



THURBER ENGINEERING LTD.

**FOUNDATION DESKTOP STUDY REPORT
PRELIMINARY DESIGN AND ENVIRONMENTAL ASSESSMENT
RAMP HIGHWAY 6N – HIGHWAY 403E
STRUCTURES REPLACEMENT ON NEW ALIGNMENT
HIGHWAY 403 AND HIGHWAY 6 INTERCHANGE
HAMILTON, ONTARIO
W.O. #16-20004
SITES 36-28 & 36-29**

GEOCRES NO. 30M5-339

Site 36-28

**Latitude: 43.294211°
Longitude: -79.893186°**

Site 36-29

**Latitude: 43.294048°
Longitude: -79.892083°**

Report

to

AECOM

Date: November 10, 2022
File: 25963



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1.0 INTRODUCTION

This report presents the results of a foundation desktop study carried out by Thurber Engineering Ltd. (Thurber) for the preliminary design and environmental assessment for the replacement of two bridges along the Highway 6N - Highway 403E Ramp, at the Highway 403 and Highway 6 interchange in Hamilton, Ontario.

This Phase 1 study is carried out for planning, structure evaluation and preliminary design purposes only. As part of the Phase 1 scope, a desktop study is to be carried out based on currently available subsurface and foundation information. Where this study determines that the existing foundation information is insufficient to complete the preliminary design, additional foundation investigation and assessment will be recommended for completing Phase 1. It is understood that the budget for this additional investigation is to be drawn from the Phase 2 contingency upon approval by MTO.

Thurber was retained by AECOM to carry out this Phase 1 study under the Ministry of Transportation Ontario (MTO) Assignment Number 2016-E-0027.

This site is a part of the overall Highway 403 and Highway 6 Interchange project where up to 14 bridges, 3 structural culverts and 15 retaining walls are planned to be replaced, reconstructed or rehabilitated.

It is a condition of this report that Thurber's performance of its professional services be subject to the attached Statement of Limitations and Conditions.



The following references and drawings are available in the general vicinity of this site.

- Ontario Department of Highways, Foundation Investigation Report, Chedoke Expressway (Wolfe Island Area), Proposed Crossing, Highway 403 & Highway 6, District No. 4, W.P. 200-60, dated June 2, 1960, 60-F-319C, Geocres No. 30M05-008 (Reference 1).
- Archive drawings, Department of Highways Ontario, Bridge Office, Toronto – Chedoke Expressway, Ramp “R” Overpass, General Arrangement, Bridge No.6, W.P. 263-60, dated August 1960 (Reference 2).
- Archive drawings, Department of Highways Ontario, Bridge Office, Toronto – Chedoke Expressway, Underpass at Ramp “R”, General Arrangement, Bridge No.5, W.P. 845-71-01, dated August 1960 (Reference 3).
- Archive drawings, Highway 403/Highway 6 Interchange, Bridge Rehabilitation, General Arrangement, Sheet 348, Site 36-28, Contract No. 96-66, W.P. 80-93-01, prepared by Mitchell Pound & Braddock, dated February 1994 (Reference 4).
- Archive drawings, Highway 403/Highway 6 Interchange, Bridge Rehabilitation, General Arrangement, Sheet 361, Site 36-29, Contract No. 96-66, W.P. 80-93-01, prepared by Mitchell Pound & Braddock, dated February 1994 (Reference 5).
- Ontario Bridge Management System (OBMS), Ontario Structure Inspection Manual- Inspection Form, N-E Ramp over Highway 403 WB, County Site Number: 36-28, dated December 14, 2016 (Reference 6).
- Ontario Bridge Management System (OBMS), Ontario Structure Inspection Manual- Inspection Form, N-E Ramp over Highway 403 E-N Ramp, County Site Number: 36-29, dated December 14, 2016 (Reference 7).

2.0 SITE AND PROJECT DESCRIPTION

The existing Highway 6N - Highway 403E Ramp is situated at the Highway 403 and Highway 6 interchange in the City of Hamilton, Ontario. The ramp carries vehicular traffic from southbound on Highway 6 to Highway 403 eastbound lanes (EBL). Two bridges are located along the ramp. One bridge (west) is at the west end of the ramp and crosses over the Highway 403W - Highway 6N ramp, while the second bridge (east) is approximately 30 m east of the first bridge and crosses over the Highway 403 westbound lanes (WBL).

Highway 403 in the vicinity of the site generally runs in an east to west orientation along relatively flat terrain. The WBL and EBL are separated from each other by a wide grassed median. The immediate lands to the south of Highway 403 EBL are part of the Royal Botanical Gardens



(RBG). Columbus International College is located at the northwest quadrant of the interchange. Lands surrounding the northeast quadrant are generally of residential and commercial usage. CN rail tracks run parallel to Highway 403 at approximately 500 m to the south.

Both existing bridges at the ramp are three-span structures built in 1961. Each bridge comprises reinforced rectangular voided slabs supported on two abutments and two piers. Archive drawings indicate that the abutments and piers are supported on spread footings. Further details of the bridges are presented below:

Structure	Site No.	Total Length (span length) (m)	Width (m)	Skew
West bridge	36-28	53.9 (15.2 + 25.0 + 13.7)	8.5	Varies from 39° to 50°
East bridge	36-29	67.4 (21.6 + 30.3 + 15.5)	8.5	Varies from 38° to 53°

Both approach slabs at each bridge are 6.1 m in length.

Selected photographs of the site are included in Appendix C.

The structures underwent major rehabilitation in 1997 (References 4 and 5). The rehabilitation program included partial repair of abutment faces, bridge soffits and piers with shotcrete; removal and replacement of wingwalls on the south sides; replacement of bottom slab; replacement of rocker bearings with elastometric bearings; filling identified areas with hot poured rubberized asphalt sealant; repairs of slope paving; replacement of steel railing post system and curbs with concrete barrier walls; replacement of curbs; placement of new asphalt and waterproofing; replacement of slabs at the north side and repairs of concrete deck.

The structures were also rehabilitated in 2017 as part of MTO contact No. 2016-2035. The rehabilitation consisted of replacement of the asphalt and waterproofing system; repair of the expansion joints; patch repair of delaminated and deteriorated concrete; and replacement of slope paving.

A revised preliminary GA drawing provided by AECOM in January 2022 indicates that the existing Ramp Highway 6N to Highway 403E will be replaced on a new alignment. The new bridge/ramp alignment will be approximately 20 m offset south/west of the existing ramp alignment. The new ramp will consist of a four-span concrete box girder structure supported on two abutments and three piers. The total curvilinear length of the ramp will be 212 m (48 m + 64m + 60 m + 40 m) and the deck width will be 13.05 m. The west approach slab will be 7 m



long while the east approach slab will be 6 m long. The proposed grade of the ramp will vary west to east from approximate Elevations 120.8 to 109.7. GA drawing also indicates that a new ramp (labelled as Ramp 403W to 6N) will pass under this ramp/bridge between the west abutment and Pier 1.

The project area is situated within the physiographic region known as the Niagara Escarpment, which forms a north-south trending strip, and is a major topographic break in the bedrock between the carbonate Amabel Formation to the west and the soft sediments of the Queenston Formation to the northeast. At many locations, the Queenston Formation consists of up to 1.2 m of very weathered bedrock (red clay) which grades downward into typical brick-red shale and often with green mottling. Thin to medium beds of grey-green and reddish argillaceous limestone are present in most sections. The Queenston shale is overlain by Halton Till in the area of the site. The Halton Till is a red clay to clayey silt till and is exposed in the form of a till plain extending from Lake Ontario southward to the Niagara escarpment.

3.0 SITE OBSERVATIONS

A site reconnaissance visit was conducted by a Thurber Senior Geotechnical Engineer on December 1 and 5, 2021 to observe conditions related to the foundation performance of the existing bridges and approaches. The following observations for the Highway 6N to Highway 403E Ramp bridges have been noted during our site visits:

Site 36-28

- There was no visible sign of settlement or distress along the bridge alignment and wingwalls.
- The existing approach embankments are fully covered with heavy vegetation including tall grass and bushes, and appeared to be in good condition. The forward and side slopes did not exhibit obvious sign of instability or bulging.
- Vertical cracks were noted at the concrete surfaces of the piers.
- Seepage stains were noted along the deck soffit.
- It appears that the deck soffit has been repaired as shotcrete/concrete patches were observed at intermittent locations.

Site 36-29

- There was no visible sign of settlement or distress along the bridge alignment and wingwalls.



- The existing approach embankments are fully covered with heavy vegetation including tall grass and bushes, and appeared to be in good condition. The side slopes did not exhibit obvious sign of instability or bulging.
- Several vertical and alligator cracks were noted at the concrete surfaces of the piers.
- Seepage stains were observed along the deck soffit.
- The soffit has been repaired as shotcrete/concrete patches are present at frequent locations. Patches were also noted at the piers.
- Soffit delaminations were noted at the structure.
- Growing vegetation and weeds were observed at the concrete pavers of the abutment forward slopes. Some of the concrete pavers were broken.

Selected photographs of the site taken during the site visits are presented in Appendix C.

4.0 SUBSURFACE CONDITIONS

Foundation investigations were conducted to cover the sites for the then proposed two bridges along the ramp alignment in 1960 (Reference 1), prior to construction of the existing ramp/bridges. The following boreholes were drilled for each structure:

Structure	Site No.	Borehole
West bridge	36-28	1, 2, 3, 4, 5, 6, 6A, 7, 7A
East bridge	36-29	8, 9, 10, 10A, 11, 12, 13, 13A

The actual locations of these boreholes in relation to the existing bridges cannot be confirmed since a co-ordinate system was not used at the time and there was no available record of the as-built locations of the bridges. In general, the boreholes were advanced through overburden soils using continuous flight augers to shale bedrock, and Boreholes 6A, 7A, 10A and 13A were further advanced to obtain BXL rock cores. The rock was cored to about 1.8 m below the proposed grade of the Chedoke Expressway WBL (currently Highway 403 WBL). Record of Borehole Sheets for 1 to 13, 6A, 7A, 10A, 13A, and borehole plans are included in Appendix A.

The soil stratigraphy encountered at the site during the previous investigation consisted of surficial topsoil overlying native cohesive glacial till. In Boreholes 1, 2, 4, 5, 6 and 6A, a layer of brown to grey, very stiff to hard clayey silt till containing sand, gravel and rock fragments was contacted below the topsoil. This upper till had measured thicknesses varying from 1.7 m to 2.9m with base elevations ranging between 115.2 and 116.4 where encountered. A layer of reddish brown clayey silt till was contacted below the topsoil in Boreholes 3, 7, 7A, 8, 9, 11, 12, 13 and



13A, and below the brown to grey clayey silt till in Boreholes 1, 2, 4, 5, 6 and 6A. The reddish brown till consisted of a heterogeneous mixture of sand, gravel and rock fragments in a matrix of clayey silt to silt, with thickness ranging from 0.5 m to 0.7 m in Boreholes 8, 9, 11, 12, 13 and 13A (Site 36-29), and from 2.4 m to 8.5 m in Boreholes 1 to 7, 6A and 7A (Site 36-28). The base elevations of this reddish brown till varied between 109.0 and 114.0 where fully penetrated by the boreholes. Reported SPT N-values ranged from 15 blows per 0.3 m penetration to greater than 100 blows for less than 0.3 m penetration indicating a typically hard consistency with stiff to very stiff zones at shallower depths.

Shale bedrock of the Queenston Formation was contacted below the reddish-brown till. The shale was described as horizontally bedded and weathered in the upper 0.6 m to 1.5 m. The shale was described as highly fissible and breaking parallel to the bedding planes. Limestone layers varying in thickness from about 50 mm to 150 mm were noted within the shale cores, as well as occasional thin layers of shattered shale and soft clay. Total Core Recovery in Boreholes 6A, 7A, 10A and 13A ranged from 61% to 100%. According to Reference 1 and based on previous information, the compressive strength of the weathered portion of the Queenston shale bedrock in the area ranges from approximately 48 kPa to 575 kPa (0.5 to 6 tsf), and over 19,000 kPa (200 tsf) for the sound shale.

For the purpose of reporting herein, the upper zone of the shale will be referred to as weathered shale and the underlying sound portion will be considered as sound shale bedrock. The depths and elevations where shale bedrock was proven, or top of shale inferred by auger refusal, are presented in Table 4.1.

Table 4.1 – Depth and Elevation of Shale Along Existing Ramp

Structure	Approx. Location Relative to Bridge ⁽¹⁾	Borehole	Weathered Shale Depth ⁽³⁾ (m)	Weathered Shale Elevation ⁽²⁾ (m)	Sound Shale Depth ⁽³⁾ (m)	Sound Shale Elevation ⁽²⁾ (m)
West bridge <u>Site 36-28</u>	West Pier, south side	1	9.0	109.7	10.1	108.7
	East Pier, north side	6A ⁽⁴⁾	9.1	109.1	9.8	108.5
	East abutment / approach	7, 7A ⁽⁴⁾	3.0	113.9	4.6	112.4
East bridge <u>Site 36-29</u>	West Abutment	8	1.4	110.4	2.1	109.7
	West Pier - north side	9	1.5	109.1	2.1	108.5
	West Pier - south side	13, 13A ⁽⁴⁾	-	-	1.1	111.1
	East Pier - north side	10, 10A ⁽⁴⁾	0.30	111.5	1.5	110.3
	East pier - south side	12	0.9	109.0	1.5	108.4
	East Abutment	11	0.9	110.5	1.4	110.0

⁽¹⁾ The actual locations of these boreholes cannot be confirmed due to incomplete information. The foundation elements referred to here were those used during design at that time and it is unclear if they are directly correlated to those of the existing bridges.

⁽²⁾ The elevations were reportedly referenced to a D.H.O. benchmark at the time of the investigation. It is unknown how this benchmark is related to the Canadian Geodetic Datum currently in use.

⁽³⁾ All depths were converted from Imperial Units and relative to the ground surface prior to construction of the existing bridges and approaches.

⁽⁴⁾ Bedrock proved by coring.

It is also noted that the soil and rock conditions, particularly within the upper portion, may have been modified by the original construction.

Reference 1 reported that the groundwater level could not be established during the investigation. It is anticipated that the drainage pattern at the site has been largely governed by the drainage measures along the existing highways.



5.0 EXISTING FOUNDATIONS

Based on archive design drawings (References 2 and 3) and foundation recommendations (Reference 1), each of the two existing three-span structures for the Highway 6N - Highway 403E ramp were designed to be supported on two abutments and two piers. The legibility of these drawings is relatively poor. It appears that both bridges were designed to be supported on spread footings founded on sound shale bedrock at the elevations presented in Table 5.1, except for the west abutment of the west bridge (Site 36-28) where it might be founded on hard clayey silt till above the weathered shale.

Table 5.1 – Founding Depths and Elevations of Foundation Elements

Structure (Site No.)	Foundation Element	Reference Borehole	Design Underside Elevation of Footing	Estimated Founding Stratum
West bridge (Site 36-28)	West abutment	4	111.3	Hard Clayey Silt Till
	West pier	1, 5	105.8	Sound Shale
	East pier	2, 6, 6A	106.1	
	East abutment	3, 7, 7A	109.3	
East bridge (Site 36-29)	West abutment	8	107.3	
	West pier	9, 13, 13A	101.2	
	East pier	10, 10A, 12	100.3	
	East abutment	11	104.1	

Reference 1 recommended that spread footings founded on shale bedrock should be designed using a “safe” allowable bearing capacity of approximately 950 kPa to 1,450 kPa (10 to 15 tsf). The recommended allowable bearing pressure was 380 kPa (4 tsf) for spread footings founded on hard clayey silt till. The use of spread footings for the piers and abutments appears to be consistent with what is shown on the archive drawings (References 2 and 3). The following design bearing capacities are shown on the archive drawings.

<u>Site</u>	<u>Foundation element</u>	<u>Allowable bearing pressure</u>
36-28	West abutment	380 kPa (clayey silt till)
	East abutment and piers	760 kPa (shale bedrock)
36-29	West and east abutments and piers	960 kPa (shale bedrock)



References 2 and 3 indicated that the rectangular piers are about 5.5 m by 3.4 m (18 ft. by 11 ft.) in dimensions, and that the abutment strip footings are about 2.8 m (9.25 ft.) in width.

Reference 1 indicated that earth and rock cuts were required for ramp construction. The permanent cut was designed to be extended into the glacial till and shale at an inclination of 2H : 1V with vertical heights not exceeding 6 m. Where the slope height was to exceed 6 m, it was recommended that such slopes be benched at each vertical height interval of 6 m. The benches should be in the order of 3 m to 6 m in width. The slopes were to be protected with grass and graded interceptor drains where recommended.

6.0 ASSESSMENT OF EXISTING FOUNDATIONS

The archive boreholes from Reference 1 were advanced at locations and elevations that cannot be confirmed. We understand that the existing bridges are to be replaced with a new bridge to be located south/west of the existing ramp, with several new foundation elements at different locations. Since bridge replacement is involved and given the uncertainties regarding the archive boreholes which do not meet current MTO standards, it is recommended that new boreholes be advanced at selected locations (Section 13.0 below) in order to obtain adequate information for preliminary design of the replacement bridge.

A foundation assessment of the existing structure, based on current information, has been carried out to provide some information to the designers regarding the feasibility of the proposed foundations.

There is insufficient subsurface information for assessing the strength and deformation characteristics of the shale bedrock. There is very limited to no data on unconfined compressive strength, rock quality and fracture index on which the geotechnical resistance is based. For the purpose of this assessment, the Hoek and Brown rock characterization criteria and typical range of unconfined compressive strengths for Queenston shale have been used. Reference has also been made to geotechnical resistances found in published information and past projects in the general area of the site.

For spread footings founded on undisturbed weathered, fair quality or otherwise weaker Queenston shale bedrock, it is assessed that the factored geotechnical resistance would be in the range of 800 kPa to 1,200 kPa at Ultimate Limit States (ULS). For sound, slightly weathered to fresh or otherwise stronger Queenston shale bedrock, it is assessed that the factored geotechnical resistance at ULS could be in the order of 1,500 kPa to 2,000 kPa. These values



apply to vertical and concentric loads. The SLS condition does not apply to footings founded on unyielding bedrock.

According to the archive drawings, the footings founded on sound Queenston shale (below the weathered zone) were designed as per the recommendations in Reference 1 discussed above. The design allowable bearing capacity range of 750 kPa to 950 kPa from References 2 and 3 corresponds to the lower limit of the assessed geotechnical resistances.

For spread footings founded on undisturbed hard clayey silt till at this site, such as the existing west abutment of Site 36-28, it is assessed that the factored geotechnical resistance at Ultimate Limit States (ULS) is 600 kPa and the geotechnical resistance at Serviceability Limit State (SLS) is 400 kPa (corresponding up to 25 mm settlement). Reference 2 indicates that the recommended allowable bearing pressure for spread footings on hard clayey silt till is about 380kPa, which is consistent with our assessment.

Based on the archive information, it is considered feasible that the foundations of the new bridge be supported on spread footings founded on sound shale bedrock at most locations. Where bedrock is deeper such as in the west abutment area, the spread footings may be founded on the hard clayey silt till.

7.0 EARTH AND ROCK CUTS

According to the GA drawing, Highway 403 EBL and WBL will be realigned and shifted towards the existing grassed median. As a result, cuts will be required for the realignment and for maintaining a minimum vertical clearance between the bridge and the proposed Highway 403 EBL and WBL grade near Elevation 103. Cuts of about 5.0 m to 5.5 m deep are anticipated between the new Piers 2 and 3. The cuts will be formed through hard clayey silt till into the weathered to sound shale bedrock. It is anticipated that the existing highway drainage systems would be sufficient to maintain relatively dry excavations during construction, although accumulation of surface runoff and precipitation should be expected.

Temporary drainage of the cuts should be provided, where required, to maintain relatively dry and stable excavations. Surface runoff and precipitation should be diverted away from the excavations at all stages during construction. Permanent drainage will be required along the highway. It is recommended that the water be controlled by means of permanent drains incorporated within the highway design.



For permanent slopes, vegetative cover will be required on all exposed earth and shale cut slopes to protect against surficial erosion. Reference may be made to OPSS.PROV 804. For temporary slopes, plastic sheetings or tarps may be used for covering where required.

Temporary protection (shoring) may be required at some locations for the earth cut operations. Preliminary comments on temporary protection (shoring) are presented in Section 11.0 of this report.

8.0 APPROACH EMBANKMENTS

Reference 1 recommended that the design approach and side slopes be at an inclination of 2H : 1V. The archive drawings appear to show that the design slope inclinations were 2H : 1V which is consistent with the recommendations. Our site observations indicate that the existing approach fills are in good condition.

Based on the GA drawing for a new structure on a new alignment, new approaches would be up to the order 10 m to 11 m in height at the west abutment and 7 m to 8 m in height at the east abutment. Placement of new fill will be required at both abutments.

The subgrade for the new fill at the abutments is expected to be the existing approach fills, stiff to hard till or shale. No global stability issues are anticipated for the fills at an inclination of 2H : 1V or flatter, provided the approved new fill is placed and compacted in accordance with OPSS.PROV 206 and OPSS.PROV 501, and provided that all surficial vegetation, organics and topsoil, soft/loosened or wet soils and debris are removed from the proposed embankment footprints prior to fill placement.

It is recommended that all exposed slope surfaces be vegetated and seeded in accordance with current MTO practice with reference to OPSS.PROV 804. Erosion protection measures must be provided for the slopes.

Foundation settlement of the soil subgrade is expected to take place as the fill is placed and be completed by the end of construction. Settlement of the underlying shale may be considered negligible. The magnitude of post construction settlement due to compression of the embankment fill itself depends on the type of materials to be used, but it is not anticipated to exceed 25 mm if the new fill is placed and compacted as outlined above.

9.0 ABUTMENT WALL BACKFILL AND LATERAL EARTH PRESSURES

Backfill to the abutment and wing walls should consist of free-draining granular material



conforming to OPSS.PROV 1010 Granular A or B Type II specifications. Compaction should be carried out in accordance with OPSS.PROV 206 and OPSS.PROV 501.

Earth pressures acting on the structure may be assumed to impose a triangular distribution governed by the characteristics of the backfill. For a fully drained condition, the pressures should be computed in accordance with the CHBDC 2019 but generally are given by the expression:

$$p = K (\gamma h + q)$$

Where:

- p = horizontal earth pressure on the wall at depth h (kPa)
- K = earth pressure coefficient (see table below)
- γ = unit weight of retained soil (see table below)
- h = depth below top of fill where pressure is computed (m)
- q = value of any surcharge (kPa)

The earth pressure coefficients are dependent on the material used as backfill. Recommended unfactored values are shown in Table 9.1. The at-rest coefficients should be employed for restrained walls. Active pressures should be used for any wingwalls or unrestrained walls.

In conventional design, the use of a material with a high friction angle and low active pressure coefficient (e.g. Granular A, Granular B Type II) is generally preferred as it results in lower earth pressures acting on the wall.

Table 9.1 – Lateral Earth Pressure Coefficients

Loading Condition	Earth Pressure Coefficient (K)			
	OPSS Granular A or Granular B Type II $\phi = 35^\circ, \gamma = 22.8 \text{ kN/m}^3$		OPSS Granular B Type I $\phi = 32^\circ, \gamma = 21.2 \text{ kN/m}^3$	
	Horizontal Backfill	Sloping Backfill (2H : 1V)	Horizontal Backfill	Sloping Backfill (2H : 1V)
Active (Unrestrained Wall)	0.27	0.40	0.31	0.48
At-rest (Restrained Wall)	0.43	0.62	0.47	0.70
Passive	3.7	-	3.2	-



10.0 EXCAVATION AND GROUNDWATER CONTROL

All excavations must be carried out in accordance with OPSS.PROV 902 and the Occupational Health and Safety Act (OHSA). For the purposes of assessing excavation slope and temporary support requirements in compliance with the OHSA, the embankment fills above water level and native cohesive soils are classified as Type 3 soils. Cohesionless soils and fill below water level are classified as Type 4 soils.

It is anticipated that excavation of existing fills and native cohesive soils would be required throughout the site. Shale excavation may also be involved at the pier and east abutment locations. Where required, shale excavation should be carried out using methods that will avoid disturbing the intact bedrock below the founding elevation. It is possible that rock excavation may extend into relatively sound shale with hard limestone interbeds at some locations. Heavy excavating equipment, ripping machinery and rock breakers/splitters may be required to break up strong limestone slabs.

It is anticipated that the existing highway drainage systems would be sufficient to maintain relatively dry excavations during construction. However, seepage or perched water from the water-bearing interlayers within the soils as well as accumulation of surface runoff and precipitation are to be expected. Also, concentrated seepage may be experienced from seams or fractures in the shale. All surface runoff should be diverted away from excavations.

The Contractor should be prepared to pump from properly filtered sumps to remove any seepage water or surface water collecting in an excavation. Unwatering must remain operational and effective until the excavation is backfilled.

The design of any dewatering or unwatering systems that may be required is the responsibility of the Contractor.

Where required, construction will need to be carried out in conjunction with temporary protection.

11.0 TEMPORARY PROTECTION SYSTEMS

Temporary protection (shoring) systems will be required for construction of the new abutments and piers in general accordance with OPSS.PROV 539. It is recommended that Performance Level 2 be specified.



Due to shallow or even exposed shale bedrock, sheetpiles and driven H-piles do not appear to be suitable for use as temporary protection. An augered soldier pile and lagging system with H-piles socketted into the shale should be feasible.

The selection and design of suitable temporary protection systems are the responsibilities of the Contractor. All shoring systems must be designed by a Professional Engineer experienced in such designs.

12.0 ADJACENT STRUCTURES AND BURIED UTILITIES

It is recommended that the exact locations of any existing utilities that are present in the vicinity of the work areas be established by the designer, and compared with the extent of the potential work zones related to the proposed construction.

The utilities should not be undermined or damaged during construction of the new bridge and approaches. Relocation of, and/or special protective measures for, some or all of these affected utilities may be required.

13.0 INVESTIGATION FOR PRELIMINARY DESIGN

Reference 1 is available from the GEOCREST library for this site. As discussed previously, this report was prepared in the early 1960's prior to construction of the existing bridge and approaches. The locations and elevations of the boreholes cannot be confirmed. It is also known that the site topography had been altered as part of the original construction. Given that the proposed replacement bridge will be along a new alignment and the archive boreholes do not provide much information on the shale including unconfined compressive strength, rock quality and fracture pattern to facilitate a more detail assessment of rock geotechnical resistance that is critical for the replacement bridge foundation design, it will be necessary to carry out additional site investigation and field testing to support the preparation of foundation design recommendations for preliminary design of the new bridge.

In consideration of the currently available design information, a preliminary investigation for preliminary design is proposed as follows.

- One (1) borehole near each of the proposed Pier 1, Pier 2 and East Abutment, and all advancing to core a minimum 3 m of shale.



- The depth to shale varies across the site, but based on the archive information, should be in the order of 3 m to 4 m at Piers 1 and 2, and the east abutment. The borehole depths are therefore anticipated to be in the order of 8 m.

The proposed boreholes are schematically shown on a plan in Appendix D for illustrative purposes.

For detail design, the full requirements of the MTO (2022) guideline will need to be satisfied.

14.0 CLOSURE

Engineering analysis and preparation of the foundation design report were carried out by Rocio Reyna, P,Eng. The report was reviewed by Sydney Pang, P.Eng. and P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations Projects.



THURBER ENGINEERING LTD.



Rocío Palomeque Reyna, P.Eng.
Senior Geotechnical Engineer



Sydney Pang, P.Eng.
Senior Associate, Senior Foundation Engineer



P.K. Chatterji, P.Eng.
Review Principal, Designated MTO Contact

STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



Appendix A

Record of Borehole Sheets and Borehole Plan (Geocres)

EXPLANATION OF THE FORM "OFFICE REPORT ON SOIL EXPLORATION"

The object of this form is to enable a comprehensive study of the soil to be made by combining on one sheet all of the information obtained from the boring. An explanation of the various columns of the report follows.

ELEVATION AND DEPTH

This column gives the elevation and depth of boundaries between the various soil strata. The elevation is referred to the datum shown in the general heading.

WATER CONDITIONS

In this column the water level in the casing at the time of boring or the water table in the ground, determined by a series of observations in a piezometer or standpipe, is indicated to scale by a horizontal line with the symbol W.L. or W.T. above the line. A notation of any complicated groundwater conditions will be made in this column.

DESCRIPTION

A description of the soil, using standard terminology, is contained in this column. The consistency of cohesive soils and the relative density of non-cohesive soils are described by the following terms:

Consistency	U-Strength Tons/sq. ft.	Relative Density	Standard Penetration Resistance, Blows/ft.
Very soft	0.03 to 0.25	Very loose	0 to 4
Soft	0.25 to 0.5	Loose	4 to 10
Firm	0.5 to 1.0	Compact	10 to 30
Stiff	1.0 to 2.0	Dense	30 to 50
Very stiff	2.0 to 4.0	Very dense	over 50
Hard	over 4.0		

STRATIGRAPHIC PLOT

The stratigraphic plot follows the standard symbols of the National Research Council, Canada.

ELEVATION SCALE

The information in all columns is plotted to a true elevation scale which is shown in this column.

GRAPHS

The main body of the report forms a graph which is used to plot to correct elevation the important soil properties which are obtained through field and laboratory tests. The scales and symbols for the plotting are shown at the head of the column.

OTHER TESTS

In this column are shown, by symbol, the other field or laboratory tests which have been performed on the soil and for which the results have not been plotted on the above graph.

SAMPLES

The first three columns describe the condition, type and number of each sample obtained from the boring. The location and extent of each sample is plotted to scale.

In the last column is shown the penetration resistance in blows of 4200 inch-pounds required to drive one foot of the sampler into the ground. When a 2 inch Drive Sampler is used the result obtained is termed the "Standard Penetration Resistance".

GEOCON

OFFICE REPORT ON SOIL EXPLORATION

APPENDIX I

CONTRACT 57033 BORING # 1 DATUM GEODETIC CASING BX 7
 BORING DATE FEB. 2, 1960 REPORT DATE FEB. 11, 1960 COMPILED BY J.A. M.W. CHECKED BY
 SAMPLER HAMMER WT. 140 LBS DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION



SAMPLE TYPES

A.S. AUGER SAMPLE
 S.T. SLOTTED TUBE
 W.S. WASHED SAMPLE
 D.O. DRIVE-OPEN
 D.F. DRIVE-FOOT VALVE
 C.S. CHUNK SAMPLE

F.S. FOIL SAMPLE
 S.O. SLEEVE-OPEN
 S.F. SLEEVE-FOOT VALVE
 T.O. THIN WALLED OPEN
 R.C. ROCK CORE

ABBREVIATIONS

V. IN-SITU VANE TEST
 M. MECHANICAL ANALYSIS
 U. UNCONFINED COMPRESSION
 Qc. TRIAXIAL CONSOLIDATED QUICK
 Q. TRIAXIAL QUICK
 S. TRIAXIAL SLOW

γ. WET UNIT WEIGHT
 K. PERMEABILITY
 C. CONSOLIDATION

WL. WATER LEVEL IN CASING
 WT. WATER TABLE IN SOIL

SOIL PROFILE

SAMPLES

ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	WATER CONTENT WT. %										OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS FT.
					DYNAMIC PENETRATION TEST BLOWS PER FOOT														
389.5		GROUND LEVEL		390															
0.0		SILTY TOPSOIL																	
388.0																			
1.5																			
		HARD GREY-BROWN SILTY TILL		385															
380.0				380															
9.5																			
		HARD REDDISH - BROWN CLAYEY SILT TILL		375															
				370															
				365															
360.0				360															
29.5																			
		WEATHERED REDDISH - BROWN SHALES		355															
356.5																			
33.0		SOFT SOUND REDDISH - BROWN SHALE BEDROCK		355															
354.7																			
34.8		END OF HOLE		350															

M CORE RECOVERY 50%

BXL CORE

1

M 20%

BXL CORE

2

20%

BXL CORE

3

11%

BXL CORE

4

10%

BXL CORE

5

R.C. RECOVERY 73%

BXL RC

6





OFFICE REPORT ON SOIL EXPLORATION

APPENDIX I

SAMPLE CONDITION

SAMPLE TYPES

ABBREVIATIONS

	DISTURBED
	FAIR
	GOOD
	LOST

A.S. - AUGER SAMPLE
S.T. - SLOTTED TUBE
W.S. - WASHED SAMPLE
D.O. - DRIVE-OPEN
D.F. - DRIVE FOOT VALVE
C.S. - CHUNK SAMPLE

FS - FOIL SAMPLE
SO - SLEEVE-OPEN
SF - SLEEVE-FOOT VALVE
TO - THIN WALLED OPEN
RC - ROCK CORE

V - IN-SITU VANE TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
QC - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW

A. WET UNIT WEIGHT
 X. PERMEABILITY
 C. CONSOLIDATION

WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE

ELEV. DEPTH

WATER CONDITIONS

DESCRIPTION

ISRAELI. FLOP.

EVALUATION
SCALE

WATER CONTENT Wt. %

ONAT 12W 12W 12W

OTHER
TESTS

SAMPLES

CONDITION

744.1

54
53
52
51
50

PENETRATION
RESISTANCE
BLOWS/FT

GROUND LEVEL

SUBJECT: TAPSCOTT

VERY STIFF TO HARD
GREY-BROWN AND
REDDISH-BROWN
CLAYEY SILT
TILL

HARD REDDISH-BROWN
CLAYEY SILT T.C.

END OF HOLE

158

५३

390

1975

270

345

1976

5.0

100

3301

1.5

367 4

20. 5

OFFICE REPORT ON SOIL EXPLORATION

CONTRACT 57033 BORING # 717EX-13 DATUM GEODETIC CASING
BORING DATE JAN. 25, 1960 REPORT DATE FEB. 11, 1960 COMPILED BY J.A. CHECKED BY A.
SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. LBS. ENERGY)

SAMPLE CONDITION



DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES

A.S. - AUGER SAMPLE
S.T. - SLOTTED TUBE
W.S. - WASHED SAMPLE
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
C.S. - CHUNK SAMPLE

F.S. - FOIL SAMPLE
S.O. - SLEEVE OPEN
S.F. - SLEEVE-FOOT VALVE
T.O. - THIN WALLED OPEN
R.C. - ROCK CORE

ABBREVIATIONS

V - IN-SITU VANE TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
QU - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW

7 - WET UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION

WL - WATER LEVEL IN CASIN
WT - WATER TABLE IN SOIL

SOIL PROFILE

SOIL PROFILE				WATER CONTENT WS				O NAT. FLW A Pw				OTHER TESTS	SAMPLES			
ELEVN. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	DYNAMIC PENETRATION TEST BLOWS PER FOOT								CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT
386.5		GROUND LEVEL		390												
0.0		SILTY TOPSOIL		385												
384.5				380												
2.0				375												
		HARD REDDISH-BROWN CLAYEY SILT TILL		370												
				365												
368.4		END OF HOLE														
18.1																

OFFICE REPORT ON SOIL EXPLORATION

APPEx. I.

