PRELIMINARY ENGINEERING REPORT

Birnie Avenue Bridge / Tunnel
City of Springfield, MA

September 6, 2019

City of Springfield – Department of Public Works
70 Tapley Street
Springfield, MA 01104

benesch

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SECTION 1 – EXECUTIVE SUMMARY

1.1 Project Overview and Scope

Alfred Benesch & Company was retained by the City of Springfield to perform a study and provide recommendations for roadway improvements and rehabilitation of the roadway bridge / pedestrian tunnel passing underneath Birnie Avenue connecting to German Gerena Community School. The existing bridge / tunnel has been subject to unwanted water infiltration for years and exhibits signs of associated deterioration. This report is based on observations from our field visit as well as previous reports and testing results made available to us. This report addresses the bridge / tunnel under Birnie Avenue in between the atrium building and the Gerena School building. Water infiltration into the adjacent structures is not addressed in this report.

The structure of the Birnie Avenue bridge / tunnel generally consists of 23 concrete box girders supported on concrete abutments. There are also cast-in-place concrete beams supporting portions of sidewalk / ground surface adjacent to the precast concrete box girders at the interfaces with the school and atrium structures.

The structure was constructed in 1974 and contains a corridor which is open to the public. This corridor allows pedestrians to move safely between the Main Street area and the Plainfield Street area by crossing under I-91, Birnie Avenue and the railroad tracks. It also allows access to the Gerena School and Chestnut Accelerated Middle School. The tunnel/bridge also houses rental/office space which is currently unusable due to water infiltration. The corridor and rental spaces are finished with a drop-down ceiling. The corridor was once finished with floor tiles, but they have been removed due to water damage.

The intent of this assessment is to observe the structure condition of the existing bridge / tunnel and identify areas where water infiltration is occurring and to recommend measures to deter the infiltration of water into the tunnel / bridge.

1.2 Field Observations

During the field investigation stage of the study, representatives from Benesch, Nobis (geotechnical subconsultant), and Arora (mechanical & electrical subconsultant) met with building maintenance personnel in order to get a better understanding of locations where water infiltration was occurring. The following locations of water infiltration were noted at the Birnie Avenue Bridge / Tunnel:

- Water was observed to be dripping off the bottom of the concrete slab in the northeast corner of the bridge, possibly down the atrium building exterior wall
- Water was observed to be infiltrating the tunnel through the joint between beam #1 and the concrete edge beam #1 near the north and south abutments

- Water was observed to be infiltrating the tunnel through the joint between beam #23 and the concrete edge beam #2 near the north abutment
- In general, the joints between the prestressed concrete box beams are leaking along the north abutment and water is running down the abutment face
- Water was observed to be infiltrating all utility bays. The stay-in-place metal forms and the steel angles that support them are exhibiting heavy rust and section loss.
- Water was observed to be infiltrating the tunnel at all four locations where Birnie Avenue curb lines cross over the bridge abutments

1.3 Recommendations

To address the ongoing water infiltration (noted above) we recommend the following:

- Repair and Waterproof Topping Slab: Excavate above the box beams and adjacent concrete slabs, repair concrete topping slab as needed and install new waterproofing membrane along surface of repaired topping slab. Due to water infiltration noted through the utility bays, it is recommended that these portions of the slab be completely reconstructed.
- Repair and Waterproof Abutments: Excavate down the sides of the existing abutments, repair abutments as necessary, and apply waterproofing membrane along the entire back face (including all utility penetrations) of both abutments.
- Waterproof Joints at Abutments and Building Interfaces: Excavate fill materials at the interfaces of the bridge / tunnel and adjacent structures and replace waterproofing / joint materials. Replace bridge expansion joints at each abutment.
- Revise Roadway Profile to Divert Surface Water From Bridge / Tunnel: Install speed table over Birnie Avenue bridge / tunnel to guide water away from structure. Note: The speed table will also serve the purpose of reducing the speed of traffic along Birnie Avenue.
- Collect and Drain Groundwater: Install perforated drains behind the abutments and pump chambers to pump groundwater away from the bridge / tunnel site.

1.4 Maintenance and Protection of Traffic

The proposed roadway, drainage and structure waterproofing will be constructed utilizing stage construction. One lane of traffic will be maintained at all times during construction. During stage one, the western half of Birnie Avenue will be closed to traffic for construction while the eastern half of the roadway will be open to traffic. During stage two, the eastern half of Birnie Avenue will be closed to traffic to complete construction while the western half of the roadway will be open to traffic. Temporary earth retention will be used to support the roadway adjacent to the excavation.

1.5 Estimated Cost

The following table provides a summary of the preliminary construction costs anticipated for this the proposed work items:

Estimated Construction Cost					
	Structure	Roadway	Mechanical / Electrical	Contingency & Inflation	Total
Birnie Avenue Bridge / Tunnel Improvements	$603,000	$203,000	$784,000	$415,000	$2,005,000

Note that these values are based on preliminary information and are subject to change pending further evaluation and receipt of new data.

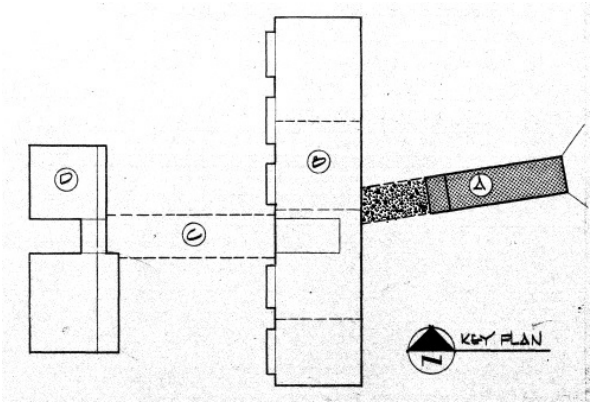
These costs likewise to not include any costs for interior renovations in the finished spaced located below the bridge structure.

For an itemized cost estimate refer to Appendix B – “Cost Estimate”.

SECTION 2 – PROJECT DESCRIPTION

The Birnie Avenue bridge / tunnel is a single span precast concrete box girder bridge supported on concrete abutments. This structure carries Birnie Avenue over an underground pedestrian corridor and rental / office spaces. The bridge spans generally north to south.

The site is located at 200 Birnie Avenue in Springfield, Massachusetts (address of Gerena School). The site consists of the Birnie Avenue bridge / tunnel which extends from Linda Park (near Main Street), to below Interstate 91, then below ground (i.e. below Birnie Avenue) into Gerena School. The Birnie Avenue bridge / tunnel is in Building A (see Key Plan and Existing Plans in Appendix C).



Key Plan

The bridge / tunnel was originally constructed in 1974. The span length (bearing to bearing) is approximately 52’ - 3”. The superstructure consists of 23 precast concrete box girders with a 4” reinforced concrete slab above it. There are independently supported reinforced concrete beams on both the east end and west end of 23 box beams. These beams do not carry Birnie Avenue but carry the area between the curb line and the building on either side of the bridge / tunnel. The superstructure is supported on both sides by concrete abutments. There are sidewalks on both sides of Birnie Avenue supported by this structure. There are three utility bays within the 23-beam structure. These bays span between box girders using a thickened reinforced concrete slab. The bridge / tunnel has an out-to-out width of 97’-10”.

