FINAL GEOTECHNICAL EXPLORATION REPORT (REVISION 1)
REPLACEMENT OF FIVE MILE WASH AND LITTLE COLORADO RIVER BRIDGES
ADOT PROJECT NO. 180 NA 309 F0313 01C
FEDERAL AID NO. 180-B(211)T
NAVAJO COUNTY, ARIZONA

Prepared for:

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Ethos Project No. 2022095
January 13, 2025

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EXPIRES 12/31/2025

January 13, 2025
Ethos Project No. 2022095

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SUBJECT: Final Geotechnical Exploration Report (Revision 1)
Replacement of Five Mile Wash and Little Colorado River Bridges
ADOT Project No. 180 NA 309 F0313 01C
Federal Aid No. 180-B(211)T
Navajo County, Arizona

Dear Sai:

Ethos Engineering, LLC is pleased to present the findings of this geotechnical exploration for the proposed Five Mile Wash Crossing and Little Colorado River Bridge located on US Route 180 (US 180) in Navajo County, Arizona, roughly 3 miles southeast of the City of Holbrook. Our services were conducted in general accordance with the scope of services presented in our revised proposal dated September 23, 2022. This report provides the results of our investigation, the results of laboratory testing and recommendations for foundation designs for the Five Mile Wash Culvert and Little Colorado River Bridge. Revisions to our previous submittal, dated May 22, 2024, are based on review comments provided by ADOT Contracts and Specifications (C&S).

We appreciate the opportunity to be of service on this project. If you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,
Ethos Engineering, LLC

EXPIRES 12/31/2025
Katie Mackay, P.E.
Project Geotechnical Engineer

Reviewed By:

Keith Dahlen, P.E.
Principal/Senior Geotechnical Engineer

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1.0 INTRODUCTION

1.1 GENERAL

Ethos Engineering, LLC (Ethos), was retained by NRra, Inc. (NFra), the Prime designer, to provide geotechnical services for this project. This report includes the results of our geotechnical exploration for planned improvements for the Five Mile Wash Bridge [milepost (MP) 309.11 (Station 100)] and Little Colorado River Bridge [MP 310.41 (Station 171)] located on US Route 180 (US 180) in Navajo County, Arizona, roughly 3 miles southeast of the City of Holbrook. The site is shown on the Vicinity Location Map presented as Figure 1.

Our planned scope was to perform the subsurface explorations, laboratory testing, preparation of a geotechnical investigation report, and preparation of foundation data sheets. ADOT will prepare the Pavement Design Summary and Materials Design Report.

1.2 PROJECT SCOPE OF WORK

Improvements will consist of replacing the existing Five Mile Wash (FMW) bridge with a multi-box culvert and reconstructing the Little Colorado bridge (LCB). Based on structural drawings prepared by NFra (April, 2023) for this project, a five-cell concrete box culvert is planned to replace the existing two-span structure at the FMW bridge. The culvert will be built on the existing alignment with a total width of approximately 50 feet to accommodate two, 12-foot travel lanes with 8-foot shoulders and guard rails. The total length of the structure will be approximately 59 feet. Each cell will be approximately 10 feet wide and 10 feet tall with an additional 2 feet and 3 inches of fill placed above the structure to bring the roadway to grade. A 6-foot cutoff wall is planned on the upstream (south) side of the structure.

The structural drawings also indicate a new two-span structure for the LCB with an overall length of about 172 feet to replace the existing three-span crossing of the river. The span lengths will be 118 feet for the west span and 49 feet for the east span. Wingwalls are assumed to be integrated with the abutments. Based on revised structural drawings prepared by NFra (May, 2024), the west abutment foundation is planned to be a spread footing (founded on bedrock) and the pier and east abutment foundations are indicated as 24-inch driven steel piles filled with concrete. The pier is planned to be supported by 20 piles and the east abutment will have 27 piles. The existing bridge is founded on a spread footing (west abutment) and steel piles with concrete pile caps at the other locations. The bridge will be built adjacent to the existing bridge on its south side and will have a width of 41 feet to accommodate two, 12-foot travel lanes with 7-foot shoulders and concrete barrier.

2.0 FIELD EXPLORATION

Prior to our field exploration, Ethos obtained an ADOT Northeast District encroachment permit (1231602), dated May 31, 2023. Following receipt of the permit, Ethos staked the boring locations and coordinated clearing utilities within the proposed work areas through Arizona 811.

Drilling of the exploratory borings was performed by Resilient Drilling Services (Resilient) from June 12 through June 27, 2023. The borings were drilled with a truck-mounted CME 75 drill-rig (Rig #113) advancing a combination of 8-inch outer diameter (OD) hollow-stem auger (HSA), down-hole percussion hammer and HQ3 wireline rock coring. A track-mounted CME 55 drill (Rig #115) was used to drill a second boring with HSA at the location of LCR-3.

The field work was supervised by Magdaleno Meza, EIT of Ethos. The subsurface soil and rock conditions for the structure elements were explored by drilling a total of 2 borings at FMW to depths of 43 feet to 60 feet and 3 borings at LCB to depths of about 34 feet to 151.5 feet. Table 2.1 summarizes the field exploration program for this project. The approximate locations of the borings are shown in Figures 2 and 3.

Table 2.1 – Field Exploration Program

Boring ID	US 180 Station & Offset	Element	Latitude	Longitude	Depth (feet)
FMW-1	100+67, 16' R	Culvert	N 34.88562°	W 110.13165°	60
FMW-2	101+60, 20' L	Culvert	N 34.88565°	W 110.13133°	43
LCR-1	169+85, 6' R	Bridge Abutment	N 34.88272°	W 110.10901°	34
LCR-3	171+20, 30' R	Bridge Pier	N 34.88275°	W 110.10855°	92
LCR-4	171+65, 6'R	Bridge Abutment	N 34.88286°	W 110.10843°	151.5

Note: Boring LCR-2 was not drilled due to structural design change from 3-span to 2-span bridge.

During the field exploration, the soil and rock encountered were visually classified, logged, and sampled by the field engineer. Disturbed samples of soils were obtained using a 1.375-inch inner diameter (ID) and 2-inch OD standard penetration test (SPT) split spoon sampler. Bulk samples of drill cuttings were also collected at selected near-surface depths from the borings. The SPT samplers and ring samplers were driven 18 and 12 inches or to refusal (i.e. 50 blows for less than a 6-inch interval), respectively, using an automatic hydraulic-actuated 140-pound hammer, free falling 30 inches. Unless noted otherwise on the boring logs, the sample driving resistance was recorded as number of blows per six inches of penetration. The penetration results are presented on the borings logs adjacent to each sample. The recovered soil samples were removed from the sampler, sealed to reduce moisture loss, and submitted to the WSP laboratory. Rock core samples were collected and boxed for further examination and laboratory testing. Photographs of the rock core obtained from the borings are presented in Appendix C. The logs of the exploratory borings are presented in Appendix A.

All borings drilled through existing pavement were backfilled with cuttings and topped to finished grade with cold patch asphalt. The bridge deck at the Boring LCR-2 and LCR-3 locations was pre-cored to provide a drill hole through the deck. As previously discussed, Boring LCR-2 was not drilled. Boring LCR-3 was initially drilled through the bridge deck hole to a depth of 25 feet. The percussion hammer was not able to advance below that depth due to the loose, wet sand conditions. Resilient mobilized a track drill and a second Boring LCR-3 was drilled to a depth of about 92 feet from the ground surface (below the bridge deck).

The two bridge borings which encountered groundwater (LCR-3 and LCR-4) were backfilled with cuttings and cement grout (in the upper 20 feet) in accordance with requirements of the Arizona Department of Water Resources (ADWR).

3.0 LABORATORY TESTING

Selected laboratory tests were assigned by Ethos and performed by WSP on representative samples recovered from the borings to support our field classification and to provide information regarding engineering characteristics and properties of the subsurface soil and rock. The laboratory testing program is listed in Table 3.1. The results of the laboratory tests are presented in Appendix B.

Table 3.1 – Laboratory Testing Program

Laboratory Test	Sample Type	Number of Tests	Purpose of Test
Sieve Analysis (ASTM C136 & C117)	Bulk/SPT	16	Soil Classification and Pavement Design
Atterberg Limits (ASTM D4318)	Bulk/SPT	16	Soil Classification and Pavement Design

Laboratory Test	Sample Type	Number of Tests	Purpose of Test
Density of Rings (ASTM D7263)	Ring	7	Soil Density & Moisture Condition
Moisture Content (ASTM D2216)	Ring	7	Soil Moisture Condition
Unconfined Compressive Strength of Intact Rock (ASTM D7012)	Rock Core	4	Rock Compressive Strength
Direct Shear (ASTM D3080)	Ring	3	Soil Strength
R-Value (AASHTO T190)	Bulk	2	Subgrade Strength Characteristics for Pavement Design
pH & Resistivity (AZ 236)	Bulk	4	Soil Corrosion Characteristics
Sulfates and Chlorides (AZ 733/736)	Bulk	4	Soil Degradation Characteristics

4.0 GENERAL SITE CONDITIONS

4.1 SURFACE CONDITIONS

US 180 is an asphaltic concrete (AC) paved undivided two-lane roadway with 12-foot-wide travel lanes and 8-foot-wide shoulders. Within the vicinity of the two bridge sites, US 180 traverses a combination of agricultural and high plains native desert areas. At the time of our investigation, the ground surface in the vicinity of FMW was mostly barren with scattered brush, small trees, and grasses. Exposed bedrock was visually identified within FMW. The wash was dry and had fencing from neighboring properties located adjacent to and within the wash. The ground surface in the vicinity of LCB consisted of scattered brush, grass, and exposed bedrock at the west abutment. Water was flowing within the riverbed and the active river channel was lined with grass, shrubs, and trees.

4.2 SUBSURFACE CONDITIONS

4.2.1 Geology

The project site is located in the Colorado Plateau physiographic province of the southwestern United States. The Colorado Plateau province is situated between the Rocky Mountains to the east and the Basin and Range physiographic province to the southwest. The Colorado Plateau is generally located in the northeastern portion of Arizona, extending into Utah, Colorado, and New Mexico. The Colorado Plateau was formed during middle and late Tertiary time (100 to 15 million years ago) and is characterized by great thicknesses of flat and nearly flat lying Paleozoic to Mesozoic sedimentary strata, eroded into scenic plateaus, cliffs, and canyons. In many locations, the otherwise horizontal and continuous sedimentary sequences have been broken by faults and/or bent and uplifted into monoclines and plateaus, likely during Laramide compressional deformation associated with the creation of the Rocky Mountains. Although uplifted, very little deformation has occurred to the bedrock units with the portion of the Colorado Plateau in the near vicinity of the project site. The entire plateau drains to the Colorado River.

Prior to drilling, local site geology was evaluated by reviewing the Geologic Map of Arizona (Richard et al., 2000) and the Google Earth GIS database of Geologic Units for descriptions of surface mapping. The geologic maps indicate the two project sites lie within the Permian Sedimentary Rocks. This area is described as gray to tan, cherty limestone of Kaibab and Toroweap Formations, and underlying white to tan, fine-grained Coconino Sandstone. Limestone was deposited in a shallow sea, and sandstone was deposited in near-shore dunes and beach settings. These bedrock conditions are consistent with the observed bedrock described in Section 4.2.2 for FMW and the LCB west abutment. The soil conditions at the LCB pier and east abutment are more accurately described by Holocene Surficial Deposits as are indicated on the Geologic Map to the northwest of the site along the Little Colorado River. These soils are described as unconsolidated deposits associated with modern fluvial systems. This unit consists primarily of fine-grained, well-sorted sediment on alluvial plains, but also includes gravelly channel, terrace, and alluvial fan deposits on middle and upper piedmonts.

4.2.2 Geotechnical Profiles

The FMW borings (FMW-1 and FMW-2) encountered eight to nine feet of embankment fill consisting of very loose to medium dense silty sand (SM) and silty, clayey sand (SC-SM) with no to low plasticity. The embankment fill was underlain by native loose to medium dense silty sand (SM) and silty, clayey sand (SC-SM) with no to low plasticity extending to depths of 20 feet at FMW-1 and 12 feet at FMW-2. Very soft to soft limestone was encountered to depths of 26 feet in FMW-1 and 13 feet in FMW-2. Below these depths, more competent, moderately hard to hard limestone was encountered to the full depths of investigation. This rock was typically less weathered with rock quality designation (RQD) values which varied from 0 and 60 percent. A summary of the FMW geotechnical profile is provided in Table 4.1 below. Additionally, the USCS profile and N-value profile are provided in Figure 4.

Table 4.1: Five Mile Wash Geotechnical Profile Summary

Layer	Bottom Elevation (ft)[1]	Bottom Depth (ft)	Soil Description	USCS
1	5,097	8 to 9	Embankment Fill: Very Loose to Medium Dense Silty Sand and Silty, Clayey Sand	SM/SC-SM
2	5,086 to 5,093	12 to 20	Native Soil: Loose to Medium Dense Silty Sand and Silty, Clayey Sand	SM/SC-SM
3	5,079 to 5,092	13 to 27	Bedrock: Soft Limestone	Bedrock
4	5046[2]	60	Bedrock: Moderately Hard to Hard Limestone	Bedrock

Notes: [1]Surface elevation at approximately 5,106 feet for FMW-1 and 5,105 feet for FMW-2.
[2]Maximum depth explored.

The LCB profile varied greatly between each bridge support. The west abutment boring (LCR-1) encountered medium dense to very dense nonplastic silty sand (SM) to a depth of about 10 feet underlain by very dense silty sand to possible soft bedrock. Permian limestone bedrock was encountered at 11 feet and consisted of very soft to soft, moderately weathered limestone extending to a depth of about 15 feet. Medium hard to hard rock with an RQD of 25 to 85 percent was encountered below 15 feet, extending to the full depth of investigation. A summary of the geotechnical profile for the LCB west abutment is provided in Table 4.2 below.

Table 4.2: Little Colorado Bridge West Abutment Geotechnical Profile Summary

Layer	Bottom Elevation (ft)[1]	Bottom Depth (ft)	Soil Description	USCS
1	5,110	11	Medium Dense to Very Dense Silty Sand. Possible bedrock contact below 5,111	SM
2	5,106	15	Bedrock: Very Soft to Soft Limestone	Bedrock
3	5,062[2]	43[2]	Bedrock: Moderately Hard to Hard Limestone	Bedrock

Notes: [1]Surface elevation at approximately 5,121 feet.
[2] Maximum depth explored.

The LCB pier boring (LCR-3) was drilled within the ravine (below the bridge deck). The geotechnical profile at this location consisted of very loose to loose nonplastic sand with varying amounts of silt (SM/SP/SP-SM) in the upper 30 feet. This material increased in density to medium dense to a depth of 89 feet at which point very dense nonplastic gravel with sand and silt was encountered to the maximum depth explored. A summary of the geotechnical profile for the LCB pier is provided in Table 4.3 below.

Table 4.3: Little Colorado Bridge Pier Geotechnical Profile Summary

Layer	Bottom Elevation (ft)[1]	Bottom Depth (ft)	Soil Description	USCS
1	5,063	30	Very Loose to Loose Sand with Varying Amounts of Silt	SM/SP/ SP-SM
2	5,004	89	Medium Dense Sand with Silt	SP-SM
3	5,001[2]	92[2]	Very Dense Gravel with Sand and Silt	GP-GM

Notes: [1]Surface elevation at approximately 5,093 feet.
[2] Maximum depth explored.

The LCB east abutment (Boring LCR-4) geotechnical profile consisted of medium dense nonplastic silty sand (SM) and medium plasticity clayey sand (SC) and sandy clay (CL) embankment fill in the upper 18 feet. The embankment fill was underlain by loose to medium dense sand and gravel (SP-SM/GM) which was underlain by a 15-foot layer of medium to high plasticity very soft to soft clay. Beneath the clay was a layer of very loose to medium dense nonplastic sand with varying amounts of silt (SM/SP-SM). This material was underlain by approximately 9 feet of soft sandy clay after which medium dense nonplastic to low plasticity sand and sand with clay (SP/SP-SC) was encountered to the maximum depth explored. A summary of the geotechnical profile for the LCB east abutment is provided in Table 4.4 below.

Table 4.4: Little Colorado Bridge East Abutment Geotechnical Profile Summary

Layer	Bottom Elevation (ft)[1]	Bottom Depth (ft)	Soil Description	USCS
1	5,097	18	Embankment Fill: Medium Dense Silty Sand, Clayey Sand, and Sandy Clay	SM/SC/CL
2	5,090	25	Medium Dense Silty Gravel and Sand with Silt	GM/SP-SM
3	5,074	41	Very Soft to Soft Sandy Clay, Clay with Sand, and Fat Clay	CL/CH
4	5,020	95	Loose to Medium Dense Silty Sand and Sand with Silt	SM/SP-SM
5	5,011	104	Soft Sandy Clay	CL
3	4,964[2]	151[2]	Medium Dense Sand and Sand with Clay	SP-SM

Notes: [1]Surface elevation at approximately 5,115 feet.
[2] Maximum depth explored.

The individual boring logs with more detailed descriptions are presented in Appendix A. The USCS profiles and N-value profiles are provided in Figure 4.

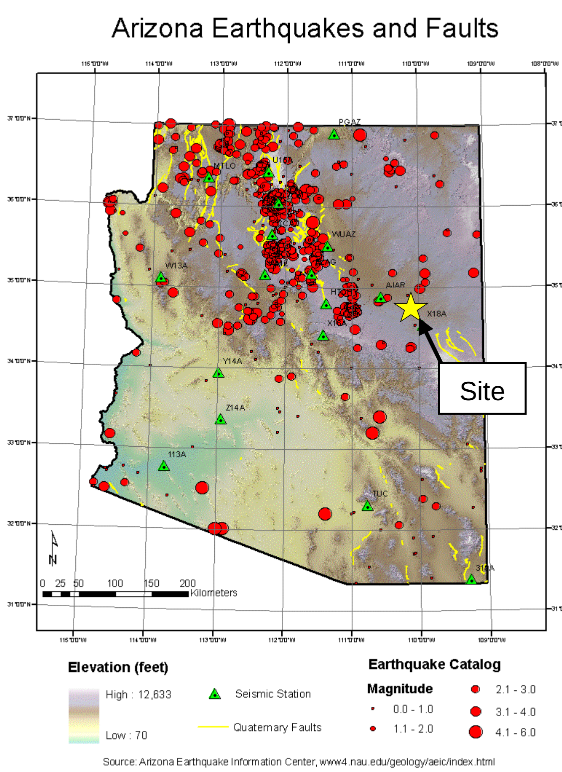
4.2.3 Groundwater Conditions

Groundwater was not encountered at Five Mile Wash. Based on a review of the ADWR groundwater data (2001), historic high groundwater level near the proposed FMW crossing (Well Local ID: A-17-21 08DBB) was at an approximate depth of 22 feet below grade (El. 5,088 feet). Groundwater, in the possible form of perched water from seasonal runoff, may impact construction of the culvert at Five Mile Wash.

Groundwater was encountered in Borings LCR-3 and LCR-4 at approximate depths of 12 feet (El. 5,081 feet) and 30 feet (El. 5,085 feet) at the time of exploration. Based on a review of the ADWR groundwater data (2023), historic high groundwater level near the LCB in recent years (Well Local ID: A-17-21 10CBA) has been at an approximate elevation of 5,085 feet. This groundwater elevation was used for design purposes at the LCB site. The local groundwater table within the alluvium of the Little Colorado River will impact construction of the pier and east abutment foundations of the planned bridge. Seasonal variations could cause fluctuations in the local groundwater depths.

4.2.4 Seismic Conditions

The site is located approximately 38 miles northwest of the Vernon fault zone which trends through the middle of the Pliocene-Quaternary Springerville volcanic field in east-central Arizona. The faults are on the Mogollon Slope, an erosion surface cut on Mesozoic rocks that slopes north from the Colorado Plateau margin to the Little Colorado River. Faults cut uppermost Miocene (~6 Ma) to lower Pleistocene (0.9 to 1.3 Ma) volcanic rocks and Mesozoic bedrock. Amounts of displacement have not been reported (USGS).



The Arizona Earthquake Center has provided a state map of earthquakes and faults (see figure to the right). The project site is located southeast of the Arizona Seismic Belt within the Central Colorado

Plateau Zone. ADOT has provided design earthquake magnitudes for seismic zones across the state (ADOT, 1992). According to ADOT (1992), earthquakes in this zone are relatively infrequent and of small magnitude compared to adjacent zones. The maximum credible earthquake for the Central Colorado Plateau seismic source zone is estimated to be 6.0. Therefore, 6.0 was used in the liquefaction analysis described in Section 4.2.5.

The site classification was determined by calculating the average corrected SPT (N_{60}) for the upper 100 feet of the soil profile (N_bar) using the weighted harmonic mean in accordance with AASHTO Table C3.10.3.1-1 (2017). From Table 3.10.3.1-1 of AASHTO (2012) the Site Classification was determined for the various site locations as presented in Table 4.5 below. In accordance with AASHTO (2012) the project site has the Horizontal Spectral Response Acceleration Coefficients with a 7 percent probability of exceedance in 75 years. The probabilistic horizontal spectral acceleration values for the designated return period and corresponding horizontal peak ground acceleration (PGA) were obtained from the United States Geological Survey (USGS) seismic hazards program website (USGS 2002). The values obtained from the website are based on 2009 AASHTO Guide Specifications for LRFD Seismic Bridge Design and use 2002 USGS seismic hazard data. For structural design, the seismic parameters in Table 4.5 should be used.

Table 4.5: Summary of Seismic Parameters

Parameter	5-Mile Wash Crossing	Little Colorado Bridge West Abutment	Little Colorado Bridge Pier & East Abutment	AASHTO Reference
Latitude, °N	34.88563	34.882718	34.882753	
Longitude, °W	110.13148	110.109008	110.108549	
Site Class Definition	C	B	E	Table 3.4.2.1-1
Site Coefficient, F_{PGA}	1.2	1.0	2.5	Table 3.4.2.3-1
Site Coefficient, Fa	1.2	1.0	2.5	Table 3.4.2.3-1
Site Coefficient, F_v	1.7	1.0	3.5	Table 3.4.2.3-2
PGA	0.052g	0.051g	0.051g	
Spectral Acceleration, S_{DS}	0.139 g	0.115g	0.288g	Equation 3.4.1-2
Spectral Acceleration, S_{D1}	0.063 g	0.037g	0.128g	Equation 3.4.1-3

4.2.5 Geologic Hazards - Liquefaction

Liquefaction occurs when dynamic loading of a saturated sand or silt causes pore-water pressures to increase to levels where grain-to-grain contact is lost and the material temporarily behaves as a viscous fluid. Liquefaction can cause settlement of the ground surface, settlement and tilting of structures, flotation of buoyant buried structures and fissuring of the ground surface.

The FMW crossing and LCB west abutment have shallow bedrock; therefore, these locations were determined not to be susceptible to liquefaction. Due to the loose saturated sand at the LCB pier and east abutment, evaluation of the potential for liquefaction and dynamic settlement was performed at these locations. Data from Borings LCR-3 and LCR-4 and review of published geotechnical and geologic data was used in the evaluation.

A groundwater elevation of 5,085 feet was used for evaluation of liquefaction potential at the site. Ethos has used the data from the boring logs and the methodology outlined in the Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils (Youd and Idriss, 1997) to evaluate the potential for liquefaction at the site.

Per the criteria, zones that exhibit a factor-of-safety less than 1.1 under seismic loading conditions may liquify under seismic loading. Results of the liquefaction analysis indicate a factor of safety of 1.4 or greater at the pier and east abutment locations (see Figures G1 and G2 in Appendix G). This value further increases below the depth of scour. Therefore, liquefaction is not anticipated on this project.

5.0 ENGINEERING ANALYSES AND RECOMMENDATIONS

Our investigation and laboratory testing results and geotechnical engineering recommendations for foundation support of the FMW Crossing and LCB improvements are presented in the following sections. These recommendations are based on our understanding of the project, the results of our field exploration, laboratory testing for the site, and engineering analyses.

5.1 FOUNDATIONS SUMMARY

At the FMW Crossing, the culvert may bear directly on bedrock but is not required to do so. Recommendations are provided herein for support of the box culvert.

Due to the presence of shallow bedrock at the LCB west abutment, spread footings bearing directly on bedrock are recommended at this location. The pier and east abutment locations will require deep foundations to obtain sufficient support in the loose to medium dense sand and soft clay soils which have infilled the stream channel basin (above rock). It appears the rock, which is exposed roughly 110 feet east of the planned east abutment, is relatively deep at the planned center pier and east abutment locations.

In general, driven steel piles or drilled shafts, in groups, which derive the majority of their support from side shear and limited tip resistance within the medium dense soils present at depth, would provide adequate support of the pier and east abutment with limited post-construction settlements. However, design load information provided by NFra indicates strength and service loads for the center pier which exceed those available for a single drilled shaft constructed within the limits of the explored depths. Groups of shafts or piles constructed under a sizable pile cap will be required for either foundation type utilized at the pier.

Ground settlement due to new embankment construction is of concern. Preloading of the embankment and sleeving of piles or drilled shafts through the upper clay material at the east abutment should also be considered to accelerate the rate of consolidation in clays at shallow depths and to reduce downdrag. Included herein are drilled shaft and driven steel pile recommendations for support of the LCB bridge pier and east abutment. These two foundation types both have advantages and disadvantages that should be considered when selecting a foundation type. A summary of these advantages and disadvantages are provided in Table 5.1 below.

Table 5.1: Advantages and Disadvantages of Drilled Shaft and Pile Foundations at LCB Pier and East Abutment

Foundation	Advantages	Disadvantages
Drilled Shafts	-Smaller footprint than pile cap -More common in the state of Arizona	-Construction difficulties in loose saturated sands
Driven Piles	-The current LCB bridge is supported on piles -Easier to install -Capacity of each pile recorded at installation -Can increase capacity by adding more piles -May be battered for increased lateral support	-Larger pile cap footprint

Though the proposed bridge is slightly longer than the existing structure, the east abutment is not founded in rock. We recommend consideration be given to adding a third span to the bridge and extending it an additional approximately 110 feet to the east. This would allow the east abutment to be supported on rock and the loads at the piers to be greatly reduced.

5.2 SPREAD FOOTINGS

5.2.1 Bearing Resistance

The strength and service limit state design analyses for spread footings were completed per the methods presented in Sections 10.5 and 10.6 of AASHTO (2012), and ADOT Geotechnical Design Policy SF-1 (2010a). At the FMW crossing, limestone bedrock varies from 20 feet below grade at Boring FMW-1 to 12 feet below grade at FMW-2 (El. 5,086 feet to 5,092 feet). According to historical data, the existing bridge footings vary in depth from El. 5,087 feet to El. 5,094 feet. Structural drawings indicate a bottom of box elevation of 5,093 feet and a bottom of cutoff wall elevation of 5,088. Due to the presence of existing footings and to better ensure uniformity of bearing conditions, overexcavation of up to three feet is recommended where bedrock is not encountered.

At the location of the LCB west abutment, the depth to bedrock is anticipated to be relatively uniform. Though the exposed rock ledge at the west abutment is nearly vertical (with some overhangs) it appears the footprint for the planned abutment is set back sufficiently such that the entire footing will be founded on intact, nearly flatly bedded limestone bedrock. We recommend the footing be constructed no closer than 1 foot from the rock ledge. Cement grout infill may be required to achieve a level bearing surface where the jointed section of rock exists at the location of the new footing. The grout, if used, should achieve a minimum 28-day compressive strength of 2,000 psi.

NFra provided anticipated loads for the LCB west abutment spread footing on May 2, 2024. These loads include 4.2 ksf for the service limit state and 5.2 ksf for the limit state. The factored net bearing resistance, q_{Rn}, for the strength limit state design was determined using the net nominal bearing resistance (ultimate bearing capacity), q_{nn}, calculated per Section 10.6.3.1.2a and bearing resistance factor, φ_b, from Section 10.5.5.2.2 of AASHTO (2012). The parameters presented below in Table 5.2 were assumed for the nominal resistance and strength limit state analyses. The footing lengths and depth were assumed based on information provided by NFra.

Table 5.2: Spread Footing Analysis Parameters
Strength Limit State Design for Bearing

Parameter	Symbol	FMW Culvert	LCB West Abutment
Soil Angle of Internal Friction	ϕ_f	28 degrees	30 degrees
Soil Total Unit Weight	γ	110 pcf	120 pcf
Cohesion	c	0 psf	0 psf
Maximum Footing Length	L	55 ft	48
Footing Bearing Depth	D_f	2 ft	10 ft
Effective Footing Width	B_f	50 ft	5 to 15 ft
Bearing Resistance Factor	φ_b	0.45	0.45

The resulting factored net bearing resistance, q_{Rn}, versus effective footing width, B', for the FMW culvert and LCB west abutment are shown as the "Strength Limit State" line in Appendix D Figures D1 and D2, respectively.

Per the ADOT Geotechnical Design Policy SF-1 (2010a), the modified Schmertmann method presented in Section 8.5 of the Federal Highway Administration (FHWA, 2006) Soils and Foundation Reference Manual was used to calculate settlements for the service limit state analysis. The parameters assumed for this analysis are presented in Tables 5.3 and 5.4.

Table 5.3: Five Mile Wash Culvert Spread Footing Analysis Parameters
Service Limit State Design for Bearing

Parameter	Symbol	Depth Interval (ft)[1]	
		0-8	Below 8
Soil Type	--	Silty Sand	Limestone
Soil Unit Weight (pcf)	γ	110	130
Corrected SPT N-value	N_{60}	7 to 20	100
Elastic Modulus (ksf)	E_s	85 to 320	4,100

(1) Depth of 0 corresponds with El. 5095'.

Table 5.4: LCB West Abutment Spread Footing Analysis Parameters Service Limit State Design for Bearing

Parameter	Symbol	Depth Interval (ft)[1]	
		0-10	Below 10
Soil Type	--	Sand	Limestone
Soil Unit Weight (pcf)	γ	110	130
Corrected SPT N-value	N_{60}	26	100
Elastic Modulus (ksf)	E_s	320	4,100

(1) Depth of 0 assumed to be at existing ground.

The parameters are based on the measured soil densities, distribution of N values and using correlations with N-values presented in Bowles (1986). Figures D1 and D2 present the family of service limit state curves developed per ADOT Geotechnical Design Policy SF-1 (2010a) for design settlements of 0.25, 0.5, 0.75, 1.0, and 1.25 inches and various effective footing widths, B_f.

5.2.2 Sliding

The factored sliding resistance, R_R, for limit state design should be determined using the nominal sliding resistance between soil and foundation, R_τ, and nominal passive resistance, R_{ep}, per Section 10.6.3.4, and corresponding resistance factors, φ_τ and φ_{ep}, from Section 10.5.5.2.2 of AASHTO LRFD (2012). We recommend the parameters presented in Table 5.5 be used for analyzing sliding resistance.

Passive lateral soil resistance should typically be neglected in the upper 3 feet of finished grade due to the potential for disturbance. Below a depth of 3 feet, the nominal passive resistance can be estimated assuming a hydrostatic pressure distribution of 350 psf per foot at the FMW crossing. For footings founded in rock (LCB west abutment), the nominal passive resistance may be increased to 600 psf per foot. A coefficient of friction of 0.45 is recommended for computing the lateral resistance between the bases of foundations and the underlying soils/rock when analyzing lateral loads.

Table 5.5 - FMW Crossing and LCB West Abutment Spread Footing Analysis Parameters - Strength Limit State Design for Sliding

Parameter	Symbol	Value
Factored Sliding Resistance		
Resistance Factor for Shear Between Soil and Foundation	φ_τ	0.90(1)
Resistance Factor for Passive Resistance	φ_{ep}	0.50
Nominal Sliding Resistance		
Soil Angle of Internal Friction	ϕ_f	30 deg.
Soil Total Unit Weight	γ	115 pcf
Cohesion	C	0
Shear Resistance Between Soil and Foundation	δ	24 deg. = ϕ_f
Passive Earth Pressure Coefficient	K_p	3.0

(1) Use resistance factor of 0.90 for soil-on-soil interface for the bottom horizontal plane of footing between toe and front of key. For remainder of footing bottom use values provided in AASHTO, 2012 Table 10.5.5.2.2-1.

5.2.3 Eccentricity

The eccentricity in the L (long) dimension of an abutment footing is typically negligible, such that L = L'. The effective footing length (B') in the B (short) dimension is calculated as B' = B – 2e_B, where e_B is the B dimension eccentricity determined by the structural engineer. The maximum allowable eccentricity at the strength limit state should be calculated for footings on soil/rock in accordance with ADOT Geotechnical Design Policy SF-2 (ADOT, 2010b).

5.2.4 Foundation Subgrade Preparation

Foundation elements for the FMW crossing and LCB west abutment are assumed to be constructed within excavations cut to the base of planned spread footing foundations. Trash, debris, vegetation (including roots) and other organics, any existing spread fill, any unstable (soft, loose, disturbed, water softened, sedimentation, collapsible, expansive, etc.) soils, and other deleterious materials should be removed from proposed structure foundation areas prior to construction. Existing footings for the FMW bridge may remain in place; however, soil beneath the planned culvert should be excavated 3 feet unless bedrock is encountered. Site grading should extend laterally a minimum of 1.5 feet beyond structure areas. All areas of excavation should be observed and approved by the geotechnical engineer after clearing and before any placement of foundations or backfilling operations begin at the site. Any voids present in the exposed bedrock should be filled as directed by the geotechnical engineer. The extent of removal of unsuitable materials should also be as directed by the geotechnical engineer.

5.2.5 Structure Backfill

All backfill placed for this project to build the sites to final design grades (following foundation excavations) should consist of structure backfill meeting the requirements of Section 203 of the current ADOT Standard Specifications. Based on limited testing, the majority of existing site soils are anticipated to be suitable for structure backfill. All structure backfill placed within 50 feet of the new box culvert or bridge approach slabs should be moisture conditioned to within 2 percent of the optimum moisture content and compacted to a minimum of 100 percent of maximum ASTM D698 Standard Proctor density. Beyond these limits, the level of compaction may be reduced to 95 percent.

5.3 DRILLED SHAFTS IN SOIL

5.3.1 Drilled Shaft Axial Resistance

The strength and service limit state design analyses for redundant drilled shafts installed in soil were completed at the LCB pier and east abutment locations per the LRFD methods described in Sections 10.5 and 10.8, respectively, (AASHTO 2012), and the ADOT Geotechnical Design Policy for Load Factor Resistance Design, DS-1 (2010a).

The factored shaft resistance, R_R, for strength limit state design was determined using the nominal shaft tip resistance, R_p, and nominal shaft side resistance R_s, computed per Sections 10.8.3.5.2c and 10.8.3.5.2b, respectively, of AASHTO LRFD (2012), and the corresponding resistance factors, φ_{qp} and φ_{qs}, from Section 10.5.5.2.4. The parameters used in the analyses are presented in Tables 5.6 and 5.7. J2 Engineering & Environmental Design provided scour estimations on 8/2/2023 of El. 5,049 feet at the pier and El. 5,052 feet at the east abutment. An elevation of 5,050 feet was used for analysis at both locations. All soil parameters above this elevation were neglected. Since the east abutment contains a 10-foot layer of saturated clay not encountered at the pier location, two separate analyses for axial resistance were deemed appropriate. The N-values were corrected based on a verified hammer energy efficiency of greater than 60 percent. The γ values were taken from our dry density and moisture content test results and based on our experience with these types of soils.

Table 5.6: Drilled Shaft Analysis Parameters
LCB Bridge Pier - Strength and Service Limit State Design for Axial Loading

Parameter	Symbol	Depth Interval (ft)[1]		
		0-40	40-85	85+
Soil Type (AASHTO)		Neglected	Sand	Gravel
Effective Soil Unit Weight (pcf)	γ	---	52.6	62.6
Avg. Energy Corrected SPT N-Value	N	---	20 to 34	50+
Resistance Factors for Redundant Shafts				
Tip	φ_{qp}	0.50		
Shaft	φ_{qs}	0.55		

(1) Depth 0 equates to top of shaft elevation of 5,090 feet. Existing grade is 5,093 feet at Boring LCR-3.

Table 5.7: Drilled Shaft Analysis Parameters
LCB East Abutment - Strength and Service Limit State Design for Axial Loading

Parameter	Symbol	Depth Interval (ft)[1]			
		0-60	60-90	90-100	100+
Soil Type (AASHTO)		Neglected	Sand	Clay	Sand
Effective Soil Unit Weight (pcf)	γ	---	62.6	37.6	62.6
Avg. Energy Corrected SPT N-Value	N	---	9 to 20	---	16 to 43
Undrained Shear Strength (psf)	S_u	---	---	1,020	---
Resistance Factors for Redundant Shafts					
Tip	φ_{qp}	---	0.50	0.40	0.50
Shaft	φ_{qs}	---	0.55	0.45	0.55

(1) Depth 0 equates to top of shaft elevation of 5,110 feet. Existing grade is 5,115 feet at Boring LCR-4.

The strength, service, and extreme limit axial resistance curves showing the factored axial resistance versus depth for drilled, cast-in-place shaft diameters of 4, 5, 6, 7, 8, 9, and 10 feet are presented in Appendix E, Figures E1 through E14. The service limit axial resistance curves were developed per Section 10.8.2.2 of AASHTO LRFD (2012) for design settlements of 0.1, 0.25, 0.5, 0.75 and 1.0 inch. The trend line normalized load transfer curves (Figures 10.8.2.2.2-3 and -4) were used to factor the developed side shear and tip resistance to create the settlement-based service axial resistance curves. The extreme limit axial resistance curves were developed using the unfactored resistance.

Based on the loose, saturated soils encountered in Boring LCR-4, we recommend that drilled shafts for the LCB east abutment not bear (tip) within the elevation range of 5,030 to 5,010. This zone is indicated on Figures E8 through E14. If shafts extend below elevation 5,010 feet, additional downdrag forces may occur beyond those outlined in Section 5.3.2 of this report. For this reason, it would be beneficial to keep shaft tips above elevation 5,030.

To account for group effects, a resistance reduction factor, η, should be applied to the axial resistance to closely spaced drilled shafts. Per Section 10.8.3.6.3 of AASHTO LRFD (2012), the reduction factor should be 0.65 for center-to-center shaft spacings of 2.5 diameters, and 1.0 for spacings of 4.0 diameters (or greater). Linear interpolation should be used to determine the axial resistance reduction factor for spacings between 2.5 and 4.0 diameters. If the drilled shaft being designed is non-redundant, AASHTO recommends reducing the values of the resistance factors by 20 percent. Conversely, the structural engineer can increase the loads by 20 percent and then enter the provided axial resistance charts with the increased load.

NFra provided anticipated loads for the LCB pier and east abutment on May 20, 2024 as summarized in Table 5.8:

Table 5.8: Little Colorado River Bridge Structural Loads (NFra, 5/20/2024)

Bridge Support	Service Kips	Strength Kips
Pier	2,793	3,804
East Abutment	1,105	1,565

According to shaft resistance values presented in Figure E2, the maximum strength resistance for a 10-foot diameter shaft at the pier is 2,300 kips. This value for a single, non-redundant shaft is insufficient for the required loading provided by NFra. Therefore, Ethos recommends increasing the number of drilled shafts or using driven piles at this location. Given the loose saturated sands at the site, driven piles may be a more viable option from a construction standpoint. Driven pile recommendations are provided in Section 5.4.

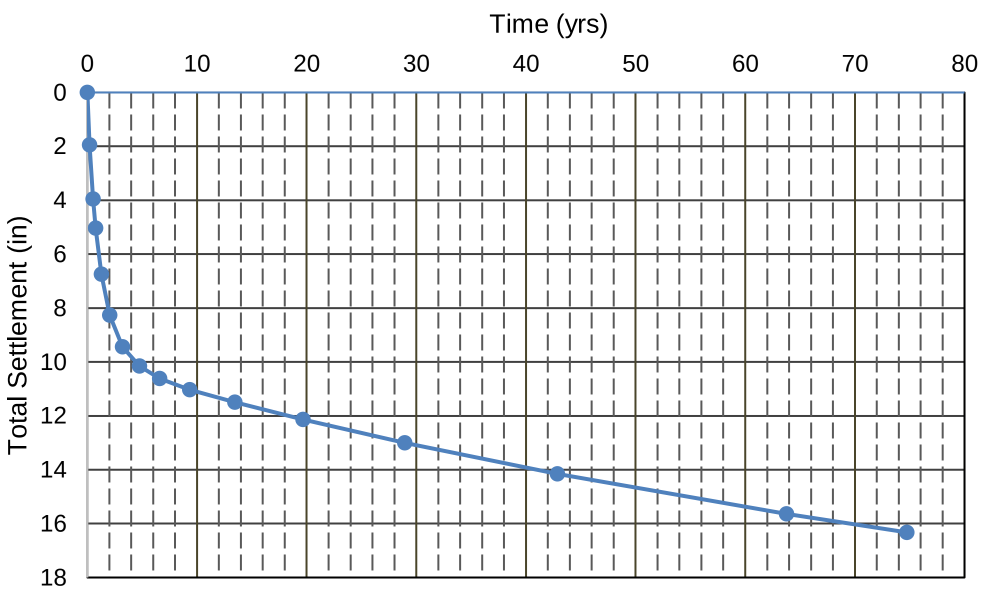
5.3.2 Downdrag

Deep foundations supporting the LCB east abutment, subjected to new embankment fill surcharges, may experience downdrag loads due to settlement. The LCB pier is expected to experience less than 0.4 inches of settlement from the east abutment embankment surcharge and is therefore not considered to have downdrag forces.

The new embankment fill soil, if in contact with the drilled shaft, can move downward as it settles, relative to the drilled shaft, and “drag” the shaft down, and/or the new embankment fill soil can cause the existing ground to settle and the existing ground can move downward relative to the shaft. The design charts in Appendix E do not account for these downdrag forces. To limit potential downdrag forces on driven pile or drilled shaft foundations within embankment fills (LCB east abutment), Ethos recommends the construction sequence begin with placing the embankment fill to allow the immediate settlement to occur prior to construction of the driven pile or drilled shaft foundations.

We understand that preloading is planned three months prior to the installation of the drilled shafts or driven piles. Figure 5-1 illustrates the predicted settlement of the soil expected to occur over the lifespan of the structure beneath the southwest corner of the east abutment after three months of preloading is complete. The predicted settlement varies across the site as is further explained in Section 5.6.

Figure 5-1: Time vs. Total Settlement at SWC of East Abutment After Preloading



A maximum of 16.3 inches of soil settlement may occur over the 75-year lifespan of the structure. Of these 16.3 inches, 90 percent (approximately 14.8 inches) is anticipated to occur within the upper layers of soft clay at an elevation of 5,075 or above.

Due to the extensive time required for primary consolidation, downdrag is anticipated even with preloading before the piles or shafts are constructed; however, settlement is expected to be significantly less since immediate settlement will have already occurred. The following downdrag analysis was performed on the southwest corner of the east abutment where the majority of embankment fill will be added. Values are for drilled shafts installed three months after construction of the embankment fill with a tip elevation no deeper than 5,030 feet. Sleeves may be used within the upper clay layers to eliminate downdrag.

Downdrag loads for this construction sequence were calculated using procedures outlined in Article 3.11.8 (AASHTO 2012) and the Federal Highway Administration (FHWA) Drilled Shafts Manual (2010). The side shear and end bearing in the founding stratum were assigned based on the results of the vertical resistance analyses, as described in Section 5.5.1, except that soil above the depth of scour was included for downdrag purposes and resistance to downdrag. Downdrag loads were evaluated for a drilled shaft diameter of 5 feet in conjunction with the foundation design load information.

Downdrag loads were calculated at a relative soil to shaft displacement of 0.4 inches required to develop the full side resistance as presented in Article 3.11.8 (AASHTO 2012). Downdrag loads presented in Table 5.9 should be included when evaluating the shaft structural resistance but should not be added to the strength limit loads when determining the embedment depth of the shafts because of the consideration of scour during the strength limit state. Since the embedment depth has not yet been determined by the structural engineer, these values may change. The downdrag load will increase significantly if the drilled shaft tip elevation is extended below an elevation of 5,010 feet.

Table 5.9: Drilled Shaft Downdrag Loading

Structure Element	Strength Load per Shaft[1] [kips]	Shaft Tip Elevation[2] [feet]	Shaft Settlement		Downdrag Load per Shaft [kips]
			Below Shaft Tip[3] [inches]	Relative Shaft Tip Movement[4] [inches]	
LCB East Abutment	391	5,035	1.5	<0.25	570

(1) Assumes four drilled shafts at the east abutment.
(2) Tip elevation estimated based on loading information provided by designer.
(3) Settlement of the soil below shaft tip resulting in downward movement of the shaft and surrounding soil.
(4) Movement of shaft tip relative to surrounding soil required to develop resistance.
(5) Calculations are for a 5-foot diameter drilled shaft.

5.3.3 Lateral Loading

It is our understanding that the lateral load analyses will be performed using the software program L-Pile developed by Ensoft, Inc. This program analyzes pier deflection as a function of the design loads, foundation construction, and subsurface conditions. It is recommended that LPILE Plus (Version 5.0 or later) be used for analysis of single piles and that GROUP (Version 7 or later) be used for analysis of pile groups. For closely spaced drilled shafts, the p-y curves developed using the recommended parameters should be adjusted using a P-multiplier, P_m, with the values determined per Section 10.7.2.4 of AASHTO LRFD (2012). L-Pile parameters for use in the analysis of drilled shafts and driven piles are provided in Tables 5.10 and 5.11.

Table 5.10: LCB Pier Soil Input Parameters for LPILE

Elevation (ft)		p-y	γ’	ϕ	C	ε_{50}	k
From	To	Curve	(pcf)[1]	(deg)	(psf)[2]		(pci)[3]
5,050[4]	5,005	Sand	52.6[5]	30	--	--	60
Below 5,005		Sand	62.6[5]	34	--	--	125

(1) Pcf = pounds per cubic foot
(2) Psf = pounds per square foot
(3) Pci = pounds per cubic inch
(4) Strength (phi and k) should be neglected above El. 5,050’ to account for scour
(5) Assumes submerged conditions

Table 5.11: LCB East Abutment Soil Input Parameters for LPILE

Elevation (ft)		p-y	γ’	ϕ	C	ε_{50}	k
From	To	Curve	(pcf)[1]	(deg)	(psf)[2]		(pci)[3]
5,050[(4)]	5,020	Sand	62.6[(5)]	30	--	--	90
5,020	5,010	Clay	37.6[(5)]	---	510	0.007	--
Below 5,010		Sand	62.6[(5)]	30	--	--	90

(1) Pcf = pounds per cubic foot
(2) Psf = pounds per square foot
(3) Pci = pounds per cubic inch
(4) Strength (ϕ and k) should be neglected above El. 5,050’ to account for scour
(5) Assumes submerged conditions

5.3.4 Drilled Shaft Construction

The soil consists primarily of generally loose sands and very soft clays in the upper 50 to 60 feet, becoming somewhat denser at depth. Groundwater should be expected at depths of less than 30 feet. Casing and/or slurry will be needed to advance drilled shafts. All construction techniques should be in accordance with Section 609 of the *ADOT Standard Specifications* (ADOT 2021) and the project-specific special provisions. Quality control during the drilled-shaft construction should include those items specifically called out in the *ADOT Standard Specifications* (ADOT 2021), Section 609. A quality control report should be submitted for each shaft, stating that all details were monitored and meet the project requirements.

Straight, drilled shaft excavations can be advanced with single-flight-auger or bucket auger bits to the recommended depth. Cleaning of the drilled-shaft excavations should be performed in accordance with Section 609 of the ADOT Standard Specifications (ADOT 2021). It should be verified by inspection and measurement that the excavation is open to that depth. The pier excavation should be cleaned so no more than 3 inches of slough or loose material is present in the bottom of the excavation.

As groundwater is expected to impact the construction of drilled shafts, integrity testing of each drilled shaft foundation shall be performed in accordance with Section 609-3.05 (ADOT, 2021) by means of cross-hole sonic logging (CSL) survey and a gamma-gamma logging (GGL) survey.

5.4 DRILLED SHAFTS IN ROCK (ROCK SOCKETS)

Current plans indicate the existing west foundation for the LCB is founded on rock. The proposed alignment to the south of the existing bridge appears to have a section of rock which either failed into the channel through fracturing or was eroded into the channel. This missing piece comes close to where the footing is currently planned. Though not anticipated, if the footprint of the abutment footing falls within 1 foot of the bedrock edge (where the contact drops significantly), we recommend the LCB west abutment be supported on rock sockets.

5.4.1 Axial Resistance of Rock Sockets

Drilled shaft axial resistance values for rock sockets were calculated at the proposed LCB west abutment in accordance with Section 10.8.3.5.4b of AASHTO (2012). Table 5.12 presents the rock parameters determined for the various strata for use in the analysis. The uppermost alluvium was neglected.

Table 5.12: LCB West Abutment Rock Socket Analysis Parameters
Strength Limit State Design for Axial Loading

Rock Parameter	Strata		
	1	2	3
Depth Below Top of Bedrock (feet) (1)	0 to 5	5 to 15	Below 15
Comp. Strength of Rock (q_u) (psi)	250	10,000	12,000
RQD	5	25	60
Joint Type (closed vs open/gouge-filled)	open	open	open
αE (interpolated from Table 10.8.3.5.4b-1)	0.113	0.475	0.550
GSI (Table 10.4.6.4-1)	10	70	80
m (Table 10.4.6.4-4)	0.007	0.575	2.4
s (Eq. 10.4.6.4-2)	$1x10^{-7}$	0.00293	0.082

(1) Top of rock assumed at depth = El. 5,111 feet.

The strength limit axial resistance curves showing the factored axial resistance versus depth for drilled, cast-in-place shaft diameters of 4, 4.5, 5, 5.5, and 6 feet are presented in Appendix E, Figure E15. We anticipate that support of the LCB west abutment will be accomplished with drilled shafts embedded into the limestone bedrock at a minimum depth of 2.5 x Diameter of the shaft (D) below top of bedrock. Top of bedrock is anticipated to be at an approximate elevation of 5,111 feet. Table 5.8 above indicates an anticipated strength load of 567 kips per shaft. Based on results of our analysis, we expect the four-foot diameter drilled shaft embedded a minimum of 10 feet into bedrock to have ample capacity for the provided loads.

The corresponding resistance factor for geotechnical resistance of drilled shafts penetrating rock is 0.5 for both side resistance and end bearing as presented in Table 10.5.5.2.4-1 of AASHTO (2012). This resistance factor assumes redundant foundations as defined in Article 10.5.5.2.4 of AASHTO (2012).

If the design contains a non-redundant foundation condition, a factor of 0.8 should be applied to the rock resistance values identified at varying depths in the design chart. It appears, based on review of the plans, that the shafts will be redundant. Drilled shafts should be installed a minimum of 2 feet from the cliff edge.

5.4.2 Service Limit State of Rock Sockets

The service axial resistance chart is not included herein and can be provided upon request. According to our field investigation, rock below the minimum depth of embedment is considered to be of good to very good quality. According to Article 10.6.2.4.4 of AASHTO (2012), elastic settlements may be assumed to be less than 0.5 inches in this material.

5.4.3 Lateral Resistance of Rock Sockets

Table 5.13 presents recommended geotechnical parameters for use within the LPILE soil-shaft interaction program (Ensoft 2007). It is recommended that LPILE Plus (Version 5.0 or later) be used for analysis of single shafts and that GROUP (Version 7 or later) be used for analysis of shaft groups where more than one shaft is connected by a cap.

Table 5.13: LCB West Abutment Rock Socket Analysis Parameters
LPILE Below Top of Rock

Depth	p-y Curve	Unit Weight	Strain Factor, k_{rm}	Uniaxial Compressive Strength, q_u	Initial Rock Mass Modulus, E_m	RQD
(feet)		(pcf)		(psi)	(ksi)	(%)
0-5	Weak Rock	135	0.0005	250	300	5
5-10	Strong Rock	140	---	10,000	---	---
Below 10	Strong Rock	140	---	12,000	---	---

(1) Top of rock assumed at depth = El. 5,111 feet. Overburden soil neglected.

For closely spaced drilled shafts, the p-y curves developed using the recommended parameters should be adjusted using a P-multiplier, Pm, with the values determined per Section 10.7.2.4 of AASHTO LRFD (2017).

5.5 DRIVEN PILES

5.5.1 Driven Pile Axial Resistance

The pier and east abutment for the new LCB may be supported on driven steel pipe piles filled with concrete which extend to the medium dense granular soils present at depths of at least 10 feet below depth of scour (minimum tip elevation of 5,040 feet). Soft clay was identified at the east abutment location. We recommend east abutment piles do not tip below an elevation of 5,025 feet in order to avoid this softer zone.

Axial resistance charts for strength and extreme event are provided in Appendix F as Figures F1 to F4. The charts were determined using the α-method for clay and the Nordlund method for sand (AASHTO, 2012). Actual conditions are expected to vary across the site and at each structural support.

The service limit state was evaluated for the pile group using the equivalent footing analogy in accordance with Section 10.7.2.3 of AASHTO (2012). According to the structural drawings provided by NFra on May 2,2024, a pile configuration of 4 by 5 piles is planned for the pier location and a configuration of 3 by 9 piles is planned for the east abutment. A spacing of 3 times the pile diameter was specified in the drawings. Results of the analyses indicate an anticipated settlement of less than one inch at both locations for the service loads provided by NFra in Table 5.8 above.

5.5.2 Drivability Analyses

A preliminary drivability analysis was performed using the software program GRLWEAP to evaluate whether the pile driving hammer, as assumed for this project, is capable of driving the steel piles to the depths required to provide the necessary geotechnical resistance without overstressing the pile. For the purpose of design, we have assumed the piles will be installed with a Delmag D30-32 driving hammer. This hammer has a rated energy of 75 foot-kips. The drivability analyses indicate the Delmag D30-32 hammer, if this size hammer is utilized, can drive a 24-inch diameter (0.75- inch-thick wall) Grade 50 steel pile without overstressing the pile. The analysis indicates the maximum hammer energy should not exceed about 50 foot-kips. The contractor should verify drivability based on the actual hammer.

Additionally, this pile has a nominal structural resistance of approximately 2,100 kips and a factored structural resistance in compression (φc=0.5, assuming severe driving conditions) of 1,050 kips, which is more than sufficient to accommodate the average strength pile load of 190 kips (220 kips maximum) at the pier and 58 kips (77 kips maximum) at the east abutment. The preliminary drivability analysis is included in Appendix H.

Pile Tip Elevation: As stated previously, piles should be driven a minimum of 10 feet below depth of scour to provide the required geotechnical axial pile resistance for the pier and east abutment. Additionally, piles for the east abutment foundation should not tip below an elevation of 5,025 feet to avoid bearing on the soft clay layer and inducing additional downdrag loads. Based on the subsurface conditions, we anticipate that the depth required to achieve the required nominal resistance may vary due to variations in the firmness of the on-site soils. If more resistance is needed at the east abutment, we recommend adding more piles in leu of driving the piles below the maximum recommended elevation of 2,025 feet. The recommendations provided herein are for axial loading. Lateral load analyses (by others) may indicate piles need to extend below these elevations.

Pile Driving Analyzer (PDA) Testing: The nominal geotechnical resistance should be evaluated using the dynamic testing program, with driving criteria established for the remaining piles. Based on the structural drawings showing 20 piles for the pier and 27 piles for the east abutment, use of the 0.65 resistance factor, and 2012 AASHTO LRFD Bridge Design Specifications, a minimum of 2 PDA tests with at least one per support element is recommended at the structure. In addition, it is recommended that set and stroke values be recorded during driving to establish pile driving criteria and to evaluate axial capacity for all remaining piles. Alternatively, the use of a wave equation per Section 603-3 (ADOT, 2021) can be used to determine the required depth based on the driving hammer criteria.

Pile Settlement: Settlement of piles driven into the medium dense soils are anticipated to consist of both elastic compression of the pipe piles and load induced movement. Considering a maximum service dead load of 140 kips per pile at the pier and 41 kips per pile at the east abutment, settlement of piles driven into these soils should be 1 inch or less.

5.5.3 Downdrag

As stated in Section 5.3.2, deep foundations supporting the LCB east abutment, subject to new embankment fill surcharges, may experience downdrag loads. The design charts for driven piles in Appendix F do not account for these additional downdrag forces. Pier foundations are not expected to experience downdrag loads.

Downdrag loads were calculated at a relative soil to pile displacement of 0.4 inches required to develop the full side resistance as presented in Article 3.11.8 (AASHTO 2012). Downdrag loads presented in Table 5.14 should be included when evaluating the pile structural resistance but should not be added to the strength limit loads when determining the embedment depth of the piles because of the consideration of scour during the strength limit state. If the pile were to tip below the do not tip zone (i.e. elevation of 2,025 feet), the settlement from the deeper clay layer could cause a significant increase in downdrag loads. Therefore, if additional capacity is needed during construction, we recommend increasing the number of piles and not the depth of the piles.

The values in Table 5.14 below are for driven piles constructed a minimum of three months after preloading the embankment fill. If preloading is not performed, these recommendations must be reevaluated. Sleeves may be used within the upper clay layers to eliminate downdrag loads if needed.

Table 5.14: Driven Pile Downdrag Loading

Structure Element	Strength Load per Structure [kips]	Number of Piles per Structure	Factored Load per Pile [kips]	Pile Tip Elevation[1] [feet]	Pile Settlement		Downdrag Load per Pile [kips]
					Below Pile Tip[2] [inches]	Relative Pile Tip Movement[3] [inches]	
LCB East Abutment	1,565	27	58	5,029	1.5	<0.25	127

(1) Tip elevation estimated based on number of piles and loading information provided by designer.
(2) Settlement of the soil below pile tip resulting in downward movement of the pile and surrounding soil.
(3) Movement of pile tip relative to surrounding soil required to develop resistance.
(4) Calculations are for a 2-foot diameter steel pipe pile filled with concrete.

5.5.4 Driven Pile Lateral Resistance

The values presented in Tables 5.10 and 5.11 are considered applicable for the design of both drilled shafts and driven piles. For piles spaced at 5B or less, where B is the pile diameter, the p-y curves developed using the recommended parameters should be adjusted using a P-multiplier, P_m, with the values determined per Section 10.7.2.4 of AASHTO LRFD (2012).

5.5.5 Pile Driving Installations

It is important to have an experienced pile contractor. The pile contractor should have at least five years of experience in pile foundations and submit proof of at least three similar projects. All pile driving should be performed under full-time monitoring of a qualified engineer to verify the proper set has been obtained. Complete driving records should be kept for each pile. Piles should not be driven past the point where the design resistances are achieved to prevent possible damage to the piles. Piles damaged during driving should be replaced with new piles.

Vibration Monitoring: Based on data contained in NCHRP Synthesis 253, 1997, damage to structures from pile driving vibration is not likely to occur at a distance from the driven pile if:

a) more than 50 feet for piles lengths of 50 feet or less or,
b) one pile length for piles greater than 50 feet.

Since no existing buildings are located within 50 feet of any of the proposed new pile locations, we do not anticipate that pile driving will adversely affect any nearby buildings.

Utilities and existing bridge structures are located within 50 feet of the new abutments and within the influence of pile driving vibrations. The influence of pile driving vibrations on these structures should be evaluated by the contractor and the utility owner prior to pile driving. Depending on the vibration limits required on adjacent utilities and structures, vibration monitoring should be performed prior to and during construction activities. Vibration monitoring should also be considered by the contractor with respect to vibrations which might be caused by other construction activities, such as the installation of shoring including sheet piling or driven soldier piles.

5.6 EMBANKMENT SETTLEMENT

Bridge approach embankment settlements were estimated using the Settle3D software by Rocscience. The estimated soil properties and layer thicknesses included in the analysis were determined using the log of Boring LCR-4. N-values (blow counts) were corrected as needed and correlated with engineering parameters using established correlations from the FHWA (2017) and AASHTO (2012) recommended ranges. These analyses are deemed to be conservative. Groundwater was encountered in the borings and was included in the calculations. Granular soil layers were modeled as elastic and are anticipated to be immediate. Primary consolidation or secondary compression of fine-grained soils was modeled for saturated clay soils.

As discussed in Section 5.3.2, if preloading of the embankment is performed at least three months prior to construction, a maximum of approximately 16.3 inches of settlement may occur over the 75-year lifespan of the structure at the east abutment. Of these 16.3 inches, 90 percent (approximately 14.8 inches) is anticipated to occur within the upper layers of soft clay at an elevation of 5,075 or above. The rate of consolidation may be accelerated by installing wick drains. The amount of settlement may significantly be reduced if lightweight fill is used.

The results of the Settle3D analysis are provided in Appendix I. Since the new embankment will partially overlay the existing bridge approach embankment, a staged analysis was performed that included the original embankment installation 65 years ago. The following stages were included in the analysis:

Table 5.15: Embankment Settlement Stages For Settle3D Evaluation

Stage	Time (years)	Details
1	0	Installation of original embankment
2	65	Current time
3	66	Installation of new embankment (begin preloading)
4	66.08	1 month after new embankment (preloading)
5	66.17	2 months after new embankment (preloading)
6	66.25	3 months after new embankment – construct bridge and roadway
7	67	1 year after new embankment
8	71	5 years after new embankment
9	141	75 years after new embankment

To obtain the total settlement due to the new embankment, values from Stage 6 were subtracted from the total calculated settlements at Stage 9. The new embankment load was modeled with a maximum fill height of 17 feet at the southwest corner and a minimum height of 0 feet where the new embankment will taper to connect with the existing embankment along the northern edge. The analysis also includes a traffic surcharge of 250 psf.

As mentioned previously, results indicate a maximum settlement of approximately 16.3 inches. This settlement occurs at the southwest corner of the embankment where the east abutment foundation will be located. Settlement at the pier is anticipated to be less than 1 inch. Differential settlement of several inches is anticipated across the embankment due to the varying fill height being added above the existing embankment. Seismic (extreme event) induced settlement is estimated to be less than 1 inch. Results are based on one boring. The estimated settlement may decrease with additional soil sampling and testing.

5.7 PAVEMENT

5.7.1 Pavement Design Data

ADOT will issue the PDS and MDR based on the geotechnical data provided herein. The results of laboratory grain-size analysis, Atterberg limits, and R-value testing are presented in Table 5.16.

Table 5.16: Results of Near Surface Subgrade Testing

Boring ID	Depth (feet)	Station & Offset	USCS	% Passing #200 Sieve	PI	Correlated R-Value	Tested R-Value
FMW-1	1-5	100+67, 16’ R	SM	26	0	70	--
FMW-2	1-5	101+60, 20’ L	SM	13	0	84	72
LC-4	1-5	171+65, 6’R	SM	23	0	73	66
					Average	71.4	70.5

Two laboratory R-value tests completed for this project had values of 66 and 72 with an average value of 69. By comparison, 3 correlated R-values ranged from 70 to 84 with an average of 75.4. The calculated R_{mean} value of 75 causes the correlated resilient modulus (M_r) to exceed the maximum permitted value of 26,000 psi, based on a seasonal variation factor of 1.7 determined for Holbrook, Arizona from Table 2-4 (ADOT 2017). Back-calculating for the maximum resilient modulus yields a design R-value of 55. Therefore, a construction control R-value of 55 is recommended.

5.7.2 Site Grading for Embankments and Pavement

The following site grading recommendations are intended to provide support for the proposed FMW culvert and LCB sites and their associated embankments. The grading activities should be performed under observation and testing directed by a geotechnical engineer.

Trash, debris, vegetation (including roots) and other organics, any unstable (soft, loose, disturbed, water softened, etc.) soils, and other deleterious materials should be completely removed from proposed pavement areas prior to construction. This site grading should extend laterally a minimum of 2 feet beyond pavement areas. All areas of excavation should be observed and approved by a representative of the geotechnical engineer after clearing and before any filling operations begin at the sites.

The subgrade preparation should be performed as outlined in Section 203 of the ADOT Standard Specifications except as noted herein. In proposed pavement and embankment areas, the ground surface should be prepared to a minimum depth of 6 inches below finished subgrade. Subgrade preparation should consist of over-excavating (if soft soils are encountered as described above), scarification, moisture conditioning, and compaction. The limits of ground preparation should extend to the toe of slope where embankments are constructed.

Though the tested soils possess high correlated or test R-values, the embankment fill soils are very loose to loose on the west side of FMW. Given the sandy soil conditions, we recommend that the exposed soil surface within limits of the excavation for the new box culvert be scarified to a minimum depth of 6 inches, moisture conditioned to within 2 percent of optimum and compacted to a minimum of 95 percent of standard Proctor density. Compaction of the sands will likely be best achieved with a vibratory smooth drummed roller with a weight sufficient to achieve the required level of compaction.

5.8 SLOPES

5.8.1 Permanent Slopes

We recommend that non-stabilized embankment fill slopes generally be on the order of 2.5:1 (H:V) or flatter. Flatter slopes will promote re-vegetation and reduce the potential for erosion rilling. Fill slopes protected with slope paving or rock armored slopes should be no steeper than 1.5:1 (H:V).

5.8.2 Temporary Slopes

Temporary excavations for construction of drilled shaft or pile caps, bridge wingwall footings, etc. at the LCB pier and east abutment can be made with conventional earthmoving equipment. Single-shank ripping may be required for Five Mile Wash Crossing and the LCB west abutment where very dense soil and rock are present. Temporary slopes should be excavated in accordance with OSHA (1995). In accordance with Subpart P, Appendix A, the sandy embankment fill and underlying native soils above rock are considered to be Type C soils. For excavations less than 20 feet and within such materials, Subpart P, Appendix B indicates a maximum allowable unshored slope of 1.5H:1V for Type C soils. Flatter slopes may be required where either clean, sandy soils are encountered or where the soils become excessively wet, and soft. For those portions of excavations which are completed in stable rock, a vertical slope is considered acceptable.

Should steeper slopes be required due to the proximity of existing structures or other contractor needs, the stability of the slopes should be verified by a registered geotechnical engineer (State of Arizona) who is proficient in slope stability analyses. Shoring may be required for slopes above rock constructed steeper than 1.5H:1V.

The perimeter of all excavations should be protected against water runoff and infiltration near the edges to maintain stability. Heavy equipment and spoil piles should not be allowed within 10 feet of the edge of the excavation. The perimeter of all excavations should be protected against water runoff and infiltration near the edges to maintain stability.

5.8.3 Earthwork Factors/ Ground Compaction/ Water Use

Earthwork (shrink/swell) factors and ground compaction were estimated based on the results of the laboratory and field testing, and from past experience with similar soils. The existing embankment fills and native site surface soils were generally loose to medium dense where sampled. An earthwork factor of 10% shrink is recommended for these soils which are excavated on-site and recompacted to a minimum of 95 percent of maximum dry density. For soils compacted to 100 percent of maximum dry density an earthwork factor of 15% shrink could be assumed. Ground compaction will vary depending on the existing conditions. However, a ground compaction of 0.2 feet is recommended for the project.

These estimates are general in nature and are based on guidance provided by the ADOT Geotechnical Project Development Manual (ADOT 2021), limited data from our field explorations, and the soil conditions we encountered at the site. Earthwork factors will vary depending upon actual subsurface conditions, which may include variations in soil gradations and gravel contents. The earthwork shrinkage values are expected to be different for areas where compaction requirements are either greater or less than 95 percent of ASTM D698.

Approximately 80 gallons of water per cubic yard should be estimated for compaction of subgrade and base materials and subgrade materials. The application of water estimated for subgrade materials is considerably higher than the amount calculated based upon the difference between in-situ and optimum compaction moisture content, and includes a conservative overrun for losses due to seepage, evaporation, inadequate mixing, spillage, etc. Precipitation during and/or before construction may reduce the required amount of water.

5.9 CORROSION POTENTIAL

5.9.1 Metal Pipes

Four samples (pH) and (resistivity) from the current investigation were used to evaluate the corrosion potential on corrugated metal pipe. The corrosion potential for the site was characterized using laboratory pH and electrical resistivity testing, performed in accordance with Arizona Test Method 236. Results of the corrosion potential testing are summarized in Table B-1 and summarized in Table 5.17.

Table 5.17 - Results of Corrosion Testing

Boring ID	Depth (feet)	Station & Offset	pH	Resistivity (ohm-cm)	Sulfate (ppm)	Chloride (ppm)
FMW-1	1-5	100+67, 16' R	7.5	1,446	420	20
FMW-2	1-5	101+60, 20' L	8.5	2,616	4	33
LCR-3	5-10	171+20, 30' R	7.5	1,515	551	46
LCR-4	1-5	171+65, 6'R	7.9	895	1,605	281

The laboratory pH values ranged from 7.5 to 8.5 with an average of 7.9. The resistivity values ranged from 895 to 2,616 ohm-centimeters (ohm-cm) with an average value of 1,618 ohm-cm. Pipe locations where the pH is greater than 9.0 and/or the resistivity is less than 2,000 ohm-cm require the use of special pipes and/or pipe coatings (ADOT 2021). Three of the samples tested had a resistivity value less than 2,000 ohm-cm. Therefore, specialized piping or other corrosion mitigation measures such as corrosion monitoring will likely be necessary for metallic pipes at both project locations.

5.9.2 Concrete Structures

A total of four samples from the current investigation were used for soluble sulfates and chlorides (Arizona Test Method 733 and Arizona Test Method 736) to support design of concrete structures. The results of these laboratory tests are included in Appendix B and summarized in Table 5.8 above.

Total soluble sulfate values ranged from 4 to 1,605 parts per million (ppm) with an average of 645 ppm. The sulfate test measures the water-leachable or "available" sulfate content. These results were compared to Table 19.3.1.1, "Exposure Categories and Classes," in Section 19.3.1 of the American Concrete Institute's (ACI's) Building Code Requirements for Structural Concrete (ACI 318-19, 2014). Three of the samples fall within Exposure Class S0 for water-soluble sulfate (SO_4^{2-}) in soil by percent mass (SO_4<0.1% or 1,000 ppm) and are categorized with a severity level of "not applicable" in terms of sulfate exposure. One sample at the Little Colorado River Bridge east abutment location was noted to exceed 1,000 ppm and with Class S1 severity. Based on Table 19.3.2.1, "Requirements for Concrete by Exposure Class," in Section 19.3.2 of ACI 318-19, Type II (moderate sulfate resistant) Portland cement type is recommended for concrete structures in contact with these materials. The minimum compressive strength of concrete specified for Type II Portland cement is 4,000 psi.

Chloride test results at four locations for soils encountered during the current investigation had values ranging from 20 to 281 ppm with an average of 95 ppm. Regarding chloride attack, Section 19.3.2 of ACI 318-19/318R-19 (2014) indicates that when concrete is exposed to external sources of chlorides, concrete should be proportioned to satisfy the requirements for the applicable exposure class in Table 19.3.1.1 of ACI 318-19/318R-19. The anticipated concrete exposure for this segment falls within Exposure Class C1. Table 19.3.2.1 of ACI 318-19/318R-19 should be referred to for requirements for concrete by exposure class. For Exposure Class C1, the minimum compressive strength of concrete specified for is 2,500 psi and the maximum water-soluble chloride ion content in concrete, by percent weight of cement, is 0.30% for non-prestressed concrete and 0.06% for prestressed concrete.

We recommend that the results of our laboratory testing be reviewed by a person or firm experienced in corrosion protection designs for the actual construction at the site, and/or by the appropriate pipe or material manufacturer. These results are general in nature and may not be representative of site conditions. A qualified corrosion engineer should be consulted if corrosion of underground utilities is a concern or if a detailed evaluation is necessary.

6.0 CLOSURE

The geotechnical services were performed in a manner consistent with that level of care and skill ordinarily exercised by other members of the geotechnical profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions and recommendations are based on the completed test borings, visual observations and the review of plans and geotechnical reports prepared by others. It is possible that conditions could vary beyond the data evaluated. Ethos makes no guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by the Client and their representatives, and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on site and off site), or other factors may change over time, and additional work may be required with the passage of time. Any party other than the Client who wishes to use this report shall notify Ethos of such intended use. Based on the intended use of the report, Ethos may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release Ethos from any liability resulting from the use of this report by any unauthorized party.

7.0 REFERENCES

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FIGURES

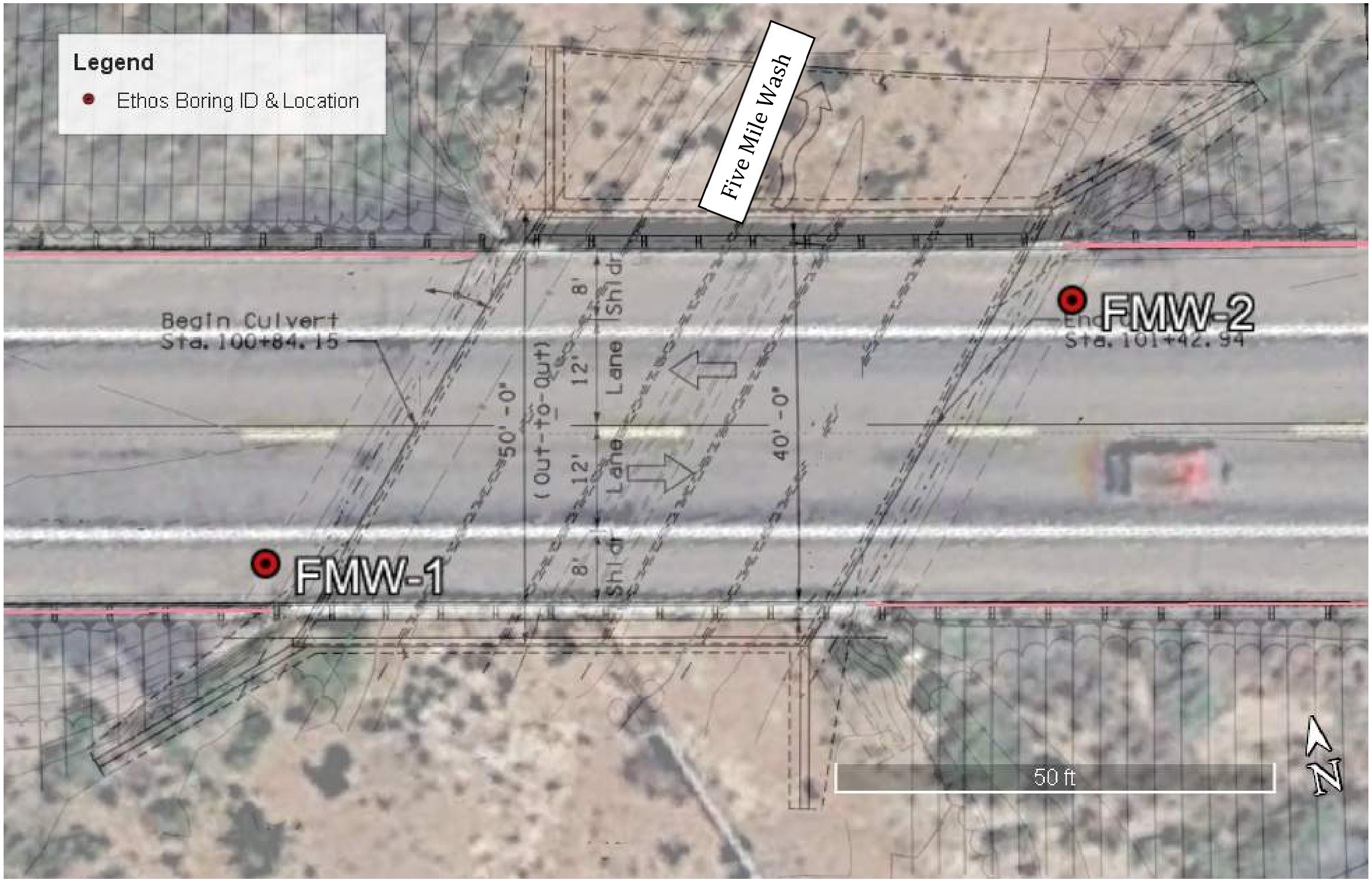
Source View: latitude 34.885613°, longitude -110.13149°. Google Earth May 2019 Imagery. Accessed on July 24, 2023.

Figure 1

Vicinity Map Showing Project Locations

Replacement of Five Mile Wash and Little Colorado River Bridges

Navajo County, Arizona



Source View: latitude 34.885629°, longitude -110.131455°. Google Earth May 2019 Imagery. Accessed on July 24, 2023.

Figure 2

Site Map Showing Test Locations at Five Mile Wash

Replacement of Five Mile Wash and Little Colorado River Bridges

Navajo County, Arizona

Source View: latitude 34.88281°, longitude -110.870°. Google Earth May 2019 Imagery. Accessed on July 24, 2023.

Figure 3

Site Map Showing Test Locations at Little Colorado River

Replacement of Five Mile Wash and Little Colorado River Bridges

Navajo County, Arizona

FIGURE 4 - USCS & N-VALUE SITE PROFILES

USCS PROFILE

Color		USCS	General Description
(red)	=	CH, MH	High PI Silts and Clays
(dark orange)	=	CL, CL-ML	Low to Medium PI Clays
(ochre)	=	ML	Low to Medium PI Silts
(salmon)	=	SC-SM, SC	Clayey Sands
(cream)	=	SP-SC, SM	Silty Sands and Sands w/ Clay
(yellow)	=	SP, SP-SM	NP Sands
(pale pink)	=	GC-GM, GC	Clayey Gravels
(light gray)	=	GP-GC, GM	Silty Gravels and Gravels w/ Clay
(gray)	=	GP, GP-GM	NP Gravels

Boring ID	FMW-1	FMW-2	LCR-1	LCR-3	LCR-4
Location	Five Mile Wash Culvert West Side	Five Mile Wash Culvert East Side	Little Colorado West Abutment	Little Colorado Bridge Pier	Little Colorado East Abutment
Station	100+67, 16' R	101+60, 20' L	169+85, 6' R	171+20, 30' R	171+65, 6'R
Total Depth	60	43	34	92	150
Elevation	5106	5105	5121	5093	5115
5115			SM		SM
5110			SM		SM
5105	SM	SM	BEDROCK		SM
5100	SC-SM	SC-SM	BEDROCK		CL
5095	SC-SM	BEDROCK	BEDROCK	SM	SP-SM
5090	SM	BEDROCK	BEDROCK	SP	CL
5085	SM	BEDROCK		SP	CL
5080	BEDROCK	BEDROCK		SP	CH
5075	BEDROCK	BEDROCK		SP-SM	SM
5070	BEDROCK	BEDROCK		SP-SM	SM
5065	BEDROCK	BEDROCK		SP-SM	SM
5060	BEDROCK			SP-SM	SM
5055	BEDROCK			SP-SM	SM
5050	BEDROCK			SP-SM	SP-SM
5045				SP-SM	SP-SM
5040				SP-SM	SP-SM
5035				SP-SM	SP-SM
5030				SP-SM	SP-SM
5025				SP-SM	SP-SM
5020				SP-SM	CL
5015				SP-SM	CL
5010				SP-SM	SP
5005				SP-SM	SP
5000				GP-GM	SP
4995					SP
4990					SP
4985					SP
4980					SP
4975					SP-SC
4970					SP-SC
4965					SP-SC

N60-VALUE PROFILE

Color		N-Value Range
(red)	=	0-10
(orange)	=	11-29
(yellow)	=	29-49
(green)	=	50+
(bold outline)		Ring

Notes
- N-values are uncorrected
- Correction factor of (Ring sampler blowcount)*(0.65) = SPT N-Value used for relative firmness color coding.

Boring ID	FMW-1	FMW-2	LCR-1	LCR-3	LCR-4
Location	Five Mile Wash Culvert West Side	Five Mile Wash Culvert East Side	Little Colorado West Abutment	Little Colorado Bridge Pier	Little Colorado East Abutment
Station	100+67, 16' R	101+60, 20' L	169+85, 6' R	171+20, 30' R	171+65, 6'R
Total Depth	60	43	34	92	150
Elevation	5106	5105	5121	5093	5115
5115			26		
5110			100		17
5105	9	18	100		15
5100	4	10	100		19
5095	10	16	100		20
5090	7	100	100	3	7
5085	100	100		3	2
5080	100	100		3	3
5075	100	100		5	7
5070	100	100		3	2
5065	100	100		12	3
5060	100			17	14
5055	100			26	4
5050	100			18	9
5045				24	6
5040				21	14
5035				16	13
5030				17	7
5025				20	14
5020				15	7
5015				19	5
5010				14	13
5005				14	11
5000				100	30
4995					17
4990					13
4985					21
4980					20
4975					19
4970					13
4965					13

APPENDIX A

BORING LOGS

SOILS SAMPLING & BORING LOG INFORMATION

The material and in-situ moisture descriptions of soils presented on the boring logs are based on visual observation and classification in accordance with the Unified Soil Classification System (USCS), presented on the next page. The field logs were modified, where appropriate, based on laboratory testing of selected samples.

The relative density and firmness described on the test boring logs are generally based on standard penetration test (SPT) blows per foot (N) for mostly cohesionless and cohesive soils. 2-inch outside diameter (O.D.) SPT samplers are advanced up to 18 inches into undisturbed soils beyond the base of either a hollow stem auger or drill casing. The samplers are driven with a 140-pound hammer and a 30-inch drop. SPT values are recorded on the boring logs for each 6-inch increment of penetration with sampler refusal based on a penetration of less than 6 inches and a blowcount of 50.

<u>Relative Density</u>

Relative density for mostly cohesionless, uncemented sands and sand and gravel mixtures is described based on the following SPT blowcounts:

N	Relative Density
0-4	Very Loose
5-10	Loose
11-30	Medium Dense
31-50	Dense
>50	Very Dense

<u>Relative Firmness</u>

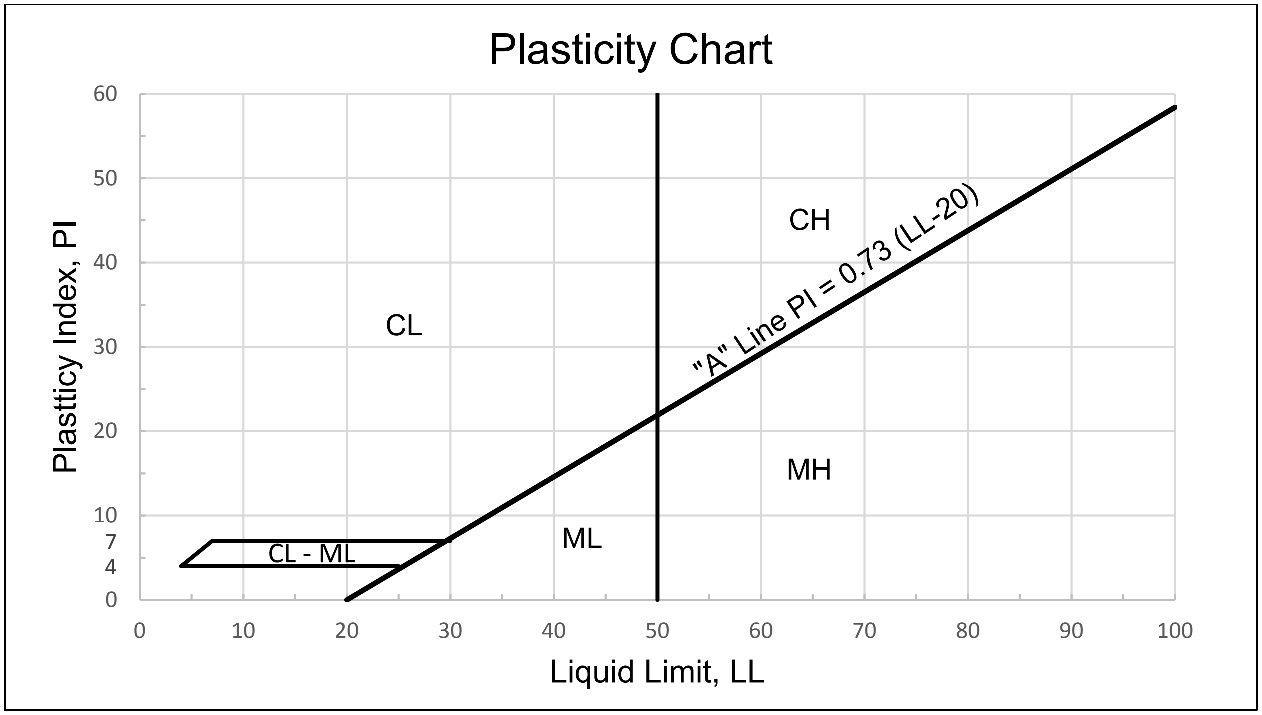
Relative Firmness for cohesive and/or cemented soils including silts, clays and silty to clayey sandy and gravelly soils is described based on the following SPT blowcounts:

N	Relative Firmness
0-4	Very Soft
5-8	Soft
9-15	Moderately Firm
16-30	Firm
31-49	Very Firm
50+	Hard

Undisturbed samples of firmer soils, typically present in the southwest, are obtained with 3-inch O.D. samplers lined with 2.42-inch inside diameter (I.D.) brass rings. The samplers are advanced up to 12 inches into undisturbed soils beyond the base of either a hollow stem auger or drill casing. The samplers are driven with a 140-pound hammer and a 30-inch drop. The N value blowcounts are recorded on the boring logs for each 6-inch increment of penetration with sampler refusal based on a penetration of less than 12 inches and a blowcount of 100.

Unified Soil Classification System
(ASTM D2487)

<table>
<tr><td colspan="4">Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests</td><td>Group Symbol</td><td>Group Description</td></tr>
<tr><td rowspan="8">Coarse-Grained Soils (More than 50% Retained on No. 200 Sieve).</td><td rowspan="4">Gravels More than 50% of Coarse Fraction Retained on No. 4 Sieve</td><td colspan="2" rowspan="2">Clean Gravels Less than 5% Fines</td><td>GW</td><td>Well Graded Gravels, Gravel-Sand Mixtures or Sand-Gravel-Cobble Mixtures.</td></tr>
<tr><td>GP</td><td>Poorly Graded Gravels, Gravel-Sand Mixtures or Sand-Gravel-Cobble Mixtures.</td></tr>
<tr><td rowspan="2">Gravels with More than 12% Fines</td><td>Fines Classify as ML or MH</td><td>GM</td><td>Silty Gravels, Gravel-Sand-Silt Mixtures</td></tr>
<tr><td>Fines Classify as CL or CH</td><td>GC</td><td>Clayey Gravels, Gravel-Sand-Clay Mixtures</td></tr>
<tr><td rowspan="4">Sands 50% or More of Coarse Fraction Passes No. 4 Sieve</td><td colspan="2" rowspan="2">Clean Sands Less than 5% Fines</td><td>SW</td><td>Well Graded Sands, Gravelly Sands.</td></tr>
<tr><td>SP</td><td>Poorly Graded Sands, Gravelly Sands.</td></tr>
<tr><td rowspan="2">Sands with More than 12% Fines</td><td>Fines Classify as ML or MH</td><td>SM</td><td>Silty Sands, Sand-Silt Mixtures</td></tr>
<tr><td>Fines Classify as CL or CH</td><td>SC</td><td>Clayey Sands, Sand-Clay Mixtures</td></tr>
<tr><td rowspan="4">Fine-Grained Soils (50% or More Passes No. 200 Sieve).</td><td rowspan="2">Silts and Clays (Liquid Limit less than 50)</td><td colspan="2">PI > 7 and Plots on Above “A” Line</td><td>CL</td><td>Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays</td></tr>
<tr><td colspan="2">PI <4 or Plots Below “A” Line</td><td>ML</td><td>Inorganic Silts, Clayey Silts with Low Plasticity</td></tr>
<tr><td rowspan="2">Silts and Clays (Liquid Limit 50 or More)</td><td colspan="2">PI Plots on Above “A” Line</td><td>CH</td><td>Inorganic Clays of High Plasticity, Fat Clays, Silty and Sandy Clays of High Plasticity</td></tr>
<tr><td colspan="2">PI Plots Below “A” Line</td><td>MH</td><td>Inorganic Silts of High Plasticity, Silty Soils, Elastic Silts</td></tr>
</table>



Angularity	
Angular	
Subangular	
Subrounded	
Rounded	

Soil Particle Definitions	
Material	Particle Size Range
Boulders	Greater than 300 mm (12 in.)
Cobbles	300 mm to 75 mm (12 in. to 3
Coarse Gravel	75 mm to 19 mm (3 in. to ¾ in.)
Fine Gravel	19mm (3/4 in.) to No. 4 sieve
Coarse Sand	No. 4 Sieve to No. 10 Sieve
Medium Sand	No. 10 Sieve to No. 40 Sieve
Fine Sand	No. 40 Sieve to No. 200 Sieve
Fines (Silt or Clay)	Less than No. 200 Sieve

Plasticity	
$PI = 0$	Non-Plastic
$1 \leq PI \leq 7$	Low
$8 \leq PI \leq 25$	Medium
$PI \geq 25$	High

Moisture
Slightly Moist
Moist
Wet
(Saturated)

ROCK SAMPLING & BORING LOG INFORMATION

Borings are advanced in rock and rock-like materials using one of, or combinations of, various drilling methods, including wireline coring, pneumatic percussion, mud-rotary, or rock-bit. Typically, borings are advanced through unconsolidated overburden materials using hollow-stem auger, pneumatic percussion with casing, or mud-rotary with casing methods until competent rock is reached. The underlying rock is then usually cored using wireline methods with the upper casing sections left in-place to maintain the borehole until completion. Core may be recovered in N- or H-sizes, usually in a triple-tube core barrel with a split inner liner. N-series core has an approximate O.D. of 1.8 inches and H-series core has an approximate O.D. of 2.4 inches. The recovered core is logged and then placed into waxed cardboard boxes for future inspection, shipping, and storage.

The classifications and material descriptions of rocks presented on the boring logs are based on visual observation and classification in general accordance with widely used and accepted systems and formats. The classifications and names of rock types presented on the boring logs are given in general accordance with the field classification system adopted by the United States Bureau of Reclamation (USBR, as modified from R. B. Travis, 1955). The classifications are intended to provide general lithologic classification to the rock materials encountered and are not based on any detailed petrographic or mineralogical analyses. The descriptive rock information presented on the boring logs is in general accordance with the standards given in the Guidelines for Geotechnical Investigation and Geotechnical Report Presentation (ADOT, 1991), and supplemented as warranted by descriptive criteria presented in the Engineering Geology Field Manual (Second Edition, Volume I, USBR, 1998). Abbreviations of full descriptive terms may be shown on the boring logs and are parenthesized within the full descriptions given below. The percent core recovery, Rock Quality Designation (RQD), and percent fluid recovery are continuously logged during drilling. Selected samples from the recovered core may be submitted for laboratory testing, including unconfined compressive strength, triaxial compression, and direct shear, among others. The field logs are modified, where appropriate, based on further inspection of recovered core and/or laboratory testing of selected samples.

Degree of Rock Weathering

The degree of weathering of the rock mass is described based on the following criteria:

Designation	Field Identification
Fresh (F)	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly Weathered (SW)	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric. Decomposition extends up to 1 inch into rock.
Moderately Weathered (MW)	Rock mass is decomposed 50% or less. Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Highly Weathered (HW)	Rock mass is more than 50% decomposed. Rock can be excavated with geologist's pick. All discontinuities exhibit secondary mineralization. Complete discoloration or rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed (Dec)	Rock mass is completely decomposed. Original rock "fabric" may be evident. May be reduced to a soil with hand pressure.

Note: The designations and diagnostic characteristics listed above are most applicable to crystalline rocks with feldspars and ferromagnesian minerals. Weathering in some other rock types, particularly young and/or poorly indurated sedimentary units, may not entirely conform to the above designations and criteria.

Scale of Relative Rock Hardness

Relative rock hardness and strength of intact rock is described based on the following criteria:

Designation	Field Identification
Extremely Soft (ES)	Can be indented with difficulty by thumbnail. May be moldable or friable with finger pressure.
Very Soft (VS)	Crumbles under firm blows with point of a geology pick. Can be peeled by a pocketknife. Scratched with fingernail.
Soft (S)	Can be peeled by a pocketknife with difficulty. Cannot be scratched with fingernail. Shallow indentation made by firm blow of geology pick.
Medium Hard (MH)	Can be scratched by knife or pick. Specimen can be fractured with a single firm blow of hammer/geology pick.
Hard (H)	Can be scratched with knife or pick only with difficulty. Several hard hammer blows required to fracture specimen.
Very Hard (VH)	Cannot be scratched by knife or sharp pick. Specimen requires many blows of hammer to fracture or chip. Hammer rebounds after impact.