SAMPLE CONDITION

SAMPLE TYPES

ABBREVIATIONS

<input type="checkbox"/>	DISTURBED
<input type="checkbox"/>	FAIR
<input type="checkbox"/>	GOOD
<input checked="" type="checkbox"/>	LOST

A.S. AUGER SAMPLE
S.T. SLOTTED TUBE
W.S. WASHED SAMPLE
D.O. DRIVE OPEN
D.F. DRIVE-FOOT VALVE
C.S. CHUNK SAMPLE

F.S. - FOIL SAMPLE
S.O. - SLEEVE OPEN
S.F. - SLEEVE FOOT VALVE
T.O. - THIN WALLED OPEN
R.C. - ROCK CORE

V - IN SITU VANE TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
QC - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW

G - WET UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION
 WL - WATER LEVEL IN CASING
 WT - WATER TABLE IN SOIL

SOIL PROFILE

SAMPLES

ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	WATER CONTENT W ₂			OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS FT.
					NAT	LW	PW					
					DYNAMIC PENETRATION TEST BLOWS PER FOOT							
392.9		GROUND LEVEL		395								
0.0		SILTY TOPSOIL		390								
391.4				385								
1.5				380								
		HARD GREY BROWN AND REDDISH-BROWN CLAYEY SILT TILL		375								
				370								
381.9				365								
11.0				360								
				355								
				350								
				345								
				340								
				335								
				330								
				325								
				320								
				315								
				310								
				305								
				300								
				295								
				290								
				285								
				280								
				275								
				270								
				265								
				260								
				255								
				250								
				245								
				240								
				235								
				230								
				225								
				220								
				215								
				210								
				205								
				200								
				195								
				190								
				185								
				180								
				175								
				170								
				165								
				160								
				155								
				150								
				145								

OFFICE REPORT ON SOIL EXPLORATION

APPENDIX I

SAMPLE CONDITION

SAMPLE TYPES

ABBREVIATIONS

	DISTURBED
	FAIR
	GOOD
	LOST

A.S. - AUGER SAMPLE
ST. - SLOTTED TUBE
W.S. - WASHED SAMPLE
D.O. - DRIVE-OPEN
D.F. - DRIVE-FOOT VALVE
C.S. - CHUNK SAMPLE

F.S. - FOIL SAMPLE
S.O. - SLEEVE-OPEN
S.F. - SLEEVE-FOOT VALVE
T.O. - THIN WALLED OPEN
R.C. - ROCK CORE

V - IN-SITU VANE TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
QC - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW

W - WET UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

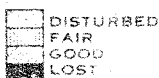
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GEOCON

OFFICE REPORT ON SOIL EXPLORATION

CONTRACT ST033 BORING # APPEX. I DATUM GEODETIC CASING BX
 BORING DATE FEB. 4, 1960 REPORT DATE FEB. 12, 1960 COMPILED BY J.A. CHECKED BY A.
 SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. - LBS. ENERGY)

SAMPLE CONDITION



A.S. - AUGER SAMPLE
 S.T. - SLOTTED TUBE
 W.S. - WASHED SAMPLE
 D.O. - DRIVE OPEN
 D.F. - DRIVE FOOT VALVE
 C.S. - CHUNK SAMPLE

SAMPLE TYPES

F.S. - FOIL SAMPLE
 S.O. - SLEEVE-OPEN
 S.F. - SLEEVE FOOT VALVE
 T.O. - THIN WALLED OPEN
 R.C. - ROCK CORE

ABBREVIATIONS

V - IN-SITU VANE TEST
 M - MECHANICAL ANALYSIS
 U - UNCONFINED COMPRESSION
 QC - TRIAXIAL CONSOLIDATED QUICK
 Q - TRIAXIAL QUICK
 S - TRIAXIAL SLOW
 γ - WET UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION
 WL - WATER LEVEL IN CASING
 WT - WATER TABLE IN SOIL

SOIL PROFILE

SAMPLES

ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLT	ELEVATION SCALE	WATER CONTENT W %			OTHER TESTS	CONDITION	TYPE	* NUMBER	PENETRATION RESISTANCE BLOWS FT.
					O NAT.	LW	PW					
					DYNAMIC PENETRATION TEST BLOWS PER FOOT							
				390								
388.0		GROUND LEVEL										
0.0		SILTY TOPSOIL										
286.2				385								
1.8												
		HARD GREY-BROWN SILTY TILL		380								
378.0												
10.0				375								
		HARD REDDISH- BROWN CLAYEY SILT TILL		370								
				365								
				360								
358.0		WEATHERED REDDISH - BROWN SHALE		355								
30.0												
356.0		SOFT SOUND REDDISH - BROWN SHALE BEDROCK										
32.0												
353.8		END OF HOLE		350								
34.7												

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CORE RECOVERY 100%

50%

35%

10%

36%

R.C. RECOVERY 70%

B.X.L. CORE

B.X.L. CORE

B.X.L. CORE

B.X.L. CORE

B.X.L. CORE

B.X.L. RC

GEOCON

OFFICE REPORT ON SOIL EXPLORATION

APPENDIX 2

CONTRACT NO. S7032 BORING # 7 AND 7A DATUM GEODETIC CASING BX
 BORING DATE FEB 1, 1960 REPORT DATE FEB 12, 1960 COMPILED BY J.A. CHECKED BY
 SAMPLER HAMMER WT 140 LBS DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION

DISTURBED
 FAIR
 GOOD
 LOST

SAMPLE TYPES

A.S. AUGER SAMPLE
 S.T. SLOTTED TUBE
 W.S. WASHED SAMPLE
 D.O. DRIVE OPEN
 D.F. DRIVE-FOOT VALVE
 C.S. CHUNK SAMPLE

F.S. FOIL SAMPLE
 S.O. SLEEVE-OPEN
 S.F. SLEEVE-FOOT VALVE
 T.O. THIN WALLED OPEN
 R.C. ROCK CORE

V. IN-SITU VANE TEST
 M. MECHANICAL ANALYSIS
 U. UNCONFINED COMPRESSION
 Q. TRIAXIAL CONSOLIDATED QUICK
 Q. TRIAXIAL QUICK
 S. TRIAXIAL SLOW

ABBREVIATIONS

W. UNIT WEIGHT
 K. PERMEABILITY
 C. CONSOLIDATION

WL. WATER LEVEL IN CASING
 WT. WATER TABLE IN SOIL

SOIL PROFILE

ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	WATER CONTENT W ₁ W ₂ W ₃ W ₄ W ₅ W ₆ W ₇ W ₈ W ₉ W ₁₀ NAT. LW. ΔPw										OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS FT.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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GEOCON

OFFICE REPORT ON SOIL EXPLORATION

APPEX-I

CONTRACT 57033 BORING # B AND D DATUM GEODETIC CASING
 BORING DATE FEB. 1, 1960 REPORT DATE FEB. 12, 1960 COMPILED BY J.A. CHECKED BY
 SAMPLER HAMMER WT 140 LBS DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION

☐ DISTURBED
☐ FAIR
☐ GOOD
☐ LOST

SAMPLE TYPES

A.S. AUGER SAMPLE
 S.T. SLOTTED TUBE
 W.S. WASHED SAMPLE
 D.O. DRIVE OPEN
 D.F. DRIVE FOOT VALVE
 C.S. CHUNK SAMPLE
 F.S. FOIL SAMPLE
 S.O. SLEEVE OPEN
 S.F. SLEEVE FOOT VALVE
 T.O. THIN WALLED OPEN
 R.C. ROCK CORE

ABBREVIATIONS

V. IN-SITU VANE TEST
 M. MECHANICAL ANALYSIS
 U. UNCONFINED COMPRESSION
 Q.C. TRIAXIAL CONSOLIDATED QUICK
 Q. TRIAXIAL QUICK
 S. TRIAXIAL SLOW
 W.U.W. WET UNIT WEIGHT
 K. PERMEABILITY
 C. CONSOLIDATION
 W.L. WATER LEVEL IN CASING
 W.T. WATER TABLE IN SOIL

SOIL PROFILE

ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	WATER CONTENT W%			OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS FT.	
					NAT	LW	PW						
					DYNAMIC PENETRATION TEST BLOWS PER FOOT								
366.8 0.0	SEE REPORT	GROUND LEVEL			100								
364.0 2.8		SILTY TOPSOIL		365						250	1	5	
362.3 4.5		STIFF REDDISH-BROWN CLAYEY SILT TILL								S.O.	2	15	
359.8 7.0		WEATHERED REDDISH-BROWN SHALE		360						S.O.	3	45	
										S.O.	4	>100	
										D.O.	5	>100	
			SOFT SOUND REDDISH-BROWN SHALE BEDROCK		355						D.O.	6	86
											D.O.	7	>100
349.2 17.6			END OF HOLE		350						D.O.	8	>100
					345								
				365	10								
363.0 0.0	SEE REPORT	GROUND LEVEL											
360.4 2.6		SILTY ORGANIC TOPSOIL		360						250	1	3	
358.0 5.0		VERY STIFF REDDISH-BROWN CLAYEY SILT TILL								S.O.	2	16	
356.0 7.0		WEATHERED REDDISH-BROWN SHALE		355						S.O.	3	40	
										S.O.	4	>100	
										D.O.	5	>100	
			SOFT SOUND REDDISH-BROWN SHALE BEDROCK		350						D.O.	6	>100
											D.O.	7	>100
345.4 17.0		END OF HOLE		340						D.O.	8	>100	

GEOCON

OFFICE REPORT ON SOIL EXPLORATION

APPENDIX I

CONTRACT 57033 BORING # 10 AND 11 DATUM GEODETIC CASING
 BORING DATE FEB. 24, 1960 REPORT DATE FEB. 12, 1960 COMPILED BY J.A. CHECKED BY J.F.
 SAMPLER HAMMER WT. 140 LBS DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. LBS. ENERGY)

SAMPLE CONDITION

☐ DISTURBED
☐ FAIR
☐ GOOD
☐ LOST

SAMPLE TYPES

A.S. - AUGER SAMPLE
 S.T. - SLOTTED TUBE
 W.S. - WASHED SAMPLE
 D.O. - DRIVE-OPEN
 D.F. - DRIVE-FOOT VALVE
 C.S. - CHUNK SAMPLE
 F.S. - FOIL SAMPLE
 S.O. - SLEEVE-OPEN
 S.F. - SLEEVE-FOOT VALVE
 T.O. - THIN WALLED OPEN
 R.C. - ROCK CORE

ABBREVIATIONS

V - IN-SITU VANE TEST
 M - MECHANICAL ANALYSIS
 U - UNCONFINED COMPRESSION
 Q.C. - TRIAXIAL CONSOLIDATED QUICK
 Q - TRIAXIAL QUICK
 S - TRIAXIAL SLOW
 W - WET UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION
 WL - WATER LEVEL IN CASING
 WT - WATER TABLE IN SOIL

SOIL PROFILE				SAMPLES					
ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS FT.
				WATER CONTENT W% NAT. LW PW					
				DYNAMIC PENETRATION TEST BLOWS PER FOOT					
366.9 0.0 1.0	SEE REPORT	GROUND LEVEL SILTY TOPSOIL						1	5
361.9 5.0		WEATHERED REDDISH-BROWN SHALE						2	36
354.3 12.6		SOFT SOUND REDDISH-BROWN SHALE BEDROCK						3	72
								4	>100
		END OF HOLE					5	>100	
								6	>100
365.5 0.0 1.0	SEE REPORT	GROUND LEVEL SILTY TOPSOIL						1	6
362.5 3.0		FIRM TO STIFF REDDISH-BROWN CLAYEY SILT TILL						2	29
361.0 4.5		WEATHERED REDDISH- BROWN SHALE						3	>100
		SOFT SOUND REDDISH-BROWN SHALE BEDROCK						4	>100
								5	>100
								6	62
351.8 13.7		END OF HOLE							

APPEND. I.

SAMPLE CONDITION

SAMPLE TYPES


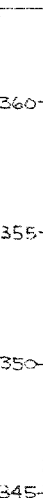
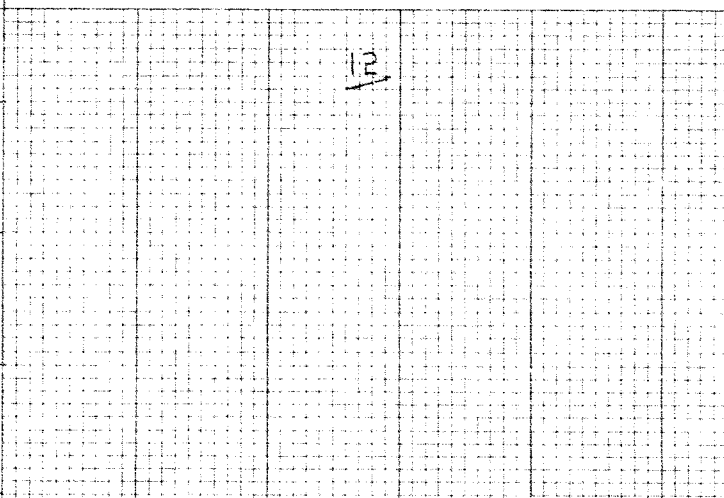



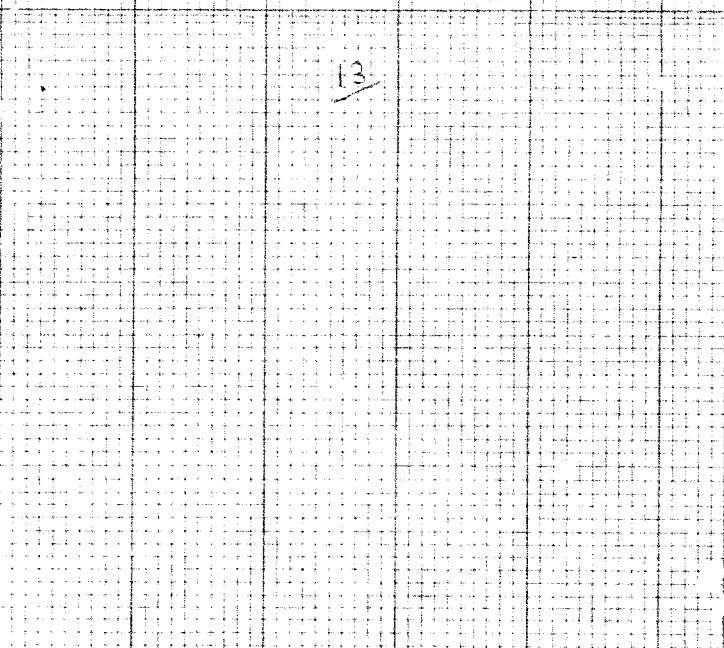

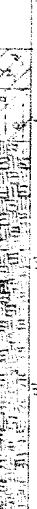
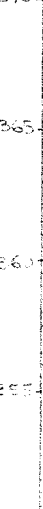
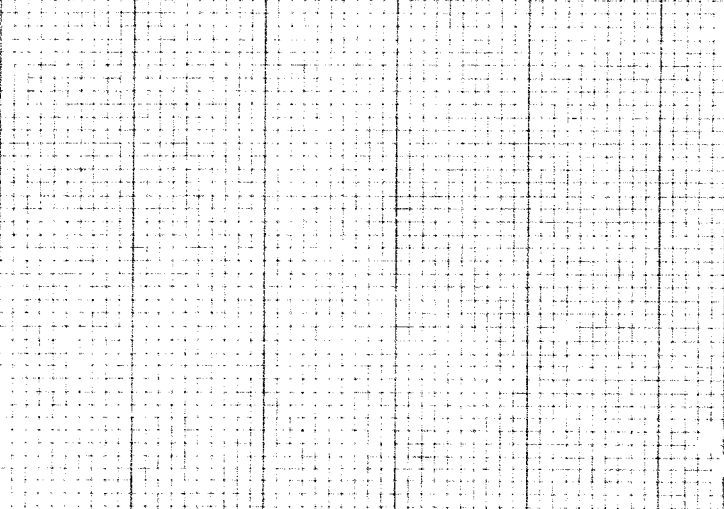
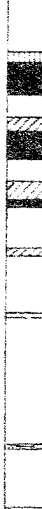


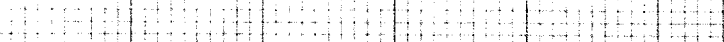

ABBREVIATIONS

F.S. - FOIL SAMPLE
S.O. - SLEEVE-OPEN
S.F. - SLEEVE-FOOT VALVE
T.O. - THIN WALLED OPEN
R.C. - ROCK CORE

- V - IN-SITU VANE TEST
- M - MECHANICAL ANALYSIS
- U - UNCONFINED COMPRESSION
- QC - TRIAXIAL CONSOLIDATED QUICK
- Q - TRIAXIAL QUICK
- S - TRIAXIAL SLOW

γ - WET UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION

WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE														OTHER TESTS		SAMPLES																				
ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	WATER CONTENT W _p O NAT. TLW Δ PW											CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS/FT.																	
					DYNAMIC PENETRATION TEST BLOWS PER FOOT																															
360.7	SEE REPORT	GROUND LEVEL																																		
0.0		SILTY TOPSOIL																			360	2" SO	1	3												
0		FIRM REDDISH-BROWN CLAYEY SILT TILL																				SO	2	35												
357.7		WEATHERED REDDISH-BROWN SHALE																				SO	3	>100												
5.0																						SO	4	>100												
355.7	SEE REPORT	SOFT SOUND REDDISH-BROWN SHALE BEDROCK																																		
5.0																							D.O.	5	>100											
347.6		END OF HOLE																				345	D.O.	6	>100											
13.1																																				
368.1	SEE REPORT	GROUND LEVEL																																		
0.0		SILTY TOPSOIL																				370	2" SO	1	3											
365.6		HARD REDDISH-BROWN CLAYEY SILT TILL																				365	SO	2	41											
5.6																							SO	3	>100											
364.6																							SO	4	>100											
18.0	SEE REPORT	SOFT SOUND REDDISH-BROWN SHALE BEDROCK																																		
5.6																							D.O.	5	>100											
350.1		END OF HOLE																				350	D.O.	6	>100											
18.0																							A.S.	7	—											

GEOCON

OFFICE REPORT ON SOIL EXPLORATION

APPENDIX I

CONTRACT 37033 BORING # 12A DATUM GEODETIC CASING BX
 BORING DATE FEB. 23, 1960 REPORT DATE APRIL 9, 1960 COMPILED BY M.A. CHECKED BY
 SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. LBS. ENERGY

SAMPLE CONDITION

☐ DISTURBED
☐ FAIR
☐ GOOD
☐ LOST

SAMPLE TYPES

A.S. - AUGER SAMPLE
 S.T. - SLOTTED TUBE
 W.S. - WASHED SAMPLE
 D.O. - DRIVE OPEN
 D.F. - DRIVE FOOT VALVE
 C.S. - CHUNK SAMPLE
 F.S. - FOIL SAMPLE
 S.O. - SLEEVE OPEN
 S.F. - SLEEVE FOOT VALVE
 T.O. - THIN WALLED OPEN
 R.C. - ROCK CORE

ABBREVIATIONS

V - IN-SITU VANE TEST
 M - MECHANICAL ANALYSIS
 U - UNCONFINED COMPRESSION
 Q - TRIAXIAL CONSOLIDATED QUICK
 Q - TRIAXIAL QUICK
 S - TRIAXIAL SLOW
 W - WET UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION
 WL - WATER LEVEL IN CASING
 WT - WATER TABLE IN SOIL

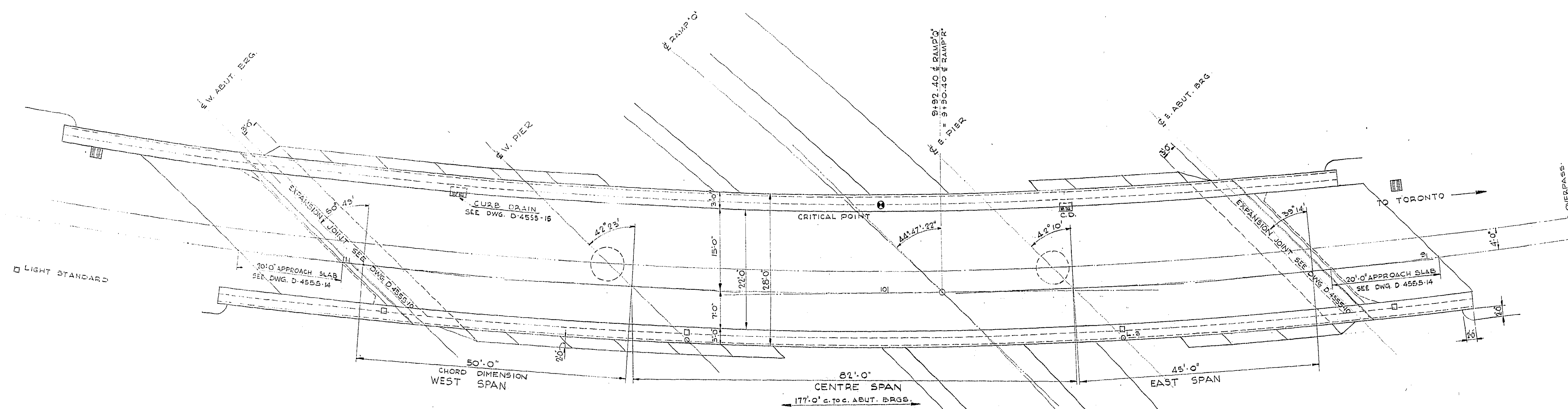
SOIL PROFILE

SOIL PROFILE												SAMPLES			
ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	WATER CONTENT W				OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOWS		
					O NAT LW Δ PW										
					DYNAMIC PENETRATION TEST BLOWS PER FOOT										
369.0		GROUND LEVEL		70											
368.0		SILTY TOPSOIL		68											
367.0		HARD REDDISH BROWN CLAYEY SILT TILL		66											
366.0				64											
365.0				62											
364.0				60											
363.0				58											
362.0				56											
361.0				54											
360.0				52											
359.0				50											
358.0				48											
357.0				46											
356.0				44											
355.0				42											
354.0				40											
353.0				38											
352.0				36											
351.0				34											
350.0				32											
349.0				30											
348.0				28											
347.0				26											
346.0				24											
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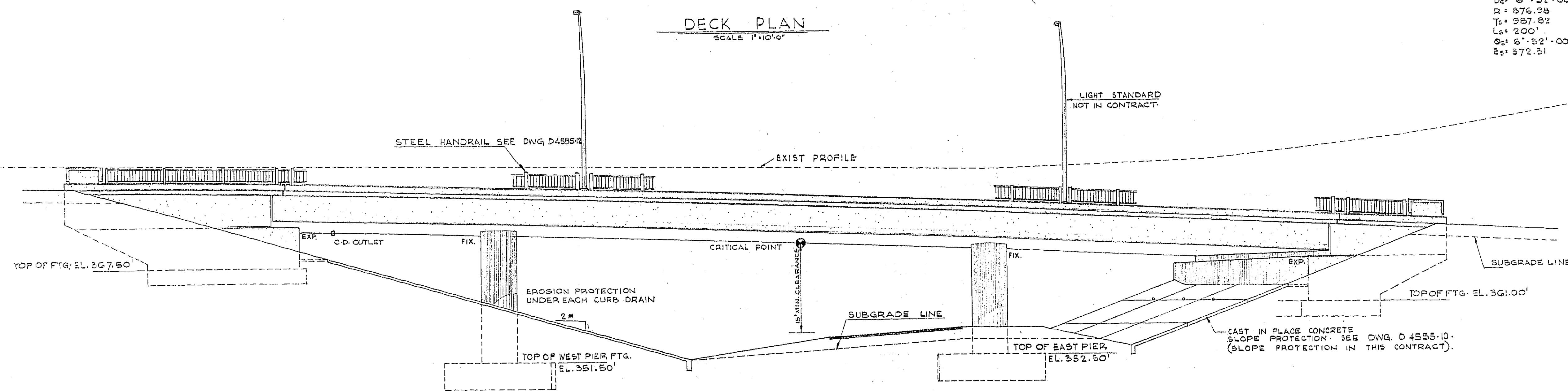
Appendix B

Archive Drawings of Existing Bridge (Construction and Rehabilitation)



CURVE DATA

Δ	30° 51' 55"
Δc	77° 20' 58"
Dc	6° 22' 00"
R	976.98
Ts	557.82
Ls	200'
Sc	6° 52' 00"
Ss	572.51

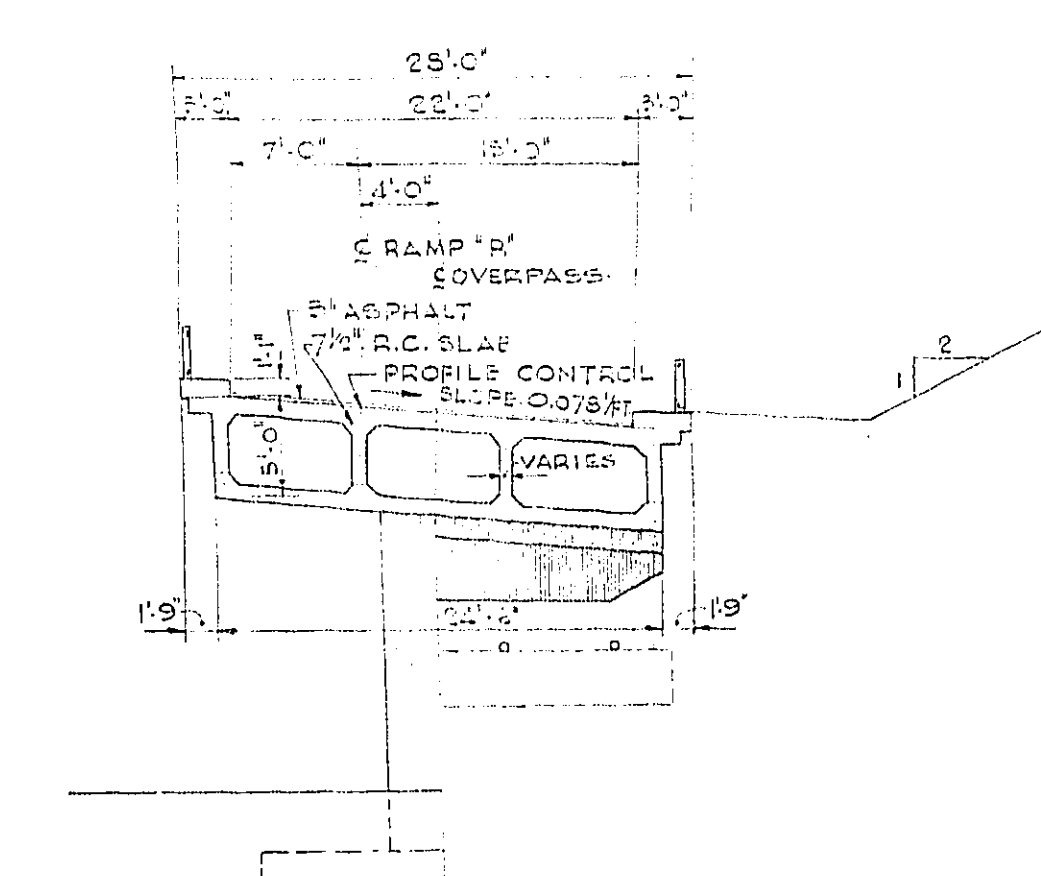
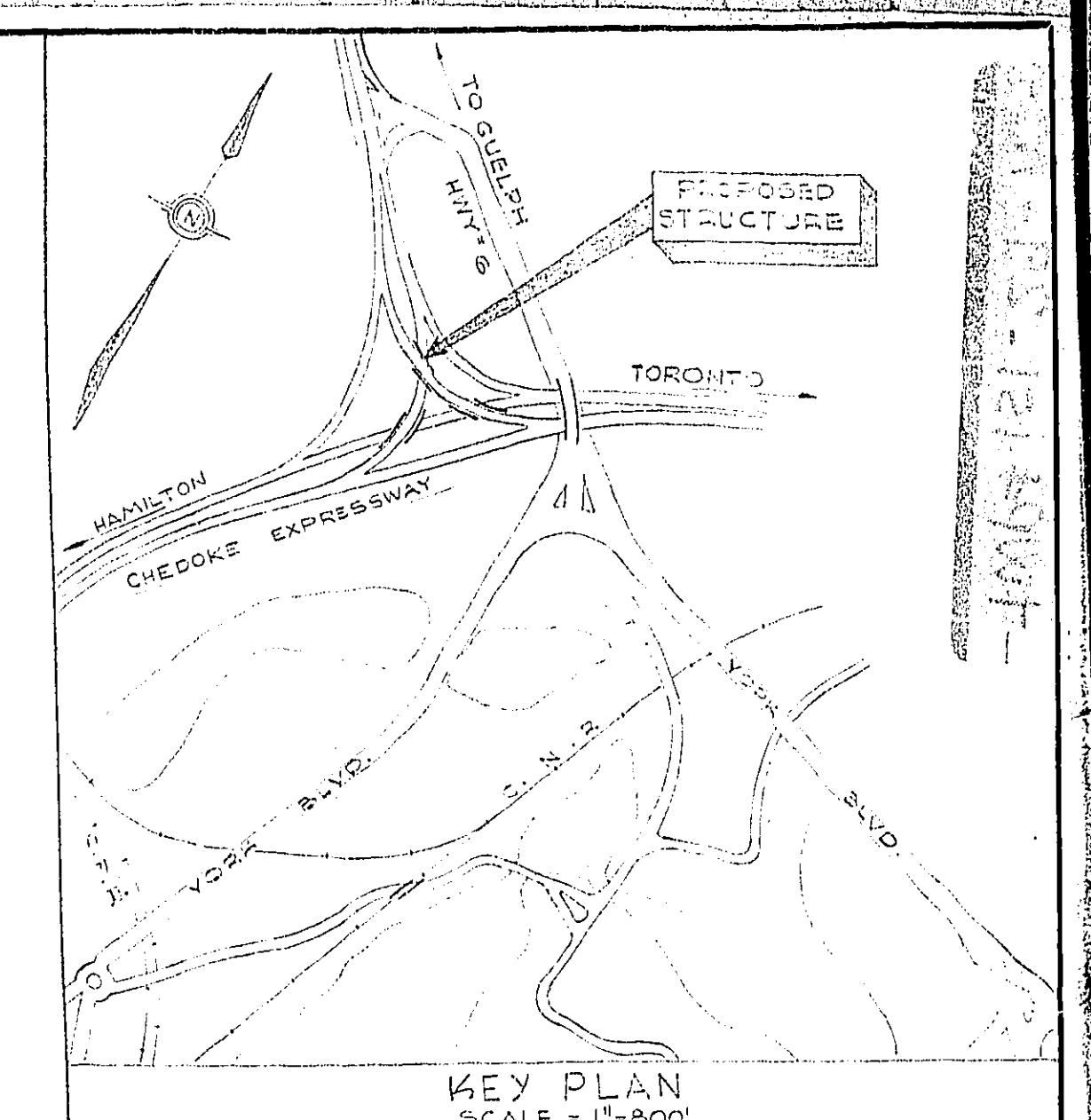
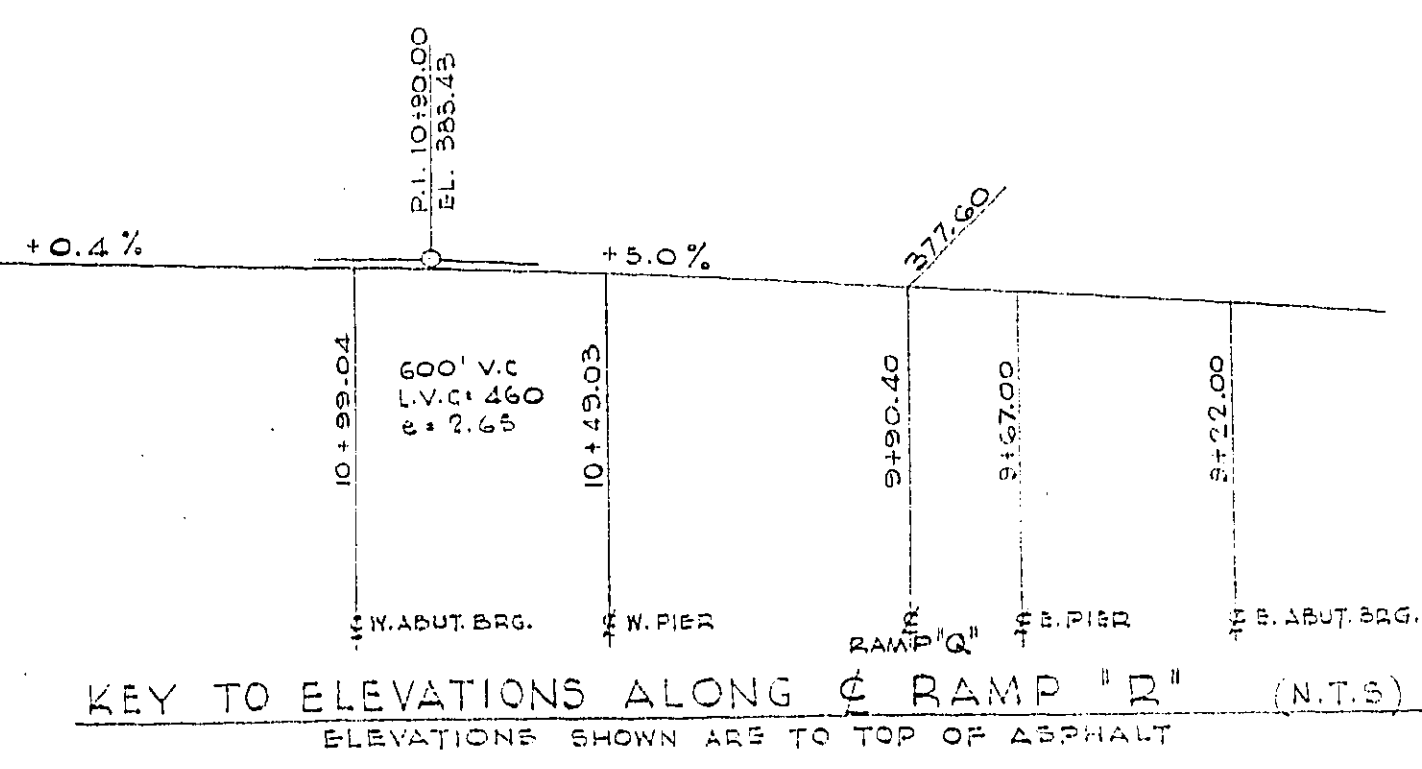


DRAWING LIST

- D-4555-1 GENERAL ARRANGEMENT
- D-4555-2 FOUNDATION PLAN & DETAILS
- D-4555-3 EAST ABUTMENT & WING WALL DETAIL
- D-4555-4 WEST ABUTMENT & WING WALL DETAIL
- D-4555-5 WEST & EAST SPANS - BOTTOM SLAB REINF.
- D-4555-6 CENTRE SPAN, BOTTOM SLAB REINF.
- D-4555-7 WEST SPAN - TOP SLAB REINFORCING
- D-4555-8 EAST SPAN - TOP SLAB REINFORCING
- D-4555-9 DECK ELEV. JOINT LOCATIONS & POST SPACING
- D-4555-10 MISCELLANEOUS DETAILS
- D-4555-11 ABUTMENT BEARING DETAILS
- D-4555-12 GUARDRAIL DETAILS
- D-4555-13 ELECTRICAL DETAILS
- D-4555-14 APPROACH SLAB DETAILS
- D-4555-15 CURB DRAIN DETAILS
- D-4555-16 REINFORCING STEEL SCHEDULE
- D-4555-17 " " " "
- D-4555-18 " " " "
- D-4555-19 " " " "
- D-4555-20 " " " "
- D-4555-21 " " " "
- D-4555-22 " " " "
- D-4555-23 " " " "

PROPERTIES OF SKEW ANGLES

SKEW	SINE	COSINE	TANGENT
35° 14'	.582480	.774577	.516549
42° 10'	.671285	.741195	.305685
44° 47' 12"	.704805	.709701	.332577
42° 25'	.674088	.738651	.312552
50° 45'	.775125	.631804	1.226850



GENERAL NOTES:

NOTE TO DISTRICT ENGINEER - CONCRETE WORK ON THIS STRUCTURE MUST NOT BE COMMENCED UNTIL MONUMENTS TO FIX CONTROL POINTS HAVE BEEN ERECTED AND CHECKED BY THE DISTRICT ENGINEER.

NOTE TO CONTRACTOR - STRUCTURE TO BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRUCTURES, D.H.O. FORM NO. 3 AND THE SPECIAL PROVISIONS, EXTRA COPIES OF WHICH MAY BE OBTAINED FROM THE DISTRICT ENGINEER.

CONCRETE MIX - ALL CONCRETE IN STRUCTURE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 POUNDS PER SQUARE INCH AT 28 DAYS.

AN APPROVED ADMIXTURE SUPPLIED BY THE DEPARTMENT WILL BE ADDED TO ALL CONCRETE AS SPECIFIED BY THE MATERIALS AND RESEARCH SECTION, D.H.O.

MAXIMUM SIZE OF AGGREGATE FOR ALL CONCRETE - 1 1/2 INCHES EXCEPT IN DECK AND COLUMNS, WHERE THE MAXIMUM SIZE IS ONE INCH.

REINFORCING STEEL - CLEAR COVER IN FOOTINGS - 3 INCHES.

CLEAR COVER FOR ALL OTHER CONCRETE IN CONTACT WITH EARTH OR ROCK - 3 INCHES.

CLEAR COVER IN DECK 1 1/2 INCHES TOP AND ONE INCH BOTTOM.

CLEAR COVER FOR REMAINING CONCRETE IN STRUCTURE TWO INCHES EXCEPT WHERE OTHERWISE NOTED.

ALL BAR SPICES TO BE LAPPED 35 DIAMETERS UNLESS OTHERWISE NOTED.

CONSTRUCTION NOTES - FOR NOTES CONCERNING FOUNDATION CONSTRUCTION SEE DRAWING D-4555-2.

ALL EXPOSED CONCRETE EDGES TO HAVE 1" X 1" CHAMFER EXCEPT AS OTHERWISE NOTED.

NO CONCRETE TO BE PLACED BEFORE MATERIALS HAVE BEEN APPROVED AND A MIX ESTABLISHED TO THE SATISFACTION OF THE ENGINEER.

NO CONCRETE TO BE PLACED BEFORE FORMWORK, FALSEWORK AND REINFORCING STEEL HAVE BEEN CHECKED AND APPROVED BY THE ENGINEER.

CONCRETE DECK MUST BE PLACED ON SPANS IN SEQUENCE SHOWN ON DRAWINGS.