The interior space under the bridge / tunnel is split into two sections. The southern half of the space consists of a corridor that is open to the public. There is a drop ceiling in this space and there was once a finished floor in the hallway which has been removed due to water damage. The northern half of the space houses rental / office spaces. These spaces are also finished with a drop ceiling in most rooms and tiled bathroom walls and floors. Many of the finishes along the north abutment wall are deteriorating due to water infiltration.

2.1 Existing Information

The City of Springfield has provided the following documents:

- Historic plan sheets (219 sheets), dated August 1972, prepared by Perkins & Will Architects, Inc.;
- Phase 1 Investigation Report dated August 2012, prepared by Simpson Gumpertz & Heger;
- HVAC Study report dated August 2012, prepared by RDK Engineers;
- Letter from City of Springfield Department of Public Works (DPW) dated January 9, 2013;
- Building Environmental Review Poster Series, prepared by Department of Parks, Buildings and Recreation Management, and
- I-91 bridge plans, dated April 1967, prepared by Charles A. Maguire & Associates.

Based on a review of the existing information, we understand the Birnie Avenue Bridge / Tunnel and Building A, have experienced water intrusion issues related to multiple potential sources (e.g. roof leaks, stormwater intrusion, intrusion from utilities, and groundwater seepage). The Phase 1 investigation was carried out by others in Spring 2012 which included a survey of areas of leakage at the tunnel and included excavation and water testing to recreate seepage patterns. The Phase 1 report suggested that a comprehensive repair program be performed to re-waterproof the entire tunnel.

The letter from the City of Springfield DPW, dated January 2013, generally concurred with the Phase 1 report and suggested that the entire tunnel section should be exposed and all insulating and waterproofing material should be replaced. Additionally, the letter from the DPW provided potential solutions to address the groundwater seepage which consisted of installing 6" diameter infiltration pipes on the north and south sides of the tunnel and connecting the pipes to a pump station.

2.2 Location Map

Figure 1 – Location Map

SECTION 3 – EVALUATION OF EXISTING CONDITIONS

3.1 Traffic and Highway Geometrics

Birnie Avenue has a functional classification "Urban – Arterial" and is developed with health care facilities and a parking garage to the north of the German Gerena School and industrial buildings to the south. The section of roadway in the vicinity of the project is bordered by I-91 to the east and serves as a frontage road from I-91 on the north and to I-91 and Route 20 to the south.

From the north, Birnie Avenue is a two-way roadway up to the parking lot entrance at the north end of the German Gerena School. South of this location the I-91 Southbound off-ramp merges with Birnie Avenue and the roadway transitions to a one-way southbound operation with 2 travel lanes. The roadway does not have a posted speed limit. There are "School Zone 20 MPH" speed signs with time of day flashing beacons on the I-91 Southbound off ramp north of the school and "School Zone 20 MPH" (without flashing beacons) speed signs on Birnie Avenue.

The roadway width across the bridge is 39.6' curb-to-curb. There is a faded skip line running down the middle of the pavement and there are no painted shoulder lines across the bridge. Approximately 100' south of the bridge, the roadway transitions to 30' wide to shield a right turn lane to the parking lot south of the school. Birnie Avenue south of the parking lot entrance remains a 30' +/- wide roadway. When school is in session, school buses queue in the existing right shoulder across the bridge prior to school dismissal. The busses enter the parking lot south of the bridge to pick up students at the time school is let out.

On the east side of Birnie Avenue there is a 6' wide concrete sidewalk separated from the roadway by a 3' wide grass strip. The concrete sidewalk in front of the school is adjacent to the roadway curbline and is 11' wide. There is also an 8' grass strip between the school and sidewalk. The only crosswalks and associated sidewalk ramps are located at the I-91 southbound off ramp north of the bridge.

There are entrances at the north and south ends of the school with 3 doorways that exit onto the sidewalk adjacent to Birnie Avenue. One doorway is located within the limits of the Bridge/Tunnel.

There is a 250' long steel w beam highway guardrail at the curbline in front of the school which crosses the bridge / tunnel. The guardrail posts are anchored in the concrete sidewalk. The existing cover over the bridge / tunnel at the rail posts is approximately 1'-6".

3.2 Field Observations

Representatives from Benesch visited the site on June 6, 2019 for a site walk which was attended by representatives of our subconsultants Nobis and Arora. The Benesch team reviewed the site

with representatives from the City of Springfield Building Department and school facilities staff. The site visit included a tour of areas of the Birnie Avenue Bridge / Tunnel which experienced water infiltration issues. The intent of this visit was to identify / confirm sources of water infiltration into the structure. The following is a summary of the findings.

Topside of Bridge / Tunnel

Bituminous Concrete Pavement – The bituminous concrete pavement across the bridge exhibits several areas of cracking, open up to 1" wide. There is a section on the east side of the roadway that has been cut open for previous testing and patched. There is a pothole adjacent to this patch that has been filled with bituminous material. There are cracks along the bridge joints over both the north and south abutments. These cracks extend across the entire roadway.

Sidewalks and Curbs – The concrete sidewalk on the west side of Birnie Avenue is in generally good condition. The curb that runs along this sidewalk, however, is tilting in towards the roadway and some sections are misaligned. The concrete sidewalk to the east of Birnie Avenue has vegetation growing through the joints. A portion of this sidewalk has been removed for previous testing and patched with bituminous. The curb height along this sidewalk is uneven.

Guardrail and Fences – There is guard rail on the west side of Birnie Avenue. This rail exhibits no notable deficiencies.

Superstructure

The superstructure consists of 23 prestressed concrete box beams covered with a 4" concrete topping slab. There are also reinforced concrete beams on the east and west ends. The superstructure contains three utility bays between box beams. In these locations, there is a thickened slab with steel angles on either end for support. The prestressed concrete box beams and reinforced concrete beams exhibit efflorescence in areas of water infiltration but are in sound condition overall. The steel angles in the utility bays are heavily rusted in areas of water infiltration and in some locations exhibit loss of section. These utility bays have stay-in-place metal forms on the bottom that are heavily rusted as well. The topping slab was not exposed as part of this effort, however, by the amount of water infiltrating the bridge / tunnel, it is reasonably assumed that there are problems with the membrane waterproofing system and most likely the deck itself.

Substructure

The concrete abutment stems are approximately 3 feet wide and bear on concrete footings approximately 10 feet wide. The structures are generally in good condition. There is efflorescence on the concrete abutment stems in areas of water infiltration. No major cracks or spalls were noted. There are approach slabs that sit each abutment. Each approach slab is 8 inches thick and 14 feet wide.

3.3 Load Rating

A review of the 2017 inspection report indicates that the existing load rating of the bridge is 56.9 tons (as compared to the 36-ton load of an HS-20 truck). As this indicates that excess capacity is available for the proposed speed table, no load rating has been performed as part of the study phase of the work. A load rating is recommended to be performed as a part of the final design.

3.4 Geotechnical Observations

Elevations in this section refer to the NAVD88 vertical datum. Elevations from the existing plans have been converted to meet this datum.

Based on the Building A plans, El. 60 feet is the ground level of the first floor of Gerena School and the roadway grade of Birnie Avenue is at approximate El. 58 feet.

