	-1.23	0.45	0.22	0.08	-0.39	2.36	-5.12
5- 2	-0.56	0.45	0.23	0.08	-0.40	3.66	-3.27
5- 3	-0.07	0.46	0.23	0.08	-0.40	5.02	-2.16
5- 4	0.22	0.47	0.23	0.08	-0.41	6.32	-1.63
5- 5	0.32	0.47	0.24	0.08	-0.42	6.78	-1.22
5- 6	0.22	0.48	0.24	0.08	-0.42	6.32	-1.63
5- 7	-0.07	0.49	0.24	0.08	-0.43	5.03	-2.16
5- 8	-0.55	0.49	0.25	0.08	-0.44	3.66	-3.27

5- 9	-1.23	0.50	0.25	0.08	-0.44	2.36	-5.13
5-10	-2.09	0.51	0.25	0.08	-0.45	1.53	-7.85

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	-4.23	0.58	0.29	0.08	-0.52	0.00	-4.77
7- 1	-2.38	0.57	0.28	0.08	-0.51	0.00	-3.25
7- 2	-0.93	0.56	0.28	0.08	-0.50	0.00	-2.03
7- 3	0.10	0.56	0.28	0.08	-0.50	0.21	-1.12
7- 4	0.72	0.55	0.27	0.08	-0.49	0.36	-0.63
7- 5	0.92	0.54	0.27	0.08	-0.48	0.41	-0.42
7- 6	0.72	0.54	0.27	0.08	-0.48	0.36	-0.63
7- 7	0.09	0.53	0.26	0.08	-0.47	0.21	-1.13
7- 8	-0.94	0.52	0.26	0.08	-0.46	0.00	-2.03
7- 9	-2.38	0.52	0.26	0.08	-0.46	0.00	-3.25
7-10	-4.24	0.51	0.25	0.08	-0.45	0.00	-4.77

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS20T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	LIVE LOADS Neg
EXTERIOR WALL BOTTOM							
1- 0	0.11	2.81	1.41	0.34	-2.54	0.27	-0.46
1- 1	0.11	2.04	1.02	0.27	-1.83	0.27	-0.46
1- 2	0.11	1.34	0.67	0.21	-1.19	0.27	-0.46
1- 3	0.11	0.72	0.36	0.14	-0.63	0.27	-0.46
1- 4	0.11	0.18	0.09	0.07	-0.14	0.27	-0.46
1- 5	0.11	-0.28	-0.14	0.00	0.27	0.27	-0.46
1- 6	0.11	-0.66	-0.33	-0.07	0.60	0.27	-0.46
1- 7	0.11	-0.97	-0.48	-0.14	0.87	0.27	-0.46
1- 8	0.11	-1.19	-0.60	-0.21	1.05	0.27	-0.46
1- 9	0.11	-1.34	-0.67	-0.27	1.16	0.27	-0.46

1-10	0.11	-1.41	-0.71	-0.34	1.20	0.27	-0.46

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	0.68	0.33	0.16	0.06	-0.29	4.35	-0.40
2- 1	0.51	0.33	0.16	0.06	-0.29	3.89	-0.74
2- 2	0.34	0.33	0.16	0.06	-0.29	3.42	-1.15
2- 3	0.17	0.33	0.16	0.06	-0.29	2.86	-1.62
2- 4	0.00	0.33	0.16	0.06	-0.29	2.27	-2.12
2- 5	-0.17	0.33	0.16	0.06	-0.29	1.69	-2.63
2- 6	-0.34	0.33	0.16	0.06	-0.29	1.14	-3.13
2- 7	-0.51	0.33	0.16	0.06	-0.29	0.66	-3.59
2- 8	-0.68	0.33	0.16	0.06	-0.29	0.30	-3.99
2- 9	-0.85	0.33	0.16	0.06	-0.29	0.09	-4.29
2-10	-1.02	0.33	0.16	0.06	-0.29	0.06	-4.39

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 1	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 2	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 3	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 4	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 5	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 6	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 7	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 8	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3- 9	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44
3-10	-0.03	0.01	0.00	0.00	-0.01	0.41	-0.44