CONSTRUCTION JOINTS SHALL BE MADE ONLY WHERE LOCATED ON THE DRAWINGS UNLESS OTHERWISE APPROVED BY THE ENGINEER.

PRINT RECORD

NO.	FOR	DATE
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2	FOR	11-10-60
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61668
TWP 151-29-1-R

DATE	BY	DESCRIPTION
10-10-60	ALB	REVISED AS CONSTRUCTED
11-10-60	JCC	DWG LIST REVISED
12-10-60	JCC	DWG LIST REVISED

BRIDGE NO. 6 W.P. 365-50
C. C. PARKER & PARSONS, BRINCKERHOFF LIMITED
HAMILTON CONSULTING ENGINEERS, ONTARIO
DEPARTMENT OF HIGHWAYS, ONTARIO
BRIDGE OFFICE - TORONTO

**CHEDOKE EXPRESSWAY
RAMP 'D' OVERPASS**

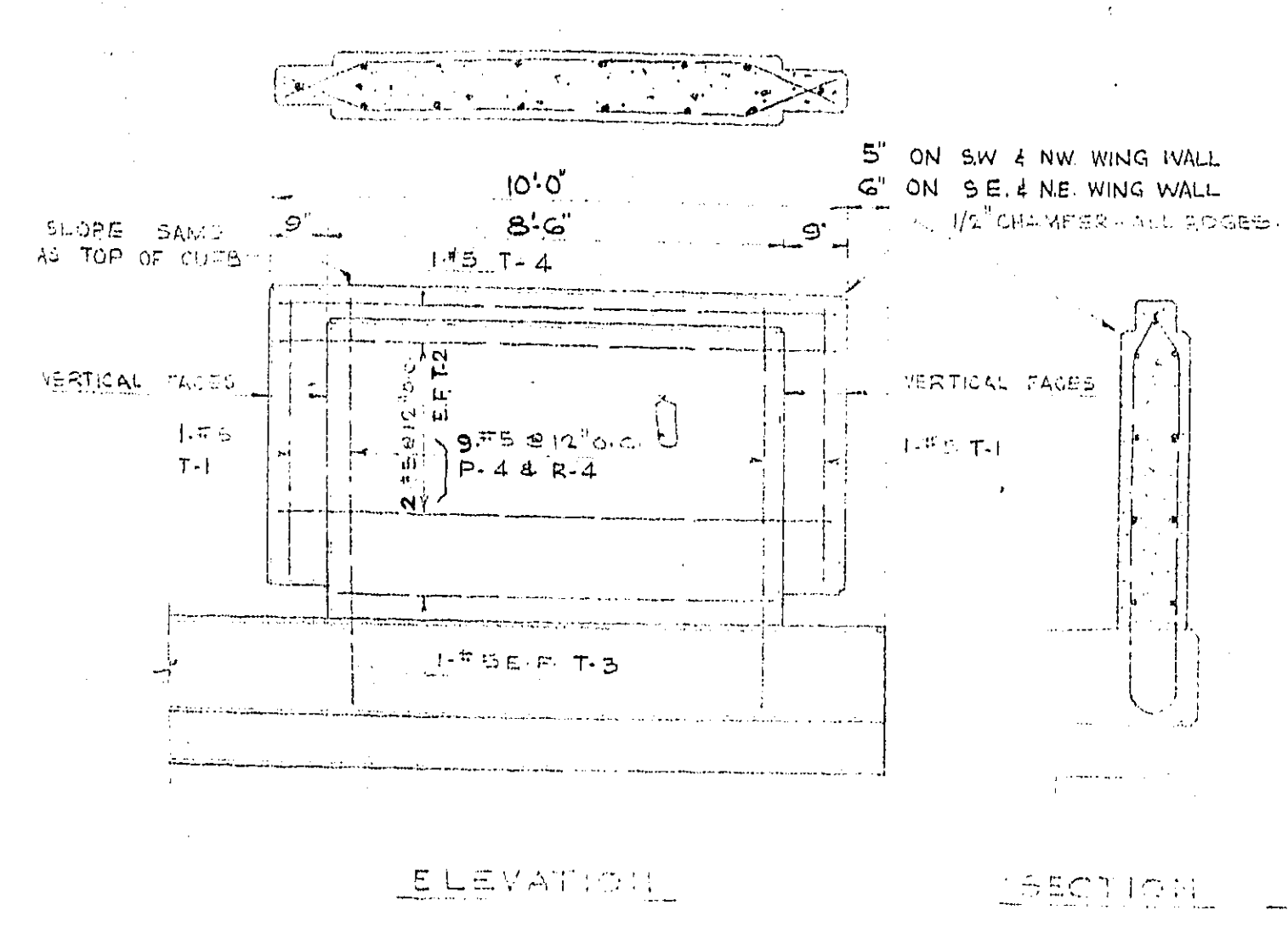
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CO. OF WENTWORTH
TWP. OF WEST FLAMBOROUGH LOT 28 CON. 11

GENERAL ARRANGEMENT

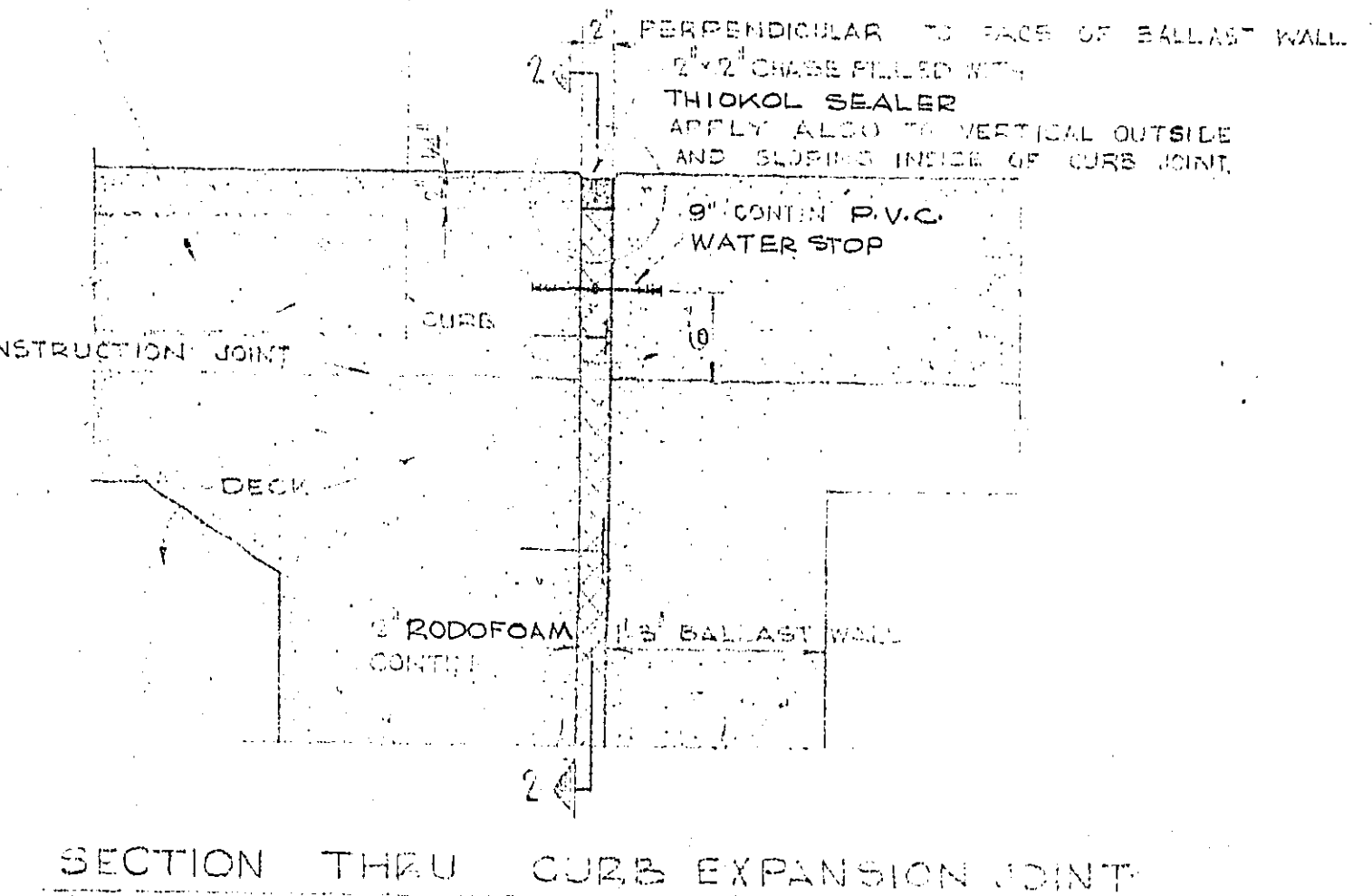
APPROVED *Bill L...*
BRIDGE ENGINEER DESIGN ENGINEER

DESIGN	G.W.A.	CHECK	R.K.C.C.	CONTRACT	NUMBER
DRAWING	W.C.	CHECK	F.B.	LOADING	NUMBER
DATE	AUG 12 1960	BY			

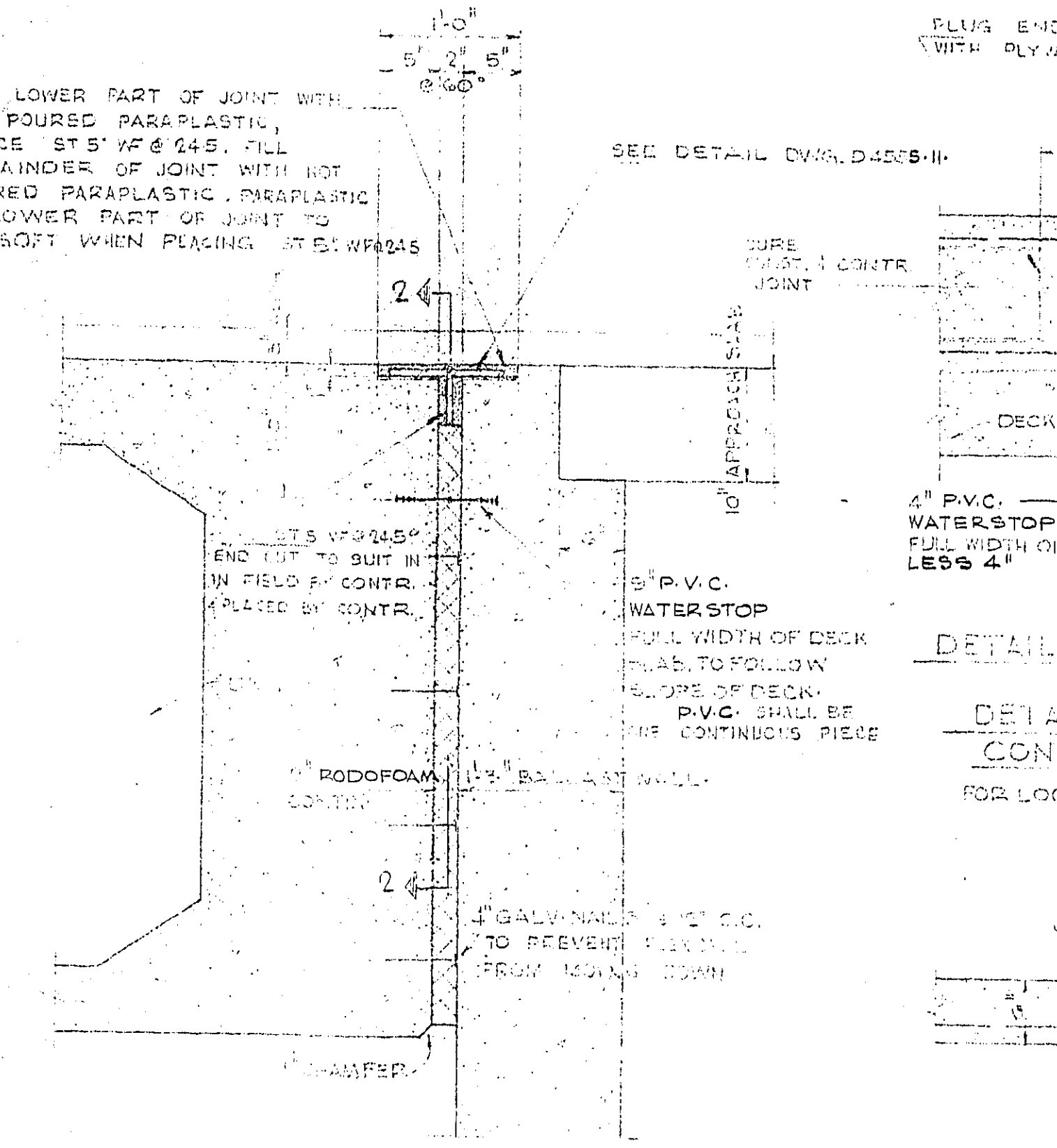
5164 60-209



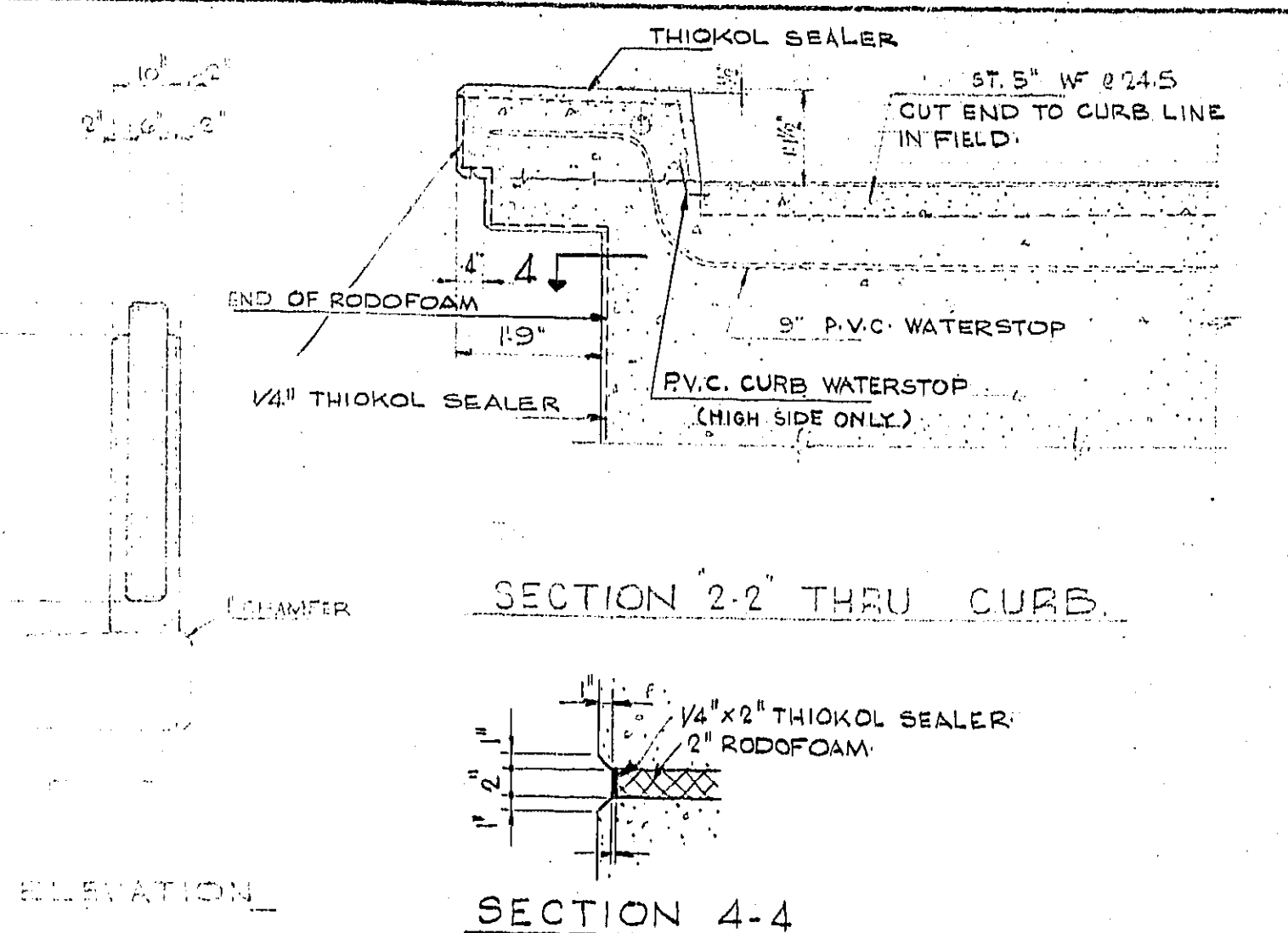
ALL CONCRETE TUBES PLUGS AND PATCHINGS SUPPLIED & PLACED BY CONTRACTOR.



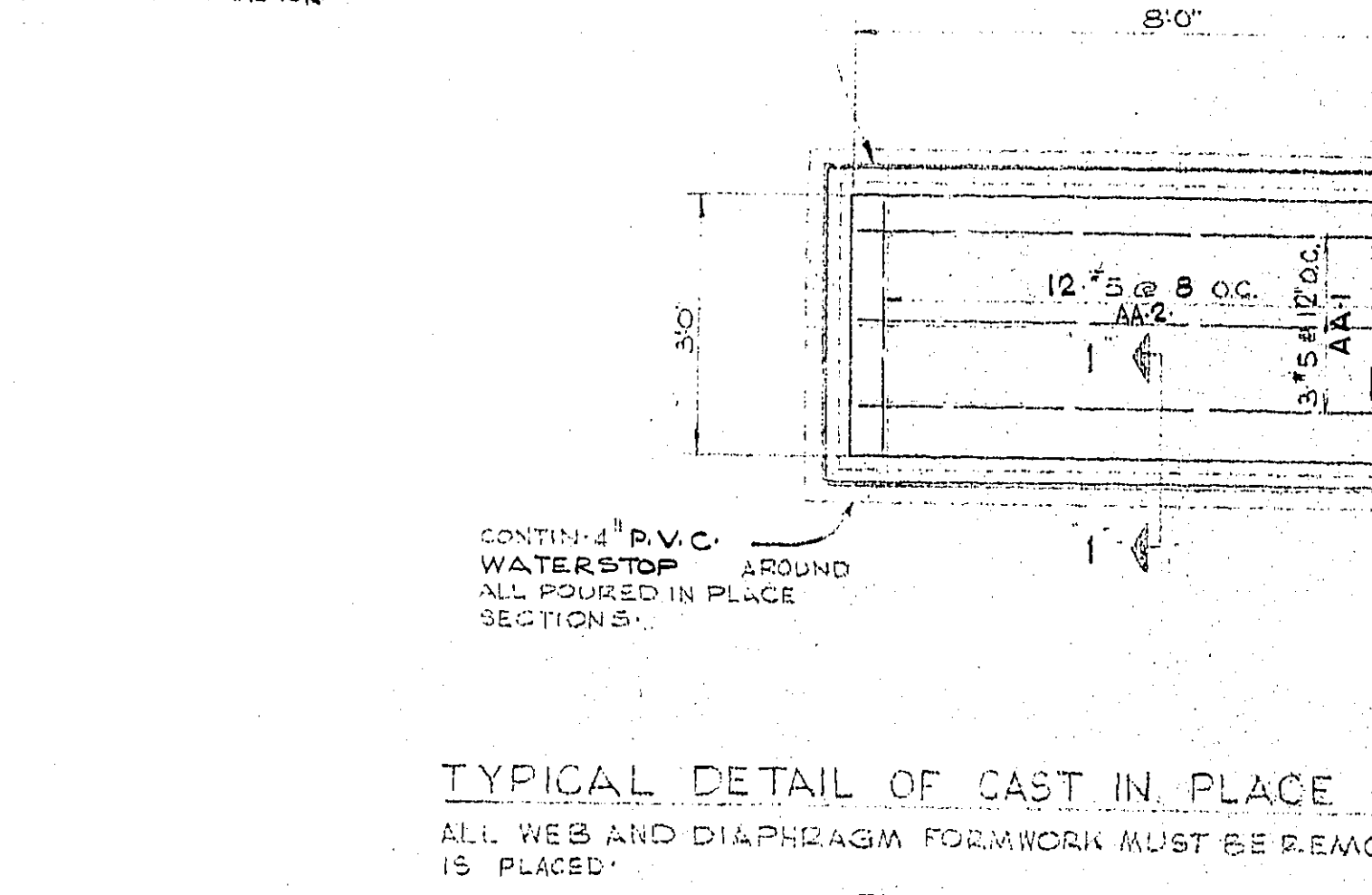
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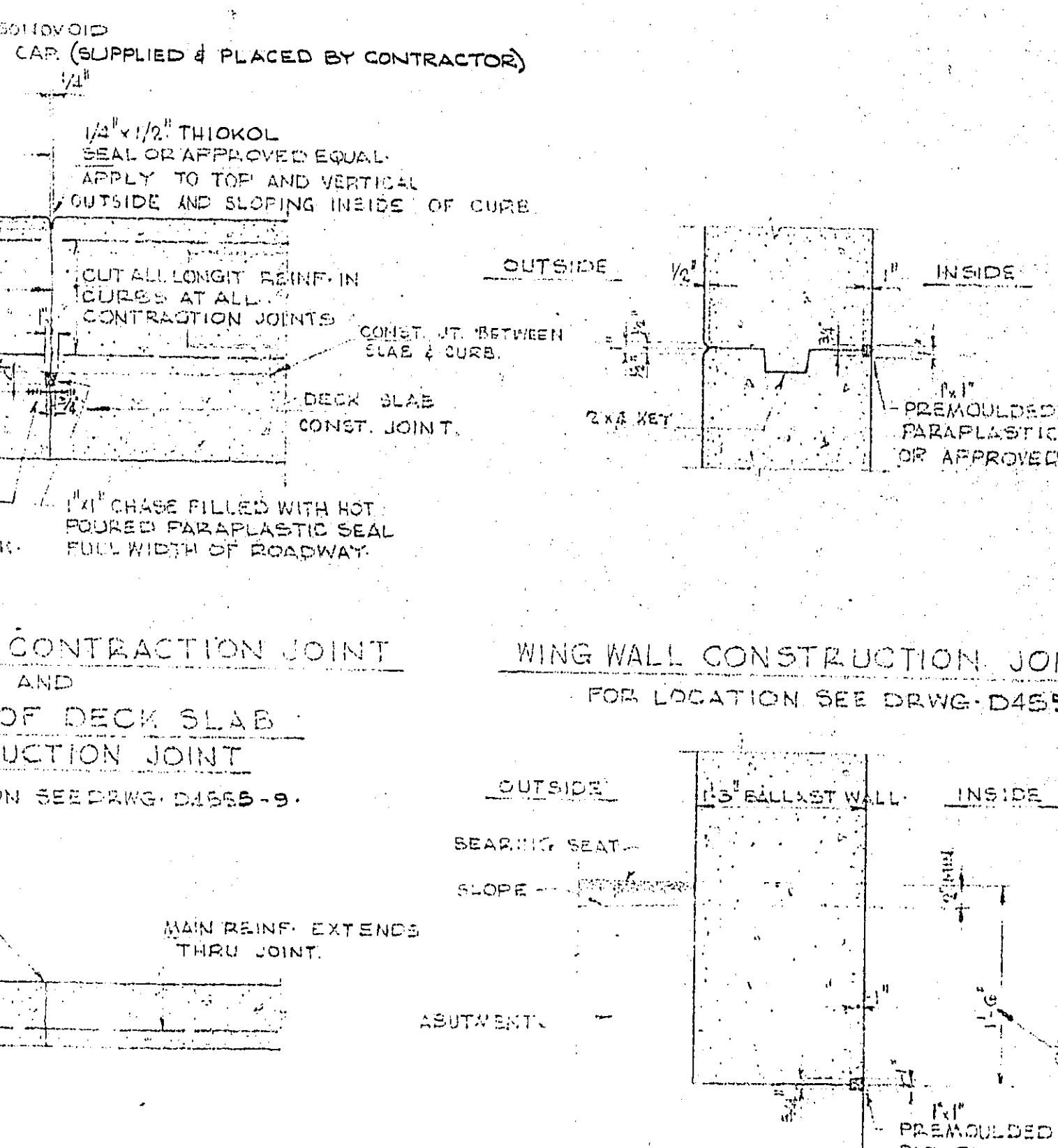
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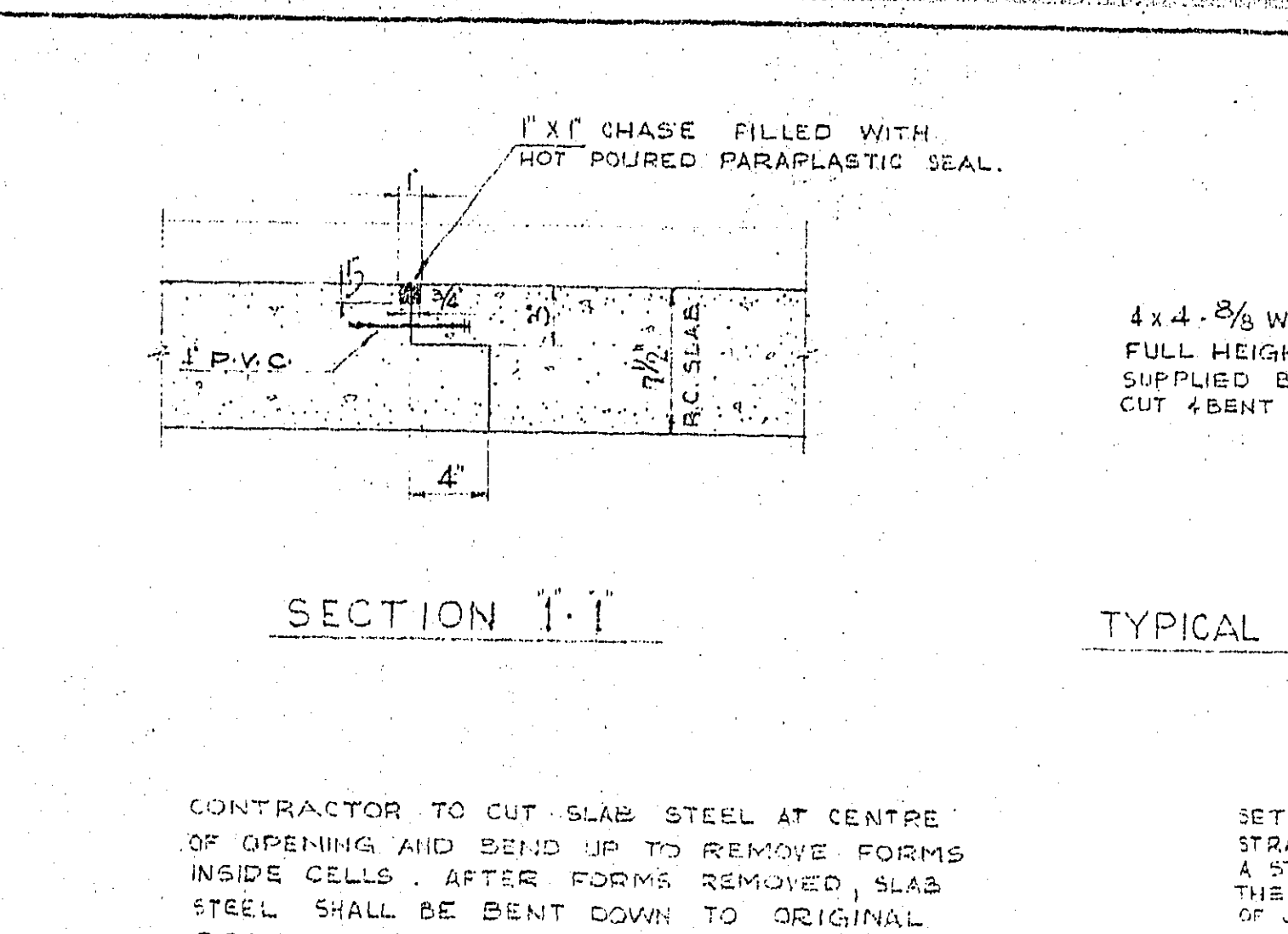
SECTION 2-2 THRU CURB



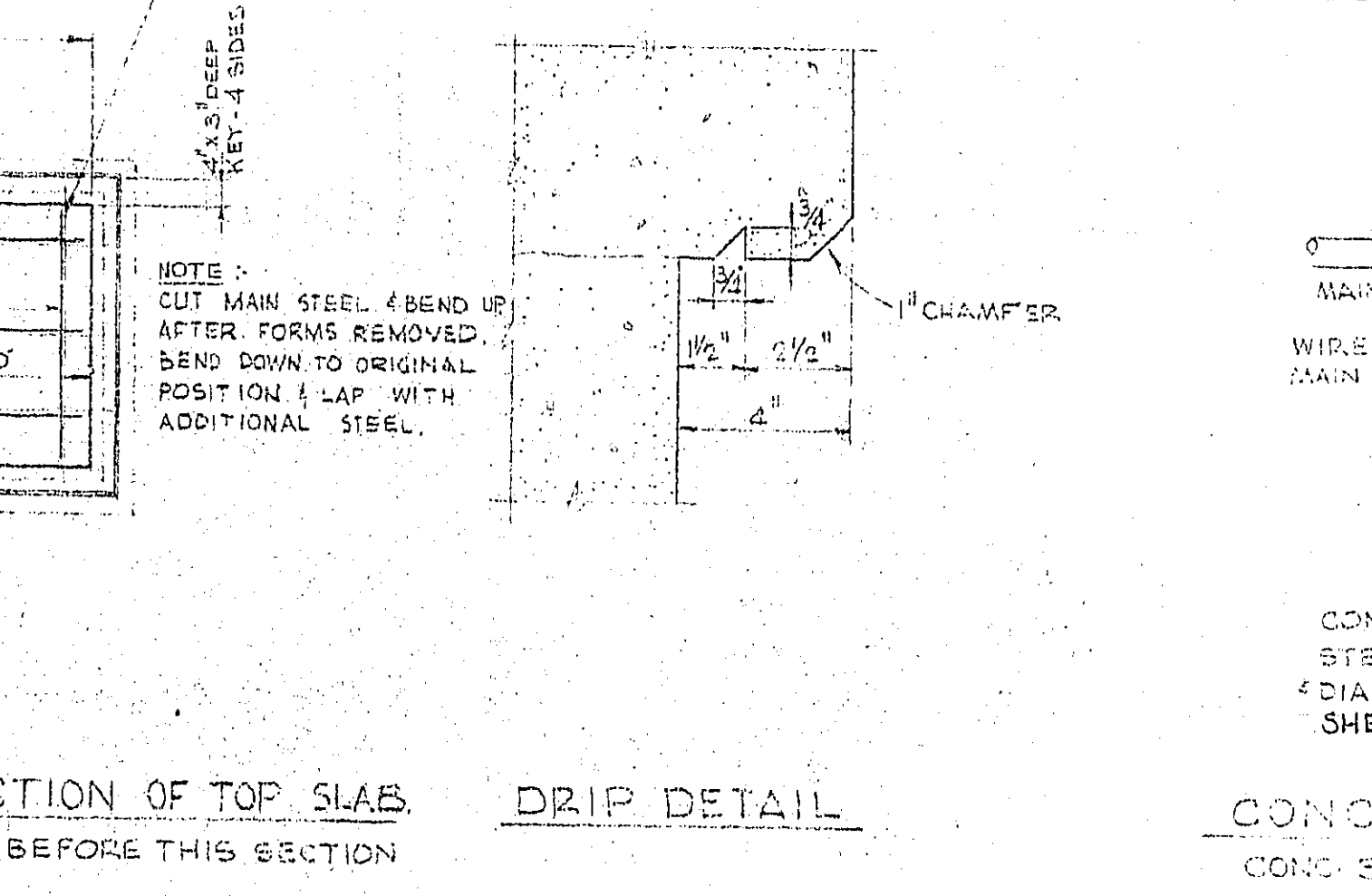
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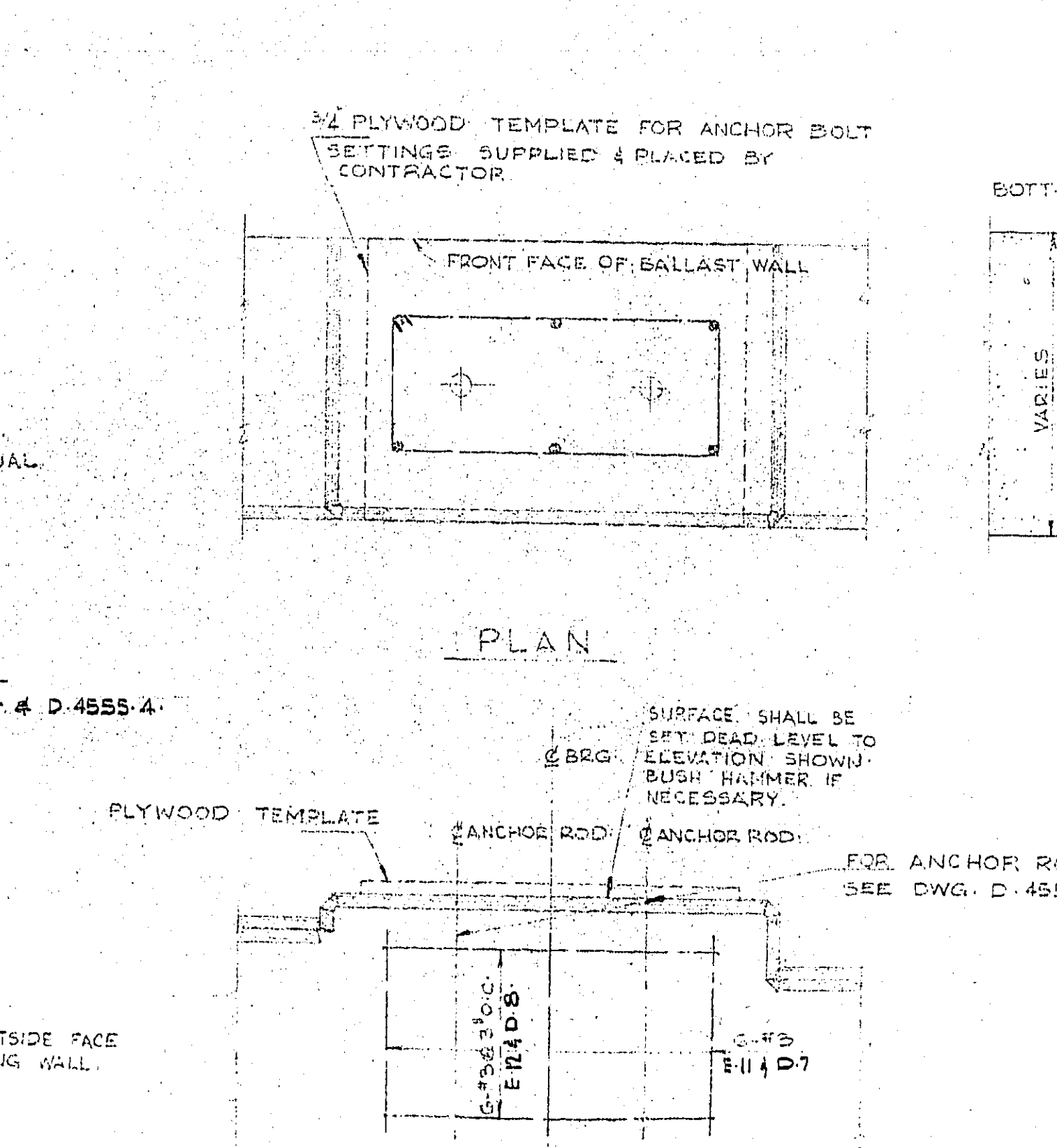
DETAIL OF BOTTOM SLAB CONSTRUCTION JOINT