The tunnel has a thicker mat slab (i.e. about 4'-8" thick) starting about where the tunnel connects to Building B on the western side of the tunnel of the school and extending east, below Birnie Avenue until about the start of the I-91 overpass. The mat slab then thins to about 1'-6" thick and continues east about 40 feet terminating near a stairwell.

The lowest finished floor elevation of the tunnel occurs where the mat slab starts and is at El. 44 feet (i.e. approximately 14 feet below roadway grades). The finished floor elevation where the thicker mat slab ends is at about El. 48.0 feet (i.e. approximately 10 feet below roadway grades). The tunnel continues to ramp up to El. 49.3 near the stair landing that is below the I-91 overpass. The thinner mat slab ends near this stairwell. The Linda Park entrance to Building A has a finished floor elevation of El. 58 feet.

As a part of the field investigation**,** Nobis tried to locate monitoring wells previously installed by others as mentioned in a Phase 1 investigation report. Nobis could not locate the existing monitoring wells.

GENERALIZED SUBSURFACE CONDITIONS

Surficial Geology Maps

Based on our review of the USGS surficial geologic map entitled "Geologic Map of the Springfield South Quadrangle, Hampden County, Massachusetts, and Hartford and Tolland Counties, Connecticut", the site likely consists of alluvium. The alluvium is described as:

> "recent stream deposits of light-grayish-brown silt, sand, and gravel along the Connecticut River, Westfield River, and smaller streams. Occurs in several levels of flood plains up to 25 feet above river level. Generally, less than 20 feet thick."

Subsurface Conditions Encountered in I-91 Borings

The historic I-91 bridge plans shows five (5) borings completed near the I-91 bridge overpass. The borings are labeled S-6 through S-10 and PHB-4. The borings were performed in December 1965, except boring PHB-4 which was completed in April 1964. A boring log sheet is included as part of the plan set. The I-91 bridge plans are included as Appendix C. Borings S-6 and S-8 are located closest to the Birnie Avenue tunnel.

Based on the historic borings, the subsurface conditions generally consisted of alluvial deposits overlying glacial till. The glacial till was generally encountered at approximately 65 to 70 feet below historic grades except for boring S-10 where the top of glacial till was encountered approximately 44 feet below historic grades. The alluvial deposits consisted of alternating layers of clean sand, silty sand, and silt/clay.

The I-91 borings were completed prior to the construction of the tunnel. It is unclear what type of backfill was used below and/or adjacent to the tunnel. Additional subsurface explorations should be completed during the next phase of the project to gain a better understanding of the subsurface conditions.

Groundwater

Groundwater levels were included on the I-91 borings logs and varied between 11 to 14.5 feet below historic grades, except for the groundwater level in boring PHB-4 which was 22.5 feet below historic grades. The boring notes on the I-91 bridge plans indicate that the groundwater levels do not necessarily represent stabilized groundwater levels.

The I-91 bridge plans appear to use NGVD 29 (mean sea level) for the vertical datum. A conversion was applied to convert the mean sea level elevations to NAVD88. The conversion from mean sea level to the datum to NAVD88 should be considered approximate. The approximate conversion from NGVD29 to NAVD88 is 0.7 feet (i.e. subtract 0.7 feet from the NGVD29 elevation to obtain the NAVD88 elevation.)

The groundwater levels shown on the boring logs correspond to approximate El. 50 to 45 except for boring PHB-4 which has the water level at El. 38.

The Phase 1 Investigation report indicates that a groundwater monitoring well was found in the sidewalk along Birnie Avenue. The report presents a groundwater measurement from this well at approximately 10 feet below grades corresponding to about El. 48.

PRELIMINARY GEOTECHNICAL CONSIDERATIONS

This section presents preliminary geotechnical considerations related to the remedial design of the Birnie Avenue Tunnel.

Design Groundwater Elevation

We recommend a preliminary design groundwater elevation of El. 50 based on the historic information. Note the highest finished floor elevation of the floor with a mat slab is at El. 48 feet. The design groundwater elevation should be updated during future phases of the project after monitoring wells are installed.

Infiltration Seepage and Construction Considerations

Birnie Avenue - Northern and Southern Walls

Based on the site visit, and discussions of historic issues in the available reports, water infiltration into the tunnel roof and/or walls appears to be a primary concern. The remedial design of the tunnel should account for this infiltration seepage.

The backfill material below Birnie Avenue and adjacent to the tunnel walls is not known.

Birnie Avenue Slab Seepage

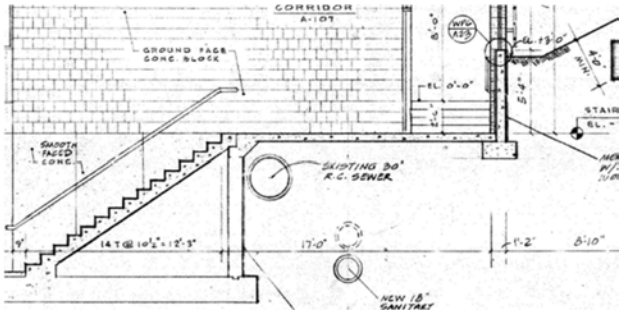
Based on the site visit and existing information it's not clear that slab seepage is a concern for the Birnie Avenue Tunnel. The existing tunnel appears to consist of a mat slab which was designed to resist seepage.

Stairwell Below I-91 Overpass

The stairwell below the I-91 overpass has had historic water infiltration issues, as mentioned above. One possible source of the water infiltration issue could be due to water being collected behind the existing I-91 north and south abutments and discharging in this area. Installing sump pumps in the area between the existing bridge abutments and the eastern portion of the building may be a possible solution for the water infiltration in this area. However, access for equipment between the north abutment and the eastern portion of the building is extremely limited. Smaller equipment, such as a geoprobe rig, may be needed to drill a well in this area. Sump pumps or other options should be further developed as this project progresses.

Sanitary Sewers

There is an existing 18" sanitary sewer which is located adjacent to or below the tunnel. There is also an existing pressurized 30" R.C. sanitary sewer in this area.



The 18" sanitary sewer could be a potential source of water infiltration adjacent to the tunnel walls.

3.5 Mechanical / Electrical Observations

Arora Engineers, Inc. conducted a site visit to identify the existing conditions of the mechanical and electrical systems.

There are existing electrical facilities located in Gerena School from which it is anticipated any proposed pumps would be fed from. There is an Onan / Cummins 350 kW generator which provides standby power. The electrical loading on these facilities will have to be tested to confirm the available capacity available.

Though there are existing pump facilities located within the school structure, there are no existing pumps located within Birnie Avenue to remove water from behind the existing bridge abutments.

3.6 Roadway Drainage

The low point of the roadway is approximately 30' north of the bridge/tunnel, drainage from a localized high point just south of the southern school entrance including the areas between I-91 and the school drain to the catch basins at the low point. The catch basins empty into a system in Birnie Avenue which drains northerly. There are no drainage systems noted along Birnie Avenue for more than 600' to the south.

There is an existing catch basin at the west end of the traffic island at the entrance to the parking lot south of the school. The catch basin drains through a 15" RCP which drains to the west.

It is anticipated that both the pumped groundwater and surface runoff from the proposed project site will be outleted through these existing systems.

3.7 Utilities

There are many utilities between the underside of the prestressed concrete box beams and the drop ceiling under the bridge / tunnel. These utilities are used within the building and consist of lighting, fire alarm system, miscellaneous wires, and an HVAC system.