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	1.53	0.39	0.19	0.06	-0.35	1.06	0.00
4- 1	1.17	0.39	0.19	0.06	-0.35	0.80	0.00
4- 2	0.81	0.39	0.19	0.06	-0.35	0.54	0.00
4- 3	0.45	0.39	0.19	0.06	-0.35	0.30	-0.02
4- 4	0.09	0.39	0.19	0.06	-0.35	0.08	-0.17
4- 5	-0.27	0.39	0.19	0.06	-0.35	0.00	-0.42
4- 6	-0.64	0.39	0.19	0.06	-0.35	0.00	-0.67
4- 7	-1.00	0.39	0.19	0.06	-0.35	0.00	-0.93

4- 8	-1.36	0.39	0.19	0.06	-0.35	0.00	-1.18
4- 9	-1.72	0.39	0.19	0.06	-0.35	0.00	-1.44
4-10	-2.08	0.39	0.19	0.06	-0.35	0.00	-1.70

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	0.85	0.01	0.00	0.00	-0.01	4.41	-0.46
5- 1	0.68	0.01	0.00	0.00	-0.01	4.08	-0.66
5- 2	0.51	0.01	0.00	0.00	-0.01	3.68	-1.00
5- 3	0.34	0.01	0.00	0.00	-0.01	3.22	-1.43
5- 4	0.17	0.01	0.00	0.00	-0.01	2.71	-1.92
5- 5	0.00	0.01	0.00	0.00	-0.01	2.18	-2.44
5- 6	-0.17	0.01	0.00	0.00	-0.01	1.67	-2.97
5- 7	-0.34	0.01	0.00	0.00	-0.01	1.20	-3.45
5- 8	-0.51	0.01	0.00	0.00	-0.01	0.82	-3.89
5- 9	-0.68	0.01	0.00	0.00	-0.01	0.52	-4.23
5-10	-0.85	0.01	0.00	0.00	-0.01	0.46	-4.35

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	1.81	-0.01	0.00	0.00	0.01	1.45	0.00
7- 1	1.45	-0.01	0.00	0.00	0.01	1.20	0.00
7- 2	1.08	-0.01	0.00	0.00	0.01	0.94	0.00
7- 3	0.72	-0.01	0.00	0.00	0.01	0.68	0.00
7- 4	0.36	-0.01	0.00	0.00	0.01	0.43	0.00
7- 5	0.00	-0.01	0.00	0.00	0.01	0.17	-0.17
7- 6	-0.36	-0.01	0.00	0.00	0.01	0.00	-0.43
7- 7	-0.72	-0.01	0.00	0.00	0.01	0.00	-0.68
7- 8	-1.09	-0.01	0.00	0.00	0.01	0.00	-0.94
7- 9	-1.45	-0.01	0.00	0.00	0.01	0.00	-1.20
7-10	-1.81	-0.01	0.00	0.00	0.01	0.00	-1.45

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored MOMENTS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

Dead Soil Soil Surch Water LIVE LOADS

M-PT	Load Kft	Press (Max) Kft	Press (Min) Kft	Hgt. Kft	Press (Max) Kft	Pos Kft	Neg
EXTERIOR WALL BOTTOM							
1- 0	-1.59	-3.32	-1.66	-0.49	2.96	1.10	-2.74
1- 1	-1.46	-0.56	-0.28	-0.14	0.48	0.31	-2.29
1- 2	-1.34	1.36	0.68	0.13	-1.24	0.00	-1.84
1- 3	-1.21	2.53	1.26	0.33	-2.27	0.00	-1.95
1- 4	-1.08	3.04	1.52	0.45	-2.71	0.00	-2.39
1- 5	-0.95	2.97	1.49	0.49	-2.63	0.31	-2.99
1- 6	-0.83	2.43	1.21	0.45	-2.13	0.64	-3.75
1- 7	-0.70	1.49	0.75	0.33	-1.28	0.96	-4.51
1- 8	-0.57	0.25	0.12	0.13	-0.18	1.28	-5.26
1- 9	-0.44	-1.21	-0.60	-0.14	1.09	1.61	-6.05
1-10	-0.31	-2.79	-1.39	-0.49	2.45	2.03	-6.85
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	-0.31	-2.79	-1.39	-0.49	2.45	2.03	-6.85
2- 1	0.36	-2.42	-1.21	-0.42	2.12	4.94	-2.51
2- 2	0.84	-2.04	-1.02	-0.36	1.80	7.42	0.00
2- 3	1.13	-1.67	-0.84	-0.29	1.47	9.47	-0.13
2- 4	1.23	-1.30	-0.65	-0.23	1.15	10.93	-0.82
2- 5	1.13	-0.93	-0.47	-0.16	0.82	11.08	-1.50
2- 6	0.84	-0.56	-0.28	-0.10	0.49	9.90	-2.19
2- 7	0.35	-0.19	-0.09	-0.03	0.17	7.62	-2.88
2- 8	-0.32	0.18	0.09	0.03	-0.16	4.86	-4.60
2- 9	-1.19	0.55	0.28	0.10	-0.49	2.59	-7.74
2-10	-2.26	0.92	0.46	0.16	-0.81	1.14	-12.11
TOP SLAB RIGHT SIDE							
INTERIOR WALL BOTTOM							
3- 0	0.49	-0.55	-0.27	-0.08	0.49	2.56	-1.71
3- 1	0.45	-0.54	-0.27	-0.08	0.48	1.87	-1.01
3- 2	0.42	-0.54	-0.27	-0.08	0.48	1.21	-0.33
3- 3	0.39	-0.53	-0.26	-0.08	0.47	0.59	0.00
3- 4	0.35	-0.52	-0.26	-0.08	0.46	1.14	-0.69
3- 5	0.32	-0.52	-0.26	-0.08	0.46	1.80	-1.44
3- 6	0.29	-0.51	-0.26	-0.08	0.45	2.50	-2.19