Discontinuity Spacing Terms

The spacing of natural discontinuities in rock masses, including fractures, joints, bedding and bedding-parallel separations, foliation, and shears, is described based on the following criteria:

Spacing	Joint/Fracture Spacing Terms	Bedding/Foliation Spacing Terms
Less than 2 inches	Very Close (VC)	Very Thin (VTn) – Laminated if bedding less than ½ inch
2 inches – 1 foot	Close (C)	Thin (Tn)
1 foot – 3 feet	Moderately Close (MC)	Medium (M)
.3 feet – 10 feet	Wide (W)	Thick (Tk)
More than 10 feet	Very Wide (VW)	Very Thick (VTk) [massive]

Note: The spacings of discontinuities indicated within the columnar field on the Boring Logs are typically provided as apparent spacing measurements (along core axis) between any and all adjacent observed natural discontinuities, regardless of type or orientation. The apparent spacing measurements may, however, over- or underestimate the true spacings of individual sets of joints or fractures depending upon their orientation and/or intersection. Where possible, the true spacing of individual sets of discontinuities are measured and noted in the Material Description. Additionally, the documentation of close or very close spacings of healed, filled, incipient, or otherwise intact and unbroken discontinuities may appear to conflict with RQD values recorded on the Boring Log, and the presence of such features are noted to the extent practical in the Material Description.

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	60 Feet
		Boring Number:	**FMW-1**
Project Location:	Navajo County, Arizona	Boring Location:	FMW Culvert West Side; US 180 CST CL 100+67, 16' R
Project Number:	2022095	Rig Type / #:	CME-75/ 113
		Coordinates:	34.88562°N, 110.13165°W
Drilling Method:	Hollow Stem Auger (HSA) - HQ3 Core	Surface Elevation (feet):	5106
Logger:	M. Meza	Firm:	Ethos Engineering
		Groundwater Depth (feet):	N/A
Driller:	F. Esparza	Firm:	Resilient Drilling
		Date(s):	6/19/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
5,105	1											3" Asphalt Concrete over 5" Aggregate Base Course
5,104	2		Ring Sampler	R 7-7 (14)								EMBANKMENT FILL: Silty Sand (SM) Some Fine Subangular Gravel Predominantly Fine to Medium Sand Nonplastic, Brown, Moist, Loose
5,103	3		Auger Cuttings									
5,102	4		Auger Cuttings	A (1'-5')								
5,101	**5**		Auger Cuttings									EMBANKMENT FILL: Silty, Clayey Sand (SC-SM) Some Fine Subangular Gravel Predominantly Fine to Medium Sand Low Plasticity, Brown to Reddish Brown, Moist, Very Loose
5,100	6		SPT Spoon Sampler	S 2-2-2 (4)								
5,099	7											
5,098	8											
5,097	9											
5,096	**10**											Silty, Clayey Sand (SC-SM) Some Fine Subangular Gravel Predominantly Fine to Medium Sand Low Plasticity, Brown to Reddish Brown, Moist, Loose
5,095	11		Ring Sampler	R 6-9 (15)								
5,094	12											
5,093	13											
5,092	14											Silty Sand (SM) Predominantly Fine to Medium Sand Nonplastic, Brown to Reddish Brown, Moist, Loose
5,091	**15**											
5,090	16		Ring Sampler	R 6-4 (10)								
5,089	17											
5,088	18											
5,087	19											
5,086	**20**											
5,085	21		SPT Spoon Sampler	S 50/3"								Limestone Fine Grained Very Soft Slightly to Moderately Weathered
5,084	22											
5,083	23											
5,082	24											
5,081	**25**											

Sample Type
- S - SPT Spoon Sampler
- R - Ring Sampler
- A - Auger Cuttings
- HQ - Wireline Core

Drilling Operation
- NQ - Wireline Core
- HSA - Hollow Stem Auger
- GB - Gearbit
- HQ - Wireline Core
- HWT - Casing Adv. w/ Wireline GB

Discontinuities
- VW >10.0'
- W 3.0'-10.0'
- MC 1.0'-3.0'
- C 0.2'-1.0'
- VC 0-0.2'

Rock Hardness
- ES - Extremely Soft
- VS - Very Soft
- S - Soft
- MH - Medium Hard
- H - Hard
- VH - Very Hard

Notes
- PR - Poor Recovery
- NR - No Recovery
- BKN - Broken

Project Name:	Five Mile Wash & Little Colorado River Bridges		Boring Depth:	60 Feet	Boring Number: **FMW-1**
Project Location:	Navajo County, Arizona		Boring Location:	FMW Culvert West Side; US 180 CST CL 100+67, 16' R	
Project Number:	2022095	Rig Type / #: CME-75/ 113	Coordinates:	34.88562°N, 110.13165°W	
Drilling Method:	Hollow Stem Auger (HSA) - HQ3 Core		Surface Elevation (feet):	5106	
Logger:	M. Meza	Firm: Ethos Engineering	Groundwater Depth (feet):	N/A	
Driller:	F. Esparza	Firm: Resilient Drilling	Date(s):	6/19/2023	

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	Description
			S	50/4"								Limestone (Cont'd).
5,080	26											
5,079	27		HQ									
5,078	28											HSA Refusal, Start of HQ Core @ 26.5' Limestone Fine Grained, Tan to Whitish Tan with Light Reddish Brown Foliations
5,077	29	0.75			70%	0%	50%	Very Close (VC)	15°	Slightly Weathered	Medium Hard	
5,076	**30**											
5,075	31		HQ									
5,074	32											
5,073	33	1.2			100%	35%	50%	Close (C)	25°			
5,072	34											
5,071	**35**											
5,070	36		HQ									
5,069	37											
5,068	38	1.2			100%	0%	50%	Very Close (VC)	10°	Slightly Weathered		Note: Broken Between 37' and 38'
5,067	39											
5,066	**40**										Hard	
5,065	41		HQ									
5,064	42											
5,063	43	1.2			100%	50%	50%		20°			
5,062	44											
5,061	**45**							Very Close (VC)				
5,060	46		HQ									
5,059	47											
5,058	48	0.8			100%	55%	50%		15°	Fresh		
5,057	49											
5,056	**50**											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	60 Feet
Project Location:	Navajo County, Arizona	Boring Number:	FMW-1
Project Number:	2022095	Rig Type / #:	CME-75/ 113
Drilling Method:	Hollow Stem Auger (HSA) - HQ3 Core	Boring Location:	FMW Culvert West Side; US 180 CST CL 100+67, 16' R
Logger:	M. Meza	Firm:	Ethos Engineering
Driller:	F. Esparza	Firm:	Resilient Drilling
Coordinates:	34.88562°N, 110.13165°W	Surface Elevation (feet):	5106
Groundwater Depth (feet):	N/A	Date(s):	6/19/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
												Limestone Cont'd.
5,055	51											
5,054	52											
5,053	53	1			100%	60%	50%		15°			
5,052	54											
5,051	55							Close (C)		Fresh	Hard	
5,050	56											
5,049	57											
5,048	58	1			100%	40%	50%		30°			
5,047	59											
5,046	60											
5,045	61											Stopped Coring at 60' Backfilled with Auger Cuttings Topped Full Depth of AC and AB with Cold Patch Asphalt
5,044	62											
5,043	63											
5,042	64											
5,041	65											
5,040	66											
5,039	67											
5,038	68											
5,037	69											
5,036	70											
5,035	71											
5,034	72											
5,033	73											
5,032	74											
5,031	75											

Sample Type
- S - SPT Spoon Sampler
- R - Ring Sampler
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- HQ - Wireline Core

Drilling Operation
- NQ - Wireline Core
- HSA - Hollow Stem Auger
- GB - Gearbit
- HQ - Wireline Core
- HWT - Casing Adv. w/ Wireline GB

Discontinuities
- VW >10.0'
- W 3.0'-10.0'
- MC 1.0'-3.0'
- C 0.2'-1.0'
- VC 0-0.2'

Rock Hardness
- ES - Extremely Soft
- VS - Very Soft
- S - Soft
- MH - Medium Hard
- H - Hard
- VH - Very Hard

Notes
- PR - Poor Recovery
- NR - No Recovery
- BKN - Broken

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	43 Feet
Boring Number:	FMW-2		
Project Location:	Navajo County, Arizona	Boring Location:	FMW Culvert East Side; US 180 CST CL 101+60, 20' L
Project Number:	2022095 Rig Type / #: CME-75/ 113	Coordinates:	34.88565°N, 110.13133°W
Drilling Method:	Hollow Stem Auger (HSA) - HQ3 Core	Surface Elevation (feet):	5105
Logger:	M. Meza Firm: Ethos Engineering	Groundwater Depth (feet):	N/A
Driller:	F. Esparza Firm: Resilient Drilling	Date(s):	6/15/2023 to 6/16/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	Description
5,104	1											4" Asphalt Concrete over 6" Aggregate Base Course
5,103	2		S	S 10-9-9 (18)								EMBANKMENT FILL: Silty Sand (SM) Some Fine Subangular Gravel Predominantly Fine to Medium Sand Nonplastic, Brown, Moist, Medium Dense
5,102	3		A									
5,101	4		A									
5,100	5		A									
5,099	6		R	R 8-8 (16)								Note: Decreased Gravel, Light Brown to Brown Below 5'
5,098	7											
5,097	8											
5,096	9											Sand with Silt and Clay (SC-SM) Trace Fine to Coarse Subangular Gravel Predominantly Fine to Medium Sand Low Plasticity, Brown to Tanish Brown, Moist, Medium Dense
5,095	10											
5,094	11		S	S 7-8-9 (16)								
5,093	12											
5,092	13											Limestone Fine Grained Very Soft Slightly to Moderately Weathered, l. brown to tan
5,091	14	1.4	HQ		100%	45%	90%	Close (C)	15°	Slightly Weathered	Hard	HSA Refusal, Start of HQ Core @ 13'
5,090	15		HQ					Very Close (VC)				Limestone Fine Grained Tan
5,089	16		HQ					Close (C) / Very Close (VC)	<5°			
5,088	17		HQ									
5,087	18		HQ					Close (C)				
5,086	19	1.4	HQ		93%	35%	90%	Close (C)	10°			
5,085	20		HQ									
5,084	21		HQ					Very Close (VC)				
5,083	22		HQ									
5,082	23		HQ					Close (C)				
5,081	24	1.8	HQ		100%	40%	90%					
5,080	25		HQ									

Sample Type
- S - SPT Spoon Sampler
- R - Ring Sampler
- A - Auger Cuttings
- HQ - Wireline Core

Drilling Operation
- NQ - Wireline Core
- HSA - Hollow Stem Auger
- GB - Gearbit
- HQ - Wireline Core
- HWT - Casing Adv. w/ Wireline GB

Discontinuities
- VW >10.0'
- W 3.0'-10.0'
- MC 1.0'-3.0'
- C 0.2'-1.0'
- VC 0-0.2'

Rock Hardness
- ES - Extremely Soft
- VS - Very Soft
- S - Soft
- MH - Medium Hard
- H - Hard
- VH - Very Hard

Notes
- PR - Poor Recovery
- NR - No Recovery
- BKN - Broken

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	43 Feet
Project Location:	Navajo County, Arizona	Boring Number:	**FMW-2**
Project Number:	2022095	Boring Location:	FMW Culvert East Side; US 180 CST CL 101+60, 20' L
Rig Type / #:	CME-75/ 113	Coordinates:	34.88565°N, 110.13133°W
Drilling Method:	Hollow Stem Auger (HSA) - HQ3 Core	Surface Elevation (feet):	5105
Logger:	M. Meza	Firm:	Ethos Engineering
Driller:	F. Esparza	Firm:	Resilient Drilling
Groundwater Depth (feet):	N/A	Date(s):	6/15/2023 to 6/16/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
5,079	26							Close (C)	10°	Fresh		Limestone Fine Grained
5,078	27	1.8			100%	40%	70%					Tan
5,077	28							Very Close (VC) Close (C)	20°	Moderately Weathered		
5,076	29											
5,075	30							Very Close (VC)				
5,074	31	1.8			100%	30%	50%		<5°			
5,073	32							Close (C)		Fresh		
5,072	33										Hard	
5,071	34							Very Close (VC)	10°			
5,070	35											
5,069	36	1.6			100%	30%	50%	Close (C)	30°			
5,068	37									Moderately Weathered		
5,067	38							Very Close (VC)				Limestone Fine Grained
5,066	39							Close (C)		Slightly Weathered		Very Soft Slightly to Moderately Weathered, l. brown to t
5,065	40								20°			Limestone
5,064	41	2			100%	20%	50%					Fine Grained
5,063	42							Very Close (VC)		Moderately Weathered		
5,062	43								80°			
5,061	44											Stopped Coring at 43' Backfilled with Auger Cuttings
5,060	45											Topped Full Depth of AC and AB with Cold Patch Asphalt
5,059	46											
5,058	47											
5,057	48											
5,056	49											
5,055	50											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	34 Feet
		Boring Number:	**LCR-1**
Project Location:	Navajo County, Arizona	Boring Location:	LCR Bridge West Abutment; US 180 CST CL 169+85, 6' R
Project Number:	2022095 — Rig Type / #: CME-75/ 113	Coordinates:	34.88272°N, 110.10901°W
Drilling Method:	Percussion Hammer - HQ3 Core	Surface Elevation (feet):	5,121
Logger:	M. Meza — Firm: Ethos Engineering	Groundwater Depth (feet):	N/A
Driller:	F. Esparza — Firm: Resilient Drilling	Date(s):	6/12/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	Description
5,120	1											**4.75" Asphalt Concrete over 6.5" Aggregate Base Course**
5,119	2		A									**Silty Sand (SM)** Some Fine Subangular Gravel
5,118	3	0.6	A	A (1-5')								Predominate Fine to Medium Sand Nonplastic, Tan to Light Brown, Moist,
5,117	4		A									Medium Dense
5,116	5		A									
5,115	6		S	S 6-11-15 (26)								Note: Increased Gravel, Medium to Coarse Sand Below 5'
5,114	7	1	A	A (5-10')								
5,113	8		A									
5,112	9		A									
5,111	10		A									
5,110	11		S	S 50/2"								Note: Hard Below 10'. Possible bedrock contact
5,109	12											**Limestone** Fine Grained
5,108	13	3										Very Soft to Soft Moderately Weathered
5,107	14											Whitish tan, Moist
5,106	15		S	S 50/1"								
5,105	16		HQ		96%	30%	90%	Very Close (VC)	<5°		Hard	Hammer Refusal, Start of HQ Core @ 15' **Limestone** Fine Grained, Tan to Light Reddish Tan
5,104	17	2.25	HQ									with Light Reddish Brown Foliations
5,103	18		HQ					Close (C)				
5,102	19		HQ									
5,101	20		HQ		100%	25%	90%	Very Close (VC)	10°	Slightly Weathered	Medium Hard	
5,100	21	1	HQ									
5,099	22		HQ					Close (C)			Hard	
5,098	23		HQ									
5,097	24		HQ									
5,096	25	1.8	HQ		60%	25%	90%	NR	NR	NR	NR	

Sample Type
- S - SPT Spoon Sampler
- R - Ring Sampler
- A - Auger Cuttings
- HQ - Wireline Core

Drilling Operation
- NQ - Wireline Core
- HSA - Hollow Stem Auger
- GB - Gearbit HQ - Wireline Core
- HWT - Casing Adv. w/ Wireline GB

Discontinuities
- VW >10.0'
- W 3.0'-10.0'
- MC 1.0'-3.0'
- C 0.2'-1.0'
- VC 0-0.2'

Rock Hardness
- ES - Extremely Soft
- VS - Very Soft
- S - Soft
- MH - Medium Hard
- H - Hard
- VH - Very Hard

Notes
- PR - Poor Recovery
- NR - No Recovery
- BKN - Broken

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	34 Feet
		Boring Number:	**LCR-1**
Project Location:	Navajo County, Arizona	Boring Location:	LCR Bridge West Abutment; US 180 CST CL 169+85, 6' R
Project Number:	2022095 Rig Type / #: CME-75/ 113	Coordinates:	34.88272°N, 110.10901°W
Drilling Method:	Percussion Hammer - HQ3 Core	Surface Elevation (feet):	5121
Logger:	M. Meza Firm: Ethos Engineering	Groundwater Depth (feet):	N/A
Driller:	F. Esparza Firm: Resilient Drilling	Date(s):	6/12/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
5,095	26							NR	NR	NR	NR	Limestone Cont'd.
5,094	27	1.8			60%	60%	90%					
5,093	28							Wide (W)	<5°			
5,092	29											
5,091	**30**									Fresh	Hard	
5,090	31							Moderately Close (MC)	10°			
5,089	32	1.6			100%	85%	90%					
5,088	33											
5,087	34							Broken	Broken	Broken	Broken	
5,086	**35**											Stopped Coring at 34' Backfilled with Auger Cuttings Topped Full Depth of AC and AB with Cold Patch Asphalt
5,085	36											
5,084	37											
5,083	38											
5,082	39											
5,081	**40**											
5,080	41											
5,079	42											
5,078	43											
5,077	44											
5,076	**45**											
5,075	46											
5,074	47											
5,073	48											
5,072	49											
5,071	**50**											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	92 Feet
Project Location:	Navajo County, Arizona	Boring Number:	LCR-3
Project Number:	2022095	Boring Location:	LCR Bridge Pier; US 180 CST CL 171+20, 30' R
Rig Type / #:	CME-55 / Track	Coordinates:	34.88275°N, 110.10855°W
Drilling Method:	Hollow Stem Auger (HSA) - HQ3 Core	Surface Elevation (feet):	5093
Logger:	M. Meza	Firm:	Ethos Engineering
Driller:	F. Esparza	Firm:	Resilient Drilling
Groundwater Depth (feet):	12	Date(s):	6/27/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
5,092	1											**Silty Sand (SM)** Trace Fine Subangular Gravel Predominantly Fine to Medium Grained Sand Nonplastic, Brown to Dark Brown, Moist Very Loose
5,091	2											
5,090	3			A (0-5')								
5,089	4											
5,088	**5**											**Sand (SP)** Trace Fine to Coarse Subangular Gravel Predominantly Medium to Coarse Angular Sand Nonplastic, Brown, Wet, Very Loose
5,087	6			A (5-6.5')								
5,086	7											
5,085	8											
5,084	9											
5,083	**10**											
5,082	11											
5,081	12											
5,080	13			A (10-15')								
5,079	14											
5,078	**15**											
5,077	16			S 1-1-2 (3)								
5,076	17											
5,075	18											
5,074	19											**Sand with Silt (SP-SM)** Trace Fine Subangular Gravel Predominantly Fine Subangular Sand Nonplastic, Brown, Wet, Loose
5,073	**20**											
5,072	21			S 4-3-2 (5)								
5,071	22											
5,070	23											
5,069	24											
5,068	**25**											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	92 Feet	Boring Number:	LCR-3
Project Location:	Navajo County, Arizona	Boring Location:	LCR Bridge Pier; US 180 CST CL 171+20, 30' R		
Project Number:	2022095 Rig Type / #: CME-55 / Track	Coordinates:	34.88275°N, 110.10855°W		
Drilling Method:	Hollow Stem Auger (HSA) - HQ3 Core	Surface Elevation (feet):	5093		
Logger:	M. Meza Firm: Ethos Engineering	Groundwater Depth (feet):	12		
Driller:	F. Esparza Firm: Resilient Drilling	Date(s):	6/27/2023		

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
			X	S 2-2-1 (3)								**Sand with Silt (SP-SM) continued**
5,067	26		X									**Occassional Fine Subangular Gravel**
												Predominantly Fine to Medium Angular Sand
5,066	27											**Nonplastic, Brown, Wet, Very Loose below 25'**
5,065	28											
5,064	29											
5,063	**30**											
			X	S 3-6-6 (12)								**Note: Medium Dense Below 30'**
5,062	31		X									
5,061	32											
5,060	33											
5,059	34											
5,058	**35**											
			X	S 3-7-10 (17)								
5,057	36		X									
5,056	37											
5,055	38											
5,054	39											
5,053	**40**											
			X	S 8-11-15 (26)								
5,052	41		X									
5,051	42											
5,050	43											
5,049	44											
5,048	**45**											
			X	S 7-9-9 (18)								
5,047	46		X									
5,046	47											
5,045	48											
5,044	49											
5,043	**50**											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	92 Feet
Project Location:	Navajo County, Arizona	Boring Number:	LCR-3
Project Number:	2022095	Rig Type / #:	CME-55 / Track
Drilling Method:	Hollow Stem Auger (HSA) - HQ3 Core	Boring Location:	LCR Bridge Pier; US 180 CST CL 171+20, 30' R
Logger:	M. Meza	Firm:	Ethos Engineering
Driller:	F. Esparza	Firm:	Resilient Drilling
Coordinates:	34.88275°N, 110.10855°W	Surface Elevation (feet):	5093
Groundwater Depth (feet):	12	Date(s):	6/27/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	Description
5,042	51		X	S 16-13-11 (24)								Sand with Silt (SP-SM) continued
5,041	52											
5,040	53											
5,039	54											
5,038	**55**											
5,037	56		X	S 10-10-11 (21)								
5,036	57											
5,035	58											
5,034	59											
5,033	**60**											
5,032	61		X	S 10-7-9 (16)								
5,031	62											
5,030	63											
5,029	64											
5,028	**65**											
5,027	66		X	S 10-7-10 (17)								
5,026	67											
5,025	68											
5,024	69											
5,023	**70**											
5,022	71		X	S 13-9-11 (20)								
5,021	72											
5,020	73											
5,019	74											
5,018	**75**											

Sample Type
- S - SPT Spoon Sampler
- R - Ring Sampler
- A - Auger Cuttings
- HQ - Wireline Core

Drilling Operation
- NQ - Wireline Core
- HSA - Hollow Stem Auger
- GB - Gearbit
- HQ - Wireline Core
- HWT - Casing Adv. w/ Wireline GB

Discontinuities
- VW >10.0'
- W 3.0'-10.0'
- MC 1.0'-3.0'
- C 0.2'-1.0'
- VC 0-0.2'

Rock Hardness
- ES - Extremely Soft
- VS - Very Soft
- S - Soft
- MH - Medium Hard
- H - Hard
- VH - Very Hard

Notes
- PR - Poor Recovery
- NR - No Recovery
- BKN - Broken

- **Project Name:** Five Mile Wash & Little Colorado River Bridges
- **Project Location:** Navajo County, Arizona
- **Project Number:** 2022095 **Rig Type / #:** CME-55 / Track
- **Drilling Method:** Hollow Stem Auger (HSA) - HQ3 Core
- **Logger:** M. Meza **Firm:** Ethos Engineering
- **Driller:** F. Esparza **Firm:** Resilient Drilling
- **Boring Depth:** 92 Feet
- **Boring Number:** LCR-3
- **Boring Location:** LCR Bridge Pier; US 180 CST CL 171+20, 30' R
- **Coordinates:** 34.88275°N, 110.10855°W
- **Surface Elevation (feet):** 5093
- **Groundwater Depth (feet):** 12
- **Date(s):** 6/27/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
5,017	76			S 5-10-5 (15)								**Sand with Silt (SP-SM) continued**
5,016	77											
5,015	78											
5,014	79											
5,013	**80**											
5,012	81			S 13-8-11 (19)								
5,011	82											
5,010	83											
5,009	84											
5,008	**85**											
5,007	86			S 11-6-8 (14)								Note: Increased Gravel below 85'
5,006	87											
5,005	88											
5,004	89											
5,003	**90**											**Gravel with Sand and Silt (GP-GM)** Fine to Coarse Subangular Gravel Considerable Medium to Coarse Angular Sand
5,002	91			S 50/2"								Nonplastic, Brown to Light Brown, Wet, Very Dense
5,001	92			S 50/1"								Note: Trace to Some Cobbles Below 90'
5,000	93											Refusal @ 92' with HQ Casing Advance on Cobbles. Backfilled with Cuttings and Capped with 20' of Half Sack Grout
4,999	94											
4,998	**95**											
4,997	96											
4,996	97											
4,995	98											
4,994	99											
4,993	**100**											

Sample Type
- S - SPT Spoon Sampler
- R - Ring Sampler
- A - Auger Cuttings
- HQ - Wireline Core

Drilling Operation
- NQ - Wireline Core
- HSA - Hollow Stem Auger
- GB - Gearbit
- HQ - Wireline Core
- HWT - Casing Adv. w/ Wireline GB

Discontinuities
- VW >10.0'
- W 3.0'-10.0'
- MC 1.0'-3.0'
- C 0.2'-1.0'
- VC 0-0.2'

Rock Hardness
- ES - Extremely Soft
- VS - Very Soft
- S - Soft
- MH - Medium Hard
- H - Hard
- VH - Very Hard

Notes
- PR - Poor Recovery
- NR - No Recovery
- BKN - Broken

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	151.5 Feet
Project Location:	Navajo County, Arizona	Boring Number:	**LCR-4**
Project Number:	2022095	Rig Type / #:	CME-75/ 113
Drilling Method:	Hollow Stem Auger	Boring Location:	LCR Bridge East Abutment; US 180 CST CL 171+65, 6' R
Logger:	M. Meza	Firm:	Ethos Engineering
Driller:	F. Esparza	Firm:	Resilient Drilling
Coordinates:	34.88286°N, 110.10843°W	Surface Elevation (feet):	5115
Groundwater Depth (feet):	30	Date(s):	6/20/2023 to 6/21/2023

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
5,114	1											**4" Asphaltic Concrete over** **7" Aggregate Base Course**
5,113	2											**EMBANKMENT FILL - Silty Sand (SM)** Some Fine Angular Gravel Predominately Fine to Medium Angular Sand Nonplastic, Brown, Moist, Medium Dense
5,112	3											
5,111	4											
5,110	**5**											
5,109	6			R 15-11 (26)								
5,108	7											
5,107	8											
5,106	9											
5,105	**10**											
5,104	11			S 8-6-9 (15)								
5,103	12											
5,102	13											**EMBANKMENT FILL - Clayey Sand (SC)** Some Fine to Coarse Angular Gravel Predominantly Fine Grained Sand Low to Medium Plasticity, Brown and Moist
5,101	14											
5,100	**15**											**EMBANKMENT FILL - Silty Sand (SM)** Trace Fine Angular Gravel Predominantly Fine to Medium Sand Nonplastic, Brown, Moist
5,099	16			S 8-9-10 (19)								
5,098	17											**EMBANKMENT FILL - Sandy Clay (CL)** Trace Fine Subangular Gravel Considerable Fine Grained Sand Medium Plasticity, Brown, Moist and Firm
5,097	18											
5,096	19											**Silty Gravel with Sand (GM)** Fine to Coarse Angular Gravel Considerable Medium to Coarse Sand Nonplastic, Brown, Moist, Medium Dense
5,095	**20**											
5,094	21			S 7-10-10 (20) PR								
5,093	22											
5,092	23											
5,091	24											**Sand with Silt (SP-SM)** Occasional Fine Angular Gravel Predominately Fine to Medium Sand Nonplastic, Brown, Moist, Loose
5,090	**25**											

Sample Type
- S - SPT Spoon Sampler
- R - Ring Sampler
- A - Auger Cuttings
- HQ - Wireline Core

Drilling Operation
- NQ - Wireline Core
- HSA - Hollow Stem Auger
- GB - Gearbit
- HQ - Wireline Core
- HWT - Casing Adv. w/ Wireline GB

Discontinuities
- VW >10.0'
- W 3.0'-10.0'
- MC 1.0'-3.0'
- C 0.2'-1.0'
- VC 0-0.2'

Rock Hardness
- ES - Extremely Soft
- VS - Very Soft
- S - Soft
- MH - Medium Hard
- H - Hard
- VH - Very Hard

Notes
- PR - Poor Recovery
- NR - No Recovery
- BKN - Broken

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	151.5 Feet	Boring Number:	LCR-4
Project Location:	Navajo County, Arizona	Boring Location:	LCR Bridge East Abutment; US 180 CST CL 171+65, 6' R		
Project Number:	2022095 Rig Type / #: CME-75/ 113	Coordinates:	34.88286°N, 110.10843°W		
Drilling Method:	Hollow Stem Auger	Surface Elevation (feet):	5115		
Logger:	M. Meza Firm: Ethos Engineering	Groundwater Depth (feet):	30		
Driller:	F. Esparza Firm: Resilient Drilling	Date(s):	6/20/2023 to 6/21/2023		

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	Description
5,089	26		R	R 5-6 (11)								**Sandy Clay (CL)** Considerable Fine Sand
5,088	27											Brown, Moist, Soft Note: Interbedded Layers of Sand and Clay
5,087	28											**Clay with Sand (CL)** Occasional Fine Gravel
5,086	29											Trace Fine Sand Medium Plasticity, Brown, Moist, Soft
5,085	**30**											**Sand with Silt (SP-SM)** Occasional Fine Gravel
5,084	31		S	S 1-1-1 (2)								Predominantly Fine to Medium Sand Nonplastic, Tan to Light
5,083	32											Brown, Wet to Moist, Very Loose **Sandy Clay (SC/CL)**
5,082	33											Occasional Fine Gravel Some Fine Grained Sand
5,081	34											Medium to High Plasticity, Brown, Wet and Very Soft
5,080	**35**											
5,079	36		R	R 2-3 (5)								**Fat Clay (CH)** Trace Fine Sand
5,078	37											High Plasticity, Brown to Reddish Brown, Moist to Wet, Very Soft
5,077	38											
5,076	39											
5,075	**40**											
5,074	41		R	R 4-7 (11)								**Silty Sand (SM)**
5,073	42											Predominate Fine Sand Nonplastic, Brown, Wet, Loose
5,072	43											
5,071	44											
5,070	**45**											
5,069	46		S	S 0-1-1 (2) NR								Note: Very Loose Below 45'
5,068	47											
5,067	48											Note: Cuttings became liquid due to super saturation below 47'
5,066	49											
5,065	**50**											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	151.5 Feet	Boring Number:	LCR-4
Project Location:	Navajo County, Arizona	Boring Location:	LCR Bridge East Abutment; US 180 CST CL 171+65, 6' R		
Project Number:	2022095 Rig Type / #: CME-75/ 113	Coordinates:	34.88286°N, 110.10843°W		
Drilling Method:	Hollow Stem Auger	Surface Elevation (feet):	5115		
Logger:	M. Meza Firm: Ethos Engineering	Groundwater Depth (feet):	30		
Driller:	F. Esparza Firm: Resilient Drilling	Date(s):	6/20/2023 to 6/21/2023		

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
			S	S 1-1-2 (3) NR								**Silty Sand (SM) continued**
5,064	51											
5,063	52											
5,062	53											
5,061	54											
5,060	**55**											
			S	S 5-7-7 (14)								Note: Medium Dense Below 55'
5,059	56											
5,058	57											
5,057	58											
5,056	59											
5,055	**60**											
			S	S 1-2-2 (4) NR								Note: Very Loose Below 60'
5,054	61											
5,053	62											
5,052	63											
5,051	64											
5,050	**65**											
			S	S 2-3-6 (9)								**Sand with Silt (SP-SM)** Trace Fine Subangular Gravel Predominantly Fine to Medium Sand Nonplastic, Brown, Wet, Loose
5,049	66											
5,048	67											
5,047	68											
5,046	69											
5,045	**70**											
			S	S 2-2-4 (6)								
5,044	71											
5,043	72											
5,042	73											
5,041	74											
5,040	**75**											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	151.5 Feet	Boring Number:	LCR-4
Project Location:	Navajo County, Arizona	Boring Location:	LCR Bridge East Abutment; US 180 CST CL 171+65, 6' R		
Project Number:	2022095 Rig Type / #: CME-75/ 113	Coordinates:	34.88286°N, 110.10843°W		
Drilling Method:	Hollow Stem Auger	Surface Elevation (feet):	5115		
Logger:	M. Meza Firm: Ethos Engineering	Groundwater Depth (feet):	30		
Driller:	F. Esparza Firm: Resilient Drilling	Date(s):	6/20/2023 to 6/21/2023		

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
			S	S 2-6-8 (14)								**Sand with Silt (SP-SM) continued**
5,039	76											Note: Medium Dense below 75'
5,038	77											
5,037	78											
5,036	79											
5,035	**80**											
5,034	81		S	S 3-4-9 (13)								
5,033	82											
5,032	83											
5,031	84											
5,030	**85**											
5,029	86		S	S 3-3-4 (7) NR								Note: Loose Below 85'
5,028	87											
5,027	88											
5,026	89											
5,025	**90**											
5,024	91		S	S 4-7-7 (14)								Note: Medium Dense Below 90'
5,023	92											
5,022	93											
5,021	94											
5,020	**95**											
5,019	96		R	R 6-4 (10)								**Sandy Clay (CL)** Occasional Fine Gravel
5,018	97											Considerable Fine Grained Sand Medium Plasticity, Brown, Wet, Soft
5,017	98											
5,016	99											
5,015	**100**											

Sample Type
- S - SPT Spoon Sampler
- R - Ring Sampler
- A - Auger Cuttings
- HQ - Wireline Core

Drilling Operation
- NQ - Wireline Core
- HSA - Hollow Stem Auger
- GB - Gearbit
- HQ - Wireline Core
- HWT - Casing Adv. w/ Wireline GB

Discontinuities
- VW >10.0'
- W 3.0'-10.0'
- MC 1.0'-3.0'
- C 0.2'-1.0'
- VC 0-0.2'

Rock Hardness
- ES - Extremely Soft
- VS - Very Soft
- S - Soft
- MH - Medium Hard
- H - Hard
- VH - Very Hard

Notes
- PR - Poor Recovery
- NR - No Recovery
- BKN - Broken

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	151.5 Feet	Boring Number:	LCR-4
Project Location:	Navajo County, Arizona	Boring Location:	LCR Bridge East Abutment; US 180 CST CL 171+65, 6' R		
Project Number:	2022095 Rig Type / #: CME-75/ 113	Coordinates:	34.88286°N, 110.10843°W		
Drilling Method:	Hollow Stem Auger	Surface Elevation (feet):	5115		
Logger:	M. Meza Firm: Ethos Engineering	Groundwater Depth (feet):	30		
Driller:	F. Esparza Firm: Resilient Drilling	Date(s):	6/20/2023 to 6/21/2023		

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	Description
5,014	101			R 3-5 (8)								**Sandy Clay (CL) Cont.** Note: Decreased sand below 100'
5,013	102											
5,012	103											
5,011	104											
5,010	**105**											**Sand (SP)** Trace Fine Angular Gravel Predominantly Medium to Coarse Sand Nonplastic, Wet, Brown, Medium Dense
5,009	106			S 9-9-4 (13)								
5,008	107											
5,007	108											
5,006	109											
5,005	**110**											
5,004	111			S 10-4-7 (11)								Note: Some Fine to Coarse Angular Gravel Below 110'
5,003	112											
5,002	113											
5,001	114											
5,000	**115**											
4,999	116			S 10-12-18 (30)								
4,998	117											
4,997	118											
4,996	119											
4,995	**120**											
4,994	121			S 6-7-10 (17) NR								
4,993	122											
4,992	123											
4,991	124											
4,990	**125**											

Sample Type
S - SPT Spoon Sampler
R - Ring Sampler
A - Auger Cuttings
HQ - Wireline Core

Drilling Operation
NQ - Wireline Core
HSA - Hollow Stem Auger
GB - Gearbit HQ - Wireline Core
HWT - Casing Adv. w/ Wireline GB

Discontinuities
VW >10.0'
W 3.0'-10.0'
MC 1.0'-3.0'
C 0.2'-1.0'
VC 0-0.2'

Rock Hardness
ES - Extremely Soft
VS - Very Soft
S - Soft
MH - Medium Hard
H - Hard
VH - Very Hard

Notes
PR - Poor Recovery
NR - No Recovery
BKN - Broken

Project Name:	Five Mile Wash & Little Colorado River Bridges	Boring Depth:	151.5 Feet
Boring Number:	LCR-4		
Project Location:	Navajo County, Arizona	Boring Location:	LCR Bridge East Abutment; US 180 CST CL 171+65, 6' R
Project Number:	2022095	Rig Type / #:	CME-75/ 113
Coordinates:	34.88286°N, 110.10843°W		
Drilling Method:	Hollow Stem Auger	Surface Elevation (feet):	5115
Logger:	M. Meza	Firm:	Ethos Engineering
Groundwater Depth (feet):	30		
Driller:	F. Esparza	Firm:	Resilient Drilling
Date(s):	6/20/2023 to 6/21/2023		

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
			☒	S 6-6-7 (13) NR								**Sand (SP) continued**
4,989	126											
4,988	127											
4,987	128											Note: Cuttings became liquid due to super saturation below 128'
4,986	129											
4,985	**130**		☒	S 7-10-11 (21) NR								
4,984	131											
4,983	132											
4,982	133											
4,981	134											
4,980	**135**		☒	S 10-10-10 (20)								
4,979	136											
4,978	137											Note: Occasional Cobbles Between 137' to 139'
4,977	138											
4,976	139											
4,975	**140**		☒	S 8-15-4 (19)								**Sand with Clay (SP-SC)** Occasional Fine Gravel Predominantly Fine to Medium Sand Low Plasticity, Wet, Brown, Medium Dense
4,974	141											
4,973	142											
4,972	143											
4,971	144											
4,970	**145**		☒	S 9-6-7 (13)								
4,969	146											
4,968	147											
4,967	148											
4,966	149											
4,965	**150**											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

Project Name: Five Mile Wash & Little Colorado River Bridges		Boring Depth: 151.5 Feet	Boring Number:	**LCR-4**
Project Location: Navajo County, Arizona		Boring Location: LCR Bridge East Abutment; US 180 CST CL 171+65, 6' R		
Project Number: 2022095	Rig Type / #: CME-75/ 113	Coordinates: 34.88286°N, 110.10843°W		
Drilling Method: Hollow Stem Auger		Surface Elevation (feet): 5115		
Logger: M. Meza	Firm: Ethos Engineering	Groundwater Depth (feet): 30		
Driller: F. Esparza	Firm: Resilient Drilling	Date(s): 6/20/2023 to 6/21/2023		

Elev (feet)	Depth (feet)	Drill Rate (min/ft)	Sample Interval	Sample Type (& Blowcounts)	% Recovery	Rock Quality Designation (RQD)	% Fluid Recovery	Spacing of Discontinuities	Orientation of Discontinuities	Degree of Weathering	Relative Rock Hardness	
4,964	151			S 6-7-6 (13) NR								**Sand with Clay (SP-SC) continued**
4,963	152											Stopped Drilling at 150'
4,962	153											Stopped Sampler at 151.5'
4,961	154											Backfilled with Cuttings and Capped with 20' of Half Sack Grout; Patched with Asphalt
4,960	**155**											
4,959	156											
4,958	157											
4,957	158											
4,956	159											
4,955	**160**											
4,954	161											
4,953	162											
4,952	163											
4,951	164											
4,950	**165**											
4,949	166											
4,948	167											
4,947	168											
4,946	169											
4,945	**170**											
4,944	171											
4,943	172											
4,942	173											
4,941	174											
4,940	**175**											

Sample Type	Drilling Operation	Discontinuities	Rock Hardness	Notes
S - SPT Spoon Sampler	NQ - Wireline Core	VW >10.0'	ES - Extremely Soft	PR - Poor Recovery
R - Ring Sampler	HSA - Hollow Stem Auger	W 3.0'-10.0'	VS - Very Soft	NR - No Recovery
A - Auger Cuttings	GB - Gearbit HQ - Wireline Core	MC 1.0'-3.0'	S - Soft	BKN - Broken
HQ - Wireline Core	HWT - Casing Adv. w/ Wireline GB	C 0.2'-1.0'	MH - Medium Hard	
		VC 0-0.2'	H - Hard	
			VH - Very Hard	

APPENDIX B

LABORATORY TEST RESULTS

Table B-1: Summary of Laboratory Test Results

Boring Number	Depth (ft)		USCS/Group Symbol (ASTM D2487)	Percent Fines (minus #200) (ASTM C136)	Liquid Limit (ASTM D4318)	Plasticity Index (ASTM D4318)	Moisture Content (%) (ASTM D2216/ D2937)	In Place Dry Density (pcf) (ASTM D2937)	Unconfined Compressive Strength of Intact Rock (PSI) (ASTM D7012)	Direct Shear (ASTM D3080)	R-Value at 300 PSI (AASHTO T-190)	pH (AZ 236)	Resistivity ohm-cm (AZ 236)	Sulfates (ppm) (AZ 733)	Chlorides (ppm) (AZ 736)
	Begin	End													
FMW-1	1	5	SM	26	NV	NP						7.5	1,446	420	20
FMW-1	1.5	2.5					5.9	110.2							
FMW-1	10	11	SC-SM	20	20	7	5.7	104.3							
FMW-1	15	16	SM	12	NV	NP	3.7	98.5							
FMW-1	34.1	35							10,028						
FMW-1	42	42.8							11,499						
FMW-2	1	5	SM	13	NV	NP					72	2,616	8.5	4	33
FMW-2	5	6	SM	12	NV	NP	4.7	109.6							
LC-1	5	10	SM	14	NV	NP						1,515	7.5	551	46
LC-1	18	18.5							12,616						
LC-1	21	21.5							11,973						
LC-3	20	21.5	SM	38	NV	NP									
LC-3	35	36.5	SP-SM	10	NV	NP									
LC-3	60	61.5	SP-SM	5.8	NV	NP									
LC-3	85	86.5	SP-SM	5.4	NV	NP									
LC-4	1	5	SM	23	NV	NP					66	895	7.9	1,605	281
LC-4	5	6					4.9	108.1							
LC-4	25	26	CL	70	28	10	23.2	96.4							
LC-4	35	36	CH	92	82	56				X					
LC-4	40	41	SM	26	NV	NP				X					
LC-4	95	96	CL	60	31	12				X					
LC-4	100	101	CL	87	37	16	31.9	90.0							
Average				**32.1**	**---**	**---**	**11.4**	**102.4**	**11529.0**	**---**	**69.0**	**1258.4**	**367**	**645**	**95**
Standard Deviation				**28.9**	**---**	**---**	**11.3**	**7.7**	**1100.4**	**---**	**4.2**	**1096.3**	**719**	**681**	**124**
Maximum				**92**	**82**	**56**	**31.9**	**110.2**	**12616.0**	**0**	**72**	**2616.0**	**1,446**	**1605**	**281**
Minimum				**5.4**	**NV**	**NP**	**3.7**	**90.0**	**10028.0**	**0**	**66**	**7.5**	**8**	**4**	**20**
Count				**16**	**16**	**16**	**7**	**7**	**4**	**3**	**2**	**4**	**4**	**4**	**4**

PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
DATE ASSIGNED: 7/6/23

MECHANICAL SIEVE ANALYSIS (ASTM C136/C117) PLASTICITY INDEX (ASTM D4318)
GROUP SYMBOL, USCS (ASTM D2487)

PERCENT PASSING BY WEIGHT

				Silt or Clay	SAND								GRAVEL									COBBLES	
					Fine			Medium			Coarse		Fine				Coarse						
Location & Depth	USCS	LL	PI	#200	#100	#50	#40	#30	#16	#10	#8	#4	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	3"	6"	Lab #
FMW-1 (1.0-5.0')	SM	NV	NP	26	39	52	57	62	72	79	81	89	92	96	98	100	100	100	100	100	100	100	23-1519-02
FMW-1 (10.0-11.0')	SC-SM	20	7	20	29	40	47	55	67	73	74	81	85	90	96	100	100	100	100	100	100	100	23-1519-03
FMW-1 (15.0-16.0')	SM	NV	NP	12	28	63	73	81	92	96	97	98	99	99	100	100	100	100	100	100	100	100	23-1519-04
FMW-2 (1.0-5.0')	SM	NV	NP	13	17	29	39	49	65	72	74	82	86	92	96	99	100	100	100	100	100	100	23-1519-07
FMW-2 (5.0-6.0')	SM	NV	NP	12	17	31	42	54	70	77	79	86	90	94	98	100	100	100	100	100	100	100	23-1519-08
LC-1 (5.0-10.0')	SM	NV	NP	14	26	44	48	52	61	68	70	82	90	95	99	100	100	100	100	100	100	100	23-1519-09
LC-3 (20.0-21.5')	SM	NV	NP	38	53	74	83	87	89	90	90	91	92	93	95	100	100	100	100	100	100	100	23-1519-12
LC-3 (35.0-36.5')	SP-SM	NV	NP	10	22	54	70	80	87	89	90	94	95	96	98	100	100	100	100	100	100	100	23-1519-13
LC-3 (60.0-61.5')	SP-SM	NV	NP	5.8	10	22	34	52	79	86	88	94	96	97	98	100	100	100	100	100	100	100	23-1519-14

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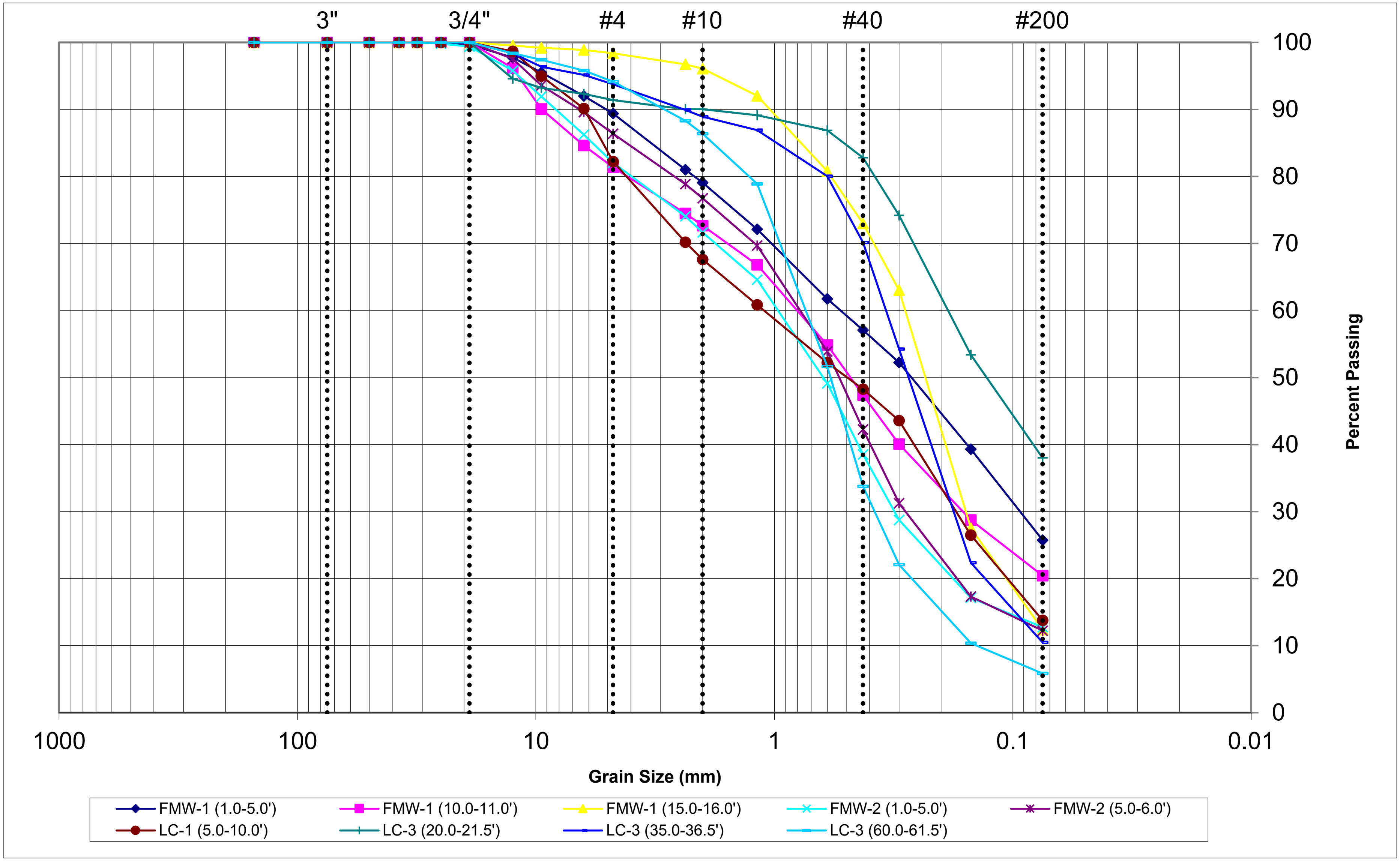
PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
DATE ASSIGNED: 7/6/23

MECHANICAL SIEVE ANALYSIS GRAPHS



PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
DATE ASSIGNED: 7/6/23

MECHANICAL SIEVE ANALYSIS (ASTM C136/C117) PLASTICITY INDEX (ASTM D4318)
GROUP SYMBOL, USCS (ASTM D2487)

PERCENT PASSING BY WEIGHT

				Silt or Clay	SAND								GRAVEL									COBBLES	
					Fine			Medium			Coarse		Fine				Coarse						
Location & Depth	**USCS**	**LL**	**PI**	**#200**	**#100**	**#50**	**#40**	**#30**	**#16**	**#10**	**#8**	**#4**	**1/4"**	**3/8"**	**1/2"**	**3/4"**	**1"**	**1 1/4"**	**1 1/2"**	**2"**	**3"**	**6"**	**Lab #**
LC-3 (85.0-86.5')	SP-SM	NV	NP	5.4	9	21	30	37	47	54	56	68	73	84	88	96	100	100	100	100	100	100	23-1519-15
LC-4 (1.0-5.0')	SM	NV	NP	23	38	54	61	65	71	74	76	82	86	93	98	100	100	100	100	100	100	100	23-1519-16
LC-4 (25.0-26.0')	CL	28	10	70	94	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	23-1519-18
LC-4 (35.0-36.0')	CH	82	56	92	93	94	95	96	97	98	98	99	100	100	100	100	100	100	100	100	100	100	23-1519-19
LC-4 (40.0-41.0')	SM	NV	NP	26	58	93	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	23-1519-20
LC-4 (95.0-96.0')	CL	31	12	60	96	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	23-1519-21
LC-4 (100.0-101.0')	CL	37	16	87	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	23-1519-22

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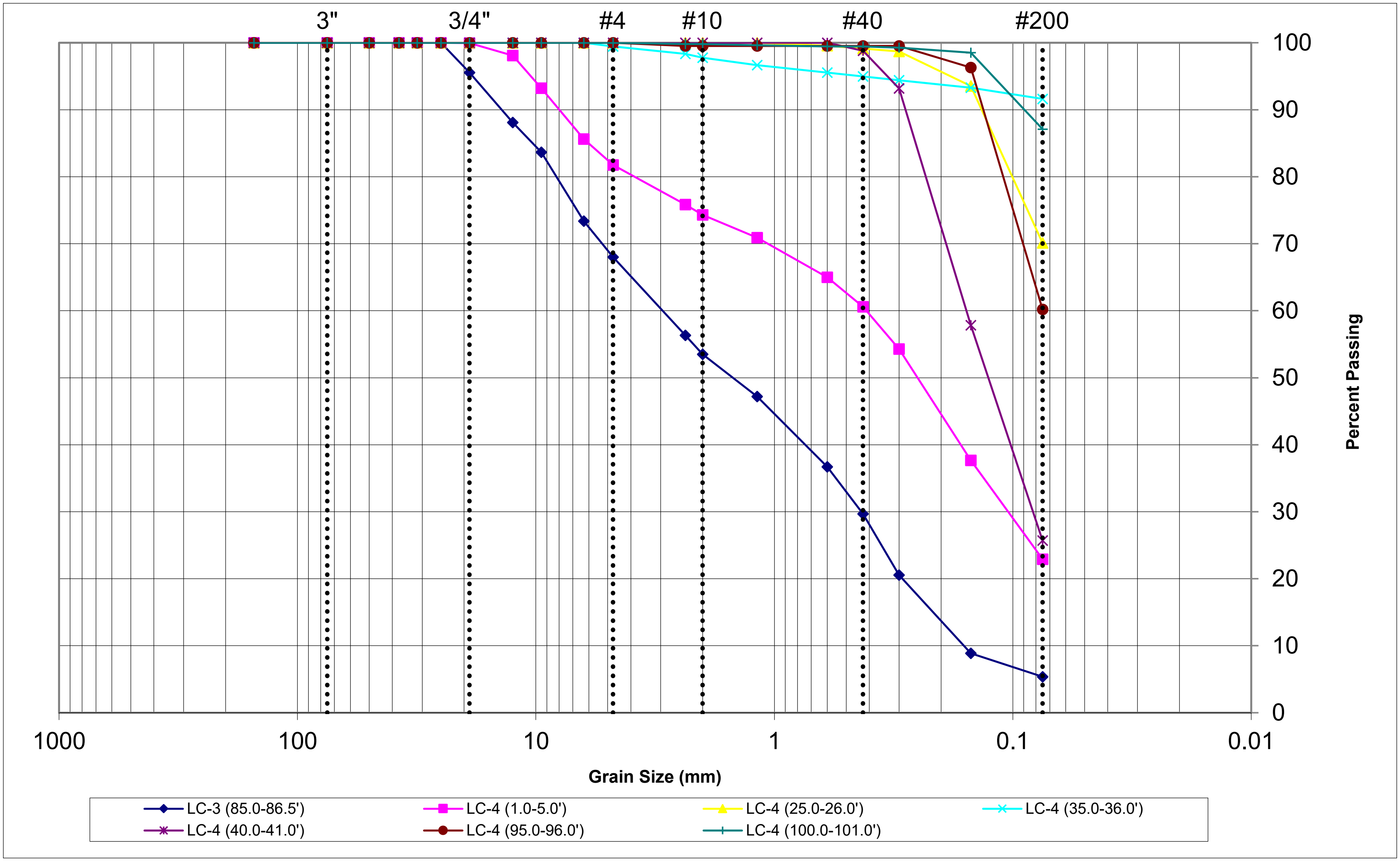
PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
DATE ASSIGNED: 7/6/23

MECHANICAL SIEVE ANALYSIS GRAPHS



PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
DATE ASSIGNED: 7/6/23

DENSITY OF SOIL IN PLACE BY THE DRIVE-CYLINDER METHOD (ASTM D2937)

LAB #	BORING	MOISTURE WET WT. (g)	MOISTURE DRY WT. (g)	MOISTURE CONTENT	NUMBER OF RINGS	WET WEIGHT & RINGS (g)	WEIGHT OF RINGS (g)	DRY DENSITY (pcf)
23-1519-01	FMW-1 (1.5-2.5')	845.5	798.7	5.9%	6	1,114.5	268.8	110.2
23-1519-03	FMW-1 (10.0-11.0')	522.2	494.2	5.7%	5	889.3	223.6	104.3
23-1519-04	FMW-1 (15.0-16.0')	613.7	591.8	3.7%	6	1,006.8	266.6	98.5
23-1519-08	FMW-2 (5.0-6.0')	683.2	652.6	4.7%	6	1,103.4	272.2	109.6
23-1519-17	LC-4 (5.0-6.0')	273.7	261.0	4.9%	2	364.3	90.4	108.1
23-1519-18	LC-4 (25.0-26.0')	572.5	464.7	23.2%	4	755.1	181.6	96.4
23-1519-22	LC-4 (100.0-101.0')	716.0	542.9	31.9%	5	944.2	227.2	90.0

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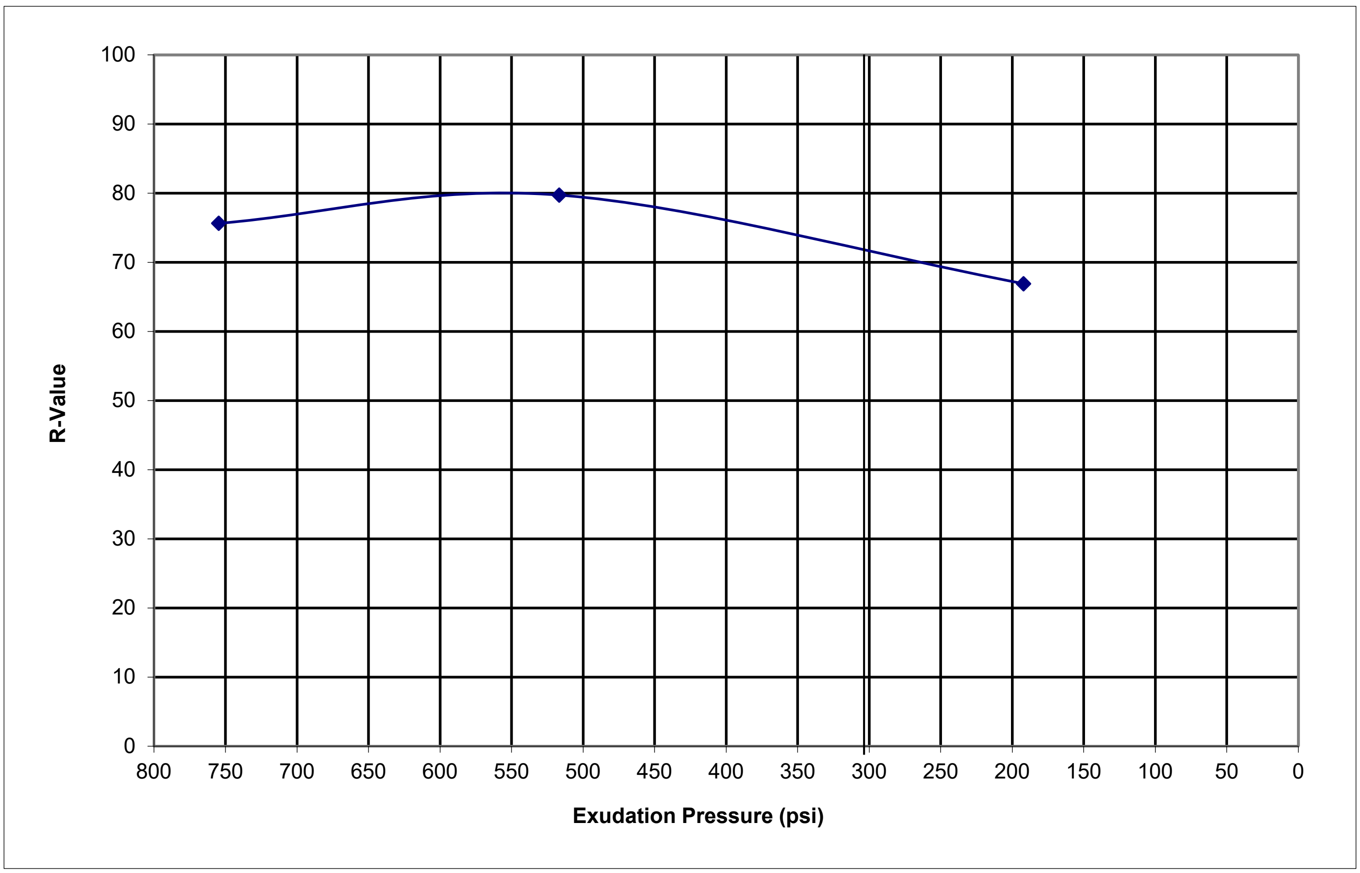
PROJECT:	US 180 5-Mile and LCR Bridges	JOB NO:	17-2019-4257.14
LOCATION:	Navajo County, AZ	WORK ORDER NO:	1
MATERIAL:	Soil - See Boring Logs	LAB NO:	23-1519-07
SAMPLE SOURCE:	FMW-2 (1.0-5.0')	DATE SAMPLED:	07/06/23

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (ASTM D2844)

SPECIMEN ID	A	B	C
Moisture Content	8.6%	7.7%	6.9%
Compaction Pressure (psi)	25	25	25
Specimen Height (inches)	2.50	2.48	2.51
Dry Density (pcf)	130.5	130.3	129.8
Horiz. Pres. @ 1000lbs (psi)	20.0	13.0	14.0
Horiz. Pres. @ 2000lbs (psi)	38.0	23.0	27.0
Displacement	3.97	3.79	3.97
Expansion Pressure (psi)	0.0	0.0	0.0
Exudation Pressure (psi)	192	517	755
R Value	67	80	76



R Value at 300 PSI = 72

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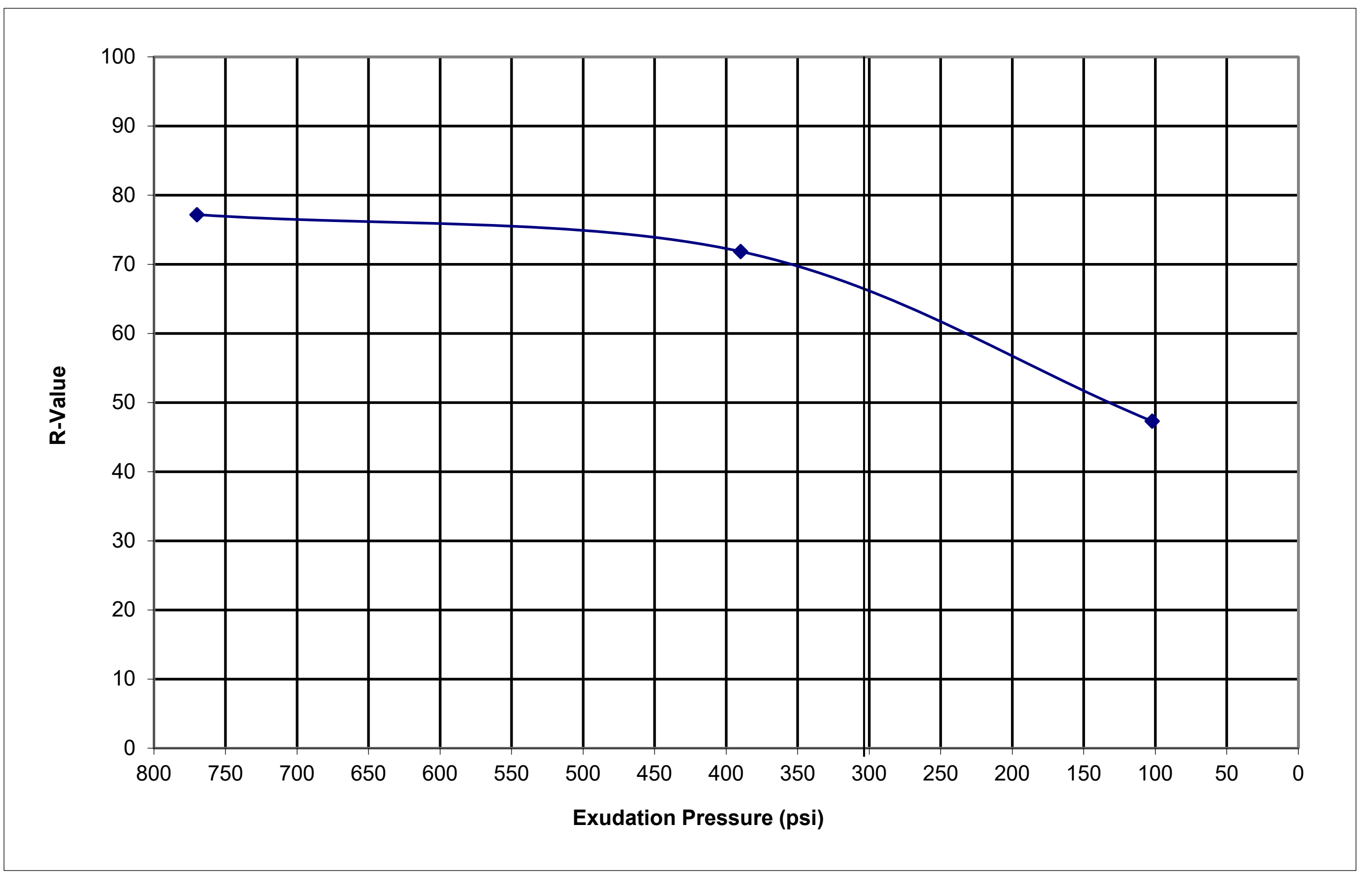
PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs
SAMPLE SOURCE: LC-4 (1.0-5.0')

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
LAB NO: 23-1519-16
DATE SAMPLED: 07/06/23

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (ASTM D2844)

SPECIMEN ID	A	B	C
Moisture Content	10.6%	9.7%	8.8%
Compaction Pressure (psi)	25	25	30
Specimen Height (inches)	2.52	2.53	2.48
Dry Density (pcf)	127.8	127.4	128.5
Horiz. Pres. @ 1000lbs (psi)	32.0	17.0	15.0
Horiz. Pres. @ 2000lbs (psi)	63.0	32.0	26.0
Displacement	4.29	3.92	3.81
Expansion Pressure (psi)	0.0	0.0	0.0
Exudation Pressure (psi)	102	390	770
R Value	47	72	77



R Value at 300 PSI = 66

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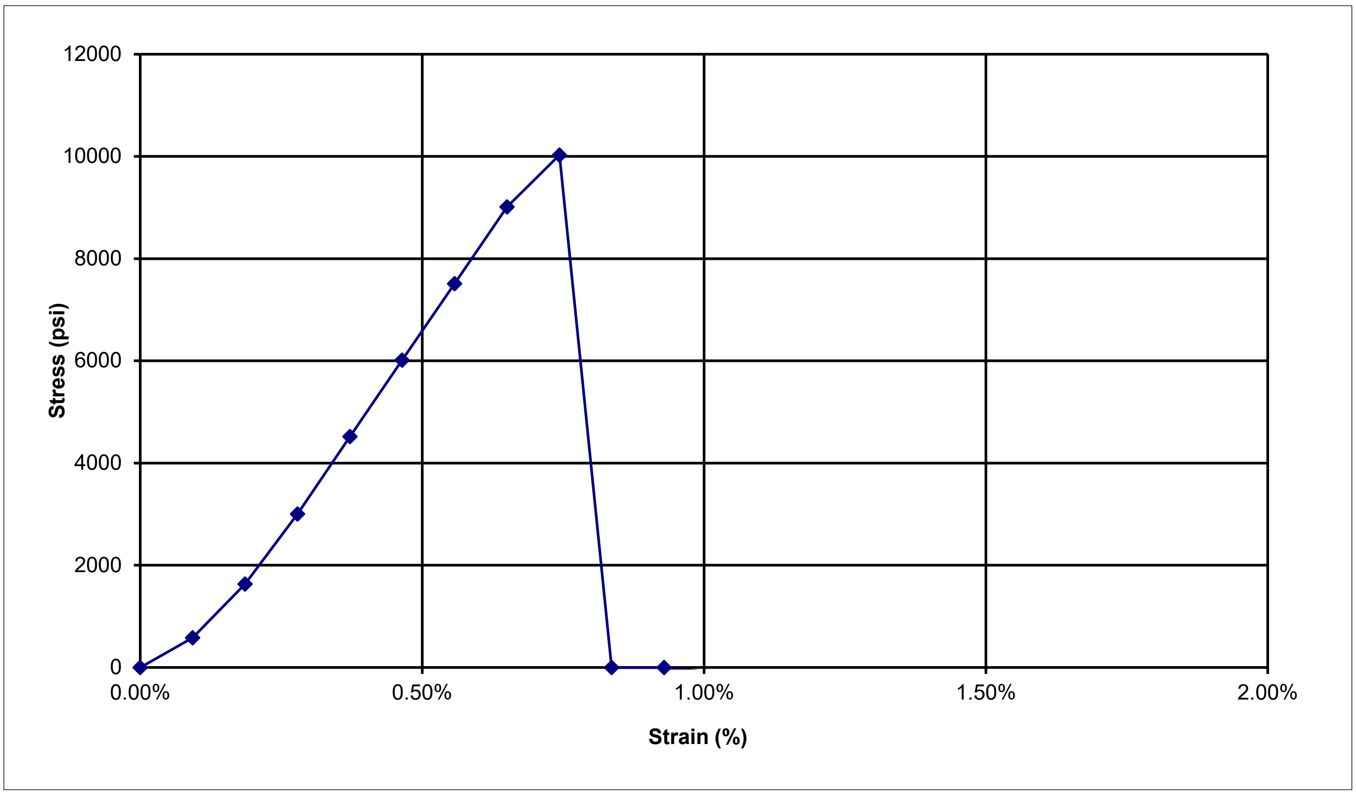
PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: See Boring Logs
SAMPLE SOURCE: FMW-1 (34.1-35.0')
SAMPLE PREP: In Situ

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
LAB NO: 23-1519-05
DATE ASSIGNED: 07/06/23

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS (ASTM D7012) METHOD C

DIAMETER (IN):	2.38
LENGTH (IN):	5.38
L/D (2.0-2.5 REQ.):	2.26
DRY DENSITY (PCF):	133.5
MOISTURE CONTENT:	0.1%

STRAIN RATE (IN/MIN):	0.020
TOTAL STRAIN:	0.74%
UNCONFINED COMPRESSIVE STRENGTH (PSI):	**10,028**



Note: Test specimens were not prepared in accordance with ASTM D4543. Results may differ from results obtained from a test specimen that meets the requirements of ASTM D4543.

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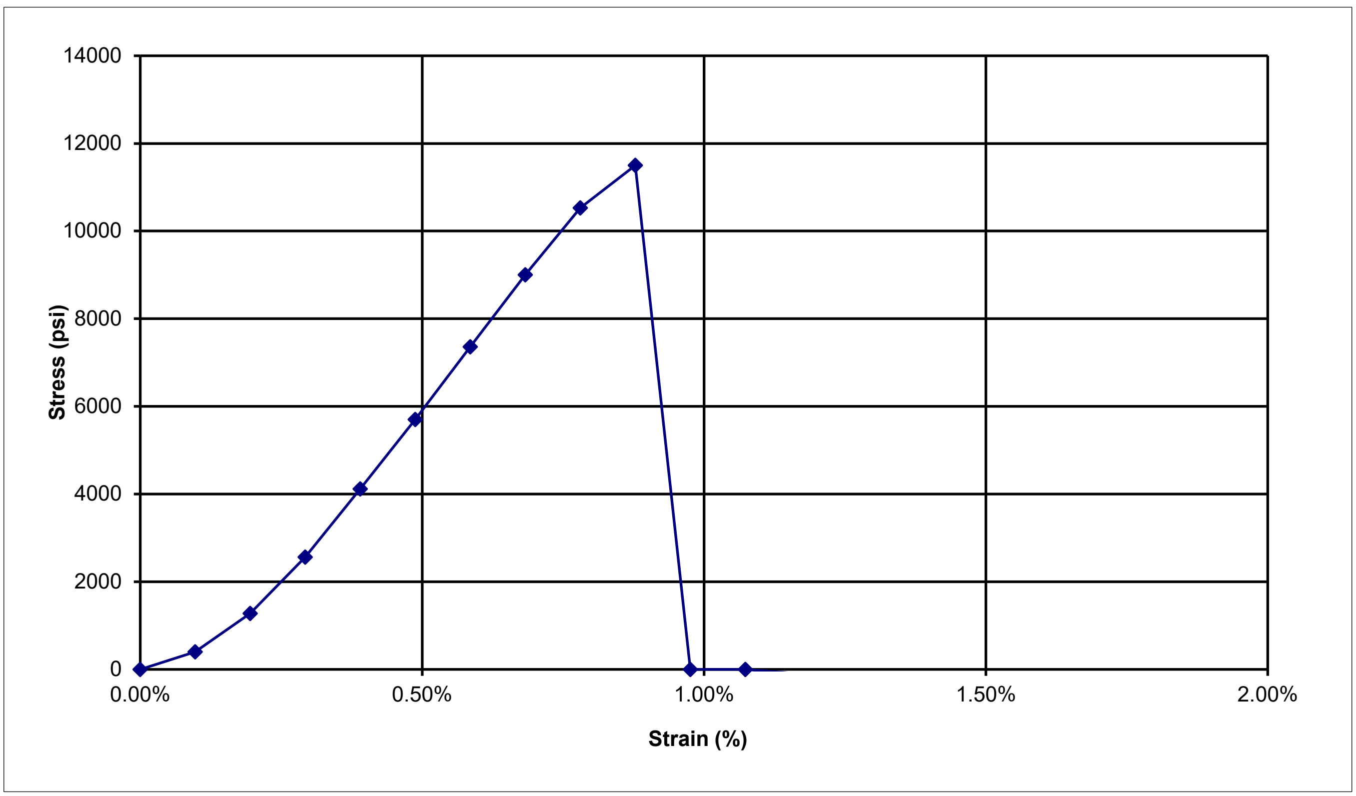
PROJECT:	US 180 5-Mile and LCR Bridges	**JOB NO:**	17-2019-4257.14
LOCATION:	Navajo County, AZ	**WORK ORDER NO:**	1
MATERIAL:	See Boring Logs	**LAB NO:**	23-1519-06
SAMPLE SOURCE:	FMW-1 (42.0-42.8')	**DATE ASSIGNED:**	07/06/23
SAMPLE PREP:	In Situ		

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS
(ASTM D7012) METHOD C

DIAMETER (IN):	2.39	STRAIN RATE (IN/MIN):	0.020
LENGTH (IN):	5.13	TOTAL STRAIN:	0.88%
L/D (2.0-2.5 REQ.):	2.15	**UNCONFINED COMPRESSIVE STRENGTH (PSI):**	**11,499**
DRY DENSITY (PCF):	134.8		
MOISTURE CONTENT:	2.1%		



Note: Test specimens were not prepared in accordance with ASTM D4543. Results may differ from results obtained from a test specimen that meets the requirements of ASTM D4543.

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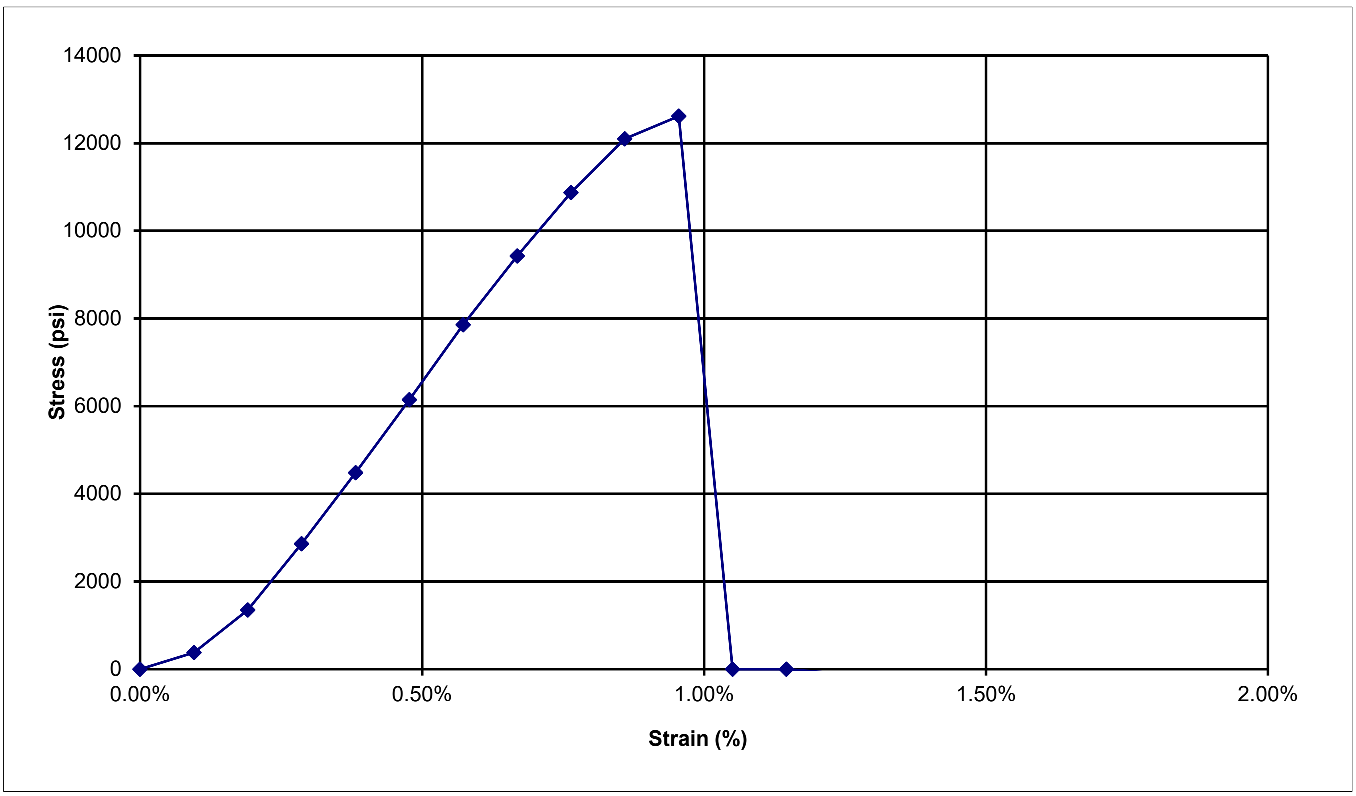
PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: See Boring Logs
SAMPLE SOURCE: LC-1 (18.0-18.5')
SAMPLE PREP: In Situ

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
LAB NO: 23-1519-10
DATE ASSIGNED: 07/06/23

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS (ASTM D7012) METHOD C

DIAMETER (IN):	2.37
LENGTH (IN):	5.24
L/D (2.0-2.5 REQ.):	2.21
DRY DENSITY (PCF):	140.3
MOISTURE CONTENT:	0.2%

STRAIN RATE (IN/MIN):	0.020
TOTAL STRAIN:	0.96%
UNCONFINED COMPRESSIVE STRENGTH (PSI):	**12,616**



Note: Test specimens were not prepared in accordance with ASTM D4543. Results may differ from results obtained from a test specimen that meets the requirements of ASTM D4543.

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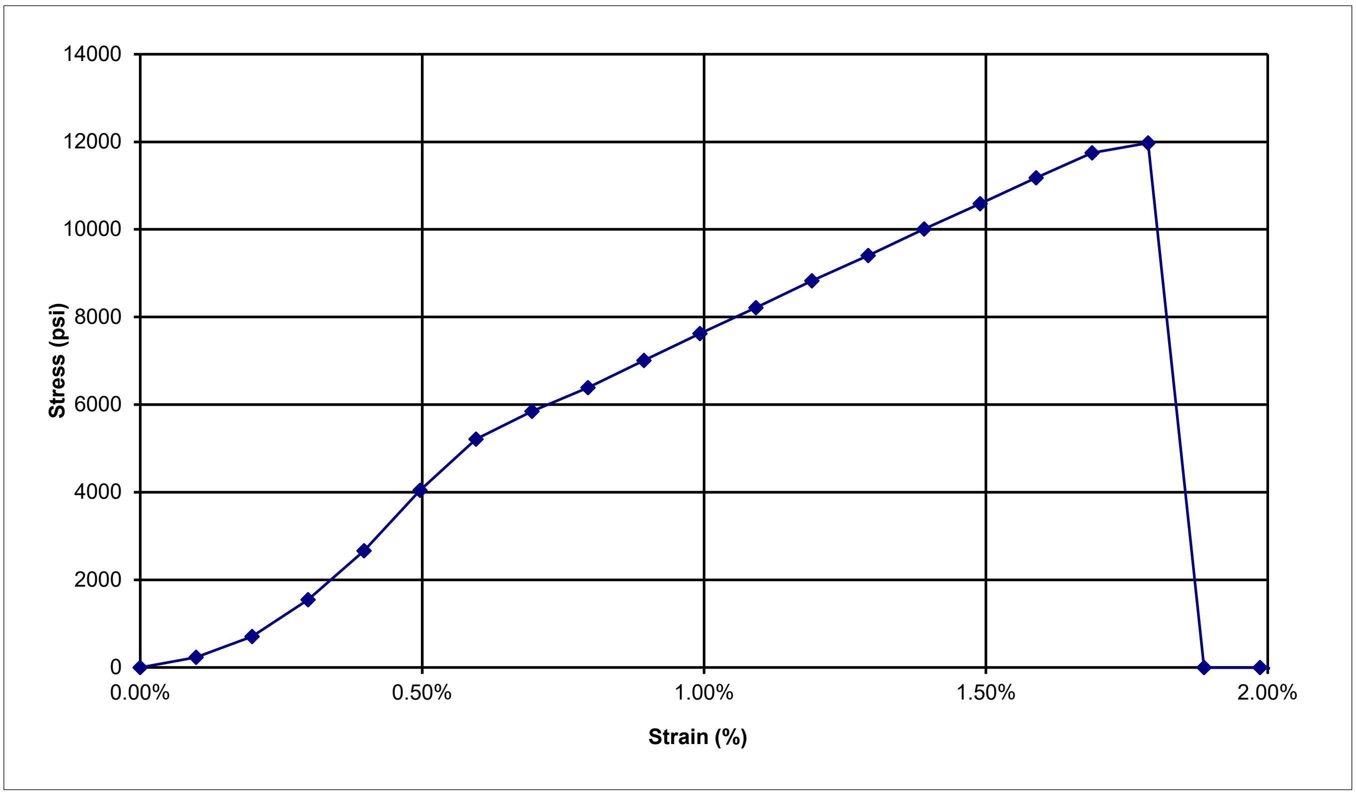
PROJECT:	US 180 5-Mile and LCR Bridges	**JOB NO:**	17-2019-4257.14
LOCATION:	Navajo County, AZ	**WORK ORDER NO:**	1
MATERIAL:	See Boring Logs	**LAB NO:**	23-1519-11
SAMPLE SOURCE:	LC-1 (21.0-21.5')	**DATE ASSIGNED:**	07/06/23
SAMPLE PREP:	In Situ		

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS (ASTM D7012) METHOD C

DIAMETER (IN):	2.30	STRAIN RATE (IN/MIN):	0.020
LENGTH (IN):	5.04	TOTAL STRAIN:	1.79%
L/D (2.0-2.5 REQ.):	2.19	**UNCONFINED COMPRESSIVE STRENGTH (PSI):**	**11,973**
DRY DENSITY (PCF):	142.0		
MOISTURE CONTENT:	0.2%		



Note: Test specimens were not prepared in accordance with ASTM D4543. Results may differ from results obtained from a test specimen that meets the requirements of ASTM D4543.