The utilities which run underneath / alongside Birnie Avenue are as follows:

- 8" high pressure gas main near western curb line of Birnie Avenue, through box beams
- 6" low pressure gas main near western curb line of Birnie Avenue, through box beams
- Electrical conduits near western curb line of Birnie Avenue, between box beams
- (6)–4" Telecom. conduits near eastern curb line of Birnie Avenue between box beams
- 6" Water main west of Birnie Avenue
- Brick sewer system beneath Birnie Avenue in area of bridge / tunnel

It is anticipated that facilities located within the utility bays will require temporary support during construction of the slab in these areas.

SECTION 4 – RECOMMENDATIONS AND CONCLUSIONS

4.1 Recommended Repair / Remediation Items

To address the water infiltration (noted in section 1.2), Benesch recommends the following items:

A. Repair and Waterproof Topping Slab

To address water infiltration through the superstructure, we recommend that the topping slab be repaired and a new waterproofing membrane be installed. This work would entail the following work items:

- Remove existing bituminous concrete pavement and waterproofing membrane.
- Perform localized repairs on concrete topping slab as required to restore structural integrity. Due to water infiltration noted through the utility bays, it is recommended that these portions of the slab be completely reconstructed.
- Install new spray-applied waterproofing membrane.
- Install new roadway surface.

B. Repair & Waterproof Abutments

To address water infiltration through the abutments, we recommend that a new waterproofing membrane be installed along the back face of the abutment stems. This work would entail the following work items:

- Excavate behind the abutments to expose the entire rear face of the abutment stems. Temporary earth retention will be required for the work to maintain traffic and to ensure stability of adjacent structures.
- Perform localized repairs to the back surface of the abutments.
- Install new spray-applied waterproofing membrane along the back face of the abutment stems.
- Backfill.

C. Waterproof Joints at Abutments and Building Interfaces

To address water infiltration at the abutments and interfaces with the adjacent structures, we recommend the following:

- Install new bridge deck joints at both abutments.
- Excavate fill materials at the interfaces of the bridge / tunnel and the adjacent structures (school / atrium). Replace waterproofing materials at these interfaces and backfill.

D. Revise Roadway Profile to Divert Surface Water Away from Bridge / Tunnel

As a general means to address water-infiltration at the bridge / tunnel, it is recommended to make modifications to the roadway grade to drain water away from the bridge. This entails the following recommended items:

- Construct a 6" high speed table over the bridge / tunnel. The bridge/tunnel crosses Birnie Avenue at a skew. The elevated roadway section should be perpendicular to the roadway. This would generate a raised roadway section that is 68' long.
- At each end of the raised section the roadway would be sloped from existing grade to the raised speed table (31' to the north and 25' to the south). The raised grade will drain to the existing low point to the north. The revised roadway grade to the south will create a new low point. A new drainage system with catch basins at each curb line will need to be created at the new low point. There is adequate grade to provide gravity flow from the new low point to the existing catch basin and drainage system in the school parking lot south of the bridge.

E. Collect and Drain Groundwater

To further exclude water from entering the bridge / tunnel site, it is also recommended to collect the existing groundwater behind each of the abutments and pump the water from the site. This work entails the following recommended items:

- Based on our preliminary evaluation, we recommend two (2) 6-inch diameter perforated pipes on each side of Birnie Avenue Tunnel, for a total of four (4) pipes. The purpose of the pipes is to collect infiltration seepage near the tunnel walls from above ground surface. We recommend a preliminary flow rate of 1.66 cubic-feet-per-second (cfs) on each side of the tunnel, for a total flow rate of 3.32 cfs. We recommend the upper pipe be located at approximate El. 55.5 and the lower pipe be located at approximate El. 52. These pipes shall be designed based on the following:
  - Schedule 80 perforated pipe
  - Minimum slope of 0.5% sloped towards the proposed pumps
  - Surround each pipe with minimum of 6-inches of ¾-inch crushed stone
  - The crushed stone should consist of MassDOT M2.01.4
  - Geotextile fabric (Mirafi 140N or approved equivalent) should be wrapped around the crushed stone.

<u>Mechanical -Pumping Lift Stations</u>

- Install pump chambers behind each abutment to pump the water to the existing / proposed surface drainage systems.

- The stated infiltration rate of 1.66 cubic feet per second (cfs) per side of the tunnel, equates to a flow in gallons per minute (gpm) of 746 or nominally 750 gpm for discussion purposes, per pump lift station. There would be two (2) such pump lift stations, one on each side of the tunnel and a total project flow rate of 3.22 cfs or nominally 1,500 gpm.
- We anticipate a lift height of 10 feet and a total dynamic head including lift, of 25 feet, to be confirmed in design, for each of the stations. A single pump performing this duty would require, depending on efficiency and final actual lift, a motor of 10 HP rating. At the very minimum, each pump lift station should have two (2) pumps for 100% standby in case of pump failure. Even with this configuration, we anticipate that in extreme conditions, both pumps might run together at some point, and so a power capacity of 20 HP per station is anticipated. The minimum common discharge size would be 8-inch ductile iron, with 10-inch preferable, per station.
- The pump configurations we anticipate would be submersible pumps, equal to Flygt or Grundfos. Each would be mounted on a vertical guide rail within the pump wet well, to allow easier retrieval and service from grade-level. When lowered, the pump's discharge flange aligns with the discharge piping flange and locks into place. See Appendix F for pump details.
- For longevity and ease of service, we recommend lead-lag pump controls to allow remote and automatic alternating between pumps, to provide even wear over time. Without such controls, with one pump in the lead, a manual effort to switch pumps must be made. If not done, the lead pump life would be diminished. The use of variable frequency drives (VFDs) is also recommended to allow operational flexibility and to reduce wear and tear on pump bearings, shafts and seals. All electrical components would be installed in NEMA 4X weatherproof enclosures above-grade. Each pump lift station would be surrounded by a chain link fence enclosure with locking gate and link roof to reduce risk of unauthorized entry.
- The above reflects a 2-pump arrangement. As a further configuration refinement, a 3-pump arrangement is often considered. These would be arranged such that one pump would handle lower load periods, two together would handle the full design volume for that station and the third would be a common-standby. As a better first-value, we recommend a duplex (2-pump) installed arrangement, with a third "attic stock" replacement pump securely stored in a crate, for ready replacement should one fail. This "2-pump plus spare-in-crate" approach also allows the use of pre-cast pump well sections for lower cost and faster installation. This is reflected in the concept estimate.
- Any pump station arrangement should be instrumented with controls and alarms to annunciate pump status, inconsistent status, water levels including high and critical levels.

We recommend that a simple and robust SCADA PLC-based system be employed, as the City may already be using. Simplicity and reliability would govern over information and features; that is our recommendation.

Electrical Power, Normal and Standby

- The electrical service would emanate from the Gerena School main electrical room, which includes standby power from the school generator, an Onan/Cummins 350 kW unit. We recommend that these pumps be placed on standby power and separated from Life-Safety functions. See Appendix F for electrical distribution plan.
- Before design commences, electrical loading of the generator and distribution panels must be determined by log meter readings over a minimum 30-day period. The generator would require a connected load test to determine reserve capacity within its rated capacity, which is normally 80 percent of nameplate kW. Posted test records from 2014 were evident but did not reveal what actual connected use would be, if actual loads were operating during the test.
- It is likely that the current generator is used for Life Safety, even if it has other "standby" power loads connected to it. This was often done in years past but is no longer acceptable by code. With the single automatic transfer switch noted, the current code will require a second "standby power" ATS be provided with associated distribution panels for any standby loads added to the generator. This too has been included in the concept estimate.