3- 7	0.25	-0.50	-0.25	-0.08	0.45	3.19	-2.93
3- 8	0.22	-0.50	-0.25	-0.08	0.44	3.89	-3.68
3- 9	0.19	-0.49	-0.25	-0.08	0.43	4.59	-4.43
3-10	0.15	-0.48	-0.24	-0.08	0.43	5.29	-5.18

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-1.59	-3.32	-1.66	-0.49	2.96	1.10	-2.74
4- 1	-0.05	-2.88	-1.44	-0.43	2.57	1.56	-1.16
4- 2	1.09	-2.43	-1.22	-0.36	2.17	1.86	-0.24
4- 3	1.80	-1.99	-0.99	-0.30	1.77	2.15	0.00
4- 4	2.11	-1.54	-0.77	-0.23	1.38	2.16	0.00
4- 5	2.01	-1.10	-0.55	-0.16	0.98	1.78	-0.11
4- 6	1.49	-0.65	-0.33	-0.10	0.58	1.11	-0.46
4- 7	0.55	-0.21	-0.10	-0.03	0.19	0.48	-1.14
4- 8	-0.79	0.24	0.12	0.03	-0.21	0.00	-2.80
4- 9	-2.55	0.68	0.34	0.10	-0.61	0.00	-5.00
4-10	-4.72	1.13	0.56	0.17	-1.00	0.00	-7.66

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	-2.10	0.44	0.22	0.08	-0.38	2.29	-11.76
5- 1	-1.23	0.45	0.22	0.08	-0.39	3.53	-7.68
5- 2	-0.56	0.45	0.23	0.08	-0.40	5.49	-4.90
5- 3	-0.07	0.46	0.23	0.08	-0.40	7.54	-3.24
5- 4	0.22	0.47	0.23	0.08	-0.41	9.47	-2.45
5- 5	0.32	0.47	0.24	0.08	-0.42	10.17	-1.83
5- 6	0.22	0.48	0.24	0.08	-0.42	9.47	-2.45
5- 7	-0.07	0.49	0.24	0.08	-0.43	7.54	-3.24
5- 8	-0.55	0.49	0.25	0.08	-0.44	5.49	-4.90
5- 9	-1.23	0.50	0.25	0.08	-0.44	3.54	-7.70
5-10	-2.09	0.51	0.25	0.08	-0.45	2.30	-11.77

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	-4.23	0.58	0.29	0.08	-0.52	0.00	-7.15
7- 1	-2.38	0.57	0.28	0.08	-0.51	0.00	-4.88
7- 2	-0.93	0.56	0.28	0.08	-0.50	0.00	-3.05
7- 3	0.10	0.56	0.28	0.08	-0.50	0.31	-1.68
7- 4	0.72	0.55	0.27	0.08	-0.49	0.54	-0.94

7- 5	0.92	0.54	0.27	0.08	-0.48	0.61	-0.64
7- 6	0.72	0.54	0.27	0.08	-0.48	0.54	-0.94
7- 7	0.09	0.53	0.26	0.08	-0.47	0.31	-1.69
7- 8	-0.94	0.52	0.26	0.08	-0.46	0.00	-3.05
7- 9	-2.38	0.52	0.26	0.08	-0.46	0.00	-4.88
7-10	-4.24	0.51	0.25	0.08	-0.45	0.00	-7.15