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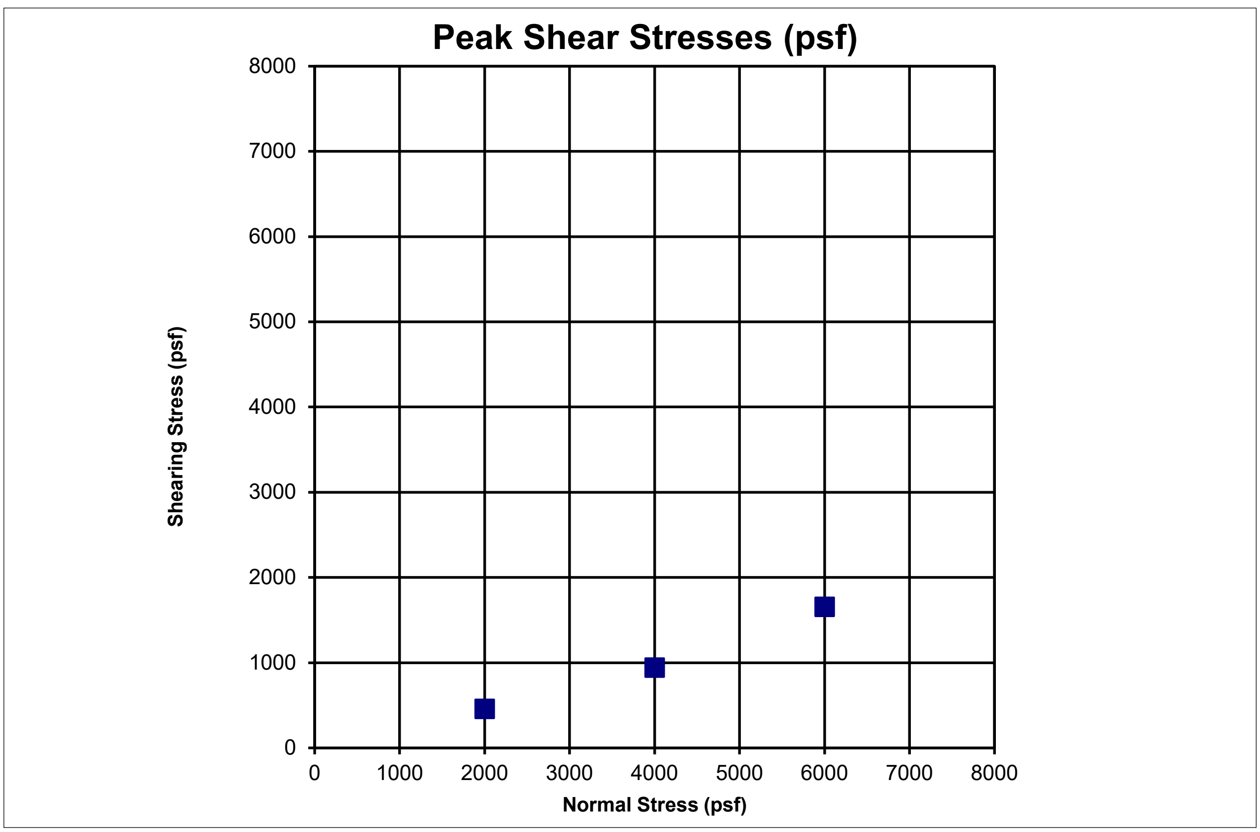
PROJECT:	US 180 5-Mile and LCR Bridges
LOCATION:	Navajo County, AZ
MATERIAL:	Soil - See Boring Logs
SAMPLE SOURCE:	LC-4 (35.0-36.0')
SAMPLE PREPARATION:	Saturated - 2, 4, and 6ksf

JOB NO:	17-2019-4257.14
WORK ORDER NO:	1
LAB NO:	23-1519-19
DATE ASSIGNED:	7/6/2023

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D3080)

Initial thickness of specimen (in.):	1.00	1.00	1.00
Initial diameter of specimen (in.):	2.42	2.42	2.42
Final thickness before shear (in.):	0.973	0.968	0.965
Shearing device used:	Humboldt Automated Shear Test System by Trautwein Soil Testing Equipment		
Rate of deformation (in/min):	0.01	0.01	0.01
Direct shear point:	1	2	3
Dry mass of specimen (g):	91.9	92.2	92.4
Initial Moisture Content:	41.9%	43.4%	44.6%
Initial Wet Density (pcf):	108.0	109.5	110.7
Initial Dry Density (pcf):	76.1	76.4	76.5
Final Moisture Content:	42.4%	44.3%	45.5%
Final Wet Density (pcf):	111.4	113.8	115.4
Final Dry Density (pcf):	78.2	78.9	79.3
Normal Stress (psf):	2000	4000	6000
Maximum Shearing Stress (psf):	459	943	1654
Vertical Deformation @ Max Shear (in):	0.288	0.169	0.129
Horizontal Deformation @ Max Shear (in):	0.060	0.054	0.121



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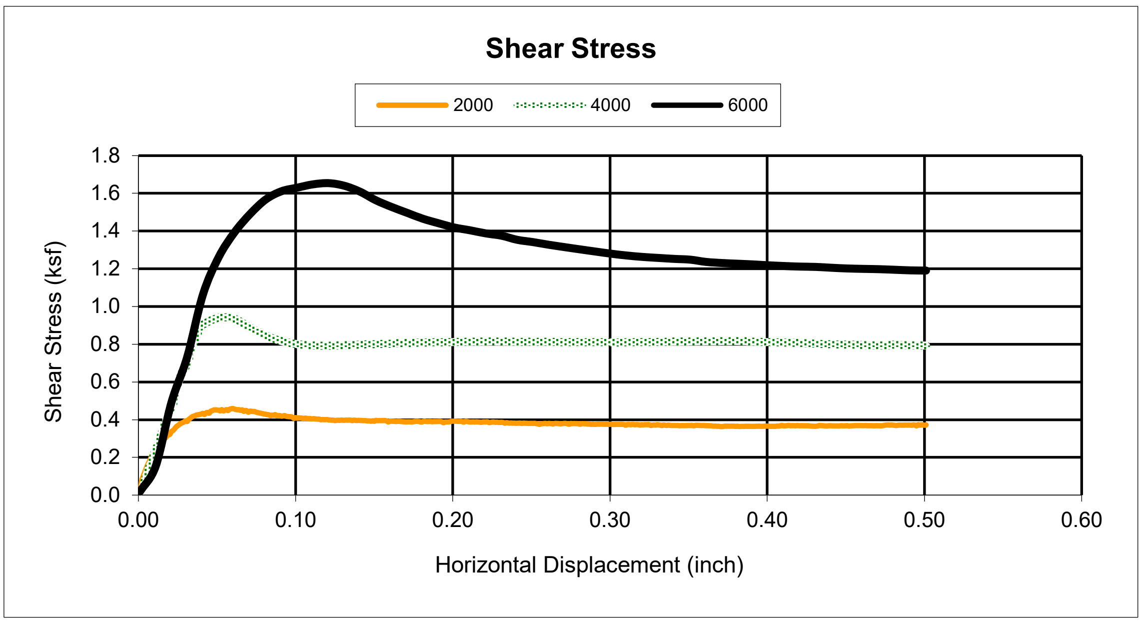
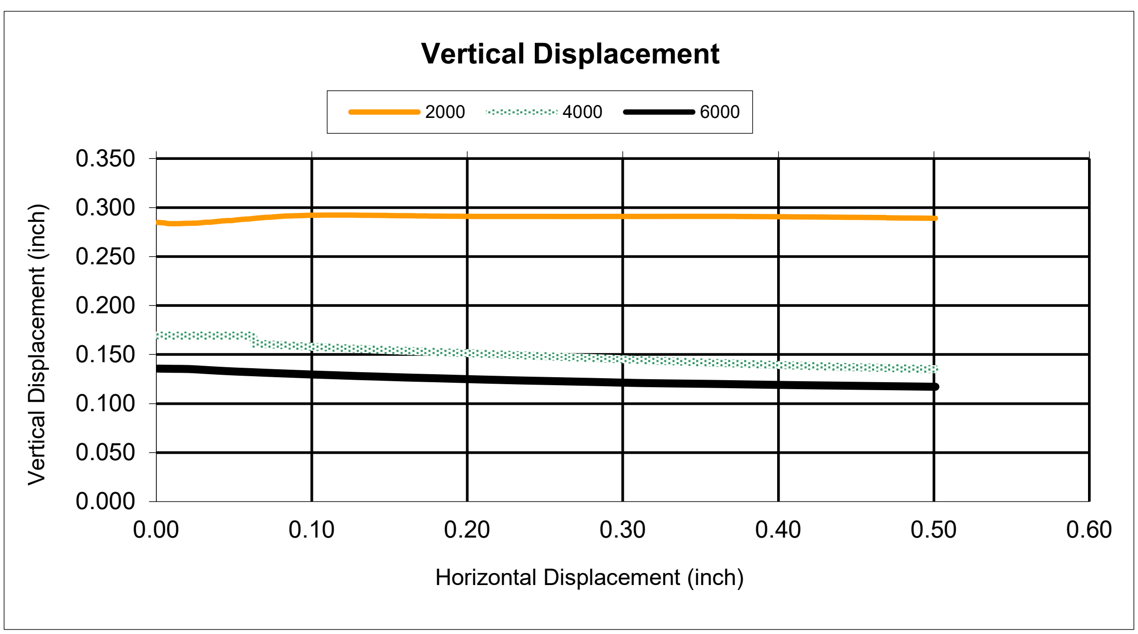
PROJECT:	US 180 5-Mile and LCR Bridges	**JOB NO:**	17-2019-4257.14
LOCATION:	Navajo County, AZ	**WORK ORDER NO:**	1
MATERIAL:	Soil - See Boring Logs	**LAB NO:**	23-1519-19
SAMPLE SOURCE:	LC-4 (35.0-36.0')	**DATE ASSIGNED:**	7/6/2023
SAMPLE PREPARATION:	Saturated - 2, 4, and 6ksf		

NORMAL LOADS (psf): 2000 4000 6000

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D3080)





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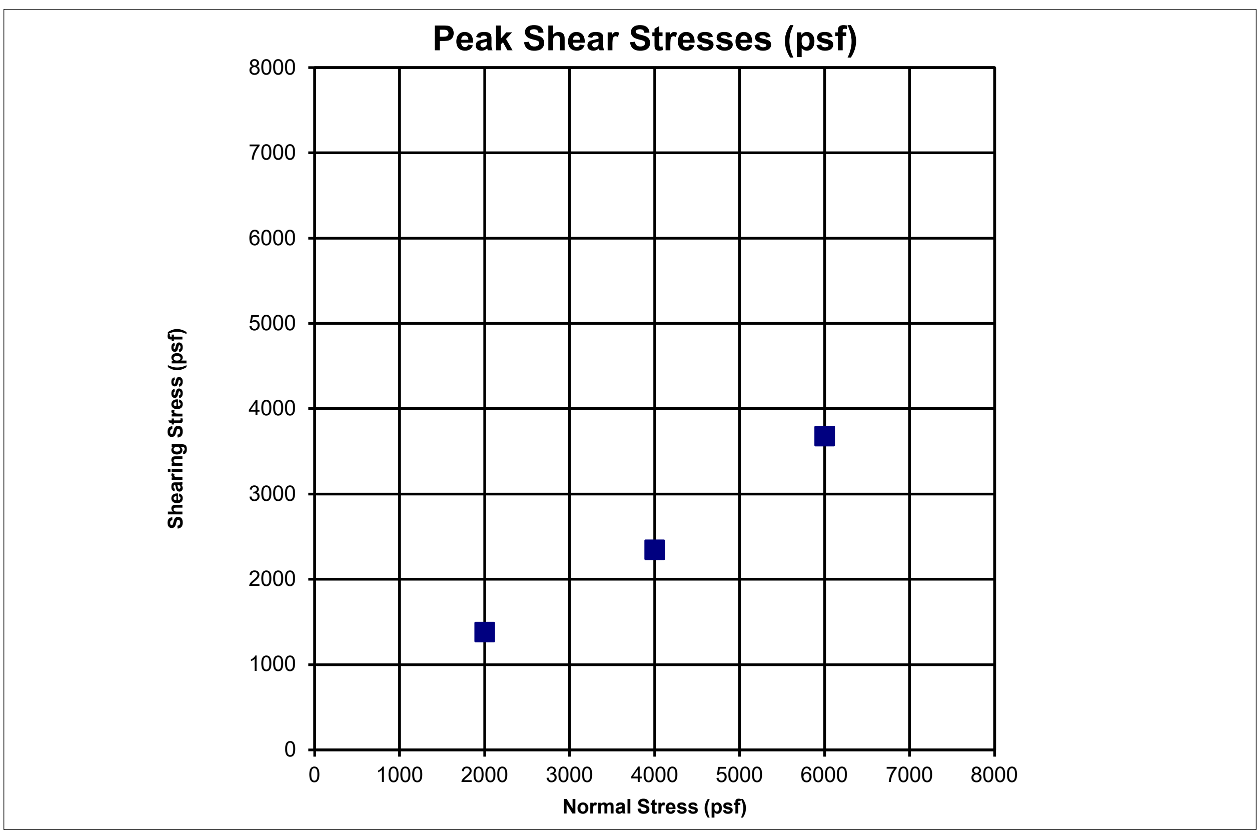
Phoenix, AZ 85040

PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs
SAMPLE SOURCE: LC-4 (40.0-41.0')
SAMPLE PREPARATION: Saturated - 2, 4, and 6ksf

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
LAB NO: 23-1519-20
DATE ASSIGNED: 7/6/2023

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D3080)

Initial thickness of specimen (in.):	1.00	1.00	1.00
Initial diameter of specimen (in.):	2.42	2.42	2.42
Final thickness before shear (in.):	0.989	0.985	0.991
Shearing device used:	Humboldt Automated Shear Test System by Trautwein Soil Testing Equipment		
Rate of deformation (in/min):	0.01	0.01	0.01
Direct shear point:	1	2	3
Dry mass of specimen (g):	119.5	119.8	121.1
Initial Moisture Content:	23.2%	24.2%	23.0%
Initial Wet Density (pcf):	121.9	123.2	123.4
Initial Dry Density (pcf):	99.0	99.2	100.3
Final Moisture Content:	24.9%	25.0%	23.8%
Final Wet Density (pcf):	125.0	126.0	125.3
Final Dry Density (pcf):	100.1	100.8	101.2
Normal Stress (psf):	2000	4000	6000
Maximum Shearing Stress (psf):	1383	2345	3679
Vertical Deformation @ Max Shear (in):	0.207	0.191	0.168
Horizontal Deformation @ Max Shear (in):	0.121	0.491	0.151



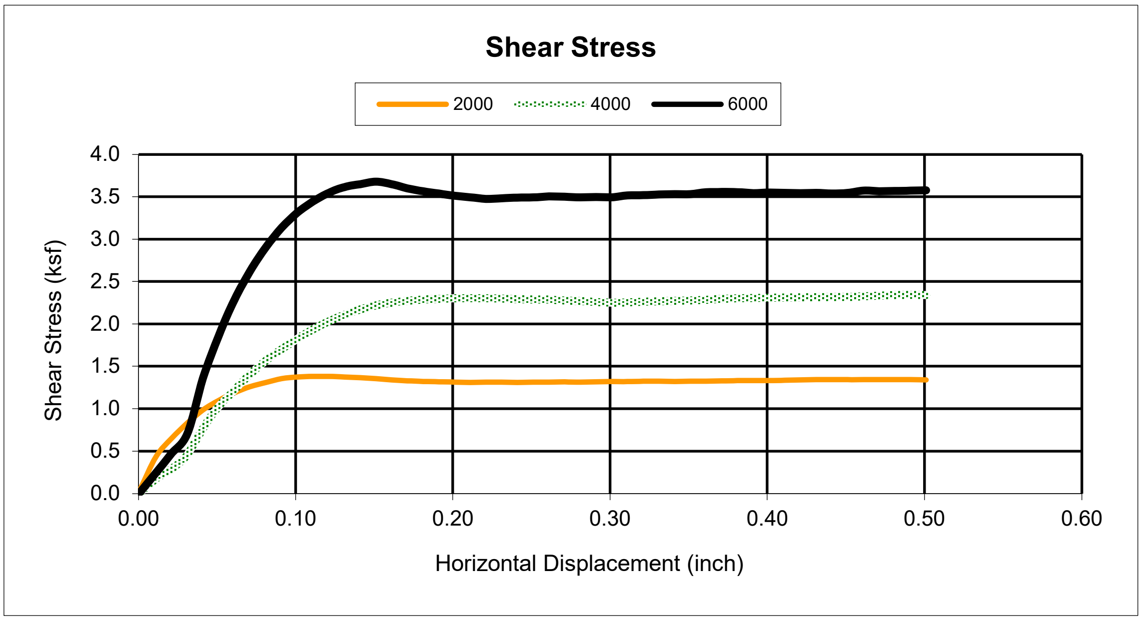
WSP USA
3630 E Wier Ave.
Phoenix, AZ 85040

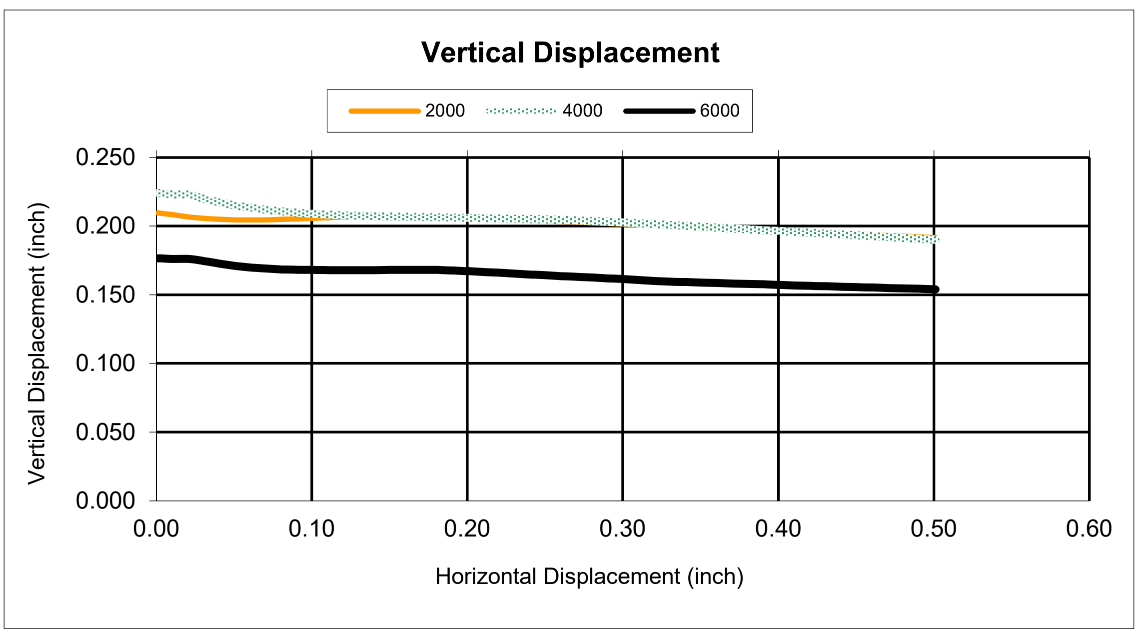
REVIEWED BY Robert Kostelny

PROJECT:	US 180 5-Mile and LCR Bridges	**JOB NO:**	17-2019-4257.14
LOCATION:	Navajo County, AZ	**WORK ORDER NO:**	1
MATERIAL:	Soil - See Boring Logs	**LAB NO:**	23-1519-20
SAMPLE SOURCE:	LC-4 (40.0-41.0')	**DATE ASSIGNED:**	7/6/2023
SAMPLE PREPARATION:	Saturated - 2, 4, and 6ksf		

NORMAL LOADS (psf): 2000 4000 6000

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D3080)



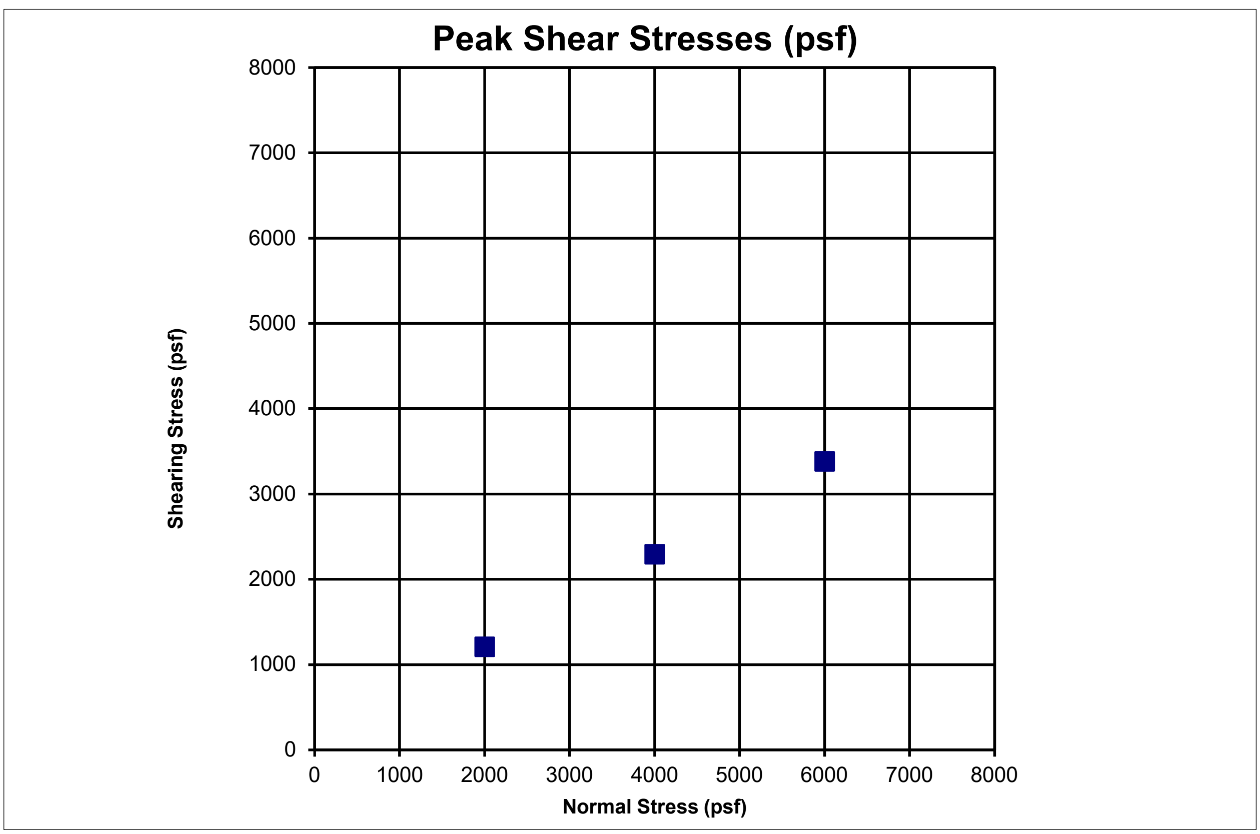


WSP USA
3630 E Wier Ave.
Phoenix, AZ 85040

PROJECT: US 180 5-Mile and LCR Bridges	**JOB NO:** 17-2019-4257.14
LOCATION: Navajo County, AZ	**WORK ORDER NO:** 1
MATERIAL: Soil - See Boring Logs	**LAB NO:** 23-1519-21
SAMPLE SOURCE: LC-4 (95.0-96.0')	**DATE ASSIGNED:** 7/6/2023
SAMPLE PREPARATION: Saturated - 2, 4, and 6ksf	

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D3080)

Initial thickness of specimen (in.):	1.00	1.00	1.00
Initial diameter of specimen (in.):	2.42	2.42	2.42
Final thickness before shear (in.):	0.972	0.964	0.964
Shearing device used:	Humboldt Automated Shear Test System by Trautwein Soil Testing Equipment		
Rate of deformation (in/min):	0.01	0.01	0.01
Direct shear point:	1	2	3
Dry mass of specimen (g):	107.4	108.9	113.7
Initial Moisture Content:	34.3%	32.4%	30.3%
Initial Wet Density (pcf):	119.4	119.4	122.7
Initial Dry Density (pcf):	89.0	90.2	94.2
Final Moisture Content:	35.9%	31.9%	30.0%
Final Wet Density (pcf):	124.5	123.4	126.9
Final Dry Density (pcf):	91.6	93.6	97.7
Normal Stress (psf):	2000	4000	6000
Maximum Shearing Stress (psf):	1209	2295	3384
Vertical Deformation @ Max Shear (in):	0.186	0.151	0.134
Horizontal Deformation @ Max Shear (in):	0.211	0.341	0.371



WSP USA
3630 E Wier Ave.
Phoenix, AZ 85040

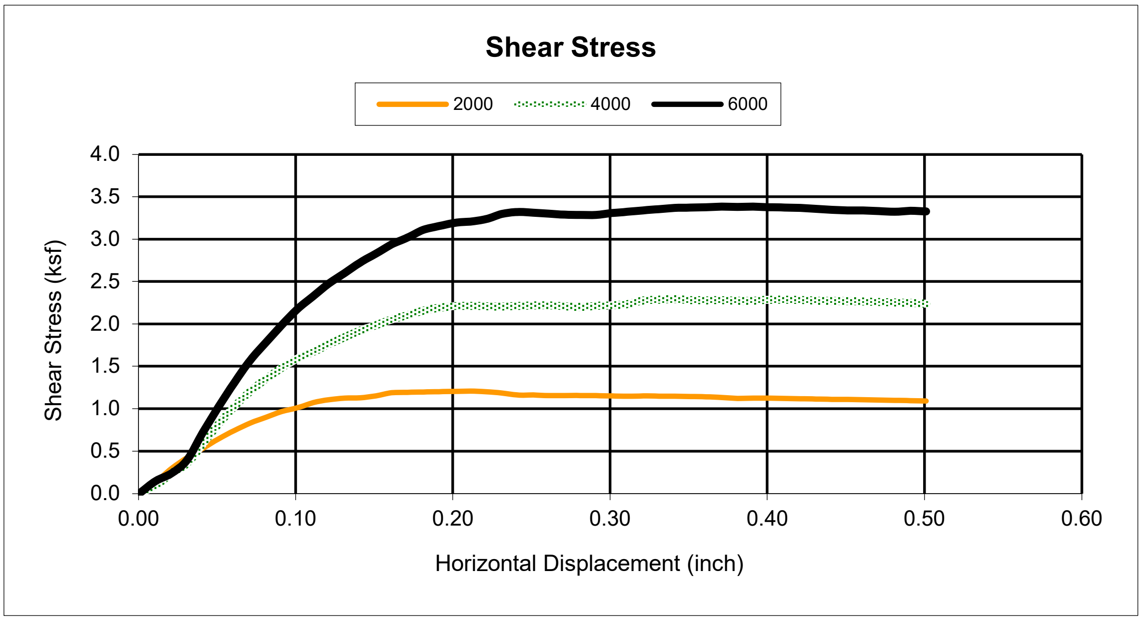
REVIEWED BY Robert Kostelny

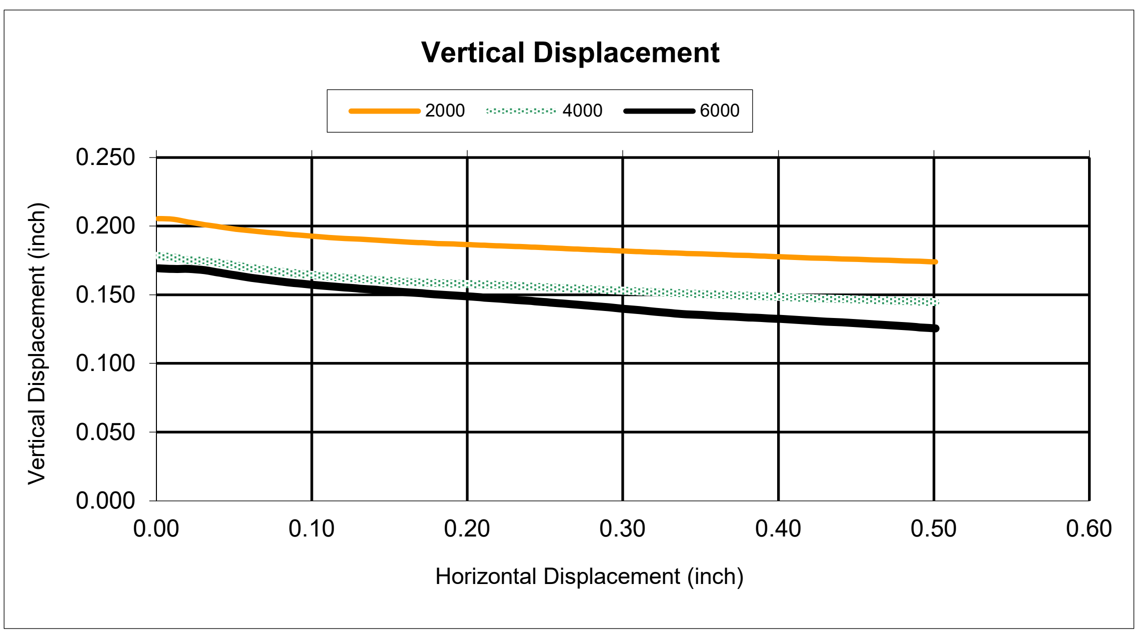
PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs
SAMPLE SOURCE: LC-4 (95.0-96.0')
SAMPLE PREPARATION: Saturated - 2, 4, and 6ksf

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
LAB NO: 23-1519-21
DATE ASSIGNED: 7/6/2023

NORMAL LOADS (psf): 2000 4000 6000

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D3080)





WSP USA
3630 E Wier Ave.
Phoenix, AZ 85040

PROJECT: US 180 5-Mile and LCR Bridges
LOCATION: Navajo County, AZ
MATERIAL: Soil - See Boring Logs

JOB NO: 17-2019-4257.14
WORK ORDER NO: 1
DATE ASSIGNED: 07/06/23

pH & RESISTIVITY (AZ 236)

LAB NO	SAMPLE SOURCE	RESISTIVITY (Ohm-cm)	pH
23-1519-02	FMW-1 (1.0-5.0')	1,446	7.5
23-1519-07	FMW-2 (1.0-5.0')	2,616	8.5
23-1519-09	LC-1 (5.0-10.0')	1,515	7.5
23-1519-16	LC-4 (1.0-5.0')	895	7.9

WSP USA
3630 E Wier Ave.
Phoenix, AZ 85040

REVIEWED BY Robert Kostelny

MOTZZ LABORATORY, INC.

Report: 947293
Reported: 7/12/2023
Received: 7/10/2023
PO: 172019425714

Laboratory Analysis Report

WSP USA Environment & Infrastructure Inc.
Franco Escalante
4600 E. Washington Street Suite 600
Phoenix, Arizona 85034

Project: 17-2019-4257-14

Lab Number	Sample ID	
947293-1	23-1519-02	FMW-1 (1.0-5.0')

Test Parameter

Test	Method	Result	Units
Chloride	AASHTO T291	20	ppm
Sulfate	AASHTO T290	420	ppm

Lab Number	Sample ID	
947293-2	23-1519-07	FMW-2 (1.0-5.0')

Test Parameter

Test	Method	Result	Units
Chloride	AASHTO T291	33	ppm
Sulfate	AASHTO T290	4	ppm

Lab Number	Sample ID	
947293-3	23-1519-09	LC-1 (5.0-10.0')

Test Parameter

Test	Method	Result	Units
Chloride	AASHTO T291	46	ppm
Sulfate	AASHTO T290	551	ppm

Lab Number	Sample ID	
947293-4	23-1519-16	LC-4 (1.0-5.0')

Test Parameter

Test	Method	Result	Units
Chloride	AASHTO T291	281	ppm
Sulfate	AASHTO T290	1605	ppm

APPENDIX C

ROCK CORE PHOTOS

Boring FMW-1 Rock Core

Box 1 of 4

Boring FMW-1 Rock Core

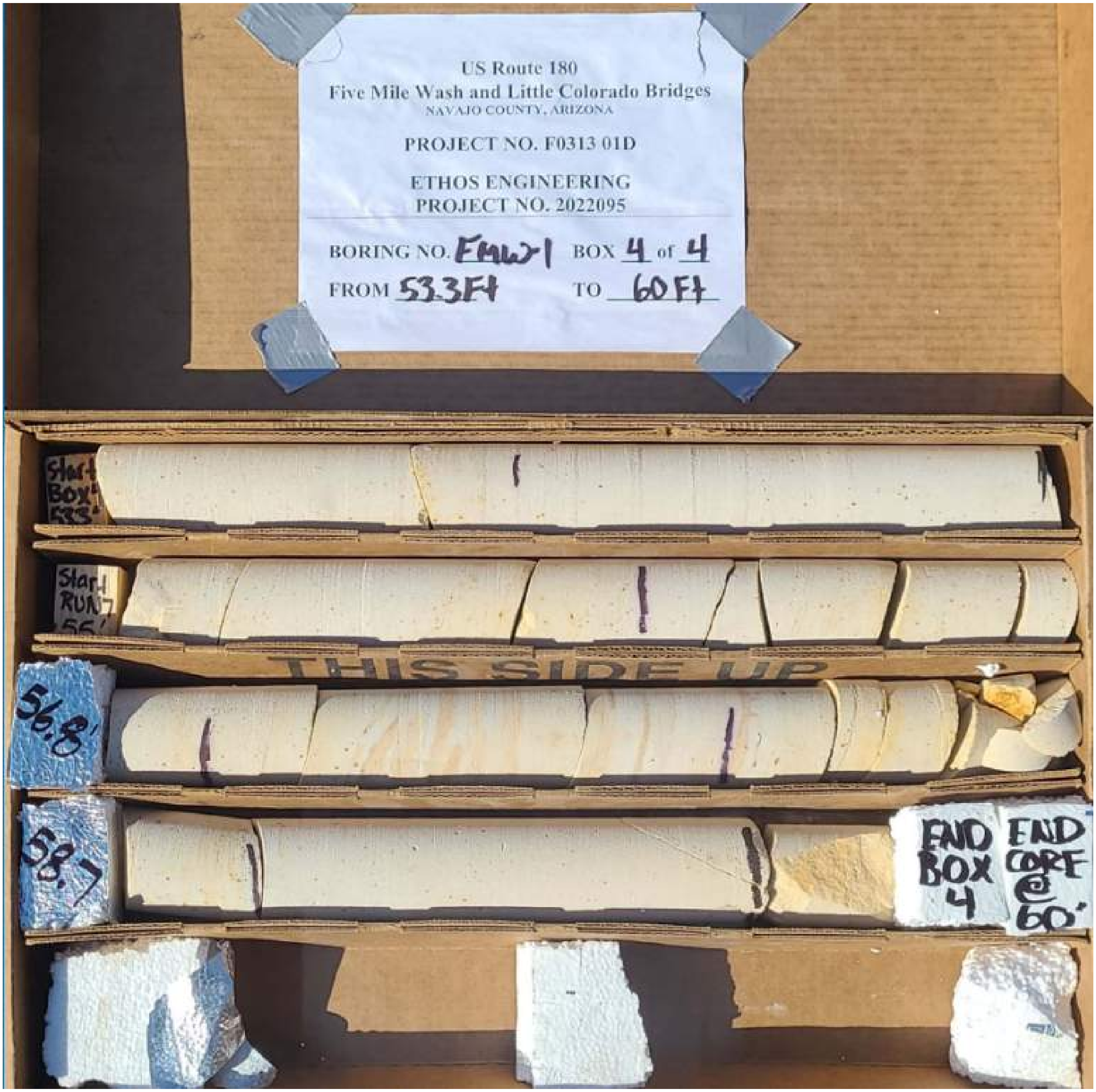
Box 2 of 4

Boring FMW-1 Rock Core

Box 3 of 4

Boring FMW-1 Rock Core

Box 4 of 4

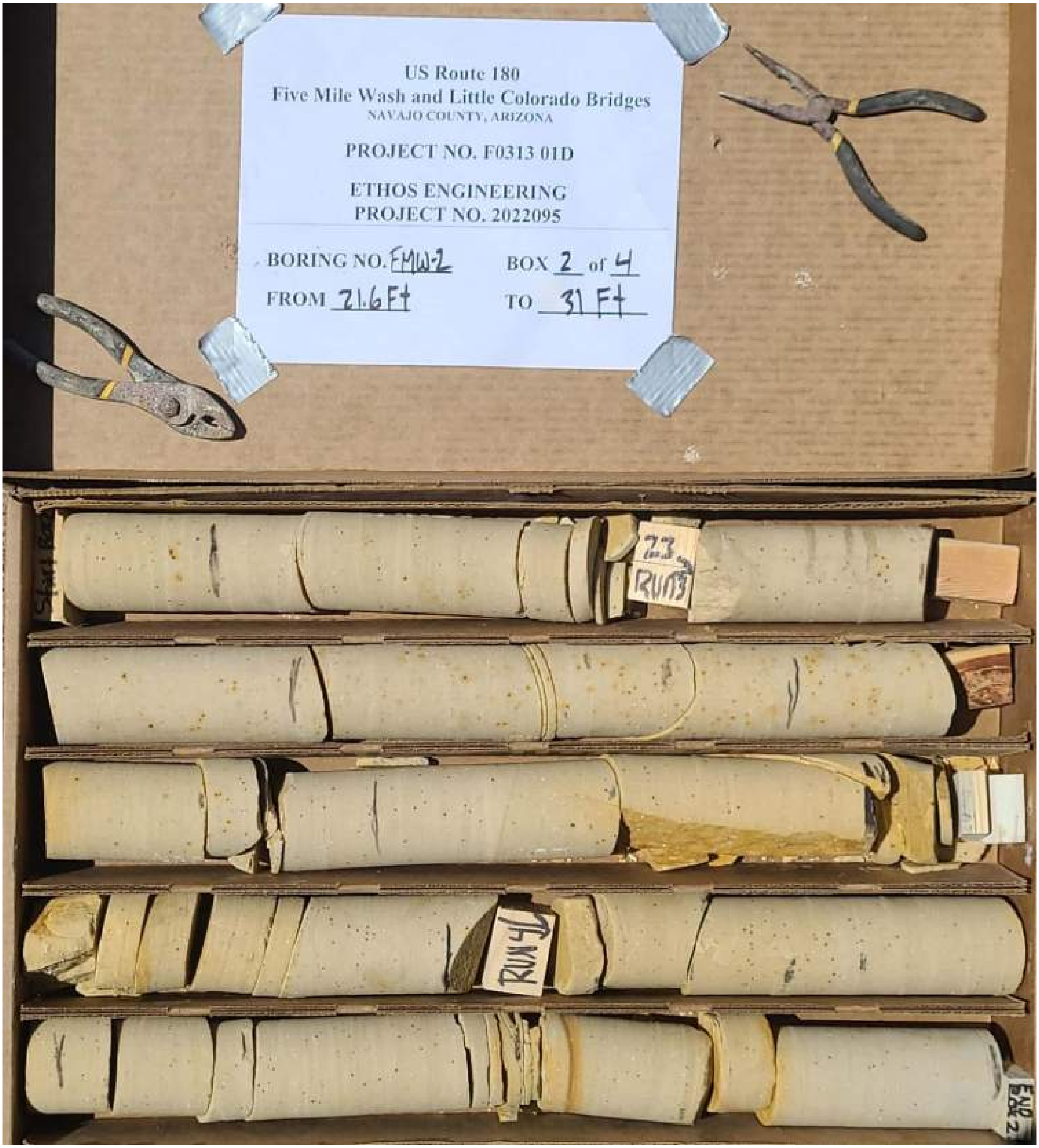


Boring FMW-2 Rock Core

Box 1 of 4

Boring FMW-2 Rock Core

Box 2 of 4



Boring FMW-2 Rock Core

Box 3 of 4

Boring FMW-2 Rock Core

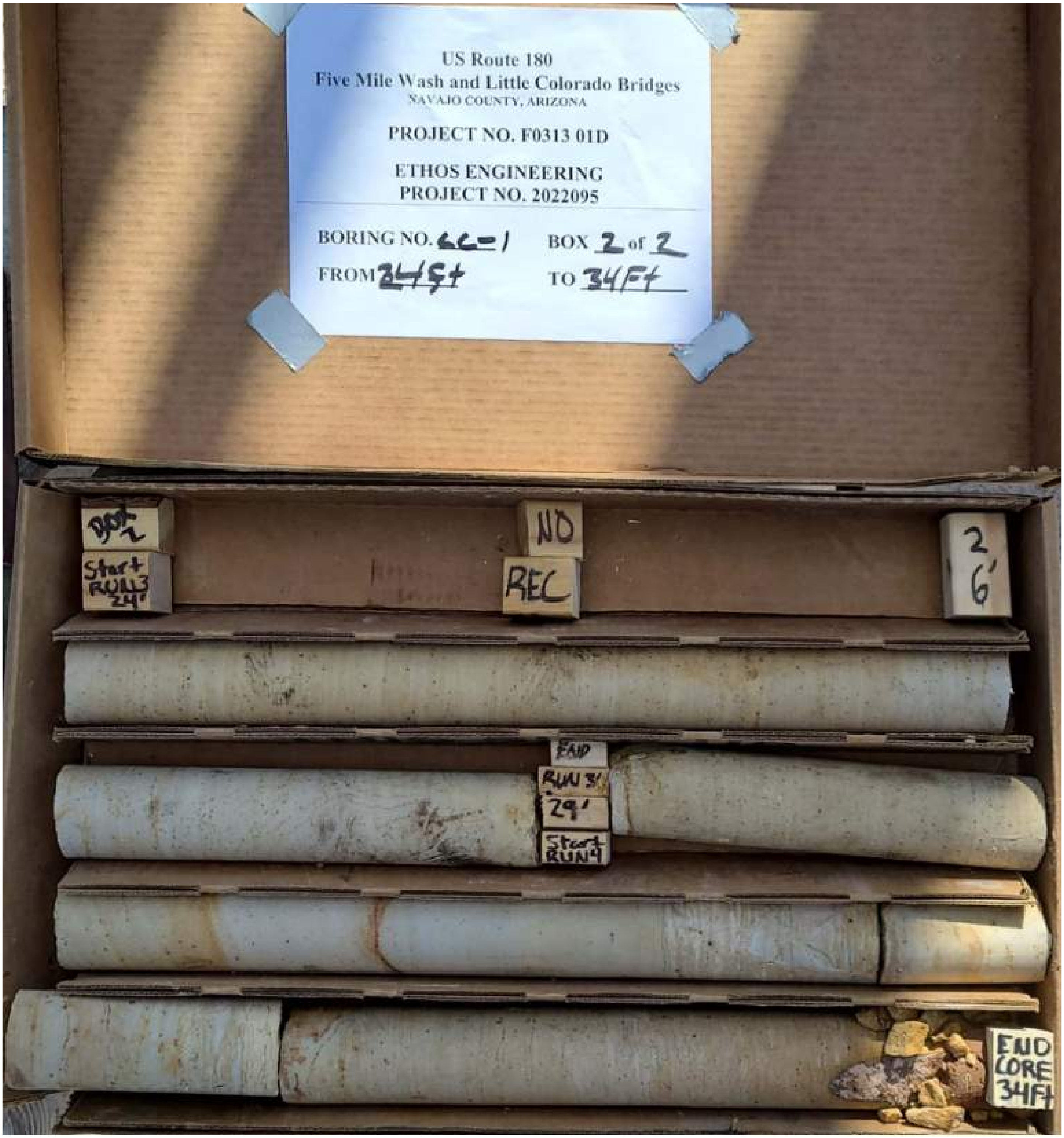
Box 4 of 4

Boring LC-1 Rock Core

Box 1 of 2

Boring LC-1 Rock Core

Box 2 of 2



APPENDIX D

BEARING RESISTANCE CHARTS

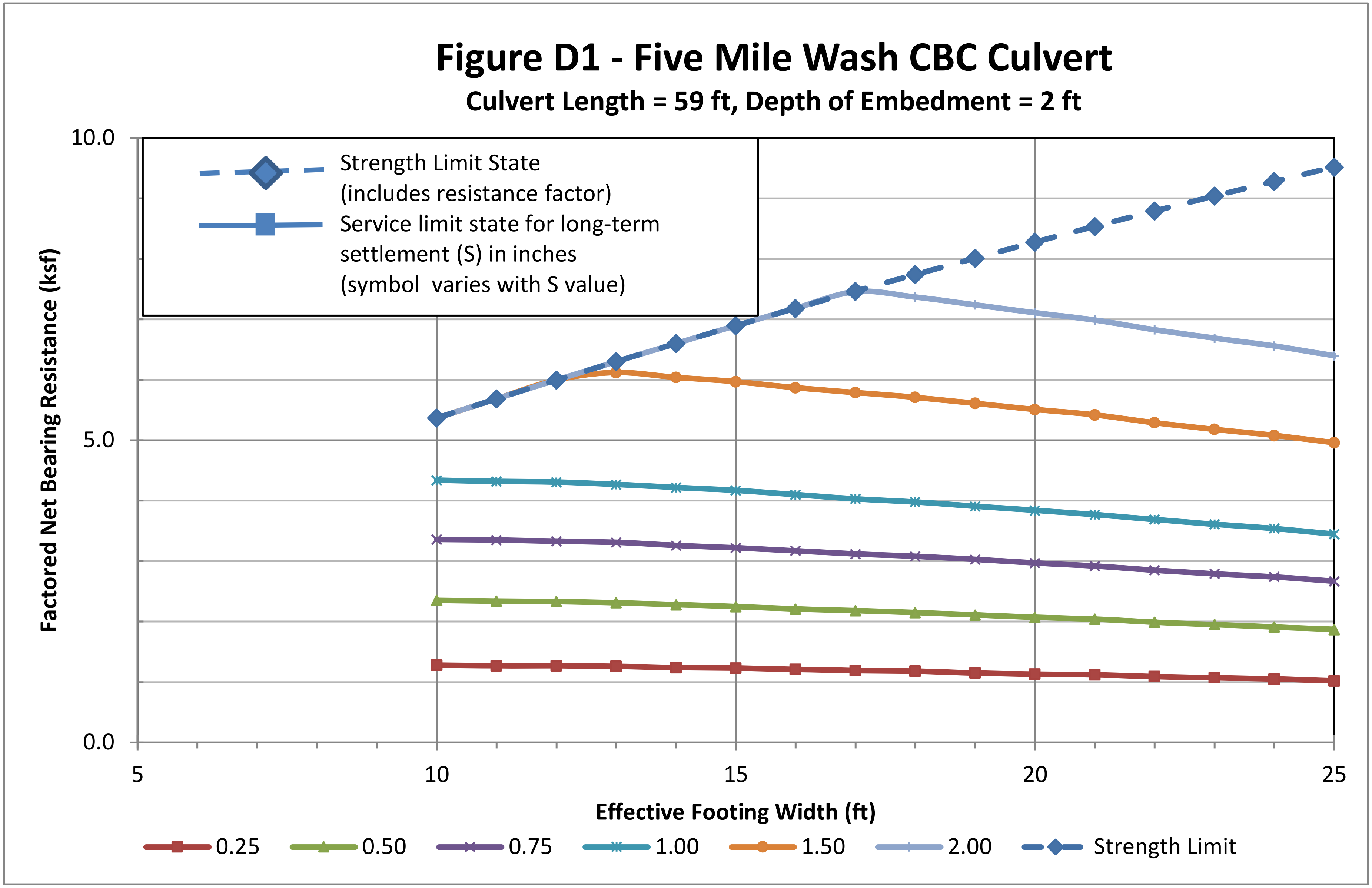


Figure D1 - Five Mile Wash CBC Culvert
Culvert Length = 59 ft, Depth of Embedment = 2 ft
Strength Limit State
(includes resistance factor)
Service limit state for long-term
settlement (S) in inches
(symbol varies with S value)
Factored Net Bearing Resistance (ksf)
10.0
5.0
0.0
5
10
15
20
25
Effective Footing Width (ft)
0.25
0.50
0.75
1.00
1.50
2.00
Strength Limit

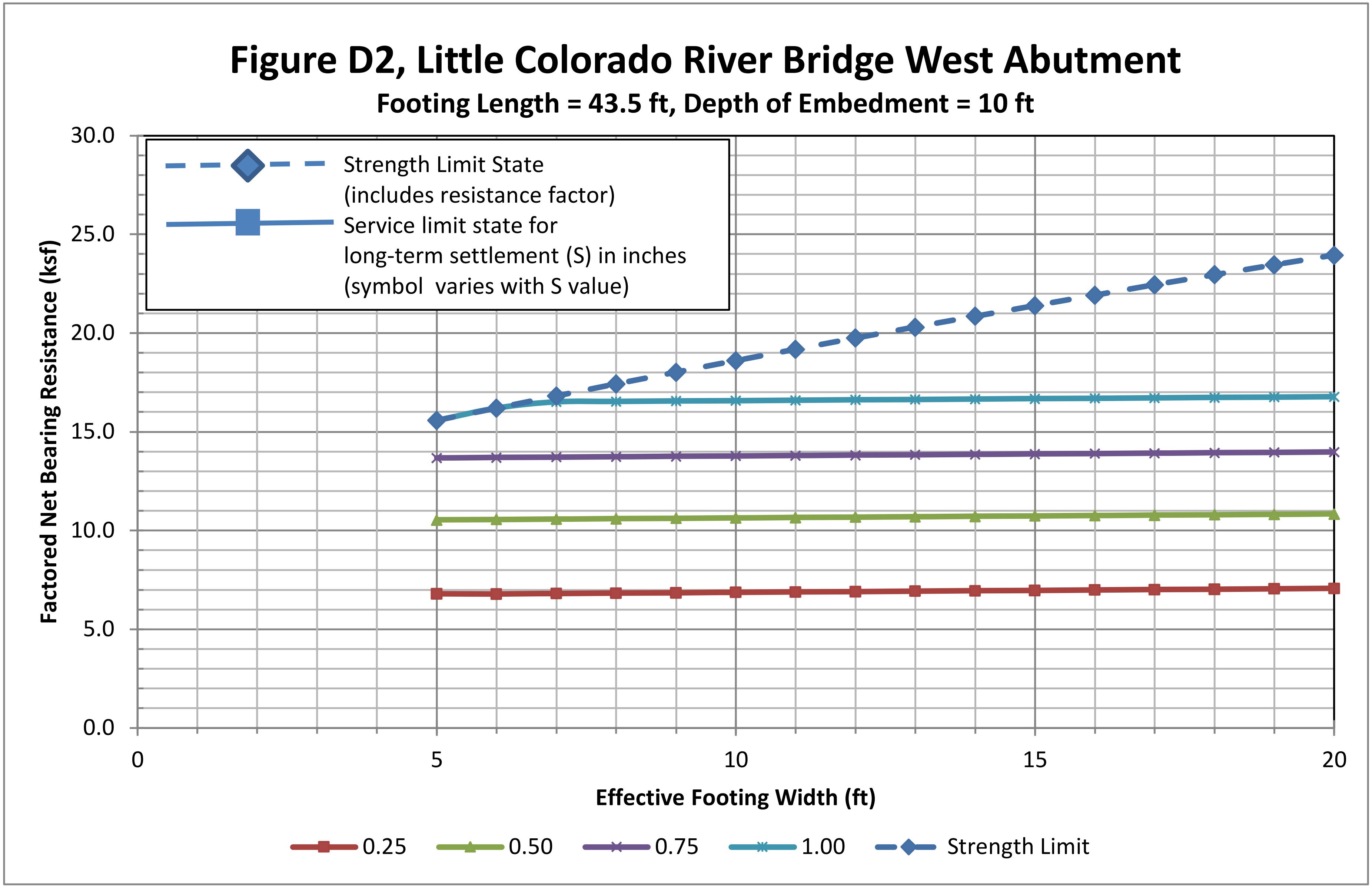
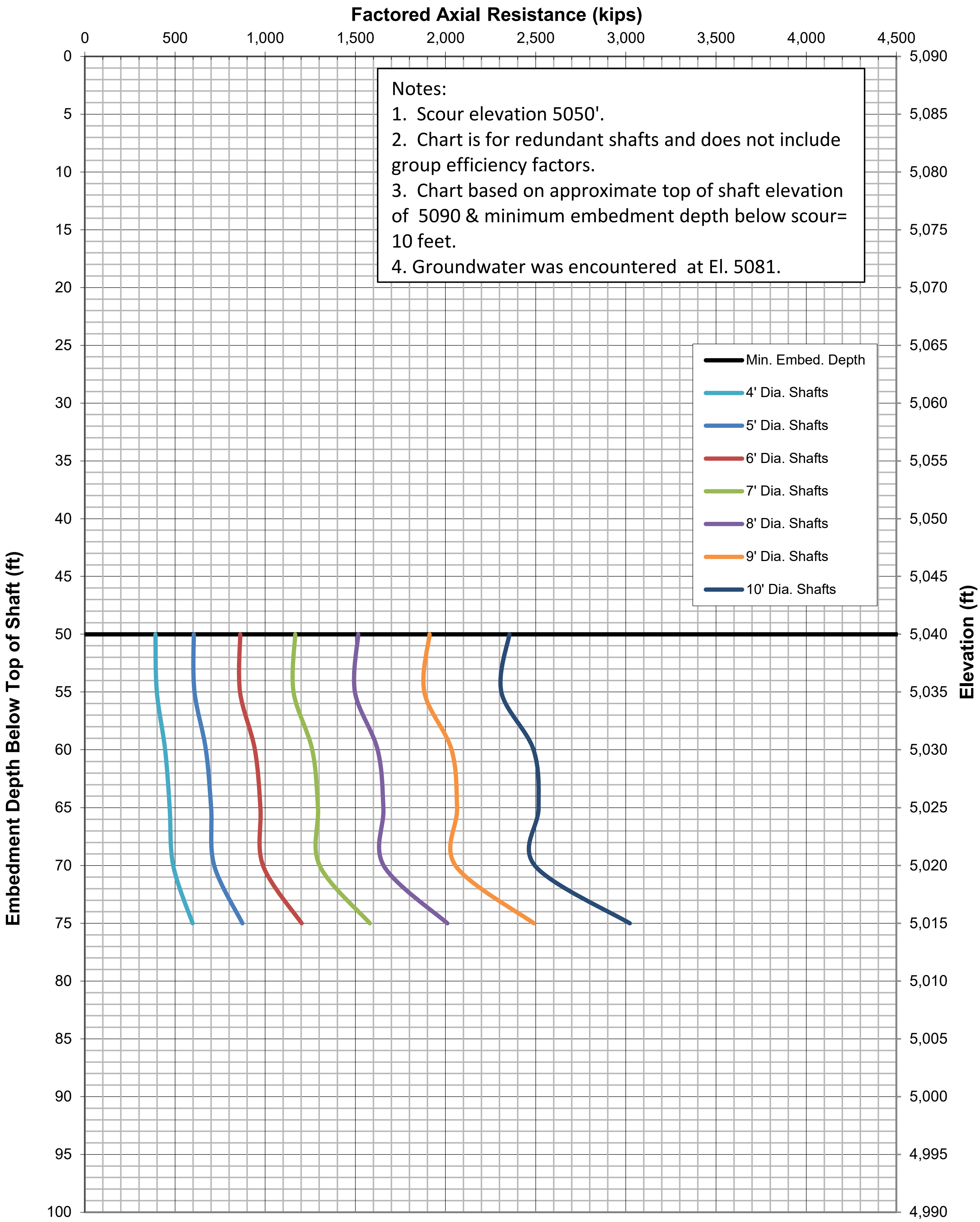


Figure D2, Little Colorado River Bridge West Abutment
Footing Length = 43.5 ft, Depth of Embedment = 10 ft
Strength Limit State
(includes resistance factor)
Service limit state for
long-term settlement (S) in inches
(symbol varies with S value)
Factored Net Bearing Resistance (ksf)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0
5
10
15
20
Effective Footing Width (ft)
0.25
0.50
0.75
1.00
Strength Limit

APPENDIX E

DRILLED SHAFT AXIAL RESISTANCE CHARTS



ethos ENGINEERING, LLC.

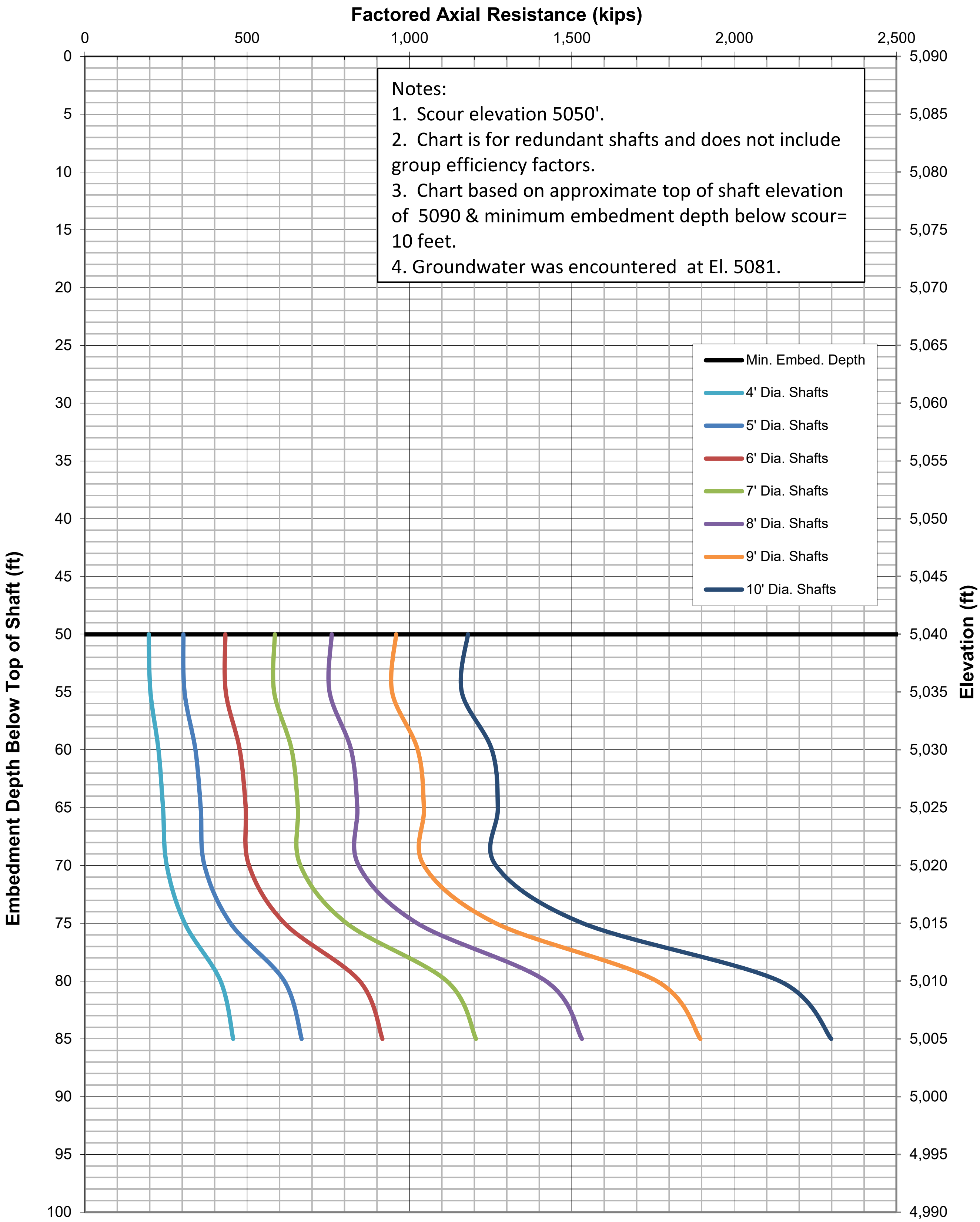
Designer:	Date:
K Mackay	8/2/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Extreme Limit Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge Pier
Boring LCR-3

Figure

E1



ethos ENGINEERING, LLC.

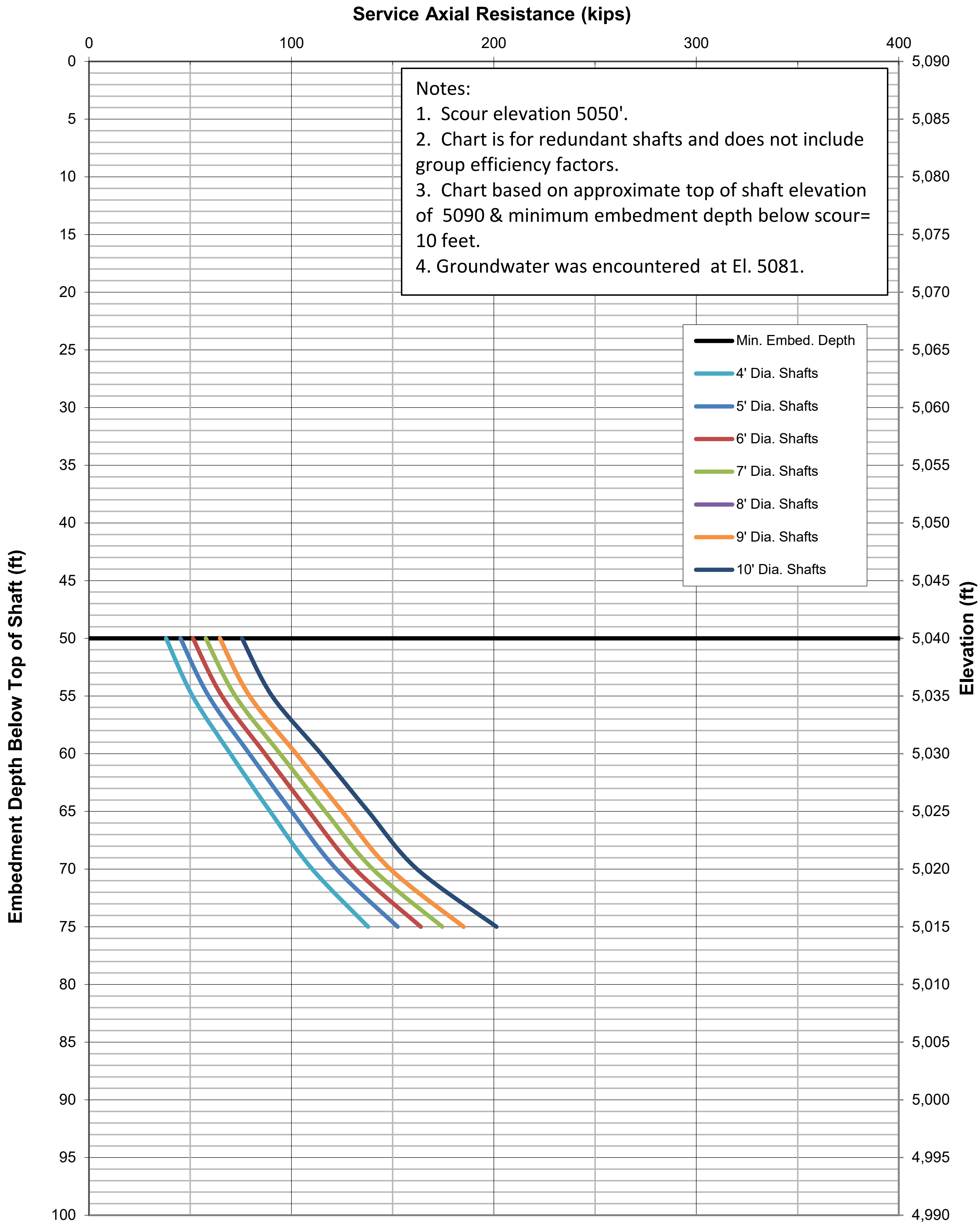
Designer:	Date:
K Mackay	8/2/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Strength Limit Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge Pier
Boring LCR-3

Figure

E2



ethos ENGINEERING, LLC.

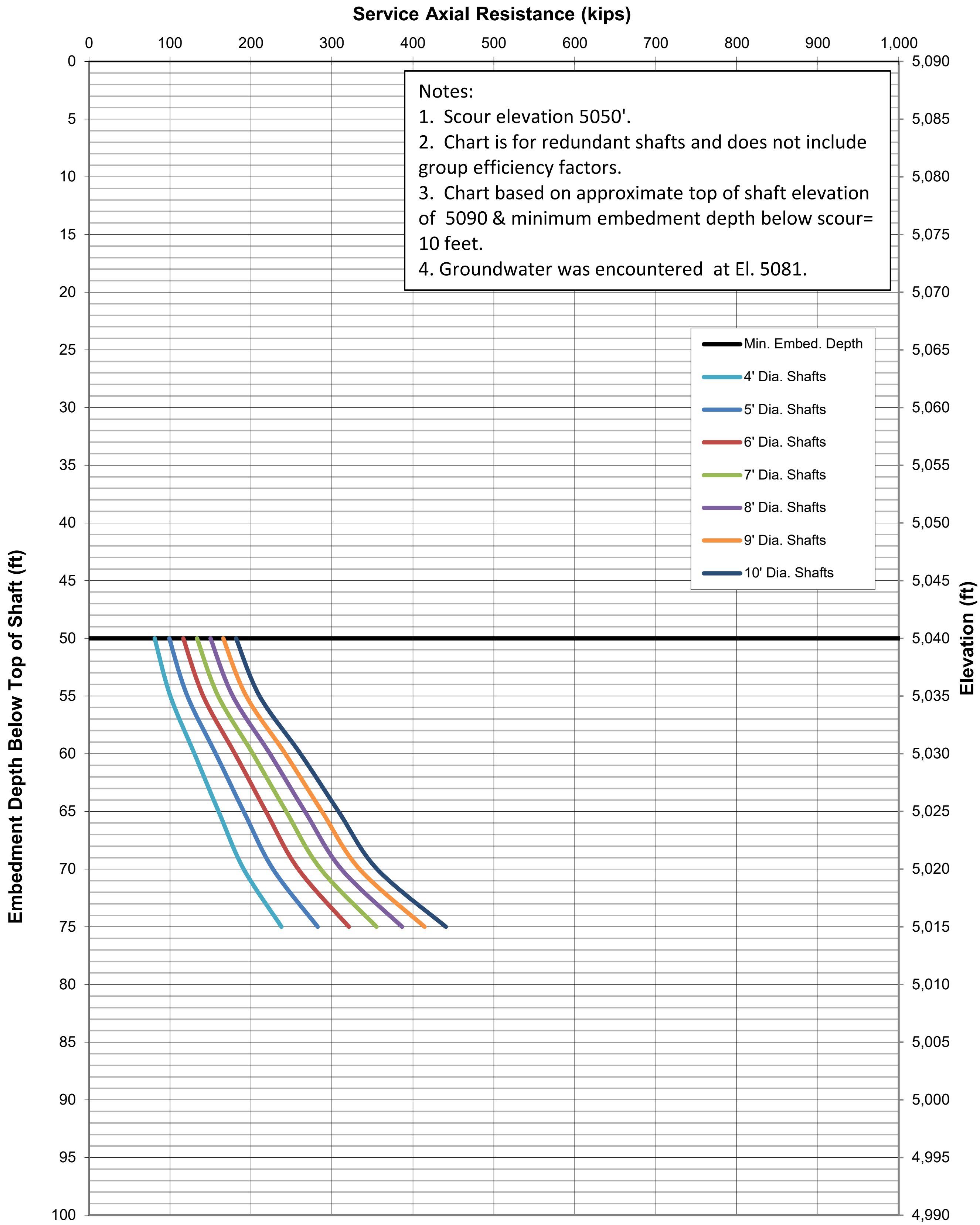
Designer:	Date:
K Mackay	8/2/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Service Limit (0.10 Inch Settlement) - Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge Pier
Boring LCR-3

Figure

E3



ethos ENGINEERING, LLC.

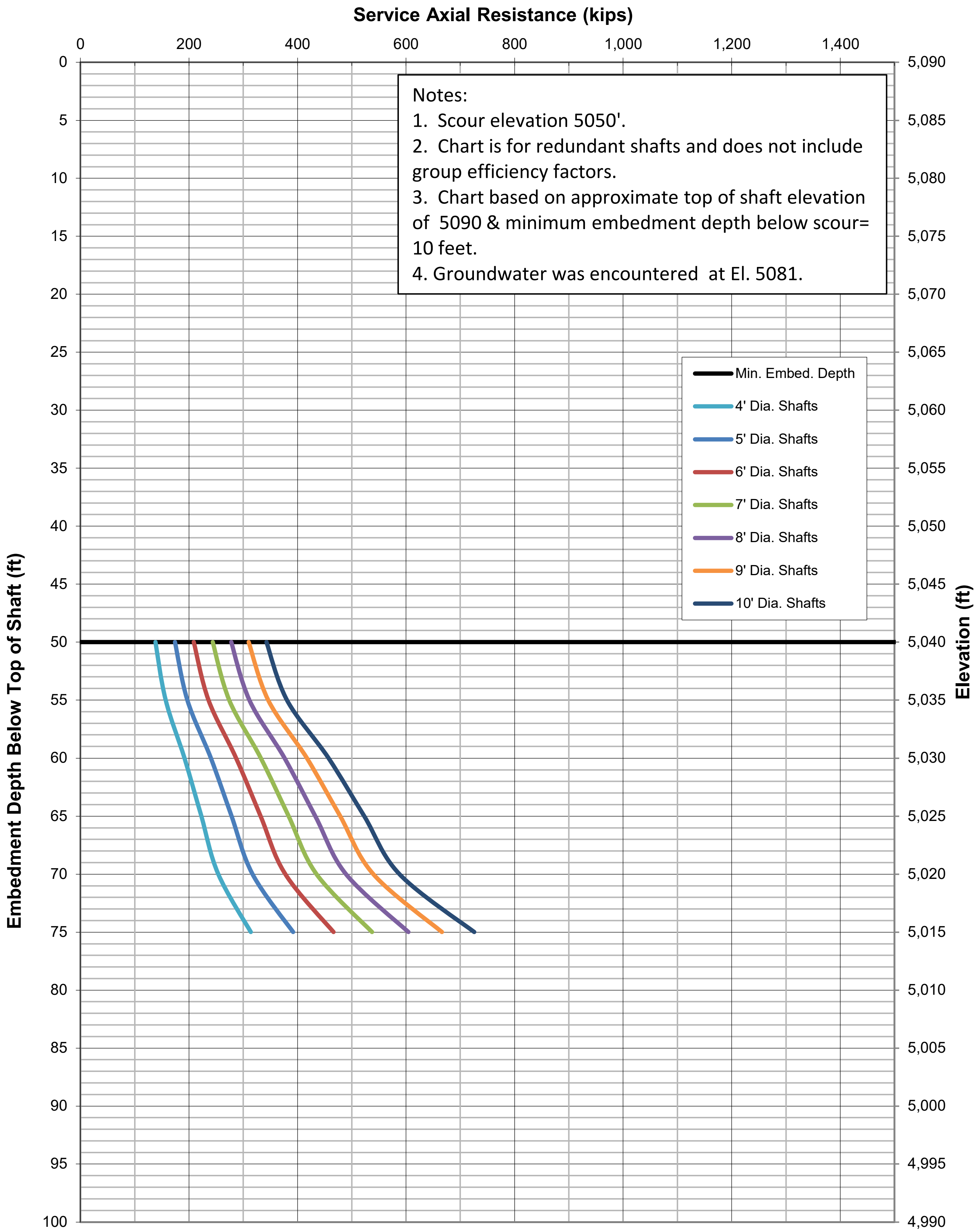
DRILLED SHAFT FOUNDATION DESIGN CHART
Service Limit (0.25 Inch Settlement) - Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge Pier
Boring LCR-3

Figure

E4

Designer:	Date:
K Mackay	8/2/2023



ethos ENGINEERING, LLC.

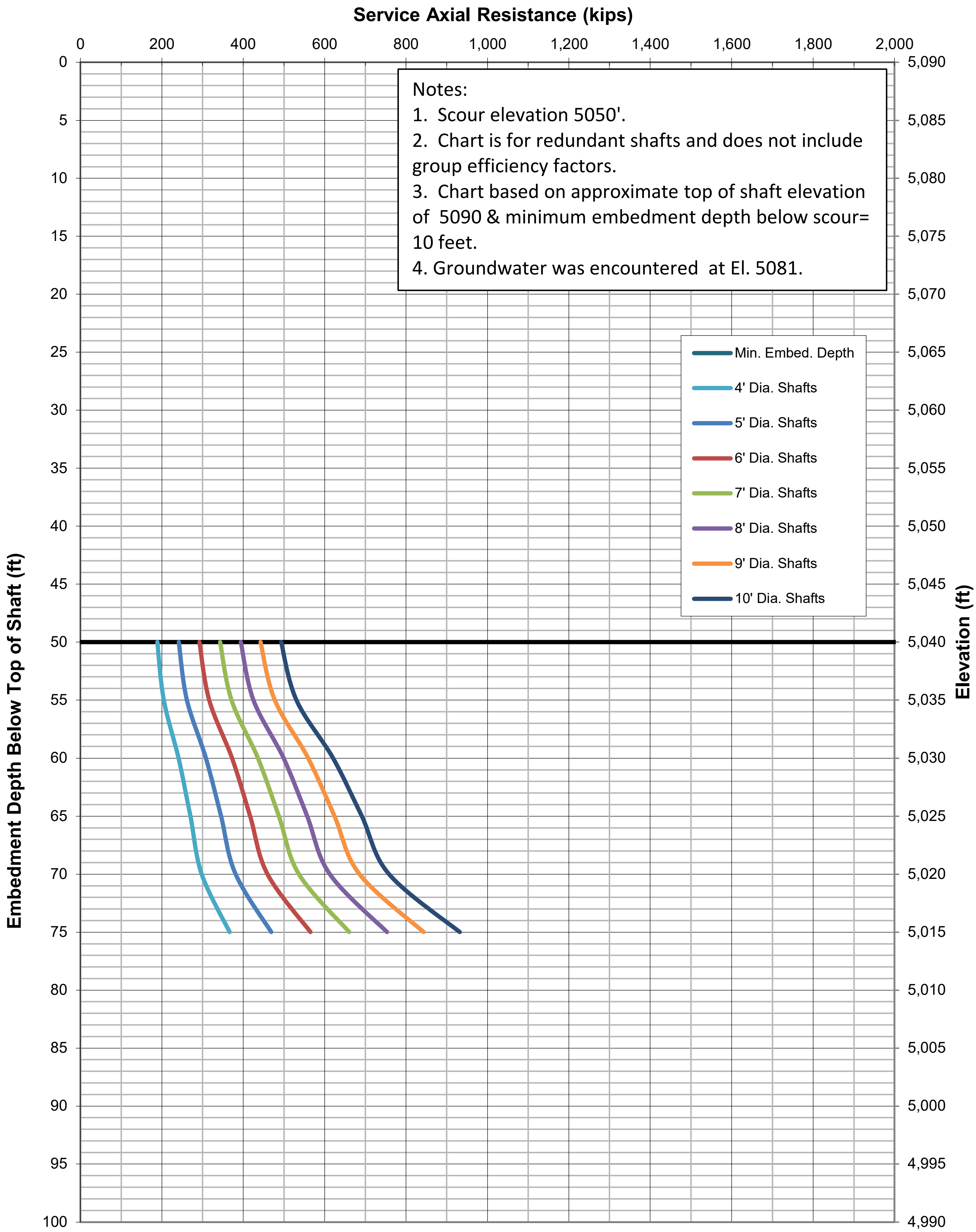
Designer:	Date:
K Mackay	8/2/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Service Limit (0.5 Inch Settlement) - Axial Resistance in Kips

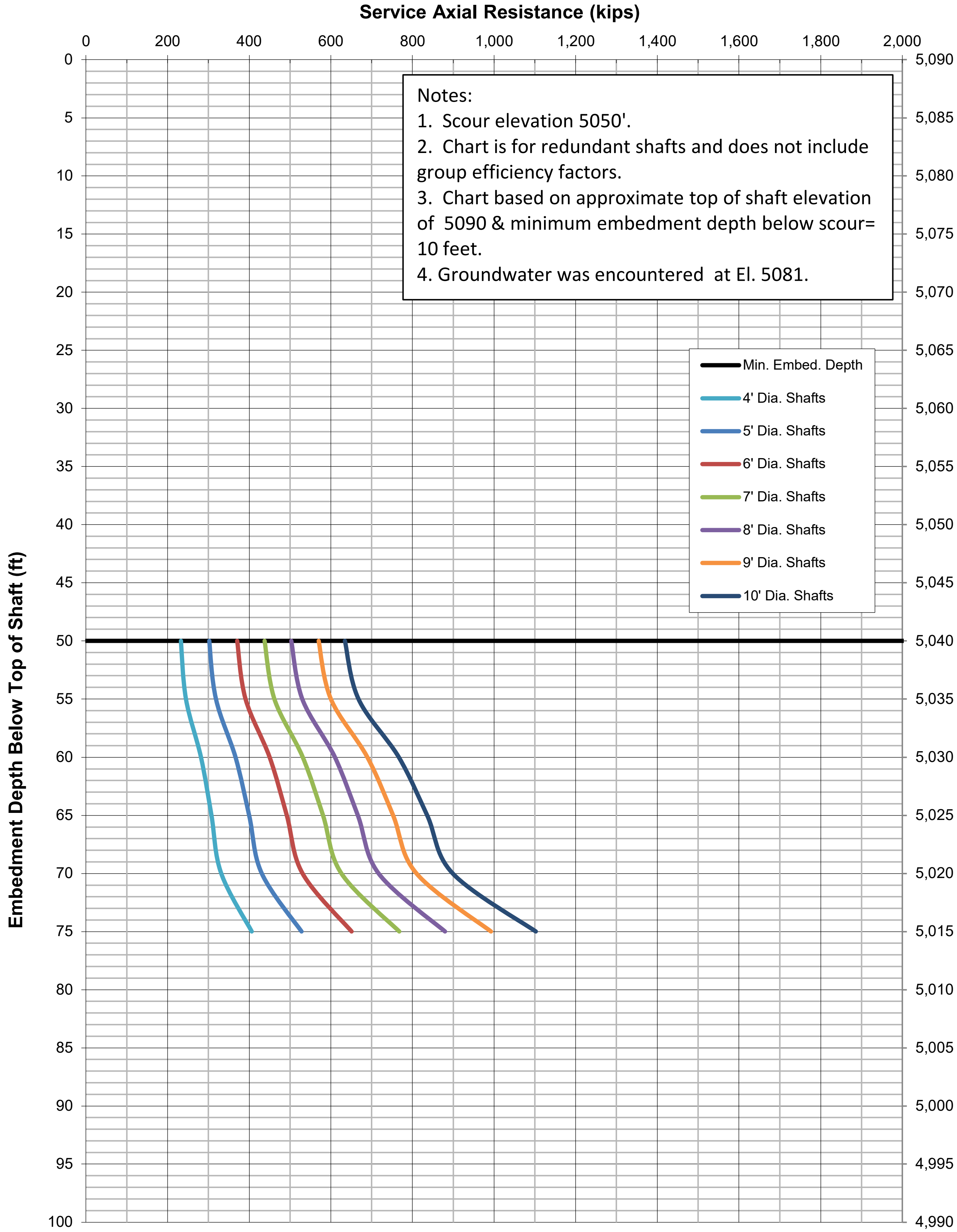
Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge Pier
Boring LCR-3

Figure

E5



ethos ENGINEERING, LLC.		DRILLED SHAFT FOUNDATION DESIGN CHART Service Limit (0.75 Inch Settlement) - Axial Resistance in Kips Replacement of Five Mile Wash & Little Colorado River Bridges Little Colorado River Bridge Pier Boring LCR-3	Figure E6
Designer:	Date:		
K Mackay	8/2/2023		



ethos ENGINEERING, LLC.

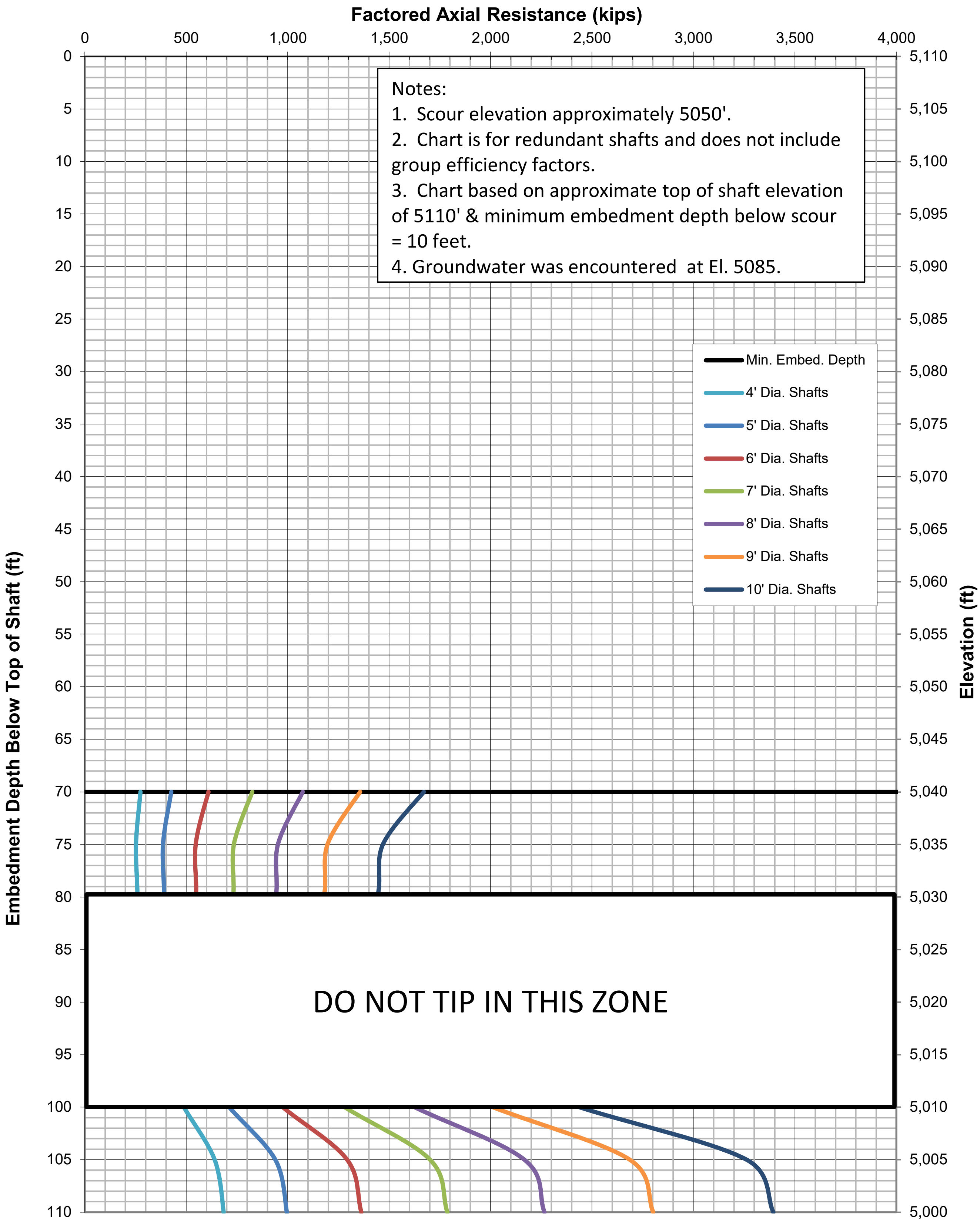
Designer:	Date:
K Mackay	8/2/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Service Limit (1 Inch Settlement) - Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge Pier
Boring LCR-3

Figure

E7



ethos ENGINEERING, LLC.

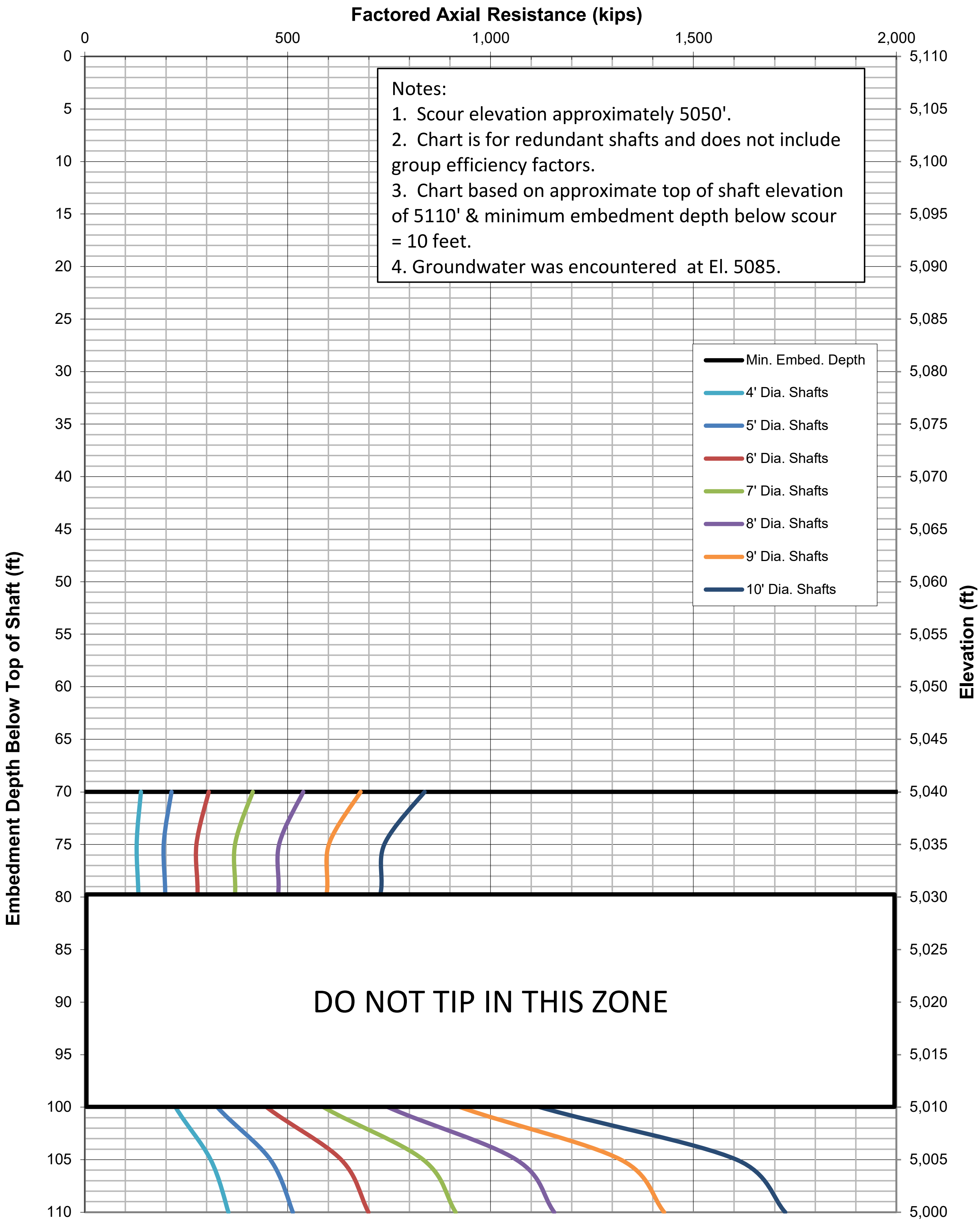
Designer:	Date:
K Mackay	9/21/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Extreme Limit Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge East Abutment
Boring LCR-4

Figure

E8



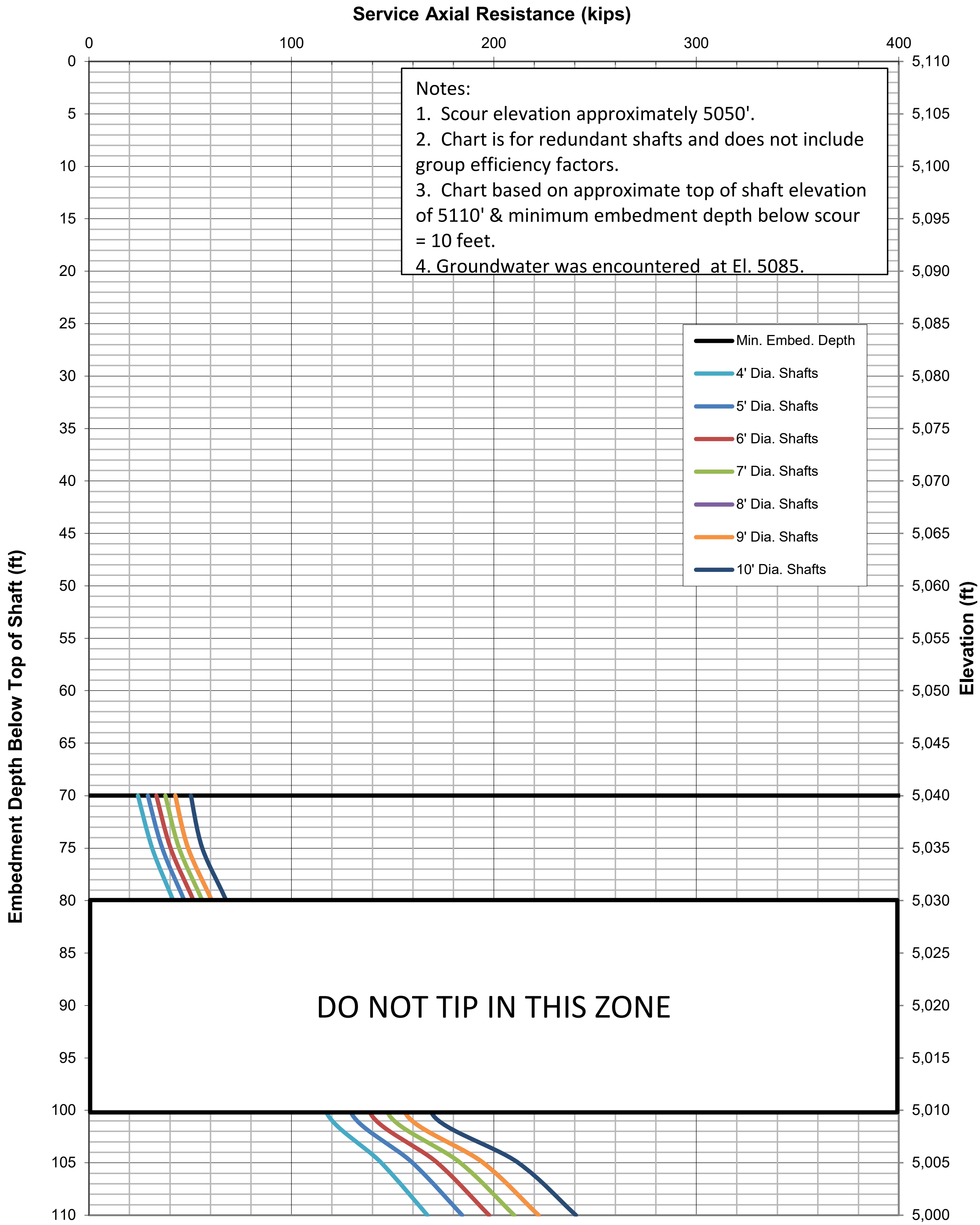
ethos ENGINEERING, LLC.

Designer:	Date:
K Mackay	9/21/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Strength Limit Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge East Abutment
Boring LCR-4

Figure
E9



ethos ENGINEERING, LLC.

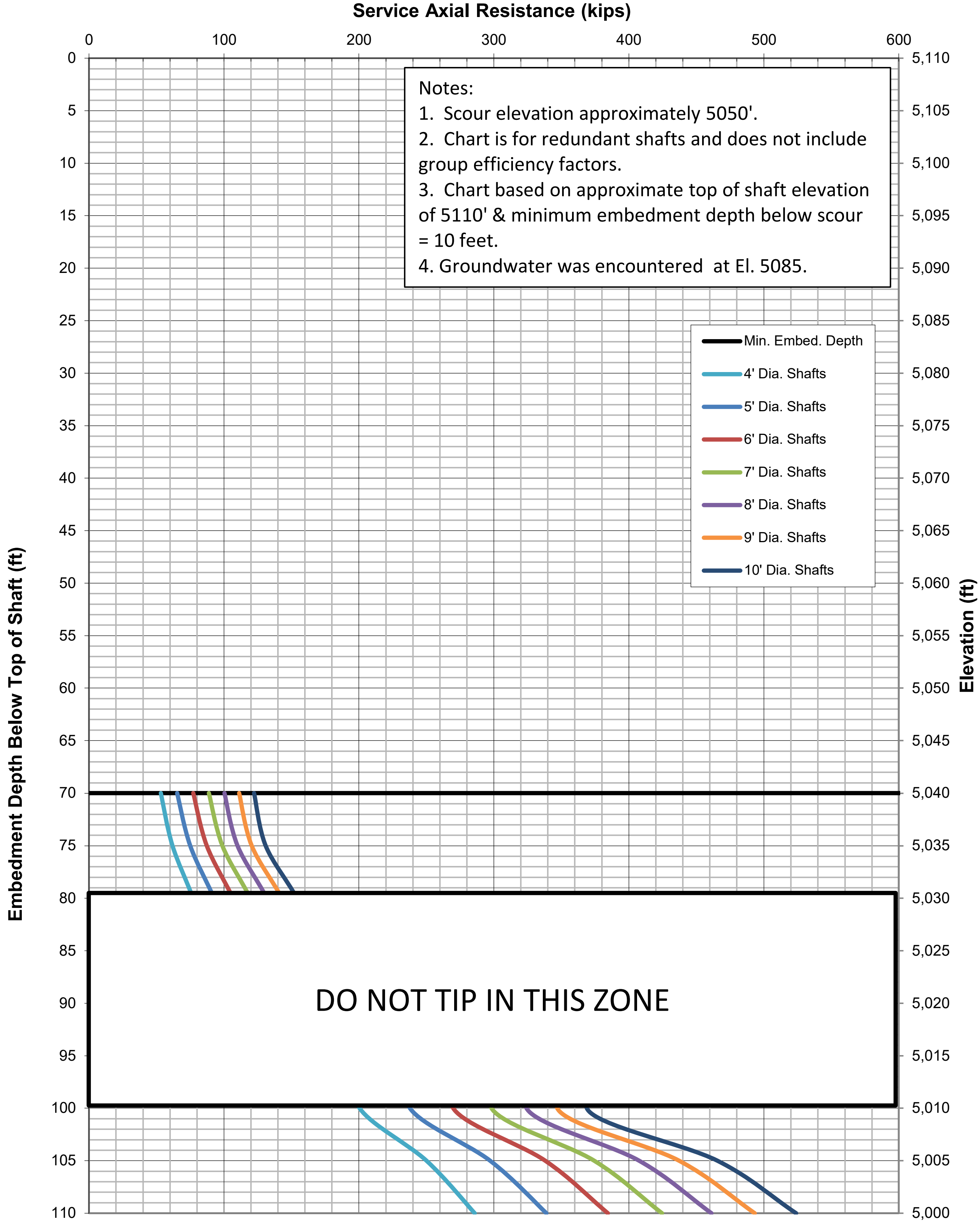
Designer:	Date:
K Mackay	9/21/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Service Limit (0.10 Inch Settlement) - Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge East Abutment
Boring LCR-4

Figure

E10



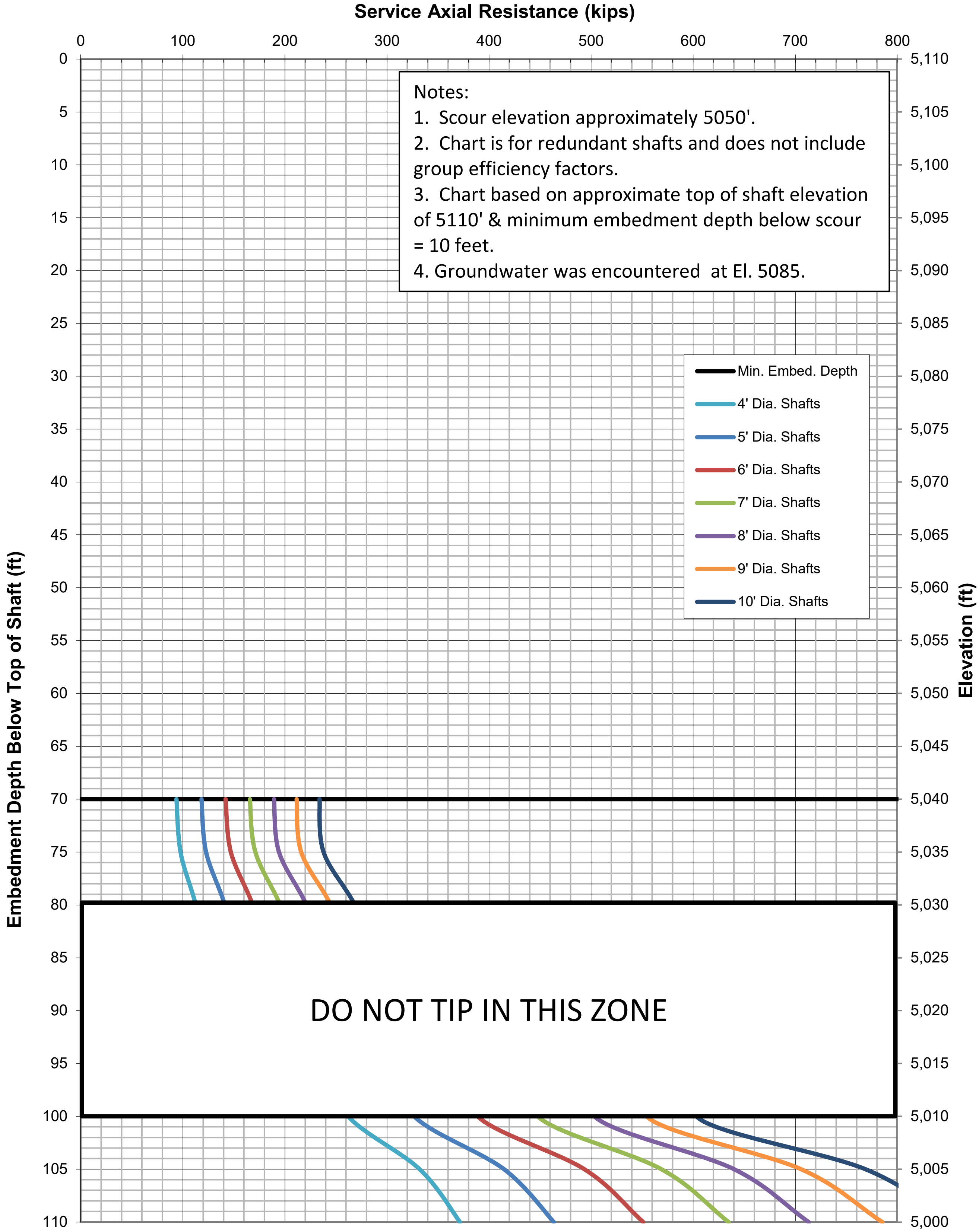
ethos ENGINEERING, LLC.

Designer:	Date:
K Mackay	9/21/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Service Limit (0.25 Inch Settlement) - Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge East Abutment
Boring LCR-4

Figure
E11



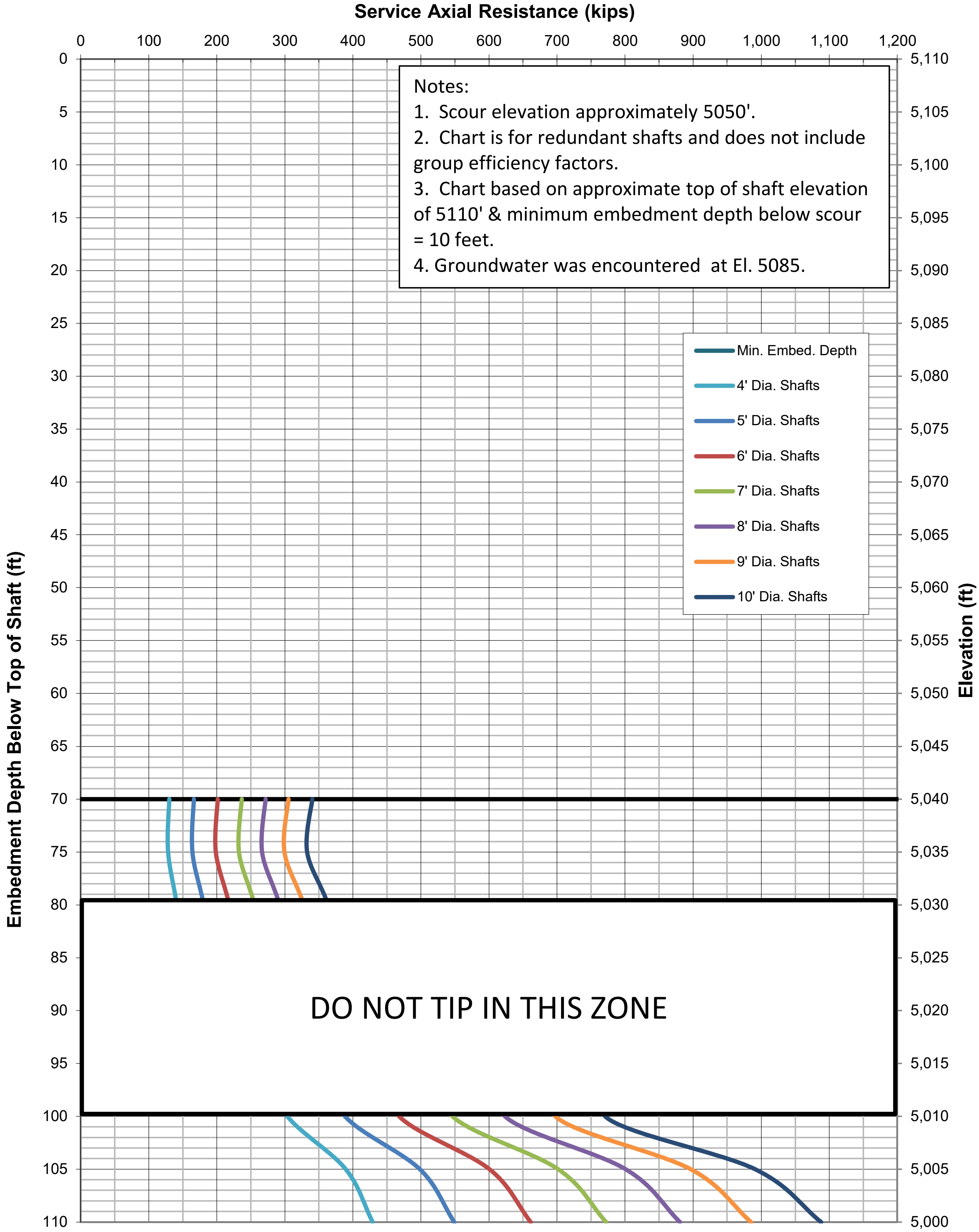
ethos ENGINEERING, LLC.