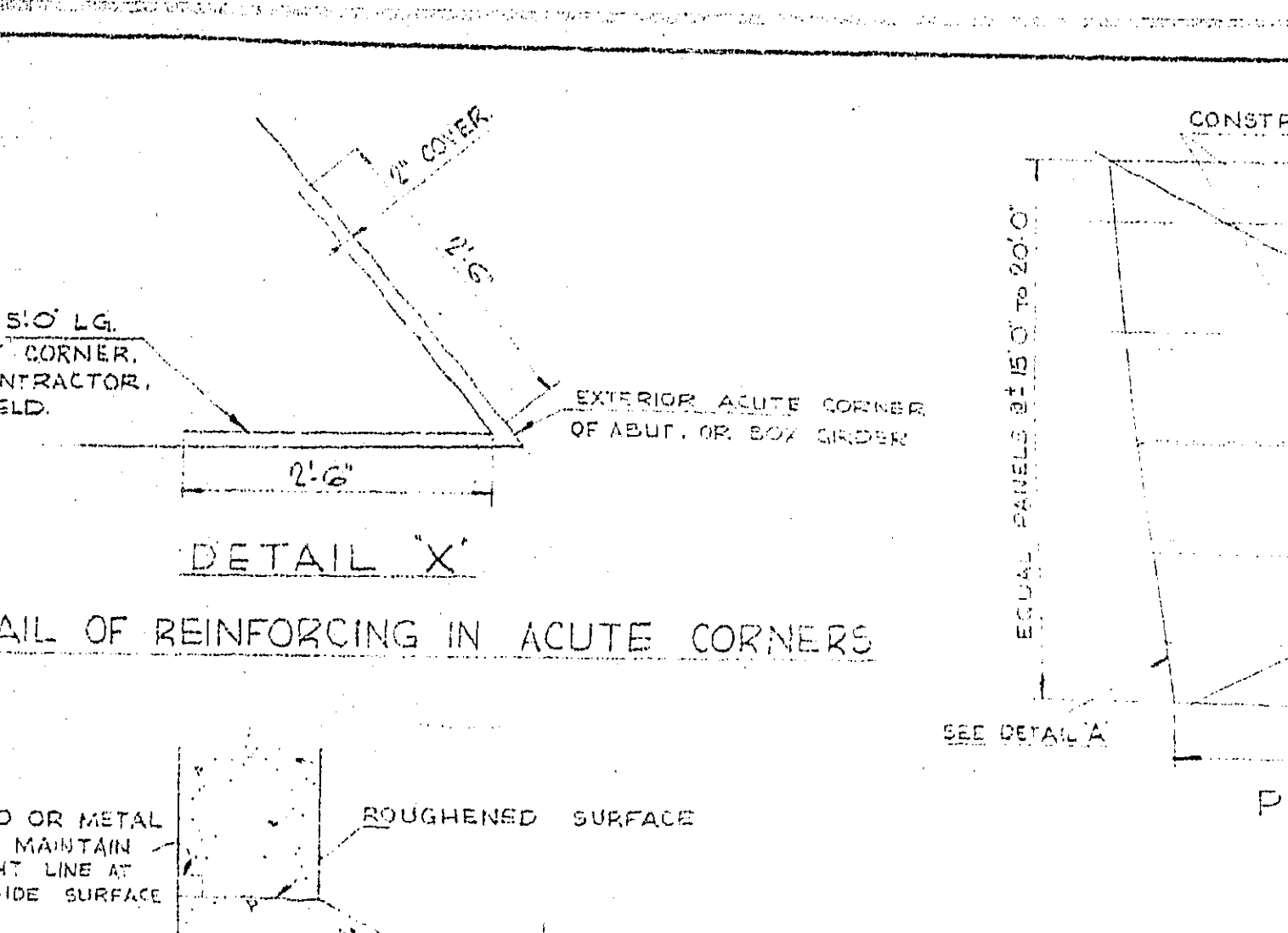
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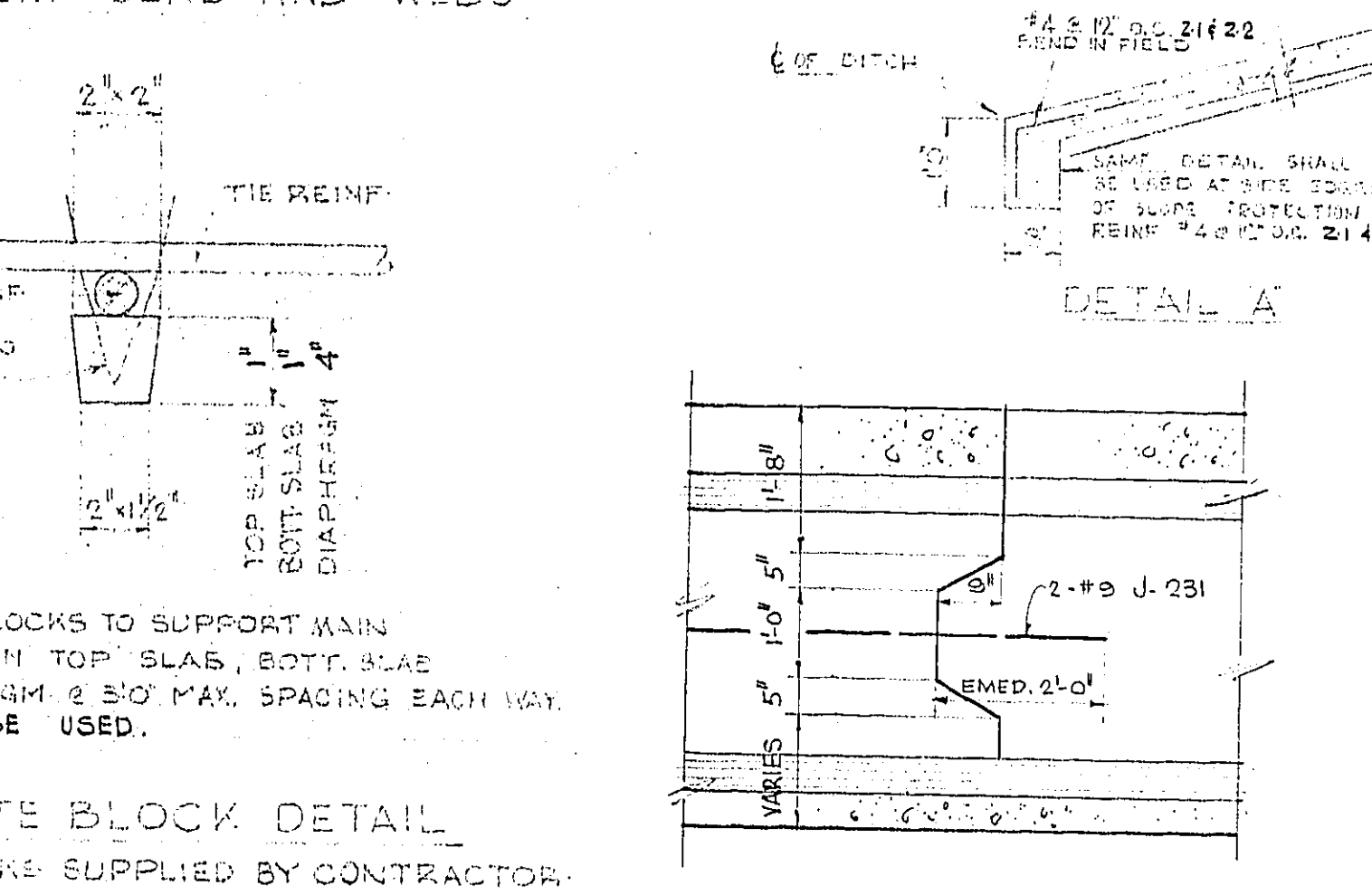
TYPICAL DETAIL OF CAST IN PLACE SECTION OF TOP SLAB



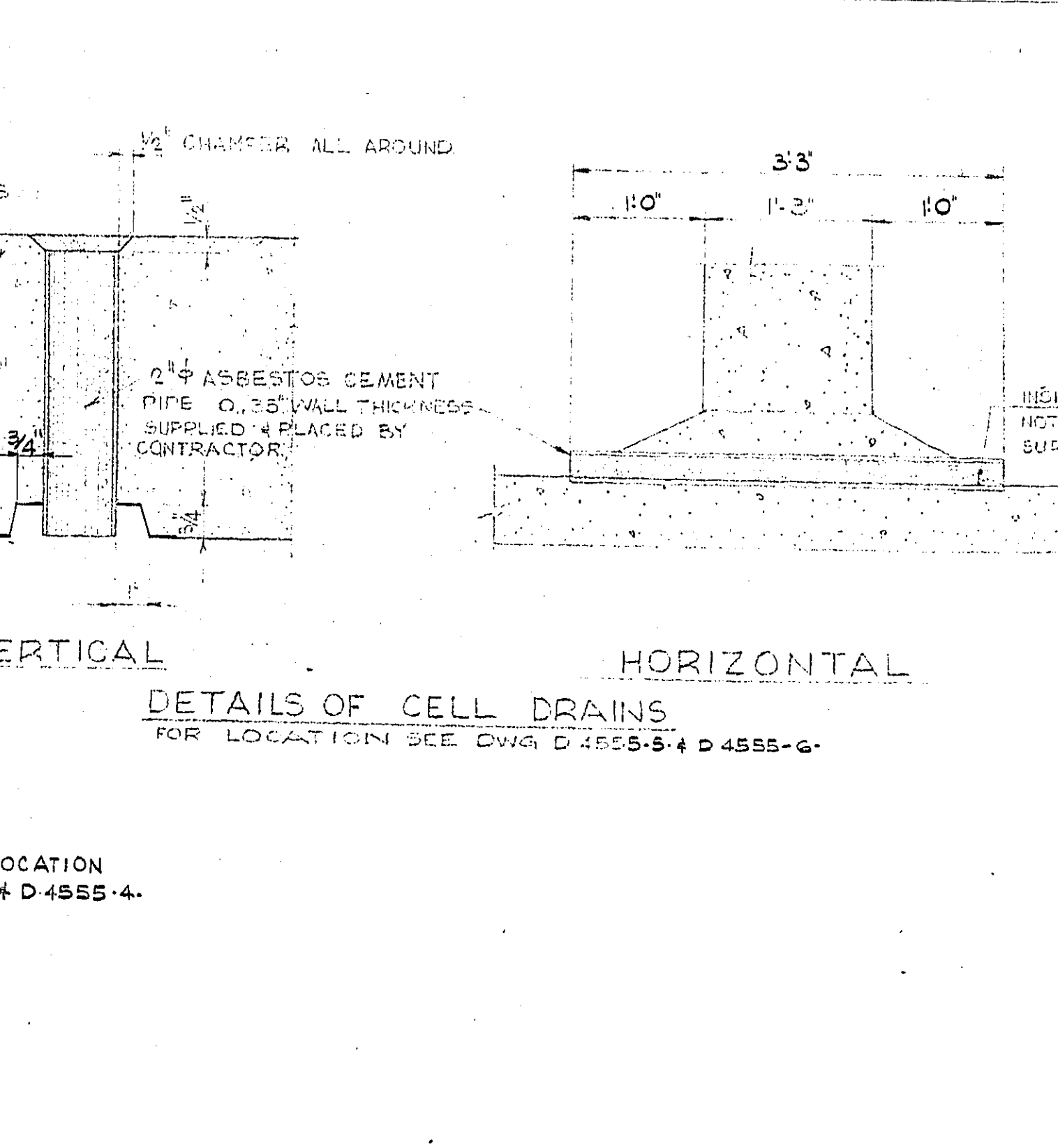
DETAIL OF JOINT BETWEEN BOTTOM SLAB AND WEBS



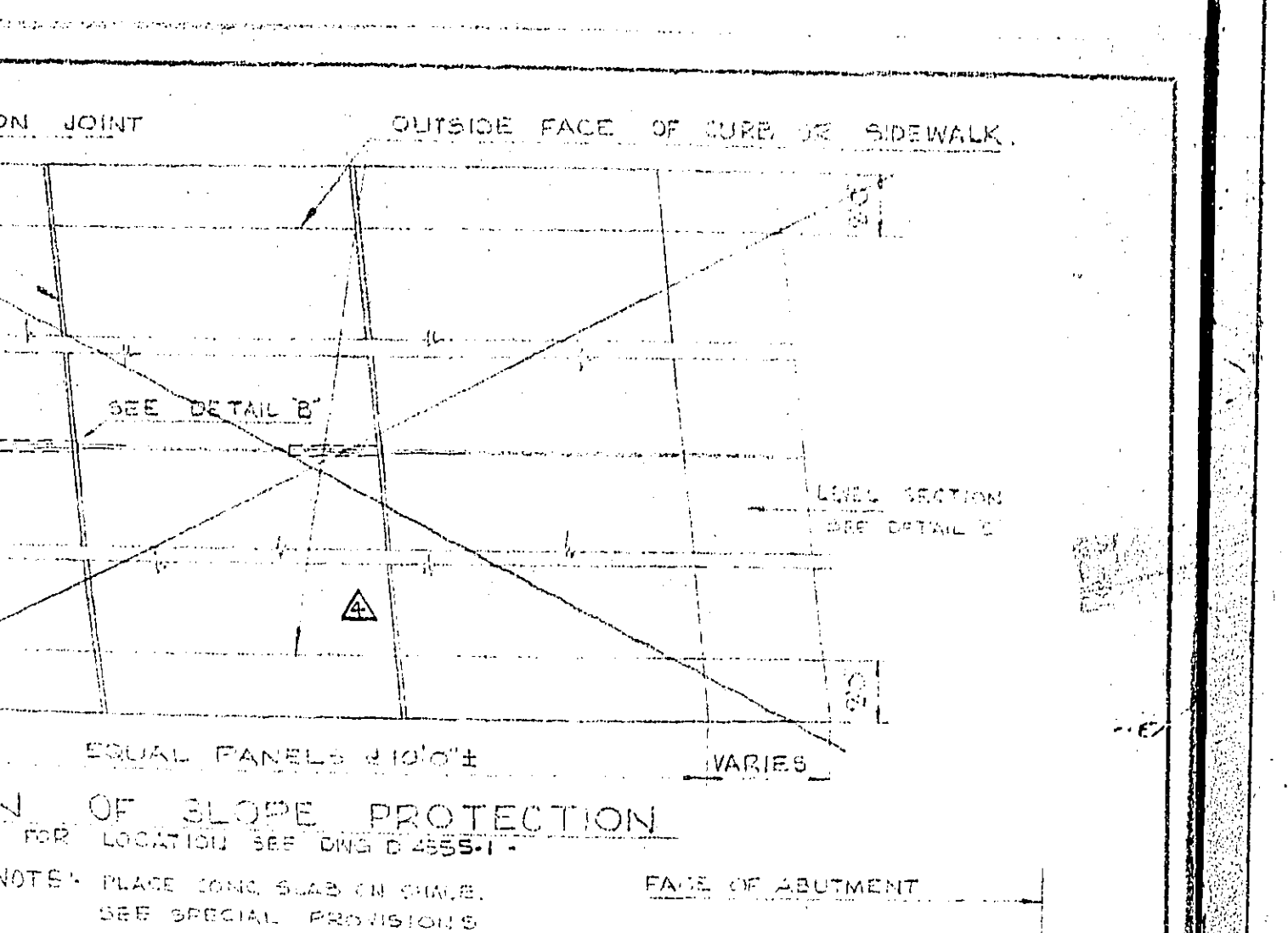
TYPICAL DETAIL OF REINFORCING IN ACUTE CORNERS



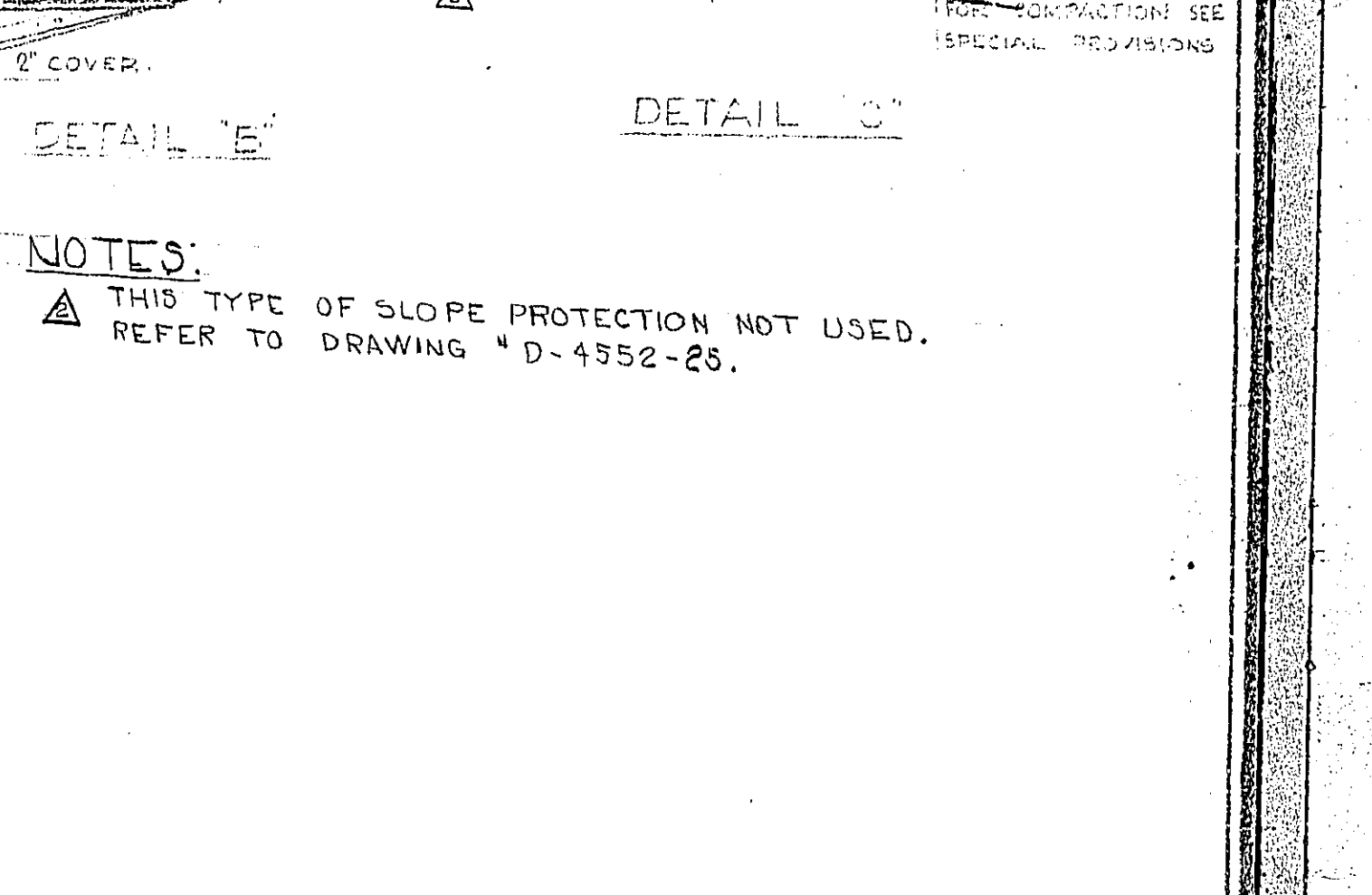
DETAIL OF JOINT BETWEEN BOTTOM SLAB AND WEBS



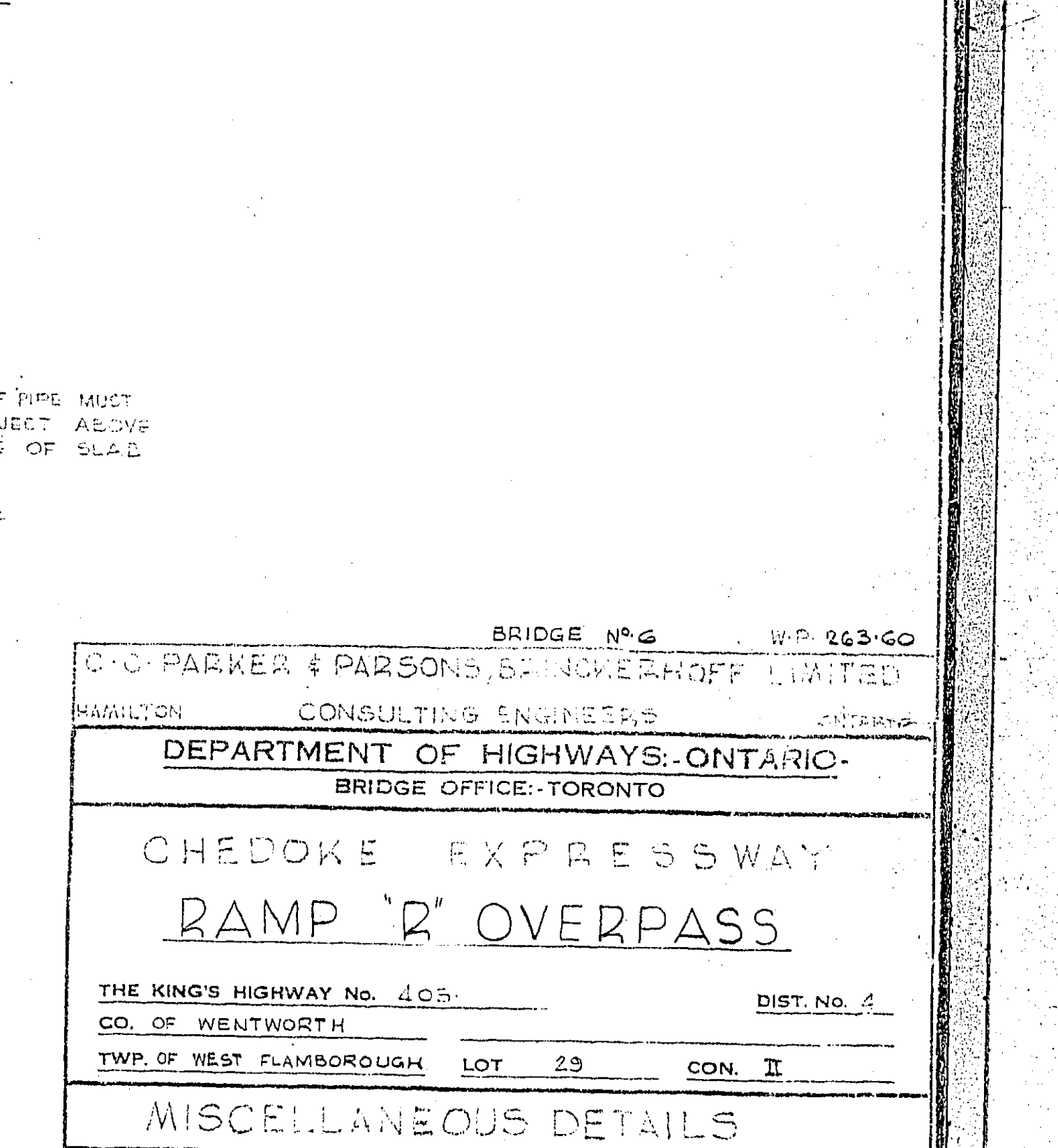
DETAIL OF JOINT BETWEEN BOTTOM SLAB AND WEBS



PLAN OF SLOPE PROTECTION

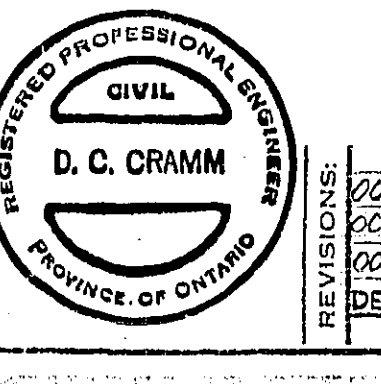


DETAIL OF JOINT BETWEEN BOTTOM SLAB AND WEBS



DETAIL OF JOINT BETWEEN BOTTOM SLAB AND WEBS

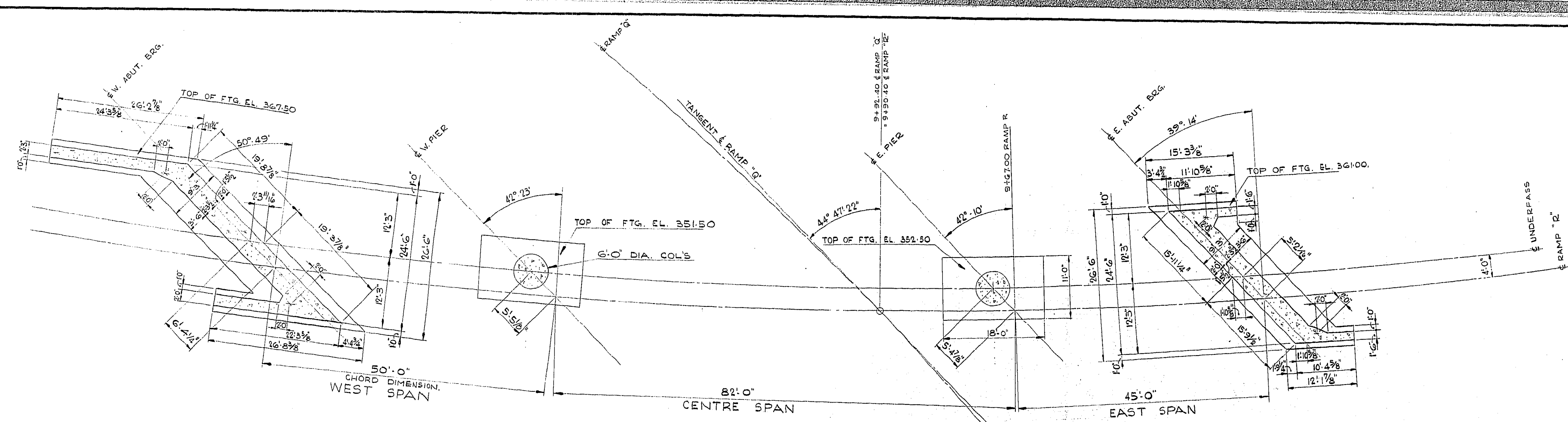
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REVISION	DATE	BY	DESCRIPTION
1	10/12/60	D.C.C.	REVISED PLAN OF SLOPE PROTECTION
2	10/12/60	D.C.C.	REVISED PLAN OF SLOPE PROTECTION
3	10/12/60	D.C.C.	REVISED PLAN OF SLOPE PROTECTION
4	10/12/60	D.C.C.	REVISED PLAN OF SLOPE PROTECTION
5	10/12/60	D.C.C.	REVISED PLAN OF SLOPE PROTECTION
6	10/12/60	D.C.C.	REVISED PLAN OF SLOPE PROTECTION
7	10/12/60	D.C.C.	REVISED PLAN OF SLOPE PROTECTION
8	10/12/60	D.C.C.	REVISED PLAN OF SLOPE PROTECTION
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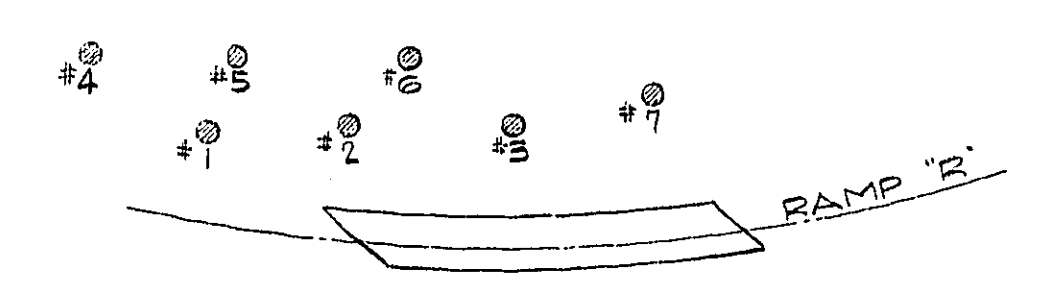
61669

BRIDGE No. 6		W.P. 263-60	
C.O. PARKER & PARSONS, ENGINEERS LIMITED			
CONSULTING ENGINEERS			
DEPARTMENT OF HIGHWAYS-ONTARIO			
BRIDGE OFFICE-TORONTO			
CHODOKE EXPRESSWAY			
RAMP 'B' OVERPASS			
THE KING'S HIGHWAY No. 405		DIST. No. 4	
CO. OF WENTWORTH		TWP. OF WEST FLAMBOROUGH	
LOT 29		CON. II	
MISCELLANEOUS DETAILS			
APPROVED			
BRIDGE ENGINEER		DESIGN ENGINEER	
D.C. CRAMM		D.C. CRAMM	
DATE		DATE	
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DRAWING		DRAWING	
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D.C.C.		D.C.C.	
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CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
AUG 12, 1960		AUG 12, 1960	
DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	
D.C.C.		D.C.C.	
DATE		DATE	
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DRAWING		DRAWING	
G.S.N.		G.S.N.	
CHECK		CHECK	

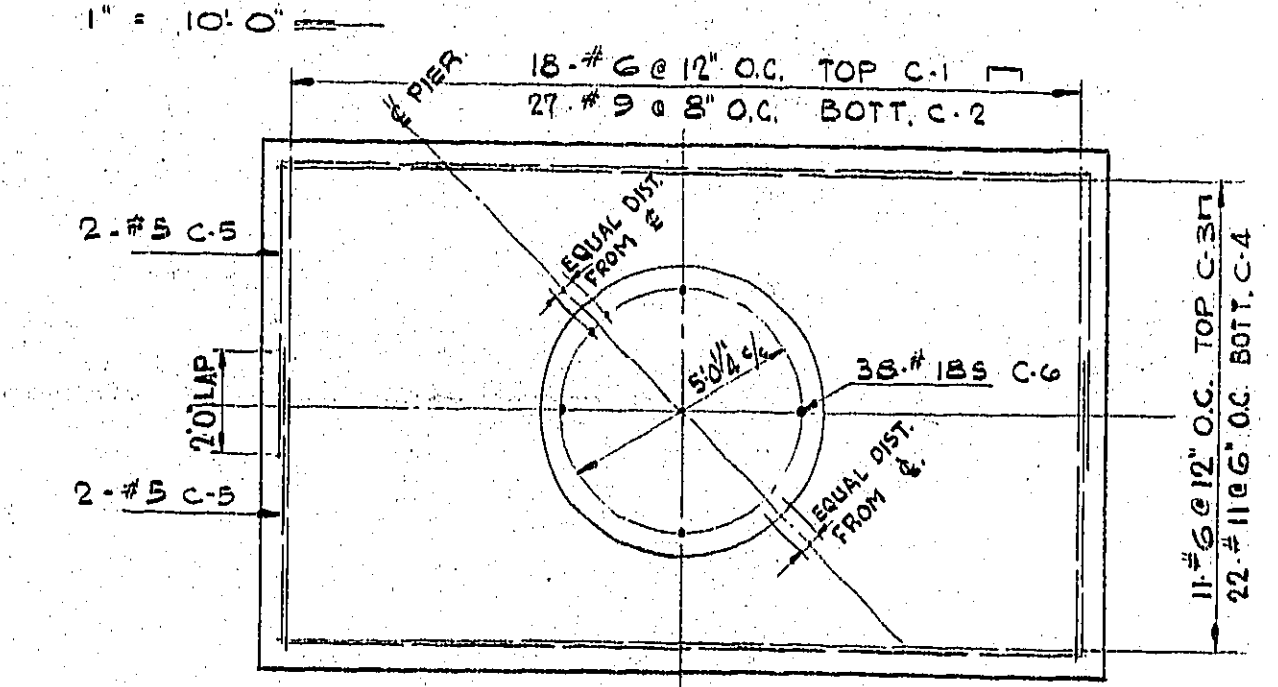


CURVE DATA

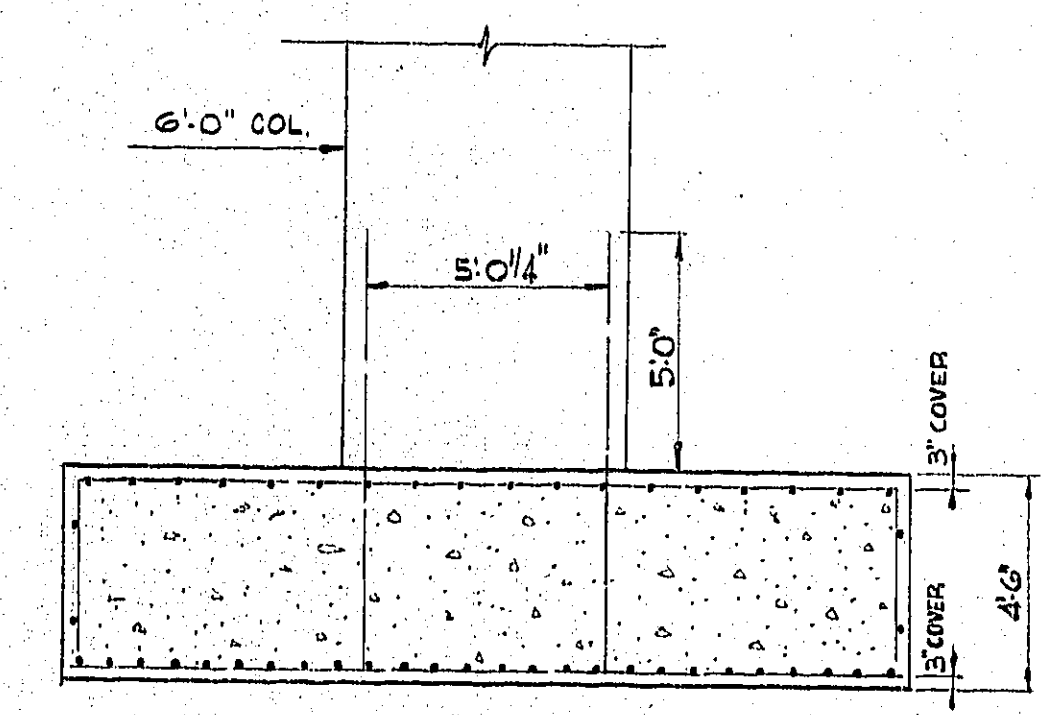
Δ	190° 34' 58"
Δc	77° 30' 56"
Δc	6° 30' 00"
Δ	1676.95
Ts	987.82
Ls	200'
Qs	6° 32' 00"
Es	372.31



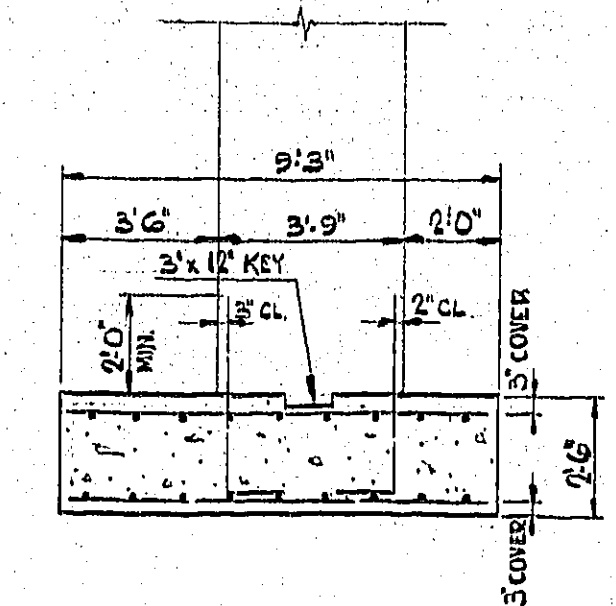
FOUNDATION PLAN
SCALE 1" = 10' 0"