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored SHEARS (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load K	Soil Press (Max) K	Soil Press (Min) K	Surch Hgt. K	Water Press (Max) K	LIVE LOADS Pos K	Neg
EXTERIOR WALL BOTTOM							
1- 0	0.11	2.81	1.41	0.34	-2.54	0.40	-0.70
1- 1	0.11	2.04	1.02	0.27	-1.83	0.40	-0.70
1- 2	0.11	1.34	0.67	0.21	-1.19	0.40	-0.70
1- 3	0.11	0.72	0.36	0.14	-0.63	0.40	-0.70
1- 4	0.11	0.18	0.09	0.07	-0.14	0.40	-0.70
1- 5	0.11	-0.28	-0.14	0.00	0.27	0.40	-0.70
1- 6	0.11	-0.66	-0.33	-0.07	0.60	0.40	-0.70
1- 7	0.11	-0.97	-0.48	-0.14	0.87	0.40	-0.70
1- 8	0.11	-1.19	-0.60	-0.21	1.05	0.40	-0.70
1- 9	0.11	-1.34	-0.67	-0.27	1.16	0.40	-0.70
1-10	0.11	-1.41	-0.71	-0.34	1.20	0.40	-0.70
EXTERIOR WALL TOP							
TOP SLAB LEFT SIDE							
2- 0	0.68	0.33	0.16	0.06	-0.29	6.53	-0.60
2- 1	0.51	0.33	0.16	0.06	-0.29	5.84	-1.11
2- 2	0.34	0.33	0.16	0.06	-0.29	5.12	-1.73
2- 3	0.17	0.33	0.16	0.06	-0.29	4.29	-2.43
2- 4	0.00	0.33	0.16	0.06	-0.29	3.41	-3.18
2- 5	-0.17	0.33	0.16	0.06	-0.29	2.53	-3.95

2- 6	-0.34	0.33	0.16	0.06	-0.29	1.71	-4.70
2- 7	-0.51	0.33	0.16	0.06	-0.29	0.99	-5.39
2- 8	-0.68	0.33	0.16	0.06	-0.29	0.44	-5.99
2- 9	-0.85	0.33	0.16	0.06	-0.29	0.13	-6.43
2-10	-1.02	0.33	0.16	0.06	-0.29	0.10	-6.59

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 1	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 2	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 3	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 4	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 5	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 6	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 7	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 8	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3- 9	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65
3-10	-0.03	0.01	0.00	0.00	-0.01	0.61	-0.65

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	1.53	0.39	0.19	0.06	-0.35	1.58	0.00
4- 1	1.17	0.39	0.19	0.06	-0.35	1.20	0.00
4- 2	0.81	0.39	0.19	0.06	-0.35	0.81	0.00
4- 3	0.45	0.39	0.19	0.06	-0.35	0.46	-0.03
4- 4	0.09	0.39	0.19	0.06	-0.35	0.12	-0.25
4- 5	-0.27	0.39	0.19	0.06	-0.35	0.00	-0.62
4- 6	-0.64	0.39	0.19	0.06	-0.35	0.00	-1.01
4- 7	-1.00	0.39	0.19	0.06	-0.35	0.00	-1.39
4- 8	-1.36	0.39	0.19	0.06	-0.35	0.00	-1.78
4- 9	-1.72	0.39	0.19	0.06	-0.35	0.00	-2.16
4-10	-2.08	0.39	0.19	0.06	-0.35	0.00	-2.54

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	0.85	0.01	0.00	0.00	-0.01	6.62	-0.69
5- 1	0.68	0.01	0.00	0.00	-0.01	6.12	-0.98
5- 2	0.51	0.01	0.00	0.00	-0.01	5.52	-1.50
5- 3	0.34	0.01	0.00	0.00	-0.01	4.82	-2.15

5- 4	0.17	0.01	0.00	0.00	-0.01	4.06	-2.88
5- 5	0.00	0.01	0.00	0.00	-0.01	3.27	-3.67
5- 6	-0.17	0.01	0.00	0.00	-0.01	2.50	-4.45
5- 7	-0.34	0.01	0.00	0.00	-0.01	1.81	-5.18
5- 8	-0.51	0.01	0.00	0.00	-0.01	1.23	-5.83
5- 9	-0.68	0.01	0.00	0.00	-0.01	0.78	-6.35
5-10	-0.85	0.01	0.00	0.00	-0.01	0.69	-6.53