Designer:	Date:
K Mackay	9/21/2023

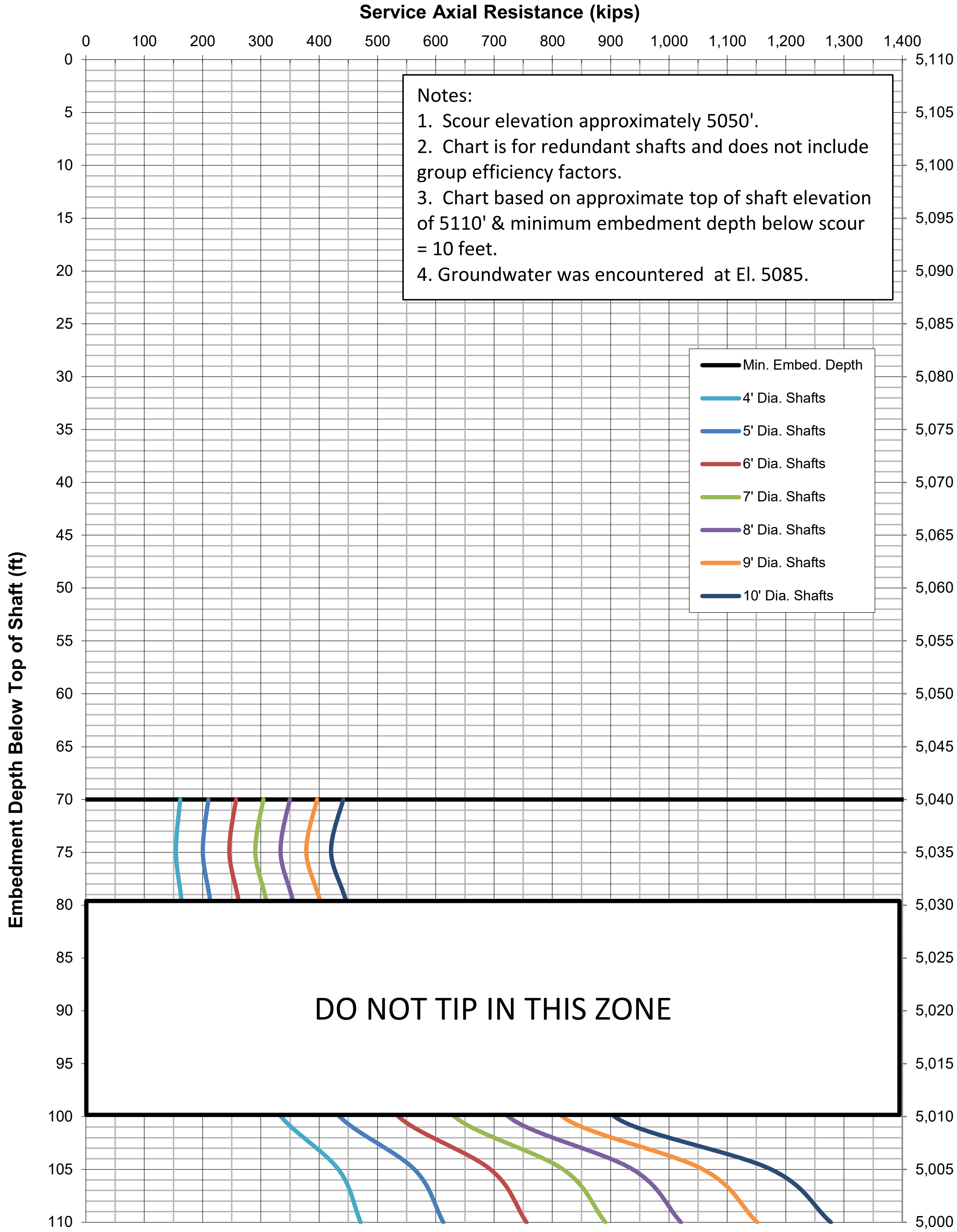
DRILLED SHAFT FOUNDATION DESIGN CHART
Service Limit (0.5 Inch Settlement) - Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge East Abutment
Boring LCR-4

Figure
E12



ethos ENGINEERING, LLC.		**DRILLED SHAFT FOUNDATION DESIGN CHART** **Service Limit (0.75 Inch Settlement) - Axial Resistance in Kips** **Replacement of Five Mile Wash & Little Colorado River Bridges** **Little Colorado River Bridge East Abutment** **Boring LCR-4**	Figure E13
Designer:	Date:		
K Mackay	9/21/2023		



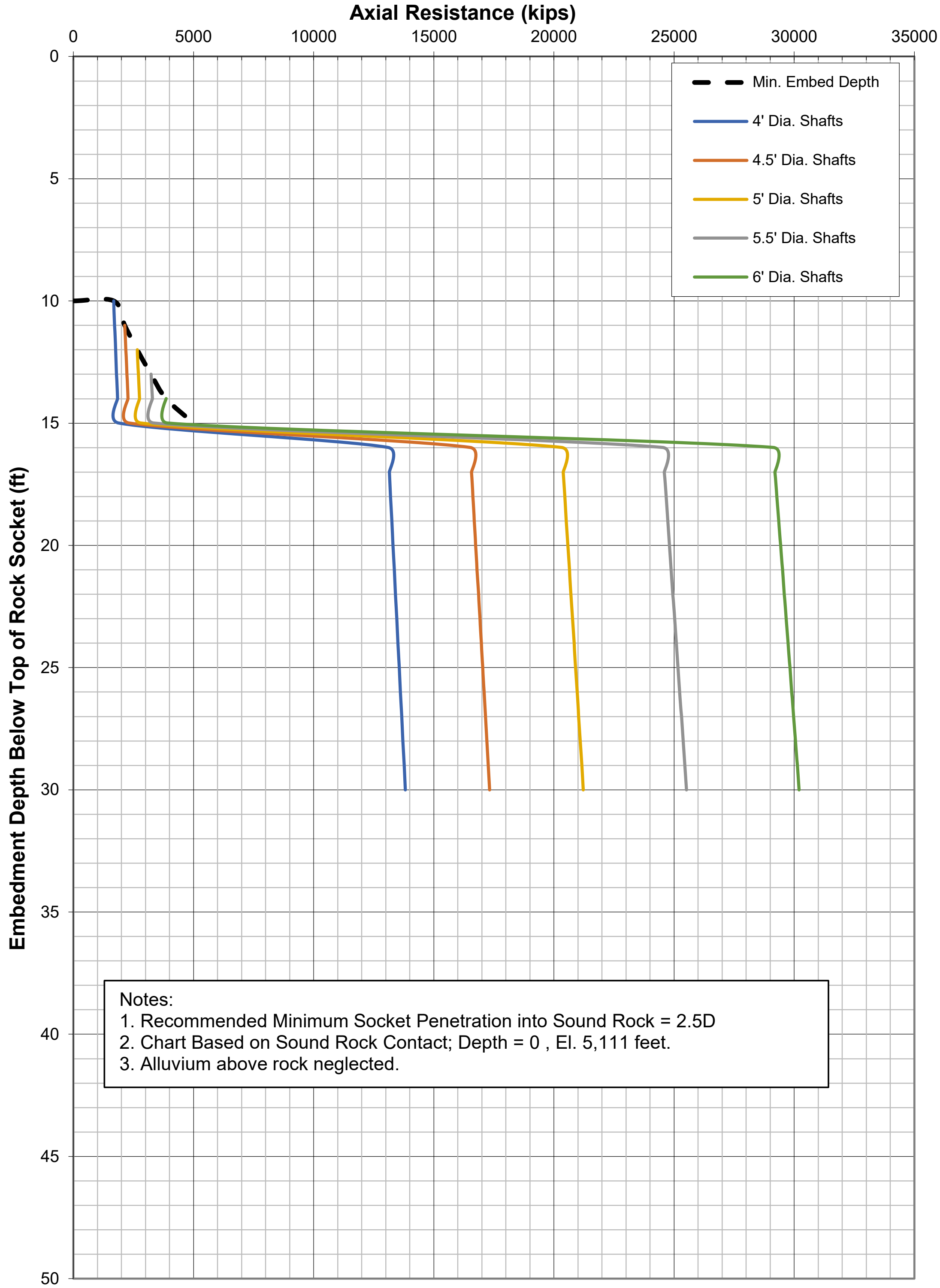
ethos ENGINEERING, LLC.

Designer:	Date:
K Mackay	9/21/2023

DRILLED SHAFT FOUNDATION DESIGN CHART
Service Limit (1 Inch Settlement) - Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge East Abutment
Boring LCR-4

Figure
E14



Notes:
1. Recommended Minimum Socket Penetration into Sound Rock = 2.5D
2. Chart Based on Sound Rock Contact; Depth = 0 , El. 5,111 feet.
3. Alluvium above rock neglected.

ethos ENGINEERING, LLC.

Designer:	Date:
K. Mackay	9/15/2023

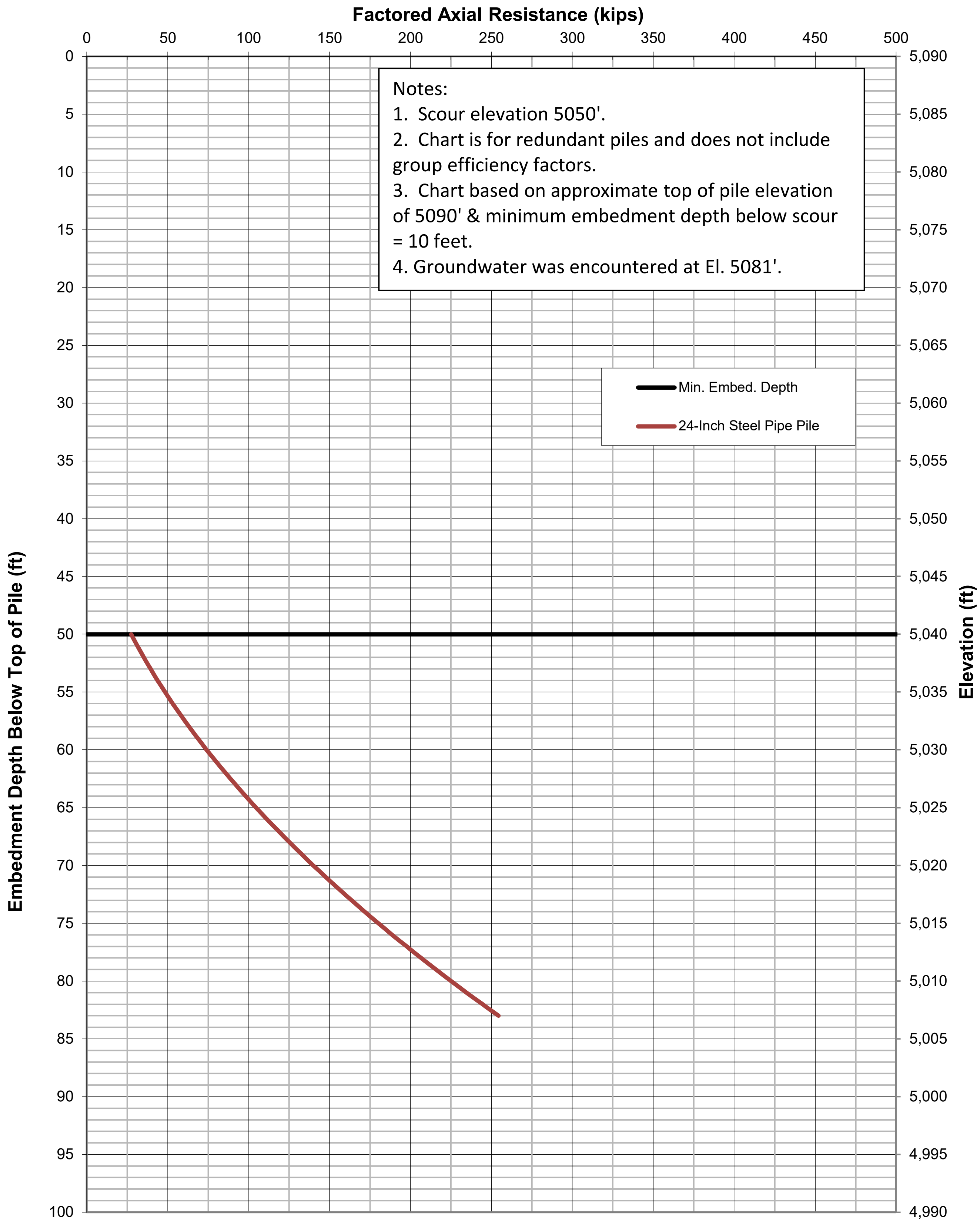
DRILLED SHAFT FOUNDATION DESIGN CHART
Strength Limit Axial Resistance

Replacement of Five Mile Wash & Little Colorado River Bridges
Project Number 2022095

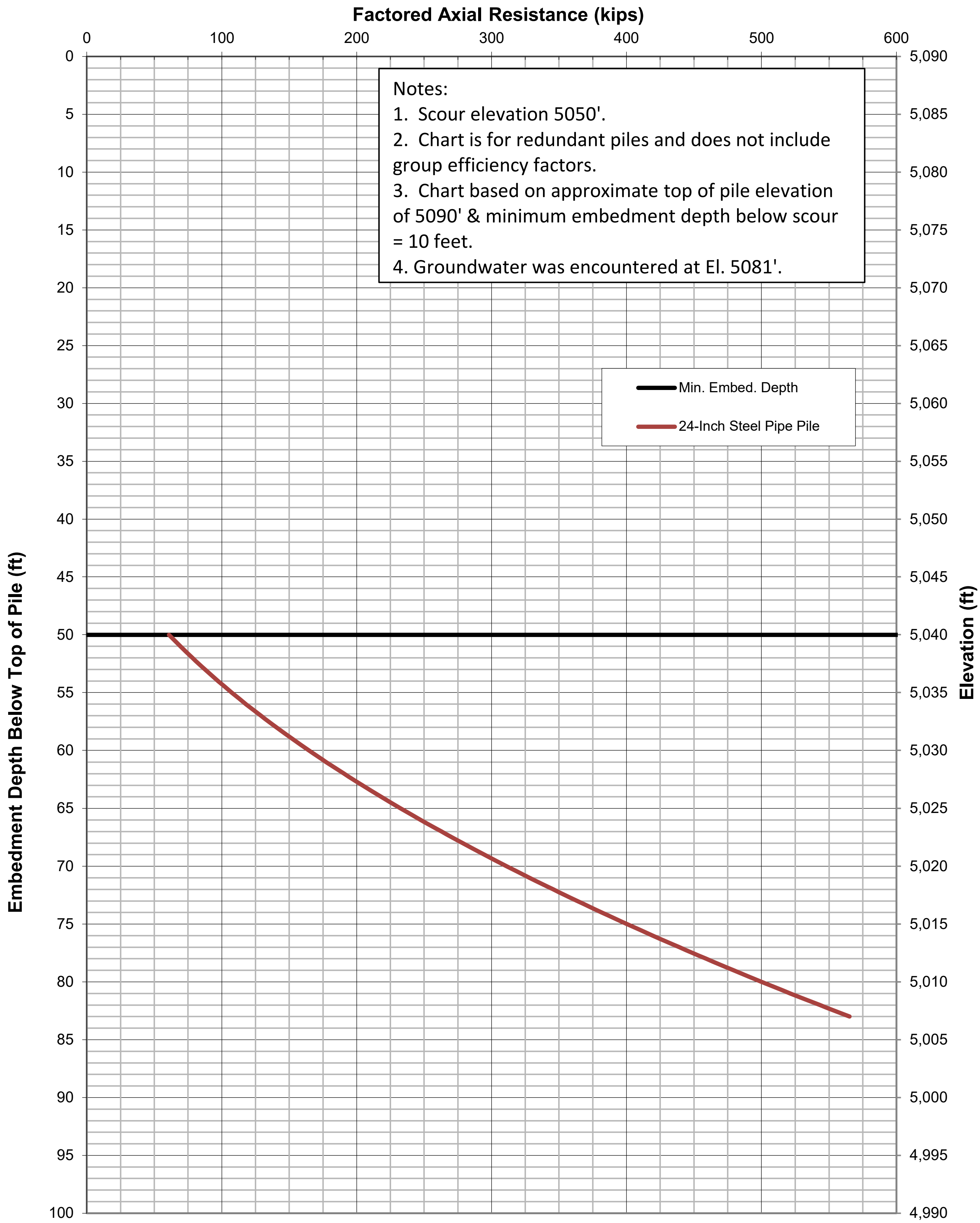
Figure
E15

APPENDIX F

DRIVEN STEEL PILE AXIAL RESISTANCE CHARTS



ethos ENGINEERING, LLC.	**STEEL PILE FOUNDATION DESIGN CHART** **Strength Limit Axial Resistance in Kips** **Replacement of Five Mile Wash & Little Colorado River Bridges** **Little Colorado River Bridge Pier** **Boring LCR-3**		Figure F1
Designer:	Date:		
K Mackay	11/28/2023		



ethos ENGINEERING, LLC.

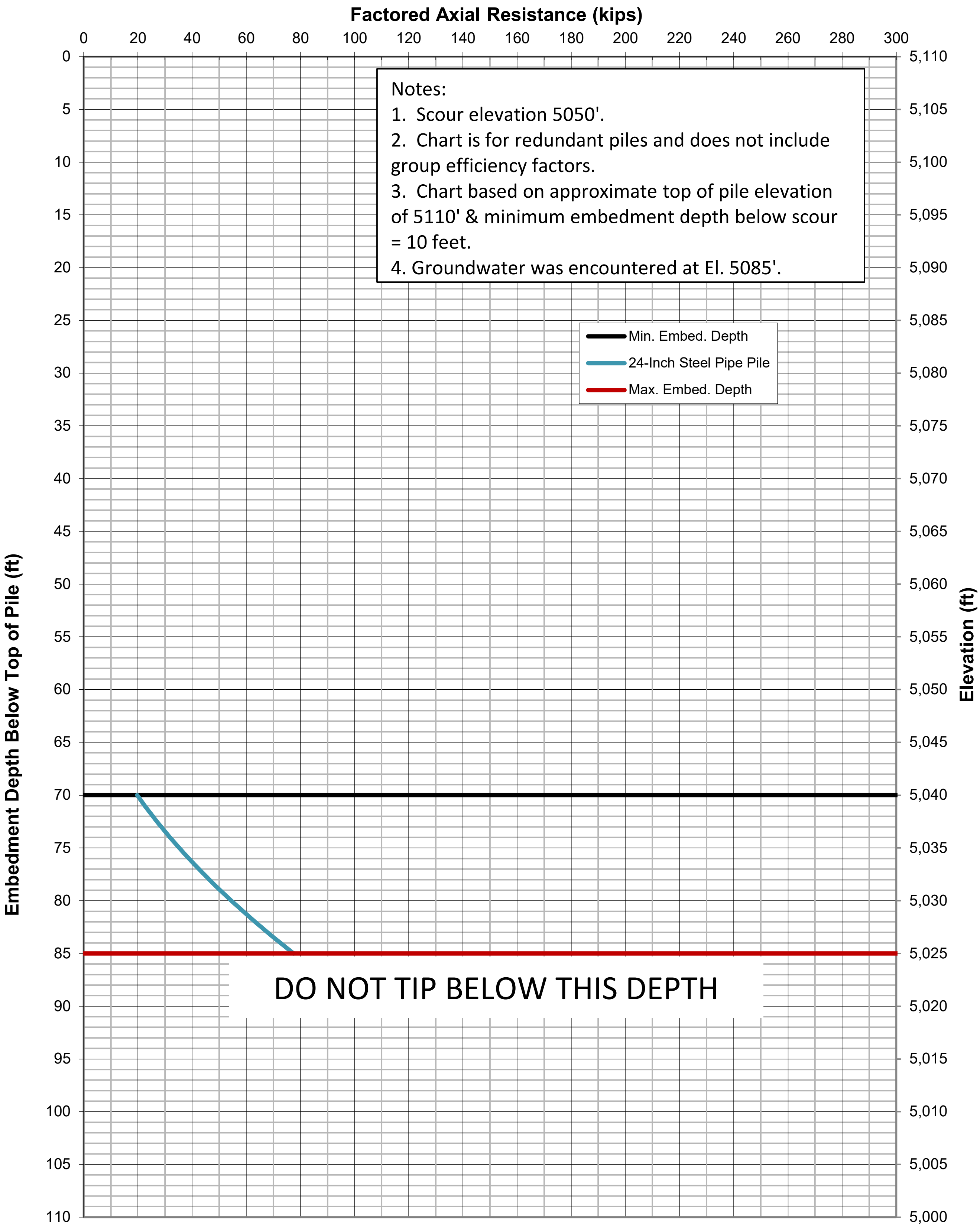
Designer:	Date:
K Mackay	11/28/2023

STEEL PILE FOUNDATION DESIGN CHART
Extreme Limit Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge Pier
Boring LCR-3

Figure

F2



ethos ENGINEERING, LLC.

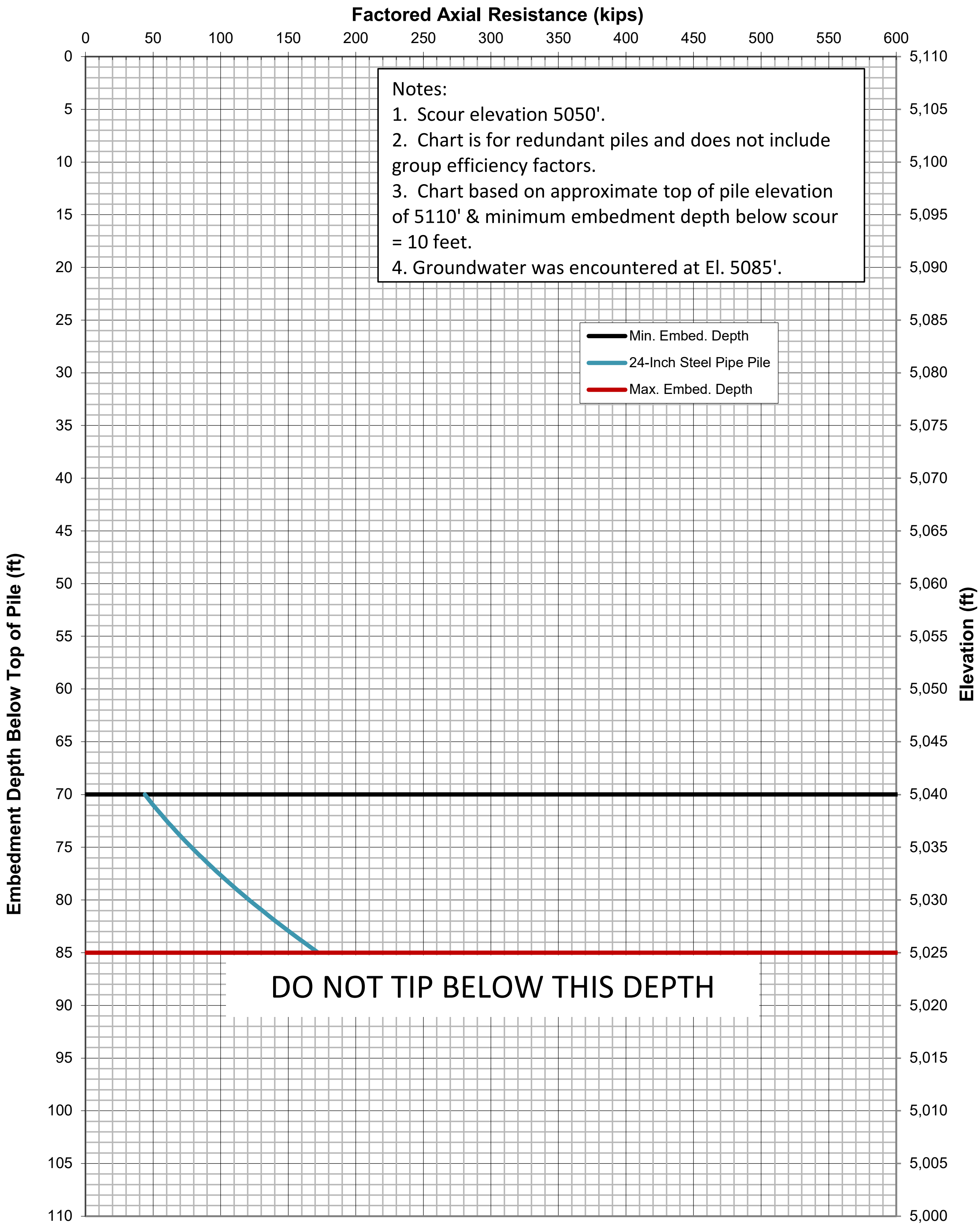
Designer:	Date:
K Mackay	11/30/2023

STEEL PILE FOUNDATION DESIGN CHART
Strength Limit Axial Resistance in Kips

Replacement of Five Mile Wash & Little Colorado River Bridges
Little Colorado River Bridge East Abutment
Boring LCR-4

Figure

F3



ethos ENGINEERING, LLC.		STEEL PILE FOUNDATION DESIGN CHART Extreme Limit Axial Resistance in Kips Replacement of Five Mile Wash & Little Colorado River Bridges Little Colorado River Bridge East Abutment Boring LCR-4	Figure F4
Designer:	Date:		
K Mackay	11/30/2023		

APPENDIX G

LIQUEFACTION ANALYSIS

FIGURE G1
Liquefaction Analysis Results - Little Colorado River Bridge Pier

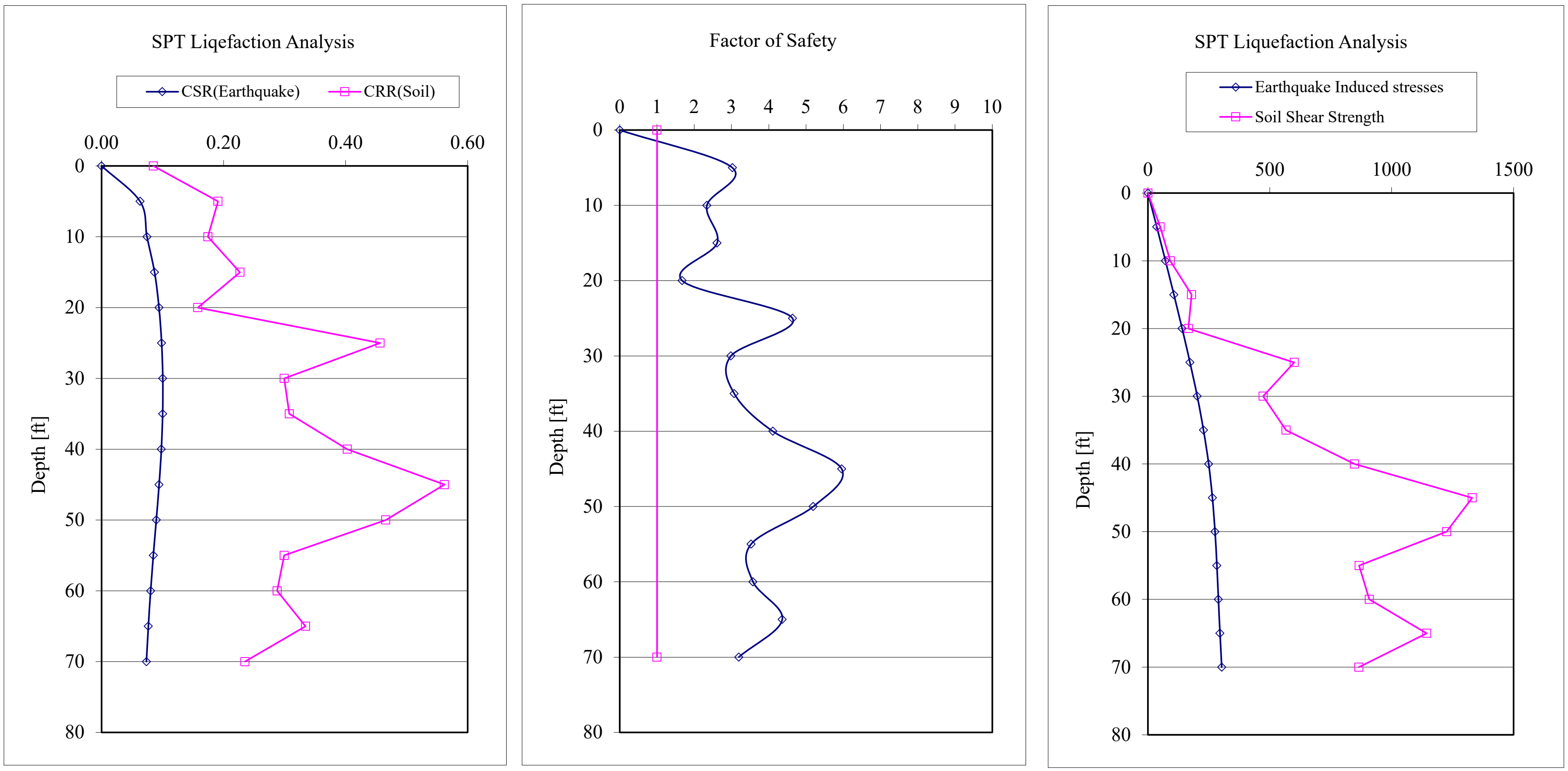
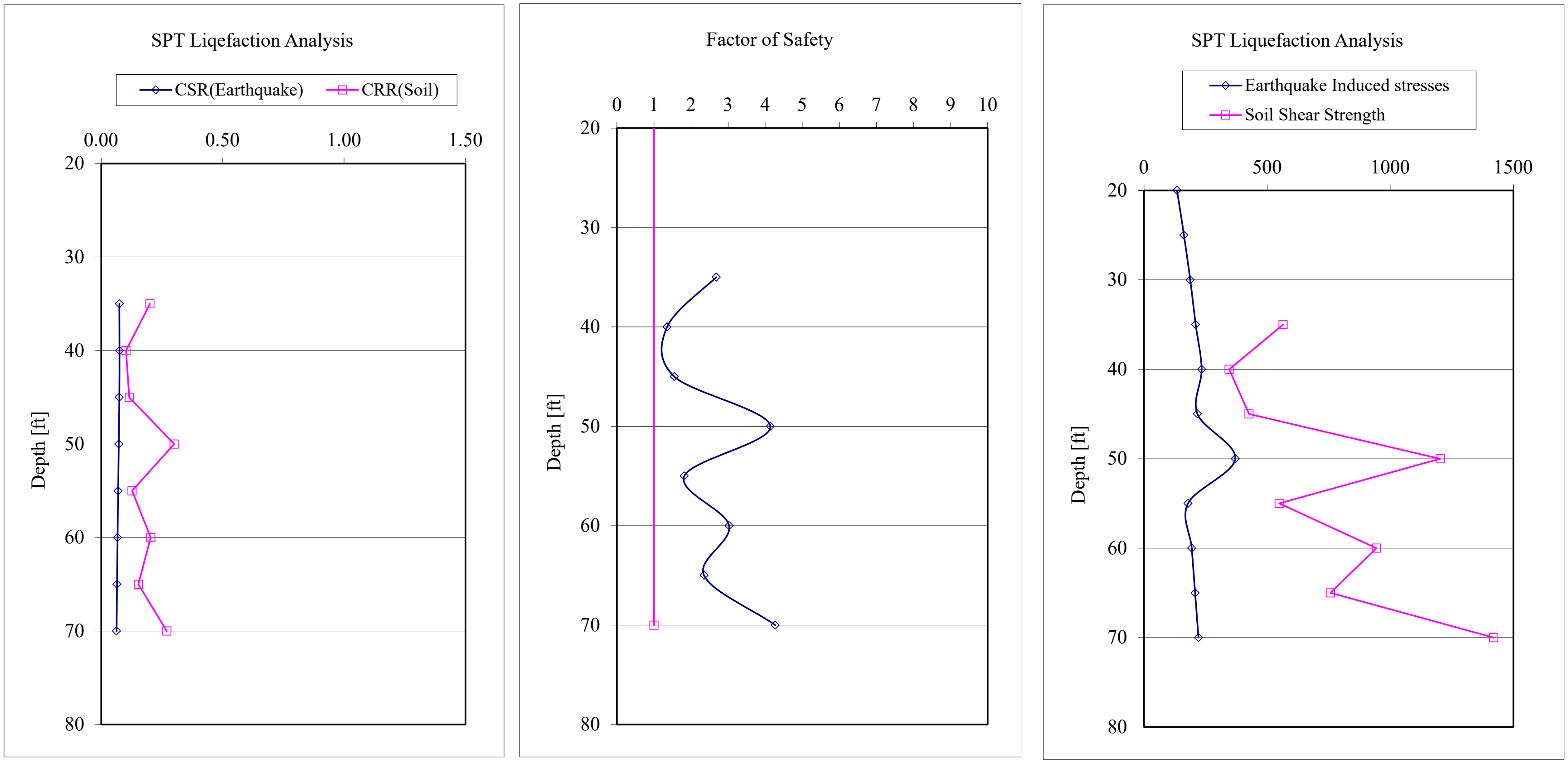


FIGURE G2
Liquefaction Analysis Results - Little Colorado River East Bridge Abutment



APPENDIX H

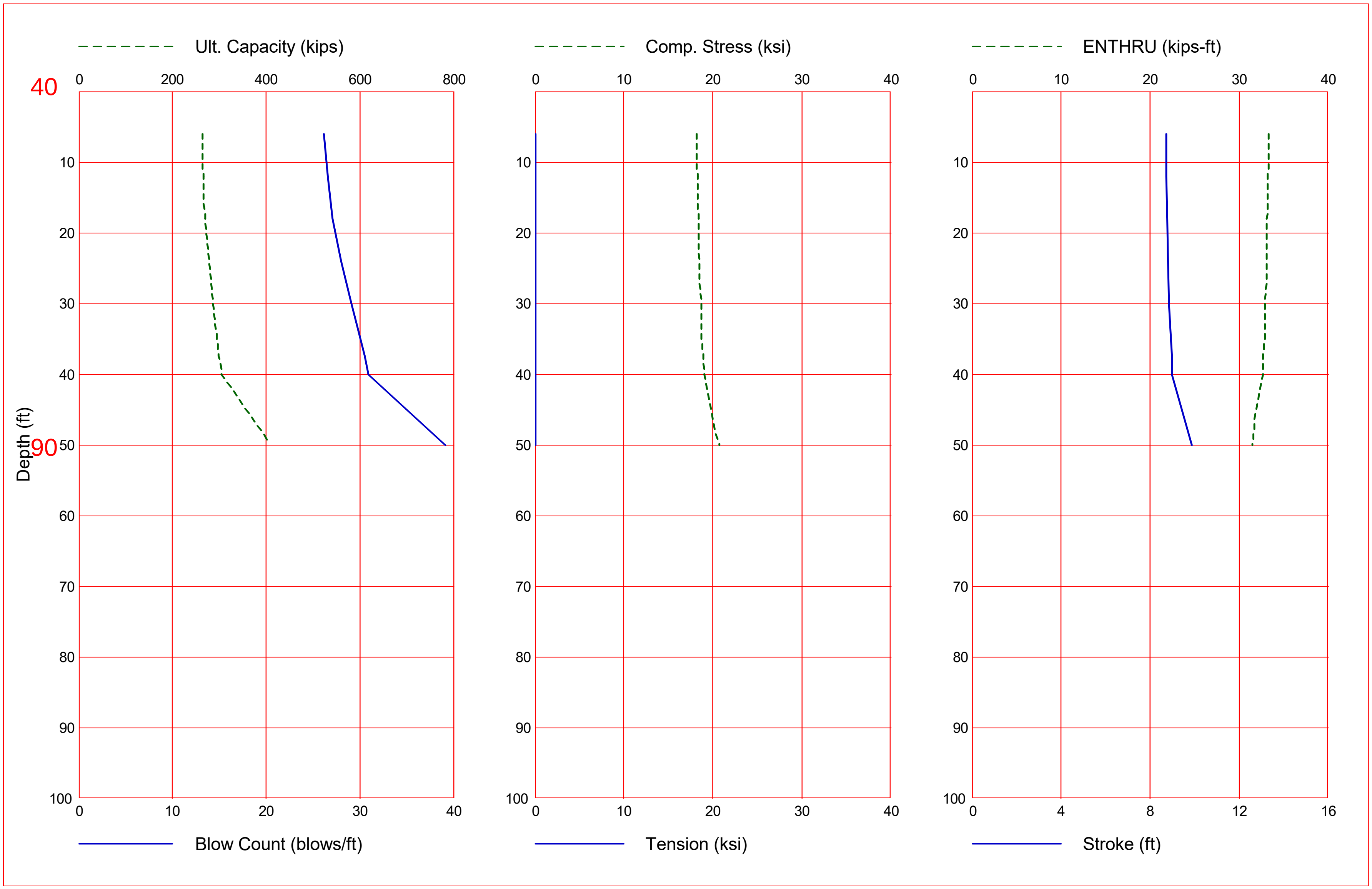
DRIVABILITY ANALYSIS

40 feet neglected for scour

Ethos Engineering
US 180 Little Colorado River Bridge Pier

Aug 07 2023
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 0.833 / 1.000



Gain/Loss 1 at Shaft and Toe 0.833 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
6.0	263.4	0.9	262.5	26.2	18.212	0.000	8.71	33.3
12.0	266.2	3.8	262.5	26.6	18.269	0.000	8.74	33.2
18.0	270.9	8.5	262.5	27.1	18.347	0.000	8.77	33.1
24.0	277.5	15.0	262.5	28.0	18.489	0.000	8.81	33.1
30.0	285.9	23.5	262.5	29.1	18.667	0.000	8.87	32.9
32.6	290.3	27.8	262.5	29.6	18.759	0.000	8.90	32.9
37.4	298.9	36.5	262.5	30.5	18.929	0.000	8.97	32.7
40.0	304.2	41.8	262.5	30.9	19.037	0.000	9.00	32.7
50.0	410.9	82.9	328.1	39.1	20.796	0.000	9.87	31.5

Total Continuous Driving Time 33.00 minutes; Total Number of Blows 1305 (starting at penetration 6.0 ft)

Capacity = 410.9, Computation Time Increment = 0.030 msec

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
1	41.4	38.9	-5.869	0.00	10.5	0.029	0.009	11.7	0.022	0.007	13.3	0.0	8.6	9.5	0.015	0.005	9.5	0.015
2	41.5	39.1	-5.843	0.00	10.5	0.029	0.009	11.8	0.022	0.008	13.4	0.0	8.6	9.6	0.015	0.005	9.6	0.015
3	41.6	39.4	-5.818	0.00	10.6	0.029	0.009	11.8	0.022	0.008	13.4	0.0	8.6	9.6	0.015	0.005	9.6	0.015
4	41.7	39.6	-5.792	0.00	10.6	0.030	0.010	11.9	0.023	0.008	13.5	0.0	8.7	9.6	0.015	0.005	9.6	0.015
5	41.7	39.9	-5.767	0.00	10.7	0.030	0.010	11.9	0.023	0.008	13.5	0.0	8.7	9.6	0.015	0.005	9.6	0.015
6	41.8	40.2	-5.741	0.00	10.7	0.030	0.010	11.9	0.023	0.008	13.5	0.0	8.7	9.7	0.016	0.005	9.7	0.016
7	41.9	40.4	-5.715	0.00	10.8	0.030	0.010	12.0	0.023	0.008	13.6	0.0	8.7	9.7	0.016	0.005	9.7	0.016
8	42.0	40.7	-5.690	0.00	10.8	0.031	0.010	12.0	0.023	0.008	13.6	0.0	8.8	9.7	0.016	0.005	9.7	0.016
9	42.1	41.0	-5.664	0.00	10.9	0.031	0.010	12.1	0.023	0.008	13.7	0.0	8.8	9.8	0.016	0.005	9.8	0.016
10	42.2	41.2	-5.638	0.00	10.9	0.031	0.010	12.1	0.023	0.008	13.7	0.0	8.8	9.8	0.016	0.005	9.8	0.016
11	42.3	41.5	-5.613	0.00	11.0	0.032	0.010	12.2	0.024	0.008	13.8	0.0	8.9	9.8	0.016	0.005	9.8	0.016
12	42.4	41.8	-5.587	0.00	11.0	0.032	0.010	12.2	0.024	0.008	13.8	0.0	8.9	9.9	0.016	0.005	9.9	0.016
13	42.5	42.1	-5.562	0.00	11.1	0.032	0.010	12.3	0.024	0.008	13.8	0.0	8.9	9.9	0.016	0.005	9.9	0.016
14	42.5	42.3	-5.536	0.00	11.1	0.032	0.010	12.3	0.024	0.008	13.9	0.0	8.9	9.9	0.017	0.005	9.9	0.017
15	42.6	42.6	-5.510	0.00	11.2	0.033	0.010	12.3	0.025	0.008	13.9	0.0	9.0	10.0	0.017	0.005	10.0	0.017
16	42.7	42.9	-5.485	0.00	11.2	0.033	0.010	12.4	0.025	0.008	14.0	0.0	9.0	10.0	0.017	0.005	10.0	0.017
17	42.8	43.2	-5.459	0.00	11.3	0.033	0.010	12.4	0.025	0.008	14.0	0.0	9.0	10.0	0.017	0.005	10.0	0.017
18	42.9	43.5	-5.434	0.00	11.3	0.034	0.010	12.5	0.025	0.008	14.1	0.0	9.1	10.1	0.017	0.005	10.1	0.017
19	43.0	43.8	-5.408	0.00	11.4	0.034	0.010	12.5	0.026	0.008	14.1	0.0	9.1	10.1	0.017	0.006	10.1	0.017
20	43.1	44.1	-5.382	0.00	11.4	0.034	0.010	12.6	0.026	0.008	14.2	0.0	9.1	10.1	0.017	0.006	10.1	0.017
21	43.2	44.4	-5.357	0.00	11.5	0.035	0.010	12.7	0.026	0.008	14.2	0.0	9.2	10.2	0.017	0.006	10.2	0.017
22	43.3	44.7	-5.331	0.00	11.5	0.035	0.010	12.7	0.026	0.008	14.3	0.0	9.2	10.2	0.017	0.006	10.2	0.017
23	43.3	45.0	-5.305	0.00	11.6	0.035	0.010	12.8	0.027	0.008	14.3	0.0	9.2	10.2	0.017	0.006	10.2	0.017
24	43.4	45.3	-5.280	0.00	11.7	0.036	0.010	12.8	0.027	0.008	14.4	0.0	9.2	10.3	0.018	0.006	10.3	0.018
25	43.5	45.6	-5.254	0.00	11.7	0.036	0.010	12.9	0.027	0.008	14.4	0.0	9.3	10.3	0.018	0.006	10.3	0.018
26	43.6	45.9	-5.229	0.00	11.8	0.037	0.010	12.9	0.027	0.008	14.5	0.0	9.3	10.3	0.018	0.006	10.3	0.018
27	43.7	46.2	-5.203	0.00	11.8	0.037	0.010	13.0	0.028	0.008	14.5	0.0	9.3	10.4	0.018	0.006	10.4	0.018
28	43.8	46.5	-5.178	0.00	11.9	0.037	0.010	13.0	0.028	0.008	14.6	0.0	9.4	10.4	0.019	0.006	10.4	0.019
29	43.9	46.8	-5.152	0.00	11.9	0.038	0.010	13.1	0.028	0.008	14.6	0.0	9.4	10.5	0.019	0.006	10.5	0.019
30	44.0	47.2	-5.126	0.00	12.0	0.038	0.010	13.1	0.028	0.008	14.7	0.0	9.4	10.5	0.019	0.006	10.5	0.019
31	44.1	47.5	-5.101	0.00	12.1	0.039	0.010	13.2	0.029	0.008	14.7	0.0	9.5	10.5	0.020	0.006	10.5	0.020
32	44.1	47.8	-5.075	0.00	12.1	0.039	0.011	13.3	0.029	0.008	14.8	0.0	9.5	10.6	0.020	0.006	10.6	0.020
33	44.2	48.1	-5.050	0.00	12.2	0.039	0.011	13.3	0.029	0.008	14.8	0.0	9.5	10.6	0.020	0.006	10.6	0.020
34	44.3	48.5	-5.024	0.00	12.2	0.040	0.011	13.4	0.030	0.008	14.9	0.0	9.6	10.7	0.020	0.006	10.7	0.020
35	44.4	48.8	-4.998	0.00	12.3	0.040	0.011	13.4	0.030	0.008	14.9	0.0	9.6	10.7	0.020	0.006	10.7	0.020
36	44.5	49.1	-4.973	0.00	12.4	0.040	0.011	13.5	0.031	0.008	15.0	0.0	9.7	10.7	0.021	0.006	10.7	0.021
37	44.6	49.5	-4.947	0.00	12.4	0.041	0.011	13.6	0.031	0.008	15.0	0.0	9.7	10.8	0.021	0.006	10.8	0.021
38	44.7	49.8	-4.922	0.00	12.5	0.041	0.011	13.6	0.031	0.009	15.1	0.0	9.7	10.8	0.021	0.006	10.8	0.021
39	44.8	50.2	-4.896	0.00	12.6	0.042	0.011	13.7	0.032	0.009	15.2	0.0	9.8	10.9	0.021	0.006	10.9	0.021
40	44.9	50.5	-4.870	0.00	12.6	0.042	0.011	13.7	0.032	0.009	15.2	0.0	9.8	10.9	0.022	0.006	10.9	0.022
41	44.9	50.9	-4.845	0.00	12.7	0.043	0.011	13.8	0.032	0.009	15.3	0.0	9.8	10.9	0.022	0.006	10.9	0.022
42	45.0	51.2	-4.819	0.00	12.8	0.043	0.011	13.8	0.033	0.009	15.3	0.0	9.9	11.0	0.022	0.006	11.0	0.022

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
43	45.1	51.6	-4.794	0.00	12.8	0.044	0.011	13.9	0.033	0.009	15.4	0.0	9.9	11.0	0.022	0.006	11.0	0.022
44	45.2	52.0	-4.768	0.00	12.9	0.044	0.011	14.0	0.034	0.009	15.5	0.0	10.0	11.1	0.023	0.006	11.1	0.023
45	45.3	52.3	-4.743	0.00	13.0	0.045	0.011	14.0	0.034	0.009	15.5	0.0	10.0	11.1	0.023	0.006	11.1	0.023
46	45.4	52.7	-4.717	0.00	13.0	0.046	0.011	14.1	0.034	0.009	15.6	0.0	10.0	11.2	0.023	0.006	11.2	0.023
47	45.5	53.1	-4.692	0.00	13.1	0.046	0.011	14.2	0.035	0.009	15.7	0.0	10.1	11.2	0.024	0.006	11.2	0.024
48	45.6	53.5	-4.666	0.00	13.2	0.047	0.011	14.2	0.035	0.009	15.7	0.0	10.1	11.3	0.024	0.006	11.3	0.024
49	45.7	53.9	-4.640	0.00	13.2	0.047	0.011	14.3	0.036	0.009	15.8	0.0	10.2	11.3	0.024	0.006	11.3	0.024
50	45.7	54.2	-4.615	0.00	13.3	0.048	0.011	14.4	0.036	0.009	15.9	0.0	10.2	11.4	0.024	0.006	11.4	0.024
51	45.8	54.6	-4.589	0.00	13.4	0.049	0.011	14.5	0.036	0.009	15.9	0.0	10.3	11.4	0.025	0.006	11.4	0.025
52	45.9	55.0	-4.564	0.00	13.5	0.049	0.011	14.5	0.037	0.009	16.0	0.0	10.3	11.5	0.025	0.006	11.5	0.025
53	46.0	55.4	-4.538	0.00	13.5	0.050	0.012	14.6	0.037	0.009	16.1	0.0	10.3	11.5	0.025	0.006	11.5	0.025
54	46.1	55.8	-4.513	0.00	13.6	0.050	0.012	14.7	0.038	0.009	16.1	0.0	10.4	11.6	0.025	0.006	11.6	0.025
55	46.2	56.2	-4.487	0.00	13.7	0.051	0.012	14.8	0.038	0.009	16.2	0.0	10.4	11.6	0.026	0.006	11.6	0.026
56	46.3	56.6	-4.462	0.00	13.8	0.052	0.012	14.8	0.039	0.009	16.3	0.0	10.5	11.7	0.026	0.006	11.7	0.026
57	46.4	57.1	-4.436	0.00	13.8	0.052	0.012	14.9	0.040	0.009	16.3	0.0	10.5	11.7	0.026	0.006	11.7	0.026
58	46.5	57.5	-4.411	0.00	13.9	0.053	0.012	15.0	0.040	0.009	16.4	0.1	10.6	11.8	0.026	0.006	11.8	0.026
59	46.5	57.9	-4.385	0.00	14.0	0.053	0.012	15.1	0.040	0.009	16.5	0.1	10.6	11.8	0.027	0.006	11.8	0.027
60	46.6	58.3	-4.360	0.00	14.1	0.054	0.012	15.1	0.041	0.009	16.6	0.1	10.7	11.9	0.027	0.006	11.9	0.027
61	46.7	58.8	-4.334	0.00	14.2	0.055	0.012	15.2	0.041	0.009	16.6	0.1	10.7	11.9	0.028	0.006	11.9	0.028
62	46.8	59.2	-4.308	0.00	14.3	0.055	0.012	15.3	0.042	0.009	16.7	0.1	10.8	12.0	0.028	0.007	12.0	0.028
63	46.9	59.6	-4.283	0.00	14.3	0.056	0.012	15.4	0.042	0.009	16.8	0.1	10.8	12.0	0.028	0.007	12.0	0.028
64	47.0	60.1	-4.257	0.00	14.4	0.057	0.012	15.5	0.043	0.010	16.9	0.1	10.9	12.1	0.029	0.007	12.1	0.029
65	47.1	60.5	-4.232	0.00	14.5	0.058	0.012	15.6	0.043	0.010	16.9	0.1	10.9	12.2	0.029	0.007	12.2	0.029
66	47.2	61.0	-4.206	0.00	14.6	0.058	0.012	15.6	0.044	0.010	17.0	0.1	11.0	12.2	0.030	0.007	12.2	0.030
67	47.3	61.4	-4.181	0.00	14.7	0.059	0.012	15.7	0.044	0.010	17.1	0.1	11.0	12.3	0.030	0.007	12.3	0.030
68	47.3	61.9	-4.155	0.00	14.8	0.060	0.012	15.8	0.045	0.010	17.2	0.1	11.1	12.3	0.031	0.007	12.3	0.031
69	47.4	62.4	-4.130	0.00	14.9	0.060	0.012	15.9	0.045	0.010	17.3	0.1	11.1	12.4	0.031	0.007	12.4	0.031
70	47.5	62.9	-4.104	0.00	15.0	0.061	0.013	16.0	0.046	0.010	17.4	0.1	11.2	12.5	0.031	0.007	12.5	0.031
71	47.6	63.3	-4.079	0.00	15.1	0.062	0.013	16.1	0.047	0.010	17.4	0.1	11.3	12.5	0.032	0.007	12.5	0.032
72	47.7	63.8	-4.053	0.00	15.2	0.062	0.013	16.2	0.047	0.010	17.5	0.1	11.3	12.6	0.032	0.007	12.6	0.032
73	47.8	64.3	-4.028	0.00	15.3	0.063	0.013	16.3	0.048	0.010	17.6	0.1	11.4	12.7	0.032	0.007	12.7	0.032
74	47.9	64.8	-4.002	0.00	15.3	0.064	0.013	16.3	0.048	0.010	17.7	0.1	11.4	12.7	0.033	0.007	12.7	0.033
75	48.0	65.3	-3.977	0.00	15.4	0.065	0.013	16.4	0.049	0.010	17.8	0.1	11.5	12.8	0.033	0.007	12.8	0.033
76	48.1	65.8	-3.951	0.00	15.5	0.065	0.013	16.5	0.050	0.010	17.9	0.1	11.5	12.8	0.033	0.007	12.8	0.033
77	48.1	66.3	-3.926	0.00	15.6	0.066	0.013	16.6	0.050	0.010	18.0	0.1	11.6	12.9	0.034	0.007	12.9	0.034
78	48.2	66.8	-3.900	0.00	15.7	0.067	0.013	16.7	0.051	0.010	18.1	0.1	11.7	13.0	0.034	0.007	13.0	0.034
79	48.3	67.4	-3.875	0.00	15.9	0.068	0.013	16.8	0.052	0.010	18.2	0.1	11.7	13.1	0.035	0.007	13.1	0.035
80	48.4	67.9	-3.850	0.00	16.0	0.069	0.013	16.9	0.052	0.010	18.3	0.1	11.8	13.1	0.035	0.007	13.1	0.035
81	48.5	68.4	-3.824	0.00	16.1	0.070	0.013	17.0	0.053	0.010	18.4	0.1	11.9	13.2	0.036	0.007	13.2	0.036
82	48.6	69.0	-3.799	0.00	16.2	0.071	0.013	17.1	0.054	0.010	18.5	0.1	11.9	13.3	0.036	0.007	13.3	0.036
83	48.7	69.5	-3.773	0.00	16.3	0.072	0.013	17.2	0.054	0.011	18.6	0.1	12.0	13.3	0.036	0.007	13.3	0.036
84	48.8	70.0	-3.748	0.00	16.4	0.073	0.014	17.3	0.055	0.011	18.7	0.1	12.0	13.4	0.037	0.007	13.4	0.037

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
85	48.9	70.6	-3.722	0.00	16.5	0.073	0.014	17.4	0.055	0.011	18.8	0.1	12.1	13.5	0.037	0.007	13.5	0.037
86	48.9	71.2	-3.697	0.00	16.6	0.074	0.014	17.5	0.056	0.011	18.9	0.1	12.2	13.6	0.038	0.007	13.6	0.038
87	49.0	71.7	-3.671	0.00	16.7	0.075	0.014	17.7	0.057	0.011	19.0	0.1	12.2	13.6	0.038	0.007	13.6	0.038
88	49.1	72.3	-3.646	0.00	16.8	0.076	0.014	17.8	0.057	0.011	19.1	0.1	12.3	13.7	0.039	0.007	13.7	0.039
89	49.2	72.9	-3.621	0.00	16.9	0.077	0.014	17.9	0.058	0.011	19.2	0.1	12.4	13.8	0.039	0.007	13.8	0.039
90	49.3	73.5	-3.595	0.00	17.0	0.078	0.014	18.0	0.059	0.011	19.3	0.1	12.5	13.9	0.040	0.008	13.9	0.040
91	49.4	74.1	-3.570	0.00	17.2	0.079	0.014	18.1	0.060	0.011	19.4	0.1	12.5	14.0	0.040	0.008	14.0	0.040
92	49.5	74.7	-3.544	0.00	17.3	0.080	0.014	18.2	0.060	0.011	19.5	0.1	12.6	14.0	0.040	0.008	14.0	0.040
93	49.6	75.3	-3.519	0.00	17.4	0.081	0.014	18.3	0.061	0.011	19.6	0.1	12.7	14.1	0.041	0.008	14.1	0.041
94	49.7	75.9	-3.493	0.00	17.5	0.081	0.014	18.5	0.062	0.011	19.7	0.1	12.7	14.2	0.041	0.008	14.2	0.041
95	49.7	76.5	-3.468	0.00	17.6	0.082	0.014	18.6	0.063	0.011	19.8	0.1	12.8	14.3	0.042	0.008	14.3	0.042
96	49.8	77.2	-3.443	0.00	17.8	0.083	0.015	18.7	0.063	0.011	20.0	0.1	12.9	14.4	0.043	0.008	14.4	0.043
97	49.9	77.8	-3.417	0.00	17.9	0.084	0.015	18.8	0.064	0.011	20.1	0.1	13.0	14.5	0.043	0.008	14.5	0.043
98	50.0	78.5	-3.392	0.00	18.0	0.085	0.015	18.9	0.065	0.011	20.2	0.1	13.1	14.5	0.044	0.008	14.5	0.044
99	50.1	79.1	-3.367	0.00	18.2	0.086	0.015	19.1	0.065	0.012	20.3	0.1	13.1	14.6	0.044	0.008	14.6	0.044
100	50.2	79.8	-3.341	0.00	18.3	0.087	0.015	19.2	0.066	0.012	20.4	0.1	13.2	14.7	0.045	0.008	14.7	0.045
101	50.3	80.4	-3.316	0.00	18.4	0.088	0.015	19.3	0.067	0.012	20.6	0.1	13.3	14.8	0.045	0.008	14.8	0.045
102	50.4	81.1	-3.290	0.00	18.6	0.089	0.015	19.4	0.068	0.012	20.7	0.1	13.4	14.9	0.046	0.008	14.9	0.046
103	50.5	81.8	-3.265	0.00	18.7	0.090	0.015	19.6	0.068	0.012	20.8	0.1	13.5	15.0	0.046	0.008	15.0	0.046
104	50.5	82.5	-3.240	0.00	18.8	0.092	0.015	19.7	0.069	0.012	20.9	0.1	13.5	15.1	0.047	0.008	15.1	0.047
105	50.6	83.2	-3.214	0.00	19.0	0.093	0.015	19.8	0.070	0.012	21.1	0.1	13.6	15.2	0.048	0.008	15.2	0.048
106	50.7	83.9	-3.189	0.00	19.1	0.094	0.015	20.0	0.071	0.012	21.2	0.1	13.7	15.3	0.048	0.008	15.3	0.048
107	50.8	84.7	-3.164	0.00	19.2	0.095	0.016	20.1	0.072	0.012	21.3	0.1	13.8	15.4	0.049	0.008	15.4	0.049
108	50.9	85.4	-3.138	0.00	19.4	0.096	0.016	20.3	0.073	0.012	21.5	0.1	13.9	15.5	0.049	0.008	15.5	0.049
109	51.0	86.1	-3.113	0.00	19.5	0.097	0.016	20.4	0.073	0.012	21.6	0.1	14.0	15.6	0.050	0.008	15.6	0.050
110	51.1	86.9	-3.088	0.00	19.7	0.098	0.016	20.5	0.074	0.012	21.7	0.1	14.1	15.7	0.050	0.008	15.7	0.050
111	51.2	87.6	-3.062	0.00	19.8	0.099	0.016	20.7	0.075	0.012	21.9	0.1	14.2	15.8	0.051	0.009	15.8	0.051
112	51.3	88.4	-3.037	0.00	20.0	0.100	0.016	20.8	0.076	0.012	22.0	0.1	14.2	15.9	0.051	0.009	15.9	0.051
113	51.3	89.2	-3.012	0.00	20.1	0.102	0.016	21.0	0.077	0.013	22.2	0.1	14.3	16.0	0.052	0.009	16.0	0.052
114	51.4	90.0	-2.986	0.00	20.3	0.103	0.016	21.1	0.078	0.013	22.3	0.1	14.4	16.1	0.052	0.009	16.1	0.052
115	51.5	90.8	-2.961	0.00	20.4	0.104	0.016	21.3	0.079	0.013	22.4	0.1	14.5	16.2	0.053	0.009	16.2	0.053
116	51.6	91.6	-2.936	0.00	20.6	0.105	0.017	21.4	0.080	0.013	22.6	0.1	14.6	16.3	0.053	0.009	16.3	0.053
117	51.7	92.4	-2.910	0.00	20.8	0.106	0.017	21.6	0.081	0.013	22.7	0.1	14.7	16.4	0.054	0.009	16.4	0.054
118	51.8	93.2	-2.885	0.00	20.9	0.108	0.017	21.7	0.081	0.013	22.9	0.1	14.8	16.5	0.055	0.009	16.5	0.055
119	51.9	94.1	-2.860	0.00	21.1	0.109	0.017	21.9	0.082	0.013	23.0	0.1	14.9	16.6	0.055	0.009	16.6	0.055
120	52.0	94.9	-2.835	0.00	21.2	0.110	0.017	22.1	0.083	0.013	23.2	0.2	15.0	16.7	0.056	0.009	16.7	0.056
121	52.1	95.8	-2.809	0.00	21.4	0.111	0.017	22.2	0.084	0.013	23.3	0.2	15.1	16.8	0.057	0.009	16.8	0.057
122	52.1	96.7	-2.784	0.00	21.6	0.113	0.017	22.4	0.085	0.013	23.5	0.2	15.2	17.0	0.057	0.009	17.0	0.057
123	52.2	97.6	-2.759	0.00	21.7	0.114	0.017	22.5	0.086	0.013	23.7	0.2	15.3	17.1	0.058	0.009	17.1	0.058
124	52.3	98.5	-2.734	0.00	21.9	0.115	0.017	22.7	0.087	0.014	23.8	0.2	15.4	17.2	0.059	0.009	17.2	0.059
125	52.4	99.4	-2.708	0.00	22.1	0.117	0.018	22.9	0.088	0.014	24.0	0.2	15.5	17.3	0.059	0.009	17.3	0.059
126	52.5	100.3	-2.683	0.00	22.3	0.118	0.018	23.1	0.089	0.014	24.1	0.2	15.6	17.4	0.060	0.009	17.4	0.060

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
127	52.6	101.2	-2.658	0.00	22.4	0.119	0.018	23.2	0.090	0.014	24.3	0.2	15.7	17.6	0.061	0.009	17.6	0.061
128	52.7	102.2	-2.633	0.00	22.6	0.121	0.018	23.4	0.091	0.014	24.5	0.2	15.9	17.7	0.061	0.010	17.7	0.061
129	52.8	103.2	-2.607	0.00	22.8	0.122	0.018	23.6	0.092	0.014	24.6	0.2	16.0	17.8	0.062	0.010	17.8	0.062
130	52.9	104.1	-2.582	0.00	23.0	0.123	0.018	23.8	0.093	0.014	24.8	0.2	16.1	17.9	0.063	0.010	17.9	0.063
131	52.9	105.1	-2.557	0.00	23.2	0.125	0.018	23.9	0.094	0.014	25.0	0.2	16.2	18.1	0.063	0.010	18.1	0.063
132	53.0	106.1	-2.532	0.00	23.4	0.126	0.018	24.1	0.095	0.014	25.2	0.2	16.3	18.2	0.064	0.010	18.2	0.064
133	53.1	107.1	-2.507	0.00	23.6	0.128	0.019	24.3	0.096	0.014	25.3	0.2	16.4	18.3	0.065	0.010	18.3	0.065
134	53.2	108.2	-2.481	0.00	23.8	0.129	0.019	24.5	0.098	0.015	25.5	0.2	16.5	18.4	0.066	0.010	18.4	0.066
135	53.3	109.2	-2.456	0.00	24.0	0.131	0.019	24.7	0.099	0.015	25.7	0.2	16.7	18.6	0.066	0.010	18.6	0.066
136	53.4	110.3	-2.431	0.00	24.2	0.132	0.019	24.9	0.100	0.015	25.9	0.2	16.8	18.7	0.067	0.010	18.7	0.067
137	53.5	111.4	-2.406	0.00	24.4	0.134	0.019	25.1	0.101	0.015	26.1	0.2	16.9	18.8	0.068	0.010	18.8	0.068
138	53.6	112.5	-2.381	0.00	24.6	0.136	0.019	25.3	0.102	0.015	26.3	0.2	17.0	19.0	0.069	0.010	19.0	0.069
139	53.7	113.6	-2.356	0.00	24.8	0.137	0.019	25.5	0.103	0.015	26.4	0.2	17.1	19.1	0.069	0.010	19.1	0.069
140	53.7	114.7	-2.331	0.00	25.0	0.139	0.020	25.7	0.104	0.015	26.6	0.2	17.3	19.3	0.070	0.010	19.3	0.070
141	53.8	115.9	-2.306	0.00	25.2	0.141	0.020	25.9	0.106	0.015	26.8	0.2	17.4	19.4	0.071	0.010	19.4	0.071
142	53.9	117.0	-2.280	0.00	25.5	0.142	0.020	26.1	0.107	0.015	27.0	0.2	17.5	19.6	0.072	0.011	19.6	0.072
143	54.0	118.2	-2.255	0.00	25.7	0.144	0.020	26.3	0.108	0.016	27.2	0.2	17.7	19.7	0.073	0.011	19.7	0.073
144	54.1	119.4	-2.230	0.00	25.9	0.146	0.020	26.5	0.110	0.016	27.4	0.2	17.8	19.8	0.073	0.011	19.8	0.073
145	54.2	120.6	-2.205	0.00	26.1	0.148	0.020	26.7	0.111	0.016	27.6	0.2	17.9	20.0	0.074	0.011	20.0	0.074
146	54.3	121.9	-2.180	0.00	26.4	0.149	0.021	26.9	0.112	0.016	27.8	0.2	18.1	20.1	0.075	0.011	20.1	0.075
147	54.4	123.1	-2.155	0.00	26.6	0.151	0.021	27.2	0.114	0.016	28.0	0.2	18.2	20.3	0.076	0.011	20.3	0.076
148	54.5	124.4	-2.130	0.00	26.8	0.153	0.021	27.4	0.115	0.016	28.2	0.3	18.3	20.5	0.077	0.011	20.5	0.077
149	54.5	125.7	-2.105	0.00	27.1	0.155	0.021	27.6	0.116	0.016	28.5	0.3	18.5	20.6	0.078	0.011	20.6	0.078
150	54.6	127.0	-2.080	0.00	27.3	0.157	0.021	27.9	0.118	0.016	28.7	0.3	18.6	20.8	0.079	0.011	20.8	0.079
151	54.7	128.3	-2.055	0.00	27.5	0.159	0.021	28.1	0.119	0.016	28.9	0.3	18.8	20.9	0.079	0.011	20.9	0.079
152	54.8	129.7	-2.030	0.00	27.8	0.161	0.022	28.3	0.121	0.017	29.1	0.3	18.9	21.1	0.080	0.011	21.1	0.080
153	54.9	131.1	-2.005	0.00	28.0	0.163	0.022	28.6	0.122	0.017	29.3	0.3	19.0	21.3	0.081	0.011	21.3	0.081
154	55.0	132.5	-1.980	0.00	28.3	0.165	0.022	28.8	0.124	0.017	29.6	0.3	19.2	21.4	0.082	0.012	21.4	0.082
155	55.1	133.9	-1.955	0.00	28.6	0.167	0.022	29.1	0.125	0.017	29.8	0.3	19.3	21.6	0.084	0.012	21.6	0.084
156	55.2	135.4	-1.930	0.00	28.8	0.169	0.022	29.3	0.127	0.017	30.0	0.3	19.5	21.8	0.085	0.012	21.8	0.085
157	55.2	136.8	-1.905	0.00	29.1	0.171	0.022	29.6	0.128	0.017	30.2	0.3	19.7	21.9	0.086	0.012	21.9	0.086
158	55.3	138.3	-1.880	0.00	29.4	0.174	0.023	29.8	0.130	0.017	30.5	0.3	19.8	22.1	0.087	0.012	22.1	0.087
159	55.4	139.9	-1.855	0.00	29.6	0.176	0.023	30.1	0.131	0.018	30.7	0.3	20.0	22.3	0.088	0.012	22.3	0.088
160	55.5	141.4	-1.830	0.00	29.9	0.178	0.023	30.3	0.133	0.018	31.0	0.3	20.1	22.5	0.089	0.012	22.5	0.089
161	55.6	143.0	-1.805	0.00	30.2	0.180	0.023	30.6	0.135	0.018	31.2	0.3	20.3	22.7	0.090	0.012	22.7	0.090
162	55.7	144.6	-1.780	0.00	30.5	0.183	0.023	30.9	0.137	0.018	31.5	0.3	20.5	22.8	0.091	0.012	22.8	0.091
163	55.8	146.2	-1.755	0.00	30.8	0.185	0.024	31.1	0.138	0.018	31.7	0.3	20.6	23.0	0.093	0.012	23.0	0.093
164	55.9	147.9	-1.730	0.00	31.1	0.188	0.024	31.4	0.140	0.018	32.0	0.3	20.8	23.2	0.094	0.012	23.2	0.094
165	56.0	149.5	-1.706	0.00	31.4	0.190	0.024	31.7	0.142	0.018	32.2	0.4	21.0	23.4	0.095	0.013	23.4	0.095
166	56.0	151.3	-1.681	0.00	31.7	0.193	0.024	32.0	0.144	0.019	32.5	0.4	21.1	23.6	0.096	0.013	23.6	0.096
167	56.1	153.0	-1.656	0.00	32.0	0.196	0.024	32.3	0.146	0.019	32.8	0.4	21.3	23.8	0.097	0.013	23.8	0.097
168	56.2	154.8	-1.631	0.00	32.3	0.198	0.025	32.6	0.148	0.019	33.0	0.4	21.5	24.0	0.099	0.013	24.0	0.099

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
169	56.3	156.6	-1.606	0.00	32.7	0.201	0.025	32.9	0.150	0.019	33.3	0.4	21.7	24.2	0.100	0.013	24.2	0.100
170	56.4	158.4	-1.581	0.00	33.0	0.204	0.025	33.2	0.152	0.019	33.6	0.4	21.9	24.4	0.101	0.013	24.4	0.101
171	56.5	160.3	-1.556	0.00	33.3	0.207	0.025	33.5	0.154	0.019	33.9	0.4	22.0	24.6	0.103	0.013	24.6	0.103
172	56.6	162.2	-1.532	0.00	33.7	0.210	0.025	33.8	0.156	0.020	34.1	0.4	22.2	24.8	0.104	0.013	24.8	0.104
173	56.7	164.2	-1.507	0.00	34.0	0.213	0.026	34.1	0.159	0.020	34.4	0.4	22.4	25.1	0.105	0.013	25.1	0.105
174	56.8	166.1	-1.482	0.00	34.3	0.216	0.026	34.4	0.161	0.020	34.7	0.4	22.6	25.3	0.107	0.014	25.3	0.107
175	56.8	168.2	-1.457	0.00	34.7	0.219	0.026	34.8	0.163	0.020	35.0	0.4	22.8	25.5	0.108	0.014	25.5	0.108
176	56.9	170.2	-1.433	0.00	35.1	0.223	0.026	35.1	0.165	0.020	35.3	0.5	23.0	25.7	0.110	0.014	25.7	0.110
177	57.0	172.3	-1.408	0.00	35.4	0.226	0.027	35.4	0.168	0.020	35.6	0.5	23.2	25.9	0.111	0.014	25.9	0.111
178	57.1	174.4	-1.383	0.00	35.8	0.229	0.027	35.8	0.170	0.021	35.9	0.5	23.4	26.2	0.113	0.014	26.2	0.113
179	57.2	176.6	-1.359	0.00	36.2	0.233	0.027	36.1	0.173	0.021	36.2	0.5	23.6	26.4	0.115	0.014	26.4	0.115
180	57.3	178.8	-1.334	0.00	36.5	0.236	0.027	36.5	0.175	0.021	36.5	0.5	23.8	26.6	0.116	0.014	26.6	0.116
181	57.4	181.1	-1.309	0.00	36.9	0.240	0.028	36.8	0.178	0.021	36.9	0.5	24.1	26.9	0.118	0.014	26.9	0.118
182	57.5	183.4	-1.285	0.00	37.3	0.244	0.028	37.2	0.181	0.021	37.2	0.5	24.3	27.1	0.120	0.014	27.1	0.120
183	57.6	185.7	-1.260	0.00	37.7	0.247	0.028	37.6	0.183	0.022	37.5	0.5	24.5	27.4	0.121	0.015	27.4	0.121
184	57.6	188.1	-1.235	0.00	38.1	0.251	0.028	37.9	0.186	0.022	37.9	0.5	24.7	27.6	0.123	0.015	27.6	0.123
185	57.7	190.6	-1.211	0.00	38.6	0.255	0.029	38.3	0.189	0.022	38.2	0.6	25.0	27.9	0.125	0.015	27.9	0.125
186	57.8	193.1	-1.186	0.00	39.0	0.259	0.029	38.7	0.192	0.022	38.5	0.6	25.2	28.1	0.127	0.015	28.1	0.127
187	57.9	195.6	-1.161	0.00	39.4	0.263	0.029	39.1	0.195	0.022	38.9	0.6	25.4	28.4	0.129	0.015	28.4	0.129
188	58.0	198.2	-1.137	0.00	39.9	0.267	0.029	39.5	0.198	0.023	39.3	0.6	25.7	28.7	0.131	0.015	28.7	0.131
189	58.1	200.9	-1.112	0.00	40.3	0.272	0.030	39.9	0.201	0.023	39.6	0.6	25.9	29.0	0.133	0.015	29.0	0.133
190	58.2	203.6	-1.088	0.00	40.8	0.276	0.030	40.3	0.204	0.023	40.0	0.6	26.2	29.2	0.135	0.016	29.2	0.135
191	58.3	206.3	-1.063	0.00	41.2	0.281	0.030	40.8	0.207	0.023	40.4	0.6	26.4	29.5	0.137	0.016	29.5	0.137
192	58.4	209.1	-1.039	0.00	41.7	0.286	0.031	41.2	0.211	0.023	40.7	0.7	26.7	29.8	0.139	0.016	29.8	0.139
193	58.4	212.0	-1.014	0.00	42.2	0.290	0.031	41.6	0.214	0.024	41.1	0.7	26.9	30.1	0.141	0.016	30.1	0.141
194	58.5	215.0	-0.990	0.00	42.7	0.295	0.031	42.1	0.218	0.024	41.5	0.7	27.2	30.4	0.144	0.016	30.4	0.144
195	58.6	218.0	-0.965	0.00	43.2	0.300	0.032	42.5	0.221	0.024	41.9	0.7	27.5	30.7	0.146	0.016	30.7	0.146
196	58.7	221.0	-0.941	0.00	43.7	0.306	0.032	43.0	0.225	0.024	42.3	0.7	27.7	31.0	0.148	0.016	31.0	0.148
197	58.8	224.2	-0.917	0.00	44.2	0.311	0.032	43.5	0.229	0.025	42.7	0.8	28.0	31.3	0.151	0.017	31.3	0.151
198	58.9	227.4	-0.892	0.00	44.8	0.316	0.033	43.9	0.233	0.025	43.1	0.8	28.3	31.6	0.153	0.017	31.6	0.153
199	59.0	230.7	-0.868	0.00	45.3	0.322	0.033	44.4	0.237	0.025	43.6	0.8	28.6	32.0	0.156	0.017	32.0	0.156
200	59.1	234.0	-0.843	0.00	45.9	0.328	0.033	44.9	0.241	0.025	44.0	0.8	28.9	32.3	0.158	0.017	32.3	0.158
201	59.2	237.5	-0.819	0.00	46.4	0.334	0.034	45.4	0.245	0.026	44.4	0.8	29.2	32.6	0.161	0.017	32.6	0.161
202	59.2	241.0	-0.795	0.00	47.0	0.340	0.034	46.0	0.249	0.026	44.9	0.9	29.5	33.0	0.164	0.017	33.0	0.164
203	59.3	244.6	-0.771	0.00	47.6	0.346	0.034	46.5	0.254	0.026	45.3	0.9	29.8	33.3	0.167	0.018	33.3	0.167
204	59.4	248.2	-0.746	0.00	48.2	0.352	0.035	47.0	0.258	0.026	45.8	0.9	30.1	33.7	0.169	0.018	33.7	0.169
205	59.5	252.0	-0.722	0.00	48.8	0.359	0.035	47.6	0.263	0.027	46.3	0.9	30.4	34.0	0.172	0.018	34.0	0.172
206	59.6	255.9	-0.698	0.00	49.4	0.365	0.035	48.1	0.268	0.027	46.7	1.0	30.8	34.4	0.175	0.018	34.4	0.175
207	59.7	259.8	-0.674	0.00	50.1	0.372	0.036	48.7	0.273	0.027	47.2	1.0	31.1	34.8	0.178	0.018	34.8	0.178
208	59.8	263.8	-0.650	0.00	50.7	0.379	0.036	49.3	0.278	0.028	47.7	1.0	31.4	35.1	0.182	0.019	35.1	0.182
209	59.9	268.0	-0.625	0.00	51.4	0.387	0.037	49.9	0.283	0.028	48.2	1.0	31.8	35.5	0.185	0.019	35.5	0.185
210	60.0	272.2	-0.601	0.00	52.1	0.394	0.037	50.5	0.288	0.028	48.7	1.1	32.1	35.9	0.188	0.019	35.9	0.188

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
211	60.0	276.6	-0.577	0.00	52.8	0.402	0.038	51.1	0.293	0.028	49.3	1.1	32.5	36.3	0.192	0.019	36.3	0.192
212	60.1	281.0	-0.553	0.00	53.5	0.410	0.038	51.7	0.299	0.029	49.8	1.1	32.9	36.7	0.195	0.019	36.7	0.195
213	60.2	285.6	-0.529	0.00	54.2	0.418	0.038	52.4	0.305	0.029	50.3	1.2	33.2	37.2	0.199	0.020	37.2	0.199
214	60.3	290.3	-0.505	0.00	55.0	0.426	0.039	53.0	0.310	0.029	50.9	1.2	33.6	37.6	0.203	0.020	37.6	0.203
215	60.4	295.1	-0.481	0.00	55.7	0.435	0.039	53.7	0.316	0.030	51.5	1.2	34.0	38.0	0.206	0.020	38.0	0.206
216	60.5	300.0	-0.457	0.00	56.5	0.444	0.040	54.4	0.323	0.030	52.0	1.3	34.4	38.5	0.210	0.020	38.5	0.210
217	60.6	305.1	-0.433	0.00	57.3	0.453	0.040	55.1	0.329	0.030	52.6	1.3	34.8	38.9	0.214	0.020	38.9	0.214
218	60.7	310.2	-0.409	0.00	58.1	0.462	0.041	55.8	0.336	0.031	53.2	1.4	35.2	39.4	0.218	0.021	39.4	0.218
219	60.8	315.6	-0.385	0.00	58.9	0.472	0.041	56.5	0.342	0.031	53.8	1.4	35.6	39.8	0.223	0.021	39.8	0.223
220	60.8	321.0	-0.361	0.00	59.8	0.482	0.042	57.3	0.349	0.032	54.4	1.4	36.1	40.3	0.227	0.021	40.3	0.227
221	60.9	326.7	-0.338	0.00	60.7	0.492	0.042	58.0	0.356	0.032	55.1	1.5	36.5	40.8	0.231	0.021	40.8	0.231
222	61.0	332.4	-0.314	0.00	61.6	0.502	0.043	58.8	0.364	0.032	55.7	1.5	37.0	41.3	0.236	0.022	41.3	0.236
223	61.1	338.1	-0.291	0.00	62.5	0.513	0.043	59.6	0.371	0.033	56.4	1.6	37.4	41.8	0.241	0.022	41.8	0.241
224	61.2	343.3	-0.271	0.00	63.4	0.524	0.044	60.4	0.379	0.033	57.0	1.6	37.9	42.4	0.245	0.022	42.4	0.245
225	61.3	348.6	-0.250	0.00	64.4	0.536	0.044	61.3	0.387	0.033	57.7	1.7	38.4	42.9	0.250	0.022	42.9	0.250
226	61.4	354.1	-0.230	0.00	65.4	0.548	0.045	62.1	0.395	0.034	58.4	1.7	38.9	43.5	0.256	0.023	43.5	0.256
227	61.5	359.7	-0.209	0.00	66.4	0.560	0.046	63.0	0.404	0.034	59.1	1.8	39.4	44.0	0.261	0.023	44.0	0.261
228	61.6	365.4	-0.189	0.00	67.4	0.572	0.046	63.9	0.412	0.035	59.8	1.9	39.9	44.6	0.266	0.023	44.6	0.266
229	61.6	371.3	-0.169	0.00	68.5	0.585	0.047	64.8	0.421	0.035	60.6	1.9	40.4	45.2	0.272	0.024	45.2	0.272
230	61.7	377.3	-0.148	0.00	69.6	0.598	0.047	65.7	0.431	0.036	61.3	2.0	40.9	45.8	0.277	0.024	45.8	0.277
231	61.8	383.5	-0.128	0.00	70.7	0.612	0.048	66.7	0.440	0.036	62.1	2.1	41.5	46.4	0.283	0.024	46.4	0.283
232	61.9	389.8	-0.108	0.00	71.8	0.626	0.049	67.7	0.450	0.037	62.9	2.1	42.0	47.0	0.289	0.024	47.0	0.289
233	62.0	396.2	-0.088	0.00	73.0	0.640	0.049	68.7	0.460	0.037	63.7	2.2	42.6	47.7	0.296	0.025	47.7	0.296
234	62.1	402.9	-0.068	0.00	74.2	0.655	0.050	69.7	0.470	0.038	64.5	2.3	43.2	48.3	0.302	0.025	48.3	0.302
235	62.2	409.6	-0.047	0.00	75.4	0.670	0.051	70.8	0.481	0.038	65.4	2.4	43.8	49.0	0.309	0.025	49.0	0.309
236	62.3	416.6	-0.027	0.00	76.6	0.685	0.052	71.9	0.492	0.039	66.2	2.4	44.4	49.7	0.315	0.026	49.7	0.315
237	62.4	423.8	-0.007	0.00	77.9	0.700	0.052	73.0	0.504	0.039	67.1	2.5	45.0	50.4	0.322	0.026	50.4	0.322
238	62.4	431.1	0.013	0.00	79.2	0.716	0.053	74.2	0.515	0.040	68.0	2.6	45.7	51.1	0.330	0.026	51.1	0.330
239	62.5	438.6	0.033	0.00	80.5	0.732	0.054	75.3	0.527	0.040	68.9	2.7	46.4	51.8	0.337	0.027	51.8	0.337
240	62.6	446.4	0.053	0.00	81.8	0.748	0.055	76.5	0.540	0.041	69.9	2.8	47.0	52.6	0.345	0.027	52.6	0.345
241	62.7	454.3	0.072	0.00	83.1	0.765	0.055	77.7	0.552	0.041	70.8	2.9	47.7	53.4	0.352	0.028	53.4	0.352
242	62.8	462.5	0.092	0.00	84.5	0.781	0.056	79.0	0.565	0.042	71.8	3.0	48.5	54.2	0.361	0.028	54.2	0.361
243	62.9	466.1	0.112	0.00	85.9	0.799	0.057	80.3	0.578	0.043	72.8	3.1	49.2	55.0	0.369	0.028	55.0	0.369
244	63.0	466.1	0.132	0.01	87.3	0.816	0.058	81.6	0.592	0.043	73.8	3.3	49.9	55.8	0.377	0.029	55.8	0.377
245	63.1	466.1	0.151	0.01	88.9	0.836	0.059	82.9	0.605	0.044	74.9	3.4	50.7	56.7	0.386	0.029	56.7	0.386
246	63.2	466.1	0.169	0.02	90.9	0.864	0.060	84.2	0.619	0.044	76.0	3.5	51.5	57.6	0.396	0.029	57.6	0.396
247	63.2	466.1	0.186	0.03	94.3	0.919	0.061	85.6	0.633	0.045	77.1	3.6	52.3	58.5	0.405	0.030	58.5	0.405
248	63.3	466.1	0.201	0.04	100.9	1.033	0.062	87.0	0.648	0.046	78.2	3.8	53.2	59.4	0.415	0.030	59.4	0.415
249	63.4	496.9	0.215	0.05	113.4	1.258	0.063	88.4	0.662	0.047	79.4	3.9	54.0	60.4	0.424	0.031	60.4	0.424
250	63.5	540.4	0.228	0.07	136.7	1.684	0.064	89.9	0.677	0.047	80.5	4.1	54.9	61.4	0.434	0.031	61.4	0.434
251	63.6	583.9	0.241	0.10	178.2	2.449	0.067	91.3	0.692	0.048	81.7	4.2	55.8	62.4	0.445	0.032	62.4	0.445
252	63.7	627.4	0.255	0.16	248.2	3.745	0.070	92.9	0.708	0.049	83.0	4.4	56.7	63.4	0.455	0.032	63.4	0.455

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
253	63.8	670.9	0.271	0.31	357.1	5.770	0.075	94.5	0.725	0.049	84.3	4.6	57.7	64.4	0.466	0.033	64.4	0.466
254	63.9	714.4	0.287	0.62	507.9	8.590	0.082	96.6	0.746	0.050	85.6	4.7	58.6	65.5	0.476	0.033	65.5	0.476
255	64.0	757.9	0.304	1.22	687.5	11.961	0.093	99.6	0.782	0.051	86.9	4.9	59.6	66.6	0.487	0.034	66.6	0.487
256	64.0	801.4	0.320	2.25	866.0	15.307	0.108	105.2	0.851	0.052	88.2	5.1	60.7	67.8	0.498	0.034	67.8	0.498
257	64.1	844.9	0.335	3.72	1009.4	17.974	0.126	115.5	0.992	0.053	89.6	5.3	61.7	68.9	0.509	0.035	68.9	0.509
258	64.2	888.5	0.349	5.54	1096.2	19.558	0.146	134.5	1.265	0.054	91.0	5.5	62.8	70.1	0.519	0.035	70.1	0.519
259	64.3	932.0	0.360	7.52	1124.9	20.043	0.167	168.3	1.767	0.056	92.5	5.8	63.9	71.3	0.530	0.036	71.3	0.530
260	64.4	975.5	0.370	9.49	1106.5	19.655	0.188	225.1	2.640	0.058	94.0	6.1	65.0	72.5	0.541	0.036	72.5	0.541
261	64.5	1019.0	0.378	11.31	1056.3	18.677	0.209	314.5	4.055	0.062	95.6	6.4	66.1	73.8	0.552	0.037	73.8	0.552
262	64.6	1062.5	0.385	12.91	989.9	17.408	0.228	442.6	6.161	0.067	97.3	6.9	67.3	75.1	0.564	0.038	75.1	0.564
263	64.7	1106.0	0.392	14.30	918.8	16.062	0.246	605.9	8.971	0.075	99.1	7.7	68.5	76.6	0.578	0.038	76.6	0.578
264	64.8	1149.5	0.399	15.47	849.9	14.762	0.262	785.3	12.235	0.086	101.3	8.9	69.8	78.4	0.598	0.039	78.4	0.598
265	64.8	1193.0	0.407	16.48	786.8	13.573	0.277	949.8	15.439	0.101	103.8	10.9	71.4	81.0	0.635	0.040	81.0	0.635
266	64.9	1236.5	0.417	17.33	731.3	12.527	0.291	1069.3	17.980	0.119	106.9	14.1	73.4	85.3	0.713	0.040	85.3	0.713
267	65.0	1280.1	0.429	18.07	683.8	11.630	0.304	1128.8	19.458	0.139	110.6	19.2	76.6	92.8	0.878	0.041	92.8	0.878
268	65.1	1323.6	0.442	18.72	644.3	10.884	0.316	1132.8	19.828	0.160	115.3	27.2	82.1	106.1	1.206	0.042	106.1	1.206
269	65.2	1367.1	0.456	19.30	612.5	10.279	0.327	1096.6	19.329	0.181	121.4	39.5	91.7	128.4	1.815	0.044	128.4	1.815
270	65.3	1410.6	0.469	19.83	587.7	9.803	0.338	1036.9	18.279	0.201	129.5	59.0	108.9	164.6	2.871	0.046	164.6	2.871
271	65.4	1445.3	0.481	20.32	569.0	9.441	0.348	967.4	16.957	0.220	140.6	90.3	139.1	219.6	4.562	0.050	219.6	4.562
272	65.5	1445.3	0.491	20.78	555.7	9.174	0.358	897.7	15.569	0.237	156.2	140.4	190.5	297.1	7.039	0.056	297.1	7.039
273	65.6	1445.3	0.499	21.22	546.6	8.984	0.368	833.1	14.245	0.253	177.5	218.9	273.7	397.4	10.267	0.065	397.4	10.267
274	65.6	1445.3	0.505	21.65	540.8	8.848	0.377	775.7	13.042	0.267	205.1	333.0	397.5	516.2	13.881	0.078	516.2	13.881
275	65.7	1445.3	0.510	22.06	537.1	8.744	0.387	726.1	11.984	0.281	238.1	478.1	559.0	645.5	17.169	0.095	645.5	17.169
276	65.8	1444.5	0.515	22.48	534.4	8.651	0.396	684.6	11.085	0.293	271.5	628.4	736.9	776.5	19.375	0.114	776.5	19.375
277	65.9	1441.0	0.520	22.88	531.6	8.551	0.405	650.2	10.354	0.305	306.5	759.1	902.4	895.8	20.232	0.136	895.8	20.232
278	66.0	1438.9	0.527	23.28	528.0	8.426	0.414	621.4	9.800	0.315	341.8	842.4	1024.3	984.8	19.706	0.157	984.8	19.706
279	66.1	1438.6	0.534	23.67	523.0	8.266	0.423	596.3	9.442	0.325	375.2	866.4	1087.6	1036.7	18.140	0.177	1036.7	18.140
280	66.2	1440.4	0.542	24.04	516.2	8.067	0.432	572.0	9.302	0.335	405.3	841.4	1100.1	1053.3	16.082	0.196	1053.3	16.082
281	66.3	1444.4	0.552	24.40	507.6	7.830	0.440	545.1	9.404	0.345	410.9	755.2	1027.0	1040.0	14.203	0.212	1040.0	14.203
282	66.4	1445.3	0.563	24.74	497.6	7.560	0.449	513.0	9.749	0.356	410.9	692.3	970.4	972.4	13.053	0.226	972.4	13.053
283	66.4	1445.3	0.575	25.06	486.5	7.269	0.456	475.0	10.278	0.366	410.9	617.3	901.2	905.7	11.647	0.239	905.7	11.647
284	66.5	1445.3	0.586	25.37	474.7	6.971	0.464	435.5	10.827	0.377	410.9	554.8	843.7	850.6	10.479	0.251	850.6	10.479
285	66.6	1445.3	0.596	25.65	462.5	6.686	0.471	404.3	11.136	0.389	410.9	497.5	790.6	798.6	9.400	0.262	798.6	9.400
286	66.7	1445.3	0.603	25.91	449.9	6.441	0.478	394.3	10.946	0.401	410.9	449.5	746.0	757.5	8.493	0.271	757.5	8.493
287	66.8	1445.3	0.609	26.16	436.7	6.270	0.485	413.8	10.151	0.412	410.9	409.5	708.6	721.7	7.734	0.280	721.7	7.734
288	66.9	1445.3	0.612	26.39	421.7	6.215	0.492	459.8	8.872	0.423	410.9	376.8	678.0	694.0	7.111	0.288	694.0	7.111
289	67.0	1445.3	0.614	26.62	403.2	6.319	0.498	519.4	7.385	0.431	410.9	351.7	654.3	672.3	6.631	0.295	672.3	6.631
290	67.1	1445.3	0.617	26.85	379.3	6.610	0.505	576.4	5.989	0.438	410.9	332.3	636.0	656.0	6.257	0.302	656.0	6.257
291	67.2	1445.3	0.620	27.07	348.7	7.076	0.513	616.5	4.944	0.444	410.9	318.4	622.8	644.5	5.990	0.308	644.5	5.990
292	67.2	1444.6	0.625	27.28	312.6	7.626	0.520	629.4	4.403	0.449	410.9	308.4	613.4	636.3	5.799	0.315	636.3	5.799
293	67.3	1444.8	0.631	27.48	276.3	8.070	0.529	616.9	4.223	0.454	410.9	301.5	607.1	631.0	5.670	0.321	631.0	5.670
294	67.4	1445.3	0.638	27.67	248.9	8.147	0.537	597.4	4.039	0.458	410.9	296.6	602.6	627.0	5.580	0.327	627.0	5.580