TYPICAL PIER FOOTING REINFORCING

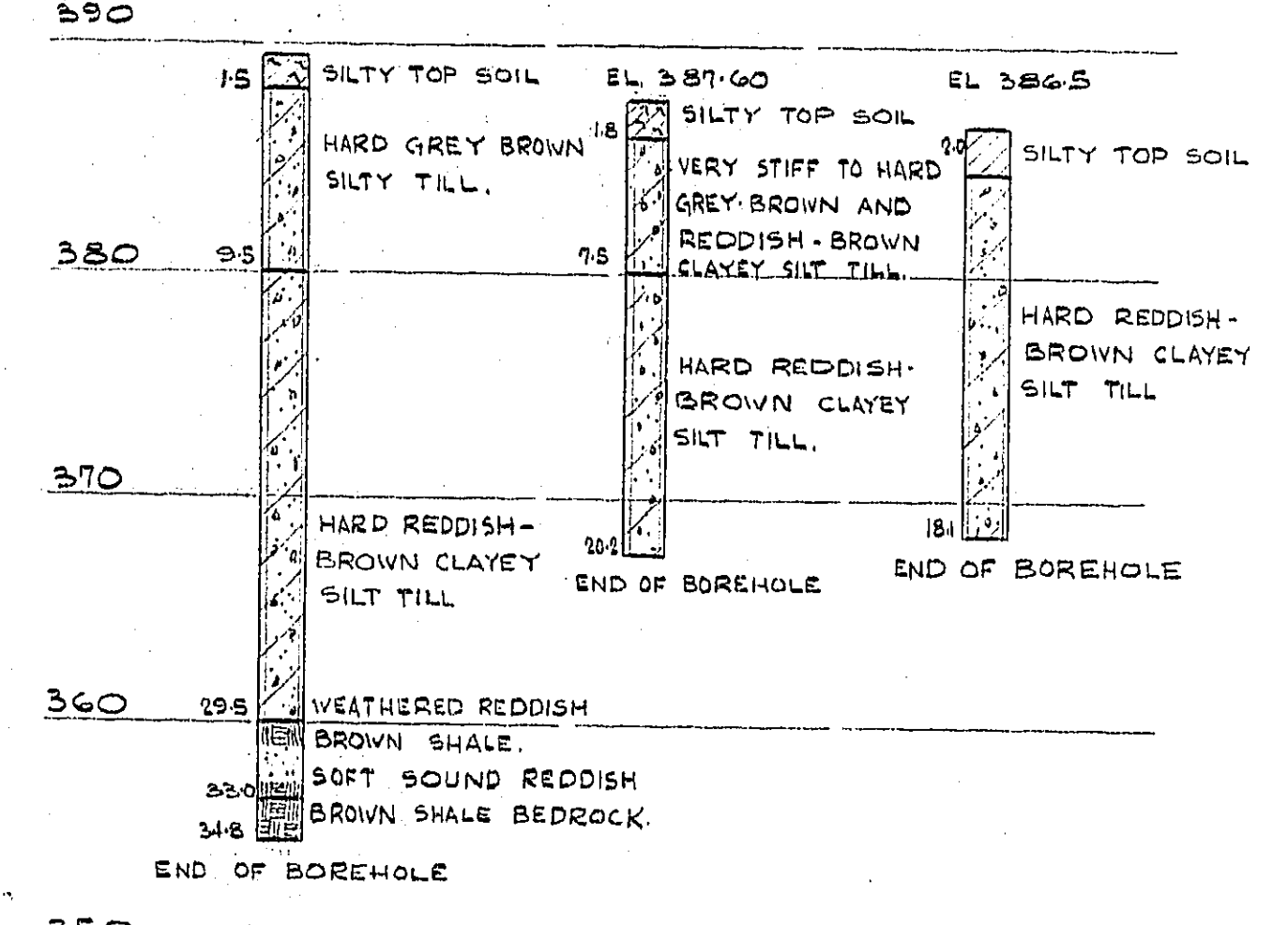


TYPICAL SECTION THRU PIER FOOTINGS

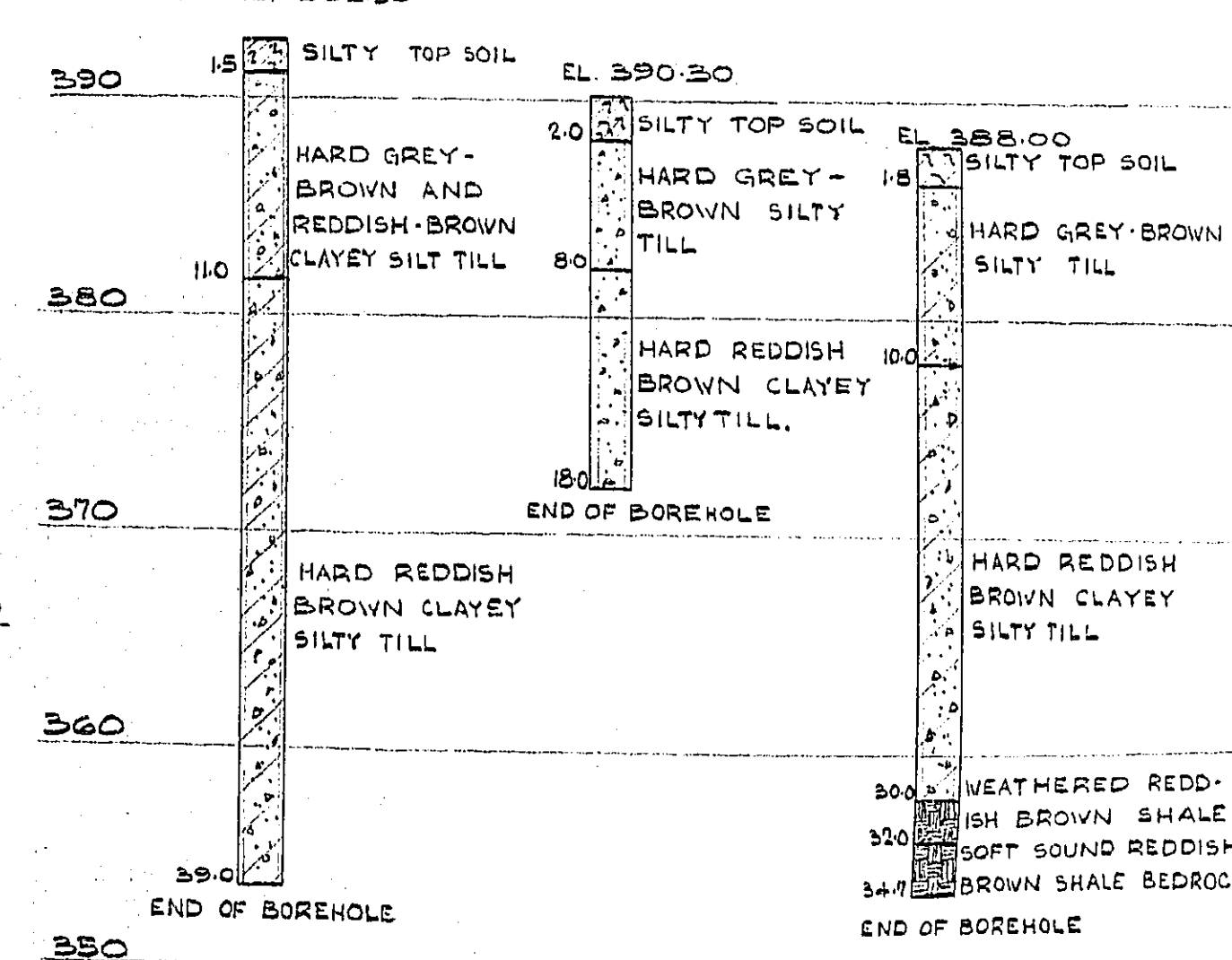


TYPICAL SECTION THRU ABUTMENT FOOTINGS

BOREHOLE #1

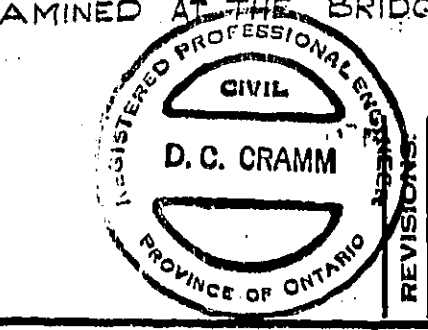


BOREHOLE #4



TEST BORING RESULTS

SOILS DATA FOR GUIDANCE ONLY. NOT GUARANTEED BY D.H.O.
THE COMPLETE SOIL INVESTIGATION REPORT BA 1057 MAY BE
EXAMINED AT THE BRIDGE OFFICE, DOWNSVIEW AVE., TORONTO, ONT.



BORE HOLE LOCATION

NOTES FOR FOUNDATION CONSTRUCTION

- FOR GENERAL NOTES SEE DRAWING D-45581
- WEST ABUT. FOOTING DESIGNED FOR A MAXIMUM ALLOWABLE SOIL PRESSURE OF 8000 POUNDS PER SQUARE FOOT.
- EXCAVATION FOR FOOTINGS IN ROCK SHALL BE MADE AS NEAT AS POSSIBLE AND FILLED COMPLETELY WITH CONCRETE.
- NO CONCRETE SHALL BE PLACED IN FOOTINGS BEFORE THE CHARACTER OF THE SOIL AND EXCAVATIONS FOR FOOTINGS HAVE BEEN APPROVED BY THE ENGINEER.
- SEE SPECIAL PROVISIONS FOR REQUIREMENTS CONCERNING TIME LAGS BETWEEN EXCAVATING FOR FOOTINGS AND PLACING CONCRETE.

BRIDGE N° 6 W.P. 293-00
C.C. PARKER & PARSONS, BRINCKERHOFF LIMITED
HAMILTON CONSULTING ENGINEERS ONTARIO
DEPARTMENT OF HIGHWAYS-ONTARIO
BRIDGE OFFICE-TORONTO

CHEDOKE EXPRESS WAY
RAMP "R" OVERPASS

THE KING'S HIGHWAY No. 403 DIST. No. 4
CO. OF. VENT WORTH
TWP. OF WEST FLAMBOROUGH LOT 29 CON. II

FOUNDATION PLAN & DETAILS

APPROVED *[Signature]* 61679
DESIGN ENGINEER *[Signature]*

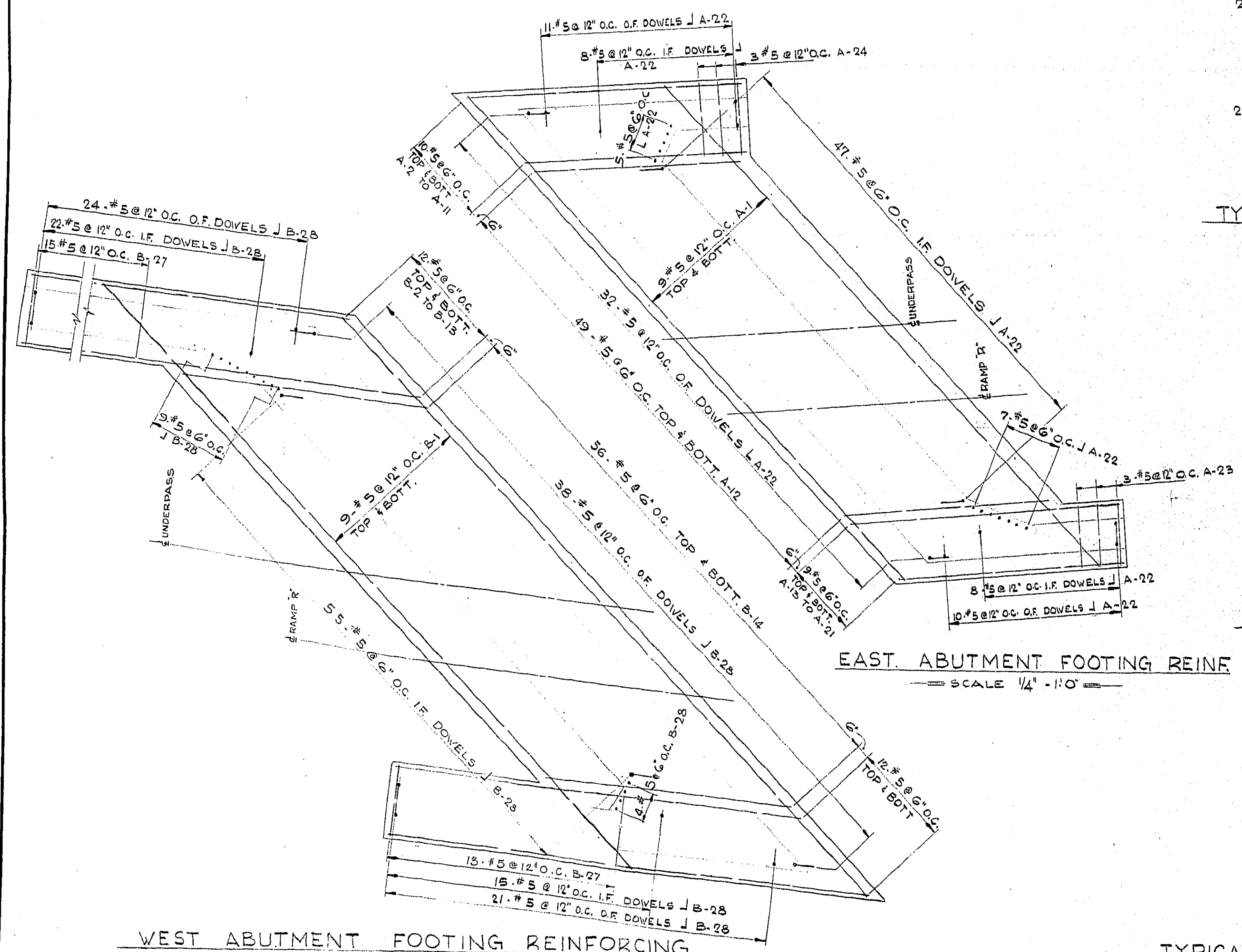
DESIGN	R.W.A.	CHECK	R.K.C.C.	CONTRACT NUMBER	160-269
DRAWING	R.M.T.	CHECK	F.B.	LEADING	
TRACING	CHECK			DATE	12-15-50
DATE	AUG. 12, 1950			DRAWING NUMBER	D-4558-2

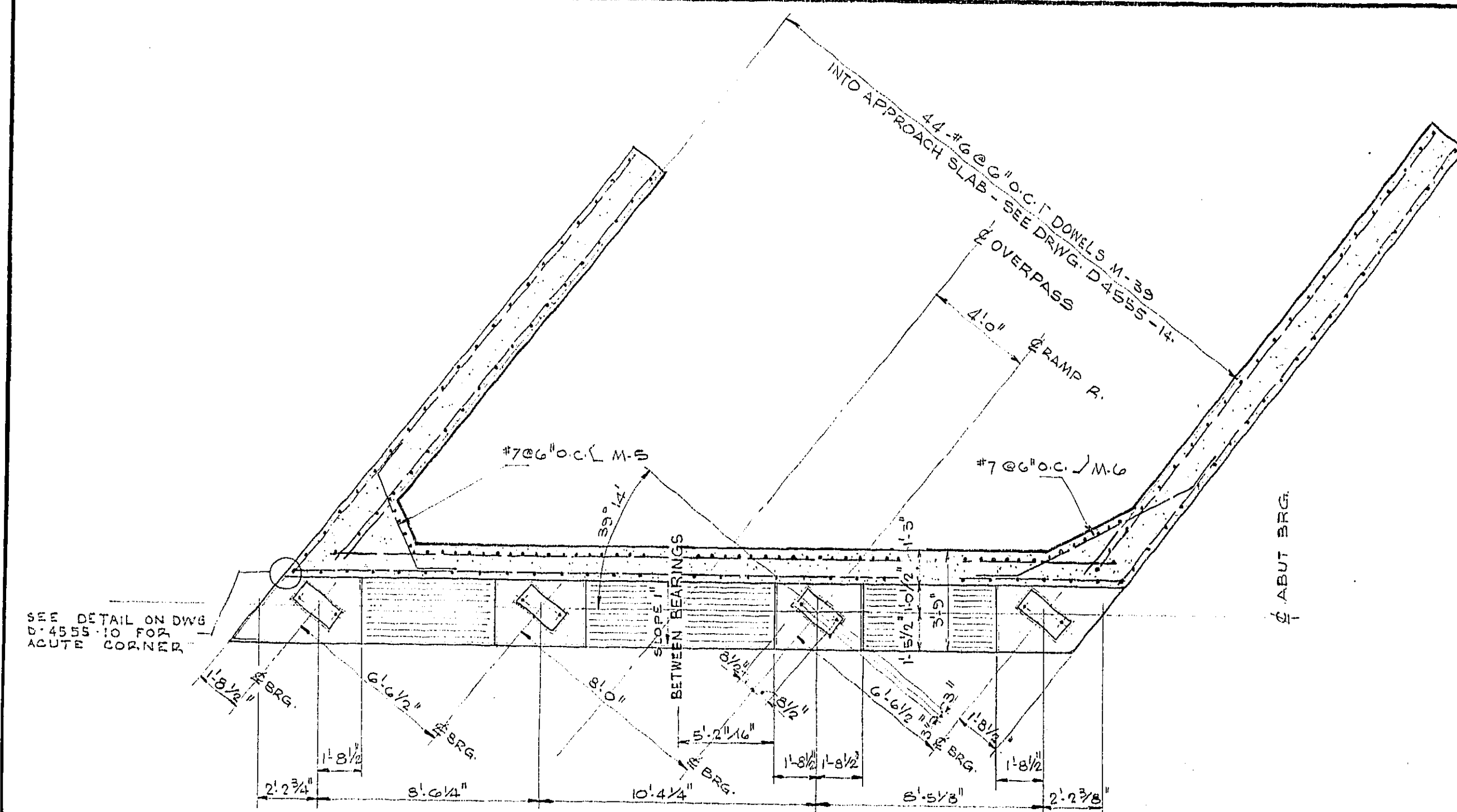
TWP. 151-29-2-A 1516-2

PRINT RECORD

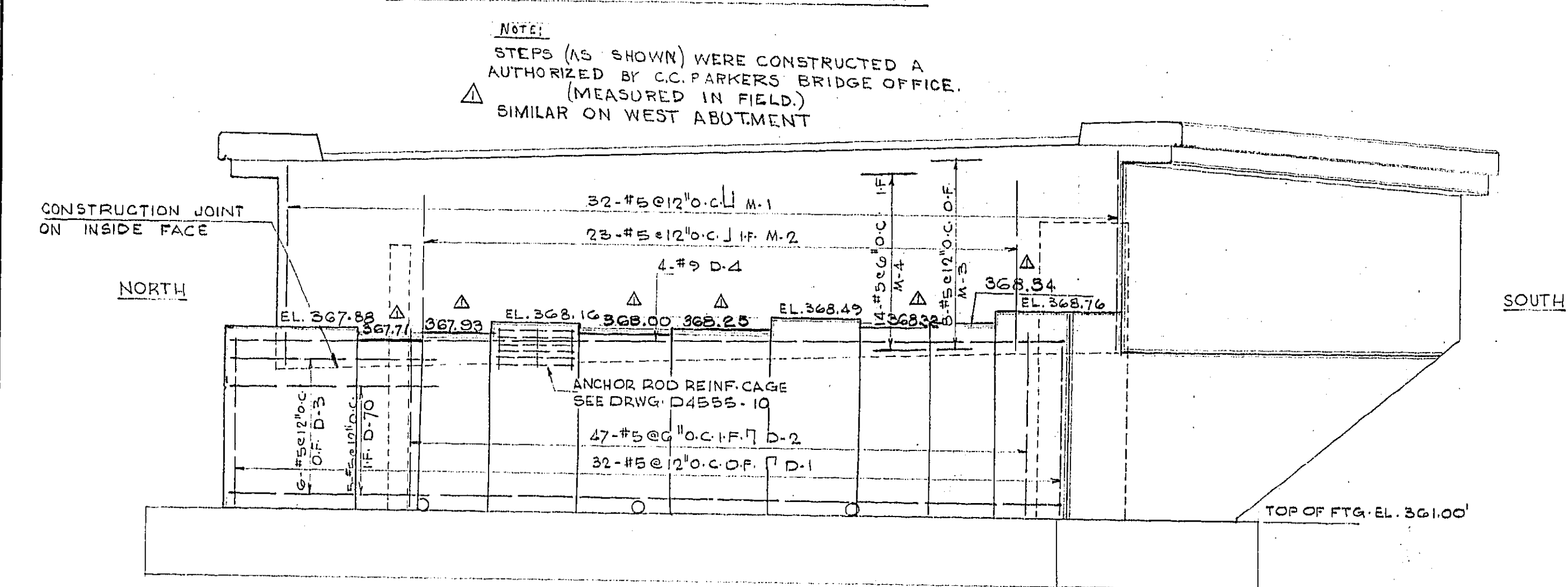
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2	FOR	1950
3	FOR	1950
4	FOR	1950
5	FOR	1950
6	FOR	1950
7	FOR	1950
8	FOR	1950
9	FOR	1950
10	FOR	1950

WEST ABUTMENT FOOTING REINFORCING
SCALE 1/2" = 10'

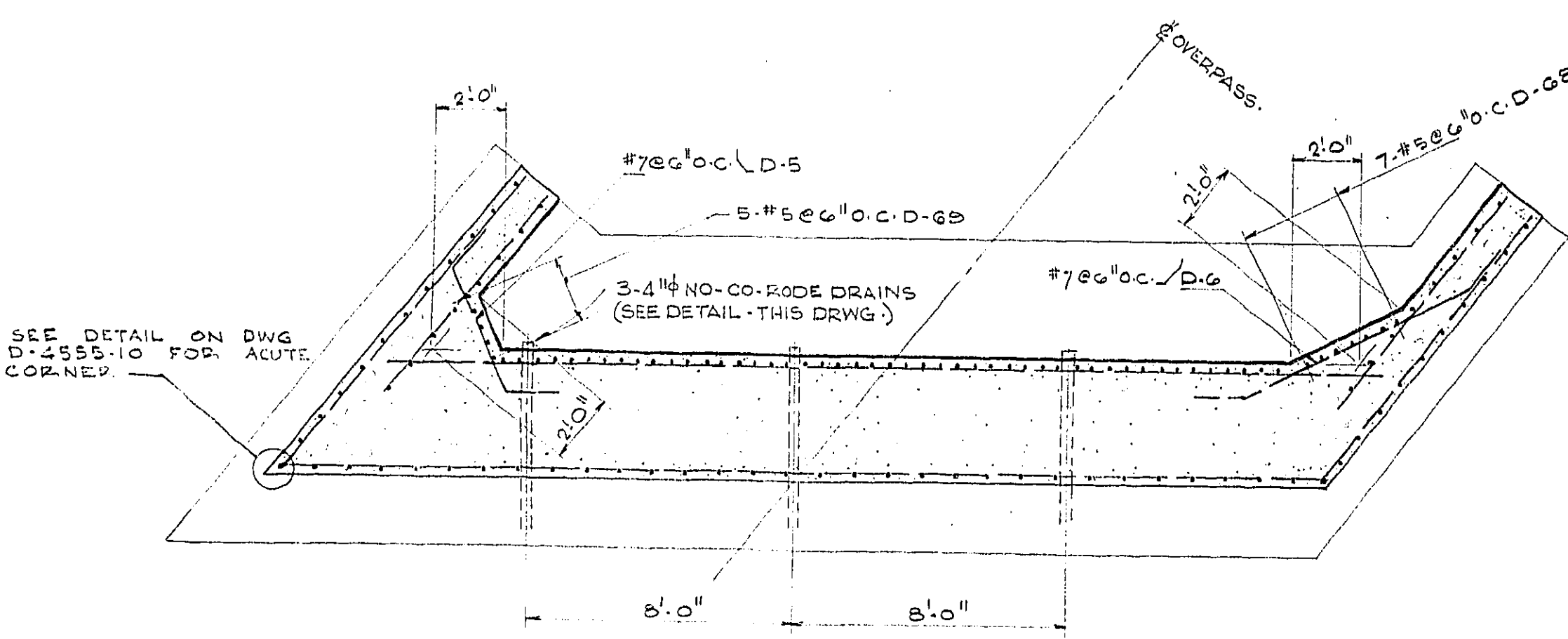




PLAN AT ABUTMENT BEARING SEAT

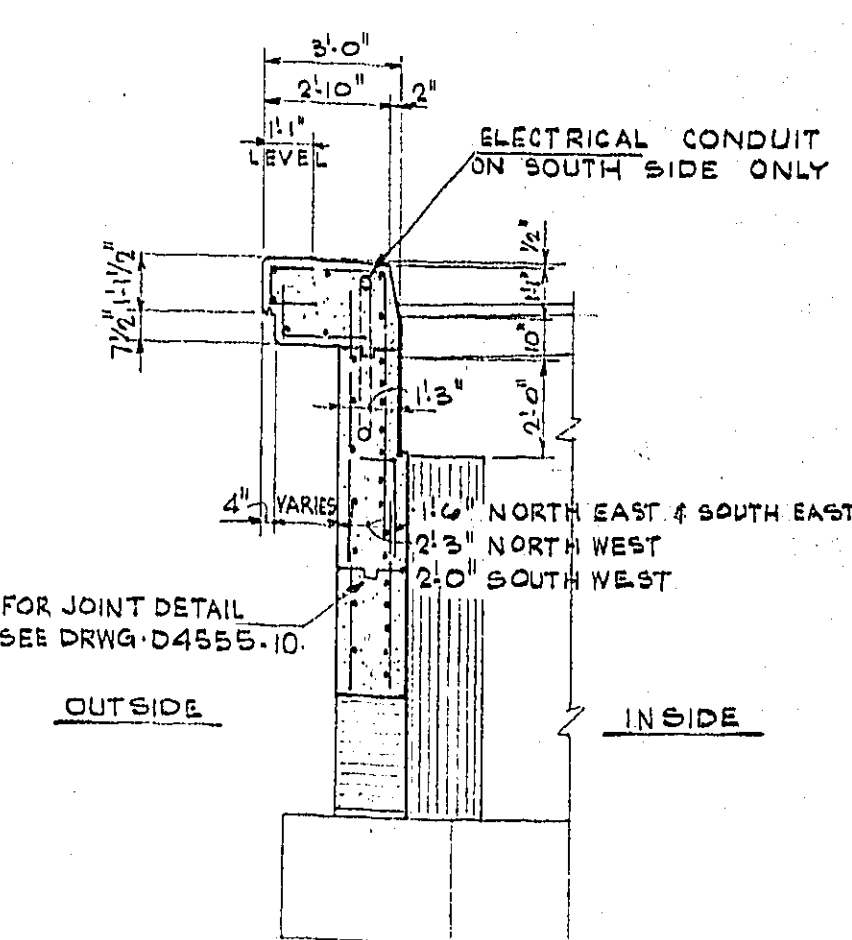


ELEVATION AT FACE OF ABUTMENT

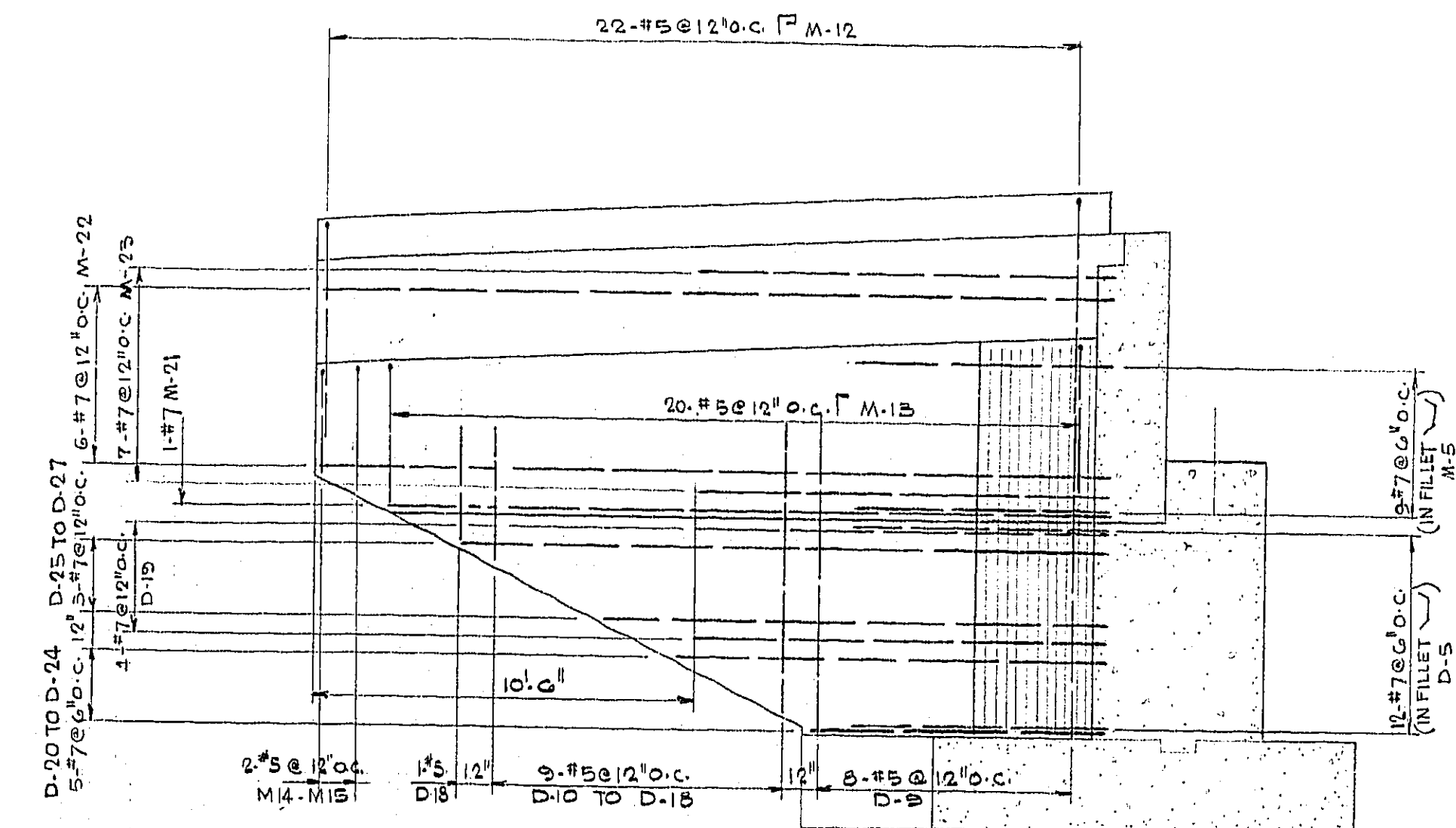


SECTION THRU ABUTMENT BELOW BEARING SEAT

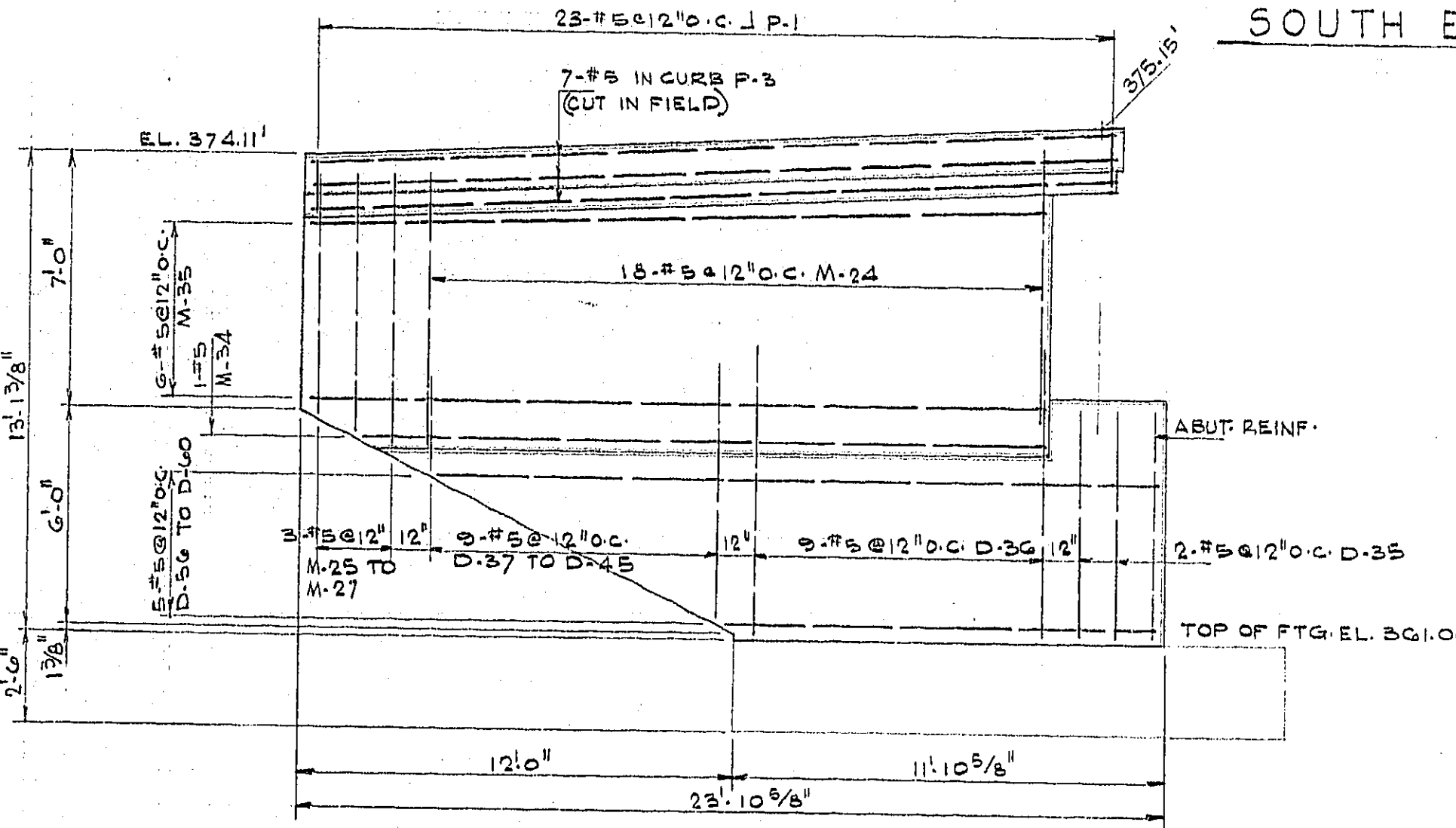
EAST ABUTMENT REINFORCING
SCALE = 1/4" = 1'-0"



TYPICAL WING WALL SECTION

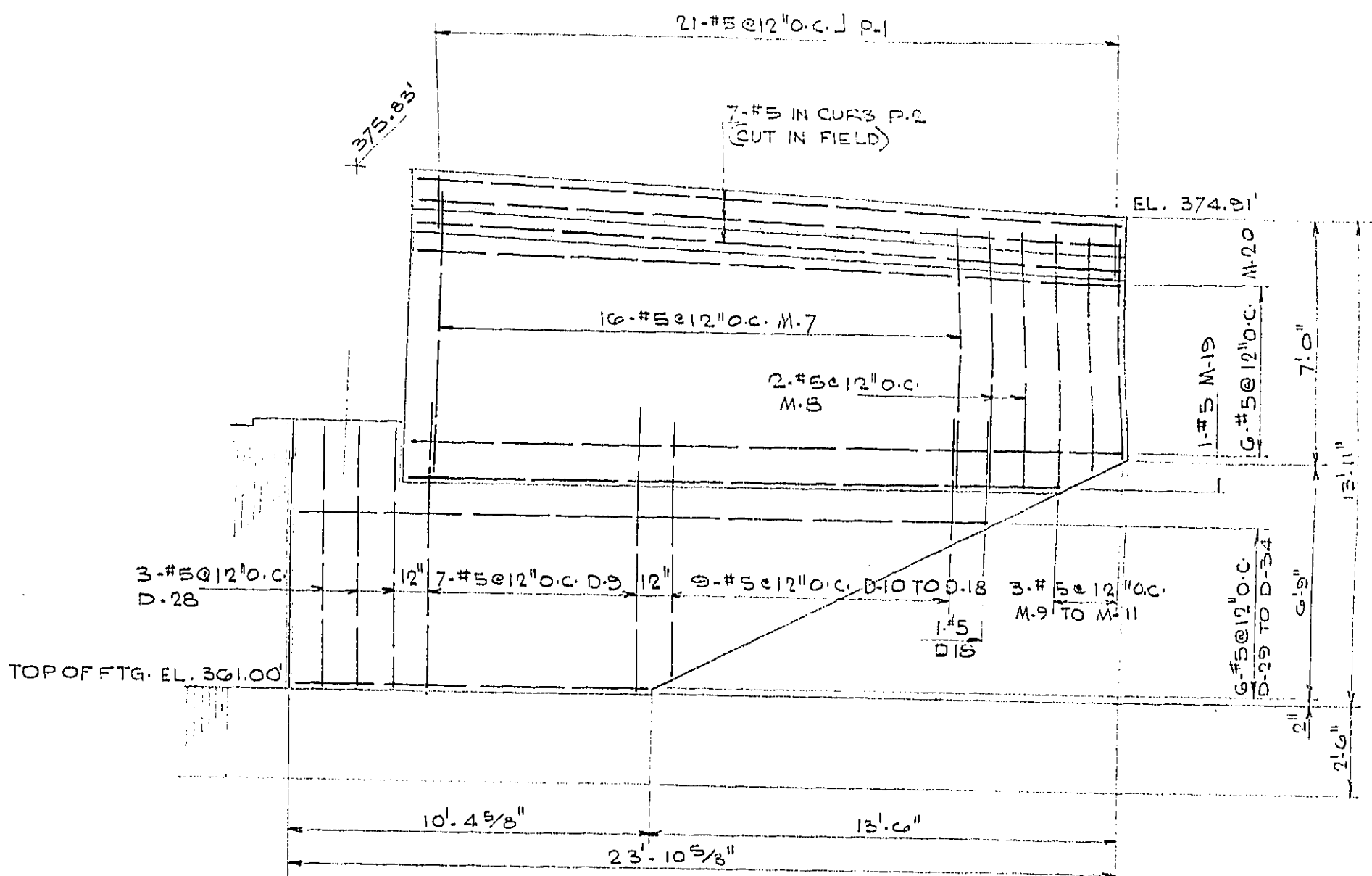


INSIDE FACE

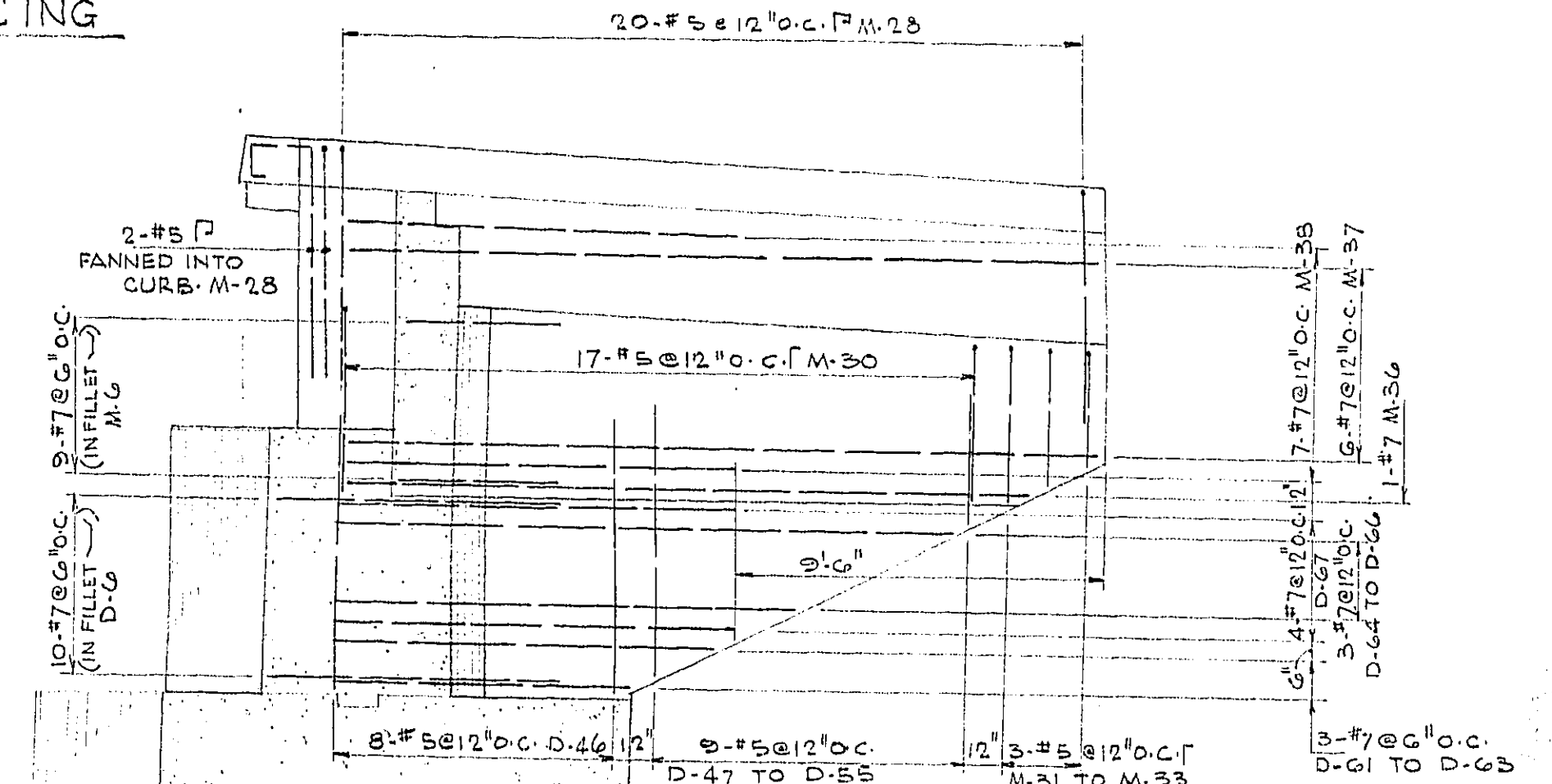


OUTSIDE FACE

SOUTH EAST WING WALL REINFORCING
SCALE = 1/4" = 1'-0"