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	1.81	-0.01	0.00	0.00	0.01	2.18	0.00
7- 1	1.45	-0.01	0.00	0.00	0.01	1.80	0.00
7- 2	1.08	-0.01	0.00	0.00	0.01	1.41	0.00
7- 3	0.72	-0.01	0.00	0.00	0.01	1.03	0.00
7- 4	0.36	-0.01	0.00	0.00	0.01	0.64	0.00
7- 5	0.00	-0.01	0.00	0.00	0.01	0.26	-0.26
7- 6	-0.36	-0.01	0.00	0.00	0.01	0.00	-0.64
7- 7	-0.72	-0.01	0.00	0.00	0.01	0.00	-1.03
7- 8	-1.09	-0.01	0.00	0.00	0.01	0.00	-1.41
7- 9	-1.45	-0.01	0.00	0.00	0.01	0.00	-1.79
7-10	-1.81	-0.01	0.00	0.00	0.01	0.00	-2.18

BOTTOM SLAB RIGHT SIDE

Current Live Load: HS30T

Unfactored AXIAL FORCES (per unit design width)
due to Dead and Live Loads including Distribution and Impact

M-PT	Dead Load	Soil Press (Max)	Soil Press (Min)	Surch Hgt.	Water Press (Max)	LIVE LOADS Pos	LIVE LOADS Neg
	K	K	K	K	K	K	K

EXTERIOR WALL BOTTOM

1- 0	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1- 1	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1- 2	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1- 3	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1- 4	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59

1- 5	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1- 6	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1- 7	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1- 8	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1- 9	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59
1-10	-0.68	-0.33	-0.16	-0.06	0.29	7.74	-6.59

EXTERIOR WALL TOP

TOP SLAB LEFT SIDE

2- 0	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 1	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 2	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 3	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 4	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 5	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 6	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 7	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 8	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2- 9	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70
2-10	0.11	-1.41	-0.70	-0.34	1.20	0.40	-0.70

TOP SLAB RIGHT SIDE

INTERIOR WALL BOTTOM

3- 0	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 1	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 2	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 3	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 4	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 5	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 6	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 7	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 8	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3- 9	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39
3-10	-1.86	0.32	0.16	0.06	-0.28	7.34	-6.39

INTERIOR WALL TOP

BOTTOM SLAB LEFT SIDE

4- 0	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4- 1	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4- 2	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40

4- 3	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4- 4	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4- 5	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4- 6	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4- 7	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4- 8	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4- 9	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40
4-10	-0.11	-2.82	-1.41	-0.34	2.54	0.70	-0.40

BOTTOM SLAB RIGHT SIDE

TOP SLAB LEFT SIDE

5- 0	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 1	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 2	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 3	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 4	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 5	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 6	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 7	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 8	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5- 9	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76
5-10	0.08	-1.40	-0.70	-0.34	1.19	0.56	-0.76

TOP SLAB RIGHT SIDE

BOTTOM SLAB LEFT SIDE

7- 0	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 1	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 2	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 3	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 4	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 5	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 6	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 7	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 8	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7- 9	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56
7-10	-0.08	-2.82	-1.41	-0.34	2.55	0.76	-0.56

BOTTOM SLAB RIGHT SIDE

INVENTORY RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.514
LOAD RATING : 18.508 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.344
LOAD RATING : 18.589 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 3.703
LOAD RATING : 133.301 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 2.548
LOAD RATING : 137.593 (TONS)
ACTION TYPE : Shear

OPERATING RATING

LOAD NO. 1: AASHTO HS20-44 (MS 18) TRUCK (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2

CONTROLLING POINT : Right
RATING FACTOR : 0.857
LOAD RATING : 30.853 (TONS)
ACTION TYPE : Shear

LOAD NO. 2: AASHTO HS30-44 (MS 27) TRUCK (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 0.574
LOAD RATING : 30.987 (TONS)
ACTION TYPE : Shear

LOAD NO. 3: AASHTO HS20-44 (MS 18) LANE (US)
TOTAL VEHICLE WT. : 36.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 6.173
LOAD RATING : 222.212 (TONS)
ACTION TYPE : Shear

LOAD NO. 4: AASHTO HS30-44 (MS 27) LANE (US)
TOTAL VEHICLE WT. : 54.000 (TONS)
CONTROLLING MEMBER : 2
CONTROLLING POINT : Right
RATING FACTOR : 4.248
LOAD RATING : 229.367 (TONS)
ACTION TYPE : Shear