F. Additional Roadway Improvements

With the proposed creation of the speed table as described in Item D above, additional traffic calming is recommended to be incorporated into the project, recognizing that the roadway fronts a school and should be treated as a low speed traffic zone. As noted in Section 3.1, the existing roadway width is nearly 40 feet at the bridge making this portion of roadway conducive to high travel speeds.

- It is recommended that the roadway width/curb line be maintained to continue to accommodate school busses in front of the school. To help generate slower travel speeds approaching the speed table and through the project site it is recommended to install painted pavement markings to clearly delineate travel paths and shoulders approaching the bridge. The roadway width over the bridge/tunnel would be defined by holding the east curbline and providing a 2' left shoulder, (2) - 12' travel paths and a 13' right shoulder.
- It is recommended to begin the travel path transition at the parking entrance at the north of the school where there is an existing 5'+/- shoulder. South of the bridge/tunnel the right shoulder would transition from 13' to 4' to match the existing roadway width.

- The existing sidewalk width in front of the school width would be retained at the existing 11'. The sidewalk along the limits of the raised speed table would require reconstruction. There is adequate pitch to maintain the existing sheet runoff from the sidewalk to the south curb.
- New pavement markings, a 4" yellow line on the left shoulder and 4" white line on the right shoulder as well as a 4" white skip line between travel lanes are proposed. In addition, advance warning speed table pavement markings would be incorporated along the centerline of each travel path. Advance warning signs for speed table with an advisory speed plaque of 25 mph would also be incorporated. In addition, it is proposed to provide angled white pavement markings in the right shoulder to discourage the shoulder being used as a travelpath.
- The hard surfaces over the bridge/tunnel other than the roadway and sidewalk could be a stamped concrete or bituminous, colorized to discourage vehicular use of these areas.

G. Geotechnical Recommendations

These preliminary recommendations are based on very limited data along with observations of the site by Nobis. These recommendations shall be considered invalid without performing further subsurface explorations, as indicated herein.

- We recommend additional borings be performed for the site and analyses to confirm the design groundwater elevation.
- Backfill placed within 2-feet below the Birnie Avenue roadway section should consist of compacted Granular Borrow (MassDOT M1.03.0, Type b). If the existing material is granular with less than 20% fines (i.e. less than 20% passing a No. 200 sieve) it may be reused below the two (2) feet of Granular Borrow upon confirmation via testing. If the existing material is silty or doesn't compact well, then the backfill below the road should consist of material meeting the gradation requirements of Granular Borrow (MassDOT M1.03.0, Type b).
- Fill below the roadway should be placed in loose layers not more than 12 inches thick and compacted to at least 95 percent of the maximum dry density as determined by the Modified Proctor Test (ASTM D-1557).
- We recommend a groundwater monitoring program be carried out over several seasons to obtain an updated design groundwater elevation. The potential slab seepage issue should be evaluated during a future phase of the project based on the groundwater monitoring information.

- We recommend a CCTV inspection of the 18" sanitary sewer which is located adjacent to or below the tunnel. The purpose of the inspection is to assess if the sewer is damaged. The recommended limits of the inspection are provided in Appendix E.
- Supplementary borings and possibly test pits are required to be performed during the next phase of the project. The proposed borings are shown on Figure 1 in Appendix E.

4.2 Estimated Construction Costs

For an itemized cost estimate refer to Appendix B – "Cost Estimate".

Estimated Construction Cost					
	Structure	Roadway	Mechanical / Electrical	Contingency & Inflation	Total
Birnie Avenue Bridge / Tunnel Improvements	$603,000	$203,000	$784,000	$415,000	$2,005,000

Table 1 – Estimated Construction Costs

Note that these values are based on preliminary information and are subject to change pending further evaluation and receipt of new data.

These costs likewise to not include any costs for interior renovations in the finished spaced located below the bridge structure.

APPENDIX A:

Photos

PHOTO 1: EVIDENCE OF WATER INFILTRATION AT NORTH ABUTMENT

PHOTO 2: EFFLORESCENCE BELOW CONCRETE SLAB AT NORTHEAST CORNER OF BRIDGE

PHOTO 3: JOINT FAILURE AT NORTH ABUTMENT BETWEEN BEAM 23 & EDGE BEAM 2

PHOTO 4: WATER INFILTRATION AT NORTH ABUTMENT BETWEEN BEAM 23 & EDGE BEAM 2

PHOTO 5: EVIDENCE OF LEAKAGE BETWEEN BEAM 23 AND EDGE BEAM 2

PHOTO 6: UNDERSIDE OF BEAMS 20-22 AT NORTH ABUTMENT

PHOTO 7: WATER INFILTRATION THROUGH NORTH ABUTMENT WALL BELOW BEAM 20

PHOTO 8: RUSTED ANGLES AND STAY-IN-PLACE FORM UNDER UTILITY BAY BETWEEN BEAMS 17 AND 18

PHOTO 9: WATER INFILTRATION BETWEEN BEAMS 16 AND 17 AT BIRNIE AVENUE CURBLINE

PHOTO 10: EFFLORESCENCE ON NORTH ABUTMENT BELOW BEAMS 14 AND 15

PHOTO 11: UTILITY ANCHOR ROD INSTALLED IN JOINT BETWEEN BEAMS 11 AND 12

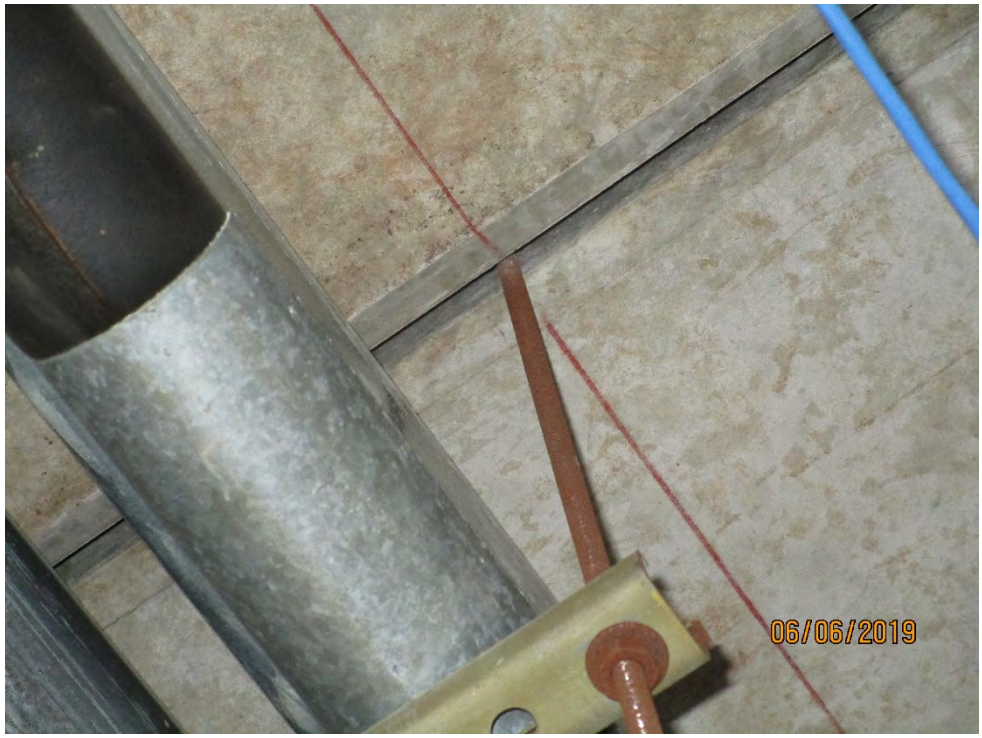


PHOTO 12: UTILITY ANCHOR ROD INSTALLED IN JOINT BETWEEN BEAMS 11 AND 12 (CLOSE-UP)