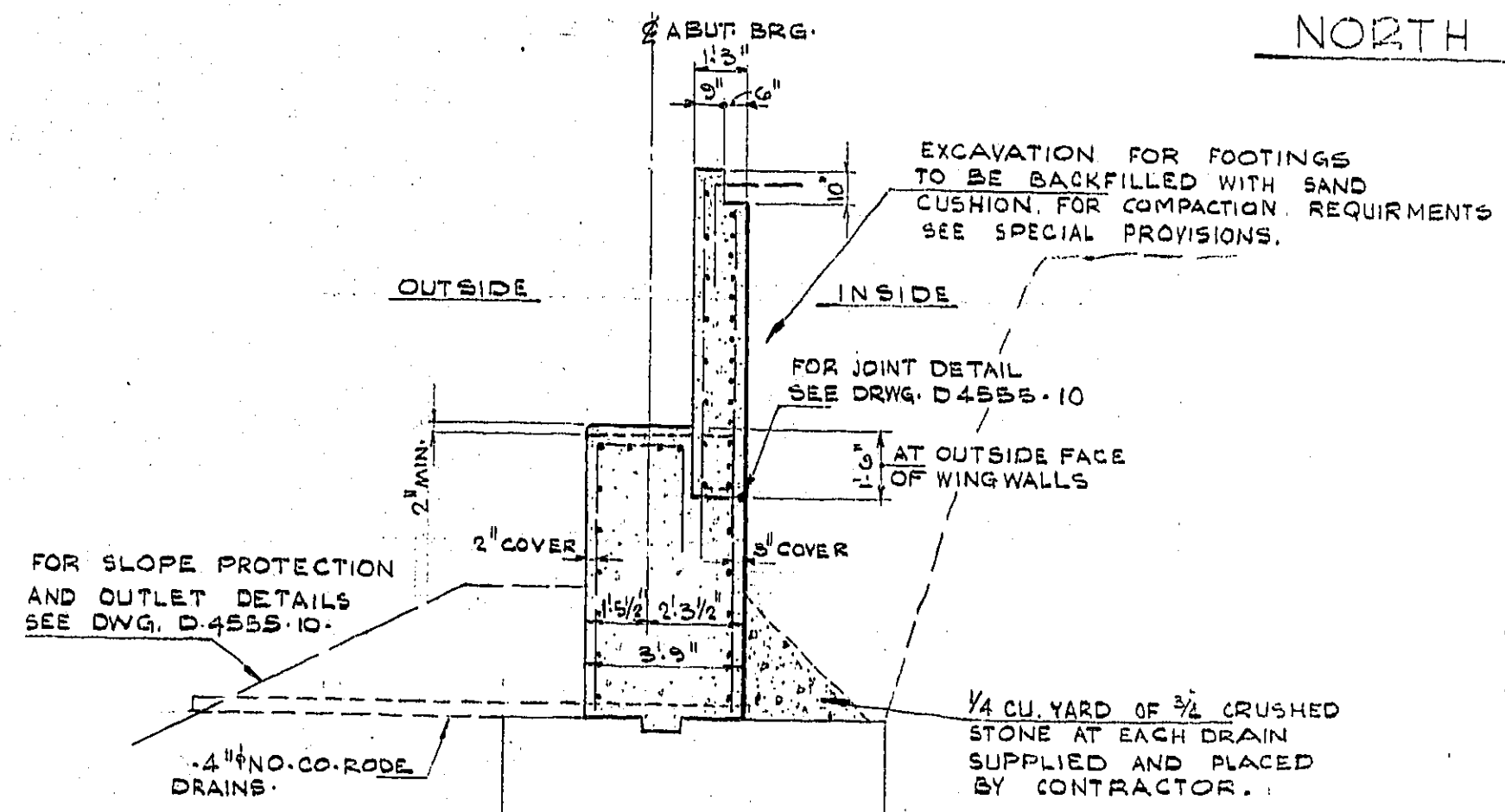


OUTSIDE FACE



INSIDE FACE

NORTH EAST WING WALL REINFORCING
SCALE = 1/4" = 1'-0"



TYPICAL ABUTMENT SECTION

- NOTES:
1. FOR GENERAL NOTES SEE DRWG. D-4555-1.
 2. FOR BEARING DETAILS AND NOTES ON SETTING ANCHOR RODS AND BEARINGS, SEE DRWG. D-4555-11.
 3. WING WALLS TO BE CONSTRUCTED STRAIGHT, BUT CURBS ON WING WALL TO FOLLOW CURVE OF ROADWAY.
 4. FOR ELECTRICAL DETAILS SEE DRWG. D-4555-12.



REVISIONS	DATE	BY	DESCRIPTION
1			ADDED NOTE AND STEPS - REV. AS CONST.

61684

BRIDGE No. 6 W.P. 263-60
C.C. PARKER & PARSONS, BRINCKERHOFF LIMITED
HAMILTON CONSULTING ENGINEERS ONTARIO
DEPARTMENT OF HIGHWAYS-ONTARIO
BRIDGE OFFICE-TORONTO

**CHEDOKE EXPRESSWAY
RAMP "R" OVERPASS**

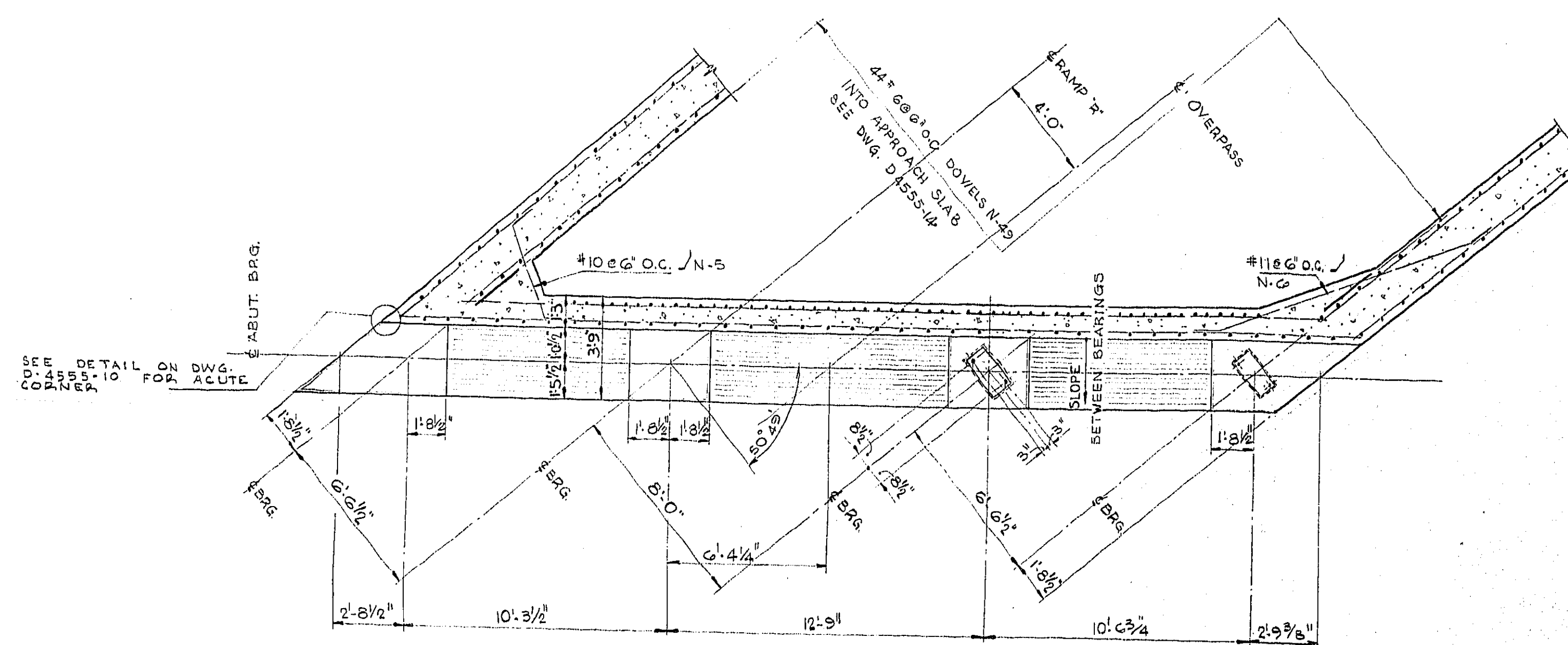
THE KING'S HIGHWAY No. 403. DIST. No. 4.
CO. OF KENT-WORTH
TWP. OF WEST FLEMINGHAM LOT 20 CON. II

EAST ABUTMENT & WING WALL DETAILS

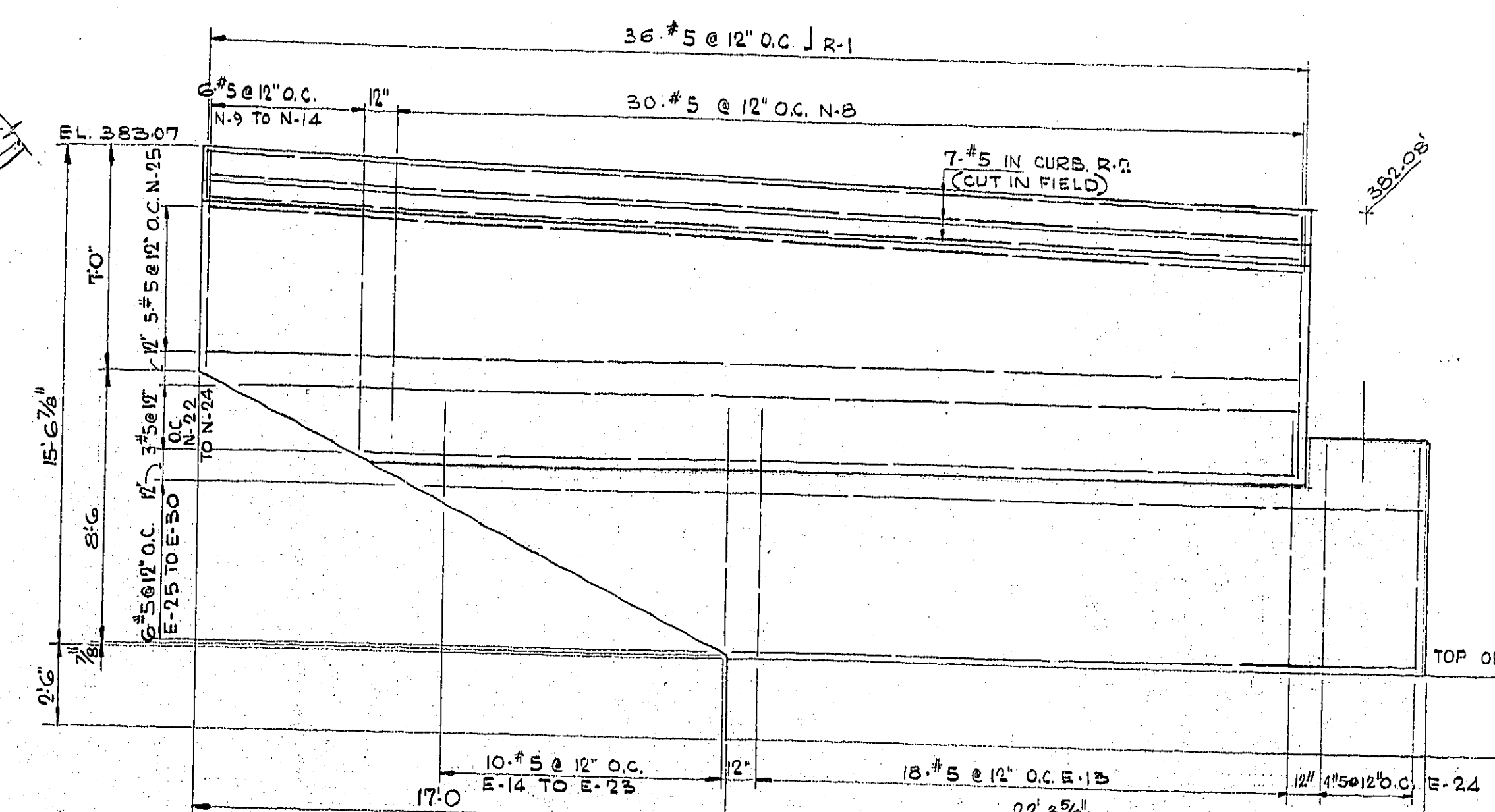
APPROVED: [Signature]
DESIGN ENGINEER

DESIGN	C.W.A.	CHECK	R.K.C.G.	CONTRACT NUMBER	
DRAWING	G.S.N.	CHECK	F.B.		60-269
TRACING		CHECK		LOADING NUMBER	
DATE	AUG. 12, 1960.			DRAWING NUMBER	D-4555-3

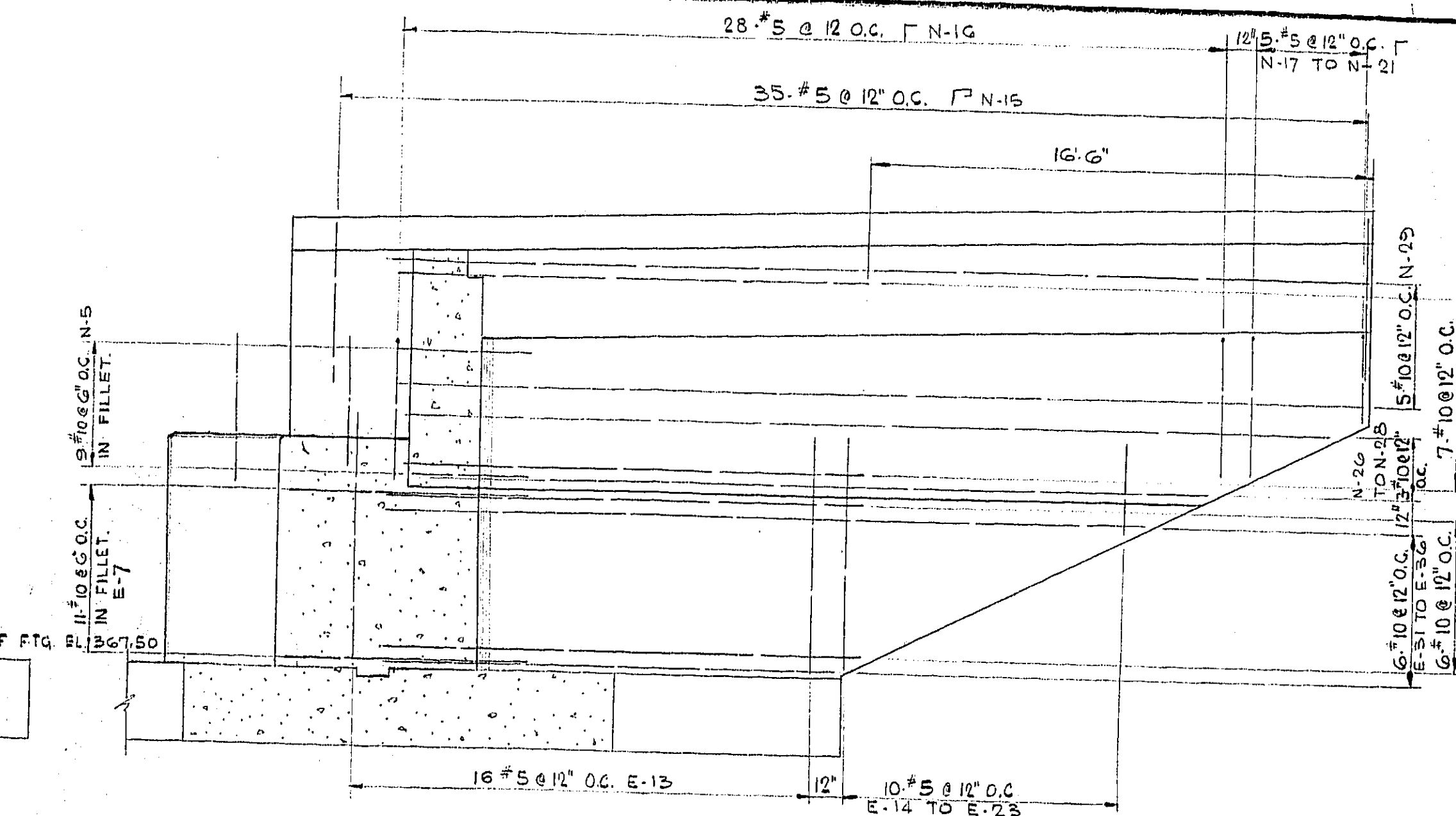
TWP. 15-29-34 15-16-5



PLAN AT ABUTMENT BEARING SEAT
SCALE 1/4" = 1'-0"

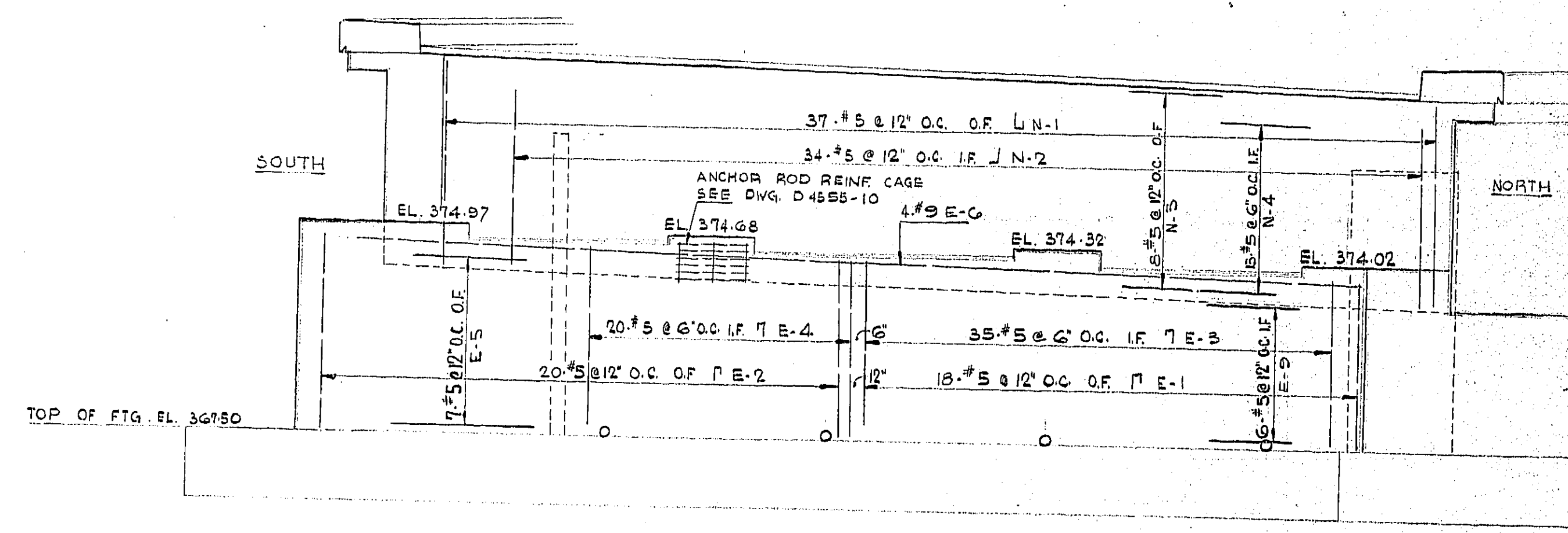


OUTSIDE FACE

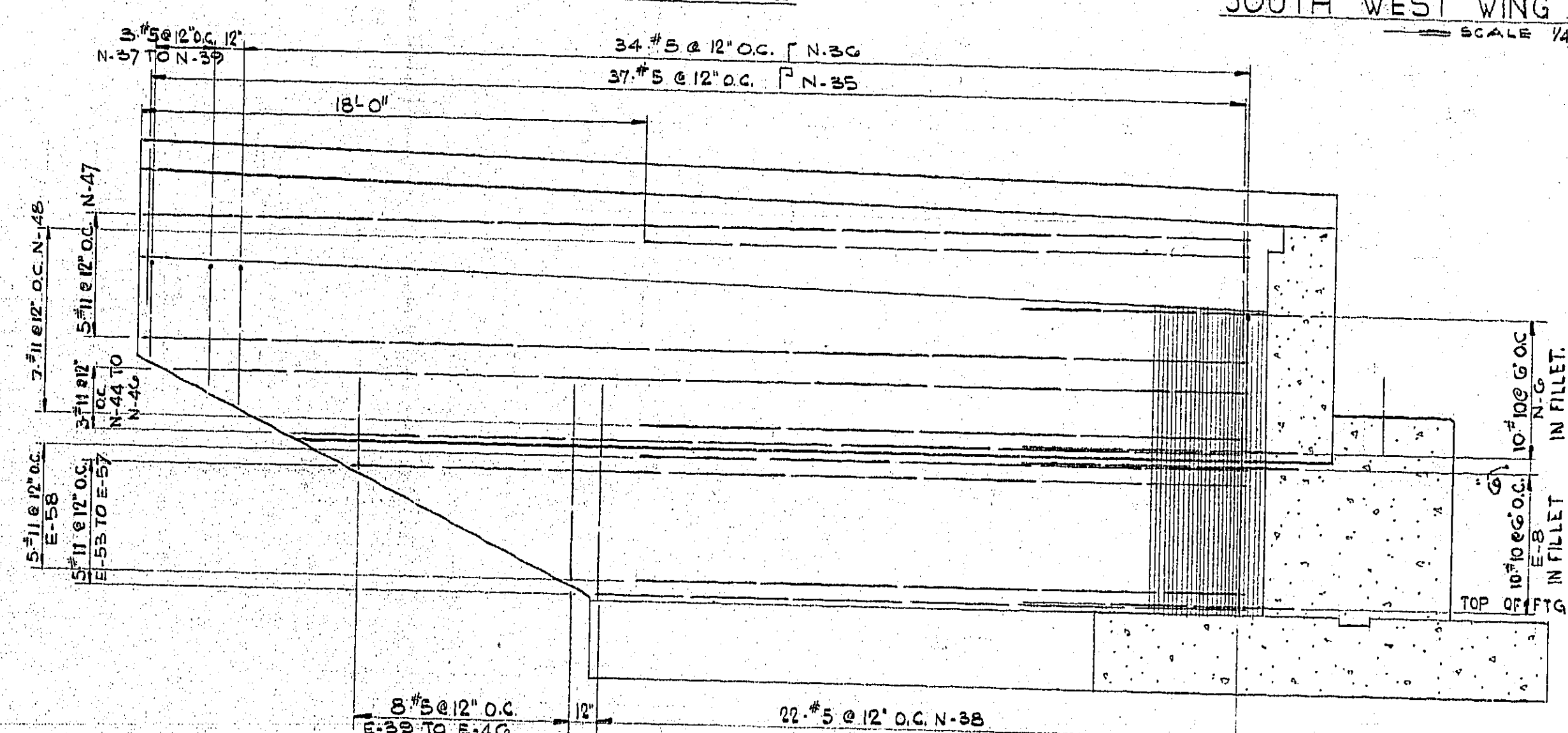


SOUTH WEST WING WALL REINFORCING
SCALE 1/4" = 1'-0"

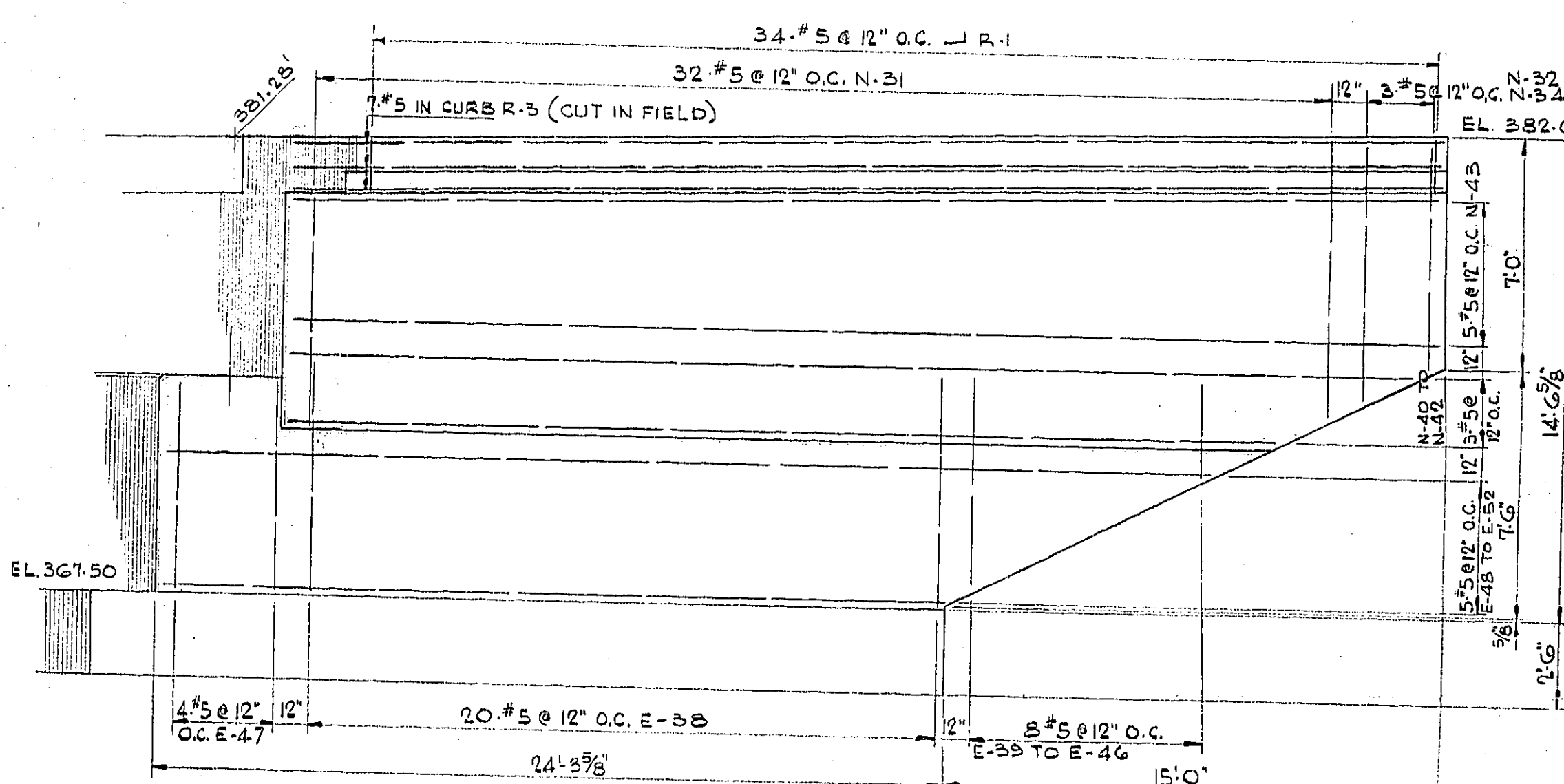
INSIDE FACE



ELEVATION AT FACE OF ABUTMENT

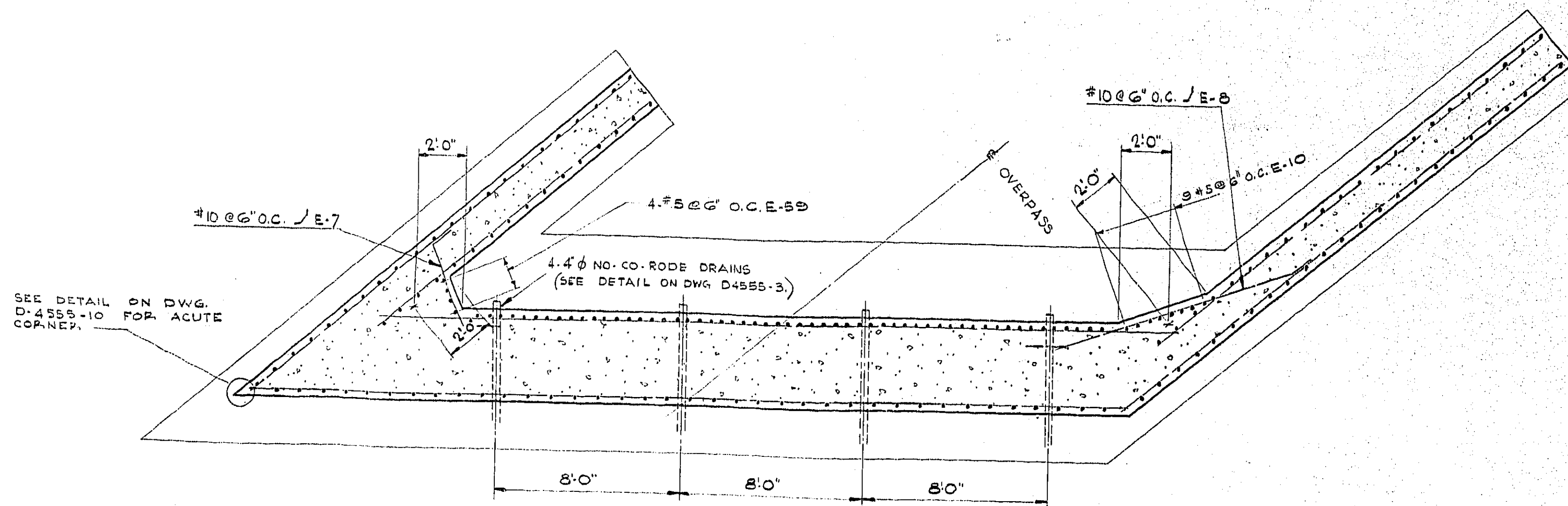


INSIDE FACE



NORTH WEST WING WALL REINFORCING
SCALE 1/4" = 1'-0"

OUTSIDE FACE



SECTION THRU ABUTMENT BELOW BEARING SEAT

WEST ABUTMENT REINFORCING
SCALE 1/4" = 1'-0"

NOTES:

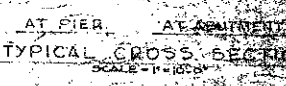
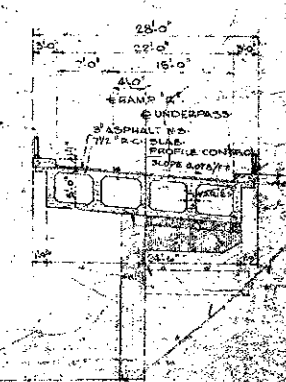
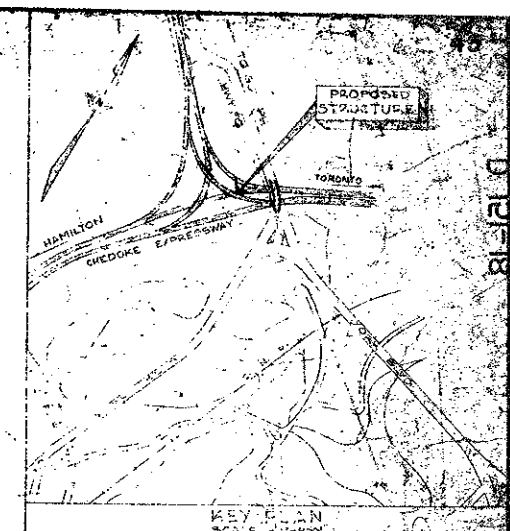
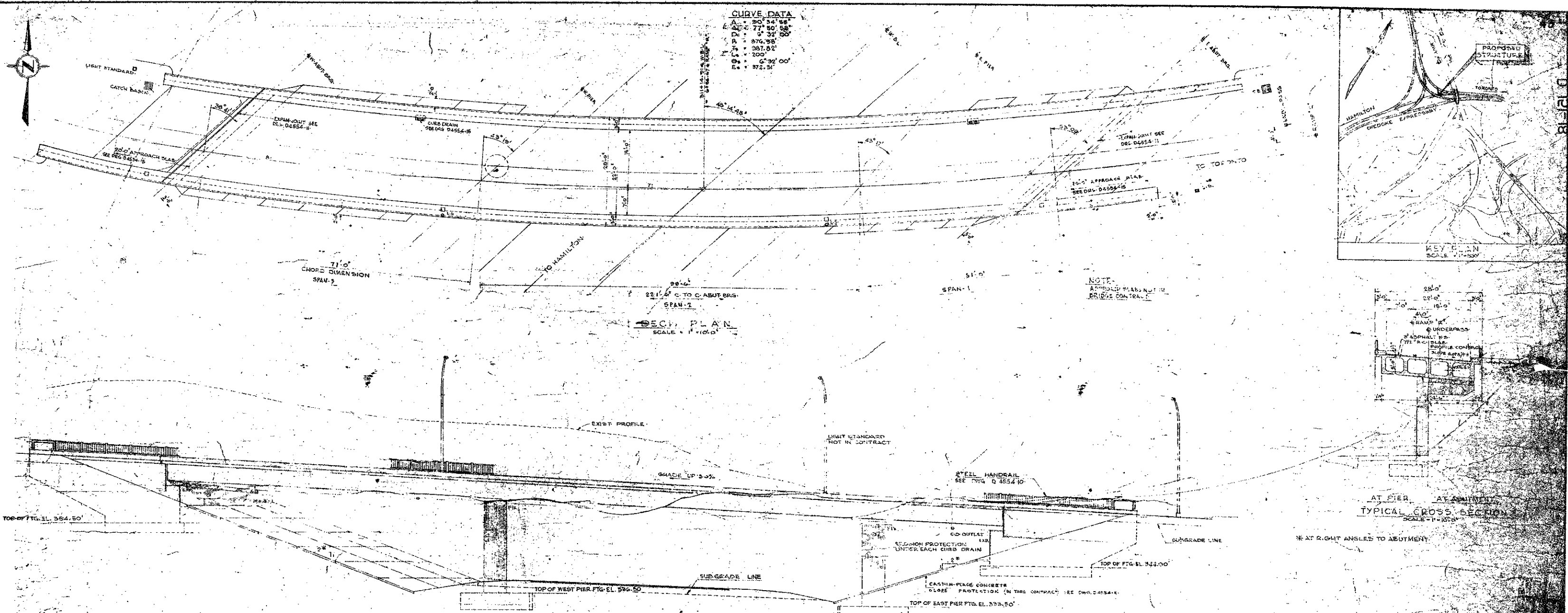
1. FOR GENERAL NOTES SEE DRWG D4555-1.
2. FOR TYPICAL SECTIONS THRU WING WALLS AND ABUTMENT SEE DRWG D4555-2.
3. WING WALLS TO BE CONSTRUCTED STRAIGHT, BUT CURBS ON WING WALLS TO FOLLOW CURVE OF ROADWAY.