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
295	67.5	1445.3	0.647	27.84	239.2	7.616	0.546	587.0	3.728	0.462	410.9	292.5	599.1	623.5	5.507	0.333	623.5	5.507
296	67.6	1445.3	0.656	27.99	251.6	6.411	0.553	581.3	3.479	0.466	410.9	288.3	595.5	619.6	5.435	0.339	619.6	5.435
297	67.7	1445.3	0.665	28.12	286.1	4.776	0.559	573.3	3.332	0.470	410.9	283.2	591.0	614.5	5.344	0.344	614.5	5.344
298	67.8	1445.3	0.673	28.22	343.5	3.279	0.564	568.3	3.187	0.473	410.9	276.6	585.2	607.8	5.226	0.350	607.8	5.226
299	67.9	1445.3	0.679	28.32	422.2	2.499	0.567	566.5	3.086	0.476	410.9	268.2	577.6	599.3	5.072	0.355	599.3	5.072
300	68.0	1445.3	0.684	28.42	509.3	2.649	0.569	563.2	3.026	0.480	410.9	258.0	568.3	589.0	4.882	0.361	589.0	4.882
301	68.0	1445.3	0.688	28.58	581.4	3.427	0.573	558.5	2.932	0.483	410.9	246.2	557.4	577.3	4.661	0.366	577.3	4.661
302	68.1	1445.3	0.689	28.80	619.7	4.212	0.577	550.1	2.789	0.486	410.9	233.3	545.4	564.7	4.417	0.371	564.7	4.417
303	68.2	1441.1	0.689	29.04	623.0	4.445	0.581	534.9	2.553	0.489	410.9	219.9	532.9	551.8	4.162	0.375	551.8	4.162
304	68.3	1432.8	0.690	29.27	602.9	3.999	0.586	513.9	2.193	0.491	410.9	206.6	520.4	539.2	3.908	0.380	539.2	3.908
305	68.4	1425.8	0.691	29.45	574.1	3.286	0.590	489.9	1.758	0.493	410.9	194.1	508.5	527.6	3.667	0.384	527.6	3.667
306	68.5	1421.2	0.693	29.60	548.4	2.769	0.593	471.9	1.365	0.495	410.9	182.9	498.0	517.7	3.454	0.387	517.7	3.454
307	68.6	1419.4	0.698	29.72	532.0	2.488	0.596	473.2	1.239	0.496	410.9	173.5	489.3	509.7	3.278	0.391	509.7	3.278
308	68.7	1420.3	0.704	29.83	524.2	2.302	0.598	502.1	1.594	0.498	410.9	166.3	482.7	503.9	3.143	0.394	503.9	3.143
309	68.8	1423.1	0.711	29.93	522.5	2.234	0.601	552.4	2.422	0.500	410.9	161.0	478.0	499.8	3.048	0.398	499.8	3.048
310	68.8	1427.1	0.719	30.04	527.1	2.330	0.603	602.9	3.416	0.503	410.9	156.9	474.5	496.3	2.975	0.401	496.3	2.975
311	68.9	1431.0	0.725	30.16	536.9	2.508	0.606	630.6	4.121	0.507	410.9	152.6	470.6	491.8	2.897	0.404	491.8	2.897
312	69.0	1434.3	0.731	30.28	548.1	2.707	0.608	626.3	4.251	0.512	410.9	146.2	464.7	484.3	2.777	0.407	484.3	2.777
313	69.1	1436.3	0.734	30.42	558.6	2.911	0.611	598.5	3.852	0.516	410.9	136.1	454.8	472.1	2.576	0.410	472.1	2.576
314	69.2	1437.1	0.736	30.57	566.3	3.058	0.615	565.3	3.221	0.520	410.9	121.0	440.0	454.8	2.276	0.412	454.8	2.276
315	69.3	1436.6	0.737	30.73	568.9	3.107	0.618	541.3	2.683	0.523	410.9	102.2	421.3	434.7	1.895	0.415	434.7	1.895
316	69.4	1435.3	0.737	30.89	565.4	3.048	0.621	529.7	2.378	0.526	410.9	83.9	402.8	417.9	1.520	0.417	417.9	1.520
317	69.5	1433.5	0.736	31.03	555.9	2.872	0.624	526.0	2.258	0.528	410.9	74.3	392.6	413.6	1.311	0.418	413.6	1.311
318	69.6	1432.0	0.734	31.16	540.9	2.591	0.627	527.2	2.241	0.530	410.9	82.2	399.4	430.2	1.450	0.419	430.2	1.450
319	69.6	1431.5	0.734	31.27	521.8	2.235	0.630	533.9	2.320	0.533	410.9	111.6	427.6	467.8	2.022	0.421	467.8	2.022
320	69.7	1432.8	0.735	31.36	500.4	1.829	0.632	544.9	2.497	0.535	410.9	155.8	470.5	514.3	2.895	0.424	514.3	2.895
321	69.8	1436.2	0.737	31.43	478.0	1.405	0.634	556.2	2.712	0.538	410.9	197.4	511.5	549.8	3.728	0.427	549.8	3.728
322	69.9	1441.7	0.742	31.48	456.0	0.989	0.635	565.3	2.896	0.541	410.9	218.1	532.5	558.9	4.154	0.432	558.9	4.154
323	70.0	1445.3	0.747	31.50	435.5	0.596	0.636	570.7	3.019	0.544	410.9	210.8	526.1	541.1	4.025	0.436	541.1	4.025
324	70.1	1445.3	0.753	31.52	417.0	0.242	0.636	570.8	3.051	0.548	410.9	183.5	500.0	509.7	3.495	0.440	509.7	3.495
325	70.2	1445.3	0.758	31.52	401.0	-0.066	0.636	564.6	2.963	0.551	410.9	152.4	469.8	481.1	2.880	0.443	481.1	2.880
326	70.3	1445.3	0.761	31.51	387.7	-0.322	0.636	552.9	2.756	0.554	410.9	130.1	448.0	464.4	2.436	0.446	464.4	2.436
327	70.4	1445.3	0.762	31.50	377.3	-0.521	0.636	536.6	2.451	0.557	410.9	120.4	438.2	459.3	2.238	0.449	459.3	2.238
328	70.4	1445.3	0.761	31.47	370.0	-0.662	0.635	516.7	2.074	0.559	410.9	119.5	437.1	460.6	2.215	0.451	460.6	2.215
329	70.5	1445.3	0.759	31.45	365.8	-0.743	0.634	494.9	1.663	0.561	410.9	123.0	440.4	465.4	2.282	0.454	465.4	2.282
330	70.6	1445.3	0.755	31.43	364.5	-0.767	0.634	472.1	1.255	0.563	410.9	129.8	446.8	473.4	2.413	0.456	473.4	2.413
331	70.7	1445.3	0.752	31.40	366.0	-0.741	0.633	449.4	0.871	0.564	410.9	139.3	456.2	483.9	2.604	0.459	483.9	2.604
332	70.8	1445.3	0.750	31.38	369.7	-0.676	0.632	428.0	0.521	0.565	410.9	149.3	466.3	493.5	2.808	0.462	493.5	2.808
333	70.9	1445.3	0.748	31.36	375.0	-0.587	0.631	408.9	0.204	0.565	410.9	156.5	473.8	499.4	2.961	0.465	499.4	2.961
334	71.0	1445.3	0.748	31.34	381.2	-0.491	0.631	393.4	-0.083	0.565	410.9	158.9	476.9	500.4	3.025	0.468	500.4	3.025
335	71.1	1445.3	0.749	31.33	387.4	-0.400	0.630	381.7	-0.336	0.565	410.9	156.1	475.0	496.1	2.987	0.471	496.1	2.987
336	71.2	1445.3	0.751	31.31	392.8	-0.328	0.630	373.8	-0.540	0.564	410.9	147.6	467.7	486.2	2.838	0.474	486.2	2.838

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
337	71.2	1445.3	0.754	31.30	396.7	-0.277	0.630	369.0	-0.684	0.564	410.9	133.6	455.1	471.1	2.581	0.477	471.1	2.581
338	71.3	1445.3	0.757	31.29	398.3	-0.250	0.629	366.8	-0.761	0.563	410.9	115.4	438.3	452.6	2.240	0.480	452.6	2.240
339	71.4	1445.3	0.759	31.29	397.5	-0.241	0.629	367.1	-0.775	0.562	410.8	94.6	419.0	432.1	1.847	0.482	432.1	1.847
340	71.5	1445.3	0.760	31.28	394.3	-0.252	0.629	369.4	-0.737	0.561	410.7	72.7	398.4	410.9	1.429	0.484	410.9	1.429
341	71.6	1445.3	0.758	31.27	389.4	-0.287	0.628	373.4	-0.658	0.560	410.6	50.9	377.9	390.3	1.013	0.485	390.3	1.013
342	71.7	1445.3	0.755	31.26	383.7	-0.349	0.628	378.4	-0.552	0.560	410.4	30.5	358.5	371.3	0.620	0.486	371.3	0.620
343	71.8	1445.3	0.750	31.24	378.4	-0.437	0.628	383.4	-0.435	0.559	410.2	12.1	341.0	354.3	0.263	0.486	354.3	0.263
344	71.9	1445.3	0.744	31.23	374.4	-0.534	0.627	387.9	-0.322	0.559	409.9	-3.9	325.7	339.8	-0.048	0.486	339.8	-0.048
345	71.9	1445.3	0.738	31.21	371.8	-0.618	0.627	391.3	-0.229	0.559	409.2	-17.1	312.7	328.0	-0.305	0.486	328.0	-0.305
346	72.0	1441.9	0.733	31.19	370.5	-0.670	0.626	393.2	-0.165	0.558	407.9	-27.0	302.4	318.9	-0.502	0.486	318.9	-0.502
347	72.1	1439.0	0.730	31.16	370.2	-0.688	0.625	393.6	-0.137	0.558	406.4	-33.7	294.8	312.5	-0.637	0.485	312.5	-0.637
348	72.2	1438.3	0.729	31.14	370.2	-0.684	0.624	392.4	-0.145	0.558	404.7	-37.2	290.1	308.9	-0.713	0.484	308.9	-0.713
349	72.3	1439.5	0.729	31.12	369.9	-0.677	0.624	389.8	-0.188	0.558	402.9	-37.7	288.1	307.9	-0.731	0.484	307.9	-0.731
350	72.4	1441.8	0.729	31.10	369.0	-0.677	0.623	386.1	-0.260	0.558	401.1	-35.7	288.6	309.3	-0.697	0.483	309.3	-0.697
351	72.5	1444.3	0.730	31.07	367.3	-0.689	0.622	381.7	-0.351	0.557	399.5	-31.7	291.1	312.5	-0.623	0.482	312.5	-0.623
352	72.6	1445.3	0.730	31.05	364.8	-0.713	0.622	377.2	-0.450	0.557	398.2	-26.4	295.1	316.9	-0.520	0.482	316.9	-0.520
353	72.7	1445.3	0.729	31.03	361.5	-0.750	0.621	373.5	-0.540	0.556	397.1	-20.5	299.9	321.7	-0.404	0.481	321.7	-0.404
354	72.7	1445.3	0.727	31.00	357.7	-0.801	0.620	371.0	-0.610	0.556	396.2	-14.8	304.8	326.3	-0.290	0.481	326.3	-0.290
355	72.8	1442.3	0.723	30.97	353.6	-0.866	0.619	370.0	-0.650	0.555	395.6	-10.0	309.1	330.1	-0.192	0.480	330.1	-0.192
356	72.9	1437.0	0.717	30.95	349.2	-0.940	0.618	369.8	-0.662	0.554	395.2	-6.5	312.3	332.5	-0.120	0.480	332.5	-0.120
357	73.0	1430.2	0.710	30.92	344.9	-1.020	0.617	369.8	-0.657	0.554	394.8	-4.7	314.0	333.5	-0.080	0.480	333.5	-0.080
358	73.1	1422.5	0.702	30.88	340.9	-1.102	0.616	369.4	-0.648	0.553	394.5	-4.5	314.1	332.8	-0.075	0.480	332.8	-0.075
359	73.2	1415.0	0.695	30.85	337.1	-1.182	0.615	368.1	-0.647	0.552	394.1	-6.0	312.6	330.6	-0.103	0.480	330.6	-0.103
360	73.3	1408.8	0.688	30.81	333.8	-1.259	0.613	365.8	-0.659	0.552	393.6	-8.8	309.8	327.2	-0.158	0.480	327.2	-0.158
361	73.4	1404.5	0.683	30.77	330.8	-1.330	0.612	362.8	-0.683	0.551	392.9	-12.5	305.9	323.0	-0.232	0.480	323.0	-0.232
362	73.5	1402.6	0.680	30.73	328.2	-1.393	0.611	359.1	-0.718	0.550	392.1	-16.7	301.5	318.4	-0.316	0.479	318.4	-0.316
363	73.5	1402.6	0.678	30.69	325.9	-1.448	0.609	354.7	-0.766	0.549	391.0	-20.5	297.2	314.2	-0.395	0.479	314.2	-0.395
364	73.6	1403.8	0.677	30.65	323.8	-1.494	0.607	349.9	-0.824	0.549	389.8	-23.6	293.5	311.0	-0.458	0.478	311.0	-0.458
365	73.7	1404.9	0.677	30.61	321.9	-1.530	0.606	345.0	-0.889	0.548	388.5	-25.3	290.9	309.0	-0.495	0.478	309.0	-0.495
366	73.8	1404.8	0.675	30.56	320.0	-1.556	0.604	340.1	-0.958	0.547	387.1	-25.8	289.6	308.0	-0.506	0.477	308.0	-0.506
367	73.9	1402.9	0.672	30.52	318.2	-1.573	0.603	335.5	-1.028	0.546	385.8	-25.4	289.2	307.8	-0.498	0.477	307.8	-0.498
368	74.0	1398.8	0.667	30.47	316.4	-1.585	0.601	331.2	-1.095	0.544	384.4	-24.7	289.0	307.5	-0.484	0.476	307.5	-0.484
369	74.1	1392.7	0.660	30.43	314.5	-1.594	0.599	327.3	-1.158	0.543	383.0	-24.4	288.6	306.7	-0.476	0.476	306.7	-0.476
370	74.2	1385.1	0.652	30.38	312.6	-1.600	0.597	323.9	-1.216	0.542	381.6	-24.8	287.5	305.1	-0.483	0.475	305.1	-0.483
371	74.3	1376.6	0.643	30.34	310.8	-1.604	0.596	320.8	-1.266	0.541	380.2	-25.9	285.7	302.8	-0.505	0.475	302.8	-0.505
372	74.3	1368.1	0.634	30.30	309.1	-1.606	0.594	318.2	-1.309	0.539	378.6	-27.6	283.2	299.9	-0.541	0.474	299.9	-0.541
373	74.4	1360.0	0.625	30.25	307.5	-1.609	0.592	315.8	-1.344	0.538	377.0	-29.9	280.1	296.5	-0.588	0.474	296.5	-0.588
374	74.5	1353.1	0.617	30.21	306.0	-1.613	0.591	313.6	-1.371	0.536	375.1	-32.5	276.5	292.5	-0.644	0.473	292.5	-0.644
375	74.6	1347.8	0.610	30.16	304.6	-1.618	0.589	311.7	-1.392	0.535	373.2	-35.4	272.6	288.3	-0.707	0.472	288.3	-0.707
376	74.7	1344.3	0.605	30.12	303.3	-1.626	0.587	309.8	-1.406	0.533	371.0	-38.4	268.4	284.0	-0.773	0.472	284.0	-0.773
377	74.8	1342.4	0.602	30.08	302.0	-1.635	0.585	308.0	-1.416	0.532	368.8	-41.3	264.3	279.8	-0.836	0.471	279.8	-0.836
378	74.9	1341.5	0.599	30.03	300.8	-1.647	0.584	306.1	-1.423	0.530	366.3	-43.9	260.3	275.7	-0.896	0.470	275.7	-0.896

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
379	75.0	1340.8	0.596	29.99	299.6	-1.661	0.582	304.3	-1.428	0.529	363.7	-46.1	256.5	271.9	-0.949	0.469	271.9	-0.949
380	75.1	1339.2	0.593	29.94	298.3	-1.676	0.580	302.5	-1.433	0.527	361.0	-47.9	253.0	268.4	-0.994	0.468	268.4	-0.994
381	75.1	1335.8	0.588	29.90	296.9	-1.691	0.578	300.8	-1.436	0.526	358.3	-49.3	249.9	265.2	-1.031	0.467	265.2	-1.031
382	75.2	1330.1	0.581	29.85	295.4	-1.707	0.577	299.2	-1.438	0.524	355.4	-50.3	247.0	262.3	-1.060	0.466	262.3	-1.060
383	75.3	1322.2	0.571	29.81	293.8	-1.723	0.575	297.6	-1.441	0.523	352.5	-50.9	244.5	259.7	-1.081	0.464	259.7	-1.081
384	75.4	1312.7	0.561	29.76	292.0	-1.737	0.573	296.1	-1.443	0.521	349.5	-51.2	242.3	257.5	-1.095	0.463	257.5	-1.095
385	75.5	1302.7	0.550	29.72	290.1	-1.750	0.571	294.5	-1.444	0.520	346.5	-51.1	240.4	255.4	-1.103	0.462	255.4	-1.103
386	75.6	1293.0	0.538	29.67	288.1	-1.761	0.569	292.8	-1.446	0.518	343.5	-50.9	238.6	253.5	-1.106	0.461	253.5	-1.106
387	75.7	1284.4	0.528	29.63	286.0	-1.772	0.567	291.0	-1.448	0.517	340.5	-50.4	237.0	251.8	-1.105	0.460	251.8	-1.105
388	75.8	1277.3	0.519	29.58	283.9	-1.782	0.565	289.2	-1.450	0.515	337.5	-49.9	235.5	250.1	-1.102	0.459	250.1	-1.102
389	75.9	1271.7	0.512	29.54	281.8	-1.791	0.563	287.2	-1.452	0.514	334.5	-49.3	234.1	248.5	-1.097	0.457	248.5	-1.097
390	75.9	1267.4	0.506	29.49	279.8	-1.800	0.562	285.0	-1.455	0.512	331.6	-48.7	232.8	246.9	-1.092	0.456	246.9	-1.092
391	76.0	1264.1	0.500	29.45	277.9	-1.808	0.560	282.8	-1.457	0.510	328.6	-48.0	231.4	245.4	-1.085	0.455	245.4	-1.085
392	76.1	1261.3	0.496	29.41	276.2	-1.813	0.558	280.5	-1.460	0.509	325.7	-47.3	230.2	244.0	-1.077	0.454	244.0	-1.077
393	76.2	1258.4	0.491	29.36	274.5	-1.816	0.556	278.0	-1.462	0.507	322.8	-46.6	228.9	242.5	-1.068	0.453	242.5	-1.068
394	76.3	1254.7	0.485	29.32	272.9	-1.818	0.554	275.5	-1.465	0.506	319.9	-45.8	227.7	241.1	-1.059	0.452	241.1	-1.059
395	76.4	1249.7	0.478	29.27	271.3	-1.817	0.552	273.0	-1.466	0.504	317.0	-45.1	226.5	239.7	-1.051	0.450	239.7	-1.051
396	76.5	1242.9	0.469	29.23	269.8	-1.815	0.550	270.4	-1.467	0.503	314.2	-44.4	225.3	238.2	-1.043	0.449	238.2	-1.043
397	76.6	1234.3	0.458	29.19	268.2	-1.811	0.548	267.8	-1.468	0.501	311.4	-43.8	224.0	236.7	-1.036	0.448	236.7	-1.036
398	76.7	1224.3	0.446	29.14	266.6	-1.806	0.546	265.3	-1.467	0.500	308.6	-43.2	222.7	235.1	-1.030	0.447	235.1	-1.030
399	76.7	1213.7	0.433	29.10	264.9	-1.800	0.544	262.8	-1.465	0.498	305.7	-42.7	221.4	233.6	-1.025	0.446	233.6	-1.025
400	76.8	1203.4	0.420	29.06	263.1	-1.794	0.542	260.4	-1.462	0.496	303.0	-42.2	220.0	231.9	-1.023	0.445	231.9	-1.023
401	76.9	1194.2	0.408	29.02	261.2	-1.788	0.540	258.1	-1.457	0.495	300.2	-41.9	218.5	230.2	-1.021	0.444	230.2	-1.021
402	77.0	1186.6	0.397	28.98	259.3	-1.782	0.538	255.9	-1.449	0.493	297.4	-41.5	217.0	228.4	-1.021	0.443	228.4	-1.021
403	77.1	1180.8	0.389	28.93	257.2	-1.776	0.537	253.8	-1.439	0.492	294.6	-41.2	215.4	226.6	-1.022	0.442	226.6	-1.022
404	77.2	1176.3	0.382	28.89	255.0	-1.771	0.535	251.8	-1.429	0.490	291.8	-41.0	213.8	224.8	-1.024	0.441	224.8	-1.024
405	77.3	1172.5	0.375	28.85	252.7	-1.766	0.533	249.7	-1.418	0.489	289.0	-40.7	212.2	223.0	-1.026	0.439	223.0	-1.026
406	77.4	1168.8	0.369	28.82	250.4	-1.761	0.531	247.8	-1.406	0.487	286.2	-40.4	210.7	221.2	-1.028	0.438	221.2	-1.028
407	77.5	1164.6	0.362	28.78	248.0	-1.757	0.529	245.8	-1.395	0.486	283.4	-40.2	209.1	219.4	-1.029	0.437	219.4	-1.029
408	77.5	1159.3	0.354	28.74	245.6	-1.752	0.527	243.8	-1.384	0.484	280.6	-39.9	207.5	217.6	-1.030	0.436	217.6	-1.030
409	77.6	1152.7	0.344	28.70	243.2	-1.748	0.525	241.7	-1.374	0.483	277.8	-39.5	206.0	215.9	-1.030	0.435	215.9	-1.030
410	77.7	1144.9	0.333	28.66	240.9	-1.743	0.523	239.7	-1.366	0.481	275.0	-39.1	204.5	214.3	-1.029	0.434	214.3	-1.029
411	77.8	1135.9	0.321	28.63	238.5	-1.738	0.522	237.6	-1.358	0.480	272.2	-38.7	203.1	212.8	-1.025	0.433	212.8	-1.025
412	77.9	1126.1	0.307	28.59	236.2	-1.732	0.520	235.4	-1.351	0.478	269.5	-38.1	201.8	211.3	-1.019	0.432	211.3	-1.019
413	78.0	1115.9	0.293	28.55	234.0	-1.725	0.518	233.2	-1.347	0.477	266.7	-37.5	200.6	209.9	-1.011	0.431	209.9	-1.011
414	78.1	1105.9	0.278	28.52	231.8	-1.717	0.516	231.0	-1.343	0.476	264.0	-36.8	199.4	208.6	-1.001	0.430	208.6	-1.001
415	78.2	1096.8	0.265	28.48	229.7	-1.708	0.514	228.7	-1.340	0.474	261.3	-36.1	198.3	207.3	-0.990	0.429	207.3	-0.990
416	78.3	1089.0	0.253	28.45	227.6	-1.698	0.512	226.4	-1.337	0.473	258.6	-35.4	197.2	206.0	-0.979	0.428	206.0	-0.979
417	78.3	1082.7	0.243	28.41	225.5	-1.689	0.511	224.1	-1.335	0.471	256.0	-34.7	196.1	204.7	-0.968	0.427	204.7	-0.968
418	78.4	1077.6	0.235	28.38	223.5	-1.679	0.509	221.9	-1.332	0.470	253.4	-34.0	195.1	203.4	-0.957	0.425	203.4	-0.957
419	78.5	1073.4	0.227	28.35	221.6	-1.668	0.507	219.6	-1.329	0.468	250.8	-33.4	194.0	202.1	-0.947	0.424	202.1	-0.947
420	78.6	1069.3	0.220	28.32	219.6	-1.658	0.505	217.4	-1.325	0.467	248.2	-32.8	192.8	200.7	-0.939	0.423	200.7	-0.939

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
421	78.7	1064.5	0.212	28.28	217.7	-1.648	0.503	215.2	-1.321	0.466	245.7	-32.3	191.7	199.3	-0.932	0.422	199.3	-0.932
422	78.8	1058.6	0.202	28.25	215.9	-1.637	0.502	213.0	-1.315	0.464	243.1	-31.8	190.5	197.9	-0.926	0.421	197.9	-0.926
423	78.9	1051.2	0.190	28.22	214.0	-1.626	0.500	210.9	-1.307	0.463	240.6	-31.4	189.2	196.4	-0.921	0.421	196.4	-0.921
424	79.0	1042.7	0.177	28.19	212.2	-1.615	0.498	208.8	-1.299	0.461	238.1	-31.0	187.9	194.9	-0.918	0.420	194.9	-0.918
425	79.1	1033.3	0.162	28.16	210.4	-1.604	0.497	206.8	-1.290	0.460	235.6	-30.7	186.6	193.4	-0.916	0.419	193.4	-0.916
426	79.1	1023.6	0.146	28.13	208.6	-1.591	0.495	204.8	-1.280	0.459	233.1	-30.3	185.3	191.8	-0.914	0.418	191.8	-0.914
427	79.2	1013.9	0.131	28.10	206.9	-1.578	0.493	202.8	-1.270	0.457	230.6	-30.1	183.9	190.3	-0.913	0.417	190.3	-0.913
428	79.3	1004.8	0.116	28.07	205.2	-1.564	0.491	200.8	-1.259	0.456	228.1	-29.8	182.5	188.7	-0.912	0.416	188.7	-0.912
429	79.4	996.5	0.102	28.04	203.5	-1.550	0.490	198.9	-1.249	0.455	225.7	-29.5	181.2	187.2	-0.911	0.415	187.2	-0.911
430	79.5	989.1	0.089	28.02	201.9	-1.535	0.488	197.0	-1.238	0.453	223.2	-29.2	179.9	185.7	-0.910	0.414	185.7	-0.910
431	79.6	982.8	0.078	27.99	200.2	-1.519	0.487	195.1	-1.228	0.452	220.7	-28.8	178.6	184.3	-0.907	0.413	184.3	-0.907
432	79.7	977.3	0.068	27.96	198.6	-1.503	0.485	193.3	-1.217	0.451	218.3	-28.4	177.3	182.8	-0.903	0.412	182.8	-0.903
433	79.8	972.5	0.059	27.94	196.9	-1.486	0.483	191.5	-1.206	0.449	215.8	-28.0	176.1	181.5	-0.898	0.411	181.5	-0.898
434	79.9	967.8	0.050	27.91	195.3	-1.469	0.482	189.8	-1.195	0.448	213.4	-27.6	174.9	180.1	-0.892	0.410	180.1	-0.892
435	79.9	962.7	0.040	27.89	193.6	-1.452	0.480	188.1	-1.184	0.447	211.0	-27.2	173.8	178.8	-0.885	0.409	178.8	-0.885
436	80.0	956.7	0.029	27.86	192.0	-1.436	0.479	186.5	-1.173	0.446	208.6	-26.7	172.7	177.5	-0.878	0.408	177.5	-0.878
437	80.1	949.5	0.016	27.84	190.4	-1.419	0.477	184.9	-1.160	0.444	206.2	-26.2	171.6	176.3	-0.869	0.407	176.3	-0.869
438	80.2	941.2	0.001	27.81	188.7	-1.403	0.476	183.3	-1.148	0.443	203.9	-25.7	170.5	175.0	-0.861	0.406	175.0	-0.861
439	80.3	932.1	-0.015	27.79	187.2	-1.386	0.474	181.8	-1.135	0.442	201.5	-25.3	169.5	173.8	-0.852	0.405	173.8	-0.852
440	80.4	922.6	-0.033	27.77	185.6	-1.370	0.473	180.3	-1.121	0.441	199.2	-24.8	168.4	172.6	-0.843	0.404	172.6	-0.843
441	80.5	913.5	-0.050	27.75	184.1	-1.353	0.471	178.8	-1.107	0.439	197.0	-24.3	167.4	171.4	-0.833	0.403	171.4	-0.833
442	80.6	905.0	-0.066	27.72	182.6	-1.337	0.470	177.3	-1.093	0.438	194.7	-23.8	166.4	170.3	-0.824	0.403	170.3	-0.824
443	80.7	897.5	-0.081	27.70	181.2	-1.321	0.468	175.7	-1.079	0.437	192.5	-23.4	165.4	169.1	-0.814	0.402	169.1	-0.814
444	80.7	891.0	-0.094	27.68	179.7	-1.305	0.467	174.2	-1.065	0.436	190.3	-22.9	164.5	168.0	-0.803	0.401	168.0	-0.803
445	80.8	885.3	-0.105	27.66	178.3	-1.289	0.466	172.7	-1.050	0.435	188.2	-22.4	163.5	166.9	-0.792	0.400	166.9	-0.792
446	80.9	880.1	-0.116	27.64	176.9	-1.273	0.464	171.2	-1.035	0.434	186.0	-21.9	162.7	165.9	-0.780	0.399	165.9	-0.780
447	81.0	875.1	-0.127	27.62	175.5	-1.257	0.463	169.7	-1.020	0.433	183.9	-21.4	161.8	164.8	-0.768	0.398	164.8	-0.768
448	81.1	870.1	-0.138	27.60	174.1	-1.241	0.462	168.2	-1.005	0.432	181.9	-20.9	160.9	163.9	-0.756	0.397	163.9	-0.756
449	81.2	864.7	-0.149	27.58	172.7	-1.225	0.460	166.7	-0.990	0.431	179.8	-20.4	160.1	162.9	-0.743	0.397	162.9	-0.743
450	81.3	858.6	-0.162	27.56	171.3	-1.210	0.459	165.2	-0.975	0.429	177.9	-19.9	159.3	162.0	-0.729	0.396	162.0	-0.729
451	81.4	851.8	-0.176	27.55	169.9	-1.194	0.458	163.8	-0.959	0.428	175.9	-19.4	158.6	161.0	-0.716	0.395	161.0	-0.716
452	81.5	844.1	-0.193	27.53	168.5	-1.178	0.456	162.3	-0.943	0.427	174.0	-18.9	157.8	160.1	-0.703	0.394	160.1	-0.703
453	81.5	835.9	-0.210	27.51	167.1	-1.162	0.455	160.9	-0.928	0.426	172.1	-18.4	157.1	159.2	-0.689	0.394	159.2	-0.689
454	81.6	827.3	-0.229	27.49	165.6	-1.145	0.454	159.5	-0.912	0.425	170.2	-18.0	156.3	158.3	-0.677	0.393	158.3	-0.677
455	81.7	819.0	-0.247	27.48	164.2	-1.129	0.453	158.2	-0.896	0.424	168.4	-17.5	155.6	157.4	-0.664	0.392	157.4	-0.664
456	81.8	811.2	-0.264	27.46	162.8	-1.112	0.452	156.8	-0.880	0.424	166.6	-17.1	154.9	156.6	-0.651	0.391	156.6	-0.651
457	81.9	804.3	-0.280	27.44	161.4	-1.095	0.450	155.4	-0.865	0.423	164.9	-16.6	154.1	155.7	-0.639	0.391	155.7	-0.639
458	82.0	798.4	-0.294	27.43	160.0	-1.079	0.449	154.0	-0.849	0.422	163.2	-16.2	153.4	154.8	-0.628	0.390	154.8	-0.628
459	82.1	793.3	-0.306	27.41	158.6	-1.062	0.448	152.6	-0.834	0.421	161.5	-15.8	152.8	154.0	-0.616	0.389	154.0	-0.616
460	82.2	788.6	-0.318	27.40	157.2	-1.045	0.447	151.2	-0.819	0.420	159.8	-15.4	152.1	153.2	-0.604	0.389	153.2	-0.604
461	82.3	784.1	-0.329	27.39	155.8	-1.028	0.446	149.9	-0.804	0.419	158.2	-15.0	151.4	152.4	-0.591	0.388	152.4	-0.591
462	82.3	779.2	-0.341	27.37	154.5	-1.011	0.445	148.5	-0.790	0.418	156.6	-14.6	150.8	151.7	-0.579	0.388	151.7	-0.579

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
463	82.4	773.9	-0.354	27.36	153.1	-0.995	0.444	147.2	-0.775	0.417	155.1	-14.3	150.2	150.9	-0.567	0.387	150.9	-0.567
464	82.5	767.9	-0.369	27.34	151.8	-0.978	0.443	145.9	-0.761	0.417	153.5	-13.9	149.6	150.2	-0.555	0.386	150.2	-0.555
465	82.6	761.3	-0.385	27.33	150.5	-0.961	0.442	144.6	-0.747	0.416	152.1	-13.5	149.0	149.5	-0.543	0.386	149.5	-0.543
466	82.7	754.2	-0.403	27.32	149.2	-0.944	0.441	143.3	-0.733	0.415	150.6	-13.2	148.4	148.7	-0.532	0.385	148.7	-0.532
467	82.8	746.9	-0.421	27.31	147.9	-0.927	0.440	142.1	-0.719	0.414	149.2	-12.9	147.8	148.0	-0.520	0.385	148.0	-0.520
468	82.9	739.5	-0.440	27.29	146.6	-0.910	0.439	140.9	-0.706	0.413	147.8	-12.5	147.2	147.3	-0.510	0.384	147.3	-0.510
469	83.0	732.2	-0.459	27.28	145.3	-0.894	0.438	139.7	-0.692	0.413	146.4	-12.2	146.7	146.6	-0.499	0.383	146.6	-0.499
470	83.1	725.5	-0.477	27.27	144.0	-0.877	0.437	138.5	-0.679	0.412	145.1	-11.9	146.1	145.9	-0.490	0.383	145.9	-0.490
471	83.1	719.3	-0.494	27.26	142.8	-0.861	0.436	137.4	-0.666	0.411	143.7	-11.7	145.5	145.2	-0.480	0.382	145.2	-0.480
472	83.2	713.9	-0.509	27.25	141.5	-0.845	0.435	136.2	-0.653	0.411	142.4	-11.4	145.0	144.5	-0.471	0.382	144.5	-0.471
473	83.3	709.2	-0.522	27.24	140.3	-0.830	0.434	135.1	-0.640	0.410	141.2	-11.1	144.4	143.9	-0.462	0.381	143.9	-0.462
474	83.4	704.9	-0.534	27.23	139.1	-0.814	0.433	134.0	-0.627	0.409	139.9	-10.9	143.9	143.2	-0.453	0.381	143.2	-0.453
475	83.5	700.7	-0.546	27.22	137.9	-0.799	0.432	132.9	-0.615	0.409	138.7	-10.6	143.3	142.6	-0.444	0.380	142.6	-0.444
476	83.6	696.3	-0.559	27.21	136.7	-0.785	0.431	131.9	-0.602	0.408	137.5	-10.4	142.8	141.9	-0.436	0.380	141.9	-0.436
477	83.7	691.4	-0.573	27.20	135.6	-0.770	0.431	130.8	-0.590	0.407	136.3	-10.1	142.3	141.3	-0.427	0.380	141.3	-0.427
478	83.8	685.9	-0.589	27.19	134.4	-0.756	0.430	129.8	-0.578	0.407	135.2	-9.9	141.8	140.7	-0.418	0.379	140.7	-0.418
479	83.9	679.7	-0.607	27.18	133.3	-0.742	0.429	128.8	-0.567	0.406	134.1	-9.6	141.3	140.1	-0.410	0.379	140.1	-0.410
480	83.9	673.2	-0.627	27.17	132.2	-0.728	0.428	127.8	-0.556	0.405	133.0	-9.4	140.8	139.5	-0.402	0.378	139.5	-0.402
481	84.0	666.6	-0.647	27.17	131.1	-0.714	0.427	126.8	-0.545	0.405	131.9	-9.2	140.3	139.0	-0.394	0.378	139.0	-0.394
482	84.1	660.0	-0.666	27.16	130.1	-0.699	0.427	125.9	-0.535	0.404	130.8	-9.0	139.9	138.4	-0.385	0.377	138.4	-0.385
483	84.2	653.9	-0.686	27.15	129.1	-0.685	0.426	124.9	-0.525	0.404	129.8	-8.8	139.4	137.9	-0.378	0.377	137.9	-0.378
484	84.3	648.1	-0.704	27.14	128.1	-0.672	0.425	124.0	-0.515	0.403	128.8	-8.6	139.0	137.3	-0.370	0.377	137.3	-0.370
485	84.4	642.9	-0.720	27.13	127.1	-0.658	0.424	123.1	-0.505	0.403	127.8	-8.3	138.5	136.8	-0.362	0.376	136.8	-0.362
486	84.5	638.2	-0.736	27.13	126.1	-0.644	0.424	122.2	-0.496	0.402	126.8	-8.1	138.1	136.3	-0.355	0.376	136.3	-0.355
487	84.6	633.9	-0.750	27.12	125.2	-0.631	0.423	121.3	-0.486	0.402	125.9	-7.9	137.7	135.8	-0.347	0.375	135.8	-0.347
488	84.7	629.9	-0.763	27.11	124.3	-0.618	0.422	120.5	-0.477	0.401	124.9	-7.8	137.3	135.3	-0.340	0.375	135.3	-0.340
489	84.7	625.9	-0.777	27.11	123.4	-0.605	0.422	119.6	-0.468	0.400	124.0	-7.6	136.9	134.8	-0.333	0.375	134.8	-0.333
490	84.8	621.9	-0.791	27.10	122.5	-0.593	0.421	118.8	-0.458	0.400	123.1	-7.4	136.5	134.3	-0.326	0.374	134.3	-0.326
491	84.9	617.4	-0.806	27.09	121.7	-0.581	0.420	118.0	-0.449	0.400	122.2	-7.2	136.1	133.8	-0.320	0.374	133.8	-0.320
492	85.0	612.5	-0.823	27.09	120.9	-0.568	0.420	117.3	-0.439	0.399	121.4	-7.1	135.7	133.3	-0.313	0.374	133.3	-0.313
493	85.1	607.1	-0.842	27.08	120.1	-0.556	0.419	116.5	-0.430	0.399	120.5	-6.9	135.3	132.9	-0.307	0.373	132.9	-0.307
494	85.2	601.3	-0.862	27.08	119.3	-0.544	0.419	115.8	-0.421	0.398	119.7	-6.8	134.9	132.4	-0.301	0.373	132.4	-0.301
495	85.3	595.3	-0.883	27.07	118.5	-0.532	0.418	115.1	-0.412	0.398	118.9	-6.6	134.5	131.9	-0.296	0.373	131.9	-0.296
496	85.4	589.6	-0.904	27.06	117.8	-0.521	0.418	114.4	-0.403	0.397	118.1	-6.5	134.1	131.5	-0.290	0.372	131.5	-0.290
497	85.5	584.1	-0.924	27.06	117.0	-0.509	0.417	113.7	-0.395	0.397	117.3	-6.3	133.8	131.1	-0.285	0.372	131.1	-0.285
498	85.5	579.2	-0.943	27.05	116.3	-0.498	0.416	113.0	-0.386	0.396	116.5	-6.2	133.4	130.6	-0.279	0.372	130.6	-0.279
499	85.6	574.8	-0.960	27.05	115.6	-0.487	0.416	112.4	-0.377	0.396	115.8	-6.1	133.0	130.2	-0.274	0.371	130.2	-0.274
500	85.7	570.8	-0.975	27.04	114.9	-0.476	0.415	111.7	-0.369	0.396	115.1	-5.9	132.7	129.8	-0.268	0.371	129.8	-0.268
501	85.8	567.1	-0.990	27.04	114.2	-0.465	0.415	111.1	-0.361	0.395	114.3	-5.8	132.4	129.4	-0.263	0.371	129.4	-0.263
502	85.9	563.5	-1.004	27.03	113.5	-0.455	0.414	110.5	-0.352	0.395	113.6	-5.6	132.1	129.1	-0.257	0.371	129.1	-0.257
503	86.0	559.9	-1.018	27.03	112.9	-0.445	0.414	110.0	-0.344	0.394	112.9	-5.5	131.7	128.7	-0.251	0.370	128.7	-0.251
504	86.1	556.0	-1.034	27.03	112.2	-0.435	0.413	109.4	-0.336	0.394	112.3	-5.4	131.4	128.3	-0.245	0.370	128.3	-0.245

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
505	86.2	551.9	-1.050	27.02	111.5	-0.426	0.413	108.9	-0.328	0.394	111.6	-5.2	131.1	128.0	-0.240	0.370	128.0	-0.240
506	86.3	547.5	-1.068	27.02	110.9	-0.417	0.413	108.3	-0.321	0.393	111.0	-5.1	130.9	127.6	-0.234	0.370	127.6	-0.234
507	86.3	542.8	-1.088	27.01	110.2	-0.408	0.412	107.8	-0.313	0.393	110.3	-4.9	130.6	127.3	-0.228	0.369	127.3	-0.228
508	86.4	537.8	-1.109	27.01	109.6	-0.399	0.412	107.3	-0.306	0.393	109.7	-4.8	130.3	127.0	-0.222	0.369	127.0	-0.222
509	86.5	532.7	-1.131	27.01	108.9	-0.391	0.411	106.8	-0.298	0.392	109.1	-4.7	130.1	126.7	-0.217	0.369	126.7	-0.217
510	86.6	527.7	-1.152	27.00	108.3	-0.383	0.411	106.3	-0.291	0.392	108.5	-4.6	129.8	126.4	-0.212	0.369	126.4	-0.212
511	86.7	523.0	-1.173	27.00	107.7	-0.375	0.410	105.8	-0.284	0.392	108.0	-4.4	129.6	126.1	-0.206	0.368	126.1	-0.206
512	86.8	518.6	-1.192	26.99	107.1	-0.368	0.410	105.2	-0.277	0.391	107.4	-4.3	129.3	125.8	-0.201	0.368	125.8	-0.201
513	86.9	514.8	-1.210	26.99	106.5	-0.361	0.410	104.7	-0.271	0.391	106.9	-4.2	129.1	125.5	-0.195	0.368	125.5	-0.195
514	87.0	511.4	-1.226	26.99	105.9	-0.354	0.409	104.2	-0.265	0.391	106.4	-4.1	128.9	125.2	-0.190	0.368	125.2	-0.190
515	87.1	508.2	-1.240	26.98	105.3	-0.347	0.409	103.7	-0.259	0.391	105.9	-3.9	128.7	125.0	-0.184	0.368	125.0	-0.184
516	87.1	505.1	-1.255	26.98	104.7	-0.340	0.409	103.2	-0.253	0.390	105.4	-3.8	128.5	124.7	-0.179	0.367	124.7	-0.179
517	87.2	501.9	-1.270	26.98	104.2	-0.334	0.408	102.7	-0.247	0.390	104.9	-3.7	128.3	124.5	-0.174	0.367	124.5	-0.174
518	87.3	498.5	-1.286	26.97	103.6	-0.328	0.408	102.2	-0.241	0.390	104.4	-3.6	128.1	124.2	-0.169	0.367	124.2	-0.169
519	87.4	494.7	-1.304	26.97	103.0	-0.323	0.408	101.8	-0.236	0.390	104.0	-3.5	127.9	124.0	-0.165	0.367	124.0	-0.165
520	87.5	490.7	-1.324	26.97	102.4	-0.317	0.407	101.3	-0.231	0.389	103.5	-3.4	127.7	123.8	-0.160	0.367	123.8	-0.160
521	87.6	486.4	-1.345	26.97	101.8	-0.312	0.407	100.8	-0.226	0.389	103.1	-3.3	127.5	123.5	-0.156	0.367	123.5	-0.156
522	87.7	482.1	-1.367	26.96	101.3	-0.307	0.407	100.4	-0.222	0.389	102.7	-3.2	127.3	123.3	-0.152	0.366	123.3	-0.152
523	87.8	477.7	-1.389	26.96	100.7	-0.302	0.406	99.9	-0.217	0.389	102.3	-3.1	127.1	123.1	-0.148	0.366	123.1	-0.148
524	87.9	473.5	-1.410	26.96	100.1	-0.297	0.406	99.4	-0.213	0.388	101.9	-3.1	126.9	122.8	-0.145	0.366	122.8	-0.145
525	87.9	469.5	-1.431	26.96	99.5	-0.293	0.406	99.0	-0.209	0.388	101.5	-3.0	126.7	122.6	-0.142	0.366	122.6	-0.142
526	88.0	465.9	-1.451	26.95	99.0	-0.289	0.405	98.5	-0.205	0.388	101.1	-2.9	126.5	122.4	-0.139	0.366	122.4	-0.139
527	88.1	462.5	-1.469	26.95	98.4	-0.285	0.405	98.1	-0.201	0.388	100.7	-2.9	126.4	122.2	-0.136	0.366	122.2	-0.136
528	88.2	459.5	-1.485	26.95	97.8	-0.281	0.405	97.6	-0.198	0.388	100.3	-2.8	126.2	121.9	-0.133	0.365	121.9	-0.133
529	88.3	456.7	-1.500	26.95	97.3	-0.278	0.404	97.2	-0.195	0.387	100.0	-2.7	126.0	121.7	-0.131	0.365	121.7	-0.131
530	88.4	454.0	-1.515	26.94	96.7	-0.275	0.404	96.7	-0.193	0.387	99.6	-2.7	125.8	121.5	-0.129	0.365	121.5	-0.129
531	88.5	451.2	-1.531	26.94	96.2	-0.272	0.404	96.3	-0.190	0.387	99.3	-2.6	125.6	121.3	-0.127	0.365	121.3	-0.127
532	88.6	448.1	-1.548	26.94	95.6	-0.269	0.403	95.8	-0.188	0.387	98.9	-2.6	125.5	121.1	-0.125	0.365	121.1	-0.125
533	88.6	444.8	-1.567	26.94	95.1	-0.267	0.403	95.4	-0.186	0.386	98.6	-2.6	125.3	120.9	-0.123	0.365	120.9	-0.123
534	88.7	441.2	-1.587	26.93	94.5	-0.265	0.403	95.0	-0.185	0.386	98.3	-2.5	125.1	120.7	-0.122	0.365	120.7	-0.122
535	88.8	437.4	-1.610	26.93	94.0	-0.262	0.403	94.5	-0.183	0.386	97.9	-2.5	124.9	120.4	-0.120	0.364	120.4	-0.120
536	88.9	433.6	-1.633	26.93	93.4	-0.261	0.402	94.1	-0.182	0.386	97.6	-2.5	124.7	120.2	-0.119	0.364	120.2	-0.119
537	89.0	429.8	-1.655	26.93	92.9	-0.259	0.402	93.7	-0.181	0.386	97.3	-2.4	124.5	120.0	-0.118	0.364	120.0	-0.118
538	89.1	426.2	-1.677	26.93	92.4	-0.258	0.402	93.3	-0.181	0.386	97.0	-2.4	124.4	119.8	-0.117	0.364	119.8	-0.117
539	89.2	422.9	-1.698	26.92	91.9	-0.256	0.402	92.8	-0.180	0.385	96.6	-2.4	124.2	119.5	-0.117	0.364	119.5	-0.117
540	89.3	419.8	-1.717	26.92	91.3	-0.256	0.401	92.4	-0.180	0.385	96.3	-2.4	124.0	119.3	-0.117	0.364	119.3	-0.117
541	89.4	417.0	-1.735	26.92	90.8	-0.255	0.401	92.0	-0.180	0.385	96.0	-2.4	123.8	119.1	-0.116	0.364	119.1	-0.116
542	89.4	414.3	-1.752	26.92	90.3	-0.254	0.401	91.6	-0.180	0.385	95.7	-2.4	123.6	118.9	-0.116	0.364	118.9	-0.116
543	89.5	411.8	-1.768	26.92	89.8	-0.254	0.400	91.2	-0.180	0.385	95.4	-2.4	123.4	118.6	-0.116	0.363	118.6	-0.116
544	89.6	409.4	-1.784	26.91	89.4	-0.254	0.400	90.8	-0.181	0.384	95.0	-2.4	123.2	118.4	-0.117	0.363	118.4	-0.117
545	89.7	406.8	-1.801	26.91	88.9	-0.254	0.400	90.4	-0.181	0.384	94.7	-2.4	123.0	118.2	-0.117	0.363	118.2	-0.117
546	89.8	404.1	-1.819	26.91	88.4	-0.255	0.400	89.9	-0.182	0.384	94.4	-2.4	122.7	117.9	-0.118	0.363	117.9	-0.118

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
547	89.9	401.3	-1.838	26.91	87.9	-0.255	0.399	89.5	-0.183	0.384	94.1	-2.4	122.5	117.7	-0.118	0.363	117.7	-0.118
548	90.0	398.1	-1.859	26.91	87.4	-0.256	0.399	89.1	-0.184	0.384	93.7	-2.4	122.3	117.4	-0.119	0.363	117.4	-0.119
549	90.1	394.8	-1.882	26.90	87.0	-0.256	0.399	88.7	-0.185	0.383	93.4	-2.5	122.1	117.2	-0.120	0.363	117.2	-0.120
550	90.2	391.5	-1.906	26.90	86.5	-0.258	0.399	88.3	-0.186	0.383	93.1	-2.5	121.9	116.9	-0.121	0.363	116.9	-0.121
551	90.2	388.1	-1.929	26.90	86.0	-0.258	0.398	87.9	-0.188	0.383	92.7	-2.5	121.6	116.7	-0.122	0.362	116.7	-0.122
552	90.3	385.0	-1.952	26.90	85.6	-0.260	0.398	87.5	-0.189	0.383	92.4	-2.5	121.4	116.4	-0.123	0.362	116.4	-0.123
553	90.4	382.1	-1.973	26.90	85.1	-0.261	0.398	87.1	-0.190	0.383	92.1	-2.5	121.2	116.1	-0.124	0.362	116.1	-0.124
554	90.5	379.5	-1.992	26.89	84.7	-0.262	0.397	86.7	-0.192	0.382	91.7	-2.6	120.9	115.9	-0.126	0.362	115.9	-0.126
555	90.6	377.1	-2.010	26.89	84.2	-0.264	0.397	86.3	-0.194	0.382	91.4	-2.6	120.7	115.6	-0.127	0.362	115.6	-0.127
556	90.7	374.9	-2.027	26.89	83.8	-0.265	0.397	85.9	-0.196	0.382	91.0	-2.6	120.4	115.3	-0.128	0.362	115.3	-0.128
557	90.8	372.7	-2.043	26.89	83.3	-0.267	0.397	85.5	-0.198	0.382	90.7	-2.6	120.2	115.0	-0.130	0.362	115.0	-0.130
558	90.9	370.5	-2.060	26.89	82.9	-0.268	0.396	85.1	-0.200	0.382	90.3	-2.7	119.9	114.8	-0.131	0.362	114.8	-0.131
559	91.0	368.2	-2.077	26.88	82.5	-0.271	0.396	84.6	-0.202	0.381	89.9	-2.7	119.7	114.5	-0.133	0.361	114.5	-0.133
560	91.0	365.8	-2.097	26.88	82.0	-0.273	0.396	84.2	-0.204	0.381	89.6	-2.7	119.4	114.2	-0.134	0.361	114.2	-0.134
561	91.1	363.2	-2.117	26.88	81.6	-0.274	0.395	83.8	-0.206	0.381	89.2	-2.7	119.2	113.9	-0.136	0.361	113.9	-0.136
562	91.2	360.4	-2.139	26.88	81.2	-0.277	0.395	83.4	-0.208	0.381	88.8	-2.8	118.9	113.6	-0.137	0.361	113.6	-0.137
563	91.3	357.6	-2.162	26.88	80.7	-0.279	0.395	83.0	-0.210	0.380	88.5	-2.8	118.6	113.3	-0.139	0.361	113.3	-0.139
564	91.4	354.7	-2.186	26.87	80.3	-0.281	0.395	82.6	-0.212	0.380	88.1	-2.8	118.4	113.0	-0.140	0.361	113.0	-0.140
565	91.5	351.8	-2.210	26.87	79.9	-0.283	0.394	82.2	-0.214	0.380	87.7	-2.8	118.1	112.7	-0.142	0.361	112.7	-0.142
566	91.6	349.1	-2.233	26.87	79.5	-0.286	0.394	81.8	-0.216	0.380	87.3	-2.9	117.8	112.4	-0.144	0.360	112.4	-0.144
567	91.7	346.6	-2.254	26.87	79.0	-0.288	0.394	81.4	-0.218	0.380	86.9	-2.9	117.5	112.1	-0.145	0.360	112.1	-0.145
568	91.8	344.3	-2.274	26.87	78.6	-0.290	0.393	80.9	-0.220	0.379	86.5	-2.9	117.3	111.8	-0.147	0.360	111.8	-0.147
569	91.8	342.2	-2.292	26.86	78.2	-0.293	0.393	80.5	-0.223	0.379	86.1	-3.0	117.0	111.5	-0.149	0.360	111.5	-0.149
570	91.9	340.3	-2.308	26.86	77.7	-0.295	0.393	80.1	-0.225	0.379	85.7	-3.0	116.7	111.1	-0.150	0.360	111.1	-0.150
571	92.0	338.5	-2.325	26.86	77.3	-0.298	0.392	79.6	-0.227	0.379	85.3	-3.0	116.4	110.8	-0.152	0.360	110.8	-0.152
572	92.1	336.6	-2.342	26.86	76.9	-0.300	0.392	79.2	-0.229	0.378	84.8	-3.0	116.1	110.5	-0.153	0.359	110.5	-0.153
573	92.2	334.5	-2.360	26.86	76.4	-0.303	0.392	78.8	-0.231	0.378	84.4	-3.1	115.8	110.2	-0.155	0.359	110.2	-0.155
574	92.3	332.3	-2.380	26.85	76.0	-0.305	0.391	78.3	-0.233	0.378	84.0	-3.1	115.5	109.9	-0.156	0.359	109.9	-0.156
575	92.4	329.9	-2.402	26.85	75.5	-0.308	0.391	77.9	-0.235	0.378	83.6	-3.1	115.2	109.5	-0.158	0.359	109.5	-0.158
576	92.5	327.5	-2.425	26.85	75.1	-0.310	0.391	77.4	-0.237	0.377	83.1	-3.1	114.9	109.2	-0.159	0.359	109.2	-0.159
577	92.6	324.9	-2.449	26.85	74.7	-0.313	0.390	77.0	-0.239	0.377	82.7	-3.2	114.6	108.9	-0.160	0.359	108.9	-0.160
578	92.6	322.4	-2.473	26.84	74.2	-0.316	0.390	76.5	-0.241	0.377	82.3	-3.2	114.3	108.5	-0.162	0.358	108.5	-0.162
579	92.7	320.0	-2.497	26.84	73.7	-0.318	0.390	76.1	-0.243	0.377	81.8	-3.2	114.0	108.2	-0.163	0.358	108.2	-0.163
580	92.8	317.7	-2.519	26.84	73.3	-0.321	0.389	75.6	-0.245	0.376	81.4	-3.2	113.7	107.8	-0.165	0.358	107.8	-0.165
581	92.9	315.6	-2.541	26.84	72.8	-0.324	0.389	75.2	-0.247	0.376	80.9	-3.2	113.4	107.5	-0.166	0.358	107.5	-0.166
582	93.0	313.6	-2.560	26.84	72.4	-0.326	0.389	74.7	-0.249	0.376	80.4	-3.3	113.1	107.2	-0.168	0.358	107.2	-0.168
583	93.1	311.7	-2.579	26.83	71.9	-0.329	0.388	74.2	-0.251	0.376	80.0	-3.3	112.8	106.8	-0.169	0.358	106.8	-0.169
584	93.2	310.0	-2.596	26.83	71.4	-0.331	0.388	73.7	-0.253	0.375	79.5	-3.3	112.5	106.5	-0.170	0.357	106.5	-0.170
585	93.3	308.4	-2.613	26.83	71.0	-0.334	0.388	73.3	-0.255	0.375	79.0	-3.3	112.2	106.1	-0.172	0.357	106.1	-0.172
586	93.4	306.7	-2.631	26.83	70.5	-0.336	0.387	72.8	-0.257	0.375	78.6	-3.3	111.9	105.8	-0.173	0.357	105.8	-0.173
587	93.4	304.9	-2.650	26.83	70.0	-0.339	0.387	72.3	-0.259	0.374	78.1	-3.4	111.5	105.4	-0.174	0.357	105.4	-0.174
588	93.5	302.9	-2.670	26.82	69.5	-0.341	0.387	71.8	-0.261	0.374	77.6	-3.4	111.2	105.1	-0.175	0.357	105.1	-0.175

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
589	93.6	300.8	-2.693	26.82	69.1	-0.343	0.386	71.3	-0.263	0.374	77.1	-3.4	110.9	104.7	-0.176	0.356	104.7	-0.176
590	93.7	298.6	-2.717	26.82	68.6	-0.346	0.386	70.8	-0.265	0.374	76.7	-3.4	110.6	104.3	-0.178	0.356	104.3	-0.178
591	93.8	296.4	-2.741	26.82	68.1	-0.348	0.385	70.3	-0.267	0.373	76.2	-3.4	110.2	104.0	-0.179	0.356	104.0	-0.179
592	93.9	294.1	-2.766	26.82	67.6	-0.350	0.385	69.8	-0.268	0.373	75.7	-3.4	109.9	103.6	-0.180	0.356	103.6	-0.180
593	94.0	292.0	-2.790	26.81	67.1	-0.352	0.385	69.3	-0.270	0.373	75.2	-3.5	109.6	103.2	-0.182	0.356	103.2	-0.182
594	94.1	290.0	-2.812	26.81	66.6	-0.354	0.384	68.8	-0.272	0.372	74.7	-3.5	109.2	102.8	-0.183	0.355	102.8	-0.183
595	94.2	288.2	-2.833	26.81	66.2	-0.356	0.384	68.3	-0.274	0.372	74.2	-3.5	108.9	102.5	-0.184	0.355	102.5	-0.184
596	94.2	286.5	-2.853	26.81	65.7	-0.358	0.384	67.7	-0.275	0.372	73.7	-3.5	108.6	102.1	-0.186	0.355	102.1	-0.186
597	94.3	284.9	-2.871	26.80	65.2	-0.360	0.383	67.2	-0.277	0.372	73.2	-3.5	108.2	101.7	-0.187	0.355	101.7	-0.187
598	94.4	283.4	-2.889	26.80	64.7	-0.361	0.383	66.7	-0.279	0.371	72.6	-3.5	107.9	101.3	-0.188	0.355	101.3	-0.188
599	94.5	281.9	-2.907	26.80	64.2	-0.363	0.382	66.2	-0.280	0.371	72.1	-3.6	107.6	100.9	-0.189	0.354	100.9	-0.189
600	94.6	280.4	-2.925	26.80	63.7	-0.365	0.382	65.7	-0.282	0.371	71.6	-3.6	107.2	100.6	-0.191	0.354	100.6	-0.191
601	94.7	278.7	-2.945	26.80	63.2	-0.366	0.382	65.2	-0.283	0.370	71.1	-3.6	106.9	100.2	-0.192	0.354	100.2	-0.192
602	94.8	277.0	-2.966	26.79	62.8	-0.367	0.381	64.7	-0.284	0.370	70.5	-3.6	106.5	99.8	-0.193	0.354	99.8	-0.193
603	94.9	275.1	-2.989	26.79	62.3	-0.368	0.381	64.1	-0.286	0.370	70.0	-3.6	106.2	99.4	-0.194	0.354	99.4	-0.194
604	95.0	273.2	-3.013	26.79	61.8	-0.370	0.380	63.6	-0.287	0.369	69.5	-3.6	105.8	99.0	-0.195	0.353	99.0	-0.195
605	95.0	271.2	-3.038	26.79	61.3	-0.371	0.380	63.1	-0.288	0.369	68.9	-3.7	105.5	98.6	-0.197	0.353	98.6	-0.197
606	95.1	269.2	-3.063	26.79	60.8	-0.372	0.380	62.6	-0.289	0.369	68.4	-3.7	105.1	98.2	-0.198	0.353	98.2	-0.198
607	95.2	267.4	-3.088	26.78	60.4	-0.372	0.379	62.1	-0.291	0.369	67.9	-3.7	104.7	97.8	-0.199	0.353	97.8	-0.199
608	95.3	265.6	-3.110	26.78	59.9	-0.373	0.379	61.6	-0.291	0.368	67.3	-3.7	104.4	97.4	-0.200	0.353	97.4	-0.200
609	95.4	264.0	-3.131	26.78	59.4	-0.374	0.379	61.0	-0.292	0.368	66.8	-3.7	104.0	97.0	-0.201	0.352	97.0	-0.201
610	95.5	262.6	-3.150	26.78	59.0	-0.374	0.378	60.5	-0.293	0.368	66.2	-3.7	103.7	96.6	-0.202	0.352	96.6	-0.202
611	95.6	261.2	-3.168	26.78	58.5	-0.375	0.378	60.0	-0.294	0.367	65.7	-3.7	103.3	96.2	-0.202	0.352	96.2	-0.202
612	95.7	259.9	-3.186	26.77	58.0	-0.375	0.377	59.5	-0.295	0.367	65.1	-3.7	103.0	95.8	-0.203	0.352	95.8	-0.203
613	95.8	258.5	-3.205	26.77	57.6	-0.375	0.377	59.0	-0.295	0.367	64.6	-3.7	102.6	95.4	-0.204	0.352	95.4	-0.204
614	95.8	257.1	-3.224	26.77	57.1	-0.375	0.377	58.5	-0.296	0.366	64.0	-3.7	102.3	95.0	-0.204	0.351	95.0	-0.204
615	95.9	255.6	-3.245	26.77	56.7	-0.375	0.376	58.0	-0.296	0.366	63.4	-3.7	101.9	94.6	-0.205	0.351	94.6	-0.205
616	96.0	254.0	-3.267	26.77	56.2	-0.375	0.376	57.5	-0.296	0.366	62.9	-3.7	101.5	94.2	-0.205	0.351	94.2	-0.205
617	96.1	252.3	-3.290	26.77	55.8	-0.375	0.375	57.0	-0.297	0.365	62.3	-3.7	101.2	93.8	-0.206	0.351	93.8	-0.206
618	96.2	250.6	-3.315	26.76	55.3	-0.374	0.375	56.5	-0.297	0.365	61.8	-3.7	100.8	93.4	-0.206	0.350	93.4	-0.206
619	96.3	248.9	-3.340	26.76	54.9	-0.374	0.375	56.0	-0.296	0.365	61.2	-3.7	100.5	93.0	-0.206	0.350	93.0	-0.206
620	96.4	247.2	-3.365	26.76	54.4	-0.373	0.374	55.5	-0.296	0.364	60.6	-3.7	100.1	92.6	-0.206	0.350	92.6	-0.206
621	96.5	245.5	-3.389	26.76	54.0	-0.372	0.374	55.0	-0.296	0.364	60.1	-3.7	99.8	92.2	-0.206	0.350	92.2	-0.206
622	96.6	244.0	-3.412	26.76	53.6	-0.371	0.373	54.5	-0.296	0.364	59.5	-3.7	99.4	91.8	-0.206	0.350	91.8	-0.206
623	96.6	242.6	-3.433	26.75	53.1	-0.370	0.373	54.0	-0.295	0.364	58.9	-3.7	99.1	91.5	-0.206	0.349	91.5	-0.206
624	96.7	241.3	-3.453	26.75	52.7	-0.369	0.373	53.5	-0.294	0.363	58.4	-3.7	98.7	91.1	-0.206	0.349	91.1	-0.206
625	96.8	240.1	-3.471	26.75	52.3	-0.367	0.372	53.0	-0.293	0.363	57.8	-3.6	98.4	90.7	-0.205	0.349	90.7	-0.205
626	96.9	238.9	-3.489	26.75	51.9	-0.366	0.372	52.6	-0.292	0.363	57.3	-3.6	98.0	90.3	-0.205	0.349	90.3	-0.205
627	97.0	237.7	-3.507	26.75	51.5	-0.364	0.371	52.1	-0.291	0.362	56.7	-3.6	97.7	89.9	-0.205	0.348	89.9	-0.205
628	97.1	236.4	-3.527	26.75	51.1	-0.363	0.371	51.6	-0.290	0.362	56.1	-3.6	97.4	89.5	-0.204	0.348	89.5	-0.204
629	97.2	235.0	-3.548	26.74	50.7	-0.361	0.371	51.2	-0.289	0.362	55.6	-3.6	97.0	89.2	-0.203	0.348	89.2	-0.203
630	97.3	233.6	-3.571	26.74	50.3	-0.358	0.370	50.7	-0.287	0.361	55.0	-3.5	96.7	88.8	-0.202	0.348	88.8	-0.202

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
631	97.4	232.1	-3.596	26.74	49.9	-0.356	0.370	50.2	-0.286	0.361	54.5	-3.5	96.4	88.4	-0.201	0.348	88.4	-0.201
632	97.4	230.5	-3.621	26.74	49.5	-0.354	0.369	49.8	-0.284	0.361	53.9	-3.5	96.0	88.0	-0.200	0.347	88.0	-0.200
633	97.5	228.9	-3.647	26.74	49.1	-0.352	0.369	49.3	-0.282	0.360	53.4	-3.5	95.7	87.7	-0.199	0.347	87.7	-0.199
634	97.6	227.4	-3.671	26.74	48.7	-0.349	0.369	48.9	-0.280	0.360	52.8	-3.4	95.4	87.3	-0.198	0.347	87.3	-0.198
635	97.7	226.0	-3.695	26.73	48.3	-0.346	0.368	48.4	-0.278	0.360	52.3	-3.4	95.1	87.0	-0.197	0.347	87.0	-0.197
636	97.8	224.7	-3.718	26.73	47.9	-0.344	0.368	48.0	-0.276	0.360	51.8	-3.4	94.7	86.6	-0.195	0.347	86.6	-0.195
637	97.9	223.4	-3.739	26.73	47.5	-0.341	0.368	47.5	-0.273	0.359	51.2	-3.3	94.4	86.3	-0.194	0.346	86.3	-0.194
638	98.0	222.3	-3.758	26.73	47.1	-0.337	0.367	47.1	-0.271	0.359	50.7	-3.3	94.1	85.9	-0.192	0.346	85.9	-0.192
639	98.1	221.2	-3.777	26.73	46.8	-0.334	0.367	46.7	-0.268	0.359	50.2	-3.3	93.8	85.6	-0.191	0.346	85.6	-0.191
640	98.2	220.1	-3.796	26.73	46.4	-0.331	0.367	46.3	-0.266	0.358	49.7	-3.2	93.5	85.2	-0.189	0.346	85.2	-0.189
641	98.2	219.0	-3.814	26.73	46.0	-0.328	0.366	45.8	-0.263	0.358	49.2	-3.2	93.2	84.9	-0.187	0.346	84.9	-0.187
642	98.3	217.9	-3.834	26.73	45.7	-0.324	0.366	45.4	-0.260	0.358	48.7	-3.1	92.9	84.6	-0.185	0.345	84.6	-0.185
643	98.4	216.6	-3.856	26.72	45.3	-0.321	0.365	45.0	-0.257	0.358	48.2	-3.1	92.7	84.2	-0.183	0.345	84.2	-0.183
644	98.5	215.3	-3.880	26.72	44.9	-0.317	0.365	44.6	-0.254	0.357	47.7	-3.1	92.4	83.9	-0.181	0.345	83.9	-0.181
645	98.6	213.9	-3.905	26.72	44.6	-0.313	0.365	44.2	-0.251	0.357	47.2	-3.0	92.1	83.6	-0.179	0.345	83.6	-0.179
646	98.7	212.5	-3.931	26.72	44.2	-0.309	0.364	43.8	-0.248	0.357	46.7	-3.0	91.8	83.3	-0.177	0.345	83.3	-0.177
647	98.8	211.1	-3.957	26.72	43.9	-0.305	0.364	43.5	-0.245	0.356	46.2	-2.9	91.6	83.0	-0.174	0.344	83.0	-0.174
648	98.9	209.8	-3.982	26.72	43.5	-0.301	0.364	43.1	-0.241	0.356	45.8	-2.9	91.3	82.7	-0.172	0.344	82.7	-0.172
649	99.0	208.5	-4.006	26.72	43.2	-0.297	0.363	42.7	-0.238	0.356	45.3	-2.8	91.0	82.4	-0.170	0.344	82.4	-0.170
650	99.0	207.3	-4.028	26.72	42.8	-0.292	0.363	42.3	-0.234	0.356	44.9	-2.8	90.8	82.1	-0.167	0.344	82.1	-0.167
651	99.1	206.3	-4.048	26.71	42.5	-0.288	0.363	41.9	-0.231	0.355	44.4	-2.7	90.5	81.8	-0.164	0.344	81.8	-0.164
652	99.2	205.2	-4.067	26.71	42.2	-0.284	0.363	41.6	-0.227	0.355	44.0	-2.7	90.3	81.5	-0.162	0.343	81.5	-0.162
653	99.3	204.3	-4.086	26.71	41.9	-0.279	0.362	41.2	-0.223	0.355	43.5	-2.6	90.1	81.3	-0.159	0.343	81.3	-0.159
654	99.4	203.3	-4.105	26.71	41.5	-0.275	0.362	40.9	-0.219	0.355	43.1	-2.6	89.8	81.0	-0.157	0.343	81.0	-0.157
655	99.5	202.3	-4.125	26.71	41.2	-0.270	0.362	40.5	-0.215	0.355	42.7	-2.5	89.6	80.7	-0.154	0.343	80.7	-0.154
656	99.6	201.2	-4.146	26.71	40.9	-0.265	0.361	40.2	-0.211	0.354	42.3	-2.5	89.4	80.5	-0.151	0.343	80.5	-0.151
657	99.7	200.1	-4.168	26.71	40.6	-0.260	0.361	39.8	-0.207	0.354	41.9	-2.4	89.1	80.2	-0.149	0.343	80.2	-0.149
658	99.8	198.9	-4.192	26.71	40.3	-0.256	0.361	39.5	-0.204	0.354	41.5	-2.4	88.9	80.0	-0.146	0.342	80.0	-0.146
659	99.8	197.6	-4.218	26.71	40.0	-0.251	0.361	39.2	-0.200	0.354	41.1	-2.3	88.7	79.7	-0.143	0.342	79.7	-0.143
660	99.9	196.4	-4.244	26.71	39.7	-0.246	0.360	38.9	-0.195	0.353	40.7	-2.3	88.5	79.5	-0.140	0.342	79.5	-0.140
661	100.0	195.1	-4.270	26.70	39.4	-0.241	0.360	38.6	-0.191	0.353	40.3	-2.2	88.3	79.3	-0.137	0.342	79.3	-0.137
662	100.1	193.9	-4.295	26.70	39.1	-0.236	0.360	38.3	-0.187	0.353	40.0	-2.2	88.1	79.1	-0.134	0.342	79.1	-0.134
663	100.2	192.8	-4.319	26.70	38.8	-0.231	0.360	38.0	-0.183	0.353	39.6	-2.1	87.9	78.8	-0.131	0.342	78.8	-0.131
664	100.3	191.7	-4.341	26.70	38.5	-0.225	0.359	37.7	-0.179	0.353	39.3	-2.1	87.8	78.6	-0.128	0.342	78.6	-0.128
665	100.4	190.8	-4.361	26.70	38.3	-0.220	0.359	37.4	-0.175	0.352	38.9	-2.0	87.6	78.4	-0.125	0.341	78.4	-0.125
666	100.5	189.9	-4.380	26.70	38.0	-0.215	0.359	37.1	-0.171	0.352	38.6	-2.0	87.4	78.2	-0.122	0.341	78.2	-0.122
667	100.6	189.0	-4.399	26.70	37.7	-0.210	0.359	36.9	-0.166	0.352	38.3	-1.9	87.2	78.0	-0.119	0.341	78.0	-0.119
668	100.6	188.1	-4.418	26.70	37.5	-0.205	0.358	36.6	-0.162	0.352	37.9	-1.9	87.1	77.8	-0.116	0.341	77.8	-0.116
669	100.7	187.2	-4.439	26.70	37.2	-0.200	0.358	36.3	-0.158	0.352	37.6	-1.8	86.9	77.6	-0.114	0.341	77.6	-0.114
670	100.8	186.2	-4.461	26.70	37.0	-0.195	0.358	36.1	-0.154	0.352	37.3	-1.8	86.8	77.5	-0.111	0.341	77.5	-0.111
671	100.9	185.1	-4.484	26.70	36.7	-0.189	0.358	35.8	-0.149	0.351	37.0	-1.7	86.6	77.3	-0.108	0.341	77.3	-0.108
672	101.0	184.0	-4.509	26.70	36.5	-0.184	0.358	35.6	-0.145	0.351	36.8	-1.7	86.5	77.1	-0.104	0.341	77.1	-0.104

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
673	101.1	182.9	-4.534	26.70	36.2	-0.179	0.357	35.4	-0.141	0.351	36.5	-1.6	86.3	77.0	-0.102	0.341	77.0	-0.102
674	101.2	181.8	-4.560	26.70	36.0	-0.174	0.357	35.1	-0.137	0.351	36.2	-1.6	86.2	76.8	-0.099	0.340	76.8	-0.099
675	101.3	180.7	-4.586	26.70	35.8	-0.168	0.357	34.9	-0.132	0.351	36.0	-1.5	86.1	76.6	-0.096	0.340	76.6	-0.096
676	101.4	179.6	-4.611	26.69	35.6	-0.163	0.357	34.7	-0.128	0.351	35.7	-1.5	85.9	76.5	-0.093	0.340	76.5	-0.093
677	101.4	178.6	-4.635	26.69	35.4	-0.158	0.357	34.5	-0.124	0.351	35.5	-1.4	85.8	76.4	-0.090	0.340	76.4	-0.090
678	101.5	177.6	-4.657	26.69	35.2	-0.153	0.356	34.3	-0.120	0.350	35.2	-1.4	85.7	76.2	-0.087	0.340	76.2	-0.087
679	101.6	176.8	-4.677	26.69	35.0	-0.147	0.356	34.1	-0.116	0.350	35.0	-1.3	85.6	76.1	-0.084	0.340	76.1	-0.084
680	101.7	175.9	-4.697	26.69	34.8	-0.142	0.356	33.9	-0.112	0.350	34.8	-1.3	85.5	76.0	-0.081	0.340	76.0	-0.081
681	101.8	175.2	-4.716	26.69	34.6	-0.137	0.356	33.7	-0.108	0.350	34.6	-1.2	85.4	75.9	-0.078	0.340	75.9	-0.078
682	101.9	174.4	-4.735	26.69	34.4	-0.132	0.356	33.6	-0.104	0.350	34.3	-1.2	85.3	75.7	-0.075	0.340	75.7	-0.075
683	102.0	173.5	-4.756	26.69	34.2	-0.127	0.356	33.4	-0.099	0.350	34.2	-1.1	85.2	75.6	-0.072	0.340	75.6	-0.072
684	102.1	172.6	-4.778	26.69	34.0	-0.122	0.356	33.2	-0.095	0.350	34.0	-1.1	85.1	75.5	-0.070	0.340	75.5	-0.070
685	102.2	171.6	-4.802	26.69	33.9	-0.117	0.355	33.1	-0.091	0.350	33.8	-1.1	85.0	75.4	-0.067	0.339	75.4	-0.067
686	102.2	170.6	-4.827	26.69	33.7	-0.112	0.355	33.0	-0.087	0.350	33.6	-1.0	84.9	75.3	-0.064	0.339	75.3	-0.064
687	102.3	169.6	-4.854	26.69	33.6	-0.107	0.355	32.8	-0.083	0.349	33.4	-1.0	84.9	75.3	-0.061	0.339	75.3	-0.061
688	102.4	168.5	-4.880	26.69	33.4	-0.102	0.355	32.7	-0.079	0.349	33.3	-0.9	84.8	75.2	-0.058	0.339	75.2	-0.058
689	102.5	167.5	-4.906	26.69	33.3	-0.097	0.355	32.6	-0.075	0.349	33.1	-0.9	84.7	75.1	-0.056	0.339	75.1	-0.056
690	102.6	166.6	-4.930	26.69	33.1	-0.092	0.355	32.4	-0.071	0.349	33.0	-0.8	84.7	75.0	-0.053	0.339	75.0	-0.053
691	102.7	165.7	-4.954	26.69	33.0	-0.088	0.355	32.3	-0.068	0.349	32.8	-0.8	84.6	75.0	-0.050	0.339	75.0	-0.050
692	102.8	164.9	-4.975	26.69	32.9	-0.083	0.355	32.2	-0.064	0.349	32.7	-0.7	84.6	74.9	-0.047	0.339	74.9	-0.047
693	102.9	164.1	-4.996	26.69	32.7	-0.078	0.355	32.1	-0.060	0.349	32.6	-0.7	84.5	74.8	-0.045	0.339	74.8	-0.045
694	103.0	163.3	-5.015	26.69	32.6	-0.074	0.355	32.0	-0.056	0.349	32.5	-0.7	84.5	74.8	-0.042	0.339	74.8	-0.042
695	103.0	162.6	-5.035	26.69	32.5	-0.069	0.354	31.9	-0.053	0.349	32.4	-0.6	84.5	74.7	-0.040	0.339	74.7	-0.040
696	103.1	161.9	-5.055	26.69	32.4	-0.065	0.354	31.8	-0.049	0.349	32.3	-0.6	84.4	74.7	-0.037	0.339	74.7	-0.037
697	103.2	161.1	-5.076	26.69	32.3	-0.060	0.354	31.8	-0.045	0.349	32.2	-0.5	84.4	74.7	-0.034	0.339	74.7	-0.034
698	103.3	160.3	-5.098	26.69	32.2	-0.056	0.354	31.7	-0.042	0.349	32.1	-0.5	84.4	74.6	-0.032	0.339	74.6	-0.032
699	103.4	159.4	-5.123	26.69	32.1	-0.051	0.354	31.6	-0.039	0.349	32.0	-0.5	84.3	74.6	-0.029	0.339	74.6	-0.029
700	103.5	158.5	-5.148	26.69	32.0	-0.047	0.354	31.6	-0.035	0.349	31.9	-0.4	84.3	74.6	-0.027	0.339	74.6	-0.027
701	103.6	157.5	-5.175	26.69	31.9	-0.043	0.354	31.5	-0.032	0.349	31.9	-0.4	84.3	74.6	-0.024	0.339	74.6	-0.024
702	103.7	156.6	-5.202	26.69	31.8	-0.039	0.354	31.4	-0.028	0.349	31.8	-0.3	84.3	74.5	-0.022	0.339	74.5	-0.022
703	103.8	155.7	-5.228	26.69	31.7	-0.035	0.354	31.4	-0.025	0.349	31.7	-0.3	84.3	74.5	-0.020	0.339	74.5	-0.020
704	103.8	154.8	-5.253	26.69	31.7	-0.031	0.354	31.3	-0.022	0.349	31.7	-0.3	84.3	74.5	-0.017	0.339	74.5	-0.017
705	103.9	154.0	-5.275	26.69	31.6	-0.028	0.354	31.3	-0.019	0.348	31.7	-0.2	84.3	74.5	-0.015	0.339	74.5	-0.015
706	104.0	153.3	-5.297	26.69	31.5	-0.024	0.354	31.3	-0.016	0.348	31.6	-0.2	84.3	74.5	-0.013	0.339	74.5	-0.013
707	104.1	152.6	-5.317	26.69	31.4	-0.020	0.354	31.2	-0.013	0.348	31.6	-0.2	84.3	74.5	-0.011	0.339	74.5	-0.011
708	104.2	151.9	-5.336	26.69	31.4	-0.017	0.354	31.2	-0.010	0.348	31.6	-0.1	84.3	74.5	-0.008	0.339	74.5	-0.008
709	104.3	151.2	-5.356	26.69	31.3	-0.013	0.354	31.2	-0.007	0.348	31.5	-0.1	84.3	74.5	-0.006	0.339	74.5	-0.006
710	104.4	150.5	-5.377	26.69	31.3	-0.010	0.354	31.2	-0.004	0.348	31.5	-0.1	84.3	74.5	-0.004	0.339	74.5	-0.004
711	104.5	149.8	-5.399	26.69	31.2	-0.007	0.354	31.1	-0.001	0.348	31.5	-0.0	84.4	74.5	-0.002	0.339	74.5	-0.002
712	104.6	149.0	-5.422	26.69	31.1	-0.004	0.354	31.1	0.001	0.348	31.5	-0.0	84.4	74.6	-0.000	0.339	74.6	-0.000
713	104.6	148.2	-5.447	26.69	31.1	-0.001	0.354	31.1	0.004	0.348	31.5	0.0	84.4	74.6	0.002	0.339	74.6	0.002
714	104.7	147.4	-5.473	26.69	31.0	0.002	0.354	31.1	0.006	0.348	31.5	0.1	84.4	74.6	0.003	0.339	74.6	0.003

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
715	104.8	146.5	-5.499	26.69	31.0	0.005	0.354	31.1	0.008	0.348	31.5	0.1	84.5	74.6	0.005	0.339	74.6	0.005
716	104.9	145.7	-5.526	26.69	30.9	0.008	0.354	31.1	0.011	0.348	31.6	0.1	84.5	74.7	0.007	0.339	74.7	0.007
717	105.0	144.8	-5.552	26.69	30.9	0.010	0.354	31.1	0.013	0.348	31.6	0.1	84.5	74.7	0.008	0.339	74.7	0.008
718	105.1	144.1	-5.577	26.69	30.9	0.013	0.354	31.1	0.015	0.348	31.6	0.2	84.6	74.7	0.010	0.339	74.7	0.010
719	105.2	143.4	-5.600	26.69	30.8	0.015	0.354	31.1	0.017	0.348	31.6	0.2	84.6	74.8	0.012	0.339	74.8	0.012
720	105.3	142.7	-5.621	26.69	30.8	0.017	0.354	31.1	0.019	0.349	31.7	0.2	84.7	74.8	0.013	0.339	74.8	0.013
721	105.3	142.1	-5.641	26.69	30.8	0.019	0.354	31.2	0.021	0.349	31.7	0.2	84.7	74.9	0.015	0.339	74.9	0.015
722	105.4	141.5	-5.660	26.69	30.7	0.022	0.354	31.2	0.023	0.349	31.7	0.2	84.7	74.9	0.016	0.339	74.9	0.016
723	105.5	140.8	-5.680	26.69	30.7	0.023	0.354	31.2	0.024	0.349	31.8	0.3	84.8	75.0	0.017	0.339	75.0	0.017
724	105.6	140.2	-5.701	26.69	30.7	0.025	0.354	31.2	0.026	0.349	31.8	0.3	84.8	75.0	0.018	0.339	75.0	0.018
725	105.7	139.5	-5.723	26.69	30.6	0.027	0.354	31.2	0.027	0.349	31.9	0.3	84.9	75.1	0.020	0.339	75.1	0.020
726	105.8	138.8	-5.747	26.69	30.6	0.028	0.354	31.3	0.029	0.349	32.0	0.3	84.9	75.1	0.021	0.339	75.1	0.021
727	105.9	138.0	-5.773	26.69	30.6	0.030	0.354	31.3	0.030	0.349	32.0	0.3	85.0	75.2	0.022	0.339	75.2	0.022
728	106.0	137.3	-5.799	26.69	30.5	0.031	0.354	31.3	0.031	0.349	32.1	0.4	85.0	75.2	0.023	0.339	75.2	0.023
729	106.1	136.5	-5.826	26.69	30.5	0.032	0.354	31.3	0.032	0.349	32.1	0.4	85.1	75.3	0.023	0.339	75.3	0.023
730	106.1	135.7	-5.853	26.69	30.5	0.033	0.354	31.4	0.033	0.349	32.2	0.4	85.1	75.3	0.024	0.339	75.3	0.024
731	106.2	135.0	-5.878	26.69	30.5	0.034	0.354	31.4	0.034	0.349	32.3	0.4	85.2	75.4	0.025	0.339	75.4	0.025
732	106.3	134.3	-5.902	26.69	30.4	0.035	0.354	31.4	0.035	0.349	32.3	0.4	85.2	75.4	0.026	0.339	75.4	0.026
733	106.4	133.7	-5.925	26.69	30.4	0.036	0.354	31.4	0.035	0.349	32.4	0.4	85.3	75.5	0.026	0.339	75.5	0.026
734	106.5	133.1	-5.946	26.69	30.4	0.037	0.354	31.5	0.036	0.349	32.5	0.4	85.3	75.5	0.027	0.339	75.5	0.027
735	106.6	132.5	-5.967	26.69	30.4	0.037	0.354	31.5	0.036	0.349	32.6	0.4	85.4	75.6	0.027	0.339	75.6	0.027
736	106.7	131.9	-5.986	26.69	30.3	0.037	0.354	31.5	0.037	0.349	32.6	0.4	85.4	75.7	0.027	0.339	75.7	0.027
737	106.8	131.4	-6.006	26.69	30.3	0.037	0.354	31.5	0.037	0.349	32.7	0.4	85.5	75.7	0.028	0.339	75.7	0.028
738	106.9	130.8	-6.027	26.69	30.3	0.038	0.355	31.6	0.037	0.349	32.8	0.4	85.6	75.8	0.028	0.339	75.8	0.028
739	106.9	130.1	-6.050	26.69	30.3	0.038	0.355	31.6	0.037	0.349	32.9	0.4	85.6	75.8	0.028	0.339	75.8	0.028
740	107.0	129.5	-6.075	26.69	30.3	0.038	0.355	31.6	0.037	0.349	32.9	0.4	85.7	75.9	0.028	0.339	75.9	0.028
741	107.1	128.8	-6.101	26.69	30.2	0.037	0.355	31.7	0.037	0.349	33.0	0.4	85.7	75.9	0.028	0.339	75.9	0.028
742	107.2	128.1	-6.128	26.69	30.2	0.037	0.355	31.7	0.037	0.349	33.1	0.4	85.8	76.0	0.028	0.339	76.0	0.028
743	107.3	127.4	-6.155	26.69	30.2	0.036	0.355	31.7	0.036	0.349	33.2	0.4	85.8	76.0	0.028	0.339	76.0	0.028
744	107.4	126.7	-6.182	26.69	30.2	0.036	0.355	31.7	0.036	0.349	33.2	0.4	85.8	76.1	0.028	0.339	76.1	0.028
745	107.5	126.0	-6.207	26.69	30.1	0.035	0.355	31.7	0.035	0.349	33.3	0.4	85.9	76.1	0.027	0.339	76.1	0.027
746	107.6	125.4	-6.230	26.69	30.1	0.034	0.355	31.8	0.034	0.349	33.4	0.4	85.9	76.2	0.027	0.339	76.2	0.027
747	107.7	124.8	-6.253	26.69	30.1	0.034	0.355	31.8	0.034	0.349	33.5	0.4	86.0	76.2	0.027	0.339	76.2	0.027
748	107.7	124.3	-6.274	26.69	30.1	0.032	0.355	31.8	0.033	0.349	33.5	0.4	86.0	76.3	0.026	0.339	76.3	0.026
749	107.8	123.7	-6.294	26.69	30.0	0.031	0.355	31.8	0.032	0.350	33.6	0.4	86.1	76.3	0.026	0.339	76.3	0.026
750	107.9	123.2	-6.314	26.69	30.0	0.030	0.355	31.8	0.031	0.350	33.7	0.4	86.1	76.3	0.025	0.339	76.3	0.025
751	108.0	122.7	-6.335	26.69	30.0	0.029	0.355	31.8	0.030	0.350	33.7	0.4	86.1	76.4	0.024	0.339	76.4	0.024
752	108.1	122.1	-6.356	26.69	29.9	0.027	0.355	31.9	0.029	0.350	33.8	0.4	86.2	76.4	0.024	0.339	76.4	0.024
753	108.2	121.6	-6.380	26.69	29.9	0.026	0.355	31.9	0.028	0.350	33.9	0.4	86.2	76.5	0.023	0.339	76.5	0.023
754	108.3	121.0	-6.404	26.69	29.9	0.024	0.355	31.9	0.026	0.350	33.9	0.3	86.2	76.5	0.022	0.339	76.5	0.022
755	108.4	120.3	-6.431	26.69	29.8	0.022	0.355	31.9	0.025	0.350	34.0	0.3	86.2	76.5	0.021	0.339	76.5	0.021
756	108.5	119.7	-6.458	26.69	29.8	0.021	0.355	31.9	0.023	0.350	34.0	0.3	86.3	76.5	0.020	0.340	76.5	0.020

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

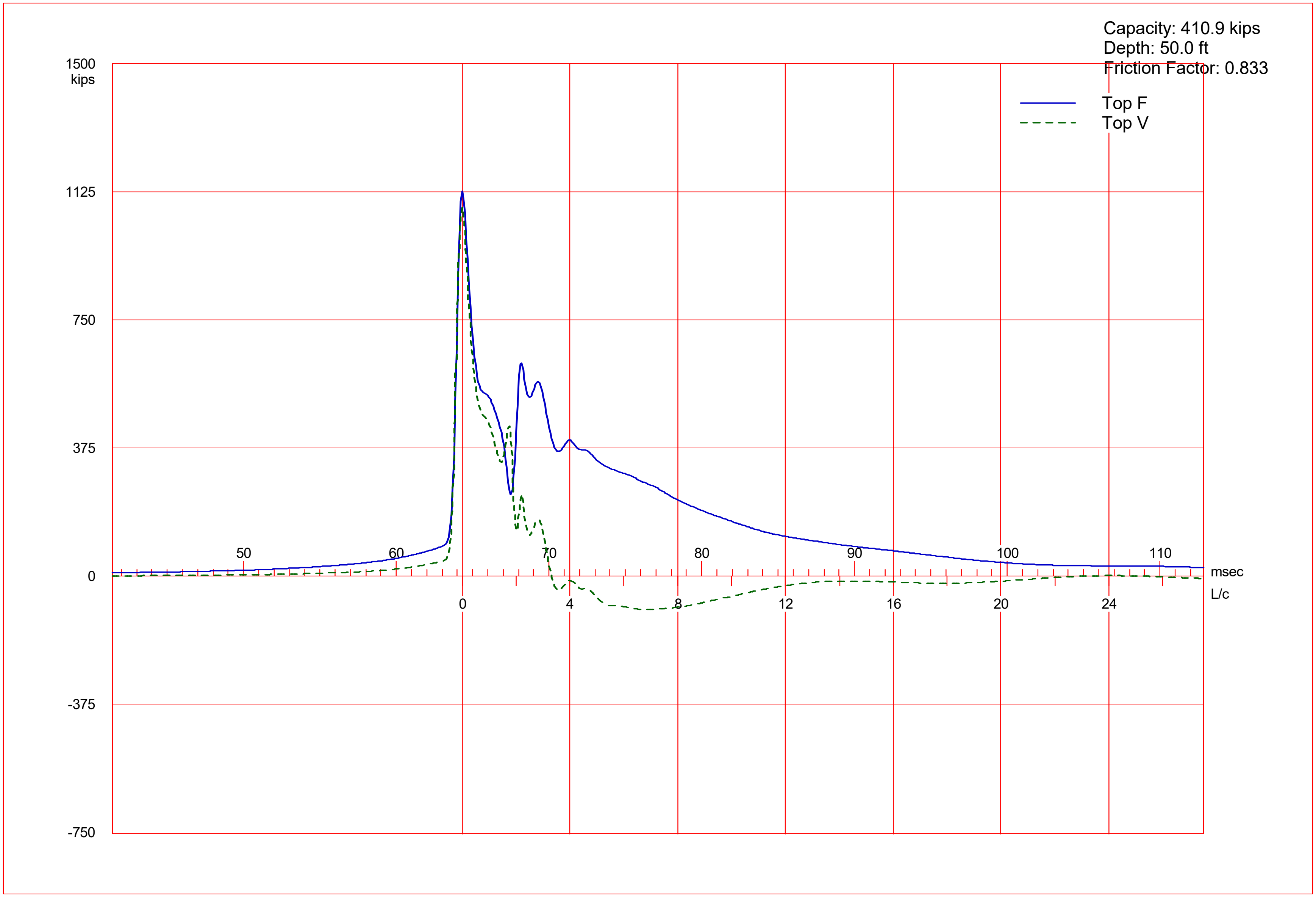
JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
757	108.5	119.0	-6.485	26.69	29.8	0.019	0.355	31.9	0.022	0.350	34.1	0.3	86.3	76.6	0.019	0.340	76.6	0.019
758	108.6	118.4	-6.512	26.69	29.7	0.017	0.355	31.9	0.020	0.350	34.1	0.3	86.3	76.6	0.018	0.340	76.6	0.018
759	108.7	117.8	-6.537	26.69	29.7	0.015	0.355	31.9	0.018	0.350	34.2	0.3	86.3	76.6	0.017	0.340	76.6	0.017
760	108.8	117.2	-6.561	26.69	29.7	0.013	0.355	31.9	0.017	0.350	34.2	0.2	86.3	76.6	0.016	0.340	76.6	0.016
761	108.9	116.7	-6.582	26.69	29.6	0.011	0.355	31.9	0.015	0.350	34.3	0.2	86.3	76.6	0.014	0.340	76.6	0.014
762	109.0	116.2	-6.603	26.69	29.6	0.008	0.355	31.9	0.013	0.350	34.3	0.2	86.4	76.6	0.013	0.340	76.6	0.013
763	109.1	115.7	-6.623	26.69	29.5	0.006	0.355	31.8	0.011	0.350	34.3	0.2	86.4	76.6	0.012	0.340	76.6	0.012
764	109.2	115.3	-6.643	26.69	29.5	0.003	0.355	31.8	0.009	0.350	34.4	0.2	86.4	76.6	0.010	0.340	76.6	0.010
765	109.3	114.8	-6.665	26.69	29.4	0.001	0.355	31.8	0.007	0.350	34.4	0.1	86.4	76.7	0.009	0.340	76.7	0.009
766	109.3	114.3	-6.687	26.69	29.4	-0.001	0.355	31.8	0.005	0.350	34.4	0.1	86.4	76.6	0.008	0.340	76.6	0.008
767	109.4	113.7	-6.711	26.69	29.3	-0.004	0.355	31.7	0.003	0.350	34.4	0.1	86.3	76.6	0.006	0.340	76.6	0.006
768	109.5	113.1	-6.736	26.69	29.3	-0.007	0.355	31.7	0.000	0.350	34.4	0.1	86.3	76.6	0.004	0.340	76.6	0.004
769	109.6	112.6	-6.763	26.69	29.2	-0.009	0.355	31.7	-0.002	0.350	34.4	0.0	86.3	76.6	0.003	0.340	76.6	0.003
770	109.7	112.0	-6.790	26.69	29.2	-0.012	0.355	31.6	-0.004	0.350	34.4	0.0	86.3	76.6	0.001	0.340	76.6	0.001
771	109.8	111.4	-6.817	26.69	29.1	-0.015	0.355	31.6	-0.006	0.350	34.5	-0.0	86.3	76.6	-0.000	0.340	76.6	-0.000
772	109.9	110.8	-6.843	26.69	29.1	-0.018	0.355	31.5	-0.009	0.350	34.4	-0.0	86.3	76.6	-0.002	0.340	76.6	-0.002
773	110.0	110.3	-6.869	26.69	29.0	-0.021	0.355	31.5	-0.011	0.350	34.4	-0.1	86.2	76.5	-0.003	0.340	76.5	-0.003
774	110.1	109.7	-6.892	26.69	28.9	-0.023	0.355	31.4	-0.014	0.350	34.4	-0.1	86.2	76.5	-0.005	0.340	76.5	-0.005
775	110.1	109.3	-6.914	26.69	28.9	-0.026	0.355	31.4	-0.016	0.350	34.4	-0.1	86.2	76.5	-0.007	0.340	76.5	-0.007
776	110.2	108.8	-6.934	26.69	28.8	-0.029	0.355	31.3	-0.018	0.350	34.4	-0.1	86.1	76.4	-0.009	0.340	76.4	-0.009
777	110.3	108.4	-6.954	26.69	28.7	-0.032	0.355	31.3	-0.021	0.350	34.4	-0.2	86.1	76.4	-0.010	0.340	76.4	-0.010
778	110.4	108.0	-6.975	26.69	28.6	-0.035	0.355	31.2	-0.023	0.350	34.3	-0.2	86.1	76.3	-0.012	0.340	76.3	-0.012
779	110.5	107.5	-6.996	26.69	28.6	-0.039	0.355	31.1	-0.026	0.350	34.3	-0.2	86.0	76.3	-0.014	0.340	76.3	-0.014
780	110.6	107.0	-7.019	26.69	28.5	-0.042	0.355	31.1	-0.028	0.350	34.2	-0.3	86.0	76.2	-0.016	0.340	76.2	-0.016
781	110.7	106.5	-7.044	26.69	28.4	-0.045	0.355	31.0	-0.031	0.350	34.2	-0.3	85.9	76.2	-0.017	0.340	76.2	-0.017
782	110.8	106.0	-7.070	26.69	28.3	-0.048	0.355	30.9	-0.034	0.350	34.2	-0.3	85.9	76.1	-0.019	0.340	76.1	-0.019
783	110.9	105.4	-7.097	26.69	28.2	-0.051	0.355	30.8	-0.036	0.350	34.1	-0.3	85.8	76.1	-0.021	0.340	76.1	-0.021
784	110.9	104.9	-7.124	26.69	28.1	-0.054	0.355	30.7	-0.039	0.350	34.0	-0.4	85.7	76.0	-0.023	0.340	76.0	-0.023
785	111.0	104.4	-7.151	26.69	28.0	-0.057	0.355	30.6	-0.041	0.350	34.0	-0.4	85.7	75.9	-0.025	0.339	75.9	-0.025
786	111.1	103.8	-7.177	26.69	27.9	-0.060	0.355	30.5	-0.044	0.349	33.9	-0.4	85.6	75.9	-0.026	0.339	75.9	-0.026
787	111.2	103.4	-7.201	26.69	27.8	-0.063	0.355	30.4	-0.046	0.349	33.8	-0.5	85.5	75.8	-0.028	0.339	75.8	-0.028
788	111.3	102.9	-7.224	26.69	27.7	-0.066	0.354	30.3	-0.049	0.349	33.7	-0.5	85.5	75.7	-0.030	0.339	75.7	-0.030
789	111.4	102.5	-7.246	26.69	27.6	-0.070	0.354	30.2	-0.052	0.349	33.7	-0.5	85.4	75.6	-0.032	0.339	75.6	-0.032
790	111.5	102.1	-7.267	26.69	27.5	-0.073	0.354	30.1	-0.054	0.349	33.6	-0.5	85.3	75.5	-0.034	0.339	75.5	-0.034
791	111.6	101.7	-7.287	26.69	27.4	-0.076	0.354	30.0	-0.057	0.349	33.5	-0.6	85.2	75.4	-0.035	0.339	75.4	-0.035
792	111.7	101.2	-7.308	26.69	27.3	-0.079	0.354	29.8	-0.059	0.349	33.4	-0.6	85.1	75.3	-0.037	0.339	75.3	-0.037
793	111.7	100.8	-7.329	26.69	27.2	-0.082	0.354	29.7	-0.062	0.349	33.3	-0.6	85.0	75.2	-0.039	0.339	75.2	-0.039
794	111.8	100.4	-7.353	26.69	27.0	-0.085	0.354	29.6	-0.064	0.349	33.2	-0.6	84.9	75.1	-0.041	0.339	75.1	-0.041
795	111.9	99.9	-7.378	26.69	26.9	-0.088	0.354	29.5	-0.067	0.349	33.0	-0.7	84.9	75.0	-0.043	0.339	75.0	-0.043
796	112.0	99.4	-7.404	26.69	26.8	-0.091	0.354	29.3	-0.069	0.349	32.9	-0.7	84.8	74.9	-0.044	0.339	74.9	-0.044
797	112.1	98.9	-7.431	26.69	26.7	-0.094	0.354	29.2	-0.071	0.349	32.8	-0.7	84.7	74.8	-0.046	0.339	74.8	-0.046
798	112.2	98.4	-7.459	26.69	26.5	-0.097	0.354	29.0	-0.074	0.349	32.7	-0.8	84.5	74.7	-0.048	0.339	74.7	-0.048