PHOTO 13: HEAVY RUST ON UTILITY CONDUIT UNDER BEAM 2 AT NORTH ABUTMENT

PHOTO 14: HEAVY RUST AT UTILITY BAY BETWEEN BEAMS 3 AND 4 AT NORTH ABUTMENT

PHOTO 15: DELAMINATED CONCRETE AT UTILITY BAY BETWEEN BEAMS 2 AND 3

PHOTO 16: HEAVY RUST ON CONDUIT UNDER UTILITY BAY WEST OF BEAM 2

PHOTO 17: WATER INFILTRATION BETWEEN EDGE BEAM 1 AND PRESTRESSED BEAM 1

PHOTO 18: FLOOR SLAB DETERIORATION AT WEST EXPANSION JOINT

PHOTO 19: RUST AT UTILITY BAY BETWEEN BEAMS 17 AND 18

PHOTO 20: LIGHT LEAKAGE BETWEEN BEAM 21 AND 22 AT QUARTER POINT OF SPAN

PHOTO 21: TYPICAL CONDITION OF UNDERSIDE OF PRESTRESSED CONCRETE BOX BEAMS

PHOTO 22: UTILITY BAY BETWEEN BEAMS 17 AND 18

PHOTO 23: WATER INFILTRATION BETWEEN EDGE BEAM 1 AND PRESTRESSED BEAM 1

PHOTO 24: LAMINATED RUST AT SW CORNER OF SOUTH ABUTMENT EXPANSION JOINT

PHOTO 25: SOUTHWEST CORNER OF SOUTH ABUTMENT EXPANSION JOINT

PHOTO 26: HEAVY RUST AND EFFLORESCENCE BETWEEN BEAMS 2 AND 3 AT SOUTH ABUTMENT

PHOTO 27: WATER INFILTRATION BETWEEN BEAMS 3 AND 4 AT SOUTH ABUTMENT

PHOTO 28: RUSTED UTILITY CONDUIT BETWEEN BEAMS 2 AND 3 AT SOUTH ABUTMENT

PHOTO 29: RUST STAINING BELOW CURB LINE UNDER BEAM 3 AT SOUTH ABUTMENT

PHOTO 30: EFFLORESCENCE AT UTILITY BAY EAST OF BEAM 17 AT SOUTH ABUTMENT

PHOTO 31: BIRNIE AVENUE AT BRIDGE LOOKING SOUTH

PHOTO 32: PAVED AREA OVER BRIDGE EAST OF BIRNIE AVENUE

PHOTO 33: VIEW OF ATRIUM FACING EAST

PHOTO 34: CRACKS IN PAVEMENT ON BIRNIE AVENUE OVER SOUTH ABUTMENT

PHOTO 35: BIRNIE AVENUE OVER BRIDGE LOOKING NORTH

PHOTO 36: WEST SIDE OF BIRNIE AVENUE OVER BRIDGE FACING NORTH - NOTE EXISTING METAL GUIDERAIL

PHOTO 37: WEST SIDEWALK ON BIRNIE AVENUE AT BRIDGE FACING NORTH

PHOTO 38: STORM DRAIN ON BIRNIE AVENUE AT NORTHWEST CORNER OF BRIDGE

APPENDIX B:

Cost Estimate

Estimate of Quantities
Preliminary Engineering Report Submittal

Project # : 70559.00
District : 2
Location : SPRINGFIELD
Description : REHABILITATION OF BIRNIE AVENUE BRIDGE / TUNNEL
Project Length : 644 FT = 0.12 MILES

Date: August 30, 2019
Prep By: JCO
Chk By: JK / SJD

Item No		Item Description	Unit	Unit Price	Quantity	Amount
		Structure Items				
107.97	*	STRUCTURAL STEEL REPAIRS	LB	$ 30.00	1625	$ 48,750.00
140.		BRIDGE EXCAVATION	CY	$ 38.00	1372	$ 52,136.00
151.2		GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	CY	$ 45.00	1372	$ 61,740.00
455.61	*	SUPERPAVE BRIDGE SURFACE COURSE - 12.5 (SSC-B-12.5)	TON	$ 200.00	34	$ 6,800.00
904.		4000 PSI, 3/4 IN., 610 CEMENT CONCRETE	CY	$ 1,500.00	94	$ 141,000.00
905.		4000 PSI, 3/8 IN., 660 CEMENT CONCRETE	CY	$ 2,700.00	18	$ 48,600.00
905.11	*	TEMPORARY EARTH SUPPORT SYSTEMS	SF	$ 80.00	750	$ 60,000.00
910.1		STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED	LB	$ 2.80	11750	$ 32,900.00
965.2	*	MEMBRANE WATERPROOFING FOR BRIDGE DECKS SPRAY APPLIED	SF	$ 10.00	10650	$ 106,500.00
973.	*	BRIDGE JOINT SYSTEM	LF	$ 150.00	296	$ 44,400.00
					STRUCTURE SUBTOTAL:	**$ 602,826.00**
		Highway Items				
100.		SCHEDULE OF OPERATIONS - FIXED PRICE $2,500	LS	$ 2,500.00	1	$ 2,500.00
120.1		UNCLASSIFIED EXCAVATION	CY	$ 35.00	150	$ 5,250.00
127.13	*	REINFORCED CONCRETE EXCAVATION FOR SIDEWALK REPAIRS	CY	$ 30.00	39	$ 1,170.00
129.6		BRIDGE PAVEMENT EXCAVATION	SY	$ 30.00	240	$ 7,200.00
142.		CLASS B TRENCH EXCAVATION	CY	$ 20.00	286	$ 5,720.00
144.		CLASS B ROCK EXCAVATION	CY	$ 100.00	5	$ 500.00
151.		GRAVEL BORROW	CY	$ 45.00	181	$ 8,145.00
170.		FINE GRADING AND COMPACTING	SY	$ 5.00	680	$ 3,400.00
201.		CATCH BASIN	EA	$ 3,000.00	2	$ 6,000.00
202.		MANHOLE	EA	$ 4,000.00	2	$ 8,000.00
220.		DRAINAGE STRUCTURE ADJUSTED	EA	$ 400.00	2	$ 800.00
241.12		12 INCH REINFORCED CONCRETE PIPE	FT	$ 65.00	280	$ 18,200.00
269.06		6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	$ 45.00	360	$ 16,200.00
402.		DENSE GRADED CRUSHED STONE FOR SUB-BASE	CY	$ 80.00	80	$ 6,400.00
415.	*	PAVEMENT MICROMILLING	SY	$ 7.00	926	$ 6,482.00
452.	*	ASPHALT EMULSION FOR TACK COAT	GAL	$ 7.50	140	$ 1,050.00
455.23	*	SUPERPAVE SURFACE COURSE – 12.5 (SSC – 12.5)	TON	$ 100.00	117	$ 11,700.00
455.31	*	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC -12.5)	TON	$ 100.00	48	$ 4,800.00
455.42	*	SUPERPAVE BASE COURSE - 25.0 (SBC - 25.0)	TON	$ 100.00	83	$ 8,300.00
455.61	*	SUPERPAVE BRIDGE SURFACE COURSE - 12.5 (SSC-B-12.5)	TON	$ 200.00	24	$ 4,800.00
482.31		SAWING & SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES	FT	$ 30.00	80	$ 2,400.00

*Item Requires a Special Provision. The item is either non-standard, or involves specialized work.