REVISIONS	DATE	BY	DESCRIPTION
1	12/12/60	REVIS	REVISED AS CONSTRUCTED

61685

C.C. PARKER & PARSONS, BRINCKERHOFF LIMITED		BRIDGE No. 6		W.P. 263-60	
HAMILTON		CONSULTING ENGINEERS		ONTARIO	
DEPARTMENT OF HIGHWAYS-ONTARIO					
BRIDGE OFFICE-TORONTO					
CHODOKE EXPRESSWAY					
RAMP 'R' OVERPASS					
THE KING'S HIGHWAY No. 403		DIST. No. 4			
CO. OF WENTWORTH					
TWP. OF WEST FLAMBOROUGH		LOT 23		CON. II	
WEST ABUTMENT & WING WALL DETAILS					
APPROVED					
[Signature]		[Signature]		[Signature]	
BRIDGE ENGINEER		DESIGN ENGINEER			
DESIGN	G.W.A.	CHECK	R.H.C.C.	CONTRACT	4533-60
DRAWING	R.M.T.	CHECK	F.B.	NUMBERS	
TRACING		CHECK		LOADING	
DATE	AUG. 12, 1960			DRAWING	60-269
				NUMBER	04555-4
					15116-4



GENERAL NOTES

1. NOTE TO CONTRACTOR: CONCRETE WORK ON THIS STRUCTURE MUST NOT BE COMMENCED UNTIL ALL NECESSARY PERMITS AND SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

2. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

3. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

4. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

5. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

6. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

7. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

8. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

9. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

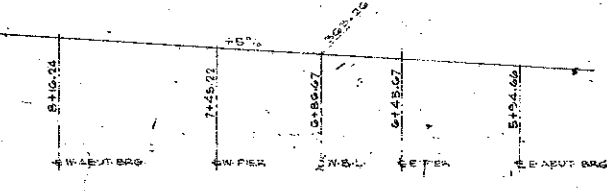
10. THE STRUCTURE SHALL BE BUILT IN ACCORDANCE WITH SPECIFICATIONS FOR STRENGTH, DURABILITY, AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH WILL BE DETERMINED BY THE DISTRICT ENGINEER.

- DRAWING LIST**
- D 4554-1 GENERAL ARRANGEMENT
 - D 4554-2 FOUNDATION PLAN & DETAILS
 - D 4554-3 EAST ABUTMENT & WING WALL DETAILS
 - D 4554-4 WEST ABUTMENT & WING WALL DETAILS
 - D 4554-5 SPAN #1 BOTTOM SLAB REINFORCING & DETAILS
 - D 4554-6 SPAN #2 BOTTOM SLAB REINFORCING & DETAILS
 - D 4554-7 SPAN #3 BOTTOM SLAB REINFORCING & DETAILS
 - D 4554-8 TOP SLAB REINFORCING
 - D 4554-9 TOP SLAB REINFORCING CONT'D
 - D 4554-10 DECK ELEV. JOINT LOCATIONS & POST BRACING
 - D 4554-11 MISCELLANEOUS DETAILS
 - D 4554-12 ABUTMENT BEARING DETAILS
 - D 4554-13 GUARDRAIL DETAILS
 - D 4554-14 ELECTRICAL DETAILS
 - D 4554-15 APPROACH SLAB DETAILS
 - D 4554-16 CURB DRAIN DETAILS
 - D 4554-17 REINFORCING STEEL SCHEDULE
 - D 4554-18 REINFORCING STEEL SCHEDULE
 - D 4554-19 REINFORCING STEEL SCHEDULE
 - D 4554-20 REINFORCING STEEL SCHEDULE
 - D 4554-21 REINFORCING STEEL SCHEDULE
 - D 4554-22 REINFORCING STEEL SCHEDULE
 - D 4554-23 REINFORCING STEEL SCHEDULE
 - D 4554-24 REINFORCING STEEL SCHEDULE

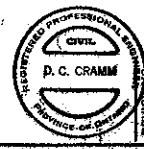
SOUTH SIDE ELEVATION
SCALE = 1" = 10'-0"

PROPERTIES OF SKEW ANGLES

SKEW	SINE	COSINE	TANGENT
55° 00'	.798685	.604220	1.331875
45° 17'	.688407	.727272	.941803
48° 14' 48"	.746019	.665525	1.120274
43° 19'	.686090	.727573	.941902
30° 41'	.509016	.860612	.580674



KEY TO ELEVATIONS ALONG RAMP
ELEVATIONS SHOWN ARE TO TOP OF ASPHALT
N.T.C.



NO.	DATE	REVISION	BY	CHKD.	DESCRIPTION
1	10/10/71	REVISED AS CONSTRUCTED	D.C. GRAMM		
2	11/10/71	REVISION LIST ADDED	D.C. GRAMM		
3	11/10/71	REVISION LIST ADDED	D.C. GRAMM		
4	11/10/71	REVISION LIST ADDED	D.C. GRAMM		

CONT. 79-101
W.P. 845-71-01

SITE 86-28

C.C. PARKER & PARSONS, BRIDGE ENGINEERS
HAMILTON CONSULTING ENGINEERS

DEPARTMENT OF HIGHWAYS-ONTARIO
BRIDGE OFFICE-TORONTO

CHEDOKE EXPRESSWAY
UNDERPASS AT RAMP

THE KING'S HIGHWAY No. 403

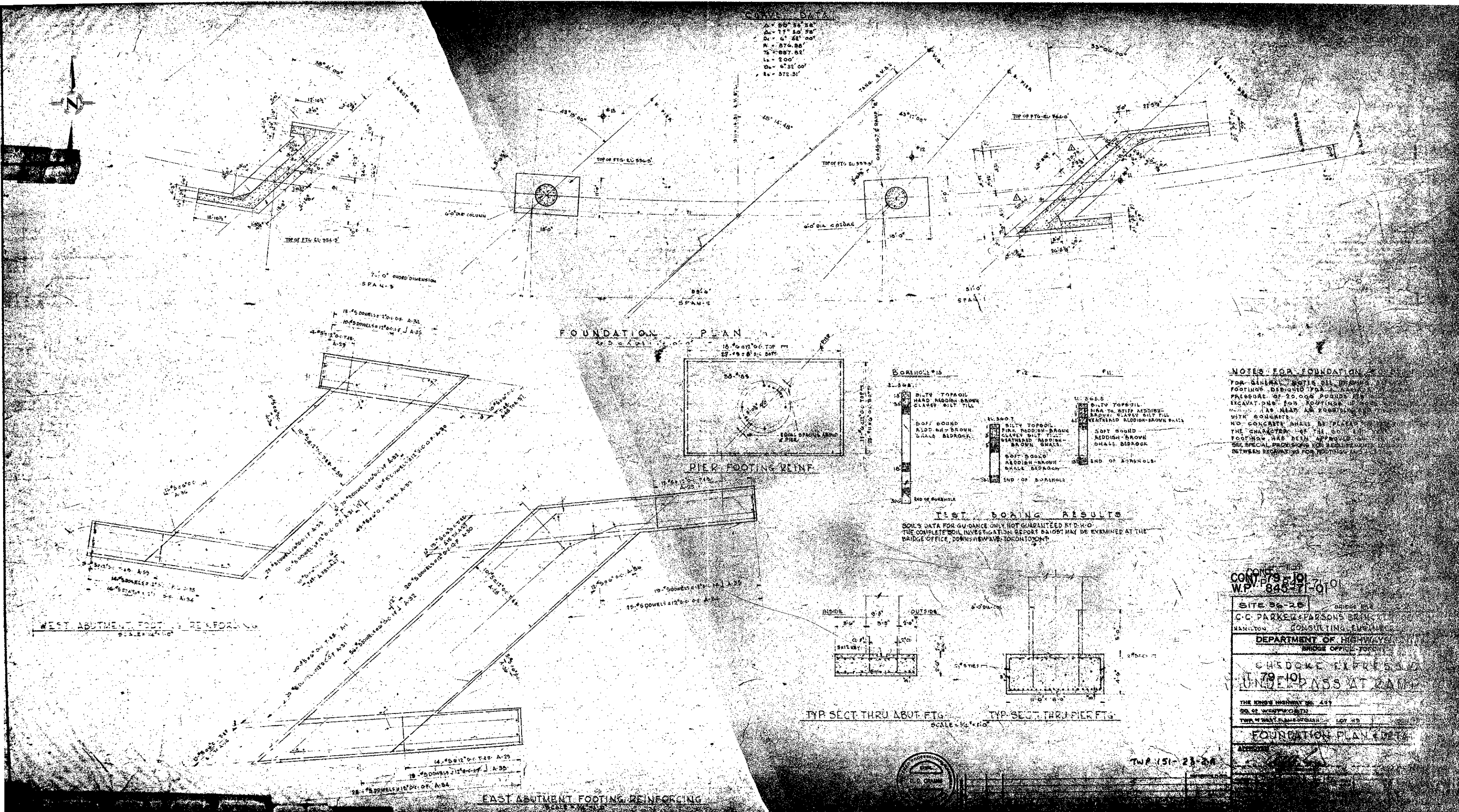
GO. OF WENTWORTH

TWP. OF WEST FLAMBOURGH LOT 13

GENERAL ARRANGEMENT

APPROVED: [Signature]

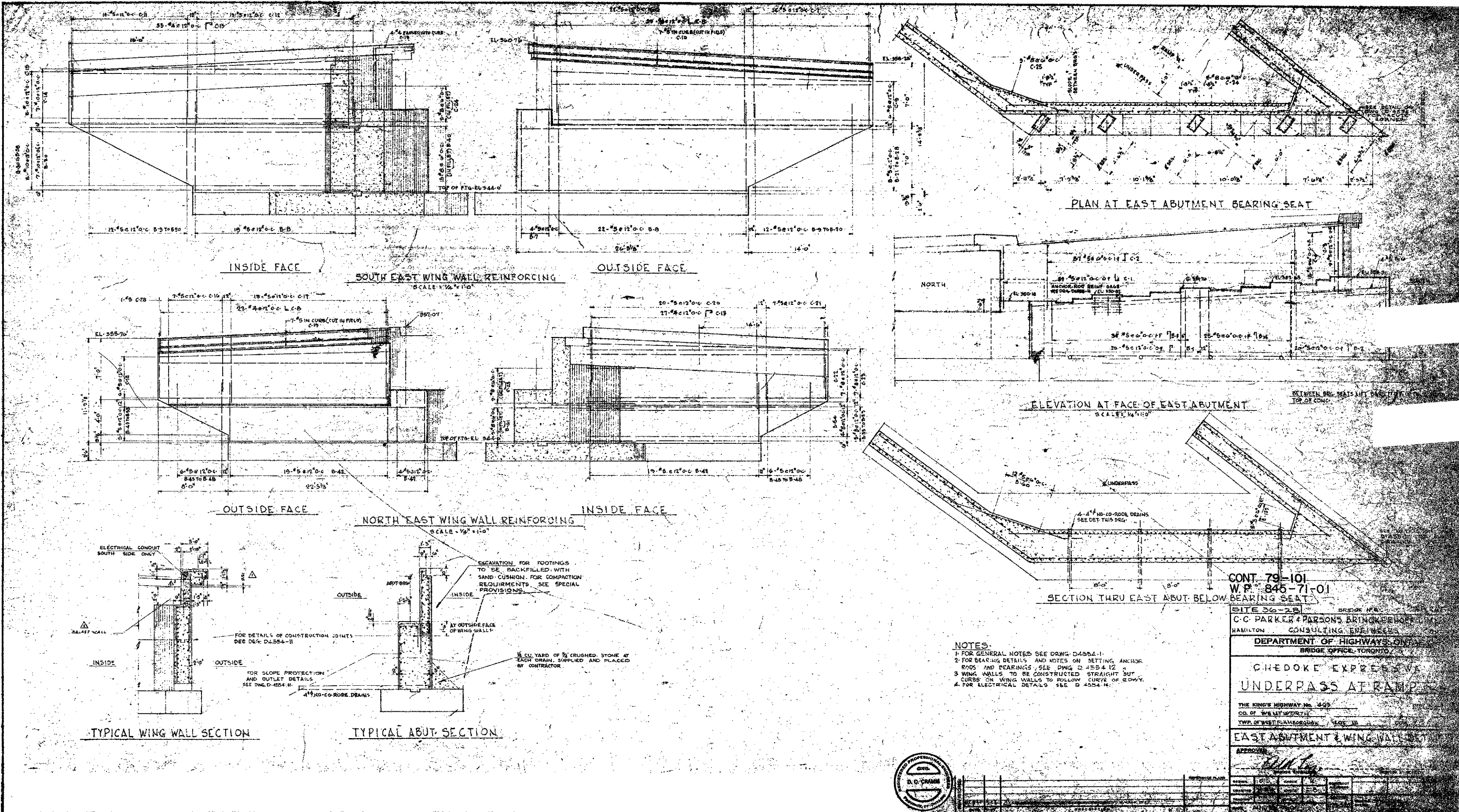
DATE: 10/10/71



NOTES FOR FOUNDATION

FOR GENERAL USE, ALL FOUNDATION FOOTINGS DESIGNED FOR A DESIGN PRESSURE OF 20.000 POUNDS PER SQUARE INCH. FOR FOOTINGS IN SOFT SOILS, AS NEAR AS POSSIBLE, WITH CONCRETE. NO CONCRETE SHALL BE PLACED IN THE CHARACTER OF THE SOIL. THE CHARACTER OF THE SOIL IS FOOTING HAS BEEN APPROVED. SEE SPECIAL PROVISIONS FOR ACCOUNTS BETWEEN BIDDING FOR FOOTING AND

CON. 79-101
 W.P. 845-71-01-01
 SITE 56-20
 G.C. PARKER & PARSONS BRINCKERHOFF
 HAMILTON, CONSULTING ENGINEERS
 DEPARTMENT OF HIGHWAYS
 BRIDGE OFFICE, TORONTO
 CHEDoke EXPRESSES
 UNDERPASS AT RAMP
 THE KING'S HIGHWAY NO. 401
 ON OF WESTWORTH
 TWP. 151-23-24
 FOUNDATION PLAN & DETAIL
 APPROVED: [Signature]
 DATE: [Blank]



- NOTES:
1. FOR GENERAL NOTES SEE DRWG. D-4554-1.
 2. FOR BEARING DETAILS AND NOTES ON SETTING ANCHOR RODS AND BEARINGS, SEE DRWG. D-4554-12.
 3. WING WALLS TO BE CONSTRUCTED STRAIGHT BUT CURBS ON WING WALLS TO FOLLOW CURVE OF ROWY.
 4. FOR ELECTRICAL DETAILS SEE D-4554-14.



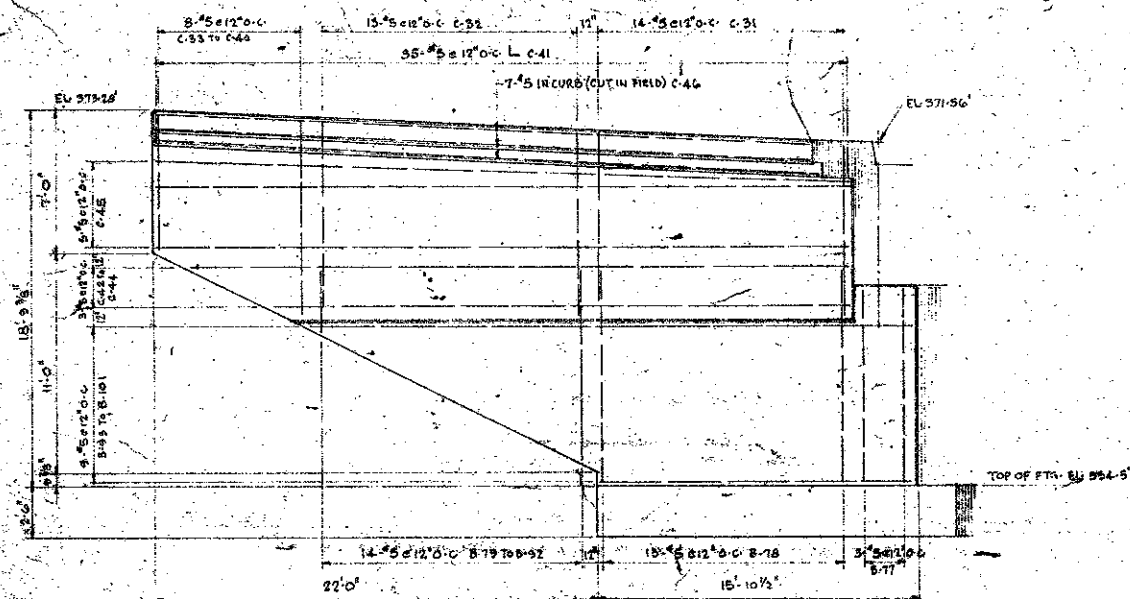
CONT. 79-101
W.P. 845-71-01
SITE 36-28
C.C. PARKER & PARSONS BRINCKERHOFF
HAMILTON CONSULTING ENGINEERS
DEPARTMENT OF HIGHWAYS, ONT.
BRIDGE OFFICE, TORONTO

CHEDOKE EXPRESSIVE
UNDERPASS AT RAMP

THE KING'S HIGHWAY NO. 402
CO. OF WESTMONT
TYP. OF WESTMONT
EAST ABUTMENT & WING WALL

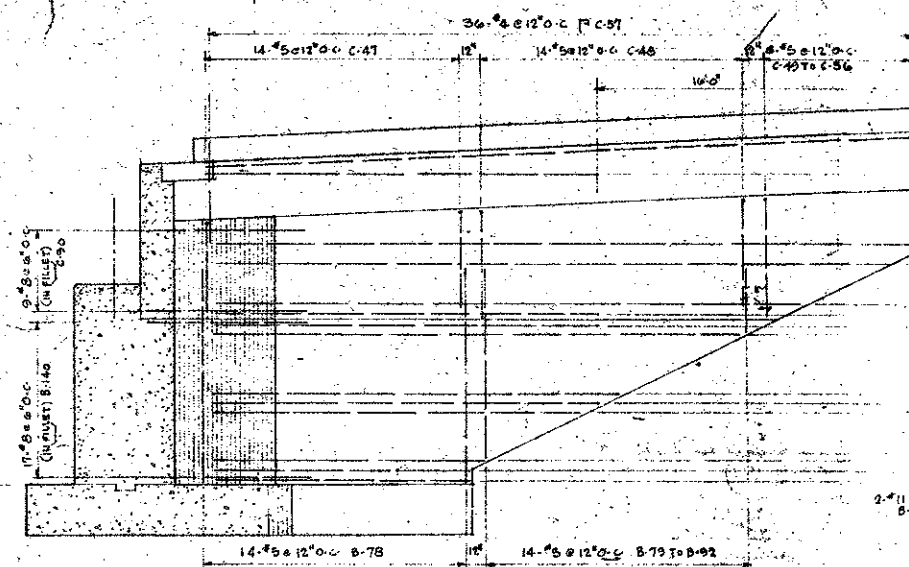
APPROVED: [Signature]
DATE: [Date]

NO.	DATE	BY	CHKD.	APPD.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

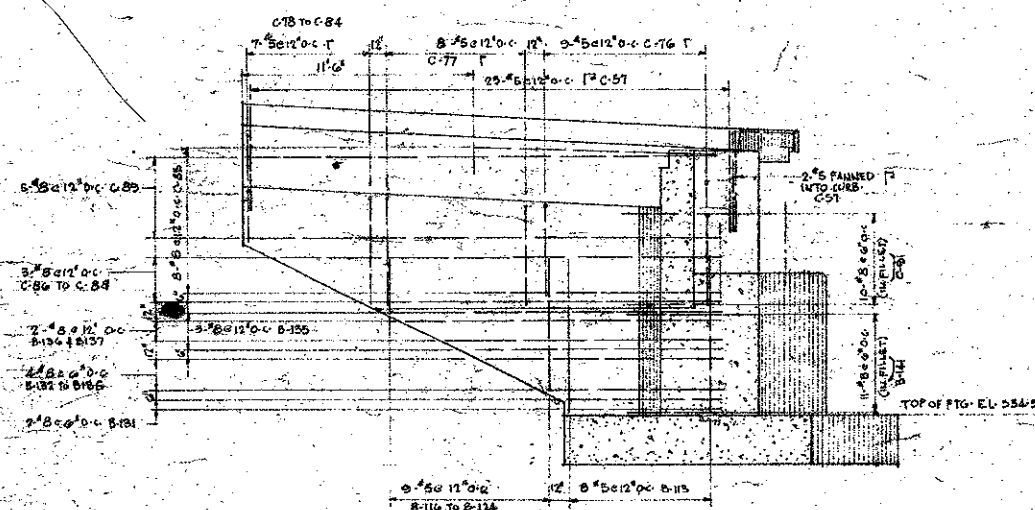


OUTSIDE FACE

SOUTH-WEST WING WALL REINFORCING
SCALE = 1/4" = 1'-0"

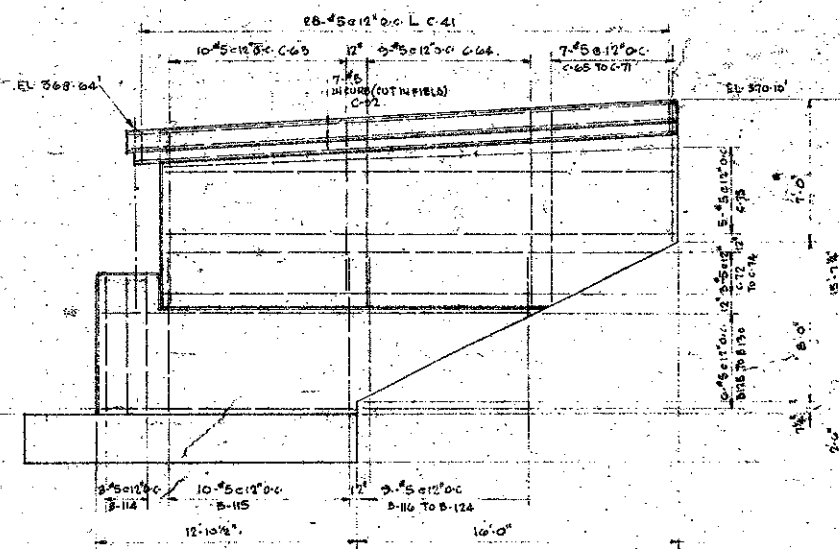


INSIDE FACE

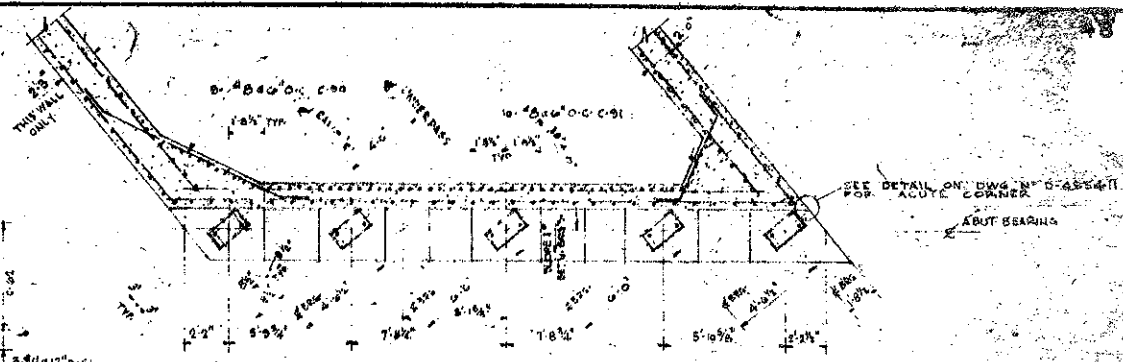


INSIDE FACE

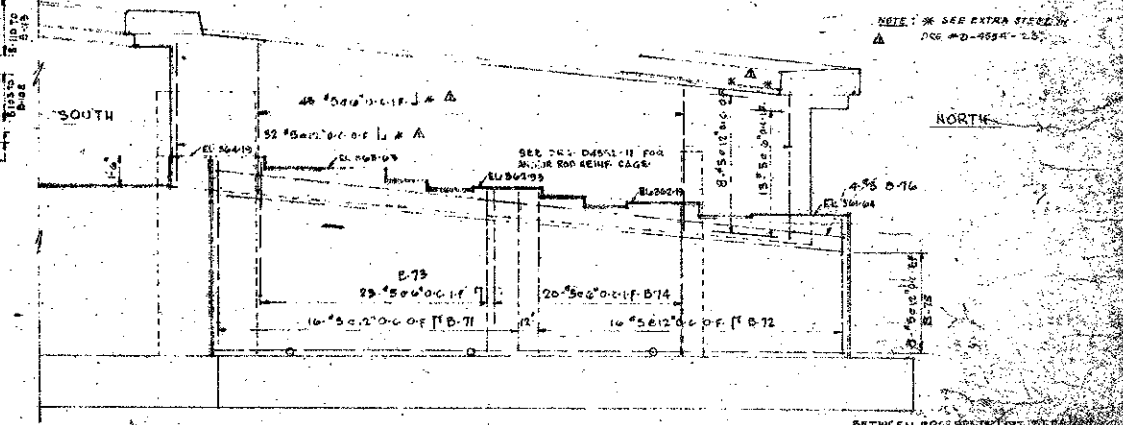
NORTH WEST WING WALL REINFORCING
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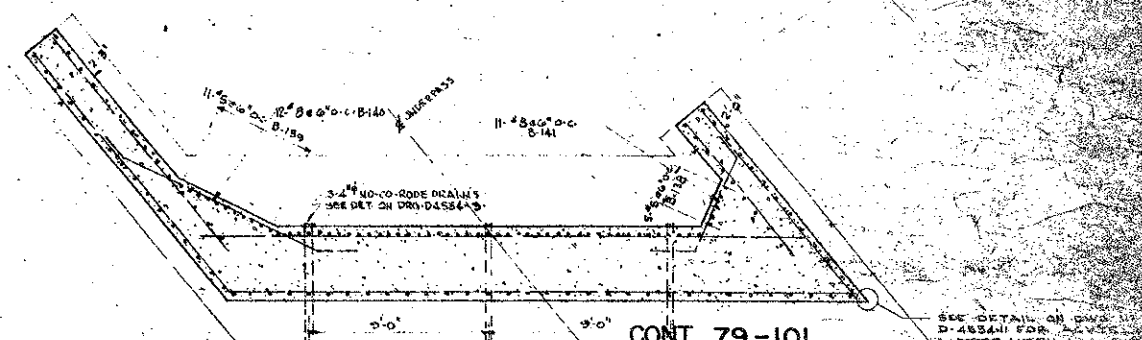
OUTSIDE FACE



PLAN AT WEST ABUT BEARING SEAT



ELEVATION AT FACE OF WEST ABUTMENT



SECTION THRU WEST ABUT. BELOW BEARING SEAT

- NOTES -
1. FOR GENERAL NOTES SEE DRG. D-4554-1
 2. FOR TYP. SECT. OF ABUTMENT SEE DRG. D-4554-2
 3. WING WALLS TO BE CONSTRUCTED STRAIGHT, BUT CURVES ON WING WALLS TO FOLLOW CURVE OF ROADWAY

CONT. 79-101
W.P. 845-71-01

SITE 30-2-B BRIDGE NO. 8

C.C. PARKER & PARSONS BRINCKERHOFF
HAMILTON CONSULTING ENGINEERS
DEPARTMENT OF HIGHWAYS-ONTARIO
BRIDGE OFFICE-TORONTO

CHEDOKE EXPRESS
UNDERPASS AT RAMP

THE KING'S HIGHWAY NO. 403

CO. OF WENTWORTH

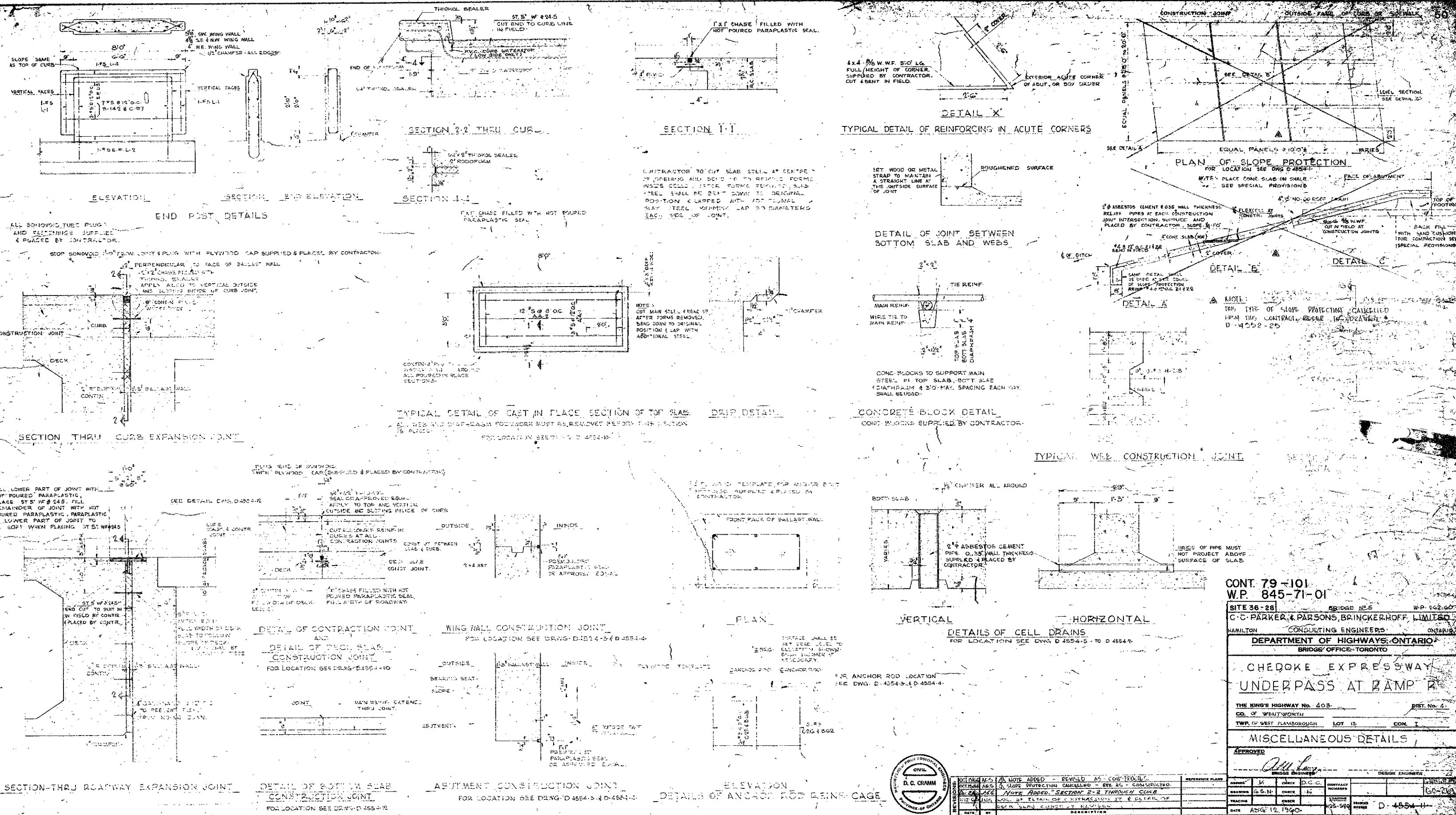
TWP. OF WEST FLAMBOURGH LOT 10

WEST ABUTMENT & WING WALL

APPROVED: *[Signature]*



REVISION	NO.	DESCRIPTION	DATE
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2	2	REVISION	1964
3	3	REVISION	1964
4	4	REVISION	1964
5	5	REVISION	1964
6	6	REVISION	1964
7	7	REVISION	1964
8	8	REVISION	1964
9	9	REVISION	1964
10	10	REVISION	1964



CONT. 79-101
W.P. 845-71-0

SITE 36-28 BRIDGE No 5 W-P-262 GO

C. C. PARKER & PARSONS, BRINCKERHOFF, LIMITED.

HAMILTON CONSULTING ENGINEERS ONTARIO

DEPARTMENT OF HIGHWAYS, ONTARIO.

BRIDGE OFFICE-TORONTO

CHEROKEE EXPRESSWAY

CHEYBROOK EXPRESSWAY

UNDERPASS AT RAMP B

SECRET

THE KING'S HIGHWAY No. 403. DIST. No. 4.

CO. OF WENTWORTH
THE ARMY & NAVAL AIRBORNE CORPS

TWP. OF WEST FLAMSBOROUGH LOT 13 CON.