Capacity = 410.9, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
799	112.3	97.9	-7.486	26.69	26.4	-0.100	0.353	28.9	-0.076	0.349	32.5	-0.8	84.4	74.6	-0.050	0.339	74.6	-0.050
800	112.4	97.4	-7.512	26.69	26.3	-0.102	0.353	28.7	-0.079	0.349	32.4	-0.8	84.3	74.5	-0.051	0.339	74.5	-0.051
801	112.5	97.0	-7.536	26.69	26.1	-0.105	0.353	28.6	-0.081	0.348	32.2	-0.8	84.2	74.4	-0.053	0.339	74.4	-0.053
802	112.5	96.6	-7.558	26.69	26.0	-0.108	0.353	28.4	-0.083	0.348	32.1	-0.9	84.1	74.2	-0.055	0.339	74.2	-0.055
803	112.6	96.2	-7.580	26.69	25.9	-0.111	0.353	28.3	-0.086	0.348	31.9	-0.9	84.0	74.1	-0.056	0.339	74.1	-0.056
804	112.7	95.8	-7.600	26.68	25.7	-0.113	0.353	28.1	-0.088	0.348	31.8	-0.9	83.9	74.0	-0.058	0.339	74.0	-0.058
805	112.8	95.4	-7.621	26.68	25.6	-0.116	0.353	28.0	-0.090	0.348	31.6	-0.9	83.7	73.8	-0.059	0.339	73.8	-0.059

Ethos Engineering
US 180 Little Colorado River Bridge Pier

Aug 07 2023
GRLWEAP Version 2010



GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

```
 Input  File: \\VR-FILE\PROJECTS\2022095 - NFRA - US 180, 5 MILE
& LITTLE COLORADO\ENGINEERING\CALCULATIONS\GEOTECH\04_DRIVEN
PILES\GRLWEAP FILES\2022095 LITTLE COLORADO PIER 40 FT SCOUR GRL
WEAP.GWW
 Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource
\HAMMER2010.GW
 Hammer File Version:  2003 (12/4/2018)

                        Input File Contents
     US 180 Little Colorado River Bridge Pier
 OUT OSG HAM STR FUL PEL   N SPL N-U P-D %SK ISM   0 PHI RSA ITR H-
D MXT     DEx
-100   0  15   0   1   0  0   0   0   0   0   1  0   0   0   0
0   0   0.000
    Pile g  Hammer g  Toe Area Pile Size           Pile Type
    32.185    32.185   452.380    24.000                Pipe
      W Cp       A Cp       E Cp       T Cp        CoR       ROut
StCp
     1.020   121.000     350.0     1.500     0.800     0.010
0.0
      A Cu       E Cu       T Cu        CoR       ROut       StCu
     0.000       0.0     0.000     0.000     0.000       0.0
      LPle       APle       EPle       WPle       Peri         CI
CoR      ROut
    90.000     54.78   50000.0    89.000     6.283          0
0.850     0.010
  FFatigue         F0  0-Bottom
         0     0.000     0.000
 Manufac  Hmr Name  HmrType No Seg-s
 DELMAG   D 30-32          1        3
    Ram Wt     Ram L  Ram Dia   MaxStrk   RtdStrk    Efficy
      6.60    123.20    16.51     13.73     11.43      0.80
    IB. Wt     IB. L   IB.Dia    IB CoR     IB RO
      1.36     28.15    16.51     0.900     0.010
  CompStrk A Chamber V Chamber   C Delay  C Duratn Exp Coeff
VolCStart  Vol CEnd
     17.68    214.03    309.10    0.0005    0.0020     1.250
0.00      0.00
     P atm        P1        P2        P3        P4        P5
     14.70   1460.00   1315.00   1185.00   1065.00      0.00
    Stroke    Effic.  Pressure  R-Weight   T-Delay Exp-Coeff
Eps-Str  Total-AW
   11.4300    0.8000 1460.0000    0.0000    0.0000    0.0000
0.0100    0.0000
        Qs        Qt        Js        Jt        Qx        Jx
Rati      Dept
     0.100     0.199     0.050     0.150     0.000     0.000
0.000     0.000
  Research Soil Model: Atoe, Plug,  Gap, Q-fac
     0.000     0.000     0.000     0.000
  Research Soil Model: RD-skn: m, d, toe: m, d
```

```
     0.000     0.000     0.000     0.000
  Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-
plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt   SU F
LimL    TSf0
    0.00    0.00    262.45    0.10    0.40    0.05    0.15   1.20
6.56   1.000
   45.00    0.45    262.45    0.10    0.40    0.05    0.15   1.20
6.56   1.000
   45.00    0.89    328.06    0.10    0.20    0.05    0.15   1.00
6.56   1.000
   55.00    1.15    328.06    0.10    0.20    0.05    0.15   1.00
6.56   1.000
   90.00    1.15    328.06    0.10    0.20    0.05    0.15   1.00
6.56   1.000
  Gain/Loss factors: shaft and toe
   0.83300   0.00000   0.00000   0.00000   0.00000
   1.00000   0.00000   0.00000   0.00000   0.00000
      Dpth         L      Wait      Strk      Pmx%      Eff.
Stff       CoR
      6.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     12.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     18.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     24.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     30.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     32.63      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     37.38      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     40.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     50.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      0.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
```

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

US 180 Little Colorado River Bridge Pier

Hammer Model: D 30-32 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	2.200				
2	2.200	151179.4	1.000	0.0000	
3	2.200	151179.4	1.000	0.0000	
Imp Block	1.360	89695.7	0.900	0.0100	
Helmet	1.020	28233.3	0.800	0.0098	10.9
Combined Pile Top		68474.9			

HAMMER OPTIONS:
Hammer File ID No. 15 Hammer Type OE Diesel
Stroke Option FxdP-VarS Stroke Convergence Crit. 0.010
Fuel Pump Setting Maximum

HAMMER DATA:
Ram Weight (kips) 6.60 Ram Length (inch) 123.20
Maximum Stroke (ft) 13.73
Rated Stroke (ft) 11.43 Efficiency 0.800

Maximum Pressure (psi) 1460.00 Actual Pressure (psi) 1460.00
Compression Exponent 1.350 Expansion Exponent 1.250
Ram Diameter (inch) 16.51
Combustion Delay (s) 0.00050 Ignition Duration (s) 0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION PILE CUSHION
Cross Sect. Area (in2) 121.00 Cross Sect. Area (in2) 0.00
Elastic-Modulus (ksi) 350.0 Elastic-Modulus

```
(ksi)       0.0
  Thickness           (inch)       1.50  Thickness
(inch)      0.00
  Coeff of Restitution             0.8  Coeff of Restitution
1.0
  RoundOut               (ft)        0.0  RoundOut
(ft)       0.0
  Stiffness        (kips/in)   28233.3  Stiffness
(kips/in)       0.0
```

```
 US 180 Little Colorado River Bridge Pier
08/07/2023
 Ethos Engineering                                                   GRLWEAP
Version 2010

  Depth                  (ft)        6.0  Standard Soil Setup
  Shaft Gain/Loss Factor         0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size            (inch)    24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft             ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
      90.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)     3.528

         Pile and Soil Model           Total Capacity Rut
(kips)     263.4
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00     0.2   0.050 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00     0.8   0.050 0.100
90.00   6.3    54.8
 Toe                                    262.5   0.150 0.398

      3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
      3.049 kips total reduced pile weight   (g= 32.19 ft/s2)

  PILE, SOIL, ANALYSIS OPTIONS:
  Uniform pile                          Pile Segments: Automatic
  No. of Slacks/Splices              0  Pile Damping
(%)         1
                                        Pile Damping
Fact.(k/ft/s)     1.074
  Driveability Analysis
```

Soil Damping Option Smith
Max No Analysis Iterations 0 Time Increment/Critical
160
Output Time Interval 3 Analysis Time-Input
(ms) 0
Output Level: Normal
Gravity Mass, Pile, Hammer: 32.170 32.185 32.185
Output Segment Generation: Automatic

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
6.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
263.4	26.2	8.71	8.65	0.00	1	0	18.21	1	2	33.3	40.0

US 180 Little Colorado River Bridge Pier
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

```
  Depth                 (ft)      12.0  Standard Soil Setup
  Shaft Gain/Loss Factor         0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size           (inch)    24.000
```

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 266.2

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	0.1	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	0.6	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	1.2	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	1.8	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	

12.00	11.43	1.00	0.800

US 180 Little Colorado River Bridge Pier
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
266.2	26.6	8.74	8.67	0.00	1	0	18.27	2	2	33.2	40.0

US 180 Little Colorado River Bridge Pier
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

```
  Depth                  (ft)       18.0  Standard Soil Setup
  Shaft Gain/Loss Factor          0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size           (inch)    24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
      90.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)     3.528

         Pile and Soil Model            Total Capacity Rut
(kips)     270.9
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  22  0.113    68475 0.000 0.000 1.00     0.0   0.050 0.100
73.33   6.3    54.8
  23  0.113    68475 0.000 0.000 1.00     0.5   0.050 0.100
76.67   6.3    54.8
  24  0.113    68475 0.000 0.000 1.00     1.1   0.050 0.100
80.00   6.3    54.8
  25  0.113    68475 0.000 0.000 1.00     1.7   0.050 0.100
83.33   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00     2.3   0.050 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00     2.8   0.050 0.100
90.00   6.3    54.8
 Toe                                    262.5   0.150 0.398

      3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
      3.049 kips total reduced pile weight   (g= 32.19 ft/s2)
```

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
18.00	11.43	1.00	0.800

US 180 Little Colorado River Bridge Pier
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
270.9	27.1	8.77	8.71	0.00	1	0	18.35	16	2	33.1	39.9

US 180 Little Colorado River Bridge Pier
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

Depth (ft) 24.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type
Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut
(kips) 277.5

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	0.0	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	0.4	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	1.0	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	1.6	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	2.1	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	2.7	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	3.3	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	3.9	0.050	0.100	90.00	6.3	54.8

Toe	262.5	0.150	0.398

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
24.00	11.43	1.00	0.800

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
277.5	28.0	8.81	8.75	0.00	1	0	18.49	17	3	33.1	39.8

US 180 Little Colorado River Bridge Pier
08/07/2023
Ethos Engineering GRLWEAP Version 2010

Depth (ft) 30.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 285.9

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	0.3	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	0.9	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	1.5	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	2.0	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	2.6	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	3.2	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	3.8	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	4.4	0.050	0.100	86.67	6.3	54.8

```
  27  0.113    68475 0.000 0.000 1.00     4.9   0.050 0.100
90.00   6.3    54.8
 Toe                                    262.5   0.150 0.398

     3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
     3.049 kips total reduced pile weight   (g= 32.19 ft/s2)


    Depth    Stroke  Pressure    Effic y
       ft        ft     Ratio
    30.00     11.43      1.00     0.800
```

 US 180 Little Colorado River Bridge Pier
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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
285.9	29.1	8.87	8.81	0.00	1	0	18.67	18	3	32.9	39.7

US 180 Little Colorado River Bridge Pier
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

Depth (ft) 32.6 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 290.3

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	0.2	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	0.7	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	1.3	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	1.9	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	2.5	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	3.1	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	3.6	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	4.2	0.050	0.100	83.33	6.3	54.8

26	0.113	68475	0.000	0.000	1.00	4.8	0.050	0.100
86.67	6.3	54.8						
27	0.113	68475	0.000	0.000	1.00	5.4	0.050	0.100
90.00	6.3	54.8						
Toe						262.5	0.150	0.398

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
32.63	11.43	1.00	0.800

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Ethos Engineering GRLWEAP Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
290.3	29.6	8.90	8.84	0.00	1	0	18.76	18	3	32.9	39.6

```
 US 180 Little Colorado River Bridge Pier
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 Ethos Engineering                                                  GRLWEAP
Version 2010

  Depth                  (ft)       37.4  Standard Soil Setup
  Shaft Gain/Loss Factor         0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size           (inch)    24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft             ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
      90.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)     3.528

         Pile and Soil Model            Total Capacity Rut
(kips)     298.9
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  16  0.113    68475 0.000 0.000 1.00     0.0   0.050 0.100
53.33   6.3    54.8
  17  0.113    68475 0.000 0.000 1.00     0.4   0.050 0.100
56.67   6.3    54.8
  18  0.113    68475 0.000 0.000 1.00     1.0   0.050 0.100
60.00   6.3    54.8
  19  0.113    68475 0.000 0.000 1.00     1.6   0.050 0.100
63.33   6.3    54.8
  20  0.113    68475 0.000 0.000 1.00     2.2   0.050 0.100
66.67   6.3    54.8
  21  0.113    68475 0.000 0.000 1.00     2.7   0.050 0.100
70.00   6.3    54.8
  22  0.113    68475 0.000 0.000 1.00     3.3   0.050 0.100
73.33   6.3    54.8
  23  0.113    68475 0.000 0.000 1.00     3.9   0.050 0.100
76.67   6.3    54.8
```

```
  24  0.113    68475 0.000 0.000 1.00     4.5   0.050 0.100
80.00   6.3    54.8
  25  0.113    68475 0.000 0.000 1.00     5.1   0.050 0.100
83.33   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00     5.6   0.050 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00     6.2   0.050 0.100
90.00   6.3    54.8
 Toe                                    262.5   0.150 0.398

      3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
      3.049 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     37.38     11.43      1.00     0.800
```

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Ethos Engineering GRLWEAP Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
298.9	30.5	8.97	8.90	0.00	1	0	18.93	18	3	32.7	39.5

```
 US 180 Little Colorado River Bridge Pier
08/07/2023
 Ethos Engineering                                                    GRLWEAP
Version 2010

  Depth                  (ft)       40.0  Standard Soil Setup
  Shaft Gain/Loss Factor         0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size           (inch)    24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft             ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
      90.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)     3.528

         Pile and Soil Model            Total Capacity Rut
(kips)     304.2
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  16  0.113    68475 0.000 0.000 1.00     0.3   0.050 0.100
53.33   6.3    54.8
  17  0.113    68475 0.000 0.000 1.00     0.9   0.050 0.100
56.67   6.3    54.8
  18  0.113    68475 0.000 0.000 1.00     1.5   0.050 0.100
60.00   6.3    54.8
  19  0.113    68475 0.000 0.000 1.00     2.0   0.050 0.100
63.33   6.3    54.8
  20  0.113    68475 0.000 0.000 1.00     2.6   0.050 0.100
66.67   6.3    54.8
  21  0.113    68475 0.000 0.000 1.00     3.2   0.050 0.100
70.00   6.3    54.8
  22  0.113    68475 0.000 0.000 1.00     3.8   0.050 0.100
73.33   6.3    54.8
  23  0.113    68475 0.000 0.000 1.00     4.4   0.050 0.100
76.67   6.3    54.8
```

```
  24  0.113    68475 0.000 0.000 1.00     4.9   0.050 0.100
80.00   6.3    54.8
  25  0.113    68475 0.000 0.000 1.00     5.5   0.050 0.100
83.33   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00     6.1   0.050 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00     6.7   0.050 0.100
90.00   6.3    54.8
 Toe                                    262.5   0.150 0.398

      3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
      3.049 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     40.00     11.43      1.00     0.800
```

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
304.2	30.9	9.00	8.92	0.00	1	0	19.04	17	3	32.7	39.4

US 180 Little Colorado River Bridge Pier
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Ethos Engineering GRLWEAP Version 2010

Depth	(ft)	50.0	Standard Soil Setup	
Shaft Gain/Loss Factor		0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type	Pipe
Pile Size	(inch)	24.000		

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 410.9

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
13	0.113	68475	0.000	0.000	1.00	0.3	0.050	0.100	43.33	6.3	54.8
14	0.113	68475	0.000	0.000	1.00	0.9	0.050	0.100	46.67	6.3	54.8
15	0.113	68475	0.000	0.000	1.00	1.5	0.050	0.100	50.00	6.3	54.8
16	0.113	68475	0.000	0.000	1.00	2.0	0.050	0.100	53.33	6.3	54.8
17	0.113	68475	0.000	0.000	1.00	2.6	0.050	0.100	56.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	3.2	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	3.8	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	4.4	0.050	0.100	66.67	6.3	54.8

```
  21  0.113    68475 0.000 0.000 1.00     4.9   0.050 0.100
70.00   6.3    54.8
  22  0.113    68475 0.000 0.000 1.00     5.5   0.050 0.100
73.33   6.3    54.8
  23  0.113    68475 0.000 0.000 1.00     6.1   0.050 0.100
76.67   6.3    54.8
  24  0.113    68475 0.000 0.000 1.00     6.7   0.050 0.100
80.00   6.3    54.8
  25  0.113    68475 0.000 0.000 1.00     7.3   0.050 0.100
83.33   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00    13.4   0.050 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00    20.4   0.050 0.100
90.00   6.3    54.8
 Toe                                    328.1   0.150 0.199

      3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
      3.049 kips total reduced pile weight   (g= 32.19 ft/s2)
```

Depth ft	Stroke ft	Pressure Ratio	Efficy
50.00	11.43	1.00	0.800

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
410.9	39.1	9.87	9.86	0.00	1	0	20.80	15	2	31.5	37.7

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SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 0.833 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
6.0	263.4	0.9	262.5	26.2	18.212	0.000	8.71	33.3
12.0	266.2	3.8	262.5	26.6	18.269	0.000	8.74	33.2
18.0	270.9	8.5	262.5	27.1	18.347	0.000	8.77	33.1
24.0	277.5	15.0	262.5	28.0	18.489	0.000	8.81	33.1
30.0	285.9	23.5	262.5	29.1	18.667	0.000	8.87	32.9
32.6	290.3	27.8	262.5	29.6	18.759	0.000	8.90	32.9
37.4	298.9	36.5	262.5	30.5	18.929	0.000	8.97	32.7
40.0	304.2	41.8	262.5	30.9	19.037	0.000	9.00	32.7
50.0	410.9	82.9	328.1	39.1	20.796	0.000	9.87	31.5

Total Driving Time 33 minutes; Total No. of Blows 1305
Starting at penetration 6.0 ft

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Ethos Engineering GRLWEAP
Version 2010

Table of Depths Analyzed with Driving System Modifiers

Depth	Temp. Length	Wait Time	Equivalent Stroke	Pressure Ratio	Efficy.	Stiffn. Factor	Cushion CoR
ft	ft	hr	ft				
6.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
12.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
18.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
24.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
30.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
32.63	90.00	0.00	11.43	1.00	0.80	1.00	1.00
37.38	90.00	0.00	11.43	1.00	0.80	1.00	1.00
40.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
50.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00

Soil Layer Resistance Values

Depth	Shaft Res.	End Bearing	Shaft Quake	Toe Quake	Shaft Damping	Toe Damping	Soil Setup	Limit Distance	Setup Time
ft	k/ft2	kips	inch	inch	s/ft	s/ft	Normlzd	ft	hrs
0.00	0.00	262.45	0.100	0.398	0.050	0.150	1.000	6.560	1.000
45.00	0.45	262.45	0.100	0.398	0.050	0.150	1.000	6.560	1.000
45.00	0.89	328.06	0.100	0.199	0.050	0.150	0.000	6.560	1.000
55.00	1.15	328.06	0.100	0.199	0.050	0.150	0.000	6.560	1.000
90.00	1.15	328.06	0.100	0.199	0.050	0.150	0.000	6.560	1.000

Gain/Loss 1 at Shaft and Toe 0.833 / 1.000

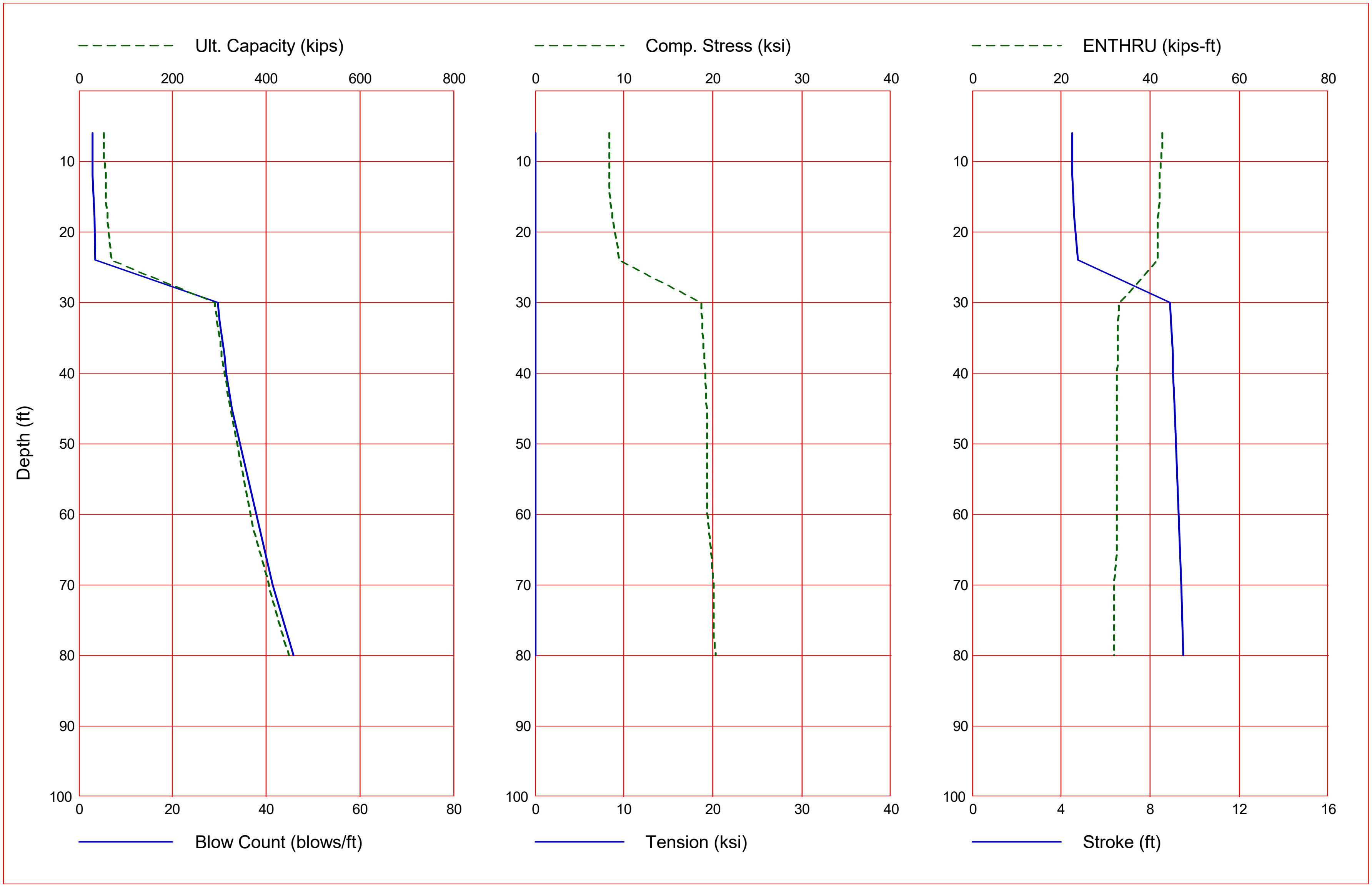
Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
6.0	53.6	1.1	52.5	2.9	8.375	0.000	4.51	42.7
12.0	57.0	4.6	52.5	3.0	8.383	0.000	4.52	42.2
18.0	62.7	10.2	52.5	3.3	8.670	0.000	4.60	41.8
24.0	70.7	18.2	52.5	3.6	9.411	0.000	4.77	41.6
30.0	290.2	27.8	262.5	29.6	18.740	0.000	8.91	32.9
32.6	295.0	32.5	262.5	30.1	18.862	0.000	8.94	32.8
37.4	304.6	42.2	262.5	31.0	19.048	0.000	9.01	32.7
40.0	310.5	48.0	262.5	31.5	19.143	0.000	9.04	32.6
42.6	316.8	54.3	262.5	32.2	19.236	0.000	9.07	32.5
45.0	322.8	60.4	262.5	32.8	19.321	0.000	9.10	32.5
70.0	405.9	143.4	262.5	41.5	20.083	0.000	9.41	31.9
80.0	449.2	186.7	262.5	45.8	20.321	0.000	9.51	31.9

Total Continuous Driving Time 51.00 minutes; Total Number of Blows 1990 (starting at penetration 6.0 ft)

Ethos Engineering
US 180 Little Colorado River Bridge Pier

Jul 30 2023
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 0.833 / 1.000



GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

```
 Input  File: \\VR-FILE\PROJECTS\2022095 - NFRA - US 180, 5 MILE & LITTLE
COLORADO\ENGINEERING\CALCULATIONS\GEOTECH\04_DRIVEN PILES\2022095 LITTLE COLORADO
PIER GRL WEAP.GWW
 Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource\HAMMER2010.GW
 Hammer File Version:  2003 (12/4/2018)

                       Input File Contents
     US 180 Little Colorado River Bridge Pier
 OUT OSG HAM STR FUL PEL   N SPL N-U P-D %SK ISM  0 PHI RSA ITR H-D MXT     DEx
-100   0  15   0   1   0  0   0   0   0   0   1  0   0   0   0   0   0   0.000
    Pile g  Hammer g  Toe Area Pile Size           Pile Type
    32.185    32.185   452.380    24.000                Pipe
      W Cp      A Cp      E Cp      T Cp       CoR      ROut      StCp
     1.020   121.000     350.0     1.500     0.800     0.010       0.0
      A Cu      E Cu      T Cu       CoR      ROut      StCu
     0.000       0.0     0.000     0.000     0.000       0.0
      LPle      APle      EPle      WPle      Peri        CI       CoR      ROut
    90.000     54.78   50000.0    89.000     6.283         0     0.850     0.010
  FFatigue        F0  0-Bottom
         0     0.000     0.000
 Manufac  Hmr Name  HmrType No Seg-s
 DELMAG   D 30-32         1        3
    Ram Wt     Ram L  Ram Dia   MaxStrk   RtdStrk    Efficy
      6.60    123.20    16.51     13.73     11.43      0.80
    IB. Wt     IB. L   IB.Dia    IB CoR     IB RO
      1.36     28.15    16.51     0.900     0.010
  CompStrk A Chamber V Chamber   C Delay  C Duratn Exp Coeff VolCStart  Vol CEnd
     17.68    214.03    309.10    0.0005    0.0020     1.250      0.00      0.00
     P atm        P1        P2        P3        P4        P5
     14.70   1460.00   1315.00   1185.00   1065.00      0.00
    Stroke    Effic.  Pressure  R-Weight   T-Delay Exp-Coeff   Eps-Str  Total-AW
   11.4300    0.8000 1460.0000    0.0000    0.0000    0.0000    0.0100    0.0000
        Qs        Qt        Js        Jt        Qx        Jx      Rati      Dept
     0.100     0.398     0.050     0.150     0.000     0.000     0.000     0.000
  Research Soil Model: Atoe, Plug,  Gap, Q-fac
     0.000     0.000     0.000     0.000
  Research Soil Model: RD-skn: m, d, toe: m, d
     0.000     0.000     0.000     0.000
  Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt    SU F   LimL    TSf0
    0.00    0.00     52.49    0.10    0.40    0.05    0.15    1.20   6.56   1.000
   25.00    0.30     52.49    0.10    0.40    0.05    0.15    1.20   6.56   1.000
   25.00    0.28    262.45    0.10    0.40    0.05    0.15    1.20   6.56   1.000
   85.00    0.94    262.45    0.10    0.40    0.05    0.15    1.20   6.56   1.000
   85.00    1.54    328.06    0.10    0.20    0.05    0.15    1.20   6.56   1.000
   90.00    1.66    328.06    0.10    0.20    0.05    0.15    1.20   6.56   1.000
  Gain/Loss factors: shaft and toe
   0.83300   0.00000   0.00000   0.00000   0.00000
   1.00000   0.00000   0.00000   0.00000   0.00000
```

Dpth	L	Wait	Strk	Pmx%	Eff.	Stff	CoR
6.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
12.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
18.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
24.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
30.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
32.63	0.00	0.00	0.000	0.0	0.000	0.000	0.000
37.38	0.00	0.00	0.000	0.0	0.000	0.000	0.000
40.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
42.63	0.00	0.00	0.000	0.0	0.000	0.000	0.000
45.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
70.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
80.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000
0.00	0.00	0.00	0.000	0.0	0.000	0.000	0.000

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

US 180 Little Colorado River Bridge Pier

Hammer Model: D 30-32 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	2.200				
2	2.200	151179.4	1.000	0.0000	
3	2.200	151179.4	1.000	0.0000	
Imp Block	1.360	89695.7	0.900	0.0100	
Helmet	1.020	28233.3	0.800	0.0098	10.9
Combined Pile Top		68474.9			

HAMMER OPTIONS:

Hammer File ID No.	15	Hammer Type	OE Diesel
Stroke Option	FxdP-VarS	Stroke Convergence Crit.	0.010
Fuel Pump Setting	Maximum		

HAMMER DATA:

Ram Weight	(kips)	6.60	Ram Length	(inch)	123.20
Maximum Stroke	(ft)	13.73			
Rated Stroke	(ft)	11.43	Efficiency		0.800
Maximum Pressure	(psi)	1460.00	Actual Pressure	(psi)	1460.00
Compression Exponent		1.350	Expansion Exponent		1.250
Ram Diameter	(inch)	16.51			
Combustion Delay	(s)	0.00050	Ignition Duration	(s)	0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION			PILE CUSHION		
Cross Sect. Area	(in2)	121.00	Cross Sect. Area	(in2)	0.00
Elastic-Modulus	(ksi)	350.0	Elastic-Modulus	(ksi)	0.0
Thickness	(inch)	1.50	Thickness	(inch)	0.00
Coeff of Restitution		0.8	Coeff of Restitution		1.0
RoundOut	(ft)	0.0	RoundOut	(ft)	0.0
Stiffness	(kips/in)	28233.3	Stiffness	(kips/in)	0.0

Depth (ft) 6.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type		Pipe
Pile Size	(inch)	24.000			

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model — Total Capacity Rut (kips) 53.6

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	0.2	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	0.9	0.050	0.100	90.00	6.3	54.8
Toe						52.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

PILE, SOIL, ANALYSIS OPTIONS:

Uniform pile — Pile Segments: Automatic
No. of Slacks/Splices 0 — Pile Damping (%) 1
Pile Damping Fact.(k/ft/s) 1.074
Driveability Analysis
Soil Damping Option Smith
Max No Analysis Iterations 0 — Time Increment/Critical 160
Output Time Interval 3 — Analysis Time-Input (ms) 0
Output Level: Normal
Gravity Mass, Pile, Hammer: 32.170 32.185 32.185
Output Segment Generation: Automatic

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
6.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
53.6	2.9	4.51	4.47	0.00	1	0	8.38	1	2	42.7	55.7

Depth (ft)	12.0	Standard Soil Setup		
Shaft Gain/Loss Factor	0.833	Toe Gain/Loss Factor	1.000	

PILE PROFILE:

Toe Area (in2)	452.380	Pile Type	Pipe	
Pile Size (inch)	24.000			

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 57.0

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	0.1	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	0.8	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	1.5	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	2.2	0.050	0.100	90.00	6.3	54.8
Toe						52.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
12.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
57.0	3.0	4.52	4.55	0.00	1	0	8.38	1	2	42.2	55.4

US 180 Little Colorado River Bridge Pier 07/30/2023
Ethos Engineering GRLWEAP Version 2010

Depth	(ft)	18.0	Standard Soil Setup		
Shaft Gain/Loss Factor		0.833	Toe Gain/Loss Factor		1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type		Pipe
Pile Size	(inch)	24.000			

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 62.7

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	0.1	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	0.6	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	1.3	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	2.0	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	2.7	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	3.4	0.050	0.100	90.00	6.3	54.8
Toe						52.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
18.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
62.7	3.3	4.60	4.64	0.00	1	0	8.67	1	2	41.8	54.9

US 180 Little Colorado River Bridge Pier 07/30/2023
Ethos Engineering GRLWEAP Version 2010

Depth	(ft)	24.0	Standard Soil Setup		
Shaft Gain/Loss Factor		0.833	Toe Gain/Loss Factor		1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type		Pipe
Pile Size	(inch)	24.000			

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 70.7

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	0.0	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	0.5	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	1.2	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	1.9	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	2.6	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	3.3	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	4.0	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	4.7	0.050	0.100	90.00	6.3	54.8
Toe						52.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
24.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
70.7	3.6	4.77	4.75	0.00	1	0	9.41	1	2	41.6	54.0

Depth	(ft)	30.0	Standard Soil Setup	
Shaft Gain/Loss Factor		0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type	Pipe
Pile Size	(inch)	24.000		

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 290.2

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	0.4	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	1.1	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	1.8	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	2.5	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	3.2	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	3.9	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	4.6	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	5.1	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	5.5	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
30.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
290.2	29.6	8.91	8.85	0.00	1	0	18.74	18	3	32.9	39.6

Depth	(ft)	32.6	Standard Soil Setup	
Shaft Gain/Loss Factor		0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type	Pipe
Pile Size	(inch)	24.000		

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 295.0

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	0.2	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	0.9	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	1.6	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	2.3	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	3.0	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	3.7	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	4.4	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	5.0	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	5.4	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	6.0	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
32.63	11.43	1.00	0.800

Rut kips	Bl Ct b/ft	Stroke (ft) down	up	Ten Str ksi	i	t	Comp Str ksi	i	t	ENTHRU kip-ft	Bl Rt b/min
295.0	30.1	8.94	8.87	0.00	1	0	18.86	18	3	32.8	39.5

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Depth	(ft)	37.4	Standard Soil Setup	
Shaft Gain/Loss Factor		0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type	Pipe
Pile Size	(inch)	24.000		

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 304.6

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
16	0.113	68475	0.000	0.000	1.00	0.0	0.050	0.100	53.33	6.3	54.8
17	0.113	68475	0.000	0.000	1.00	0.5	0.050	0.100	56.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	1.2	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	1.9	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	2.6	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	3.3	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	4.0	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	4.7	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	5.1	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	5.6	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	6.3	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	6.9	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
37.38	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
304.6	31.0	9.01	8.93	0.00	1	0	19.05	18	3	32.7	39.4

Depth (ft)	40.0	Standard Soil Setup	
Shaft Gain/Loss Factor	0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area (in2)	452.380	Pile Type	Pipe
Pile Size (inch)	24.000		

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model — Total Capacity Rut (kips) 310.5

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
16	0.113	68475	0.000	0.000	1.00	0.4	0.050	0.100	53.33	6.3	54.8
17	0.113	68475	0.000	0.000	1.00	1.1	0.050	0.100	56.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	1.8	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	2.5	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	3.2	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	3.9	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	4.6	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	5.1	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	5.5	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	6.1	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	6.8	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	7.4	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
40.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
310.5	31.5	9.04	8.96	0.00	1	0	19.14	17	3	32.6	39.3

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Depth	(ft)	42.6	Standard Soil Setup	
Shaft Gain/Loss Factor		0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type	Pipe
Pile Size	(inch)	24.000		

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model — Total Capacity Rut (kips) 316.8

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
15	0.113	68475	0.000	0.000	1.00	0.2	0.050	0.100	50.00	6.3	54.8
16	0.113	68475	0.000	0.000	1.00	0.9	0.050	0.100	53.33	6.3	54.8
17	0.113	68475	0.000	0.000	1.00	1.6	0.050	0.100	56.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	2.3	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	3.0	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	3.7	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	4.4	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	5.0	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	5.4	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	6.0	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	6.6	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	7.3	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	7.9	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
42.63	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
316.8	32.2	9.07	8.99	0.00	1	0	19.24	17	3	32.5	39.3

Depth (ft)	45.0	Standard Soil Setup	
Shaft Gain/Loss Factor	0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area (in2)	452.380	Pile Type	Pipe
Pile Size (inch)	24.000		

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 322.8

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
14	0.113	68475	0.000	0.000	1.00	0.1	0.050	0.100	46.67	6.3	54.8
15	0.113	68475	0.000	0.000	1.00	0.7	0.050	0.100	50.00	6.3	54.8
16	0.113	68475	0.000	0.000	1.00	1.4	0.050	0.100	53.33	6.3	54.8
17	0.113	68475	0.000	0.000	1.00	2.1	0.050	0.100	56.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	2.8	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	3.5	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	4.2	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	4.9	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	5.2	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	5.8	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	6.4	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	7.1	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	7.7	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	8.4	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
45.00	11.43	1.00	0.800

Rut kips	Bl Ct b/ft	Stroke (ft) down	up	Ten Str ksi	i	t	Comp Str ksi	i	t	ENTHRU kip-ft	Bl Rt b/min
322.8	32.8	9.10	9.02	0.00	1	0	19.32	16	2	32.5	39.2

Depth (ft) 70.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type Pipe
Pile Size (inch) 24.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model Total Capacity Rut (kips) 405.9

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
7	0.113	68475	0.000	0.000	1.00	0.4	0.050	0.100	23.33	6.3	54.8
8	0.113	68475	0.000	0.000	1.00	1.1	0.050	0.100	26.67	6.3	54.8
9	0.113	68475	0.000	0.000	1.00	1.8	0.050	0.100	30.00	6.3	54.8
10	0.113	68475	0.000	0.000	1.00	2.5	0.050	0.100	33.33	6.3	54.8
11	0.113	68475	0.000	0.000	1.00	3.2	0.050	0.100	36.67	6.3	54.8
12	0.113	68475	0.000	0.000	1.00	3.9	0.050	0.100	40.00	6.3	54.8
13	0.113	68475	0.000	0.000	1.00	4.6	0.050	0.100	43.33	6.3	54.8
14	0.113	68475	0.000	0.000	1.00	5.1	0.050	0.100	46.67	6.3	54.8
15	0.113	68475	0.000	0.000	1.00	5.5	0.050	0.100	50.00	6.3	54.8
16	0.113	68475	0.000	0.000	1.00	6.1	0.050	0.100	53.33	6.3	54.8
17	0.113	68475	0.000	0.000	1.00	6.8	0.050	0.100	56.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	7.4	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	8.0	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	8.7	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	9.3	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	10.0	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	10.6	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	11.2	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	11.9	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	12.5	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	13.2	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
70.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
405.9	41.5	9.41	9.36	0.00	1	0	20.08	9	2	31.9	38.6

Depth (ft)	80.0	Standard Soil Setup	
Shaft Gain/Loss Factor	0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area (in2)	452.380	Pile Type	Pipe
Pile Size (inch)	24.000		

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
90.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 3.528

Pile and Soil Model — Total Capacity Rut (kips) 449.2

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
4	0.113	68475	0.000	0.000	1.00	0.4	0.050	0.100	13.33	6.3	54.8
5	0.113	68475	0.000	0.000	1.00	1.1	0.050	0.100	16.67	6.3	54.8
6	0.113	68475	0.000	0.000	1.00	1.8	0.050	0.100	20.00	6.3	54.8
7	0.113	68475	0.000	0.000	1.00	2.5	0.050	0.100	23.33	6.3	54.8
8	0.113	68475	0.000	0.000	1.00	3.2	0.050	0.100	26.67	6.3	54.8
9	0.113	68475	0.000	0.000	1.00	3.9	0.050	0.100	30.00	6.3	54.8
10	0.113	68475	0.000	0.000	1.00	4.6	0.050	0.100	33.33	6.3	54.8
11	0.113	68475	0.000	0.000	1.00	5.1	0.050	0.100	36.67	6.3	54.8
12	0.113	68475	0.000	0.000	1.00	5.5	0.050	0.100	40.00	6.3	54.8
13	0.113	68475	0.000	0.000	1.00	6.1	0.050	0.100	43.33	6.3	54.8
14	0.113	68475	0.000	0.000	1.00	6.8	0.050	0.100	46.67	6.3	54.8
15	0.113	68475	0.000	0.000	1.00	7.4	0.050	0.100	50.00	6.3	54.8
16	0.113	68475	0.000	0.000	1.00	8.0	0.050	0.100	53.33	6.3	54.8
17	0.113	68475	0.000	0.000	1.00	8.7	0.050	0.100	56.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	9.3	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	10.0	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	10.6	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	11.2	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	11.9	0.050	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	12.5	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	13.2	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	13.8	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	14.4	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	15.1	0.050	0.100	90.00	6.3	54.8
Toe						262.5	0.150	0.398			

3.047 kips total unreduced pile weight (g= 32.17 ft/s2)
3.049 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy

80.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
449.2	45.8	9.51	9.47	0.00	1	0	20.32	6	2	31.9	38.4

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 0.833 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
6.0	53.6	1.1	52.5	2.9	8.375	0.000	4.51	42.7
12.0	57.0	4.6	52.5	3.0	8.383	0.000	4.52	42.2
18.0	62.7	10.2	52.5	3.3	8.670	0.000	4.60	41.8
24.0	70.7	18.2	52.5	3.6	9.411	0.000	4.77	41.6
30.0	290.2	27.8	262.5	29.6	18.740	0.000	8.91	32.9
32.6	295.0	32.5	262.5	30.1	18.862	0.000	8.94	32.8
37.4	304.6	42.2	262.5	31.0	19.048	0.000	9.01	32.7
40.0	310.5	48.0	262.5	31.5	19.143	0.000	9.04	32.6
42.6	316.8	54.3	262.5	32.2	19.236	0.000	9.07	32.5
45.0	322.8	60.4	262.5	32.8	19.321	0.000	9.10	32.5
70.0	405.9	143.4	262.5	41.5	20.083	0.000	9.41	31.9
80.0	449.2	186.7	262.5	45.8	20.321	0.000	9.51	31.9

Total Driving Time 51 minutes; Total No. of Blows 1990
Starting at penetration 6.0 ft

Table of Depths Analyzed with Driving System Modifiers

Depth ft	Temp. Length ft	Wait Time hr	Equivalent Stroke ft	Pressure Ratio	Efficy.	Stiffn. Factor	Cushion CoR
6.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
12.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
18.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
24.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
30.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
32.63	90.00	0.00	11.43	1.00	0.80	1.00	1.00
37.38	90.00	0.00	11.43	1.00	0.80	1.00	1.00
40.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
42.63	90.00	0.00	11.43	1.00	0.80	1.00	1.00
45.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
70.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00
80.00	90.00	0.00	11.43	1.00	0.80	1.00	1.00

Soil Layer Resistance Values

Depth ft	Shaft Res. k/ft2	End Bearing kips	Shaft Quake inch	Toe Quake inch	Shaft Damping s/ft	Toe Damping s/ft	Soil Setup Normlzd	Limit Distance ft	Setup Time hrs
0.00	0.00	52.49	0.100	0.398	0.050	0.150	1.000	6.560	1.000
25.00	0.30	52.49	0.100	0.398	0.050	0.150	1.000	6.560	1.000
25.00	0.28	262.45	0.100	0.398	0.050	0.150	1.000	6.560	1.000
85.00	0.94	262.45	0.100	0.398	0.050	0.150	1.000	6.560	1.000
85.00	1.54	328.06	0.100	0.199	0.050	0.150	1.000	6.560	1.000
90.00	1.66	328.06	0.100	0.199	0.050	0.150	1.000	6.560	1.000

Ethos Engineering
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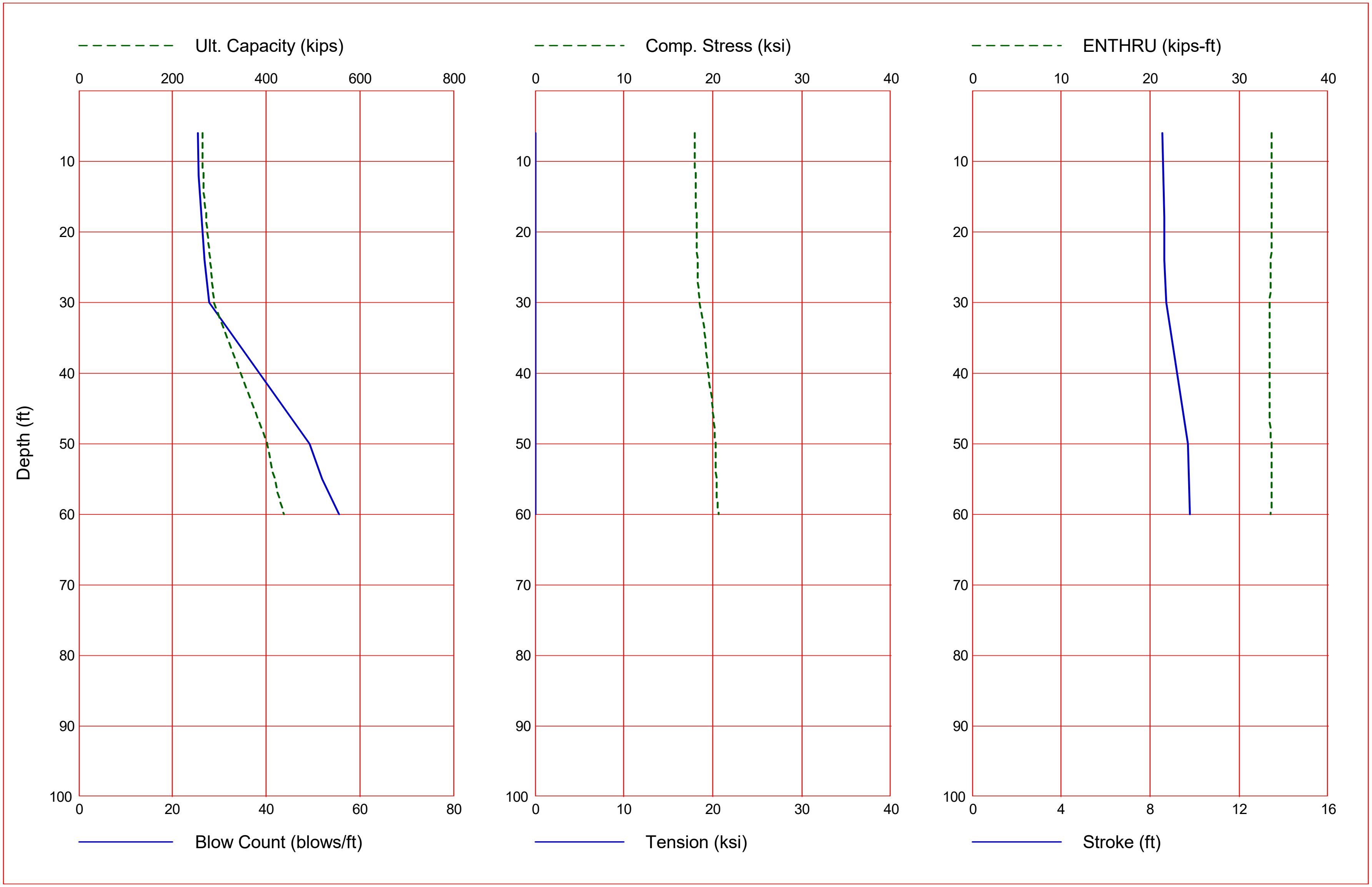
Aug 07 2023
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 0.833 / 1.000



Gain/Loss 1 at Shaft and Toe 0.833 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
6.0	263.5	1.1	262.5	25.4	17.972	0.000	8.55	33.6
12.0	266.8	4.3	262.5	25.7	18.041	0.000	8.58	33.6
18.0	272.2	9.7	262.5	26.2	18.136	0.000	8.62	33.6
24.0	279.7	17.3	262.5	26.9	18.276	0.000	8.66	33.5
30.0	289.5	27.0	262.5	27.8	18.465	0.000	8.73	33.4
50.0	401.3	86.4	314.9	49.4	20.346	0.000	9.71	33.7
55.0	418.5	103.5	314.9	52.0	20.469	0.000	9.76	33.6
60.0	437.5	122.6	314.9	55.6	20.606	0.000	9.81	33.5

Total Continuous Driving Time 49.00 minutes; Total Number of Blows 1926 (starting at penetration 6.0 ft)

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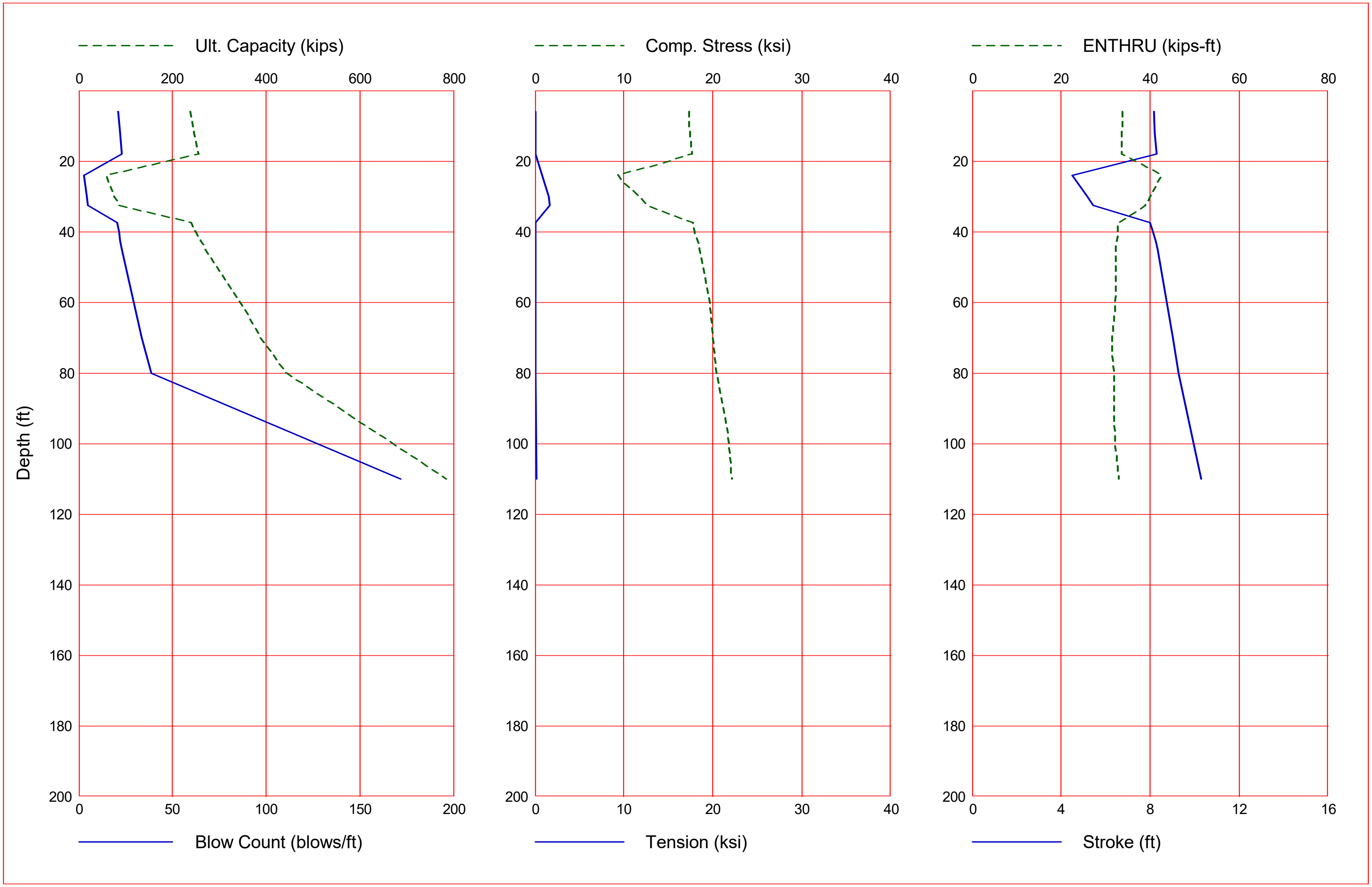
Gain/Loss 1 at Shaft and Toe 0.833 / 1.000



Gain/Loss 1 at Shaft and Toe 0.833 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
6.0	238.4	2.2	236.2	21.2	17.332	-0.022	8.17	33.8
12.0	245.1	8.9	236.2	21.9	17.470	0.000	8.22	33.7
18.0	256.3	20.0	236.2	23.1	17.695	0.000	8.31	33.6
24.0	57.4	36.1	21.3	2.7	9.162	-0.754	4.51	42.6
30.0	76.4	55.2	21.3	4.1	11.754	-1.568	5.19	40.0
32.6	85.5	64.3	21.3	4.8	12.565	-1.610	5.46	39.0
37.4	239.3	81.8	157.5	20.3	17.740	0.000	8.02	32.8
40.0	249.5	92.0	157.5	21.3	18.012	0.000	8.13	32.7
42.6	260.0	102.5	157.5	22.1	18.282	0.000	8.24	32.5
45.0	269.7	112.2	157.5	22.8	18.511	0.000	8.33	32.3
70.0	387.6	230.2	157.5	33.8	20.042	0.000	9.02	31.5
80.0	442.6	285.1	157.5	38.7	20.466	0.000	9.27	31.8
110.0	785.4	470.4	314.9	171.8	22.112	-0.142	10.30	32.9

Total Continuous Driving Time 126.00 minutes; Total Number of Blows 4825 (starting at penetration 6.0 ft)

Capacity = 785.4, Computation Time Increment = 0.030 msec

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
1	40.4	38.8	-5.878	0.00	10.3	0.021	0.005	7.6	0.010	0.003	14.1	0.0	1.5	1.9	0.006	0.002	1.9	0.006
2	40.5	39.1	-5.852	0.00	10.4	0.021	0.005	7.6	0.010	0.003	14.2	0.0	1.5	1.9	0.006	0.002	1.9	0.006
3	40.6	39.4	-5.825	0.00	10.4	0.022	0.006	7.6	0.011	0.003	14.2	0.0	1.5	1.9	0.006	0.002	1.9	0.006
4	40.7	39.6	-5.798	0.00	10.5	0.022	0.006	7.7	0.011	0.003	14.3	0.0	1.5	1.9	0.006	0.002	1.9	0.006
5	40.8	39.9	-5.771	0.00	10.5	0.022	0.006	7.7	0.011	0.003	14.3	0.0	1.5	1.9	0.007	0.002	1.9	0.007
6	40.8	40.2	-5.745	0.00	10.6	0.022	0.006	7.7	0.011	0.003	14.4	0.0	1.5	1.9	0.007	0.002	1.9	0.007
7	40.9	40.4	-5.718	0.00	10.6	0.023	0.006	7.8	0.011	0.003	14.4	0.0	1.5	1.9	0.007	0.002	1.9	0.007
8	41.0	40.7	-5.691	0.00	10.7	0.023	0.006	7.8	0.011	0.003	14.5	0.0	1.5	1.9	0.007	0.002	1.9	0.007
9	41.1	41.0	-5.664	0.00	10.8	0.023	0.006	7.8	0.012	0.003	14.6	0.0	1.5	1.9	0.007	0.002	1.9	0.007
10	41.2	41.3	-5.638	0.00	10.8	0.023	0.006	7.9	0.012	0.003	14.6	0.0	1.5	1.9	0.007	0.002	1.9	0.007
11	41.3	41.6	-5.611	0.00	10.9	0.024	0.006	7.9	0.012	0.003	14.7	0.0	1.6	1.9	0.007	0.002	1.9	0.007
12	41.4	41.9	-5.584	0.00	10.9	0.024	0.006	8.0	0.012	0.003	14.7	0.0	1.6	1.9	0.007	0.002	1.9	0.007
13	41.5	42.1	-5.557	0.00	11.0	0.024	0.006	8.0	0.012	0.003	14.8	0.0	1.6	1.9	0.007	0.002	1.9	0.007
14	41.6	42.4	-5.531	0.00	11.1	0.025	0.006	8.0	0.013	0.003	14.8	0.0	1.6	1.9	0.007	0.002	1.9	0.007
15	41.7	42.7	-5.504	0.00	11.1	0.025	0.006	8.1	0.013	0.003	14.9	0.0	1.6	2.0	0.007	0.002	2.0	0.007
16	41.7	43.0	-5.477	0.00	11.2	0.025	0.006	8.1	0.013	0.003	15.0	0.0	1.6	2.0	0.007	0.002	2.0	0.007
17	41.8	43.3	-5.451	0.00	11.2	0.026	0.006	8.2	0.013	0.003	15.0	0.0	1.6	2.0	0.007	0.002	2.0	0.007
18	41.9	43.6	-5.424	0.00	11.3	0.026	0.006	8.2	0.013	0.003	15.1	0.0	1.6	2.0	0.007	0.002	2.0	0.007
19	42.0	43.9	-5.397	0.00	11.4	0.026	0.006	8.2	0.013	0.003	15.2	0.0	1.6	2.0	0.007	0.002	2.0	0.007
20	42.1	44.2	-5.370	0.00	11.4	0.027	0.006	8.3	0.014	0.003	15.2	0.0	1.6	2.0	0.007	0.002	2.0	0.007
21	42.2	44.6	-5.344	0.00	11.5	0.027	0.006	8.3	0.014	0.003	15.3	0.0	1.6	2.0	0.007	0.002	2.0	0.007
22	42.3	44.9	-5.317	0.00	11.6	0.027	0.006	8.4	0.014	0.003	15.4	0.0	1.6	2.0	0.008	0.002	2.0	0.008
23	42.4	45.2	-5.290	0.00	11.6	0.028	0.006	8.4	0.014	0.003	15.4	0.0	1.6	2.0	0.008	0.002	2.0	0.008
24	42.5	45.5	-5.264	0.00	11.7	0.028	0.006	8.5	0.014	0.003	15.5	0.0	1.6	2.0	0.008	0.002	2.0	0.008
25	42.6	45.8	-5.237	0.00	11.8	0.028	0.006	8.5	0.014	0.003	15.6	0.0	1.6	2.0	0.008	0.002	2.0	0.008
26	42.7	46.2	-5.210	0.00	11.8	0.029	0.006	8.6	0.014	0.003	15.6	0.0	1.6	2.0	0.008	0.002	2.0	0.008
27	42.7	46.5	-5.183	0.00	11.9	0.029	0.006	8.6	0.014	0.003	15.7	0.0	1.7	2.1	0.008	0.002	2.1	0.008
28	42.8	46.8	-5.157	0.00	12.0	0.029	0.006	8.7	0.015	0.003	15.8	0.0	1.7	2.1	0.008	0.002	2.1	0.008
29	42.9	47.2	-5.130	0.00	12.0	0.030	0.006	8.7	0.015	0.003	15.8	0.0	1.7	2.1	0.008	0.002	2.1	0.008
30	43.0	47.5	-5.103	0.00	12.1	0.030	0.006	8.8	0.015	0.003	15.9	0.0	1.7	2.1	0.008	0.002	2.1	0.008
31	43.1	47.8	-5.077	0.00	12.2	0.030	0.006	8.8	0.015	0.003	16.0	0.0	1.7	2.1	0.009	0.002	2.1	0.009
32	43.2	48.2	-5.050	0.00	12.3	0.031	0.006	8.9	0.015	0.004	16.1	0.0	1.7	2.1	0.009	0.002	2.1	0.009
33	43.3	48.5	-5.023	0.00	12.3	0.031	0.006	8.9	0.015	0.004	16.1	0.0	1.7	2.1	0.009	0.002	2.1	0.009
34	43.4	48.9	-4.996	0.00	12.4	0.031	0.006	9.0	0.016	0.004	16.2	0.0	1.7	2.1	0.009	0.002	2.1	0.009
35	43.5	49.2	-4.970	0.00	12.5	0.031	0.006	9.0	0.016	0.004	16.3	0.0	1.7	2.1	0.009	0.002	2.1	0.009
36	43.6	49.6	-4.943	0.00	12.6	0.032	0.006	9.1	0.016	0.004	16.4	0.0	1.7	2.1	0.009	0.002	2.1	0.009
37	43.7	50.0	-4.916	0.00	12.7	0.032	0.006	9.1	0.016	0.004	16.4	0.0	1.7	2.2	0.009	0.002	2.2	0.009
38	43.7	50.3	-4.890	0.00	12.7	0.032	0.007	9.2	0.016	0.004	16.5	0.0	1.7	2.2	0.009	0.002	2.2	0.009
39	43.8	50.7	-4.863	0.00	12.8	0.032	0.007	9.2	0.017	0.004	16.6	0.0	1.7	2.2	0.009	0.002	2.2	0.009
40	43.9	51.1	-4.836	0.00	12.9	0.033	0.007	9.3	0.017	0.004	16.7	0.0	1.8	2.2	0.009	0.002	2.2	0.009
41	44.0	51.4	-4.810	0.00	13.0	0.033	0.007	9.3	0.017	0.004	16.8	0.0	1.8	2.2	0.010	0.002	2.2	0.010
42	44.1	51.8	-4.783	0.00	13.1	0.033	0.007	9.4	0.017	0.004	16.8	0.0	1.8	2.2	0.010	0.002	2.2	0.010

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
43	44.2	52.2	-4.756	0.00	13.2	0.034	0.007	9.4	0.017	0.004	16.9	0.0	1.8	2.2	0.010	0.002	2.2	0.010
44	44.3	52.6	-4.730	0.00	13.2	0.034	0.007	9.5	0.017	0.004	17.0	0.0	1.8	2.2	0.010	0.002	2.2	0.010
45	44.4	53.0	-4.703	0.00	13.3	0.034	0.007	9.5	0.017	0.004	17.1	0.0	1.8	2.2	0.010	0.002	2.2	0.010
46	44.5	53.4	-4.676	0.00	13.4	0.035	0.007	9.6	0.018	0.004	17.2	0.0	1.8	2.2	0.010	0.002	2.2	0.010
47	44.6	53.8	-4.650	0.00	13.5	0.035	0.007	9.6	0.018	0.004	17.3	0.0	1.8	2.3	0.010	0.002	2.3	0.010
48	44.6	54.2	-4.623	0.00	13.6	0.036	0.007	9.7	0.018	0.004	17.4	0.0	1.8	2.3	0.010	0.002	2.3	0.010
49	44.7	54.6	-4.596	0.00	13.7	0.036	0.007	9.8	0.018	0.004	17.4	0.0	1.8	2.3	0.010	0.002	2.3	0.010
50	44.8	55.0	-4.570	0.00	13.8	0.036	0.007	9.8	0.018	0.004	17.5	0.0	1.8	2.3	0.010	0.002	2.3	0.010
51	44.9	55.4	-4.543	0.00	13.8	0.037	0.007	9.9	0.018	0.004	17.6	0.0	1.8	2.3	0.011	0.002	2.3	0.011
52	45.0	55.8	-4.516	0.00	13.9	0.037	0.007	9.9	0.018	0.004	17.7	0.0	1.9	2.3	0.011	0.002	2.3	0.011
53	45.1	56.3	-4.490	0.00	14.0	0.037	0.007	10.0	0.019	0.004	17.8	0.0	1.9	2.3	0.011	0.002	2.3	0.011
54	45.2	56.7	-4.463	0.00	14.1	0.038	0.007	10.0	0.019	0.004	17.9	0.0	1.9	2.3	0.011	0.002	2.3	0.011
55	45.3	57.1	-4.436	0.00	14.2	0.038	0.007	10.1	0.019	0.004	18.0	0.0	1.9	2.4	0.011	0.002	2.4	0.011
56	45.4	57.6	-4.410	0.00	14.3	0.038	0.007	10.2	0.019	0.004	18.1	0.0	1.9	2.4	0.011	0.002	2.4	0.011
57	45.5	58.0	-4.383	0.00	14.4	0.038	0.007	10.2	0.019	0.004	18.2	0.0	1.9	2.4	0.011	0.002	2.4	0.011
58	45.6	58.5	-4.356	0.00	14.5	0.039	0.007	10.3	0.020	0.004	18.3	0.0	1.9	2.4	0.011	0.002	2.4	0.011
59	45.6	58.9	-4.330	0.00	14.6	0.039	0.007	10.4	0.020	0.004	18.4	0.0	1.9	2.4	0.011	0.002	2.4	0.011
60	45.7	59.4	-4.303	0.00	14.7	0.039	0.007	10.4	0.020	0.004	18.5	0.0	1.9	2.4	0.011	0.002	2.4	0.011
61	45.8	59.8	-4.276	0.00	14.8	0.040	0.007	10.5	0.020	0.004	18.6	0.0	1.9	2.4	0.011	0.002	2.4	0.011
62	45.9	60.3	-4.250	0.00	14.9	0.040	0.007	10.6	0.020	0.004	18.7	0.0	2.0	2.4	0.011	0.002	2.4	0.011
63	46.0	60.8	-4.223	0.00	15.0	0.040	0.008	10.6	0.021	0.004	18.8	0.0	2.0	2.5	0.011	0.002	2.5	0.011
64	46.1	61.2	-4.196	0.00	15.1	0.041	0.008	10.7	0.021	0.004	18.9	0.0	2.0	2.5	0.011	0.002	2.5	0.011
65	46.2	61.7	-4.170	0.00	15.2	0.041	0.008	10.8	0.021	0.004	19.0	0.0	2.0	2.5	0.011	0.002	2.5	0.011
66	46.3	62.2	-4.143	0.00	15.3	0.041	0.008	10.8	0.021	0.004	19.1	0.0	2.0	2.5	0.011	0.003	2.5	0.011
67	46.4	62.7	-4.117	0.00	15.4	0.042	0.008	10.9	0.021	0.004	19.2	0.0	2.0	2.5	0.012	0.003	2.5	0.012
68	46.5	63.2	-4.090	0.00	15.5	0.042	0.008	11.0	0.021	0.004	19.3	0.0	2.0	2.5	0.012	0.003	2.5	0.012
69	46.5	63.7	-4.063	0.00	15.6	0.042	0.008	11.0	0.021	0.004	19.4	0.0	2.0	2.5	0.012	0.003	2.5	0.012
70	46.6	64.2	-4.037	0.00	15.7	0.043	0.008	11.1	0.021	0.004	19.5	0.0	2.0	2.5	0.012	0.003	2.5	0.012
71	46.7	64.7	-4.010	0.00	15.8	0.043	0.008	11.2	0.022	0.004	19.6	0.0	2.0	2.6	0.012	0.003	2.6	0.012
72	46.8	65.3	-3.984	0.00	15.9	0.043	0.008	11.2	0.022	0.004	19.7	0.0	2.1	2.6	0.012	0.003	2.6	0.012
73	46.9	65.8	-3.957	0.00	16.0	0.044	0.008	11.3	0.022	0.004	19.8	0.0	2.1	2.6	0.013	0.003	2.6	0.013
74	47.0	66.3	-3.930	0.00	16.1	0.044	0.008	11.4	0.022	0.004	19.9	0.0	2.1	2.6	0.013	0.003	2.6	0.013
75	47.1	66.9	-3.904	0.00	16.2	0.044	0.008	11.4	0.022	0.004	20.0	0.0	2.1	2.6	0.013	0.003	2.6	0.013
76	47.2	67.4	-3.877	0.00	16.3	0.045	0.008	11.5	0.022	0.004	20.1	0.0	2.1	2.6	0.013	0.003	2.6	0.013
77	47.3	68.0	-3.851	0.00	16.4	0.045	0.008	11.6	0.022	0.004	20.2	0.0	2.1	2.6	0.013	0.003	2.6	0.013
78	47.4	68.5	-3.824	0.00	16.6	0.045	0.008	11.7	0.023	0.004	20.3	0.0	2.1	2.7	0.013	0.003	2.7	0.013
79	47.5	69.1	-3.797	0.00	16.7	0.046	0.008	11.7	0.023	0.004	20.4	0.0	2.1	2.7	0.013	0.003	2.7	0.013
80	47.5	69.7	-3.771	0.00	16.8	0.046	0.008	11.8	0.023	0.005	20.6	0.0	2.1	2.7	0.013	0.003	2.7	0.013
81	47.6	70.2	-3.744	0.00	16.9	0.046	0.008	11.9	0.023	0.005	20.7	0.0	2.2	2.7	0.013	0.003	2.7	0.013
82	47.7	70.8	-3.718	0.00	17.0	0.047	0.008	12.0	0.023	0.005	20.8	0.0	2.2	2.7	0.013	0.003	2.7	0.013
83	47.8	71.4	-3.691	0.00	17.1	0.047	0.008	12.0	0.024	0.005	20.9	0.0	2.2	2.7	0.013	0.003	2.7	0.013
84	47.9	72.0	-3.665	0.00	17.3	0.048	0.009	12.1	0.024	0.005	21.0	0.0	2.2	2.7	0.013	0.003	2.7	0.013

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
85	48.0	72.6	-3.638	0.00	17.4	0.048	0.009	12.2	0.024	0.005	21.1	0.0	2.2	2.8	0.013	0.003	2.8	0.013
86	48.1	73.2	-3.612	0.00	17.5	0.048	0.009	12.3	0.024	0.005	21.2	0.0	2.2	2.8	0.013	0.003	2.8	0.013
87	48.2	73.8	-3.585	0.00	17.6	0.049	0.009	12.3	0.024	0.005	21.4	0.0	2.2	2.8	0.013	0.003	2.8	0.013
88	48.3	74.5	-3.558	0.00	17.8	0.049	0.009	12.4	0.025	0.005	21.5	0.0	2.2	2.8	0.014	0.003	2.8	0.014
89	48.4	75.1	-3.532	0.00	17.9	0.050	0.009	12.5	0.025	0.005	21.6	0.0	2.2	2.8	0.014	0.003	2.8	0.014
90	48.4	75.8	-3.505	0.00	18.0	0.050	0.009	12.6	0.025	0.005	21.7	0.0	2.3	2.8	0.014	0.003	2.8	0.014
91	48.5	76.4	-3.479	0.00	18.1	0.050	0.009	12.7	0.025	0.005	21.8	0.0	2.3	2.9	0.014	0.003	2.9	0.014
92	48.6	77.1	-3.452	0.00	18.3	0.051	0.009	12.8	0.025	0.005	22.0	0.0	2.3	2.9	0.014	0.003	2.9	0.014
93	48.7	77.7	-3.426	0.00	18.4	0.051	0.009	12.8	0.026	0.005	22.1	0.0	2.3	2.9	0.014	0.003	2.9	0.014
94	48.8	78.4	-3.399	0.00	18.5	0.052	0.009	12.9	0.026	0.005	22.2	0.0	2.3	2.9	0.014	0.003	2.9	0.014
95	48.9	79.1	-3.373	0.00	18.7	0.052	0.009	13.0	0.026	0.005	22.3	0.0	2.3	2.9	0.014	0.003	2.9	0.014
96	49.0	79.8	-3.346	0.00	18.8	0.053	0.009	13.1	0.026	0.005	22.5	0.0	2.3	2.9	0.015	0.003	2.9	0.015
97	49.1	80.5	-3.320	0.00	18.9	0.054	0.009	13.2	0.026	0.005	22.6	0.1	2.3	3.0	0.015	0.003	3.0	0.015
98	49.2	81.2	-3.293	0.00	19.1	0.054	0.009	13.3	0.027	0.005	22.7	0.1	2.4	3.0	0.015	0.003	3.0	0.015
99	49.3	81.9	-3.267	0.00	19.2	0.055	0.009	13.4	0.027	0.005	22.9	0.1	2.4	3.0	0.015	0.003	3.0	0.015
100	49.4	82.6	-3.240	0.00	19.3	0.055	0.009	13.5	0.027	0.005	23.0	0.1	2.4	3.0	0.015	0.003	3.0	0.015
101	49.4	83.4	-3.214	0.00	19.5	0.056	0.009	13.5	0.027	0.005	23.1	0.1	2.4	3.0	0.015	0.003	3.0	0.015
102	49.5	84.1	-3.187	0.00	19.6	0.056	0.010	13.6	0.028	0.005	23.2	0.1	2.4	3.0	0.015	0.003	3.0	0.015
103	49.6	84.9	-3.161	0.00	19.8	0.057	0.010	13.7	0.028	0.005	23.4	0.1	2.4	3.1	0.015	0.003	3.1	0.015
104	49.7	85.7	-3.135	0.00	19.9	0.057	0.010	13.8	0.028	0.005	23.5	0.1	2.4	3.1	0.016	0.003	3.1	0.016
105	49.8	86.4	-3.108	0.00	20.1	0.058	0.010	13.9	0.028	0.005	23.7	0.1	2.4	3.1	0.016	0.003	3.1	0.016
106	49.9	87.2	-3.082	0.00	20.2	0.058	0.010	14.0	0.029	0.005	23.8	0.1	2.5	3.1	0.016	0.003	3.1	0.016
107	50.0	88.0	-3.055	0.00	20.4	0.059	0.010	14.1	0.029	0.005	23.9	0.1	2.5	3.1	0.016	0.003	3.1	0.016
108	50.1	88.8	-3.029	0.00	20.5	0.059	0.010	14.2	0.029	0.005	24.1	0.1	2.5	3.1	0.016	0.003	3.1	0.016
109	50.2	89.7	-3.002	0.00	20.7	0.060	0.010	14.3	0.030	0.005	24.2	0.1	2.5	3.2	0.016	0.003	3.2	0.016
110	50.3	90.5	-2.976	0.00	20.8	0.061	0.010	14.4	0.030	0.005	24.4	0.1	2.5	3.2	0.016	0.003	3.2	0.016
111	50.4	91.3	-2.950	0.00	21.0	0.061	0.010	14.5	0.030	0.005	24.5	0.1	2.5	3.2	0.017	0.003	3.2	0.017
112	50.4	92.2	-2.923	0.00	21.2	0.062	0.010	14.6	0.031	0.005	24.7	0.1	2.5	3.2	0.017	0.003	3.2	0.017
113	50.5	93.1	-2.897	0.00	21.3	0.063	0.010	14.7	0.031	0.005	24.8	0.1	2.6	3.2	0.017	0.003	3.2	0.017
114	50.6	93.9	-2.870	0.00	21.5	0.064	0.010	14.8	0.031	0.005	25.0	0.1	2.6	3.3	0.017	0.003	3.3	0.017
115	50.7	94.8	-2.844	0.00	21.6	0.065	0.010	14.9	0.032	0.006	25.1	0.1	2.6	3.3	0.017	0.003	3.3	0.017
116	50.8	95.7	-2.818	0.00	21.8	0.065	0.010	15.0	0.032	0.006	25.3	0.1	2.6	3.3	0.018	0.003	3.3	0.018
117	50.9	96.7	-2.791	0.00	22.0	0.066	0.011	15.1	0.032	0.006	25.4	0.1	2.6	3.3	0.018	0.003	3.3	0.018
118	51.0	97.6	-2.765	0.00	22.2	0.067	0.011	15.2	0.033	0.006	25.6	0.1	2.6	3.3	0.018	0.003	3.3	0.018
119	51.1	98.5	-2.738	0.00	22.3	0.068	0.011	15.3	0.033	0.006	25.7	0.1	2.7	3.4	0.018	0.003	3.4	0.018
120	51.2	99.5	-2.712	0.00	22.5	0.069	0.011	15.4	0.033	0.006	25.9	0.1	2.7	3.4	0.019	0.003	3.4	0.019
121	51.3	100.5	-2.686	0.00	22.7	0.070	0.011	15.6	0.034	0.006	26.1	0.1	2.7	3.4	0.019	0.003	3.4	0.019
122	51.3	101.4	-2.659	0.00	22.9	0.071	0.011	15.7	0.034	0.006	26.2	0.1	2.7	3.4	0.019	0.003	3.4	0.019
123	51.4	102.4	-2.633	0.00	23.1	0.071	0.011	15.8	0.035	0.006	26.4	0.1	2.7	3.4	0.019	0.003	3.4	0.019
124	51.5	103.4	-2.607	0.00	23.3	0.072	0.011	15.9	0.035	0.006	26.6	0.1	2.7	3.5	0.020	0.003	3.5	0.020
125	51.6	104.5	-2.580	0.00	23.4	0.073	0.011	16.0	0.036	0.006	26.7	0.1	2.8	3.5	0.020	0.003	3.5	0.020
126	51.7	105.5	-2.554	0.00	23.6	0.074	0.011	16.2	0.036	0.006	26.9	0.1	2.8	3.5	0.020	0.003	3.5	0.020

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
127	51.8	106.6	-2.528	0.00	23.8	0.075	0.011	16.3	0.037	0.006	27.1	0.1	2.8	3.5	0.020	0.004	3.5	0.020
128	51.9	107.7	-2.501	0.00	24.0	0.076	0.011	16.4	0.037	0.006	27.3	0.1	2.8	3.6	0.021	0.004	3.6	0.021
129	52.0	108.7	-2.475	0.00	24.2	0.077	0.011	16.5	0.038	0.006	27.5	0.1	2.8	3.6	0.021	0.004	3.6	0.021
130	52.1	109.9	-2.449	0.00	24.4	0.078	0.012	16.7	0.038	0.006	27.6	0.1	2.8	3.6	0.021	0.004	3.6	0.021
131	52.2	111.0	-2.423	0.00	24.6	0.080	0.012	16.8	0.039	0.006	27.8	0.1	2.9	3.6	0.021	0.004	3.6	0.021
132	52.3	112.1	-2.396	0.00	24.8	0.081	0.012	16.9	0.040	0.006	28.0	0.1	2.9	3.7	0.021	0.004	3.7	0.021
133	52.3	113.3	-2.370	0.00	25.1	0.082	0.012	17.1	0.040	0.006	28.2	0.1	2.9	3.7	0.022	0.004	3.7	0.022
134	52.4	114.5	-2.344	0.00	25.3	0.083	0.012	17.2	0.041	0.006	28.4	0.1	2.9	3.7	0.022	0.004	3.7	0.022
135	52.5	115.7	-2.318	0.00	25.5	0.084	0.012	17.3	0.041	0.006	28.6	0.1	2.9	3.7	0.022	0.004	3.7	0.022
136	52.6	116.9	-2.291	0.00	25.7	0.086	0.012	17.5	0.042	0.006	28.8	0.1	3.0	3.8	0.023	0.004	3.8	0.023
137	52.7	118.1	-2.265	0.00	25.9	0.087	0.012	17.6	0.043	0.006	29.0	0.1	3.0	3.8	0.023	0.004	3.8	0.023
138	52.8	119.4	-2.239	0.00	26.2	0.088	0.012	17.7	0.043	0.006	29.2	0.1	3.0	3.8	0.024	0.004	3.8	0.024
139	52.9	120.6	-2.213	0.00	26.4	0.090	0.012	17.9	0.044	0.006	29.4	0.1	3.0	3.8	0.024	0.004	3.8	0.024
140	53.0	121.9	-2.187	0.00	26.6	0.091	0.012	18.0	0.044	0.007	29.6	0.1	3.0	3.9	0.024	0.004	3.9	0.024
141	53.1	123.3	-2.160	0.00	26.9	0.092	0.013	18.2	0.045	0.007	29.8	0.1	3.1	3.9	0.025	0.004	3.9	0.025
142	53.2	124.6	-2.134	0.00	27.1	0.094	0.013	18.3	0.046	0.007	30.1	0.1	3.1	3.9	0.025	0.004	3.9	0.025
143	53.2	126.0	-2.108	0.00	27.4	0.095	0.013	18.5	0.046	0.007	30.3	0.1	3.1	4.0	0.026	0.004	4.0	0.026
144	53.3	127.3	-2.082	0.00	27.6	0.097	0.013	18.7	0.047	0.007	30.5	0.1	3.1	4.0	0.026	0.004	4.0	0.026
145	53.4	128.7	-2.056	0.00	27.9	0.099	0.013	18.8	0.048	0.007	30.7	0.1	3.1	4.0	0.027	0.004	4.0	0.027
146	53.5	130.2	-2.030	0.00	28.2	0.100	0.013	19.0	0.049	0.007	31.0	0.1	3.2	4.0	0.027	0.004	4.0	0.027
147	53.6	131.6	-2.004	0.00	28.4	0.102	0.013	19.1	0.049	0.007	31.2	0.1	3.2	4.1	0.027	0.004	4.1	0.027
148	53.7	133.1	-1.977	0.00	28.7	0.103	0.013	19.3	0.050	0.007	31.5	0.1	3.2	4.1	0.028	0.004	4.1	0.028
149	53.8	134.6	-1.951	0.00	29.0	0.105	0.013	19.5	0.051	0.007	31.7	0.1	3.2	4.1	0.028	0.004	4.1	0.028
150	53.9	136.1	-1.925	0.00	29.2	0.107	0.014	19.7	0.052	0.007	32.0	0.1	3.3	4.2	0.029	0.004	4.2	0.029
151	54.0	137.7	-1.899	0.00	29.5	0.109	0.014	19.8	0.053	0.007	32.2	0.1	3.3	4.2	0.029	0.004	4.2	0.029
152	54.1	139.3	-1.873	0.00	29.8	0.110	0.014	20.0	0.054	0.007	32.5	0.1	3.3	4.2	0.029	0.004	4.2	0.029
153	54.2	140.9	-1.847	0.00	30.1	0.112	0.014	20.2	0.055	0.007	32.7	0.2	3.3	4.3	0.030	0.004	4.3	0.030
154	54.2	142.5	-1.821	0.00	30.4	0.114	0.014	20.4	0.056	0.007	33.0	0.2	3.4	4.3	0.030	0.004	4.3	0.030
155	54.3	144.2	-1.795	0.00	30.7	0.116	0.014	20.6	0.057	0.007	33.3	0.2	3.4	4.3	0.031	0.004	4.3	0.031
156	54.4	145.9	-1.769	0.00	31.0	0.118	0.014	20.8	0.058	0.007	33.5	0.2	3.4	4.4	0.031	0.004	4.4	0.031
157	54.5	147.7	-1.743	0.00	31.3	0.120	0.014	20.9	0.059	0.007	33.8	0.2	3.5	4.4	0.032	0.004	4.4	0.032
158	54.6	149.4	-1.717	0.00	31.7	0.122	0.015	21.1	0.060	0.008	34.1	0.2	3.5	4.5	0.033	0.004	4.5	0.033
159	54.7	151.2	-1.691	0.00	32.0	0.124	0.015	21.3	0.061	0.008	34.4	0.2	3.5	4.5	0.033	0.004	4.5	0.033
160	54.8	153.0	-1.665	0.00	32.3	0.126	0.015	21.6	0.062	0.008	34.7	0.2	3.5	4.5	0.034	0.004	4.5	0.034
161	54.9	154.9	-1.639	0.00	32.7	0.129	0.015	21.8	0.063	0.008	35.0	0.2	3.6	4.6	0.034	0.004	4.6	0.034
162	55.0	156.8	-1.613	0.00	33.0	0.131	0.015	22.0	0.064	0.008	35.3	0.2	3.6	4.6	0.035	0.005	4.6	0.035
163	55.1	158.7	-1.587	0.00	33.3	0.133	0.015	22.2	0.065	0.008	35.6	0.2	3.6	4.6	0.035	0.005	4.6	0.035
164	55.2	160.7	-1.561	0.00	33.7	0.136	0.015	22.4	0.066	0.008	35.9	0.2	3.7	4.7	0.036	0.005	4.7	0.036
165	55.2	162.7	-1.535	0.00	34.1	0.138	0.016	22.6	0.067	0.008	36.2	0.2	3.7	4.7	0.037	0.005	4.7	0.037
166	55.3	164.8	-1.509	0.00	34.4	0.141	0.016	22.9	0.068	0.008	36.6	0.2	3.7	4.8	0.037	0.005	4.8	0.037
167	55.4	166.9	-1.483	0.00	34.8	0.143	0.016	23.1	0.069	0.008	36.9	0.2	3.8	4.8	0.038	0.005	4.8	0.038
168	55.5	169.0	-1.457	0.00	35.2	0.146	0.016	23.3	0.071	0.008	37.2	0.2	3.8	4.9	0.039	0.005	4.9	0.039

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
169	55.6	171.2	-1.432	0.00	35.6	0.149	0.016	23.6	0.072	0.008	37.6	0.2	3.8	4.9	0.039	0.005	4.9	0.039
170	55.7	173.4	-1.406	0.00	36.0	0.151	0.016	23.8	0.073	0.008	37.9	0.2	3.9	5.0	0.040	0.005	5.0	0.040
171	55.8	175.6	-1.380	0.00	36.4	0.154	0.016	24.1	0.075	0.008	38.3	0.2	3.9	5.0	0.041	0.005	5.0	0.041
172	55.9	177.9	-1.354	0.00	36.8	0.157	0.017	24.3	0.076	0.009	38.7	0.2	3.9	5.0	0.042	0.005	5.0	0.042
173	56.0	180.3	-1.328	0.00	37.2	0.160	0.017	24.6	0.077	0.009	39.0	0.3	4.0	5.1	0.042	0.005	5.1	0.042
174	56.1	182.7	-1.303	0.00	37.7	0.163	0.017	24.9	0.079	0.009	39.4	0.3	4.0	5.1	0.043	0.005	5.1	0.043
175	56.1	185.1	-1.277	0.00	38.1	0.166	0.017	25.1	0.080	0.009	39.8	0.3	4.0	5.2	0.044	0.005	5.2	0.044
176	56.2	187.6	-1.251	0.00	38.5	0.169	0.017	25.4	0.082	0.009	40.2	0.3	4.1	5.2	0.045	0.005	5.2	0.045
177	56.3	190.2	-1.225	0.00	39.0	0.172	0.018	25.7	0.083	0.009	40.6	0.3	4.1	5.3	0.045	0.005	5.3	0.045
178	56.4	192.8	-1.200	0.00	39.5	0.175	0.018	26.0	0.085	0.009	41.0	0.3	4.2	5.3	0.046	0.005	5.3	0.046
179	56.5	195.5	-1.174	0.00	39.9	0.179	0.018	26.3	0.086	0.009	41.4	0.3	4.2	5.4	0.047	0.005	5.4	0.047
180	56.6	198.2	-1.148	0.00	40.4	0.182	0.018	26.6	0.088	0.009	41.8	0.3	4.2	5.5	0.048	0.005	5.5	0.048
181	56.7	201.0	-1.123	0.00	40.9	0.186	0.018	26.9	0.090	0.009	42.3	0.3	4.3	5.5	0.049	0.005	5.5	0.049
182	56.8	203.8	-1.097	0.00	41.4	0.190	0.019	27.2	0.091	0.009	42.7	0.3	4.3	5.6	0.050	0.005	5.6	0.050
183	56.9	206.7	-1.071	0.00	41.9	0.193	0.019	27.5	0.093	0.010	43.1	0.3	4.4	5.6	0.051	0.005	5.6	0.051
184	57.0	209.7	-1.046	0.00	42.5	0.197	0.019	27.8	0.095	0.010	43.6	0.4	4.4	5.7	0.052	0.006	5.7	0.052
185	57.1	212.7	-1.020	0.00	43.0	0.201	0.019	28.1	0.097	0.010	44.0	0.4	4.5	5.7	0.053	0.006	5.7	0.053
186	57.1	215.9	-0.994	0.00	43.5	0.205	0.019	28.4	0.099	0.010	44.5	0.4	4.5	5.8	0.054	0.006	5.8	0.054
187	57.2	219.0	-0.969	0.00	44.1	0.209	0.020	28.8	0.101	0.010	45.0	0.4	4.6	5.9	0.055	0.006	5.9	0.055
188	57.3	222.3	-0.943	0.00	44.7	0.213	0.020	29.1	0.103	0.010	45.5	0.4	4.6	5.9	0.056	0.006	5.9	0.056
189	57.4	225.6	-0.918	0.00	45.3	0.218	0.020	29.5	0.105	0.010	46.0	0.4	4.7	6.0	0.057	0.006	6.0	0.057
190	57.5	229.0	-0.892	0.00	45.8	0.222	0.020	29.9	0.107	0.010	46.5	0.4	4.7	6.1	0.058	0.006	6.1	0.058
191	57.6	232.5	-0.867	0.00	46.5	0.227	0.021	30.2	0.109	0.010	47.0	0.4	4.8	6.1	0.059	0.006	6.1	0.059
192	57.7	236.1	-0.841	0.00	47.1	0.231	0.021	30.6	0.111	0.011	47.6	0.4	4.8	6.2	0.060	0.006	6.2	0.060
193	57.8	239.7	-0.816	0.00	47.7	0.236	0.021	31.0	0.113	0.011	48.1	0.5	4.9	6.3	0.062	0.006	6.3	0.062
194	57.9	243.5	-0.791	0.00	48.4	0.241	0.021	31.4	0.115	0.011	48.6	0.5	4.9	6.3	0.063	0.006	6.3	0.063
195	58.0	247.3	-0.765	0.00	49.0	0.246	0.022	31.8	0.118	0.011	49.2	0.5	5.0	6.4	0.064	0.006	6.4	0.064
196	58.0	251.3	-0.740	0.00	49.7	0.251	0.022	32.2	0.120	0.011	49.8	0.5	5.0	6.5	0.065	0.006	6.5	0.065
197	58.1	255.3	-0.714	0.00	50.4	0.257	0.022	32.6	0.123	0.011	50.4	0.5	5.1	6.6	0.066	0.006	6.6	0.066
198	58.2	259.4	-0.689	0.00	51.1	0.262	0.022	33.0	0.125	0.011	51.0	0.5	5.2	6.6	0.068	0.006	6.6	0.068
199	58.3	263.7	-0.664	0.00	51.8	0.268	0.023	33.5	0.128	0.011	51.6	0.6	5.2	6.7	0.069	0.007	6.7	0.069
200	58.4	268.0	-0.639	0.00	52.6	0.274	0.023	33.9	0.130	0.012	52.2	0.6	5.3	6.8	0.070	0.007	6.8	0.070
201	58.5	272.5	-0.613	0.00	53.3	0.280	0.023	34.4	0.133	0.012	52.8	0.6	5.3	6.9	0.072	0.007	6.9	0.072
202	58.6	277.1	-0.588	0.00	54.1	0.286	0.024	34.8	0.136	0.012	53.5	0.6	5.4	7.0	0.073	0.007	7.0	0.073
203	58.7	281.8	-0.563	0.00	54.9	0.292	0.024	35.3	0.139	0.012	54.1	0.6	5.5	7.1	0.075	0.007	7.1	0.075
204	58.8	286.6	-0.538	0.00	55.7	0.298	0.024	35.8	0.142	0.012	54.8	0.7	5.5	7.2	0.076	0.007	7.2	0.076
205	58.9	291.6	-0.513	0.00	56.5	0.305	0.025	36.3	0.145	0.012	55.5	0.7	5.6	7.2	0.078	0.007	7.2	0.078
206	59.0	296.7	-0.487	0.00	57.4	0.312	0.025	36.8	0.148	0.013	56.2	0.7	5.7	7.3	0.080	0.007	7.3	0.080
207	59.0	301.9	-0.462	0.00	58.3	0.319	0.025	37.3	0.151	0.013	56.9	0.7	5.7	7.4	0.081	0.007	7.4	0.081
208	59.1	307.3	-0.437	0.00	59.2	0.326	0.026	37.8	0.154	0.013	57.7	0.8	5.8	7.5	0.083	0.007	7.5	0.083
209	59.2	312.8	-0.412	0.00	60.1	0.334	0.026	38.4	0.158	0.013	58.4	0.8	5.9	7.6	0.085	0.007	7.6	0.085
210	59.3	318.5	-0.387	0.00	61.0	0.342	0.026	38.9	0.161	0.013	59.2	0.8	6.0	7.7	0.087	0.007	7.7	0.087