Estimate of Quantities
Preliminary Engineering Report Submittal

Project # : 70559.00
District : 2
Location : SPRINGFIELD
Description : REHABILITATION OF BIRNIE AVENUE BRIDGE / TUNNEL
Project Length : 644 FT = 0.12 MILES

Date: August 30, 2019
Prep By: JCO
Chk By: JK / SJD

Item No		Item Description	Unit	Unit Price	Quantity	Amount
482.4		SAWCUTTING PORTLAND CEMENT CONCRETE	FT	$ 10.00	68	$ 680.00
504.		GRANITE CURB TYPE VA4 - STRAIGHT	FT	$ 40.00	378	$ 15,120.00
509.1		GRANITE TRANSITION CURB - CURVED	FT	$ 60.00	10	$ 600.00
630		HIGHWAY GUARD REMOVED AND RESET	FT	$ 12.00	118	$ 1,416.00
697.1		SILT SACK	EA	$ 150.00	4	$ 600.00
701.		CEMENT CONCRETE SIDEWALK	SY	$ 60.00	278	$ 16,680.00
701.11		CEMENT CONCRETE SIDEWALK AT DRIVEWAYS - COMMERCIAL	SY	$ 70.00	8	$ 560.00
703.		HOT MIX ASPHALT DRIVEWAY	TON	$ 200.00	40	$ 8,000.00
748.		MOBILIZATION	LS	$ 5,000.00	1	$ 5,000.00
751.		LOAM BORROW	CY	$ 60.00	22	$ 1,320.00
765.		SEEDING	SY	$ 2.00	135	$ 270.00
767.81		BALES OF STRAW FOR EROSION CONTROL	EA	$ 18.00	20	$ 360.00
850.41		ROADWAY FLAGGER	HR	$ 50.00	320	$ 16,000.00
852.		SAFETY SIGNING FOR TRAFFIC MANAGEMENT	SF	$ 18.00	50	$ 900.00
854.1		PAVEMENT MARKING REMOVAL	SF	$ 1.58	520	$ 821.60
859.		REFLECTORIZED DRUM	DAY	$ 0.30	1800	$ 540.00
860.106		6 INCH REFLECTORIZED WHITE LINE (PAINTED)	FT	$ 0.25	96	$ 24.00
861.106		6 INCH REFLECTORIZED YELLOW LINE (PAINTED)	FT	$ 0.25	425	$ 106.25
864.04		PAVEMENT ARROWS AND LEGENDS REFL. WHITE (THERMOPLASTIC)	SF	$ 8.00	615	$ 4,920.00
					HIGHWAY SUBTOTAL:	**$ 202,934.85**
		MECHANICAL / ELECTRICAL (ARORA ENGINEERS)				**$ 784,362.43**
					Items Subtotal =	$1,590,123.28
998.1	*	20% CONTINGENCY	LS	$318,024.66	1	$318,025
998.2	*	3% INFLATION APPLIED FOR 2 YEARS (TO CONST. MIDPOINT)	LS	$96,838.51	1	$96,839
					Total Estimate	$2,004,986
					SAY =	**$2,005,000**

*Item Requires a Special Provision. The item is either non-standard, or involves specialized work.

BIRNIE AVENUE RELATIVE ORDER OF MAGNITUDE COST ESTIMATE- MECHANICAL AND ELECTRICAL

SUB-CONSULTANT SELF
CLIENT Alfred Benesch & Company
TASK TRIPLEX PUMP LIFT STATION (ONE OF TWO)

ARORA PROJECT NAME- NO. Birnie Avenue-Gerena School Springfield **SHEET NO.** 1 **OF** 3
LOCATION Birnie Avenue W. Springfield, MA **ESTIMATE NO.** ROM-1
TAKE OFF/QUANTITIES BY Bradford E. White **DATE:** 31-Aug-19

SPECIFICATIONS CSI DIVISION	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL TOTAL	LABOR HOURS	LABOR TOTAL	EQUIPMENT UNIT COST	EQUIPMENT TOTAL	SUBCONTRACT	SUBCONTRACT TOTAL	TOTAL
MECHANICAL 33	Pumps, Piping, Valves, Controls Pkg. Heater, Vent. Trenching for piping **Per Station**				$ 87,080.00	389	$ 31,350.00		$ 25,000.00		$ 5,000.00	**$ 148,430.00**
												$ -
												$ -
												$ -
												$ -
ELECTRICAL 26	Power Wiring, Breakers. Generator Work. Controls Wiring, Duct Bank Trenching and Concrete. **Per Station**				$ 65,507.14	614	$ 58,740.00		$ 32,450.00		$ 5,000.00	**$ 161,697.14**
ELECTRICAL 26	Generator ATS Modifications for E-Power/STBY Power				$ 3,000.00	80	$ 8,800.00		$ 50,000.00		$ -	**$ 61,800.00**
												$ -
												$ -
												$ -
	SUBTOTAL SINGLE STATION				**$ 152,587.14**	**1,003**	**$ 90,090.00**		**$ 57,450.00**		**$ 10,000.00**	**$ 310,127.14**
	Number of Stations	**2**			**2**	**2**	**2**		**2**		**2**	
	Subtotal- Two Pump Lift Stations				**$ 305,174.29**	**2,006**	**$ 180,180.00**	**$ -**	**$ 114,900.00**	**$ -**	**$ 20,000.00**	**$ 620,254.29**
	Add for Generator ATS Modifications (Common)	**1**			**3,000**	**80**	**8,800**		**50,000**		**0**	**$ 61,800.00**
	SUBTOTAL: Two Stations plus ATS Work				**$ 308,174.29**		**$ 188,980.00**		**$ 164,900.00**		**$ 20,000.00**	**$ 682,054.29**
GENERAL	**15% OH&P As Subcontractors**	**0.15**			**$ 46,226.14**		**$ 28,347.00**	**$ -**	**$ 24,735.00**	**$ -**	**$ 3,000.00**	**$ 102,308.14**
												$ -
												$ -
	SHEET TOTAL				**$ 662,574.71**	**2086**	**$ 406,307.00**	**$ -**	**$ 354,535.00**	**$ -**	**$ 43,000.00**	**$ 784,362.43**

BIRNIE AVENUE RELATIVE ORDER OF MAGNITUDE COST ESTIMATE- MECHANICAL AND ELECTRICAL

SUB-CONSULTANT SELF
CLIENT Alfred Benesch & Company
TASK TRIPLEX PUMP LIFT STATION (ONE OF TWO)