MISCELLANEOUS DETAILS

APPROVED

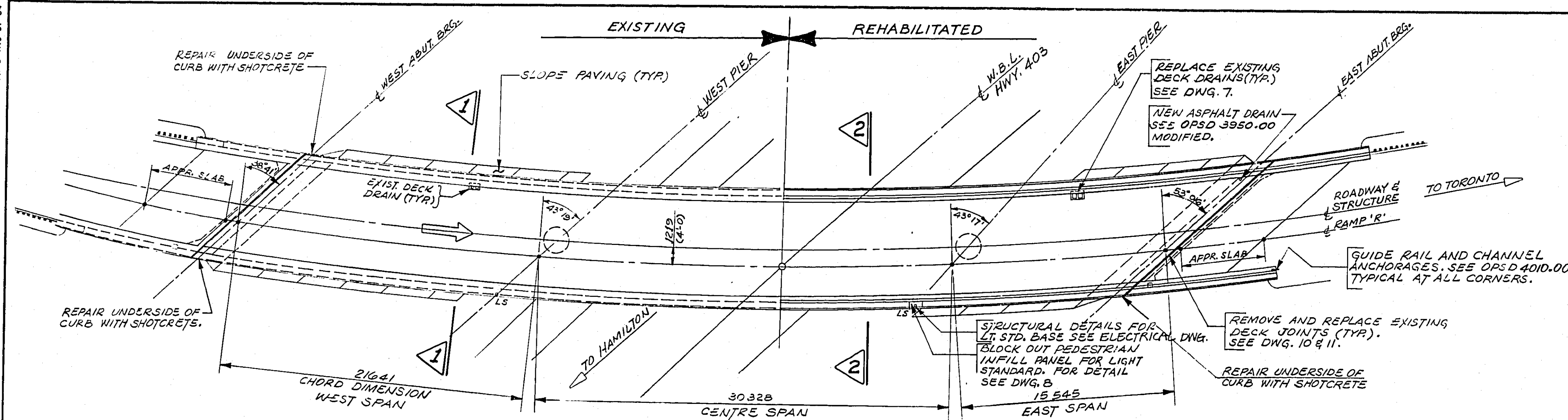
1. *Am. L.*

BRIDGE ENGINEER DESIGN ENGINEER

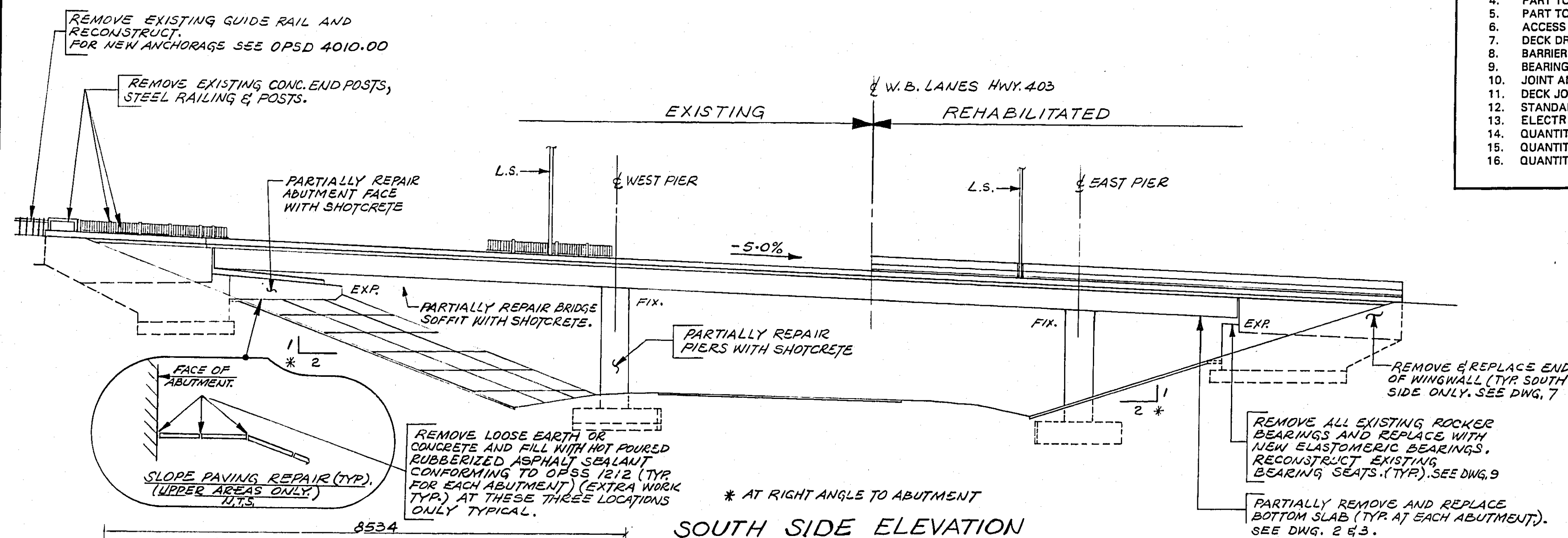
DATE	DESIGN	BY	CHECK	D.C.C.	CONTRACT		
					NUMBERS		

DRAWING	60-5-1	CHECK					60-5-1
TRACING		CHECK		LOADING			

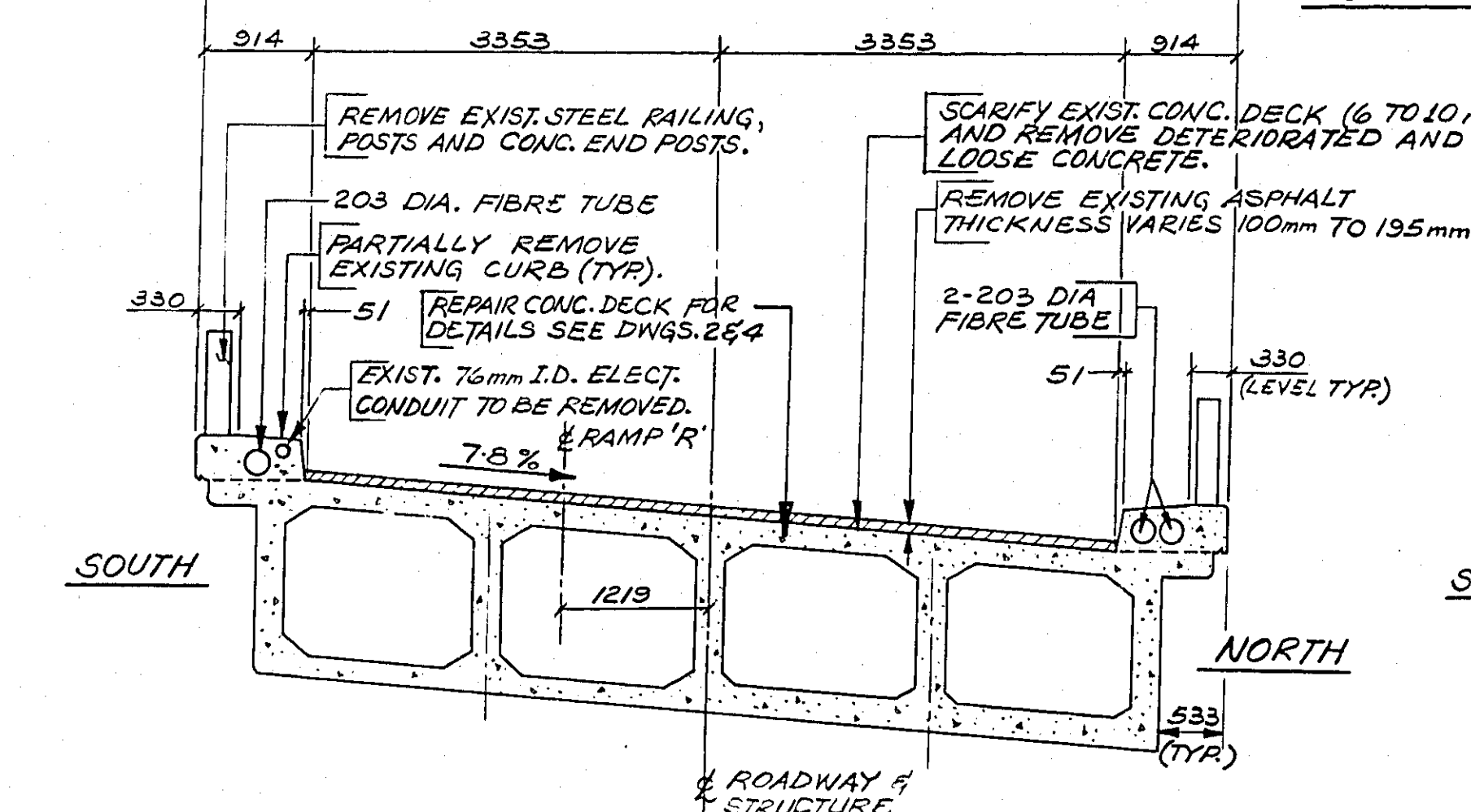
DATE	Aug 12, 1960	125-580	DRAWING NO 4554-1
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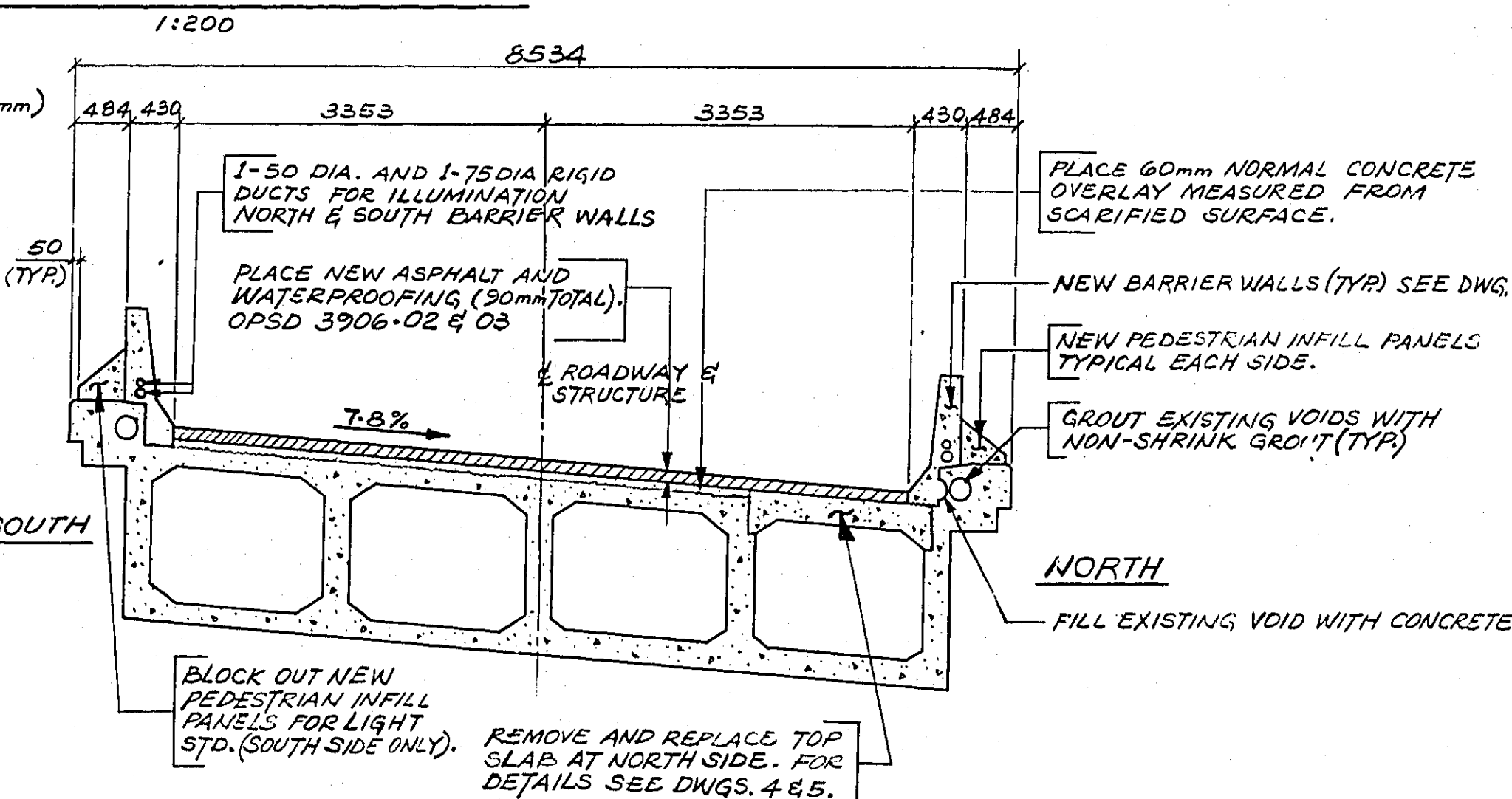
PLAN
1:200



SOUTH SIDE ELEVATION
1:200



1
TYPICAL EXISTING SECTION
1:150



2
TYPICAL REHABILITATED SECTION
1:50

LIST OF DRAWINGS

1. GENERAL ARRANGEMENT.
2. BOTTOM SLAB REPLACEMENT.
3. BOTTOM SLAB REPLACEMENT DETAILS.
4. PART TOP SLAB REPLACEMENT.
5. PART TOP SLAB REPLACEMENT DETAILS.
6. ACCESS OPENINGS - TOP SLAB.
7. DECK DRAIN AND WINGWALL REPAIR.
8. BARRIER WALL W/O RAILING.
9. BEARINGS REPLACEMENT.
10. JOINT ANCHORAGE & ARMOURING.
11. DECK JOINT REPLACEMENT.
12. STANDARD DETAILS.
13. ELECTRICAL EMBEDDED WORK.
14. QUANTITIES - STRUCTURE.
15. QUANTITIES - STRUCTURE.
16. QUANTITIES - STRUCTURE.

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No 96-66
WP No 80-93-01

HWY. 403 / HWY. 6 INTERCHANGE
BRIDGE REHABILITATION
GENERAL ARRANGEMENT



SHEET
348

Mitchell, Pound & Braddock Ltd.
Consulting Engineers & Town Planners
100 King Street West, Suite 1000
Toronto, Ontario M5X 1C5

GENERAL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL RELEVANT DIMENSIONS, ELEVATIONS AND DETAILS OF EXISTING STRUCTURE AND IS TO REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE COMMENCING ANY FABRICATION OR CONSTRUCTION. ALL EXPOSED CONCRETE SURFACES FOR REMOVALS SHALL BE SAWCUT 25 mm DEEP UNLESS OTHERWISE NOTED.
2. ALL CONCRETE SHALL BE 30 MPa UNLESS OTHERWISE SPECIFIED.
3. CLEAR COVER TO REINFORCING STEEL
DECK BOTTOM 50 ± 10 mm
ABUTMENTS AND WINGWALLS 75 ± 20 mm
PIERS 80 ± 20 mm
REMAINDER UNLESS NOTED OTHERWISE 70 ± 20 mm
4. REINFORCING STEEL SHALL BE GRADE 400 UNLESS OTHERWISE SPECIFIED. BAR MARKS WITH SUFFIX 'C' DENOTE COATED BARS. BAR MARKS WITH SUFFIX 'T' DENOTES BARS THREADED AT ONE END.
5. NO FIELD SPLICE FOR EXPANSION JOINTS IS ALLOWED.
6. ALL CROSS SLOPES ON DECK TO MATCH EXISTING UNLESS OTHERWISE NOTED.
7. DETAILS AND DIMENSIONS OF EXISTING BRIDGE HAVE BEEN DERIVED FROM THE ORIGINAL CONTRACT DRAWINGS TWP-151-28-1A TO TWP 151-28-24A.

SUGGESTED WORK SEQUENCE:

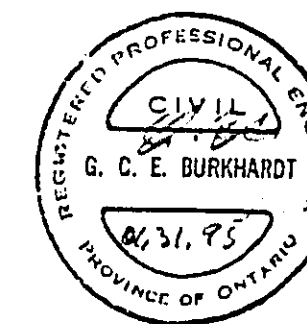
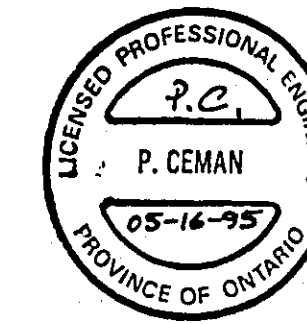
1. REMOVE EXISTING ASPHALT ON DECK AND APPROACH SLABS.
2. SCARIFY CONCRETE DECK (NOT OVER FULL DECK REMOVAL AREA) WORK NEAR OR AT BOTH ABUTMENTS CAN BE CARRIED OUT SIMULTANEOUSLY. (EXCEPT JACKING).
3. MAKE ACCESS OPENINGS IN THE TOP SLAB.
4. REMOVE AND REPLACE THE BOTTOM SLAB IN AREAS FOR JACKING.
5. JACK UP THE BRIDGE.
6. REMOVE AND RECONSTRUCT EXISTING BEARING SEATS AND REMOVE EXISTING ROCKER BEARINGS.
7. REMOVE THE REMAINING PART OF THE BOTTOM SLAB. FOR STAGING SEE DWG 2.
8. PLACE NEW ELASTOMERIC BEARINGS.
9. REPLACE THE REMAINING PART OF THE BOTTOM SLAB. FOR STAGING SEE DWG 2.
10. LOWER THE BRIDGE.
11. REPAIR ABUTMENT FACES AND OTHER SOFFIT DELAMINATIONS.
12. BRIDGE DECK REPAIR SHALL BE STAGED AS OUTLINED.
13. REMOVE OLD FORMWORK FROM WITHIN BOXES.
14. CAST CONCRETE IN ACCESS OPENINGS IN THE TOP SLAB EXCEPT AT THE NORTH SIDE.
15. INSTALL TEMPORARY SUPPORTS UNDER THE NORTH CURB ALONG THE BRIDGE.
16. REMOVE EXISTING LIGHT POLES, STEEL RAILINGS, POSTS, END POSTS AND GUIDE RAIL.
17. REMOVE CONCRETE AT CURB FACE TOGETHER WITH EXISTING EMBEDDED ELECTRICAL CONDUIT, JUNCTION BOXES ETC.
18. GROUT EXISTING VOIDS.
19. REMOVE EXISTING DECK JOINTS, PARTS OF BALLAST WALLS AND APPROACH SLABS.
20. REMOVE AND REPLACE SECTIONS OF THE TOP SLAB AT THE NORTH SIDE OF THE BRIDGE AND REPLACE EXISTING DRAINS. FOR STAGING SEE DWG 4.
21. REMOVE AND REPLACE ENDS OF THE SOUTH WINGWALLS.
22. REBUILD PARTS OF BALLAST WALLS AND APPROACH SLABS.
23. INSTALL NEW BARRIER WALLS, PEDESTRIAN INFILL PANELS AND LIGHT POLES.
24. REMOVE DETERIORATED AND LOOSE CONCRETE FROM THE DECK INCLUDING CONCRETE WITH CORROSION POTENTIAL MORE NEGATIVE THAN -0.35V.
25. REMOVE TEMPORARY SUPPORTS FROM UNDERNEATH OF CURB AT NORTH SIDE.
26. PLACE NORMAL CONCRETE OVERLAY TOGETHER WITH CONCRETE IN DECK REPAIR AREAS.
27. INSTALL NEW ASPHALT DRAIN.
28. PLACE WATERPROOFING AND NEW ASPHALT.
29. INSTALL NEW EXPANSION JOINTS.
30. RECONSTRUCT GUIDE RAIL.
31. REPAIR PIERS, ABUTMENTS, SOFFIT & SLOPE PAVING.

CONSTRUCTION STAGING

REFER TO GRADING DRAWINGS FOR STAGING AND SEQUENCE OF CONSTRUCTION.

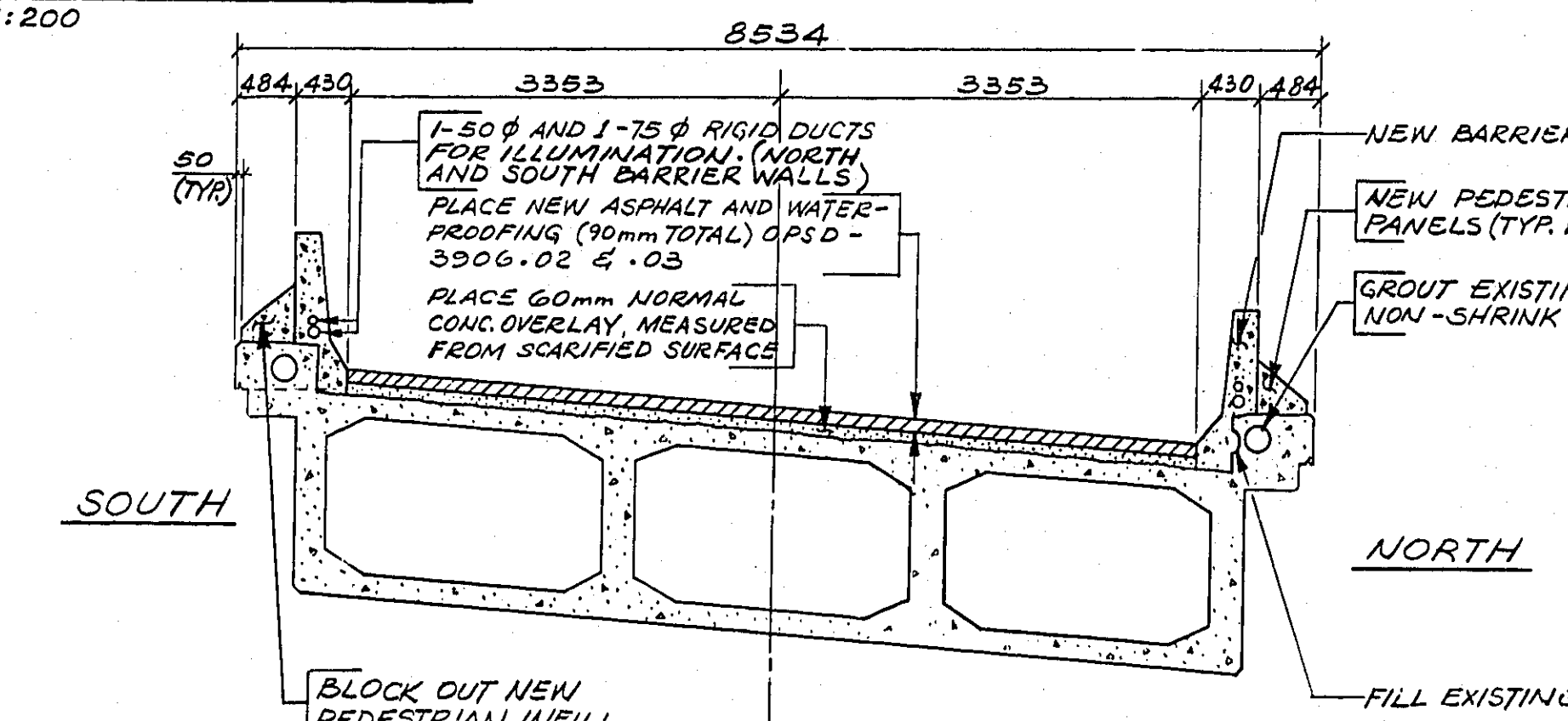
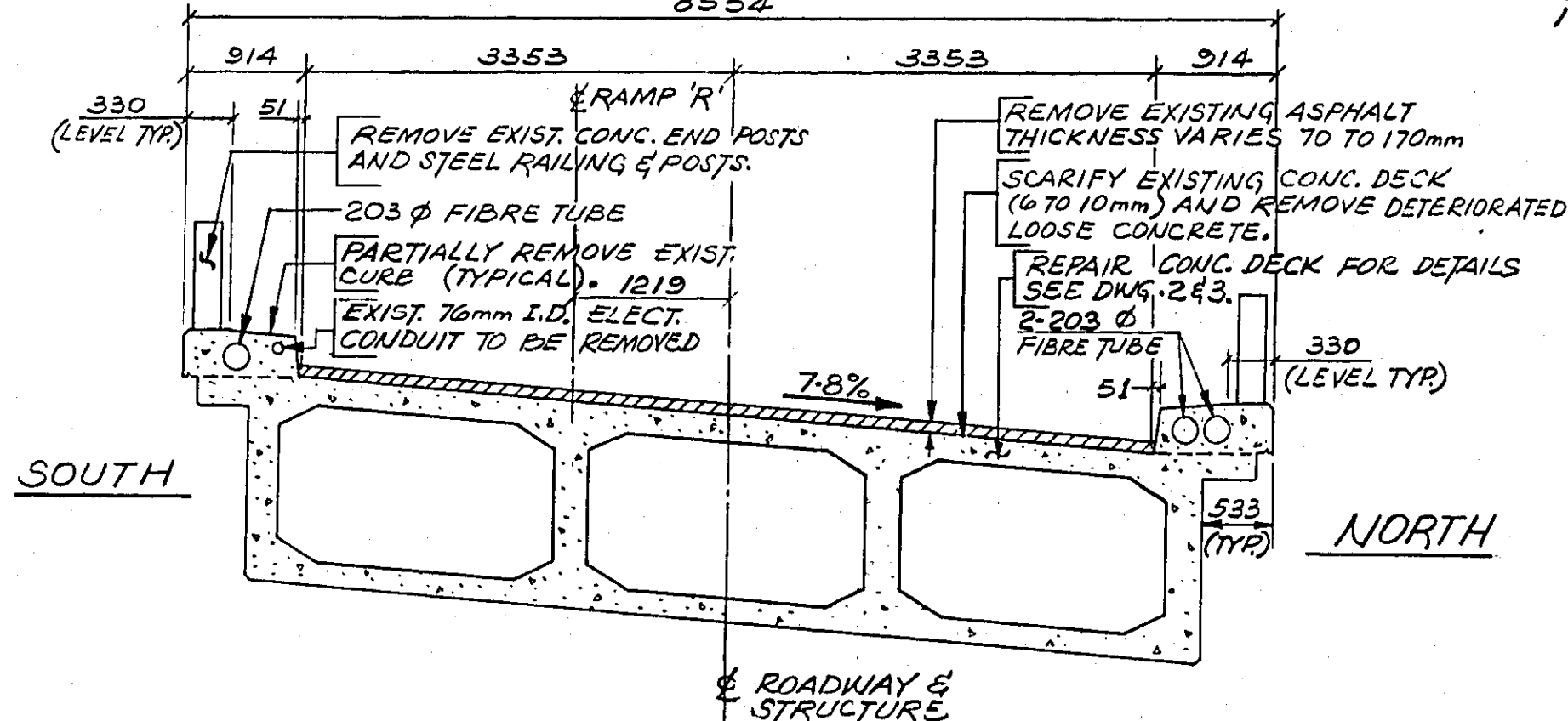
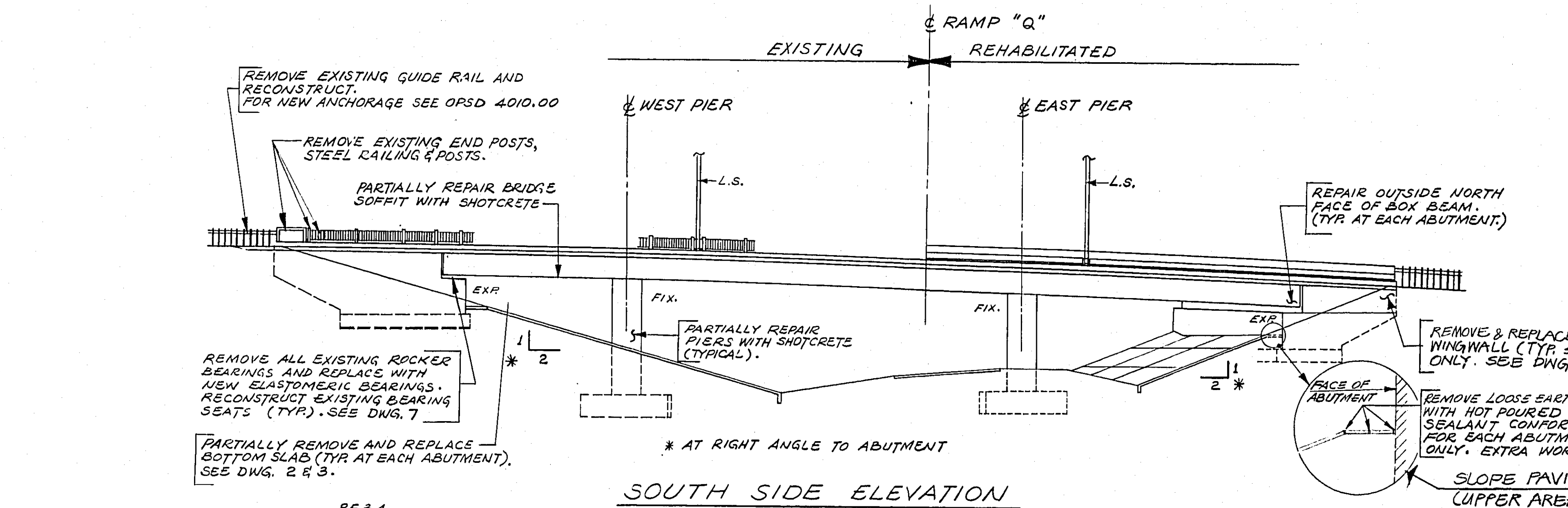
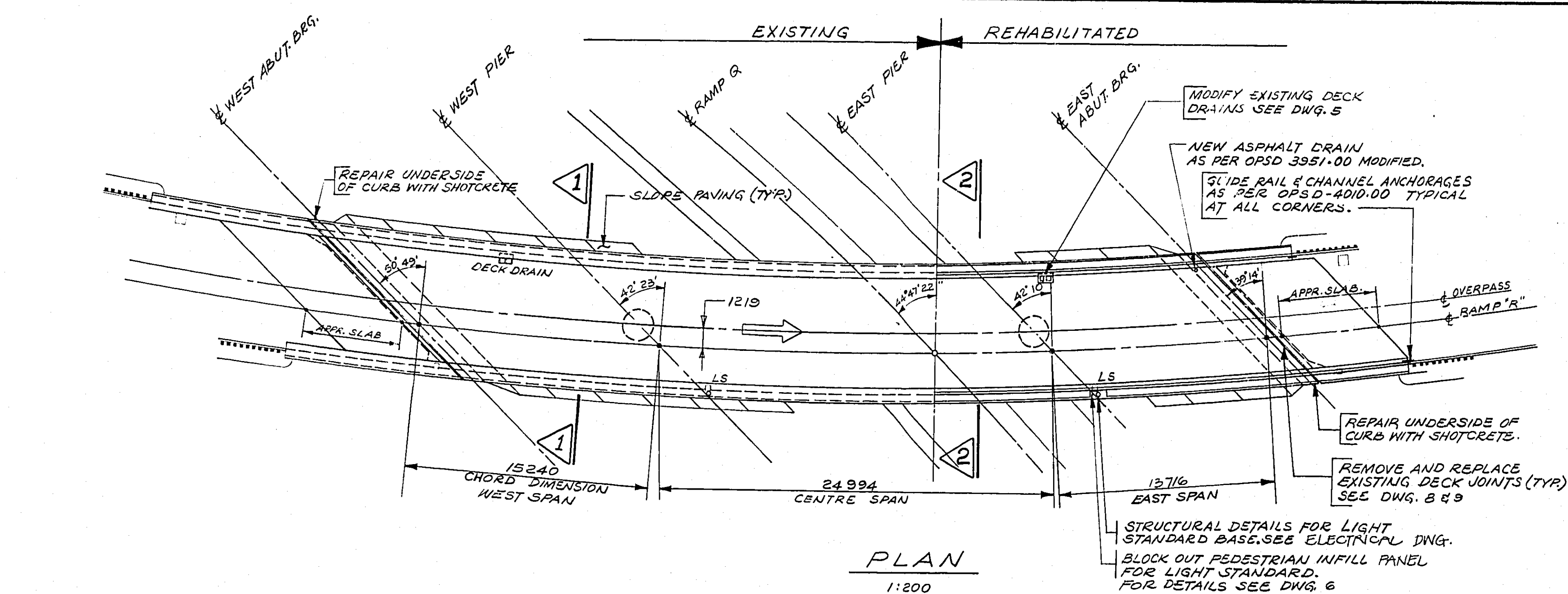
ELECTRICAL

SEE ELECTRICAL DRAWINGS FOR LAYOUT OF LIGHT STANDARDS.



DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS	DATE	BY	DESCRIPTION	23299
DESIGN	P. C.	CHK G. B.	CODE OHBDC-1991/LOAD	DATE FEB. 1994
DRAWN	D. S.	CHK P. C.	SITE 36-28 STRUCT	SCHEME: RI DWG. 1



METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

- LIST OF DRAWINGS**
1. GENERAL ARRANGEMENT.
 2. BOTTOM SLAB REPLACEMENT.
 3. BOTTOM SLAB REPLACEMENT DETAILS.
 4. ACCESS OPENINGS - TOP SLAB.
 5. DECK DRAIN MODIFICATION AND WINGWALL REPAIR.
 6. BARRIER WALL.
 7. BEARING REPLACEMENT.
 8. JOINT ANCHORAGE AND ARMOURING.
 9. DECK JOINT REPLACEMENT.
 10. STANDARD DETAILS.
 11. ELECTRICAL EMBEDDED WORK
 12. QUANTITIES - STRUCTURE.
 13. QUANTITIES - STRUCTURE.
 14. QUANTITIES - STRUCTURE.

CONT No 96-66
WP No 81-93-01
HWY. 403 / HWY. 6 INTERCHANGE
BRIDGE REHABILITATION
GENERAL ARRANGEMENT

SHEET
361

Mitchell, Pound & Braddock Ltd.
Consulting Engineers & Town Planners
100 University Avenue, Suite 1000, Toronto, Ontario M5G 1S7
Telephone: (416) 593-1111
Fax: (416) 593-1112

- GENERAL NOTES:**
1. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL RELEVANT DIMENSIONS, ELEVATIONS AND DETAILS OF EXISTING STRUCTURE AND IS TO REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE COMMENCING ANY FABRICATION OR CONSTRUCTION. ALL EXPOSED CONCRETE SURFACES FOR REMOVALS SHALL BE SAWCUT 25 mm DEEP UNLESS OTHERWISE NOTED.
 2. ALL CONCRETE SHALL BE 30 MPa UNLESS OTHERWISE SPECIFIED.
 3. CLEAR COVER TO REINFORCING STEEL
DECK BOTTOM 50 ± 10 mm
ABUTMENTS AND WINGWALLS 75 ± 20 mm
PIERS 80 ± 20 mm
REMAINDER UNLESS NOTED OTHERWISE 70 ± 20 mm
 4. REINFORCING STEEL SHALL BE GRADE 400 UNLESS OTHERWISE SPECIFIED. BAR MARKS WITH SUFFIX 'C' DENOTE COATED BARS. BAR MARKS WITH SUFFIX 'T' DENOTE BARS THREADED AT ONE END.
 5. NO FIELD SPLICE FOR EXPANSION JOINTS IS ALLOWED.
 6. ALL CROSS SLOPES ON DECK TO MATCH EXISTING UNLESS OTHERWISE NOTED.
 7. DETAILS AND DIMENSIONS OF EXISTING BRIDGE HAVE BEEN DERIVED FROM THE ORIGINAL CONTRACT DRAWINGS TWP-151-29-1A TO TWP-151-29-23A.

- SUGGESTED WORK SEQUENCE:**
1. REMOVE EXISTING ASPHALT ON DECK AND APPROACH SLABS.
 2. SCARIFY CONCRETE DECK.
 3. REMOVE DETEIORATED AND LOOSE CONCRETE FROM THE DECK INCLUDING CONCRETE WITH CORROSION POTENTIAL MORE NEGATIVE THAN -0.35V.
 4. WORK NEAR OR AT BOTH ABUTMENTS CAN BE CARRIED SIMULTANEOUSLY. (EXCEPT JACKING)
 5. MAKE ACCESS OPENINGS IN THE TOP SLAB.
 6. REMOVE AND REPLACE THE BOTTOM SLAB IN AREAS FOR JACKING.
 7. JACK UP THE BRIDGE.
 8. REMOVE AND RECONSTRUCT EXISTING BEARING SEATS AND REMOVE EXISTING ROCKER BEARINGS.
 9. REMOVE THE REMAINING PART OF THE BOTTOM SLAB. FOR STAGING SEE DWG. 2.
 10. PLACE NEW ELASTOMERIC BEARINGS.
 11. REPLACE THE REMAINING PART OF THE BOTTOM SLAB. FOR STAGING SEE DWG. 2.
 12. LOWER THE BRIDGE.
 13. REPAIR UNDERSIDE OF CURBS, FACES OF BOX BEAMS AND OTHER SOFFIT DELAMINATIONS.
 14. BRIDGE DECK REPAIRS SHALL BE STAGED AS OUTLINED.
 15. REMOVE OLD FORMWORK FROM WITHIN BOXES.
 16. CAST CONCRETE IN ACCESS OPENINGS IN THE TOP SLAB.
 17. REMOVE EXISTING LIGHT POLES, STEEL RAILINGS, POSTS, END POSTS AND GUIDE RAIL.
 18. REMOVE CONCRETE AT CURB FACE TOGETHER WITH EXISTING EMBEDDED ELECTRICAL CONDUIT, JUNCTION BOXES ETC.
 19. GROUT EXISTING VOIDS.
 20. MODIFY EXISTING DRAINS.
 21. REMOVE EXISTING DECK JOINTS, PARTS OF BALLAST WALLS AND APPROACH SLABS.
 22. REMOVE AND REPLACE ENDS OF THE SOUTH WINGWALLS.
 23. REBUILD PARTS OF BALLAST WALLS AND APPROACH SLABS.
 24. INSTALL NEW BARRIER WALLS, PEDESTRIAN INFILL PANELS AND LIGHT POLES.
 25. PLACE NORMAL CONCRETE OVERLAY TOGETHER WITH CONCRETE IN DECK REPAIR AREAS.
 26. INSTALL NEW ASPHALT DRAIN.
 27. PLACE WATERPROOFING AND NEW ASPHALT.
 28. INSTALL NEW EXPANSION JOINTS.
 29. RECONSTRUCT GUIDE RAIL.
 30. REPAIR PIERS, ABUTMENTS, SOFFIT & SLOPE PAVING.

CONSTRUCTION STAGING
REFER TO GRADING DRAWINGS FOR STAGING AND SEQUENCE OF CONSTRUCTION.

ELECTRICAL
SEE ELECTRICAL DRAWINGS FOR LAYOUT OF LIGHT STANDARDS.

P.C.
P. CEMAN
05-16-95
PROVINCE OF ONTARIO

CIVIL
G. C. E. BURKHARDT
05-34-95
PROVINCE OF ONTARIO

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS	DATE	BY	DESCRIPTION	23312

DESIGN G.B. CHK P.C. [CODE OHBDC-199] LOAD [DATE FEB. 1994]
DRAWN D.R.S. CHK P.C. SITE 36-29 STRUCT [SCHEME R1] DWG. 1



Appendix C

Selected Site Photographs



Photo 1- Ramp 6N to Highway 403E (Site 36-28)
over Ramp Highway 403 W to 6N
(Photo taken from the south side, from Ramp Highway 403 W to 6N on December 1, 2021)



Photo 2- Ramp 6N to Highway 403E (Site 36-28)
over Ramp Highway 403 W to 6N, east abutment and pier
(Photo taken from the south side, from Ramp Highway 403 W to 6N on December 1, 2021)



Photo 3- Ramp 6N to Highway 403E (Site 36-28)
over Ramp Highway 403 W to 6N, west abutment and pier
(Photo taken from the south side, from Ramp Highway 403 W to 6N on December 1, 2021)



Photo 4- Ramp 6N to Highway 403E (Site 36-28)
over Ramp Highway 403 W to 6N, bridge soffit near west pier
(Photo taken from the south side, from Ramp Highway 403 W to 6N in June 2021)



Photo 5- Ramp 6N to Highway 403E (Site 36-29)
Existing Ramp over Highway 403 WBL
(Photo taken from the north side, Highway 403 WBL on December 1, 2021)



Photo 6- Ramp 6N to Highway 403E (Site 36-29)
Existing Ramp over Highway 403 WBL, west abutment and west pier
(Photo taken from the north side, Highway 403 WBL on December 1, 2021)



Photo 7- Ramp 6N to Highway 403E (Site 36-29)
Existing Ramp over Highway 403 WBL, east abutment and east pier
(Photo taken from the north side, Highway 403 WBL)



West abutment
West Pier

Photo 8- Ramp 6N to Highway 403E (Site 36-29)
Existing Ramp over Highway 403 WBL, west abutment and west pier
(Photo taken from the north side, Highway 403 WBL)



Appendix D

Plan of Proposed Boreholes