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
211	59.4	324.4	-0.362	0.00	62.0	0.350	0.027	39.5	0.165	0.013	60.0	0.8	6.0	7.8	0.089	0.008	7.8	0.089
212	59.5	330.4	-0.337	0.00	63.0	0.358	0.027	40.1	0.168	0.014	60.8	0.9	6.1	7.9	0.091	0.008	7.9	0.091
213	59.6	336.3	-0.313	0.00	64.0	0.367	0.027	40.7	0.172	0.014	61.6	0.9	6.2	8.0	0.093	0.008	8.0	0.093
214	59.7	341.8	-0.292	0.00	65.0	0.375	0.028	41.3	0.176	0.014	62.4	0.9	6.3	8.2	0.095	0.008	8.2	0.095
215	59.8	347.4	-0.271	0.00	66.1	0.384	0.028	41.9	0.180	0.014	63.3	1.0	6.4	8.3	0.097	0.008	8.3	0.097
216	59.9	353.1	-0.249	0.00	67.2	0.394	0.029	42.5	0.184	0.014	64.2	1.0	6.5	8.4	0.099	0.008	8.4	0.099
217	60.0	359.0	-0.228	0.00	68.3	0.403	0.029	43.2	0.189	0.015	65.1	1.1	6.6	8.5	0.101	0.008	8.5	0.101
218	60.0	365.1	-0.206	0.00	69.5	0.413	0.030	43.9	0.193	0.015	66.0	1.1	6.6	8.6	0.103	0.008	8.6	0.103
219	60.1	371.3	-0.185	0.00	70.7	0.423	0.030	44.6	0.198	0.015	66.9	1.1	6.7	8.7	0.105	0.008	8.7	0.105
220	60.2	377.6	-0.164	0.00	71.9	0.434	0.030	45.3	0.202	0.015	67.9	1.2	6.8	8.9	0.108	0.008	8.9	0.108
221	60.3	384.1	-0.143	0.00	73.1	0.445	0.031	46.0	0.207	0.015	68.9	1.2	6.9	9.0	0.110	0.009	9.0	0.110
222	60.4	390.8	-0.121	0.00	74.4	0.456	0.031	46.7	0.212	0.016	69.9	1.3	7.0	9.1	0.113	0.009	9.1	0.113
223	60.5	397.7	-0.100	0.00	75.7	0.467	0.032	47.5	0.217	0.016	70.9	1.3	7.1	9.3	0.115	0.009	9.3	0.115
224	60.6	404.8	-0.079	0.00	77.0	0.479	0.032	48.3	0.223	0.016	72.0	1.4	7.2	9.4	0.118	0.009	9.4	0.118
225	60.7	412.1	-0.058	0.00	78.4	0.490	0.033	49.1	0.228	0.016	73.0	1.4	7.3	9.5	0.121	0.009	9.5	0.121
226	60.8	419.5	-0.037	0.00	79.8	0.502	0.034	49.9	0.234	0.017	74.1	1.5	7.5	9.7	0.124	0.009	9.7	0.124
227	60.9	427.2	-0.016	0.00	81.2	0.515	0.034	50.7	0.240	0.017	75.3	1.5	7.6	9.8	0.127	0.009	9.8	0.127
228	60.9	435.1	0.005	0.00	82.6	0.527	0.035	51.6	0.246	0.017	76.4	1.6	7.7	10.0	0.130	0.010	10.0	0.130
229	61.0	443.2	0.026	0.00	84.1	0.540	0.035	52.5	0.252	0.017	77.6	1.7	7.8	10.2	0.133	0.010	10.2	0.133
230	61.1	451.5	0.047	0.00	85.6	0.553	0.036	53.4	0.258	0.018	78.9	1.7	7.9	10.3	0.136	0.010	10.3	0.136
231	61.2	460.1	0.067	0.00	87.1	0.566	0.036	54.4	0.265	0.018	80.1	1.8	8.1	10.5	0.140	0.010	10.5	0.140
232	61.3	466.1	0.088	0.00	88.7	0.579	0.037	55.3	0.272	0.018	81.4	1.9	8.2	10.6	0.143	0.010	10.6	0.143
233	61.4	466.1	0.109	0.00	90.3	0.592	0.038	56.3	0.279	0.019	82.7	2.0	8.3	10.8	0.147	0.010	10.8	0.147
234	61.5	466.1	0.129	0.01	92.0	0.607	0.038	57.3	0.286	0.019	84.1	2.1	8.4	11.0	0.150	0.010	11.0	0.150
235	61.6	466.1	0.149	0.02	94.1	0.630	0.039	58.3	0.293	0.019	85.4	2.1	8.6	11.2	0.154	0.011	11.2	0.154
236	61.7	466.1	0.166	0.02	97.7	0.679	0.040	59.4	0.301	0.019	86.9	2.2	8.7	11.4	0.158	0.011	11.4	0.158
237	61.8	466.1	0.182	0.03	104.4	0.787	0.041	60.5	0.308	0.020	88.3	2.3	8.9	11.6	0.162	0.011	11.6	0.162
238	61.9	487.1	0.196	0.04	117.5	1.015	0.041	61.5	0.316	0.020	89.8	2.4	9.0	11.8	0.167	0.011	11.8	0.167
239	61.9	531.4	0.210	0.05	142.4	1.462	0.043	62.7	0.323	0.020	91.3	2.5	9.2	12.0	0.171	0.011	12.0	0.171
240	62.0	575.7	0.224	0.08	187.7	2.288	0.045	63.8	0.331	0.021	92.9	2.7	9.3	12.2	0.176	0.011	12.2	0.176
241	62.1	620.0	0.239	0.15	265.3	3.716	0.048	65.0	0.339	0.021	94.5	2.8	9.5	12.4	0.180	0.012	12.4	0.180
242	62.2	664.3	0.255	0.31	387.1	5.973	0.053	66.1	0.347	0.022	96.2	3.0	9.7	12.6	0.185	0.012	12.6	0.185
243	62.3	708.6	0.272	0.68	555.2	9.111	0.061	67.3	0.355	0.022	98.1	3.4	9.8	12.8	0.190	0.012	12.8	0.190
244	62.4	752.9	0.290	1.40	752.0	12.796	0.073	68.6	0.363	0.022	100.1	4.1	10.0	13.1	0.195	0.012	13.1	0.195
245	62.5	797.2	0.306	2.62	940.8	16.323	0.089	69.9	0.372	0.023	102.4	5.3	10.2	13.3	0.201	0.013	13.3	0.201
246	62.6	841.5	0.322	4.33	1083.8	18.964	0.108	71.4	0.384	0.023	105.3	7.7	10.4	13.6	0.206	0.013	13.6	0.206
247	62.7	885.8	0.336	6.39	1161.6	20.352	0.130	73.7	0.404	0.024	109.0	12.0	10.6	13.8	0.211	0.013	13.8	0.211
248	62.8	930.1	0.348	8.59	1177.3	20.569	0.152	77.7	0.448	0.024	114.0	19.3	10.8	14.1	0.217	0.013	14.1	0.217
249	62.8	974.4	0.358	10.70	1146.0	19.906	0.174	85.4	0.546	0.025	120.4	31.3	11.0	14.3	0.222	0.013	14.3	0.222
250	62.9	1018.7	0.366	12.62	1086.1	18.700	0.195	100.2	0.750	0.025	128.2	49.5	11.2	14.6	0.228	0.014	14.6	0.228
251	63.0	1063.0	0.373	14.29	1014.3	17.269	0.215	127.5	1.146	0.026	137.5	75.7	11.4	14.9	0.233	0.014	14.9	0.233
252	63.1	1107.3	0.380	15.72	941.8	15.811	0.233	175.1	1.861	0.028	148.0	110.3	11.6	15.1	0.238	0.014	15.1	0.238

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
253	63.2	1151.6	0.387	16.93	874.5	14.431	0.249	252.2	3.058	0.030	159.5	150.2	11.9	15.4	0.243	0.014	15.4	0.243
254	63.3	1195.9	0.396	17.96	815.6	13.181	0.264	365.8	4.888	0.035	172.0	186.3	12.1	15.7	0.249	0.015	15.7	0.249
255	63.4	1240.2	0.407	18.84	766.3	12.072	0.278	514.6	7.387	0.041	185.4	213.9	12.3	16.0	0.254	0.015	16.0	0.254
256	63.5	1284.5	0.420	19.60	727.1	11.103	0.290	681.6	10.337	0.051	199.8	229.7	12.6	16.3	0.259	0.015	16.3	0.259
257	63.6	1328.8	0.434	20.28	698.1	10.257	0.302	835.8	13.224	0.064	214.7	236.4	12.8	16.7	0.264	0.016	16.7	0.264
258	63.7	1373.1	0.449	20.88	679.4	9.514	0.313	945.6	15.411	0.079	230.5	239.5	13.0	17.1	0.272	0.016	17.1	0.272
259	63.8	1417.4	0.462	21.43	670.4	8.860	0.323	1000.0	16.511	0.097	247.1	240.9	13.3	17.9	0.286	0.016	17.9	0.286
260	63.8	1445.3	0.473	21.95	669.5	8.300	0.332	1015.7	16.689	0.115	264.6	242.0	13.7	19.3	0.317	0.016	19.3	0.317
261	63.9	1445.3	0.483	22.44	674.8	7.860	0.341	998.2	16.275	0.133	282.5	243.4	14.1	22.1	0.390	0.017	22.1	0.390
262	64.0	1445.3	0.490	22.91	684.0	7.536	0.349	950.0	15.235	0.150	301.3	246.1	14.9	27.5	0.552	0.017	27.5	0.552
263	64.1	1445.3	0.496	23.37	694.2	7.287	0.357	891.8	13.864	0.166	321.2	251.1	16.2	37.5	0.883	0.018	37.5	0.883
264	64.2	1445.3	0.501	23.82	702.2	7.086	0.365	834.3	12.482	0.180	342.1	259.5	18.8	54.4	1.512	0.019	54.4	1.512
265	64.3	1445.3	0.506	24.26	706.2	6.916	0.373	780.2	11.153	0.193	363.9	273.0	23.7	80.9	2.609	0.022	80.9	2.609
266	64.4	1445.3	0.512	24.70	705.0	6.741	0.380	733.8	9.947	0.205	387.5	295.1	33.1	118.6	4.370	0.025	118.6	4.370
267	64.5	1445.3	0.519	25.12	698.2	6.529	0.387	694.6	8.896	0.215	413.3	329.6	50.6	166.4	6.926	0.031	166.4	6.926
268	64.6	1445.3	0.527	25.52	686.9	6.261	0.394	662.9	7.982	0.224	441.8	380.4	81.3	218.2	10.199	0.041	218.2	10.199
269	64.7	1445.3	0.537	25.89	672.3	5.931	0.401	638.9	7.216	0.232	472.6	449.4	129.9	263.8	13.746	0.054	263.8	13.746
270	64.8	1445.3	0.548	26.23	656.1	5.559	0.407	621.5	6.583	0.240	505.4	531.3	195.4	294.2	16.750	0.070	294.2	16.750
271	64.8	1445.3	0.560	26.54	639.7	5.168	0.413	610.6	6.070	0.247	537.1	602.8	265.6	307.5	18.333	0.090	307.5	18.333
272	64.9	1445.3	0.571	26.82	624.0	4.772	0.418	605.5	5.670	0.253	557.0	638.6	321.7	311.3	18.091	0.109	311.3	18.091
273	65.0	1445.3	0.582	27.07	610.2	4.391	0.423	605.7	5.367	0.259	572.0	641.7	354.1	320.4	16.575	0.128	320.4	16.575
274	65.1	1445.3	0.589	27.30	599.4	4.046	0.428	609.8	5.150	0.265	585.5	622.5	369.7	341.8	14.757	0.145	341.8	14.757
275	65.2	1445.3	0.595	27.50	592.8	3.765	0.432	616.0	4.999	0.270	597.5	592.2	377.9	358.2	13.165	0.161	358.2	13.165
276	65.3	1445.3	0.597	27.70	591.6	3.570	0.436	621.4	4.899	0.275	608.1	550.8	376.1	349.9	11.547	0.174	349.9	11.547
277	65.4	1445.3	0.599	27.89	596.5	3.476	0.440	622.3	4.853	0.281	617.2	498.1	361.0	334.5	9.726	0.186	334.5	9.726
278	65.5	1445.3	0.600	28.08	607.6	3.489	0.444	615.1	4.898	0.286	624.9	445.5	342.0	327.7	8.095	0.195	327.7	8.095
279	65.6	1445.3	0.603	28.27	623.9	3.593	0.448	595.4	5.089	0.291	631.3	399.5	325.7	320.5	6.830	0.203	320.5	6.830
280	65.7	1445.3	0.607	28.49	643.4	3.755	0.452	559.4	5.470	0.297	636.7	358.2	310.6	310.5	5.788	0.210	310.5	5.788
281	65.7	1445.3	0.612	28.72	663.5	3.929	0.456	507.1	6.025	0.303	641.3	322.1	297.1	302.5	4.924	0.216	302.5	4.924
282	65.8	1445.3	0.620	28.96	681.5	4.064	0.460	444.0	6.631	0.310	645.2	293.0	286.2	296.8	4.250	0.221	296.8	4.250
283	65.9	1445.3	0.627	29.22	695.3	4.120	0.465	382.7	7.068	0.318	648.6	270.9	278.0	292.3	3.733	0.225	292.3	3.733
284	66.0	1445.3	0.636	29.48	703.4	4.073	0.469	338.3	7.098	0.326	651.7	255.1	272.2	289.9	3.344	0.229	289.9	3.344
285	66.1	1445.3	0.643	29.74	705.8	3.922	0.473	322.1	6.612	0.333	654.4	245.4	268.9	289.8	3.076	0.233	289.8	3.076
286	66.2	1445.3	0.649	29.98	703.6	3.693	0.477	334.2	5.738	0.340	657.0	240.3	268.0	291.2	2.909	0.236	291.2	2.909
287	66.3	1445.3	0.653	30.20	698.7	3.434	0.481	363.2	4.766	0.345	659.4	237.5	268.9	294.0	2.818	0.239	294.0	2.818
288	66.4	1445.3	0.655	30.41	692.5	3.205	0.485	395.9	3.940	0.350	661.9	234.5	271.3	297.4	2.781	0.242	297.4	2.781
289	66.5	1445.3	0.655	30.60	685.7	3.074	0.488	426.4	3.329	0.354	664.2	229.1	274.2	300.3	2.765	0.245	300.3	2.765
290	66.6	1445.3	0.654	30.79	676.9	3.107	0.492	457.0	2.876	0.357	666.6	220.1	276.6	301.9	2.734	0.248	301.9	2.734
291	66.7	1445.3	0.652	30.99	663.4	3.354	0.495	490.6	2.535	0.360	668.9	207.4	277.7	301.4	2.660	0.251	301.4	2.660
292	66.7	1445.3	0.650	31.20	641.1	3.818	0.499	525.2	2.335	0.363	671.2	191.9	276.9	298.9	2.531	0.254	298.9	2.531
293	66.8	1445.3	0.650	31.44	606.9	4.430	0.504	555.4	2.283	0.366	673.3	174.5	274.1	294.4	2.342	0.256	294.4	2.342
294	66.9	1445.3	0.652	31.69	561.5	5.032	0.509	579.6	2.298	0.368	675.2	156.0	269.3	288.1	2.101	0.259	288.1	2.101

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
295	67.0	1445.3	0.656	31.94	511.1	5.407	0.514	598.6	2.297	0.371	676.9	137.2	262.9	280.7	1.822	0.261	280.7	1.822
296	67.1	1445.3	0.661	32.18	466.2	5.355	0.520	611.7	2.261	0.373	678.3	119.0	255.4	273.0	1.525	0.263	273.0	1.525
297	67.2	1445.3	0.667	32.38	436.7	4.782	0.526	617.9	2.182	0.375	679.5	102.6	247.7	265.4	1.231	0.264	265.4	1.231
298	67.3	1445.3	0.671	32.54	426.6	3.788	0.531	618.8	2.052	0.378	680.4	88.7	240.2	258.5	0.960	0.265	258.5	0.960
299	67.4	1445.3	0.674	32.66	433.8	2.657	0.534	616.4	1.896	0.380	681.2	77.5	233.6	252.9	0.724	0.266	252.9	0.724
300	67.5	1445.3	0.675	32.74	454.3	1.736	0.536	612.6	1.749	0.382	681.7	69.1	228.3	249.1	0.538	0.267	249.1	0.538
301	67.6	1445.3	0.674	32.80	483.2	1.195	0.538	609.5	1.638	0.384	682.1	63.4	225.0	247.7	0.419	0.267	247.7	0.419
302	67.6	1445.3	0.671	32.84	514.2	0.902	0.539	608.5	1.578	0.385	682.4	60.2	224.1	249.0	0.379	0.268	249.0	0.379
303	67.7	1445.3	0.667	32.88	540.7	0.620	0.540	609.6	1.569	0.387	682.8	59.2	225.9	253.3	0.425	0.268	253.3	0.425
304	67.8	1445.3	0.663	32.90	559.2	0.252	0.540	611.4	1.580	0.389	683.1	59.9	230.4	259.9	0.553	0.269	259.9	0.553
305	67.9	1445.3	0.660	32.90	569.4	-0.136	0.540	611.5	1.562	0.391	683.4	61.9	237.2	268.2	0.745	0.270	268.2	0.745
306	68.0	1443.8	0.657	32.88	573.4	-0.475	0.540	607.0	1.458	0.392	683.9	64.6	245.2	276.7	0.970	0.271	276.7	0.970
307	68.1	1439.6	0.656	32.84	573.5	-0.774	0.539	595.8	1.221	0.394	684.3	67.3	253.3	284.3	1.189	0.272	284.3	1.189
308	68.2	1437.7	0.656	32.79	571.4	-1.059	0.538	577.7	0.837	0.395	684.9	69.2	260.3	289.7	1.364	0.273	289.7	1.364
309	68.3	1438.2	0.658	32.73	568.8	-1.296	0.537	555.0	0.338	0.395	685.4	69.6	265.1	292.4	1.468	0.275	292.4	1.468
310	68.4	1440.5	0.661	32.66	567.1	-1.435	0.536	531.7	-0.206	0.396	685.8	67.6	267.4	292.5	1.489	0.276	292.5	1.489
311	68.5	1443.5	0.664	32.58	567.3	-1.478	0.534	513.0	-0.696	0.395	685.9	63.0	267.2	290.5	1.435	0.278	290.5	1.435
312	68.6	1445.3	0.665	32.51	568.9	-1.455	0.532	503.3	-1.034	0.394	685.7	56.2	265.2	287.6	1.331	0.279	287.6	1.331
313	68.6	1445.3	0.665	32.44	571.1	-1.385	0.531	504.0	-1.164	0.393	684.9	48.4	262.5	284.8	1.211	0.281	284.8	1.211
314	68.7	1445.3	0.663	32.37	573.1	-1.296	0.529	511.7	-1.114	0.392	683.8	40.9	260.1	283.3	1.106	0.282	283.3	1.106
315	68.8	1442.6	0.658	32.30	574.2	-1.227	0.528	519.1	-0.993	0.390	682.1	34.5	259.0	283.3	1.040	0.283	283.3	1.040
316	68.9	1438.4	0.652	32.24	573.5	-1.210	0.527	520.6	-0.922	0.389	680.2	29.3	259.2	284.5	1.017	0.284	284.5	1.017
317	69.0	1434.3	0.646	32.17	570.1	-1.260	0.525	515.6	-0.945	0.388	677.9	24.4	260.2	285.6	1.017	0.285	285.6	1.017
318	69.1	1431.6	0.640	32.11	563.9	-1.390	0.524	507.3	-1.021	0.387	675.3	18.7	260.7	285.0	1.002	0.286	285.0	1.002
319	69.2	1430.8	0.635	32.03	554.4	-1.601	0.522	498.1	-1.099	0.386	672.4	10.8	259.0	280.8	0.924	0.288	280.8	0.924
320	69.3	1432.2	0.632	31.94	542.1	-1.881	0.520	489.0	-1.168	0.385	669.1	-0.5	253.6	272.0	0.740	0.288	272.0	0.740
321	69.4	1435.8	0.630	31.84	527.1	-2.214	0.518	480.8	-1.229	0.384	665.4	-15.1	243.7	258.7	0.435	0.289	258.7	0.435
322	69.5	1441.0	0.629	31.72	510.3	-2.583	0.516	475.0	-1.272	0.382	661.2	-31.9	230.0	242.8	0.030	0.289	242.8	0.030
323	69.6	1445.3	0.630	31.60	492.4	-2.967	0.513	472.9	-1.275	0.381	656.2	-48.7	214.6	227.2	-0.413	0.289	227.2	-0.413
324	69.6	1445.3	0.630	31.46	474.2	-3.349	0.509	474.0	-1.236	0.380	650.6	-62.6	200.6	215.4	-0.807	0.288	215.4	-0.807
325	69.7	1445.3	0.630	31.31	456.3	-3.713	0.505	476.8	-1.173	0.378	644.5	-71.3	191.1	209.8	-1.066	0.287	209.8	-1.066
326	69.8	1445.3	0.628	31.15	439.3	-4.044	0.501	479.8	-1.102	0.377	638.0	-74.4	187.5	210.6	-1.148	0.286	210.6	-1.148
327	69.9	1445.3	0.625	30.98	423.8	-4.328	0.497	481.5	-1.036	0.376	631.4	-72.8	189.3	215.5	-1.071	0.285	215.5	-1.071
328	70.0	1445.3	0.620	30.81	409.9	-4.551	0.492	480.8	-0.991	0.375	624.7	-69.4	193.8	220.4	-0.916	0.284	220.4	-0.916
329	70.1	1445.3	0.613	30.65	398.1	-4.707	0.487	476.5	-0.983	0.374	617.8	-67.3	197.5	221.9	-0.787	0.283	221.9	-0.787
330	70.2	1445.3	0.604	30.48	388.3	-4.795	0.482	468.4	-1.027	0.373	610.7	-68.3	198.0	219.3	-0.755	0.282	219.3	-0.755
331	70.3	1445.3	0.595	30.31	380.5	-4.821	0.476	456.8	-1.131	0.371	603.2	-72.1	195.3	214.7	-0.817	0.281	214.7	-0.817
332	70.4	1445.3	0.587	30.15	374.7	-4.798	0.471	442.6	-1.303	0.370	595.2	-76.7	191.4	210.3	-0.915	0.280	210.3	-0.915
333	70.5	1445.3	0.581	29.98	370.4	-4.742	0.466	426.9	-1.540	0.369	586.7	-80.3	187.8	207.1	-1.002	0.279	207.1	-1.002
334	70.5	1445.3	0.577	29.83	367.4	-4.670	0.461	410.5	-1.831	0.367	577.7	-82.3	185.1	204.8	-1.061	0.278	204.8	-1.061
335	70.6	1445.3	0.574	29.68	365.3	-4.595	0.456	394.4	-2.158	0.365	568.2	-82.8	183.3	203.7	-1.091	0.277	203.7	-1.091
336	70.7	1445.3	0.572	29.53	363.7	-4.527	0.451	378.8	-2.495	0.362	558.2	-81.5	182.9	204.2	-1.081	0.276	204.2	-1.081

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
337	70.8	1445.3	0.571	29.38	362.1	-4.470	0.446	363.7	-2.815	0.359	547.8	-78.4	184.0	206.5	-1.022	0.275	206.5	-1.022
338	70.9	1445.3	0.569	29.23	359.8	-4.424	0.441	349.1	-3.093	0.356	537.0	-74.0	186.5	209.4	-0.925	0.274	209.4	-0.925
339	71.0	1445.3	0.565	29.09	356.6	-4.387	0.436	334.9	-3.313	0.352	525.7	-69.4	189.3	212.0	-0.817	0.273	212.0	-0.817
340	71.1	1445.3	0.560	28.95	352.1	-4.354	0.432	321.4	-3.464	0.349	514.1	-65.4	191.7	213.4	-0.725	0.272	213.4	-0.725
341	71.2	1445.3	0.553	28.81	346.6	-4.322	0.427	309.4	-3.551	0.345	501.9	-62.8	193.0	213.4	-0.670	0.271	213.4	-0.670
342	71.3	1445.3	0.544	28.68	340.1	-4.291	0.422	299.5	-3.586	0.341	489.3	-61.9	192.7	211.4	-0.663	0.270	211.4	-0.663
343	71.4	1445.3	0.534	28.55	333.3	-4.264	0.418	292.4	-3.581	0.337	476.1	-63.1	190.5	207.3	-0.714	0.270	207.3	-0.714
344	71.5	1445.3	0.524	28.42	326.7	-4.247	0.413	288.2	-3.551	0.333	462.4	-66.3	186.3	201.2	-0.827	0.269	201.2	-0.827
345	71.5	1443.4	0.514	28.30	320.8	-4.247	0.408	286.2	-3.497	0.329	448.1	-71.4	180.3	193.5	-0.996	0.268	193.5	-0.996
346	71.6	1438.1	0.504	28.18	315.8	-4.264	0.404	285.5	-3.422	0.326	433.3	-78.0	172.8	184.5	-1.208	0.267	184.5	-1.208
347	71.7	1434.8	0.497	28.06	312.0	-4.293	0.399	285.0	-3.329	0.322	417.9	-85.7	164.2	174.9	-1.450	0.265	174.9	-1.450
348	71.8	1433.9	0.490	27.93	309.2	-4.320	0.394	284.1	-3.223	0.318	402.1	-93.8	155.1	165.1	-1.706	0.263	165.1	-1.706
349	71.9	1435.1	0.486	27.81	307.0	-4.331	0.390	282.4	-3.113	0.315	386.0	-101.6	146.0	155.6	-1.961	0.261	155.6	-1.961
350	72.0	1437.6	0.483	27.69	304.6	-4.314	0.385	279.7	-3.001	0.312	369.6	-108.7	137.4	146.8	-2.202	0.259	146.8	-2.202
351	72.1	1439.9	0.479	27.58	301.3	-4.265	0.380	275.8	-2.891	0.308	353.0	-114.5	129.5	139.2	-2.415	0.257	139.2	-2.415
352	72.2	1440.8	0.475	27.46	296.6	-4.189	0.376	271.0	-2.783	0.305	336.3	-118.6	122.9	133.0	-2.591	0.254	133.0	-2.591
353	72.3	1439.2	0.468	27.35	290.2	-4.102	0.371	266.1	-2.675	0.302	319.8	-120.8	117.6	128.4	-2.722	0.251	128.4	-2.722
354	72.4	1434.6	0.459	27.25	282.1	-4.021	0.367	261.2	-2.569	0.300	303.3	-120.9	113.9	125.5	-2.800	0.248	125.5	-2.800
355	72.4	1427.6	0.449	27.15	273.1	-3.961	0.362	256.4	-2.473	0.297	287.2	-119.2	111.8	124.3	-2.824	0.245	124.3	-2.824
356	72.5	1418.9	0.437	27.05	263.7	-3.928	0.358	251.6	-2.392	0.294	271.4	-115.6	111.2	124.6	-2.793	0.242	124.6	-2.793
357	72.6	1409.8	0.425	26.96	254.5	-3.910	0.354	247.3	-2.324	0.292	256.1	-110.6	112.1	126.1	-2.715	0.239	126.1	-2.715
358	72.7	1401.0	0.412	26.88	246.0	-3.886	0.350	243.5	-2.267	0.289	241.3	-104.6	114.0	128.4	-2.598	0.236	128.4	-2.598
359	72.8	1393.3	0.401	26.79	238.2	-3.839	0.345	240.5	-2.219	0.287	227.0	-98.1	116.6	131.1	-2.456	0.233	131.1	-2.456
360	72.9	1387.0	0.391	26.71	231.0	-3.760	0.341	238.3	-2.171	0.284	213.3	-91.4	119.6	133.8	-2.299	0.231	133.8	-2.299
361	73.0	1382.3	0.383	26.64	224.2	-3.655	0.337	236.9	-2.121	0.282	200.1	-85.0	122.7	136.3	-2.140	0.228	136.3	-2.140
362	73.1	1379.1	0.375	26.56	217.5	-3.531	0.333	236.2	-2.064	0.280	187.6	-79.2	125.6	138.5	-1.988	0.226	138.5	-1.988
363	73.2	1377.0	0.369	26.50	210.7	-3.395	0.330	235.8	-2.001	0.278	175.5	-74.1	128.1	140.2	-1.848	0.224	140.2	-1.848
364	73.3	1375.4	0.363	26.44	203.6	-3.251	0.326	235.3	-1.937	0.275	164.0	-69.7	130.3	141.5	-1.723	0.222	141.5	-1.723
365	73.4	1373.5	0.357	26.38	196.5	-3.104	0.323	233.9	-1.877	0.273	153.0	-65.9	132.1	142.6	-1.613	0.220	142.6	-1.613
366	73.4	1370.1	0.350	26.33	189.5	-2.964	0.319	231.3	-1.826	0.271	142.6	-62.6	133.7	143.6	-1.512	0.219	143.6	-1.512
367	73.5	1364.4	0.341	26.28	182.6	-2.834	0.316	227.4	-1.786	0.269	132.6	-59.6	135.2	144.7	-1.416	0.217	144.7	-1.416
368	73.6	1356.0	0.330	26.24	176.2	-2.715	0.313	222.2	-1.753	0.267	123.2	-56.6	136.7	145.7	-1.322	0.215	145.7	-1.322
369	73.7	1345.2	0.317	26.19	170.3	-2.607	0.310	216.2	-1.719	0.266	114.3	-53.7	138.0	146.5	-1.235	0.214	146.5	-1.235
370	73.8	1332.9	0.303	26.16	165.2	-2.508	0.307	210.1	-1.673	0.264	106.0	-51.0	139.2	147.2	-1.155	0.213	147.2	-1.155
371	73.9	1320.3	0.288	26.12	160.9	-2.414	0.305	204.4	-1.606	0.262	98.1	-48.4	140.3	147.9	-1.080	0.212	147.9	-1.080
372	74.0	1308.6	0.274	26.09	157.4	-2.324	0.302	199.3	-1.515	0.260	90.9	-45.7	141.4	148.9	-1.004	0.210	148.9	-1.004
373	74.1	1298.5	0.261	26.05	154.6	-2.234	0.300	194.9	-1.406	0.259	84.1	-42.7	142.7	150.2	-0.924	0.209	150.2	-0.924
374	74.2	1290.2	0.251	26.02	152.4	-2.142	0.297	190.9	-1.288	0.257	77.9	-39.5	144.3	151.7	-0.836	0.208	151.7	-0.836
375	74.3	1283.5	0.241	26.00	150.8	-2.046	0.295	187.2	-1.168	0.256	72.2	-36.1	146.0	153.5	-0.740	0.208	153.5	-0.740
376	74.4	1277.7	0.233	25.97	149.4	-1.944	0.293	183.7	-1.053	0.255	67.1	-32.5	148.0	155.3	-0.640	0.207	155.3	-0.640
377	74.4	1272.1	0.226	25.94	148.3	-1.835	0.291	180.3	-0.947	0.254	62.4	-29.0	149.9	156.8	-0.542	0.206	156.8	-0.542
378	74.5	1266.1	0.218	25.92	147.2	-1.719	0.289	177.1	-0.852	0.253	58.2	-25.8	151.5	157.7	-0.459	0.206	157.7	-0.459

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
379	74.6	1259.1	0.209	25.90	146.0	-1.593	0.287	173.9	-0.766	0.252	54.4	-23.1	152.7	158.0	-0.397	0.205	158.0	-0.397
380	74.7	1250.6	0.199	25.88	144.7	-1.457	0.285	170.8	-0.690	0.251	51.1	-21.1	153.2	157.6	-0.363	0.205	157.6	-0.363
381	74.8	1240.4	0.187	25.86	143.1	-1.313	0.284	167.8	-0.621	0.250	48.1	-19.6	153.2	156.8	-0.353	0.204	156.8	-0.353
382	74.9	1228.5	0.173	25.85	141.1	-1.161	0.283	165.0	-0.555	0.250	45.3	-18.5	152.7	156.0	-0.359	0.204	156.0	-0.359
383	75.0	1215.2	0.158	25.83	138.9	-1.003	0.281	162.5	-0.490	0.249	42.9	-17.4	152.2	155.6	-0.367	0.204	155.6	-0.367
384	75.1	1200.9	0.142	25.82	136.6	-0.841	0.280	160.5	-0.427	0.248	40.7	-16.1	152.0	155.8	-0.363	0.203	155.8	-0.363
385	75.2	1186.7	0.126	25.81	134.1	-0.679	0.280	158.9	-0.362	0.248	38.8	-14.2	152.3	156.7	-0.339	0.203	156.7	-0.339
386	75.3	1173.3	0.110	25.80	131.7	-0.521	0.279	157.7	-0.293	0.248	37.3	-11.8	153.1	157.9	-0.295	0.202	157.9	-0.295
387	75.3	1161.5	0.097	25.80	129.5	-0.368	0.278	156.8	-0.220	0.247	36.0	-9.1	154.3	159.3	-0.236	0.202	159.3	-0.236
388	75.4	1151.5	0.085	25.80	127.7	-0.221	0.278	156.1	-0.143	0.247	35.1	-6.3	155.7	160.6	-0.174	0.202	160.6	-0.174
389	75.5	1143.2	0.075	25.80	126.2	-0.080	0.278	155.8	-0.063	0.247	34.5	-3.6	157.0	161.6	-0.114	0.202	161.6	-0.114
390	75.6	1135.7	0.066	25.80	125.2	0.055	0.278	155.7	0.018	0.247	34.2	-1.1	158.1	162.5	-0.062	0.202	162.5	-0.062
391	75.7	1128.3	0.057	25.80	124.7	0.186	0.278	155.9	0.097	0.247	34.2	1.1	159.1	163.2	-0.019	0.202	163.2	-0.019
392	75.8	1120.1	0.047	25.80	124.7	0.314	0.278	156.6	0.172	0.247	34.6	3.1	159.9	163.7	0.015	0.202	163.7	0.015
393	75.9	1110.6	0.036	25.80	125.1	0.439	0.279	157.8	0.238	0.247	35.2	4.8	160.6	164.1	0.040	0.202	164.1	0.040
394	76.0	1099.7	0.023	25.81	125.8	0.562	0.279	159.6	0.298	0.248	36.1	6.3	161.1	164.5	0.058	0.202	164.5	0.058
395	76.1	1087.5	0.008	25.82	126.8	0.680	0.280	161.7	0.351	0.248	37.3	7.7	161.5	164.9	0.074	0.202	164.9	0.074
396	76.2	1074.4	-0.008	25.83	128.0	0.792	0.281	164.0	0.400	0.249	38.7	9.0	161.9	165.4	0.089	0.202	165.4	0.089
397	76.3	1060.8	-0.025	25.84	129.3	0.898	0.282	166.3	0.449	0.249	40.4	10.3	162.4	166.0	0.107	0.202	166.0	0.107
398	76.3	1047.2	-0.042	25.85	130.6	0.997	0.283	168.5	0.500	0.250	42.3	11.6	163.1	166.8	0.130	0.202	166.8	0.130
399	76.4	1034.0	-0.059	25.86	131.9	1.092	0.284	170.3	0.554	0.250	44.6	12.9	163.8	167.8	0.156	0.202	167.8	0.156
400	76.5	1021.7	-0.075	25.87	133.1	1.183	0.285	172.0	0.610	0.251	47.1	14.3	164.7	168.8	0.188	0.202	168.8	0.188
401	76.6	1010.5	-0.090	25.89	134.3	1.269	0.286	173.6	0.667	0.251	49.9	15.8	165.8	170.0	0.223	0.203	170.0	0.223
402	76.7	1000.6	-0.103	25.91	135.4	1.348	0.288	175.4	0.723	0.252	52.9	17.4	166.9	171.3	0.262	0.203	171.3	0.262
403	76.8	991.8	-0.114	25.92	136.6	1.418	0.289	177.5	0.777	0.253	56.2	19.0	168.2	172.7	0.302	0.203	172.7	0.302
404	76.9	983.7	-0.124	25.94	137.8	1.477	0.291	179.9	0.829	0.254	59.8	20.6	169.5	174.1	0.344	0.204	174.1	0.344
405	77.0	975.7	-0.135	25.96	139.3	1.524	0.293	182.6	0.878	0.255	63.6	22.1	170.8	175.5	0.386	0.204	175.5	0.386
406	77.1	967.1	-0.146	25.98	141.1	1.560	0.294	185.6	0.925	0.256	67.7	23.6	172.2	176.9	0.428	0.204	176.9	0.428
407	77.2	957.4	-0.159	26.00	143.2	1.590	0.296	188.8	0.969	0.257	72.1	25.0	173.6	178.3	0.467	0.205	178.3	0.467
408	77.2	946.5	-0.174	26.02	145.8	1.619	0.298	192.1	1.009	0.258	76.7	26.2	174.9	179.7	0.504	0.205	179.7	0.504
409	77.3	934.4	-0.191	26.04	148.7	1.651	0.299	195.3	1.045	0.259	81.4	27.3	176.2	181.1	0.538	0.206	181.1	0.538
410	77.4	921.9	-0.210	26.07	151.9	1.692	0.301	198.5	1.078	0.260	86.4	28.3	177.5	182.4	0.569	0.207	182.4	0.569
411	77.5	909.3	-0.229	26.09	155.2	1.741	0.303	201.5	1.107	0.261	91.6	29.0	178.7	183.6	0.596	0.207	183.6	0.596
412	77.6	897.3	-0.248	26.12	158.6	1.795	0.305	204.4	1.134	0.263	96.9	29.7	179.8	184.8	0.619	0.208	184.8	0.619
413	77.7	886.1	-0.265	26.14	161.9	1.850	0.307	207.1	1.158	0.264	102.4	30.2	180.9	186.0	0.639	0.209	186.0	0.639
414	77.8	875.9	-0.281	26.17	165.1	1.901	0.309	209.7	1.178	0.265	108.0	30.6	182.0	187.2	0.658	0.209	187.2	0.658
415	77.9	866.7	-0.295	26.20	168.2	1.943	0.311	212.1	1.193	0.266	113.8	31.1	183.1	188.5	0.676	0.210	188.5	0.676
416	78.0	858.3	-0.309	26.23	171.2	1.975	0.313	214.4	1.204	0.268	119.6	31.6	184.2	189.8	0.695	0.211	189.8	0.695
417	78.1	850.5	-0.321	26.26	174.2	1.999	0.315	216.5	1.211	0.269	125.6	32.1	185.4	191.2	0.715	0.212	191.2	0.715
418	78.2	842.9	-0.333	26.29	177.2	2.016	0.318	218.6	1.213	0.270	131.6	32.7	186.6	192.6	0.735	0.212	192.6	0.735
419	78.2	835.4	-0.345	26.33	180.2	2.027	0.320	220.8	1.214	0.272	137.8	33.3	187.8	194.0	0.755	0.213	194.0	0.755
420	78.3	827.5	-0.359	26.36	183.3	2.034	0.322	223.2	1.214	0.273	144.0	33.8	189.0	195.4	0.774	0.214	195.4	0.774

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
421	78.4	818.9	-0.374	26.39	186.4	2.037	0.324	226.0	1.217	0.274	150.2	34.3	190.2	196.7	0.791	0.215	196.7	0.791
422	78.5	809.5	-0.391	26.43	189.4	2.037	0.326	229.2	1.223	0.276	156.5	34.6	191.3	197.8	0.803	0.216	197.8	0.803
423	78.6	799.4	-0.409	26.46	192.3	2.033	0.329	232.8	1.233	0.277	162.8	34.8	192.2	198.9	0.811	0.217	198.9	0.811
424	78.7	789.0	-0.430	26.50	195.1	2.026	0.331	236.6	1.243	0.278	169.2	34.8	193.1	199.8	0.814	0.217	199.8	0.814
425	78.8	778.6	-0.450	26.54	197.7	2.014	0.333	240.5	1.253	0.280	175.5	34.6	193.8	200.7	0.812	0.218	200.7	0.812
426	78.9	768.9	-0.470	26.57	200.0	1.997	0.335	244.3	1.260	0.281	181.7	34.2	194.5	201.4	0.806	0.219	201.4	0.806
427	79.0	760.0	-0.488	26.61	202.1	1.974	0.337	248.0	1.260	0.282	188.0	33.7	195.0	202.0	0.796	0.220	202.0	0.796
428	79.1	752.2	-0.504	26.64	203.9	1.944	0.340	251.4	1.255	0.284	194.2	33.1	195.4	202.5	0.782	0.221	202.5	0.782
429	79.2	745.2	-0.518	26.68	205.6	1.909	0.342	254.7	1.245	0.285	200.3	32.3	195.6	202.9	0.764	0.222	202.9	0.764
430	79.2	738.9	-0.532	26.71	207.0	1.867	0.344	257.7	1.231	0.286	206.3	31.5	195.8	203.1	0.741	0.223	203.1	0.741
431	79.3	732.7	-0.544	26.75	208.3	1.819	0.346	260.7	1.214	0.288	212.3	30.5	195.8	203.4	0.717	0.223	203.4	0.717
432	79.4	726.6	-0.558	26.78	209.4	1.766	0.348	263.6	1.196	0.289	218.1	29.6	195.9	203.6	0.693	0.224	203.6	0.693
433	79.5	720.1	-0.572	26.82	210.4	1.708	0.350	266.4	1.175	0.290	223.9	28.8	195.9	204.0	0.672	0.225	204.0	0.672
434	79.6	713.3	-0.588	26.85	211.4	1.645	0.351	269.1	1.152	0.292	229.5	28.1	196.1	204.6	0.656	0.226	204.6	0.656
435	79.7	706.0	-0.605	26.88	212.3	1.578	0.353	271.7	1.126	0.293	235.0	27.6	196.5	205.4	0.648	0.226	205.4	0.648
436	79.8	698.3	-0.624	26.91	213.2	1.507	0.355	274.3	1.096	0.294	240.4	27.3	197.1	206.3	0.646	0.227	206.3	0.646
437	79.9	690.3	-0.644	26.94	214.2	1.433	0.356	276.6	1.062	0.295	245.7	27.1	197.8	207.3	0.649	0.228	207.3	0.649
438	80.0	682.2	-0.665	26.96	215.1	1.357	0.358	278.8	1.024	0.296	250.9	27.0	198.5	208.2	0.653	0.228	208.2	0.653
439	80.1	674.3	-0.686	26.99	216.0	1.278	0.359	280.7	0.979	0.297	255.9	26.8	199.2	208.9	0.656	0.229	208.9	0.656
440	80.1	666.8	-0.706	27.01	216.9	1.198	0.361	282.4	0.930	0.298	260.7	26.4	199.8	209.5	0.654	0.230	209.5	0.654
441	80.2	660.0	-0.724	27.03	217.7	1.116	0.362	283.9	0.876	0.299	265.4	25.9	200.2	209.9	0.646	0.231	209.9	0.646
442	80.3	654.0	-0.741	27.06	218.4	1.033	0.363	285.1	0.817	0.300	269.9	25.3	200.4	210.2	0.632	0.231	210.2	0.632
443	80.4	648.7	-0.756	27.07	219.1	0.948	0.364	286.1	0.755	0.301	274.1	24.5	200.5	210.4	0.614	0.232	210.4	0.614
444	80.5	643.9	-0.769	27.09	219.6	0.862	0.365	286.9	0.689	0.302	278.1	23.6	200.5	210.5	0.594	0.233	210.5	0.594
445	80.6	639.3	-0.783	27.11	220.0	0.773	0.366	287.5	0.622	0.303	281.9	22.7	200.5	210.6	0.573	0.233	210.6	0.573
446	80.7	634.5	-0.797	27.12	220.3	0.683	0.367	287.9	0.554	0.303	285.4	21.7	200.4	210.6	0.551	0.234	210.6	0.551
447	80.8	629.3	-0.813	27.14	220.4	0.590	0.368	288.1	0.487	0.304	288.6	20.7	200.2	210.6	0.528	0.234	210.6	0.528
448	80.9	623.6	-0.830	27.15	220.5	0.494	0.368	288.1	0.421	0.304	291.6	19.6	200.1	210.5	0.505	0.235	210.5	0.505
449	81.0	617.5	-0.850	27.15	220.5	0.397	0.369	287.9	0.357	0.305	294.2	18.4	199.8	210.3	0.479	0.236	210.3	0.479
450	81.1	611.2	-0.871	27.16	220.5	0.298	0.369	287.5	0.294	0.305	296.6	17.2	199.4	210.0	0.451	0.236	210.0	0.451
451	81.1	604.8	-0.892	27.17	220.3	0.198	0.369	286.9	0.234	0.306	298.7	15.8	199.0	209.6	0.420	0.237	209.6	0.420
452	81.2	598.6	-0.913	27.17	220.2	0.097	0.369	286.3	0.174	0.306	300.4	14.2	198.4	208.9	0.385	0.237	208.9	0.385
453	81.3	592.6	-0.934	27.17	219.9	-0.003	0.369	285.6	0.114	0.306	301.9	12.6	197.6	208.2	0.346	0.237	208.2	0.346
454	81.4	587.1	-0.954	27.17	219.6	-0.103	0.369	284.8	0.054	0.306	303.0	10.8	196.7	207.3	0.304	0.238	207.3	0.304
455	81.5	582.0	-0.973	27.16	219.2	-0.204	0.369	284.0	-0.007	0.306	303.8	8.9	195.7	206.3	0.260	0.238	206.3	0.260
456	81.6	577.5	-0.989	27.16	218.7	-0.304	0.369	283.1	-0.068	0.306	304.2	7.0	194.6	205.2	0.213	0.238	205.2	0.213
457	81.7	573.5	-1.005	27.15	218.0	-0.403	0.369	282.0	-0.129	0.306	304.3	4.9	193.4	204.0	0.165	0.239	204.0	0.165
458	81.8	569.7	-1.019	27.14	217.1	-0.501	0.368	280.8	-0.190	0.306	304.1	2.9	192.2	202.8	0.117	0.239	202.8	0.117
459	81.9	566.1	-1.034	27.13	216.1	-0.596	0.367	279.5	-0.250	0.305	303.6	0.9	190.9	201.5	0.068	0.239	201.5	0.068
460	82.0	562.3	-1.049	27.12	214.8	-0.689	0.367	277.9	-0.310	0.305	302.7	-1.1	189.5	200.2	0.020	0.239	200.2	0.020
461	82.0	558.2	-1.066	27.10	213.3	-0.779	0.366	276.3	-0.369	0.305	301.6	-3.1	188.2	198.9	-0.026	0.239	198.9	-0.026
462	82.1	553.6	-1.085	27.09	211.4	-0.867	0.365	274.5	-0.427	0.304	300.1	-5.0	186.9	197.6	-0.072	0.239	197.6	-0.072

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
463	82.2	548.6	-1.106	27.07	209.4	-0.954	0.364	272.6	-0.483	0.304	298.3	-6.9	185.6	196.4	-0.115	0.239	196.4	-0.115
464	82.3	543.4	-1.129	27.05	207.1	-1.041	0.363	270.6	-0.538	0.303	296.2	-8.6	184.3	195.1	-0.156	0.238	195.1	-0.156
465	82.4	538.2	-1.151	27.03	204.6	-1.128	0.362	268.6	-0.591	0.303	293.8	-10.3	183.0	193.8	-0.195	0.238	193.8	-0.195
466	82.5	533.3	-1.174	27.01	202.0	-1.215	0.361	266.5	-0.643	0.302	291.2	-12.0	181.8	192.6	-0.233	0.238	192.6	-0.233
467	82.6	528.7	-1.195	26.99	199.2	-1.301	0.359	264.4	-0.693	0.301	288.2	-13.6	180.6	191.3	-0.269	0.238	191.3	-0.269
468	82.7	524.7	-1.214	26.96	196.4	-1.386	0.358	262.2	-0.742	0.300	285.1	-15.1	179.4	190.1	-0.303	0.237	190.1	-0.303
469	82.8	521.0	-1.232	26.94	193.5	-1.468	0.356	259.9	-0.790	0.300	281.6	-16.6	178.2	188.8	-0.337	0.237	188.8	-0.337
470	82.9	517.7	-1.248	26.91	190.5	-1.548	0.355	257.5	-0.835	0.299	277.9	-18.1	177.0	187.5	-0.370	0.237	187.5	-0.370
471	83.0	514.6	-1.264	26.88	187.5	-1.623	0.353	255.0	-0.879	0.298	274.0	-19.6	175.7	186.1	-0.402	0.236	186.1	-0.402
472	83.0	511.6	-1.280	26.85	184.3	-1.696	0.351	252.4	-0.922	0.297	269.8	-21.0	174.5	184.8	-0.435	0.236	184.8	-0.435
473	83.1	508.5	-1.296	26.83	181.0	-1.765	0.349	249.7	-0.963	0.296	265.4	-22.5	173.2	183.4	-0.467	0.235	183.4	-0.467
474	83.2	505.3	-1.313	26.80	177.5	-1.831	0.347	246.9	-1.002	0.295	260.8	-23.9	172.0	182.1	-0.498	0.235	182.1	-0.498
475	83.3	501.9	-1.331	26.77	173.9	-1.895	0.345	243.9	-1.040	0.294	256.0	-25.2	170.7	180.7	-0.528	0.234	180.7	-0.528
476	83.4	498.1	-1.352	26.74	170.2	-1.957	0.343	240.8	-1.077	0.293	250.9	-26.6	169.5	179.4	-0.557	0.234	179.4	-0.557
477	83.5	494.0	-1.374	26.71	166.4	-2.016	0.341	237.5	-1.113	0.291	245.7	-27.8	168.3	178.1	-0.584	0.233	178.1	-0.584
478	83.6	489.7	-1.397	26.68	162.4	-2.073	0.339	234.1	-1.147	0.290	240.3	-29.0	167.1	176.8	-0.609	0.232	176.8	-0.609
479	83.7	485.5	-1.420	26.65	158.4	-2.127	0.336	230.6	-1.181	0.289	234.8	-30.1	166.0	175.6	-0.632	0.232	175.6	-0.632
480	83.8	481.5	-1.443	26.61	154.3	-2.178	0.334	227.0	-1.211	0.288	229.1	-31.2	164.9	174.4	-0.654	0.231	174.4	-0.654
481	83.9	477.8	-1.465	26.58	150.2	-2.226	0.332	223.4	-1.240	0.286	223.2	-32.2	163.8	173.1	-0.674	0.230	173.1	-0.674
482	84.0	474.6	-1.484	26.55	146.0	-2.269	0.329	219.8	-1.265	0.285	217.2	-33.2	162.8	171.9	-0.694	0.230	171.9	-0.694
483	84.0	471.8	-1.501	26.52	141.8	-2.308	0.327	216.3	-1.288	0.283	211.0	-34.1	161.8	170.7	-0.712	0.229	170.7	-0.712
484	84.1	469.2	-1.518	26.50	137.5	-2.343	0.324	212.7	-1.308	0.282	204.7	-35.0	160.7	169.6	-0.729	0.228	169.6	-0.729
485	84.2	466.8	-1.533	26.47	133.2	-2.373	0.322	209.1	-1.327	0.281	198.3	-35.8	159.7	168.4	-0.745	0.227	168.4	-0.745
486	84.3	464.3	-1.550	26.44	128.8	-2.399	0.319	205.4	-1.343	0.279	191.8	-36.7	158.8	167.2	-0.760	0.226	167.2	-0.760
487	84.4	461.6	-1.567	26.41	124.5	-2.421	0.316	201.8	-1.358	0.278	185.2	-37.5	157.8	166.1	-0.775	0.226	166.1	-0.775
488	84.5	458.6	-1.586	26.38	120.1	-2.438	0.314	198.0	-1.372	0.276	178.5	-38.3	156.8	164.9	-0.790	0.225	164.9	-0.790
489	84.6	455.5	-1.606	26.36	115.7	-2.450	0.311	194.3	-1.384	0.275	171.8	-39.0	155.8	163.7	-0.805	0.224	163.7	-0.805
490	84.7	452.1	-1.628	26.33	111.3	-2.457	0.308	190.5	-1.394	0.273	164.9	-39.8	154.8	162.4	-0.820	0.223	162.4	-0.820
491	84.8	448.6	-1.651	26.31	106.8	-2.460	0.306	186.8	-1.403	0.272	158.0	-40.5	153.8	161.2	-0.835	0.222	161.2	-0.835
492	84.9	445.0	-1.675	26.29	102.4	-2.459	0.303	183.0	-1.409	0.270	151.0	-41.2	152.7	160.0	-0.849	0.221	160.0	-0.849
493	84.9	441.4	-1.698	26.26	98.1	-2.454	0.300	179.2	-1.413	0.269	144.0	-41.8	151.8	158.9	-0.862	0.220	158.9	-0.862
494	85.0	438.1	-1.721	26.24	93.7	-2.445	0.298	175.5	-1.414	0.267	136.9	-42.3	150.8	157.8	-0.873	0.219	157.8	-0.873
495	85.1	435.0	-1.742	26.22	89.4	-2.431	0.295	171.8	-1.413	0.266	129.9	-42.7	150.0	156.8	-0.881	0.218	156.8	-0.881
496	85.2	432.3	-1.762	26.20	85.1	-2.415	0.293	168.1	-1.410	0.264	122.8	-43.0	149.2	155.8	-0.887	0.217	155.8	-0.887
497	85.3	429.9	-1.780	26.19	80.9	-2.394	0.290	164.6	-1.404	0.262	115.7	-43.3	148.4	154.9	-0.890	0.216	154.9	-0.890
498	85.4	427.7	-1.796	26.17	76.8	-2.370	0.287	161.0	-1.396	0.261	108.6	-43.4	147.7	154.0	-0.892	0.215	154.0	-0.892
499	85.5	425.5	-1.812	26.15	72.7	-2.343	0.285	157.6	-1.385	0.259	101.6	-43.5	147.0	153.1	-0.892	0.215	153.1	-0.892
500	85.6	423.3	-1.829	26.14	68.7	-2.312	0.282	154.2	-1.372	0.258	94.6	-43.5	146.4	152.3	-0.892	0.214	152.3	-0.892
501	85.7	420.8	-1.847	26.12	64.8	-2.278	0.280	150.9	-1.358	0.256	87.6	-43.4	145.7	151.5	-0.890	0.213	151.5	-0.890
502	85.8	418.1	-1.868	26.11	61.0	-2.240	0.277	147.7	-1.341	0.255	80.7	-43.3	145.1	150.7	-0.888	0.212	150.7	-0.888
503	85.9	415.0	-1.890	26.10	57.3	-2.199	0.275	144.6	-1.323	0.254	73.9	-43.1	144.6	149.9	-0.885	0.211	149.9	-0.885
504	85.9	411.8	-1.913	26.09	53.6	-2.154	0.272	141.5	-1.303	0.252	67.2	-42.9	144.0	149.1	-0.880	0.210	149.1	-0.880

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
505	86.0	408.6	-1.938	26.08	50.1	-2.106	0.270	138.6	-1.281	0.251	60.9	-42.5	143.5	148.5	-0.874	0.209	148.5	-0.874
506	86.1	405.4	-1.962	26.07	46.6	-2.056	0.268	135.7	-1.257	0.249	54.9	-42.0	143.0	147.8	-0.867	0.208	147.8	-0.867
507	86.2	402.3	-1.985	26.06	43.3	-2.004	0.266	132.9	-1.232	0.248	49.1	-41.5	142.6	147.3	-0.857	0.207	147.3	-0.857
508	86.3	399.4	-2.007	26.05	40.1	-1.949	0.264	130.2	-1.204	0.247	43.4	-40.8	142.3	146.7	-0.846	0.206	146.7	-0.846
509	86.4	396.8	-2.028	26.05	37.0	-1.894	0.261	127.5	-1.174	0.245	37.7	-40.2	142.0	146.3	-0.832	0.205	146.3	-0.832
510	86.5	394.4	-2.047	26.04	34.1	-1.838	0.259	125.0	-1.143	0.244	32.3	-39.4	141.7	145.9	-0.817	0.204	145.9	-0.817
511	86.6	392.2	-2.065	26.04	31.3	-1.781	0.257	122.4	-1.110	0.243	27.1	-38.5	141.5	145.5	-0.799	0.203	145.5	-0.799
512	86.7	390.1	-2.082	26.03	28.7	-1.724	0.256	119.9	-1.077	0.242	22.0	-37.6	141.4	145.2	-0.780	0.202	145.2	-0.780
513	86.8	388.0	-2.099	26.03	26.2	-1.667	0.254	117.3	-1.045	0.241	17.1	-36.6	141.3	145.0	-0.760	0.202	145.0	-0.760
514	86.8	385.8	-2.117	26.02	23.9	-1.610	0.252	114.7	-1.013	0.239	12.3	-35.5	141.3	144.8	-0.737	0.201	144.8	-0.737
515	86.9	383.4	-2.136	26.02	21.7	-1.550	0.250	112.3	-0.980	0.238	7.7	-34.4	141.3	144.7	-0.714	0.200	144.7	-0.714
516	87.0	380.8	-2.158	26.02	19.7	-1.489	0.249	110.0	-0.947	0.237	3.3	-33.2	141.3	144.6	-0.688	0.199	144.6	-0.688
517	87.1	377.9	-2.181	26.02	17.8	-1.425	0.247	107.7	-0.912	0.236	-0.9	-32.0	141.4	144.5	-0.662	0.198	144.5	-0.662
518	87.2	374.9	-2.206	26.01	16.1	-1.361	0.245	105.5	-0.877	0.235	-4.8	-30.7	141.6	144.5	-0.635	0.198	144.5	-0.635
519	87.3	371.8	-2.231	26.01	14.4	-1.297	0.244	103.5	-0.841	0.234	-8.7	-29.5	141.7	144.6	-0.607	0.197	144.6	-0.607
520	87.4	368.8	-2.256	26.01	13.0	-1.232	0.243	101.6	-0.803	0.233	-12.3	-28.2	142.0	144.6	-0.578	0.196	144.6	-0.578
521	87.5	366.1	-2.279	26.01	11.5	-1.165	0.241	99.7	-0.765	0.233	-15.8	-26.8	142.2	144.8	-0.548	0.196	144.8	-0.548
522	87.6	363.5	-2.301	26.01	10.3	-1.096	0.240	97.8	-0.727	0.232	-19.1	-25.5	142.5	144.9	-0.518	0.195	144.9	-0.518
523	87.7	361.2	-2.320	26.01	9.1	-1.027	0.239	96.1	-0.688	0.231	-22.2	-24.1	142.8	145.1	-0.487	0.195	145.1	-0.487
524	87.8	359.1	-2.339	26.01	8.0	-0.957	0.238	94.5	-0.648	0.230	-25.0	-22.6	143.1	145.3	-0.457	0.194	145.3	-0.457
525	87.8	357.0	-2.357	26.01	7.0	-0.888	0.237	92.9	-0.608	0.230	-27.7	-21.2	143.5	145.4	-0.427	0.194	145.4	-0.427
526	87.9	355.0	-2.375	26.01	6.2	-0.819	0.236	91.4	-0.568	0.229	-30.2	-19.8	143.8	145.5	-0.399	0.193	145.5	-0.399
527	88.0	352.9	-2.393	26.01	5.3	-0.752	0.235	90.1	-0.526	0.228	-32.5	-18.5	144.0	145.7	-0.374	0.193	145.7	-0.374
528	88.1	350.6	-2.413	26.01	4.6	-0.684	0.234	88.9	-0.484	0.228	-34.6	-17.1	144.3	145.8	-0.349	0.192	145.8	-0.349
529	88.2	348.3	-2.433	26.00	4.0	-0.616	0.234	87.7	-0.442	0.227	-36.6	-15.8	144.6	146.0	-0.325	0.192	146.0	-0.325
530	88.3	345.7	-2.456	26.00	3.4	-0.548	0.233	86.8	-0.399	0.227	-38.4	-14.4	144.9	146.2	-0.300	0.192	146.2	-0.300
531	88.4	343.0	-2.480	26.00	2.9	-0.481	0.232	85.9	-0.355	0.227	-40.1	-13.0	145.2	146.5	-0.275	0.191	146.5	-0.275
532	88.5	340.2	-2.505	26.00	2.5	-0.415	0.232	85.2	-0.312	0.226	-41.6	-11.6	145.6	146.8	-0.250	0.191	146.8	-0.250
533	88.6	337.4	-2.531	26.00	2.1	-0.350	0.232	84.5	-0.268	0.226	-42.9	-10.2	145.9	147.1	-0.225	0.191	147.1	-0.225
534	88.7	334.7	-2.556	26.00	1.8	-0.286	0.231	84.1	-0.224	0.226	-44.0	-8.8	146.3	147.4	-0.200	0.191	147.4	-0.200
535	88.8	332.1	-2.579	26.00	1.6	-0.223	0.231	83.7	-0.180	0.225	-45.0	-7.4	146.7	147.7	-0.176	0.190	147.7	-0.176
536	88.8	329.8	-2.600	26.00	1.4	-0.161	0.231	83.5	-0.137	0.225	-45.8	-6.1	147.1	148.0	-0.153	0.190	148.0	-0.153
537	88.9	327.7	-2.620	26.00	1.2	-0.099	0.231	83.3	-0.094	0.225	-46.5	-4.7	147.5	148.3	-0.130	0.190	148.3	-0.130
538	89.0	325.8	-2.638	26.00	1.1	-0.039	0.230	83.2	-0.052	0.225	-47.0	-3.4	147.9	148.7	-0.107	0.190	148.7	-0.107
539	89.1	323.9	-2.656	26.00	1.0	0.021	0.230	83.3	-0.012	0.225	-47.3	-2.1	148.3	149.1	-0.085	0.190	149.1	-0.085
540	89.2	322.0	-2.674	26.00	1.0	0.079	0.231	83.5	0.027	0.225	-47.5	-0.8	148.8	149.5	-0.062	0.190	149.5	-0.062
541	89.3	319.9	-2.693	26.00	1.1	0.136	0.231	83.8	0.064	0.225	-47.4	0.4	149.2	150.0	-0.039	0.190	150.0	-0.039
542	89.4	317.7	-2.714	26.00	1.1	0.191	0.231	84.2	0.101	0.225	-47.2	1.7	149.7	150.4	-0.016	0.190	150.4	-0.016
543	89.5	315.4	-2.737	26.00	1.2	0.245	0.231	84.7	0.137	0.225	-46.8	2.9	150.3	151.0	0.007	0.190	151.0	0.007
544	89.6	312.9	-2.761	26.00	1.4	0.297	0.231	85.2	0.172	0.225	-46.2	4.1	150.8	151.5	0.030	0.190	151.5	0.030
545	89.7	310.4	-2.786	26.00	1.6	0.347	0.232	85.8	0.206	0.226	-45.5	5.2	151.4	152.1	0.053	0.190	152.1	0.053
546	89.7	307.9	-2.812	26.00	1.9	0.397	0.232	86.5	0.238	0.226	-44.5	6.4	151.9	152.6	0.077	0.190	152.6	0.077

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
547	89.8	305.4	-2.837	26.00	2.3	0.444	0.233	87.2	0.269	0.226	-43.4	7.4	152.5	153.2	0.099	0.190	153.2	0.099
548	89.9	303.0	-2.861	26.00	2.7	0.490	0.233	88.0	0.299	0.226	-42.2	8.5	153.1	153.9	0.122	0.190	153.9	0.122
549	90.0	300.7	-2.884	26.00	3.3	0.534	0.234	88.8	0.327	0.227	-40.8	9.5	153.8	154.5	0.145	0.190	154.5	0.145
550	90.1	298.6	-2.905	26.00	3.9	0.577	0.234	89.7	0.353	0.227	-39.2	10.5	154.4	155.2	0.168	0.190	155.2	0.168
551	90.2	296.7	-2.925	26.01	4.7	0.618	0.235	90.6	0.378	0.228	-37.5	11.4	155.1	155.8	0.189	0.191	155.8	0.189
552	90.3	294.9	-2.943	26.01	5.6	0.657	0.236	91.6	0.402	0.228	-35.7	12.2	155.7	156.4	0.208	0.191	156.4	0.208
553	90.4	293.2	-2.961	26.01	6.7	0.695	0.236	92.6	0.424	0.228	-33.7	13.0	156.3	157.1	0.227	0.191	157.1	0.227
554	90.5	291.4	-2.980	26.01	7.9	0.733	0.237	93.6	0.445	0.229	-31.6	13.7	156.9	157.7	0.245	0.191	157.7	0.245
555	90.6	289.5	-3.000	26.01	9.3	0.771	0.238	94.7	0.465	0.229	-29.4	14.4	157.5	158.4	0.263	0.192	158.4	0.263
556	90.7	287.4	-3.022	26.01	10.9	0.810	0.239	95.8	0.483	0.230	-27.0	15.1	158.2	159.0	0.279	0.192	159.0	0.279
557	90.7	285.2	-3.046	26.01	12.7	0.849	0.240	96.9	0.500	0.230	-24.6	15.7	158.8	159.7	0.295	0.192	159.7	0.295
558	90.8	282.9	-3.072	26.01	14.6	0.890	0.241	98.0	0.516	0.231	-22.1	16.2	159.4	160.3	0.309	0.192	160.3	0.309
559	90.9	280.6	-3.098	26.01	16.7	0.930	0.242	99.2	0.531	0.232	-19.5	16.7	159.9	161.0	0.322	0.193	161.0	0.322
560	91.0	278.3	-3.124	26.01	19.0	0.971	0.243	100.4	0.544	0.232	-16.8	17.2	160.5	161.6	0.334	0.193	161.6	0.334
561	91.1	276.1	-3.149	26.01	21.4	1.012	0.244	101.7	0.557	0.233	-14.0	17.6	161.1	162.1	0.344	0.194	162.1	0.344
562	91.2	274.0	-3.172	26.02	23.9	1.051	0.245	103.0	0.569	0.233	-11.2	18.0	161.6	162.7	0.353	0.194	162.7	0.353
563	91.3	272.1	-3.194	26.02	26.5	1.090	0.246	104.4	0.581	0.234	-8.3	18.3	162.1	163.3	0.361	0.194	163.3	0.361
564	91.4	270.3	-3.215	26.02	29.2	1.128	0.247	105.9	0.592	0.235	-5.3	18.7	162.6	163.9	0.368	0.195	163.9	0.368
565	91.5	268.6	-3.234	26.03	31.9	1.163	0.248	107.4	0.603	0.235	-2.3	19.0	163.0	164.4	0.374	0.195	164.4	0.374
566	91.6	266.9	-3.253	26.03	34.6	1.197	0.250	109.1	0.613	0.236	0.8	19.2	163.5	164.9	0.378	0.196	164.9	0.378
567	91.6	265.3	-3.272	26.03	37.3	1.228	0.251	110.9	0.624	0.237	3.9	19.5	163.9	165.4	0.381	0.196	165.4	0.381
568	91.7	263.6	-3.292	26.04	39.9	1.256	0.252	112.8	0.636	0.237	7.1	19.7	164.3	165.8	0.383	0.196	165.8	0.383
569	91.8	261.8	-3.313	26.04	42.5	1.281	0.254	114.8	0.649	0.238	10.3	19.9	164.7	166.3	0.385	0.197	166.3	0.385
570	91.9	259.9	-3.336	26.05	45.0	1.304	0.255	117.0	0.663	0.239	13.6	20.0	165.0	166.7	0.385	0.197	166.7	0.385
571	92.0	257.9	-3.361	26.05	47.5	1.323	0.257	119.3	0.678	0.239	16.9	20.2	165.4	167.2	0.384	0.198	167.2	0.384
572	92.1	255.9	-3.387	26.06	50.0	1.339	0.258	121.7	0.694	0.240	20.2	20.3	165.7	167.6	0.383	0.198	167.6	0.383
573	92.2	253.8	-3.414	26.07	52.4	1.353	0.260	124.3	0.709	0.241	23.6	20.4	166.0	168.0	0.382	0.198	168.0	0.382
574	92.3	251.7	-3.440	26.07	54.8	1.363	0.261	126.8	0.725	0.242	27.0	20.4	166.3	168.4	0.381	0.199	168.4	0.381
575	92.4	249.8	-3.465	26.08	57.2	1.372	0.262	129.4	0.740	0.242	30.4	20.4	166.6	168.8	0.379	0.199	168.8	0.379
576	92.5	248.1	-3.488	26.09	59.5	1.378	0.264	132.1	0.754	0.243	33.9	20.4	167.0	169.2	0.378	0.200	169.2	0.378
577	92.6	246.5	-3.509	26.09	61.9	1.382	0.265	134.7	0.767	0.244	37.4	20.4	167.3	169.7	0.377	0.200	169.7	0.377
578	92.6	244.9	-3.529	26.10	64.3	1.385	0.267	137.3	0.778	0.245	41.0	20.3	167.6	170.1	0.377	0.200	170.1	0.377
579	92.7	243.5	-3.548	26.11	66.7	1.385	0.268	139.9	0.788	0.246	44.5	20.3	168.0	170.7	0.377	0.201	170.7	0.377
580	92.8	242.0	-3.567	26.12	69.1	1.385	0.270	142.4	0.795	0.247	48.2	20.3	168.4	171.2	0.380	0.201	171.2	0.380
581	92.9	240.6	-3.587	26.13	71.5	1.382	0.272	144.9	0.800	0.248	51.8	20.2	168.8	171.8	0.384	0.202	171.8	0.384
582	93.0	239.0	-3.609	26.14	73.9	1.379	0.273	147.3	0.803	0.248	55.5	20.3	169.3	172.5	0.390	0.202	172.5	0.390
583	93.1	237.4	-3.631	26.15	76.3	1.373	0.274	149.6	0.804	0.249	59.2	20.3	169.9	173.2	0.398	0.203	173.2	0.398
584	93.2	235.7	-3.655	26.16	78.7	1.366	0.276	151.8	0.803	0.250	63.0	20.4	170.5	174.0	0.408	0.203	174.0	0.408
585	93.3	234.0	-3.681	26.17	81.0	1.357	0.277	154.0	0.800	0.251	66.7	20.5	171.1	174.7	0.419	0.203	174.7	0.419
586	93.4	232.2	-3.707	26.18	83.3	1.345	0.279	156.1	0.795	0.252	70.5	20.6	171.8	175.5	0.431	0.204	175.5	0.431
587	93.5	230.4	-3.734	26.19	85.5	1.330	0.280	158.2	0.789	0.253	74.4	20.7	172.5	176.3	0.443	0.204	176.3	0.443
588	93.6	228.7	-3.760	26.20	87.6	1.312	0.282	160.2	0.781	0.254	78.2	20.9	173.2	177.1	0.455	0.205	177.1	0.455

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
589	93.6	227.1	-3.785	26.21	89.5	1.291	0.283	162.1	0.773	0.254	82.1	21.0	173.9	177.9	0.466	0.205	177.9	0.466
590	93.7	225.6	-3.808	26.22	91.4	1.266	0.285	164.1	0.764	0.255	85.9	21.0	174.6	178.7	0.476	0.206	178.7	0.476
591	93.8	224.3	-3.829	26.23	93.1	1.238	0.286	166.0	0.755	0.256	89.7	21.0	175.2	179.4	0.483	0.206	179.4	0.483
592	93.9	223.0	-3.848	26.24	94.6	1.207	0.287	167.8	0.745	0.257	93.6	21.0	175.8	180.0	0.489	0.207	180.0	0.489
593	94.0	221.8	-3.867	26.25	96.0	1.172	0.289	169.7	0.735	0.258	97.4	20.9	176.3	180.6	0.492	0.207	180.6	0.492
594	94.1	220.6	-3.886	26.26	97.3	1.133	0.290	171.5	0.725	0.259	101.1	20.7	176.8	181.2	0.493	0.208	181.2	0.493
595	94.2	219.3	-3.907	26.27	98.3	1.091	0.291	173.2	0.714	0.259	104.9	20.4	177.2	181.6	0.491	0.209	181.6	0.491
596	94.3	218.0	-3.929	26.28	99.3	1.046	0.292	174.8	0.703	0.260	108.5	20.1	177.5	182.0	0.487	0.209	182.0	0.487
597	94.4	216.5	-3.954	26.29	100.1	0.998	0.293	176.4	0.691	0.261	112.1	19.7	177.8	182.4	0.481	0.210	182.4	0.481
598	94.5	215.0	-3.979	26.30	100.8	0.948	0.294	177.8	0.677	0.262	115.7	19.3	178.1	182.7	0.473	0.210	182.7	0.473
599	94.5	213.5	-4.006	26.30	101.3	0.896	0.295	179.2	0.662	0.262	119.1	18.8	178.2	183.0	0.463	0.211	183.0	0.463
600	94.6	212.0	-4.032	26.31	101.8	0.841	0.296	180.4	0.645	0.263	122.5	18.2	178.4	183.2	0.451	0.211	183.2	0.451
601	94.7	210.5	-4.058	26.32	102.1	0.785	0.297	181.5	0.625	0.264	125.7	17.6	178.5	183.4	0.440	0.212	183.4	0.440
602	94.8	209.1	-4.084	26.33	102.4	0.728	0.298	182.4	0.602	0.264	128.9	17.0	178.6	183.6	0.427	0.212	183.6	0.427
603	94.9	207.8	-4.108	26.33	102.5	0.670	0.299	183.3	0.577	0.265	131.9	16.3	178.6	183.8	0.414	0.213	183.8	0.414
604	95.0	206.6	-4.130	26.34	102.6	0.611	0.300	184.0	0.549	0.266	134.9	15.7	178.7	183.9	0.401	0.213	183.9	0.401
605	95.1	205.4	-4.151	26.34	102.6	0.552	0.300	184.5	0.517	0.266	137.6	15.0	178.7	184.1	0.388	0.213	184.1	0.388
606	95.2	204.4	-4.171	26.35	102.5	0.493	0.301	185.0	0.483	0.267	140.3	14.3	178.7	184.2	0.375	0.214	184.2	0.375
607	95.3	203.3	-4.190	26.35	102.4	0.434	0.301	185.3	0.446	0.267	142.8	13.7	178.7	184.3	0.362	0.214	184.3	0.362
608	95.4	202.3	-4.210	26.36	102.2	0.375	0.302	185.5	0.406	0.268	145.1	13.0	178.7	184.4	0.349	0.215	184.4	0.349
609	95.5	201.2	-4.231	26.36	101.9	0.316	0.302	185.5	0.364	0.268	147.3	12.2	178.7	184.4	0.335	0.215	184.4	0.335
610	95.5	200.0	-4.254	26.36	101.5	0.257	0.302	185.5	0.320	0.268	149.3	11.5	178.6	184.4	0.321	0.215	184.4	0.321
611	95.6	198.7	-4.280	26.36	101.1	0.199	0.303	185.4	0.275	0.269	151.1	10.7	178.5	184.3	0.305	0.216	184.3	0.305
612	95.7	197.4	-4.306	26.37	100.7	0.140	0.303	185.2	0.229	0.269	152.7	9.9	178.3	184.2	0.288	0.216	184.2	0.288
613	95.8	196.1	-4.334	26.37	100.2	0.081	0.303	184.9	0.182	0.269	154.1	9.0	178.1	184.0	0.269	0.216	184.0	0.269
614	95.9	194.8	-4.361	26.37	99.6	0.023	0.303	184.5	0.135	0.269	155.3	8.0	177.8	183.7	0.249	0.217	183.7	0.249
615	96.0	193.6	-4.387	26.37	99.0	-0.036	0.303	184.0	0.088	0.270	156.3	7.0	177.4	183.4	0.227	0.217	183.4	0.227
616	96.1	192.4	-4.411	26.37	98.4	-0.095	0.303	183.5	0.041	0.270	157.1	6.0	177.0	182.9	0.202	0.217	182.9	0.202
617	96.2	191.3	-4.434	26.36	97.7	-0.154	0.303	182.9	-0.005	0.270	157.7	4.8	176.5	182.4	0.176	0.217	182.4	0.176
618	96.3	190.3	-4.456	26.36	97.1	-0.213	0.303	182.2	-0.050	0.270	158.0	3.7	175.9	181.8	0.148	0.217	181.8	0.148
619	96.4	189.4	-4.476	26.36	96.4	-0.271	0.302	181.4	-0.094	0.270	158.1	2.4	175.2	181.2	0.118	0.218	181.2	0.118
620	96.4	188.5	-4.496	26.36	95.6	-0.329	0.302	180.6	-0.137	0.269	158.0	1.2	174.5	180.4	0.086	0.218	180.4	0.086
621	96.5	187.6	-4.516	26.36	94.9	-0.387	0.302	179.7	-0.179	0.269	157.6	-0.2	173.7	179.6	0.053	0.218	179.6	0.053
622	96.6	186.6	-4.537	26.35	94.1	-0.444	0.301	178.8	-0.219	0.269	157.0	-1.5	172.9	178.8	0.020	0.218	178.8	0.020
623	96.7	185.6	-4.560	26.35	93.2	-0.499	0.301	177.8	-0.258	0.269	156.2	-2.8	172.0	177.9	-0.014	0.218	177.9	-0.014
624	96.8	184.6	-4.584	26.34	92.4	-0.554	0.300	176.7	-0.296	0.269	155.2	-4.2	171.1	177.0	-0.049	0.218	177.0	-0.049
625	96.9	183.5	-4.610	26.34	91.4	-0.608	0.299	175.6	-0.333	0.268	154.0	-5.5	170.2	176.0	-0.083	0.218	176.0	-0.083
626	97.0	182.3	-4.637	26.33	90.4	-0.660	0.299	174.5	-0.369	0.268	152.5	-6.8	169.2	175.1	-0.116	0.218	175.1	-0.116
627	97.1	181.2	-4.664	26.33	89.4	-0.711	0.298	173.3	-0.404	0.267	150.8	-8.1	168.2	174.1	-0.149	0.217	174.1	-0.149
628	97.2	180.1	-4.692	26.32	88.2	-0.760	0.297	172.0	-0.438	0.267	148.9	-9.3	167.3	173.1	-0.181	0.217	173.1	-0.181
629	97.3	179.0	-4.718	26.31	87.0	-0.807	0.296	170.8	-0.470	0.266	146.9	-10.5	166.3	172.2	-0.212	0.217	172.2	-0.212
630	97.4	178.0	-4.742	26.31	85.7	-0.853	0.295	169.5	-0.501	0.266	144.6	-11.7	165.4	171.2	-0.241	0.217	171.2	-0.241

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
631	97.4	177.1	-4.764	26.30	84.3	-0.897	0.294	168.1	-0.531	0.265	142.2	-12.8	164.5	170.3	-0.268	0.217	170.3	-0.268
632	97.5	176.3	-4.785	26.29	82.9	-0.938	0.293	166.8	-0.560	0.265	139.6	-13.8	163.6	169.3	-0.294	0.216	169.3	-0.294
633	97.6	175.5	-4.805	26.29	81.3	-0.978	0.292	165.4	-0.587	0.264	136.8	-14.8	162.7	168.4	-0.319	0.216	168.4	-0.319
634	97.7	174.7	-4.825	26.28	79.7	-1.016	0.291	163.9	-0.613	0.263	133.9	-15.7	161.9	167.6	-0.341	0.216	167.6	-0.341
635	97.8	173.9	-4.846	26.27	78.0	-1.052	0.290	162.5	-0.637	0.263	130.8	-16.6	161.0	166.7	-0.362	0.215	166.7	-0.362
636	97.9	173.1	-4.868	26.27	76.3	-1.086	0.289	161.0	-0.659	0.262	127.7	-17.4	160.2	165.9	-0.381	0.215	165.9	-0.381
637	98.0	172.2	-4.892	26.26	74.4	-1.119	0.288	159.5	-0.680	0.261	124.4	-18.2	159.5	165.0	-0.399	0.214	165.0	-0.399
638	98.1	171.2	-4.917	26.25	72.6	-1.149	0.287	157.9	-0.699	0.261	121.0	-18.9	158.7	164.2	-0.416	0.214	164.2	-0.416
639	98.2	170.2	-4.944	26.24	70.7	-1.177	0.285	156.3	-0.716	0.260	117.4	-19.5	158.0	163.4	-0.431	0.213	163.4	-0.431
640	98.3	169.2	-4.971	26.24	68.8	-1.204	0.284	154.6	-0.732	0.259	113.8	-20.1	157.3	162.6	-0.445	0.213	162.6	-0.445
641	98.4	168.2	-4.998	26.23	66.8	-1.228	0.283	152.9	-0.746	0.258	110.1	-20.7	156.6	161.9	-0.457	0.212	161.9	-0.457
642	98.4	167.3	-5.025	26.22	64.8	-1.250	0.281	151.1	-0.759	0.257	106.4	-21.2	156.0	161.2	-0.468	0.212	161.2	-0.468
643	98.5	166.4	-5.051	26.21	62.8	-1.270	0.280	149.3	-0.769	0.257	102.6	-21.7	155.4	160.5	-0.478	0.211	160.5	-0.478
644	98.6	165.5	-5.074	26.21	60.8	-1.288	0.279	147.5	-0.778	0.256	98.7	-22.1	154.8	159.8	-0.486	0.211	159.8	-0.486
645	98.7	164.8	-5.096	26.20	58.7	-1.303	0.277	145.6	-0.786	0.255	94.7	-22.5	154.2	159.1	-0.493	0.210	159.1	-0.493
646	98.8	164.0	-5.117	26.19	56.6	-1.317	0.276	143.7	-0.792	0.254	90.8	-22.8	153.7	158.5	-0.499	0.210	158.5	-0.499
647	98.9	163.4	-5.136	26.19	54.5	-1.327	0.274	141.7	-0.797	0.253	86.8	-23.1	153.1	157.9	-0.503	0.209	157.9	-0.503
648	99.0	162.7	-5.157	26.18	52.4	-1.336	0.273	139.8	-0.800	0.252	82.7	-23.3	152.7	157.3	-0.506	0.209	157.3	-0.506
649	99.1	161.9	-5.178	26.17	50.3	-1.342	0.271	137.8	-0.802	0.251	78.7	-23.5	152.2	156.8	-0.509	0.208	156.8	-0.509
650	99.2	161.1	-5.201	26.17	48.2	-1.346	0.270	135.7	-0.802	0.251	74.7	-23.6	151.8	156.2	-0.510	0.208	156.2	-0.510
651	99.3	160.3	-5.227	26.16	46.0	-1.347	0.269	133.7	-0.802	0.250	70.6	-23.7	151.4	155.7	-0.510	0.207	155.7	-0.510
652	99.3	159.4	-5.253	26.16	43.8	-1.346	0.267	131.7	-0.800	0.249	66.6	-23.7	151.0	155.2	-0.509	0.207	155.2	-0.509
653	99.4	158.5	-5.281	26.15	41.6	-1.343	0.266	129.6	-0.797	0.248	62.6	-23.7	150.6	154.8	-0.507	0.206	154.8	-0.507
654	99.5	157.6	-5.308	26.15	39.4	-1.337	0.264	127.6	-0.792	0.247	58.6	-23.7	150.3	154.3	-0.505	0.205	154.3	-0.505
655	99.6	156.7	-5.335	26.14	37.2	-1.329	0.263	125.6	-0.786	0.246	54.6	-23.7	150.0	153.9	-0.501	0.205	153.9	-0.501
656	99.7	155.9	-5.361	26.14	35.0	-1.319	0.261	123.6	-0.779	0.245	50.6	-23.6	149.7	153.5	-0.498	0.204	153.5	-0.498
657	99.8	155.1	-5.386	26.13	32.8	-1.306	0.260	121.7	-0.771	0.245	46.7	-23.4	149.4	153.1	-0.493	0.204	153.1	-0.493
658	99.9	154.4	-5.409	26.13	30.6	-1.291	0.258	119.7	-0.762	0.244	42.9	-23.3	149.1	152.7	-0.488	0.203	152.7	-0.488
659	100.0	153.7	-5.430	26.13	28.4	-1.275	0.257	117.8	-0.751	0.243	39.0	-23.1	148.8	152.3	-0.483	0.203	152.3	-0.483
660	100.1	153.1	-5.451	26.12	26.3	-1.256	0.256	115.9	-0.740	0.242	35.3	-22.9	148.6	151.9	-0.477	0.202	151.9	-0.477
661	100.2	152.4	-5.471	26.12	24.2	-1.235	0.254	114.0	-0.728	0.241	31.6	-22.6	148.4	151.6	-0.471	0.202	151.6	-0.471
662	100.3	151.8	-5.492	26.12	22.1	-1.212	0.253	112.2	-0.714	0.241	27.9	-22.3	148.1	151.3	-0.465	0.201	151.3	-0.465
663	100.3	151.1	-5.514	26.12	20.0	-1.187	0.252	110.4	-0.700	0.240	24.3	-22.0	147.9	151.0	-0.457	0.201	151.0	-0.457
664	100.4	150.4	-5.538	26.11	18.1	-1.160	0.250	108.6	-0.685	0.239	20.8	-21.7	147.8	150.7	-0.450	0.200	150.7	-0.450
665	100.5	149.6	-5.564	26.11	16.1	-1.131	0.249	106.9	-0.670	0.238	17.4	-21.3	147.6	150.4	-0.442	0.200	150.4	-0.442
666	100.6	148.7	-5.592	26.11	14.3	-1.101	0.248	105.2	-0.653	0.238	14.0	-21.0	147.4	150.2	-0.433	0.199	150.2	-0.433
667	100.7	147.9	-5.620	26.11	12.5	-1.069	0.247	103.5	-0.637	0.237	10.7	-20.5	147.3	149.9	-0.424	0.199	149.9	-0.424
668	100.8	147.1	-5.648	26.11	10.8	-1.035	0.246	101.9	-0.619	0.236	7.5	-20.1	147.2	149.7	-0.414	0.198	149.7	-0.414
669	100.9	146.3	-5.675	26.11	9.2	-0.999	0.245	100.4	-0.601	0.235	4.4	-19.6	147.1	149.5	-0.404	0.198	149.5	-0.404
670	101.0	145.5	-5.700	26.11	7.6	-0.962	0.243	98.9	-0.582	0.235	1.3	-19.1	147.0	149.4	-0.394	0.197	149.4	-0.394
671	101.1	144.8	-5.723	26.11	6.2	-0.923	0.242	97.4	-0.563	0.234	-1.6	-18.6	147.0	149.2	-0.382	0.197	149.2	-0.382
672	101.2	144.2	-5.745	26.10	4.9	-0.882	0.241	96.1	-0.543	0.234	-4.5	-18.0	147.0	149.1	-0.371	0.197	149.1	-0.371

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
673	101.2	143.6	-5.766	26.10	3.6	-0.840	0.241	94.7	-0.523	0.233	-7.2	-17.4	146.9	149.0	-0.359	0.196	149.0	-0.359
674	101.3	143.0	-5.787	26.10	2.5	-0.796	0.240	93.5	-0.502	0.232	-9.8	-16.8	146.9	148.9	-0.347	0.196	148.9	-0.347
675	101.4	142.4	-5.808	26.10	1.5	-0.750	0.239	92.3	-0.480	0.232	-12.4	-16.2	146.9	148.8	-0.334	0.196	148.8	-0.334
676	101.5	141.7	-5.830	26.10	0.6	-0.703	0.238	91.2	-0.458	0.231	-14.8	-15.5	147.0	148.8	-0.321	0.195	148.8	-0.321
677	101.6	141.1	-5.854	26.10	-0.1	-0.654	0.237	90.2	-0.436	0.231	-17.1	-14.8	147.0	148.8	-0.308	0.195	148.8	-0.308
678	101.7	140.4	-5.879	26.10	-0.7	-0.603	0.237	89.3	-0.412	0.230	-19.3	-14.1	147.1	148.7	-0.295	0.194	148.7	-0.295
679	101.8	139.6	-5.905	26.10	-1.0	-0.546	0.236	88.4	-0.388	0.230	-21.4	-13.4	147.2	148.7	-0.281	0.194	148.7	-0.281
680	101.9	138.9	-5.933	26.10	-1.1	-0.486	0.235	87.6	-0.364	0.230	-23.3	-12.6	147.2	148.7	-0.268	0.194	148.7	-0.268
681	102.0	138.1	-5.961	26.10	-1.1	-0.427	0.235	86.9	-0.339	0.229	-25.2	-11.8	147.3	148.8	-0.254	0.194	148.8	-0.254
682	102.1	137.3	-5.989	26.10	-1.0	-0.370	0.234	86.3	-0.313	0.229	-26.9	-11.0	147.5	148.8	-0.240	0.193	148.8	-0.240
683	102.2	136.6	-6.016	26.10	-1.0	-0.314	0.234	85.8	-0.286	0.229	-28.5	-10.2	147.6	148.9	-0.226	0.193	148.9	-0.226
684	102.2	135.9	-6.040	26.10	-1.0	-0.260	0.234	85.3	-0.259	0.228	-30.0	-9.4	147.7	149.0	-0.212	0.193	149.0	-0.212
685	102.3	135.3	-6.063	26.10	-0.9	-0.207	0.234	85.0	-0.231	0.228	-31.3	-8.5	147.9	149.1	-0.198	0.193	149.1	-0.198
686	102.4	134.7	-6.084	26.10	-0.9	-0.157	0.233	84.8	-0.202	0.228	-32.5	-7.5	148.1	149.2	-0.183	0.192	149.2	-0.183
687	102.5	134.1	-6.105	26.10	-0.9	-0.107	0.233	84.6	-0.173	0.228	-33.5	-6.6	148.2	149.4	-0.169	0.192	149.4	-0.169
688	102.6	133.6	-6.126	26.10	-0.8	-0.060	0.233	84.6	-0.143	0.227	-34.5	-5.6	148.5	149.5	-0.154	0.192	149.5	-0.154
689	102.7	133.0	-6.147	26.10	-0.8	-0.015	0.233	84.8	-0.111	0.227	-35.2	-4.6	148.7	149.7	-0.138	0.192	149.7	-0.138
690	102.8	132.4	-6.171	26.10	-0.8	0.029	0.233	85.1	-0.079	0.227	-35.9	-3.6	148.9	149.9	-0.123	0.192	149.9	-0.123
691	102.9	131.7	-6.195	26.10	-0.7	0.070	0.233	85.6	-0.044	0.227	-36.3	-2.6	149.2	150.1	-0.107	0.192	150.1	-0.107
692	103.0	131.0	-6.221	26.10	-0.7	0.110	0.233	86.3	-0.007	0.227	-36.7	-1.7	149.5	150.4	-0.091	0.191	150.4	-0.091
693	103.1	130.3	-6.249	26.10	-0.6	0.147	0.233	87.1	0.032	0.227	-36.8	-0.7	149.8	150.7	-0.074	0.191	150.7	-0.074
694	103.2	129.6	-6.277	26.10	-0.6	0.182	0.234	87.8	0.068	0.227	-36.8	0.2	150.1	151.0	-0.058	0.191	151.0	-0.058
695	103.2	128.8	-6.304	26.10	-0.6	0.215	0.234	88.5	0.102	0.227	-36.7	1.2	150.4	151.4	-0.040	0.191	151.4	-0.040
696	103.3	128.1	-6.332	26.10	-0.5	0.246	0.234	89.2	0.133	0.227	-36.4	2.1	150.8	151.7	-0.023	0.191	151.7	-0.023
697	103.4	127.5	-6.358	26.10	-0.5	0.275	0.234	89.9	0.163	0.228	-36.0	3.0	151.2	152.1	-0.005	0.191	152.1	-0.005
698	103.5	126.9	-6.382	26.10	-0.4	0.301	0.235	90.6	0.192	0.228	-35.4	3.9	151.6	152.6	0.014	0.191	152.6	0.014
699	103.6	126.3	-6.404	26.10	-0.4	0.326	0.235	91.3	0.218	0.228	-34.7	4.7	152.1	153.0	0.033	0.191	153.0	0.033
700	103.7	125.7	-6.426	26.10	-0.4	0.349	0.235	91.9	0.242	0.228	-33.8	5.6	152.6	153.5	0.052	0.191	153.5	0.052
701	103.8	125.2	-6.446	26.10	-0.3	0.369	0.236	92.6	0.265	0.228	-32.8	6.4	153.1	154.1	0.072	0.191	154.1	0.072
702	103.9	124.7	-6.467	26.10	-0.3	0.388	0.236	93.2	0.285	0.229	-31.7	7.2	153.6	154.7	0.093	0.191	154.7	0.093
703	104.0	124.1	-6.489	26.10	-0.3	0.405	0.237	93.8	0.304	0.229	-30.4	8.0	154.2	155.3	0.116	0.192	155.3	0.116
704	104.1	123.5	-6.513	26.10	-0.2	0.420	0.237	94.4	0.321	0.229	-29.0	8.8	154.9	156.1	0.140	0.192	156.1	0.140
705	104.1	122.9	-6.539	26.10	-0.2	0.433	0.237	95.0	0.336	0.230	-27.5	9.6	155.6	156.9	0.167	0.192	156.9	0.167
706	104.2	122.2	-6.566	26.10	-0.1	0.445	0.238	95.6	0.350	0.230	-25.8	10.4	156.4	157.7	0.194	0.192	157.7	0.194
707	104.3	121.5	-6.594	26.10	-0.1	0.454	0.238	96.1	0.361	0.231	-24.1	11.1	157.2	158.5	0.220	0.192	158.5	0.220
708	104.4	120.9	-6.623	26.10	-0.1	0.462	0.239	96.6	0.371	0.231	-22.2	11.8	157.9	159.2	0.243	0.193	159.2	0.243
709	104.5	120.2	-6.650	26.10	-0.0	0.468	0.239	97.1	0.379	0.231	-20.3	12.3	158.6	159.7	0.262	0.193	159.7	0.262
710	104.6	119.6	-6.677	26.10	-0.0	0.472	0.240	97.6	0.386	0.232	-18.3	12.7	159.2	160.3	0.277	0.193	160.3	0.277
711	104.7	119.0	-6.701	26.10	0.0	0.474	0.240	98.1	0.391	0.232	-16.2	13.1	159.7	160.9	0.290	0.193	160.9	0.290
712	104.8	118.4	-6.725	26.10	0.1	0.475	0.241	98.6	0.395	0.233	-14.1	13.3	160.2	161.4	0.301	0.194	161.4	0.301
713	104.9	117.9	-6.747	26.10	0.1	0.474	0.241	99.0	0.397	0.233	-12.0	13.5	160.7	161.9	0.310	0.194	161.9	0.310
714	105.0	117.4	-6.768	26.10	0.1	0.472	0.242	99.4	0.397	0.233	-9.8	13.6	161.1	162.3	0.316	0.194	162.3	0.316

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

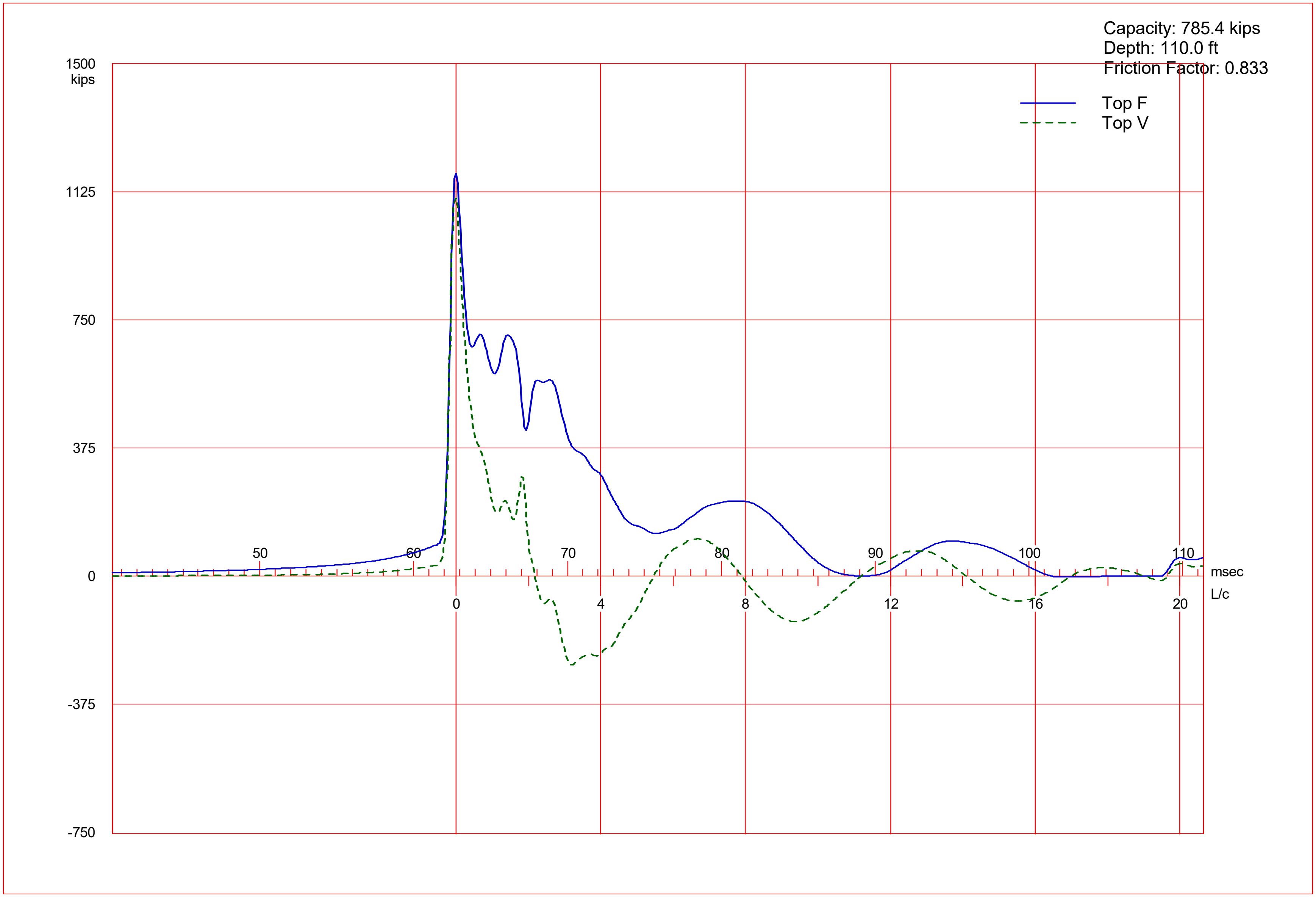
JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
715	105.1	116.9	-6.789	26.10	0.1	0.469	0.242	99.8	0.397	0.234	-7.6	13.7	161.5	162.7	0.320	0.195	162.7	0.320
716	105.1	116.4	-6.811	26.10	0.2	0.464	0.243	100.2	0.396	0.234	-5.4	13.6	161.8	163.1	0.322	0.195	163.1	0.322
717	105.2	115.8	-6.834	26.10	0.2	0.457	0.243	100.5	0.393	0.235	-3.2	13.5	162.1	163.4	0.322	0.195	163.4	0.322
718	105.3	115.3	-6.858	26.10	0.2	0.450	0.244	100.8	0.390	0.235	-1.1	13.4	162.4	163.7	0.320	0.196	163.7	0.320
719	105.4	114.7	-6.885	26.10	0.2	0.441	0.244	101.1	0.386	0.236	1.1	13.2	162.6	163.9	0.316	0.196	163.9	0.316
720	105.5	114.1	-6.913	26.10	0.3	0.431	0.245	101.3	0.380	0.236	3.2	13.0	162.8	164.1	0.311	0.197	164.1	0.311
721	105.6	113.4	-6.941	26.10	0.3	0.420	0.245	101.6	0.373	0.236	5.2	12.7	162.9	164.3	0.304	0.197	164.3	0.304
722	105.7	112.8	-6.970	26.10	0.3	0.408	0.246	101.9	0.363	0.237	7.2	12.3	163.0	164.4	0.296	0.197	164.4	0.296
723	105.8	112.2	-6.997	26.10	0.3	0.395	0.246	102.2	0.352	0.237	9.2	11.9	163.0	164.5	0.287	0.197	164.5	0.287
724	105.9	111.6	-7.023	26.10	0.3	0.381	0.247	102.5	0.339	0.238	11.1	11.5	163.0	164.6	0.277	0.198	164.6	0.277
725	106.0	111.1	-7.047	26.10	0.3	0.366	0.247	102.9	0.324	0.238	12.9	11.1	163.0	164.6	0.266	0.198	164.6	0.266
726	106.0	110.6	-7.069	26.10	0.4	0.351	0.248	103.3	0.309	0.238	14.6	10.6	163.0	164.6	0.254	0.198	164.6	0.254
727	106.1	110.1	-7.091	26.10	0.4	0.335	0.248	103.6	0.292	0.239	16.2	10.1	162.9	164.6	0.242	0.199	164.6	0.242
728	106.2	109.6	-7.112	26.10	0.4	0.319	0.248	104.0	0.275	0.239	17.8	9.5	162.8	164.5	0.228	0.199	164.5	0.228
729	106.3	109.2	-7.134	26.10	0.4	0.302	0.249	104.4	0.256	0.239	19.3	8.9	162.7	164.5	0.215	0.199	164.5	0.215
730	106.4	108.7	-7.156	26.10	0.4	0.286	0.249	104.7	0.237	0.239	20.6	8.3	162.5	164.4	0.201	0.199	164.4	0.201
731	106.5	108.1	-7.181	26.10	0.4	0.270	0.249	105.1	0.218	0.240	21.9	7.7	162.3	164.2	0.186	0.200	164.2	0.186
732	106.6	107.6	-7.206	26.10	0.4	0.253	0.249	105.5	0.198	0.240	23.0	7.1	162.1	164.1	0.172	0.200	164.1	0.172
733	106.7	107.0	-7.233	26.10	0.4	0.236	0.250	105.8	0.178	0.240	24.1	6.4	161.9	163.9	0.157	0.200	163.9	0.157
734	106.8	106.5	-7.261	26.10	0.4	0.216	0.250	106.1	0.158	0.240	25.0	5.8	161.7	163.7	0.142	0.200	163.7	0.142
735	106.9	105.9	-7.290	26.10	0.5	0.195	0.250	106.4	0.138	0.241	25.8	5.2	161.5	163.6	0.127	0.200	163.6	0.127
736	107.0	105.3	-7.318	26.10	0.5	0.172	0.250	106.7	0.118	0.241	26.6	4.5	161.2	163.3	0.112	0.200	163.3	0.112
737	107.0	104.7	-7.345	26.10	0.5	0.148	0.251	106.9	0.098	0.241	27.2	3.9	161.0	163.1	0.097	0.200	163.1	0.097
738	107.1	104.2	-7.371	26.10	0.5	0.122	0.251	107.2	0.078	0.241	27.7	3.2	160.7	162.9	0.082	0.201	162.9	0.082
739	107.2	103.7	-7.394	26.10	0.6	0.097	0.251	107.4	0.059	0.241	28.1	2.6	160.4	162.6	0.068	0.201	162.6	0.068
740	107.3	103.3	-7.416	26.10	0.6	0.071	0.251	107.5	0.040	0.241	28.5	2.0	160.1	162.4	0.054	0.201	162.4	0.054
741	107.4	102.8	-7.437	26.10	0.6	0.044	0.251	107.7	0.022	0.241	28.7	1.4	159.8	162.1	0.040	0.201	162.1	0.040
742	107.5	102.4	-7.458	26.10	0.6	0.018	0.251	107.8	0.005	0.241	28.8	0.8	159.5	161.8	0.026	0.201	161.8	0.026
743	107.6	102.0	-7.480	26.10	0.6	-0.009	0.251	108.0	-0.012	0.241	28.8	0.2	159.2	161.6	0.013	0.201	161.6	0.013
744	107.7	101.5	-7.504	26.10	0.6	-0.035	0.251	108.0	-0.027	0.241	28.8	-0.3	158.9	161.3	0.000	0.201	161.3	0.000
745	107.8	101.0	-7.529	26.10	0.5	-0.060	0.251	108.1	-0.043	0.241	28.6	-0.9	158.7	161.0	-0.012	0.201	161.0	-0.012
746	107.9	100.5	-7.556	26.10	0.5	-0.085	0.251	108.1	-0.058	0.241	28.4	-1.4	158.4	160.7	-0.023	0.201	160.7	-0.023
747	108.0	99.9	-7.584	26.10	0.5	-0.109	0.251	108.0	-0.073	0.241	28.1	-1.9	158.1	160.5	-0.035	0.201	160.5	-0.035
748	108.0	99.4	-7.612	26.10	0.5	-0.133	0.251	107.9	-0.088	0.241	27.7	-2.4	157.8	160.2	-0.045	0.201	160.2	-0.045
749	108.1	98.8	-7.640	26.10	0.5	-0.155	0.250	107.7	-0.103	0.241	27.2	-2.9	157.5	159.9	-0.055	0.201	159.9	-0.055
750	108.2	98.3	-7.668	26.10	0.5	-0.176	0.250	107.4	-0.118	0.241	26.7	-3.4	157.2	159.6	-0.064	0.201	159.6	-0.064
751	108.3	97.8	-7.694	26.10	0.4	-0.196	0.250	107.1	-0.131	0.240	26.0	-3.8	157.0	159.4	-0.073	0.201	159.4	-0.073
752	108.4	97.3	-7.718	26.10	0.4	-0.214	0.250	106.8	-0.145	0.240	25.4	-4.2	156.7	159.1	-0.081	0.200	159.1	-0.081
753	108.5	96.9	-7.742	26.10	0.4	-0.231	0.250	106.4	-0.158	0.240	24.6	-4.6	156.5	158.9	-0.089	0.200	158.9	-0.089
754	108.6	96.5	-7.763	26.10	0.4	-0.245	0.249	106.0	-0.170	0.240	23.9	-4.9	156.2	158.6	-0.095	0.200	158.6	-0.095
755	108.7	96.1	-7.784	26.10	1.7	-0.223	0.249	105.6	-0.182	0.240	23.0	-5.2	156.0	158.4	-0.101	0.200	158.4	-0.101
756	108.8	95.7	-7.806	26.10	4.8	-0.173	0.249	105.1	-0.192	0.240	22.1	-5.5	155.8	158.2	-0.106	0.200	158.2	-0.106

Capacity = 785.4, Computation Time Increment = 0.030 msec (Continued)

JP	Time msec	Pressure psi	Ram Disp. in	Energy kips-ft	Top F kips	Top V ft/s	Top Disp in	Mid F kips	Mid V ft/s	Mid Disp in	St Res kips	Dyn Res kips	Toe Res kips	Bot F kips	Bot V ft/s	Bot Disp in	Seg F kips	Seg V ft/s
757	108.9	95.2	-7.828	26.10	8.9	-0.109	0.249	104.7	-0.202	0.239	21.2	-5.8	155.6	158.0	-0.111	0.200	158.0	-0.111
758	108.9	94.8	-7.853	26.10	14.2	-0.019	0.249	104.2	-0.211	0.239	20.2	-6.0	155.4	157.8	-0.115	0.200	157.8	-0.115
759	109.0	94.3	-7.879	26.10	20.4	0.087	0.249	103.7	-0.218	0.239	19.2	-6.2	155.2	157.6	-0.119	0.200	157.6	-0.119
760	109.1	93.8	-7.907	26.10	26.9	0.202	0.249	103.3	-0.225	0.239	18.1	-6.3	155.0	157.3	-0.123	0.200	157.3	-0.123
761	109.2	93.3	-7.935	26.11	33.3	0.316	0.249	102.8	-0.231	0.238	17.1	-6.4	154.8	157.0	-0.128	0.199	157.0	-0.128
762	109.3	92.8	-7.964	26.11	39.2	0.421	0.250	102.3	-0.236	0.238	16.0	-6.4	154.6	156.8	-0.133	0.199	156.8	-0.133
763	109.4	92.3	-7.992	26.11	44.2	0.512	0.250	101.8	-0.239	0.238	14.9	-6.2	154.3	156.5	-0.138	0.199	156.5	-0.138
764	109.5	91.8	-8.019	26.11	48.2	0.585	0.251	101.4	-0.241	0.238	13.9	-5.7	154.1	156.2	-0.143	0.199	156.2	-0.143
765	109.6	91.4	-8.044	26.11	51.2	0.638	0.251	101.1	-0.241	0.237	12.9	-5.1	153.8	156.0	-0.148	0.199	156.0	-0.148
766	109.7	91.0	-8.067	26.12	53.0	0.672	0.252	101.2	-0.234	0.237	12.0	-4.3	153.6	155.7	-0.152	0.199	155.7	-0.152
767	109.8	90.6	-8.090	26.12	54.0	0.690	0.253	102.3	-0.212	0.237	11.2	-3.3	153.4	155.5	-0.156	0.198	155.5	-0.156
768	109.9	90.2	-8.111	26.12	54.1	0.693	0.254	104.7	-0.167	0.237	10.5	-2.2	153.2	155.2	-0.159	0.198	155.2	-0.159
769	109.9	89.8	-8.133	26.13	53.7	0.685	0.254	108.3	-0.097	0.236	10.0	-1.1	153.0	155.0	-0.162	0.198	155.0	-0.162
770	110.0	89.4	-8.155	26.13	52.9	0.669	0.255	112.6	-0.011	0.236	9.6	-0.1	152.8	154.8	-0.164	0.198	154.8	-0.164
771	110.1	89.0	-8.179	26.13	51.9	0.647	0.256	117.5	0.086	0.236	9.4	0.9	152.6	154.6	-0.166	0.198	154.6	-0.166
772	110.2	88.6	-8.204	26.14	50.8	0.623	0.256	122.9	0.191	0.237	9.3	1.7	152.5	154.4	-0.166	0.198	154.4	-0.166
773	110.3	88.1	-8.231	26.14	49.8	0.597	0.257	128.2	0.299	0.237	9.4	2.4	152.3	154.3	-0.166	0.197	154.3	-0.166
774	110.4	87.7	-8.259	26.14	49.0	0.573	0.258	132.9	0.397	0.237	9.8	3.0	152.2	154.1	-0.166	0.197	154.1	-0.166
775	110.5	87.2	-8.288	26.14	48.4	0.551	0.258	136.8	0.480	0.238	10.3	3.4	152.1	154.0	-0.164	0.197	154.0	-0.164
776	110.6	86.7	-8.317	26.15	48.1	0.534	0.259	140.0	0.546	0.238	11.1	3.7	152.0	153.9	-0.161	0.197	153.9	-0.161
777	110.7	86.3	-8.345	26.15	48.1	0.522	0.260	142.1	0.593	0.239	12.1	3.8	152.0	153.9	-0.157	0.197	153.9	-0.157
778	110.8	85.9	-8.371	26.15	48.4	0.515	0.260	143.4	0.622	0.240	13.3	4.0	152.1	154.1	-0.148	0.197	154.1	-0.148
779	110.8	85.5	-8.395	26.15	49.0	0.514	0.261	143.8	0.633	0.240	14.7	4.3	152.3	154.7	-0.132	0.196	154.7	-0.132
780	110.9	85.1	-8.418	26.16	49.7	0.519	0.261	143.6	0.630	0.241	16.3	4.9	153.0	155.9	-0.100	0.196	155.9	-0.100
781	111.0	84.8	-8.439	26.16	50.7	0.528	0.262	143.0	0.616	0.242	18.2	5.9	154.2	158.0	-0.044	0.196	158.0	-0.044
782	111.1	84.4	-8.461	26.16	51.8	0.541	0.262	142.0	0.594	0.242	20.4	7.7	156.2	160.7	0.039	0.196	160.7	0.039
783	111.2	84.1	-8.483	26.16	52.9	0.555	0.263	140.9	0.566	0.243	22.8	9.9	158.7	163.8	0.146	0.196	163.8	0.146
784	111.3	83.7	-8.506	26.17	54.0	0.569	0.264	139.7	0.536	0.244	25.5	12.5	161.7	167.1	0.266	0.197	167.1	0.266

Ethos Engineering
US 180 Little Colorado East Abytnebt

Aug 07 2023
GRLWEAP Version 2010



GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

```
 Input  File: \\VR-FILE\PROJECTS\2022095 - NFRA - US 180, 5 MILE
& LITTLE COLORADO\ENGINEERING\CALCULATIONS\GEOTECH\04_DRIVEN
PILES\GRLWEAP FILES\2022095 LITTLE COLORADO GRLWEAP EAST ABUT NO
SCOUR.GWW
 Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource
\HAMMER2010.GW
 Hammer File Version:  2003 (12/4/2018)

                        Input File Contents
     US 180 Little Colorado East Abytnebt
 OUT OSG HAM STR FUL PEL  N SPL N-U P-D %SK ISM  0 PHI RSA ITR H-
D MXT     DEx
-100   0  15   0   1   0  0   0   0   0   0   1  0   0   0   0
0   0   0.000
    Pile g  Hammer g  Toe Area Pile Size           Pile Type
    32.185    32.185   452.380    24.000                Pipe
      W Cp      A Cp      E Cp      T Cp       CoR      ROut
StCp
     1.020   121.000     350.0     1.500     0.800     0.010
0.0
      A Cu      E Cu      T Cu       CoR      ROut      StCu
     0.000       0.0     0.000     0.000     0.000       0.0
      LPle      APle      EPle      WPle      Peri        CI
CoR      ROut
   120.000     54.78   50000.0    89.000     6.283         0
0.850     0.010
  FFatigue        F0  0-Bottom
         0     0.000     0.000
 Manufac  Hmr Name  HmrType No Seg-s
 DELMAG   D 30-32         1        3
    Ram Wt     Ram L   Ram Dia   MaxStrk   RtdStrk    Efficy
      6.60    123.20     16.51     13.73     11.43      0.80
    IB. Wt     IB. L    IB.Dia    IB CoR     IB RO
      1.36     28.15     16.51     0.900     0.010
  CompStrk A Chamber V Chamber   C Delay  C Duratn Exp Coeff
VolCStart  Vol CEnd
     17.68    214.03    309.10    0.0005    0.0020     1.250
0.00      0.00
     P atm        P1        P2        P3        P4        P5
     14.70   1460.00   1315.00   1185.00   1065.00      0.00
    Stroke    Effic.  Pressure  R-Weight   T-Delay Exp-Coeff
Eps-Str  Total-AW
   11.4300    0.8000 1460.0000    0.0000    0.0000    0.0000
0.0100    0.0000
        Qs        Qt        Js        Jt        Qx        Jx
Rati      Dept
     0.100     0.398     0.086     0.150     0.000     0.000
0.000     0.000
  Research Soil Model: Atoe, Plug,  Gap, Q-fac
     0.000     0.000     0.000     0.000
  Research Soil Model: RD-skn: m, d, toe: m, d
```

```
     0.000     0.000     0.000     0.000
  Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-
plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt   SU F
LimL    TSf0
    0.00    0.00    236.21    0.10    0.40    0.05    0.15   1.20
6.56   1.000
   20.00    0.42    236.21    0.10    0.40    0.05    0.15   1.20
6.56   1.000
   20.00    0.52     21.26    0.10    0.40    0.20    0.15   2.00
6.56 168.000
   35.00    0.71     21.26    0.10    0.40    0.20    0.15   2.00
6.56 168.000
   35.00    0.63    157.47    0.10    0.40    0.05    0.15   1.20
6.56   1.000
   90.00    1.04    157.47    0.10    0.40    0.05    0.15   1.20
6.56   1.000
   90.00    1.00     28.35    0.10    0.40    0.20    0.15   2.00
6.56 168.000
  100.00    1.10     28.35    0.10    0.40    0.20    0.15   2.00
6.56 168.000
  100.00    1.14    314.94    0.10    0.40    0.05    0.15   1.20
6.56   1.000
  120.00    1.39    314.94    0.10    0.40    0.05    0.15   1.20
6.56   1.000
  Gain/Loss factors: shaft and toe
   0.83300   0.00000   0.00000   0.00000   0.00000
   1.00000   0.00000   0.00000   0.00000   0.00000
      Dpth          L      Wait       Strk       Pmx%       Eff.
Stff       CoR
      6.00       0.00      0.00      0.000        0.0      0.000
0.000     0.000
     12.00       0.00      0.00      0.000        0.0      0.000
0.000     0.000
     18.00       0.00      0.00      0.000        0.0      0.000
0.000     0.000
     24.00       0.00      0.00      0.000        0.0      0.000
0.000     0.000
     30.00       0.00      0.00      0.000        0.0      0.000
0.000     0.000
     32.63       0.00      0.00      0.000        0.0      0.000
0.000     0.000
     37.38       0.00      0.00      0.000        0.0      0.000
0.000     0.000
     40.00       0.00      0.00      0.000        0.0      0.000
0.000     0.000
     42.63       0.00      0.00      0.000        0.0      0.000
```

```
0.000     0.000
     45.00      0.00       0.00      0.000        0.0      0.000
0.000     0.000
     70.00      0.00       0.00      0.000        0.0      0.000
0.000     0.000
     80.00      0.00       0.00      0.000        0.0      0.000
0.000     0.000
    110.00      0.00       0.00      0.000        0.0      0.000
0.000     0.000
      0.00      0.00       0.00      0.000        0.0      0.000
0.000     0.000
```

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

US 180 Little Colorado East Abytnebt

Hammer Model: D 30-32 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	2.200				
2	2.200	151179.4	1.000	0.0000	
3	2.200	151179.4	1.000	0.0000	
Imp Block	1.360	89695.7	0.900	0.0100	
Helmet	1.020	28233.3	0.800	0.0098	10.9
Combined Pile Top		68474.9			

HAMMER OPTIONS:

Hammer File ID No. 15 Hammer Type OE Diesel
Stroke Option FxdP-VarS Stroke Convergence Crit. 0.010
Fuel Pump Setting Maximum

HAMMER DATA:

Ram Weight (kips) 6.60 Ram Length (inch) 123.20
Maximum Stroke (ft) 13.73
Rated Stroke (ft) 11.43 Efficiency 0.800

Maximum Pressure (psi) 1460.00 Actual Pressure (psi) 1460.00
Compression Exponent 1.350 Expansion Exponent 1.250
Ram Diameter (inch) 16.51
Combustion Delay (s) 0.00050 Ignition Duration (s) 0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION PILE CUSHION
Cross Sect. Area (in2) 121.00 Cross Sect. Area (in2) 0.00
Elastic-Modulus (ksi) 350.0 Elastic-Modulus

```
(ksi)        0.0
  Thickness            (inch)       1.50  Thickness
(inch)       0.00
  Coeff of Restitution             0.8  Coeff of Restitution
1.0
  RoundOut               (ft)        0.0  RoundOut
(ft)       0.0
  Stiffness        (kips/in)   28233.3  Stiffness
(kips/in)       0.0
```

```
 US 180 Little Colorado East Abytnebt
08/07/2023
 Ethos Engineering                                           GRLWEAP
Version 2010

  Depth                 (ft)       6.0  Standard Soil Setup
  Shaft Gain/Loss Factor        0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size           (inch)    24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft             ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
     120.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)     4.705

         Pile and Soil Model            Total Capacity Rut
(kips)     238.4
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00     0.4   0.050 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00     1.8   0.050 0.100
120.00   6.3    54.8
 Toe                                    236.2   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)

  PILE, SOIL, ANALYSIS OPTIONS:
  Uniform pile                          Pile Segments: Automatic
  No. of Slacks/Splices              0  Pile Damping
(%)         1
                                        Pile Damping
Fact.(k/ft/s)     1.074
  Driveability Analysis
```

```
  Soil Damping Option             Smith
  Max No Analysis Iterations          0  Time Increment/Critical
160
  Output Time Interval                3  Analysis Time-Input
(ms)        0
  Output Level: Normal
  Gravity Mass, Pile, Hammer:   32.170    32.185    32.185
  Output Segment Generation: Automatic
```

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
6.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
238.4	21.2	8.17	8.17	-0.02	36	42	17.33	2	2	33.8	41.2

```
 US 180 Little Colorado East Abytnebt
08/07/2023
 Ethos Engineering                                                  GRLWEAP
Version 2010

  Depth                 (ft)      12.0  Standard Soil Setup
  Shaft Gain/Loss Factor         0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size           (inch)    24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
     120.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)     4.705

         Pile and Soil Model            Total Capacity Rut
(kips)     245.1
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
        kips     k/in    ft    ft          kips    s/ft  inch
ft    ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  33  0.113    68475 0.000 0.000 1.00     0.2   0.050 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00     1.5   0.050 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00     2.9   0.050 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00     4.3   0.050 0.100
120.00   6.3    54.8
 Toe                                      236.2   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
```

12.00	11.43	1.00	0.800

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
245.1	21.9	8.22	8.22	0.00	1	0	17.47	2	2	33.7	41.1

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```
  Depth                  (ft)      18.0  Standard Soil Setup
  Shaft Gain/Loss Factor        0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size           (inch)    24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
     120.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)     4.705

         Pile and Soil Model            Total Capacity Rut
(kips)     256.3
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft          kips    s/ft  inch
ft     ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  31  0.113    68475 0.000 0.000 1.00     0.1   0.050 0.100
103.33   6.3    54.8
  32  0.113    68475 0.000 0.000 1.00     1.2   0.050 0.100
106.67   6.3    54.8
  33  0.113    68475 0.000 0.000 1.00     2.6   0.050 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00     4.0   0.050 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00     5.4   0.050 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00     6.7   0.050 0.100
120.00   6.3    54.8
 Toe                                    236.2   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)
```

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
18.00	11.43	1.00	0.800

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
256.3	23.1	8.31	8.29	0.00	1	0	17.70	10	2	33.6	40.9

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Depth (ft) 24.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
120.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 4.705

Pile and Soil Model Total Capacity Rut (kips) 57.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
29	0.113	68475	0.000	0.000	1.00	0.0	0.050	0.100	96.67	6.3	54.8
30	0.113	68475	0.000	0.000	1.00	1.0	0.050	0.100	100.00	6.3	54.8
31	0.113	68475	0.000	0.000	1.00	2.3	0.050	0.100	103.33	6.3	54.8
32	0.113	68475	0.000	0.000	1.00	3.7	0.050	0.100	106.67	6.3	54.8
33	0.113	68475	0.000	0.000	1.00	5.1	0.050	0.100	110.00	6.3	54.8
34	0.113	68475	0.000	0.000	1.00	6.5	0.050	0.100	113.33	6.3	54.8
35	0.113	68475	0.000	0.000	1.00	8.0	0.088	0.100	116.67	6.3	54.8
36	0.113	68476	0.000	0.000	1.00	9.6	0.200	0.100	120.00	6.3	54.8

```
Toe                                  21.3   0.150 0.398

     4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
     4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


    Depth     Stroke  Pressure    Efficy
       ft         ft     Ratio
    24.00      11.43      1.00     0.800
```

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
57.4	2.7	4.51	4.53	-0.75	11	6	9.16	1	2	42.6	55.6

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Depth	(ft)	30.0	Standard Soil Setup	
Shaft Gain/Loss Factor		0.833	Toe Gain/Loss Factor	1.000

PILE PROFILE:

Toe Area	(in2)	452.380	Pile Type	Pipe
Pile Size	(inch)	24.000		

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
120.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 4.705

Pile and Soil Model Total Capacity Rut (kips) 76.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
28	0.113	68475	0.000	0.000	1.00	0.7	0.050	0.100	93.33	6.3	54.8
29	0.113	68475	0.000	0.000	1.00	2.1	0.050	0.100	96.67	6.3	54.8
30	0.113	68475	0.000	0.000	1.00	3.4	0.050	0.100	100.00	6.3	54.8
31	0.113	68475	0.000	0.000	1.00	4.8	0.050	0.100	103.33	6.3	54.8
32	0.113	68475	0.000	0.000	1.00	6.2	0.050	0.100	106.67	6.3	54.8
33	0.113	68475	0.000	0.000	1.00	7.6	0.050	0.100	110.00	6.3	54.8
34	0.113	68475	0.000	0.000	1.00	9.4	0.200	0.100	113.33	6.3	54.8
35	0.113	68475	0.000	0.000	1.00	10.1	0.200	0.100	116.67	6.3	54.8

```
  36  0.113    68476 0.000 0.000 1.00    10.9   0.200 0.100
120.00   6.3    54.8
 Toe                                    21.3   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)
```

Depth ft	Stroke ft	Pressure Ratio	Efficy
30.00	11.43	1.00	0.800

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
76.4	4.1	5.19	5.16	-1.57	11	6	11.75	1	2	40.0	51.9

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Depth (ft) 32.6 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
120.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 4.705

Pile and Soil Model Total Capacity Rut (kips) 85.5

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	0.4	0.050	0.100	90.00	6.3	54.8
28	0.113	68475	0.000	0.000	1.00	1.8	0.050	0.100	93.33	6.3	54.8
29	0.113	68475	0.000	0.000	1.00	3.1	0.050	0.100	96.67	6.3	54.8
30	0.113	68475	0.000	0.000	1.00	4.5	0.050	0.100	100.00	6.3	54.8
31	0.113	68475	0.000	0.000	1.00	5.9	0.050	0.100	103.33	6.3	54.8
32	0.113	68475	0.000	0.000	1.00	7.3	0.050	0.100	106.67	6.3	54.8
33	0.113	68475	0.000	0.000	1.00	9.1	0.175	0.100	110.00	6.3	54.8
34	0.113	68475	0.000	0.000	1.00	10.0	0.200	0.100	113.33	6.3	54.8

```
  35  0.113    68475 0.000 0.000 1.00    10.7   0.200 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00    11.5   0.200 0.100
120.00   6.3    54.8
 Toe                                     21.3   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     32.63     11.43      1.00     0.800
```

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
85.5	4.8	5.46	5.44	-1.61	11	6	12.56	5	2	39.0	50.5

```
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  Depth                  (ft)       37.4  Standard Soil Setup
  Shaft Gain/Loss Factor         0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)   452.380  Pile Type
Pipe
  Pile Size           (inch)    24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
     120.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)     4.705

         Pile and Soil Model            Total Capacity Rut
(kips)     239.3
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  25  0.113    68475 0.000 0.000 1.00     0.0   0.050 0.100
83.33   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00     1.0   0.050 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00     2.4   0.050 0.100
90.00   6.3    54.8
  28  0.113    68475 0.000 0.000 1.00     3.7   0.050 0.100
93.33   6.3    54.8
  29  0.113    68475 0.000 0.000 1.00     5.1   0.050 0.100
96.67   6.3    54.8
  30  0.113    68475 0.000 0.000 1.00     6.5   0.050 0.100
100.00   6.3    54.8
  31  0.113    68475 0.000 0.000 1.00     8.0   0.090 0.100
103.33   6.3    54.8
  32  0.113    68475 0.000 0.000 1.00     9.6   0.200 0.100
106.67   6.3    54.8
```

```
  33  0.113    68475 0.000 0.000 1.00    10.3   0.200 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00    11.0   0.200 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00    11.8   0.200 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00    12.5   0.096 0.100
120.00   6.3    54.8
 Toe                                    157.5   0.150 0.398

     4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
     4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


    Depth    Stroke  Pressure    Efficy
       ft        ft     Ratio
    37.38     11.43      1.00     0.800
```

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
239.3	20.3	8.02	8.07	0.00	1	0	17.74	27	3	32.8	41.5

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Depth (ft) 40.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
120.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 4.705

Pile and Soil Model Total Capacity Rut (kips) 249.5

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	0.7	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	2.1	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	3.4	0.050	0.100	90.00	6.3	54.8
28	0.113	68475	0.000	0.000	1.00	4.8	0.050	0.100	93.33	6.3	54.8
29	0.113	68475	0.000	0.000	1.00	6.2	0.050	0.100	96.67	6.3	54.8
30	0.113	68475	0.000	0.000	1.00	7.6	0.050	0.100	100.00	6.3	54.8
31	0.113	68475	0.000	0.000	1.00	9.4	0.200	0.100	103.33	6.3	54.8
32	0.113	68475	0.000	0.000	1.00	10.1	0.200	0.100	106.67	6.3	54.8

```
  33  0.113    68475 0.000 0.000 1.00    10.9   0.200 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00    11.6   0.200 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00    12.3   0.129 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00    12.9   0.050 0.100
120.00   6.3    54.8
 Toe                                     157.5   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     40.00     11.43      1.00     0.800
```

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
249.5	21.3	8.13	8.17	0.00	1	0	18.01	27	3	32.7	41.3

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Depth (ft) 42.6 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type
Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
120.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 4.705

Pile and Soil Model Total Capacity Rut
(kips) 260.0

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	0.4	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	1.8	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	3.1	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	4.5	0.050	0.100	90.00	6.3	54.8
28	0.113	68475	0.000	0.000	1.00	5.9	0.050	0.100	93.33	6.3	54.8
29	0.113	68475	0.000	0.000	1.00	7.3	0.050	0.100	96.67	6.3	54.8
30	0.113	68475	0.000	0.000	1.00	9.1	0.175	0.100	100.00	6.3	54.8
31	0.113	68475	0.000	0.000	1.00	10.0	0.200	0.100	103.33	6.3	54.8

```
  32  0.113    68475 0.000 0.000 1.00    10.7   0.200 0.100
106.67   6.3    54.8
  33  0.113    68475 0.000 0.000 1.00    11.5   0.200 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00    12.2   0.160 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00    12.8   0.050 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00    13.3   0.050 0.100
120.00   6.3    54.8
 Toe                                     157.5   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     42.63     11.43      1.00     0.800
```

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
260.0	22.1	8.24	8.25	0.00	1	0	18.28	28	3	32.5	41.0

US 180 Little Colorado East Abytnebt
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

Depth (ft) 45.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
120.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 4.705

Pile and Soil Model Total Capacity Rut (kips) 269.7

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	0.2	0.050	0.100	76.67	6.3	54.8
24	0.113	68475	0.000	0.000	1.00	1.4	0.050	0.100	80.00	6.3	54.8
25	0.113	68475	0.000	0.000	1.00	2.7	0.050	0.100	83.33	6.3	54.8
26	0.113	68475	0.000	0.000	1.00	4.1	0.050	0.100	86.67	6.3	54.8
27	0.113	68475	0.000	0.000	1.00	5.5	0.050	0.100	90.00	6.3	54.8
28	0.113	68475	0.000	0.000	1.00	6.9	0.050	0.100	93.33	6.3	54.8
29	0.113	68475	0.000	0.000	1.00	8.6	0.135	0.100	96.67	6.3	54.8
30	0.113	68475	0.000	0.000	1.00	9.8	0.200	0.100	100.00	6.3	54.8

```
  31  0.113    68475 0.000 0.000 1.00    10.5   0.200 0.100
103.33   6.3    54.8
  32  0.113    68475 0.000 0.000 1.00    11.2   0.200 0.100
106.67   6.3    54.8
  33  0.113    68475 0.000 0.000 1.00    12.0   0.200 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00    12.6   0.050 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00    13.1   0.050 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00    13.6   0.050 0.100
120.00   6.3    54.8
 Toe                                   157.5   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth     Stroke  Pressure    Efficy
        ft         ft     Ratio
     45.00      11.43      1.00     0.800
```

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```
     Rut   Bl Ct   Stroke (ft) Ten Str   i   t Comp Str   i   t
ENTHRU   Bl Rt
    kips    b/ft   down     up     ksi             ksi
kip-ft   b/min
   269.7    22.8   8.33   8.33    0.00   1   0    18.51  28   3
32.3    40.9
```

US 180 Little Colorado East Abytnebt
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Ethos Engineering GRLWEAP
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Depth (ft) 70.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type
Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
120.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 4.705

Pile and Soil Model Total Capacity Rut
(kips) 387.6

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
16	0.113	68475	0.000	0.000	1.00	0.7	0.050	0.100	53.33	6.3	54.8
17	0.113	68475	0.000	0.000	1.00	2.1	0.050	0.100	56.67	6.3	54.8
18	0.113	68475	0.000	0.000	1.00	3.4	0.050	0.100	60.00	6.3	54.8
19	0.113	68475	0.000	0.000	1.00	4.8	0.050	0.100	63.33	6.3	54.8
20	0.113	68475	0.000	0.000	1.00	6.2	0.050	0.100	66.67	6.3	54.8
21	0.113	68475	0.000	0.000	1.00	7.6	0.050	0.100	70.00	6.3	54.8
22	0.113	68475	0.000	0.000	1.00	9.4	0.200	0.100	73.33	6.3	54.8
23	0.113	68475	0.000	0.000	1.00	10.1	0.200	0.100	76.67	6.3	54.8

```
  24  0.113    68475 0.000 0.000 1.00    10.9   0.200 0.100
80.00   6.3    54.8
  25  0.113    68475 0.000 0.000 1.00    11.6   0.200 0.100
83.33   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00    12.3   0.129 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00    12.9   0.050 0.100
90.00   6.3    54.8
  28  0.113    68475 0.000 0.000 1.00    13.4   0.050 0.100
93.33   6.3    54.8
  29  0.113    68475 0.000 0.000 1.00    13.9   0.050 0.100
96.67   6.3    54.8
  30  0.113    68475 0.000 0.000 1.00    14.4   0.050 0.100
100.00   6.3    54.8
  31  0.113    68475 0.000 0.000 1.00    14.9   0.050 0.100
103.33   6.3    54.8
  32  0.113    68475 0.000 0.000 1.00    15.4   0.050 0.100
106.67   6.3    54.8
  33  0.113    68475 0.000 0.000 1.00    15.8   0.050 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00    16.3   0.050 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00    16.8   0.050 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00    17.3   0.050 0.100
120.00   6.3    54.8
 Toe                                   157.5   0.150 0.398

     4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
     4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


    Depth    Stroke  Pressure    Efficy
       ft        ft     Ratio
    70.00     11.43      1.00     0.800
```

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
387.6	33.8	9.02	9.10	0.00	1	0	20.04	22	3	31.5	39.3

```
 US 180 Little Colorado East Abytnebt
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 Ethos Engineering                                              GRLWEAP
Version 2010

  Depth                 (ft)       80.0  Standard Soil Setup
  Shaft Gain/Loss Factor          0.833  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area             (in2)    452.380  Pile Type
Pipe
  Pile Size           (inch)     24.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0    54.78   50000.     89.0      6.3        0    51015.
53.7
     120.0    54.78   50000.     89.0      6.3        0    51015.
53.7

  Wave Travel Time 2L/c (ms)      4.705

         Pile and Soil Model            Total Capacity Rut
(kips)     442.6
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft     ft     in2
   1  0.113    68475 0.010 0.000 0.85     0.0   0.000 0.100
3.33   6.3    54.8
   2  0.113    68475 0.000 0.000 1.00     0.0   0.000 0.100
6.67   6.3    54.8
  13  0.113    68475 0.000 0.000 1.00     0.7   0.050 0.100
43.33   6.3    54.8
  14  0.113    68475 0.000 0.000 1.00     2.1   0.050 0.100
46.67   6.3    54.8
  15  0.113    68475 0.000 0.000 1.00     3.4   0.050 0.100
50.00   6.3    54.8
  16  0.113    68475 0.000 0.000 1.00     4.8   0.050 0.100
53.33   6.3    54.8
  17  0.113    68475 0.000 0.000 1.00     6.2   0.050 0.100
56.67   6.3    54.8
  18  0.113    68475 0.000 0.000 1.00     7.6   0.050 0.100
60.00   6.3    54.8
  19  0.113    68475 0.000 0.000 1.00     9.4   0.200 0.100
63.33   6.3    54.8
  20  0.113    68475 0.000 0.000 1.00    10.1   0.200 0.100
66.67   6.3    54.8
```

```
  21  0.113    68475 0.000 0.000 1.00    10.9   0.200 0.100
70.00   6.3    54.8
  22  0.113    68475 0.000 0.000 1.00    11.6   0.200 0.100
73.33   6.3    54.8
  23  0.113    68475 0.000 0.000 1.00    12.3   0.129 0.100
76.67   6.3    54.8
  24  0.113    68475 0.000 0.000 1.00    12.9   0.050 0.100
80.00   6.3    54.8
  25  0.113    68475 0.000 0.000 1.00    13.4   0.050 0.100
83.33   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00    13.9   0.050 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00    14.4   0.050 0.100
90.00   6.3    54.8
  28  0.113    68475 0.000 0.000 1.00    14.9   0.050 0.100
93.33   6.3    54.8
  29  0.113    68475 0.000 0.000 1.00    15.4   0.050 0.100
96.67   6.3    54.8
  30  0.113    68475 0.000 0.000 1.00    15.8   0.050 0.100
100.00   6.3    54.8
  31  0.113    68475 0.000 0.000 1.00    16.3   0.050 0.100
103.33   6.3    54.8
  32  0.113    68475 0.000 0.000 1.00    16.8   0.050 0.100
106.67   6.3    54.8
  33  0.113    68475 0.000 0.000 1.00    17.3   0.050 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00    17.8   0.050 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00    18.3   0.050 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00    18.8   0.050 0.100
120.00   6.3    54.8
 Toe                                    157.5   0.150 0.398

      4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.065 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth     Stroke  Pressure    Efficy
        ft         ft     Ratio
     80.00     11.43      1.00     0.800
```

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
442.6	38.7	9.27	9.33	0.00	1	0	20.47	19	3	31.8	38.8

US 180 Little Colorado East Abytnebt
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

Depth (ft) 110.0 Standard Soil Setup
Shaft Gain/Loss Factor 0.833 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 452.380 Pile Type Pipe
Pile Size (inch) 24.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	54.78	50000.	89.0	6.3	0	51015.	53.7
120.0	54.78	50000.	89.0	6.3	0	51015.	53.7

Wave Travel Time 2L/c (ms) 4.705

Pile and Soil Model Total Capacity Rut (kips) 785.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.113	68475	0.010	0.000	0.85	0.0	0.000	0.100	3.33	6.3	54.8
2	0.113	68475	0.000	0.000	1.00	0.0	0.000	0.100	6.67	6.3	54.8
4	0.113	68475	0.000	0.000	1.00	0.7	0.050	0.100	13.33	6.3	54.8
5	0.113	68475	0.000	0.000	1.00	2.1	0.050	0.100	16.67	6.3	54.8
6	0.113	68475	0.000	0.000	1.00	3.4	0.050	0.100	20.00	6.3	54.8
7	0.113	68475	0.000	0.000	1.00	4.8	0.050	0.100	23.33	6.3	54.8
8	0.113	68475	0.000	0.000	1.00	6.2	0.050	0.100	26.67	6.3	54.8
9	0.113	68475	0.000	0.000	1.00	7.6	0.050	0.100	30.00	6.3	54.8
10	0.113	68475	0.000	0.000	1.00	9.4	0.200	0.100	33.33	6.3	54.8
11	0.113	68475	0.000	0.000	1.00	10.1	0.200	0.100	36.67	6.3	54.8

```
  12  0.113    68475 0.000 0.000 1.00    10.9   0.200 0.100
40.00   6.3    54.8
  13  0.113    68475 0.000 0.000 1.00    11.6   0.200 0.100
43.33   6.3    54.8
  14  0.113    68475 0.000 0.000 1.00    12.3   0.129 0.100
46.67   6.3    54.8
  15  0.113    68475 0.000 0.000 1.00    12.9   0.050 0.100
50.00   6.3    54.8
  16  0.113    68475 0.000 0.000 1.00    13.4   0.050 0.100
53.33   6.3    54.8
  17  0.113    68475 0.000 0.000 1.00    13.9   0.050 0.100
56.67   6.3    54.8
  18  0.113    68475 0.000 0.000 1.00    14.4   0.050 0.100
60.00   6.3    54.8
  19  0.113    68475 0.000 0.000 1.00    14.9   0.050 0.100
63.33   6.3    54.8
  20  0.113    68475 0.000 0.000 1.00    15.4   0.050 0.100
66.67   6.3    54.8
  21  0.113    68475 0.000 0.000 1.00    15.8   0.050 0.100
70.00   6.3    54.8
  22  0.113    68475 0.000 0.000 1.00    16.3   0.050 0.100
73.33   6.3    54.8
  23  0.113    68475 0.000 0.000 1.00    16.8   0.050 0.100
76.67   6.3    54.8
  24  0.113    68475 0.000 0.000 1.00    17.3   0.050 0.100
80.00   6.3    54.8
  25  0.113    68475 0.000 0.000 1.00    17.8   0.050 0.100
83.33   6.3    54.8
  26  0.113    68475 0.000 0.000 1.00    18.3   0.050 0.100
86.67   6.3    54.8
  27  0.113    68475 0.000 0.000 1.00    18.8   0.050 0.100
90.00   6.3    54.8
  28  0.113    68475 0.000 0.000 1.00    19.3   0.050 0.100
93.33   6.3    54.8
  29  0.113    68475 0.000 0.000 1.00    19.8   0.050 0.100
96.67   6.3    54.8
  30  0.113    68475 0.000 0.000 1.00    20.3   0.050 0.100
100.00   6.3    54.8
  31  0.113    68475 0.000 0.000 1.00    17.7   0.200 0.100
103.33   6.3    54.8
  32  0.113    68475 0.000 0.000 1.00    18.2   0.200 0.100
106.67   6.3    54.8
  33  0.113    68475 0.000 0.000 1.00    18.8   0.200 0.100
110.00   6.3    54.8
  34  0.113    68475 0.000 0.000 1.00    22.9   0.050 0.100
113.33   6.3    54.8
  35  0.113    68475 0.000 0.000 1.00    23.7   0.050 0.100
116.67   6.3    54.8
  36  0.113    68476 0.000 0.000 1.00    24.6   0.050 0.100
120.00   6.3    54.8
 Toe                                   314.9   0.150 0.398
```

4.063 kips total unreduced pile weight (g= 32.17 ft/s2)
4.065 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
110.00	11.43	1.00	0.800

US 180 Little Colorado East Abytnebt
08/07/2023
Ethos Engineering GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
785.4	171.8	10.30	10.20	-0.14	5	41	22.11	10	2	32.9	37.0

US 180 Little Colorado East Abytnebt
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Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 0.833 1.000

Depth ft	Rut kips	Frictn kips	End Bg kips	Bl Ct bl/ft	Com Str ksi	Ten Str ksi	Stroke ft	ENTHRU kip-ft
6.0	238.4	2.2	236.2	21.2	17.332	-0.022	8.17	33.8
12.0	245.1	8.9	236.2	21.9	17.470	0.000	8.22	33.7
18.0	256.3	20.0	236.2	23.1	17.695	0.000	8.31	33.6
24.0	57.4	36.1	21.3	2.7	9.162	-0.754	4.51	42.6
30.0	76.4	55.2	21.3	4.1	11.754	-1.568	5.19	40.0
32.6	85.5	64.3	21.3	4.8	12.565	-1.610	5.46	39.0
37.4	239.3	81.8	157.5	20.3	17.740	0.000	8.02	32.8
40.0	249.5	92.0	157.5	21.3	18.012	0.000	8.13	32.7
42.6	260.0	102.5	157.5	22.1	18.282	0.000	8.24	32.5
45.0	269.7	112.2	157.5	22.8	18.511	0.000	8.33	32.3
70.0	387.6	230.2	157.5	33.8	20.042	0.000	9.02	31.5
80.0	442.6	285.1	157.5	38.7	20.466	0.000	9.27	31.8
110.0	785.4	470.4	314.9	171.8	22.112	-0.142	10.30	32.9

Total Driving Time 126 minutes; Total No. of Blows 4825
Starting at penetration 6.0 ft

Table of Depths Analyzed with Driving System Modifiers

Depth	Temp. Length	Wait Time	Equivalent Stroke	Pressure Ratio	Efficy.	Stiffn. Factor	Cushion CoR
ft	ft	hr	ft				
6.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
12.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
18.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
24.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
30.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
32.63	120.00	0.00	11.43	1.00	0.80	1.00	1.00
37.38	120.00	0.00	11.43	1.00	0.80	1.00	1.00
40.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
42.63	120.00	0.00	11.43	1.00	0.80	1.00	1.00
45.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
70.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
80.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00
110.00	120.00	0.00	11.43	1.00	0.80	1.00	1.00

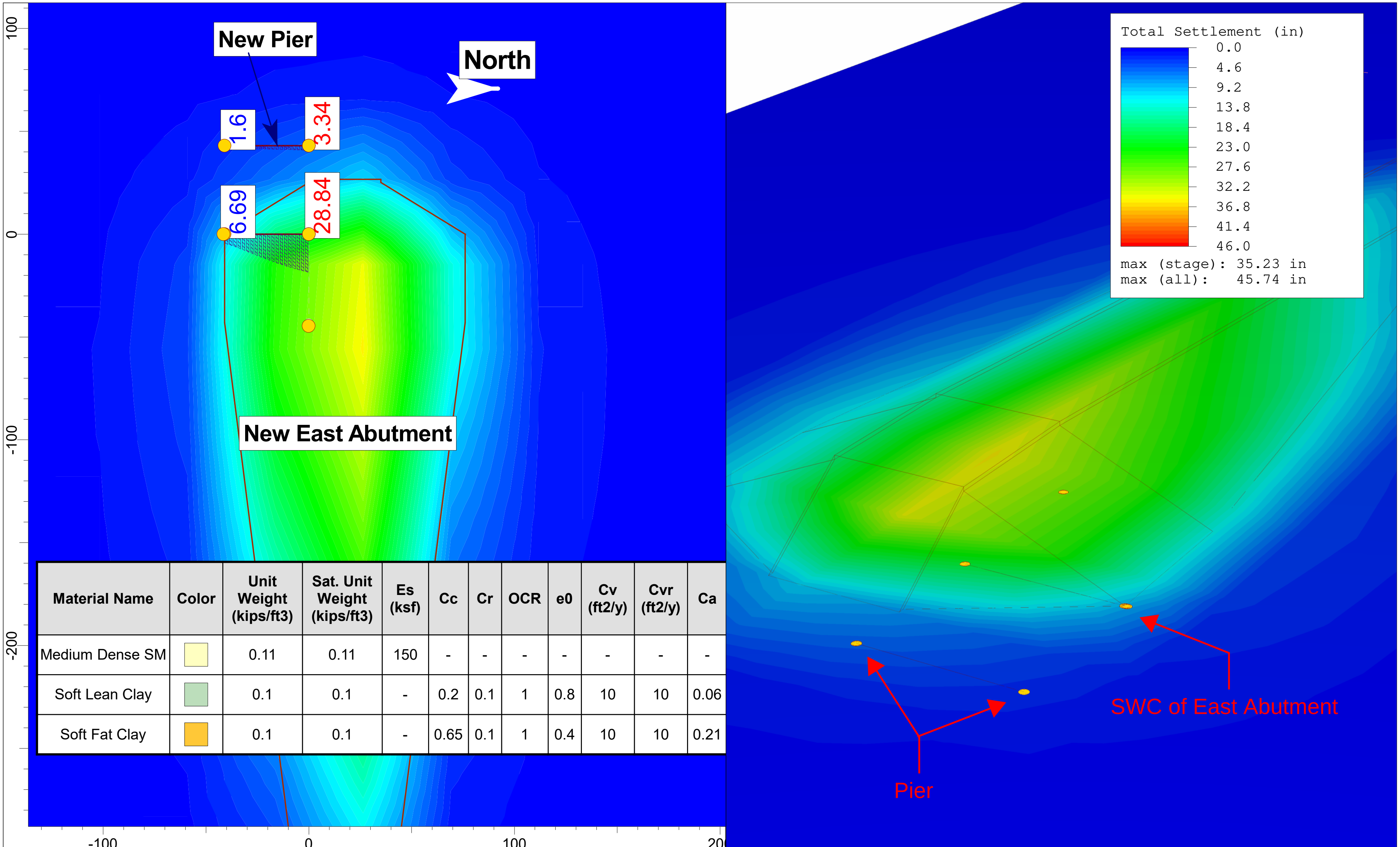
Soil Layer Resistance Values

Depth	Shaft Res.	End Bearing	Shaft Quake	Toe Quake	Shaft Damping	Toe Damping	Soil Setup	Limit Distance	Setup Time
ft	k/ft2	kips	inch	inch	s/ft	s/ft	Normlzd	ft	hrs
0.00	0.00	236.21	0.100	0.398	0.050	0.150	0.333	6.560	1.000

```
   20.00    0.42  236.21   0.100   0.398   0.050   0.150   0.333
6.560   1.000
   20.00    0.52   21.26   0.100   0.398   0.200   0.150   1.000
6.560 168.000
   35.00    0.71   21.26   0.100   0.398   0.200   0.150   1.000
6.560 168.000
   35.00    0.63  157.47   0.100   0.398   0.050   0.150   0.333
6.560   1.000
   90.00    1.04  157.47   0.100   0.398   0.050   0.150   0.333
6.560   1.000
   90.00    1.00   28.35   0.100   0.398   0.200   0.150   1.000
6.560 168.000
  100.00    1.10   28.35   0.100   0.398   0.200   0.150   1.000
6.560 168.000
  100.00    1.14  314.94   0.100   0.398   0.050   0.150   0.333
6.560   1.000
  120.00    1.39  314.94   0.100   0.398   0.050   0.150   0.333
6.560   1.000
```

APPENDIX I

SETTLEMENT ANALYSIS

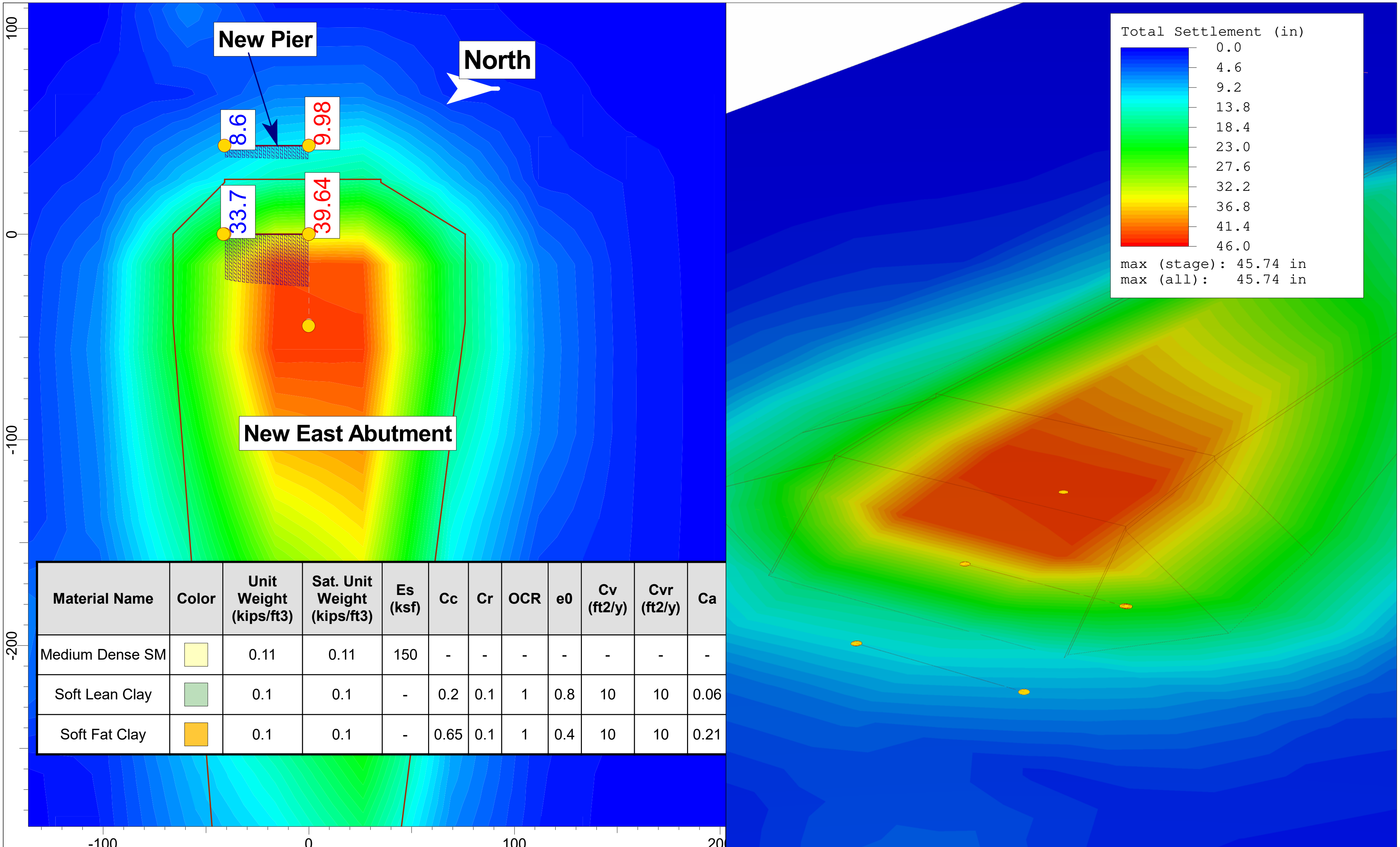


Material Name	Color	Unit Weight (kips/ft3)	Sat. Unit Weight (kips/ft3)	Es (ksf)	Cc	Cr	OCR	e0	Cv (ft2/y)	Cvr (ft2/y)	Ca
Medium Dense SM		0.11	0.11	150	-	-	-	-	-	-	-
Soft Lean Clay		0.1	0.1	-	0.2	0.1	1	0.8	10	10	0.06
Soft Fat Clay		0.1	0.1	-	0.65	0.1	1	0.4	10	10	0.21

ethos ENGINEERING, LLC.

TTLE3 5.024

Project	Replacement of Five Mile Wash & Little Colorado River Bridges		
Analysis Description	LCB East Abutment Settlement due to Embankment - Stage 2		
Drawn By	Katie Mackay	*Company*	Ethos
Date	8/2/2023, 8:27:27 PM	*File Name*	East Abutment settlement - Updated 11-30-23.s3z



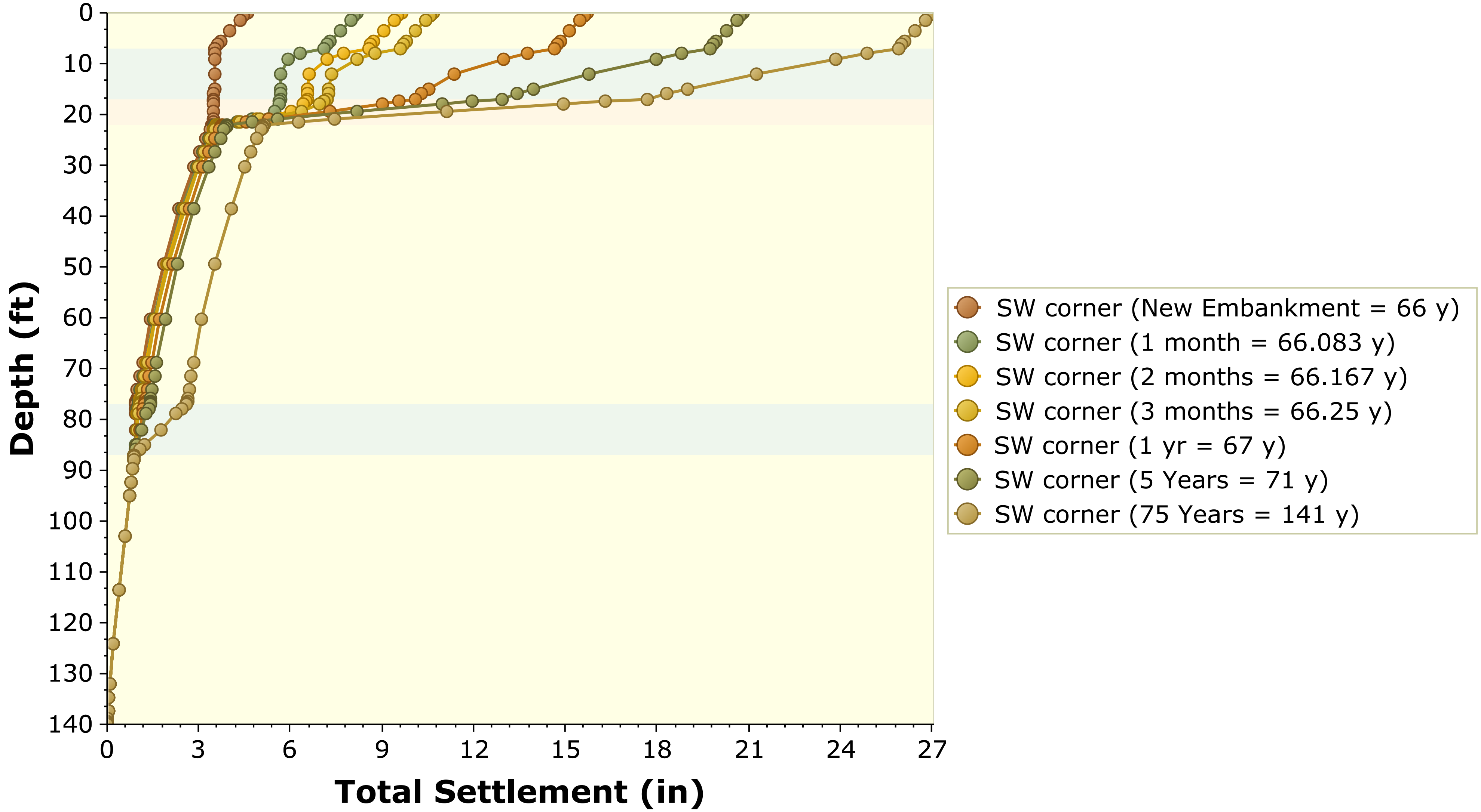
Material Name	Color	Unit Weight (kips/ft3)	Sat. Unit Weight (kips/ft3)	Es (ksf)	Cc	Cr	OCR	e0	Cv (ft2/y)	Cvr (ft2/y)	Ca
Medium Dense SM		0.11	0.11	150	-	-	-	-	-	-	-
Soft Lean Clay		0.1	0.1	-	0.2	0.1	1	0.8	10	10	0.06
Soft Fat Clay		0.1	0.1	-	0.65	0.1	1	0.4	10	10	0.21

ethos ENGINEERING, LLC.

TTLE3 5.024

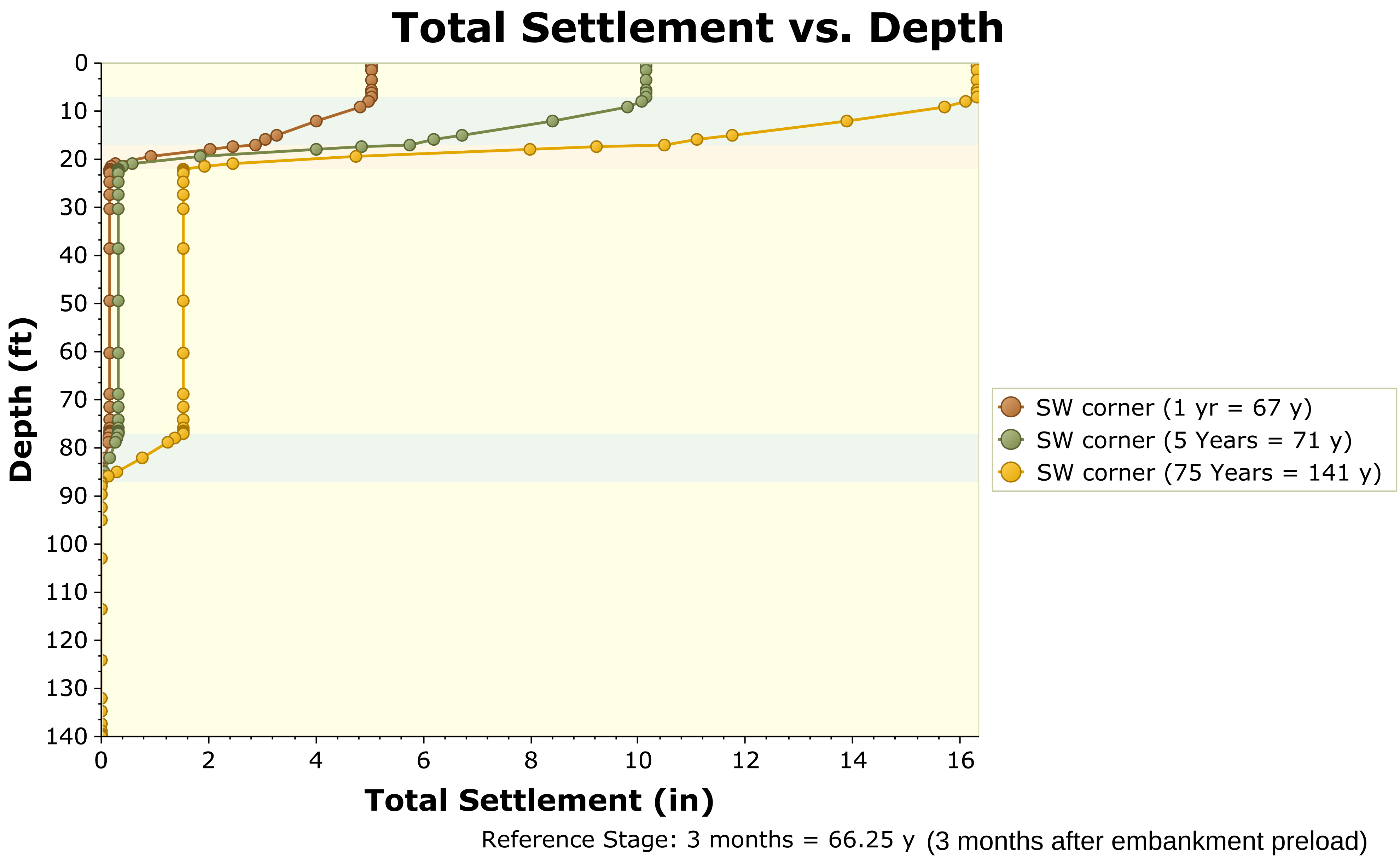
Project	Replacement of Five Mile Wash & Little Colorado River Bridges
Analysis Description	LCB East Abutment Settlement due to Embankment - Stage 9
Drawn By	Katie Mackay
Company	Ethos
Date	8/2/2023, 8:27:27 PM
File Name	East Abutment settlement - Updated 11-30-23.s3z

Total Settlement vs. Depth



Reference Stage: Current Time = 65 y (total due to new embankment)

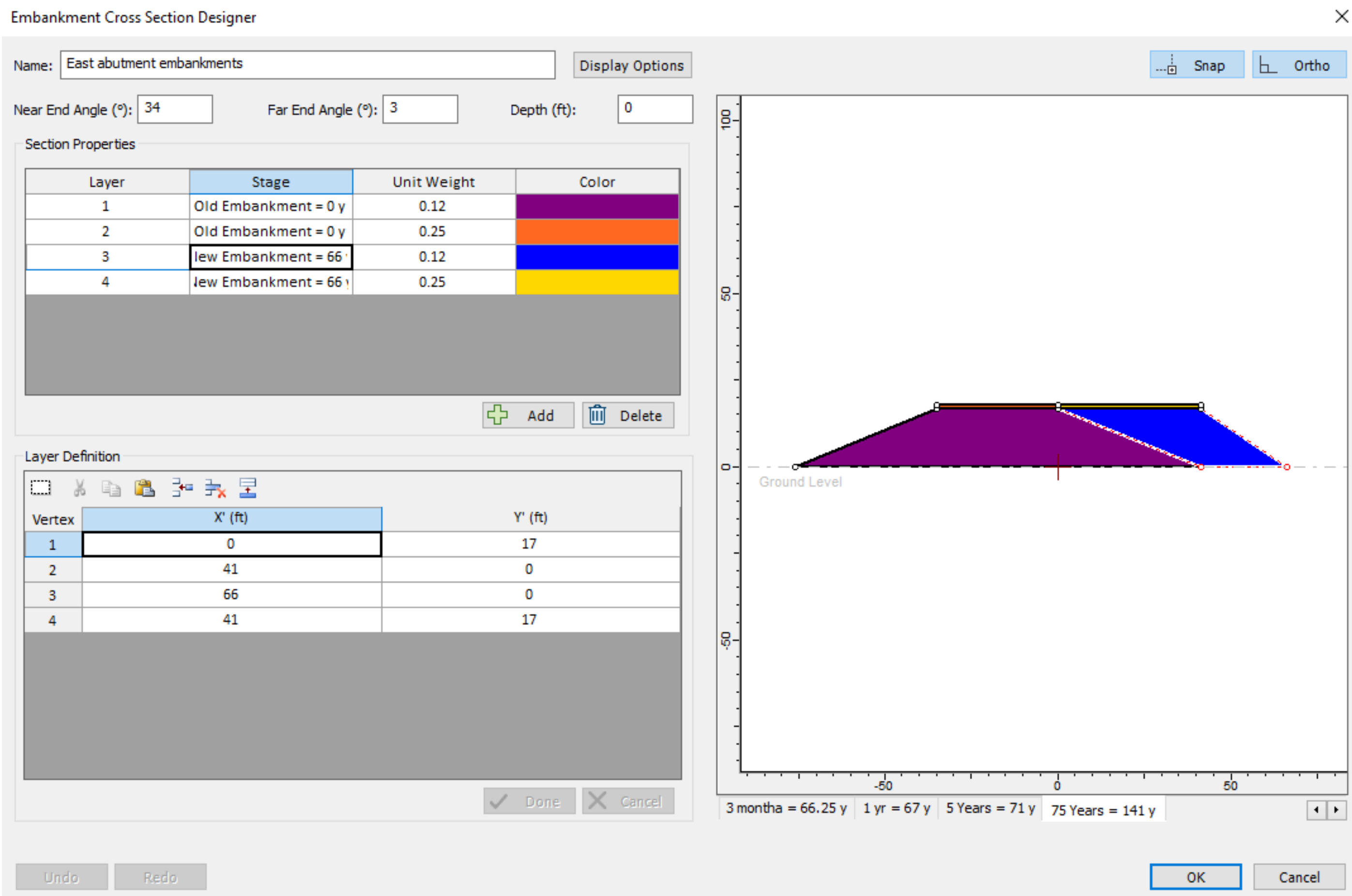
rocscience SETTLE3 5.012	Project: US 180 Little Colorado River Bridge		
	Analysis Description: LCB East Abutment Settlement due to Embankment		
	Drawn By: Katie Mackay	Company: Ethos	
	Date: 8/2/2023, 8:27:27 PM	File Name: East Abutment settlement - Updated 11-30-23.s3z	



Project	US 180 Little Colorado River Bridge		
Analysis Description	LCB East Abutment Settlement due to Embankment		
Drawn By	Katie Mackay	Company	Ethos
Date	8/2/2023, 8:27:27 PM	File Name	East Abutment settlement - Updated 11-30-23.s3z

SETTLE3 5.012

rocscience



US 180 Little Colorado River Bridge
Ethos
Report Creation Date: 2023/09/30, 22:34:45

Table of Contents

Settle3 Analysis Information

US 180 Little Colorado River Bridge

Project Settings

Document Name	East Abutment settlement
Project Title	US 180 Little Colorado River Bridge
Analysis	East Abutment Settlement due to Embankment
Author	Katie Mackay
Company	Ethos
Date Created	8/2/2023, 8:27:27 PM
Stress Computation Method	Boussinesq
Time-dependent Consolidation Analysis	
Time Units	years
Permeability Units	feet/year
Minimum settlement ratio for subgrade modulus	0.9
Use average properties to calculate layered stresses	
Improve consolidation accuracy	
Ignore negative effective stresses in settlement calculations	

Stage Settings

Stage #	Name	Time [years]
1	Old Embankment	0
2	Current Time	65
3	New Embankment	66
4	1 month	66.083
5	2 months	66.167
6	3 montha	66.25
7	1 yr	67
8	5 Years	71
9	75 Years	141

Results

Time taken to compute: 4.00708 seconds

Stage: Old Embankment = 0 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	9.70139
Total Consolidation Settlement [in]	0	0
Virgin Consolidation Settlement [in]	0	0
Recompression Consolidation Settlement [in]	0	0
Immediate Settlement [in]	0	9.70139
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	-9.75151e-05	2.29
Loading Stress XX [ksf]	-0.468207	3.10792
Loading Stress YY [ksf]	-0.881284	2.88332
Effective Stress ZZ [ksf]	0	6.414
Effective Stress XX [ksf]	-0.231716	9.11854
Effective Stress YY [ksf]	-0.614057	9.15415
Total Stress ZZ [ksf]	-9.75151e-05	15.5934
Total Stress XX [ksf]	-0.176887	18.2775
Total Stress YY [ksf]	-0.460214	18.2945
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-6.06814e-07	0.0152664
Pore Water Pressure [ksf]	-9.75151e-05	9.17942
Excess Pore Water Pressure [ksf]	-9.75151e-05	2.29
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [ksf]	0.01666	6.41148
Over-consolidation Ratio	1	1
Void Ratio	0	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-1.11022e-16	2.77556e-17

Stage: Current Time = 65 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	35.2267
Total Consolidation Settlement [in]	0	25.5253
Virgin Consolidation Settlement [in]	0	25.5253
Recompression Consolidation Settlement [in]	0	0
Immediate Settlement [in]	0	9.70139
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	-9.75151e-05	2.29
Loading Stress XX [ksf]	-0.468207	3.10792
Loading Stress YY [ksf]	-0.881284	2.88332
Effective Stress ZZ [ksf]	0	6.85742
Effective Stress XX [ksf]	-0.207193	9.54155
Effective Stress YY [ksf]	-0.560114	9.55853
Total Stress ZZ [ksf]	0	15.5934
Total Stress XX [ksf]	-0.176887	18.2775
Total Stress YY [ksf]	-0.460214	18.2945
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-6.06814e-07	0.265819
Pore Water Pressure [ksf]	0	8.736
Excess Pore Water Pressure [ksf]	0	5.15389e-18
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.01666	6.85514
Over-consolidation Ratio	1	1.00254
Void Ratio	0	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	100
Undrained Shear Strength	-1.93416e-06	0.0473791

Stage: New Embankment = 66 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	36.6504
Total Consolidation Settlement [in]	0	25.5253
Virgin Consolidation Settlement [in]	0	25.5253
Recompression Consolidation Settlement [in]	0	0
Immediate Settlement [in]	0	11.9814
Secondary Settlement [in]	0	0.107801
Loading Stress ZZ [ksf]	-0.00146371	2.29
Loading Stress XX [ksf]	-0.534182	3.16594
Loading Stress YY [ksf]	-0.901431	3.05358
Effective Stress ZZ [ksf]	0	6.85742
Effective Stress XX [ksf]	-0.260136	9.63522
Effective Stress YY [ksf]	-0.56737	9.73904
Total Stress ZZ [ksf]	-0.00146371	15.7536
Total Stress XX [ksf]	-0.209661	18.5519
Total Stress YY [ksf]	-0.462165	18.6557
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-1.43761e-07	0.266902
Pore Water Pressure [ksf]	-0.00146371	8.93742
Excess Pore Water Pressure [ksf]	-0.00146371	2.188
Degree of Consolidation [%]	0	98.98
Pre-consolidation Stress [ksf]	0.01666	6.85514
Over-consolidation Ratio	1	1.00254
Void Ratio	0	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	99.8737
Undrained Shear Strength	-1.93416e-06	0.0473791

Stage: 1 month = 66.083 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	37.0666
Total Consolidation Settlement [in]	0	25.6168
Virgin Consolidation Settlement [in]	0	25.6172
Recompression Consolidation Settlement [in]	-0.00193897	0
Immediate Settlement [in]	0	11.9814
Secondary Settlement [in]	0	0.116651
Loading Stress ZZ [ksf]	-0.00146371	2.29
Loading Stress XX [ksf]	-0.534182	3.16594
Loading Stress YY [ksf]	-0.901431	3.05358
Effective Stress ZZ [ksf]	0	7.01764
Effective Stress XX [ksf]	-0.260135	9.81585
Effective Stress YY [ksf]	-0.567292	9.91968
Total Stress ZZ [ksf]	0	15.7536
Total Stress XX [ksf]	-0.209661	18.5519
Total Stress YY [ksf]	-0.462165	18.6557
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-1.43761e-07	0.267002
Pore Water Pressure [ksf]	0	8.736
Excess Pore Water Pressure [ksf]	0	1.46643
Degree of Consolidation [%]	0	99.2051
Pre-consolidation Stress [ksf]	0.01666	7.01542
Over-consolidation Ratio	1	1.00334
Void Ratio	0	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	99.8759
Undrained Shear Strength	-6.40536e-07	0.0540366

Stage: 2 months = 66.167 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	37.2702
Total Consolidation Settlement [in]	0	25.6511
Virgin Consolidation Settlement [in]	0	25.6516
Recompression Consolidation Settlement [in]	-0.00195646	0
Immediate Settlement [in]	0	11.9814
Secondary Settlement [in]	0	0.124683
Loading Stress ZZ [ksf]	-0.00146371	2.29
Loading Stress XX [ksf]	-0.534182	3.16594
Loading Stress YY [ksf]	-0.901431	3.05358
Effective Stress ZZ [ksf]	0	7.01764
Effective Stress XX [ksf]	-0.260135	9.81585
Effective Stress YY [ksf]	-0.567292	9.91968
Total Stress ZZ [ksf]	0	15.7536
Total Stress XX [ksf]	-0.209661	18.5519
Total Stress YY [ksf]	-0.462165	18.6557
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-1.43761e-07	0.267103
Pore Water Pressure [ksf]	0	8.736
Excess Pore Water Pressure [ksf]	0	1.44221
Degree of Consolidation [%]	0	99.2899
Pre-consolidation Stress [ksf]	0.01666	7.01542
Over-consolidation Ratio	1	1.00333
Void Ratio	0	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	99.8745
Undrained Shear Strength	-6.40536e-07	0.0540366

Stage: 3 montha = 66.25 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	37.4237
Total Consolidation Settlement [in]	0	25.6766
Virgin Consolidation Settlement [in]	0	25.6771
Recompression Consolidation Settlement [in]	-0.00141096	0
Immediate Settlement [in]	0	11.9814
Secondary Settlement [in]	0	0.133253
Loading Stress ZZ [ksf]	-0.00146371	2.29
Loading Stress XX [ksf]	-0.534182	3.16594
Loading Stress YY [ksf]	-0.901431	3.05358
Effective Stress ZZ [ksf]	0	7.01764
Effective Stress XX [ksf]	-0.260135	9.81585
Effective Stress YY [ksf]	-0.567292	9.91968
Total Stress ZZ [ksf]	0	15.7536
Total Stress XX [ksf]	-0.209661	18.5519
Total Stress YY [ksf]	-0.462165	18.6557
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-1.43761e-07	0.267237
Pore Water Pressure [ksf]	0	8.736
Excess Pore Water Pressure [ksf]	0	1.40125
Degree of Consolidation [%]	0	99.352
Pre-consolidation Stress [ksf]	0.01666	7.01542
Over-consolidation Ratio	1	1.00151
Void Ratio	0	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	99.8735
Undrained Shear Strength	-6.40536e-07	0.0540366

Stage: 1 yr = 67 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	38.2122
Total Consolidation Settlement [in]	0	26.1109
Virgin Consolidation Settlement [in]	0	26.1109
Recompression Consolidation Settlement [in]	-7.69825e-06	0
Immediate Settlement [in]	0	11.9814
Secondary Settlement [in]	0	0.215034
Loading Stress ZZ [ksf]	-0.00146371	2.29
Loading Stress XX [ksf]	-0.534182	3.16594
Loading Stress YY [ksf]	-0.901431	3.05358
Effective Stress ZZ [ksf]	0	7.01764
Effective Stress XX [ksf]	-0.260135	9.81585
Effective Stress YY [ksf]	-0.567292	9.91968
Total Stress ZZ [ksf]	0	15.7536
Total Stress XX [ksf]	-0.209661	18.5519
Total Stress YY [ksf]	-0.462165	18.6557
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-1.43761e-07	0.268998
Pore Water Pressure [ksf]	0	8.736
Excess Pore Water Pressure [ksf]	0	0.984608
Degree of Consolidation [%]	0	99.6825
Pre-consolidation Stress [ksf]	0.01666	7.01542
Over-consolidation Ratio	1	1.00062
Void Ratio	0	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	99.8878
Undrained Shear Strength	-6.40536e-07	0.0540366

Stage: 5 Years = 71 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	39.518
Total Consolidation Settlement [in]	0	27.0179
Virgin Consolidation Settlement [in]	0	27.0179
Recompression Consolidation Settlement [in]	0	0
Immediate Settlement [in]	0	11.9814
Secondary Settlement [in]	0	1.17797
Loading Stress ZZ [ksf]	-0.00146371	2.29
Loading Stress XX [ksf]	-0.534182	3.16594
Loading Stress YY [ksf]	-0.901431	3.05358
Effective Stress ZZ [ksf]	0	7.01764
Effective Stress XX [ksf]	-0.260135	9.81585
Effective Stress YY [ksf]	-0.567292	9.91968
Total Stress ZZ [ksf]	0	15.7536
Total Stress XX [ksf]	-0.209661	18.5519
Total Stress YY [ksf]	-0.462165	18.6557
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-1.43761e-07	0.282874
Pore Water Pressure [ksf]	0	8.736
Excess Pore Water Pressure [ksf]	0	0.0852921
Degree of Consolidation [%]	0	99.9883
Pre-consolidation Stress [ksf]	0.01666	7.01542
Over-consolidation Ratio	1	1.00062
Void Ratio	0	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	99.9891
Undrained Shear Strength	-6.40536e-07	0.0540366

Stage: 75 Years = 141 y

Data Type	Minimum	Maximum
Total Settlement [in]	0	45.7353
Total Consolidation Settlement [in]	0	27.0892
Virgin Consolidation Settlement [in]	0	27.0892
Recompression Consolidation Settlement [in]	0	0
Immediate Settlement [in]	0	11.9814
Secondary Settlement [in]	0	6.79426
Loading Stress ZZ [ksf]	-0.00146371	2.29
Loading Stress XX [ksf]	-0.534182	3.16594
Loading Stress YY [ksf]	-0.901431	3.05358
Effective Stress ZZ [ksf]	0	7.01764
Effective Stress XX [ksf]	-0.260135	9.81585
Effective Stress YY [ksf]	-0.567292	9.91968
Total Stress ZZ [ksf]	0	15.7536
Total Stress XX [ksf]	-0.209661	18.5519
Total Stress YY [ksf]	-0.462165	18.6557
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-1.43761e-07	0.345934
Pore Water Pressure [ksf]	0	8.736
Excess Pore Water Pressure [ksf]	-8.35101e-33	4.16457e-21
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.01666	7.01542
Over-consolidation Ratio	1	1.00062
Void Ratio	-0.0843073	0.8
Permeability [ft/y]	0	0.173055
Coefficient of Consolidation [ft^2/y]	0	10
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	100
Undrained Shear Strength	-6.40536e-07	0.0540366

Embankments

1. Embankment: "East abutment embankments"

Label	East abutment embankments
Center Line	(0, 0) to (0, -43)
Near End Angle	34 degrees
Far End Angle	3 degrees
Number of Zones	4
Number of Sections	4

Zone	Name	Unit Weight (kips/ft3)
1	New Zone	0.12
2	New Zone 2	0.12
3	New Zone 3	0.25
4	New Zone 4	0.25

Liquefaction

Insitu Type	Standard Penetration Test (SPT)
General Settings	
Max. Earthquake Acceleration [g]	0.1275
Earthquake Magnitude	6
Slope Angle [°]	0
Find FS using Probability of Liquefaction of	15%
Calculate Settlement for FS <	1
Depth Correction	
Use Depth Correction (Cn)	No
Sampling Method (Cs)	Standard
Borehole Diameter (Cb)	1.12
Hammer Energy Ratio (Ce)	1.25
Use Cetin et al. (Cr)	No
Rod Length Above Ground [ft]	2
Advanced Settings	
Magnitude Scaling Factor (MSF)	Idriss (1999)
Strength Reduction Factor (RD)	Idriss (1999)
Relative Density Estimation from SPT (Dr)	Skempton (1986)
Fines Content Correction	Youd et al. (2001)
K Sigma	Hynes and Olsen (1999) (NCEER)
K Alpha	None

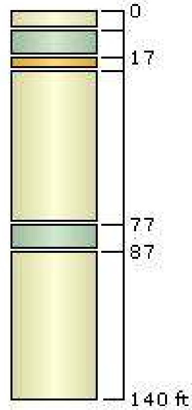
Input Data for Liquefaction

Depth [ft]	SPT N
5	28
10	10
15	3
20	5
25	10
30	3
35	4
40	20
45	6
50	13
55	9
60	20

Soil Layers

Ground Surface Drained: Yes

Layer #	Type	Thickness [ft]	Depth [ft]	Drained at Bottom
1	Medium Dense SM	7	0	No
2	Soft Lean Clay	10	7	No
3	Soft Fat Clay	5	17	Yes
4	Medium Dense SM	55	22	No
5	Soft Lean Clay	10	77	Yes
6	Medium Dense SM	53	87	No



Soil Properties

Property	Medium Dense SM	Soft Lean Clay	Soft Fat Clay
Color			
Unit Weight [kips/ft3]	0.11	0.1	0.1
Saturated Unit Weight [kips/ft3]	0.11	0.1	0.1
K0	1	1	1
Immediate Settlement	Enabled	Disabled	Disabled
Es [ksf]	150	-	-
Esur [ksf]	150	-	-
Primary Consolidation	Disabled	Enabled	Enabled
Material Type		Non-Linear	Non-Linear
Cc	-	0.2	0.65
Cr	-	0.1	0.1
e0	-	0.8	0.4
OCR	-	1	1
Cv [ft2/y]	-	10	10
Cvr [ft2/y]	-	10	10
B-bar	-	1	1
Secondary Consolidation	Disabled	Standard	Standard
Ca	-	0.06	0.21
Car	-	0.06	0.21
Undrained Su A [kips/ft2]	0	0	0
Undrained Su S	0.2	0.2	0.2
Undrained Su m	0.8	0.8	0.8
Piezo Line ID	1	1	1
Fines Content [%]	25	50	50
D50 [in]	0.024	2	2
Liquefaction Prone	Yes	No	No

Groundwater

Groundwater method	Piezometric Lines
Water Unit Weight	0.0624 kips/ft3

Piezometric Line Entities

ID	Depth (ft)
1	0 ft

Query Points

Point #	Query Point Name	(X,Y) Location	Number of Divisions
1	NW corner	0, 0	Auto: 61
2	SW corner	-41, 0	Auto: 61
3	Pier NW	0, 43	Auto: 61
4	Pier SW	-41, 43	Auto: 61
5	liquefaction	-41.477, -0.012	Auto: 61
6	Max Settlement	-0.067648, -44.628	Auto: 61

Query Lines

Line #	Query Line Name	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	front of abutment	0, 0	-41, 0	20	Auto: 61
2	Pier	0, 43	-41, 43	20	Auto: 61

Field Point Grid

Number of points	294
Expansion Factor	2

Grid Coordinates

X [ft]	Y [ft]
282.573	233.259
282.573	-593.034
-272.573	-593.034
-272.573	233.259