ARORA PROJECT NAME- NO. Birnie Avenue-Gerena School Springfield **SHEET NO.** 2 **OF** 3
LOCATION Birnie Avenue W. Springfield, MA **ESTIMATE NO.** ROM-1
TAKE OFF/QUANTITIES BY Bradford E. White **DATE:** 31-Aug-19

SPECIFICATIONS CSI DIVISION	DESCRIPTION	QTY	UNIT (SF = LF as appl.)	MATERIAL		LABOR				EQUIPMENT		SUBCONTRACT		
				UNIT COST	TOTAL	HOURS EACH	TOTAL HOURS	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL	TOTAL
MECHANICAL 33	SW Pumps, Flygt NP3153 SERIES 10 HP 750 GPM 25'	2	EA		$ -	16.00	32.00	$ 110.00	$ 3,520.00	$ 3,500.00	$ 7,000.00		$ -	$ 10,520.00
MECHANICAL 33	SPARE STOCK PUMP Flygt NP3153 SERIES	1	EA		$ -	0.00	0.00	$ 110.00	$ -	$ 3,500.00	$ 3,500.00		$ -	$ 3,500.00
MECHANICAL 33	Lift Rails SS, Cables, Per Pump	2	LS		$ -	8.00	16.00	$ 110.00	$ 1,760.00	$ 1,800.00	$ 3,600.00		$ -	$ 5,360.00
MECHANICAL 33	Controls Package-Soft Starters, VFDs, Alarms	1	LS		$ -	12.00	12.00	$ 110.00	$ 1,320.00	$ 5,500.00	$ 5,500.00		$ -	$ 6,820.00
MECHANICAL 33	Valves, BFLY, CHK, DI, Per Pump	2	EA	$ 12,000.00	$ 24,000.00	12.00	24.00	$ 110.00	$ 2,640.00		$ -		$ -	$ 26,640.00
MECHANICAL 33	DIP-CL 10In Force Main, 5' Depth FxF BO 20' nom LF	180	EA	$ 210.00	$ 37,800.00	0.250	45.00	$ 110.00	$ 4,950.00		$ -		$ -	$ 42,750.00
MECHANICAL 33	DIP-CL 8In FxF BO 20' nom sticks LF	40	SF	$ 160.00	$ 6,400.00	1.000	40.00	$ 110.00	$ 4,400.00		$ -		$ -	$ 10,800.00
MECHANICAL 33	DIP-CL 6In FxF BO 20' nom sticks LF	12	SF	$ 115.00	$ 1,380.00	1.000	12.00	$ 110.00	$ 1,320.00		$ -		$ -	$ 2,700.00
MECHANICAL 33	*Note: DIP above includes $ 150% factor for fittings per size.*				$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
MECHANICAL 33	Heater- 5kW 480V/3Ph. Hose-down type	1	EA	$ 250.00	$ 250.00	8.00	8.00	$ 110.00	$ 880.00	$ 2,400.00	$ 2,400.00		$ -	$ 3,530.00
MECHANICAL 33	Vent Fan and RH controls, Damper, Interlocks	1	EA	$ 500.00	$ 500.00	12.00	12.00	$ 110.00	$ 1,320.00	$ 3,000.00	$ 3,000.00		$ -	$ 4,820.00
					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
MECHANICAL 33	Testing, Adjusting, Balancing, Controls Assistance.	1	LS	$ 250.00	$ 250.00	40.00	40.00	$ 110.00	$ 4,400.00		$ -		$ 5,000.00	$ 9,650.00
					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
EARTHWORK 31	CLASS B Trench Excavation+Clean BFL CY (Piping)	90	EA	$ 20.00	$ 1,800.00		80.00	$ 110.00			$ -		$ -	$ 1,800.00
EARTHWORK 31	CLASS B Trench Excavation CY (Pump Chambers)	20	EA	$ 20.00	$ 400.00		8.00	$ 110.00			$ -		$ -	$ 400.00
CONCRETE 03	Foundation for Pump Chamber 10'x10'x24" 7.4 CY	7.4	EA	$ 1,500.00	$ 11,100.00		16.00	$ 110.00			$ -		$ -	$ 11,100.00
CONCRETE 03	PRECAST Pump Chamber, 84" ID x 16' D. with Hatch, MH	1	EA	$ 2,000.00	$ 2,000.00		24.00	$ 110.00	$ 2,640.00		$ -		$ -	$ 4,640.00
FENCING 32	Chain Link Fence, Gate and Sonotube Foundations, 10x10'	1	EA	$ 1,200.00	$ 1,200.00	20.00	20.00	$ 110.00	$ 2,200.00		$ -		$ -	$ 3,400.00
					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
	SUBTOTAL SINGLE STATION				**$ 87,080.00**		**389.00**		**$ 31,350.00**		**$ 25,000.00**		**$ 5,000.00**	**$ 148,430.00**
	Number of Stations	**2**			**2**		**2**		**2**		**2**		**2**	**2**
	Total, Both Lift Stations				**$ 174,160.00**	**$ -**	**778.00**	**$ -**	**$ 62,700.00**	**$ -**	**$ 50,000.00**	**$ -**	**$ 10,000.00**	
	SHEET TOTAL				**$ 174,160.00**		**778.00**		**$ 62,700.00**		**$ 50,000.00**		**$ 10,000.00**	**$ 296,860.00**

BIRNIE AVENUE RELATIVE ORDER OF MAGNITUDE COST ESTIMATE- MECHANICAL AND ELECTRICAL

SUB-CONSULTANT SELF
CLIENT Alfred Benesch & Company
TASK TRIPLEX PUMP LIFT STATION (ONE OF TWO)

ARORA PROJECT NAME- NO. Birnie Avenue-Gerena School Springfield — **SHEET NO.** 3 **OF** 3
LOCATION Birnie Avenue W. Springfield, MA — **ESTIMATE NO.** ROM-1
TAKE OFF/QUANTITIES BY Bradford E. White — **DATE:** 31-Aug-19

SPECIFICATIONS CSI DIVISION	DESCRIPTION	QTY	UNIT (SF = LF as appl.)	MATERIAL		LABOR				EQUIPMENT		SUBCONTRACT		
				UNIT COST	TOTAL	HOURS EACH	TOTAL HOURS	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL	TOTAL
ELECTRICAL 26	WIRE SW Pumps 10 HP 480V NEMA 4X Disc	2	EA	$ 800.00	$ 1,600.00	16.00	32.00	$ 110.00	$ 3,520.00	$ 3,500.00	$ 7,000.00		$ -	$ 12,120.00
ELECTRICAL 26	WIRE Controls Package-Soft Starters, VFDs, Alarms LOT	1	LS	$ 800.00	$ 800.00	40.00	40.00	$ 110.00	$ 4,400.00	$ 4,000.00	$ 4,000.00		$ -	$ 9,200.00
ELECTRICAL 26	Heater- 5kW 480V/3Ph. Hose-down type NEMA 4X	1	LS	$ 500.00	$ 500.00	12.00	12.00	$ 110.00	$ 1,320.00	$ 750.00	$ 750.00		$ -	$ 2,570.00
ELECTRICAL 26			LS		$ -	12.00	0.00	$ 110.00	$ -		$ -		$ -	$ -
ELECTRICAL 26	Breakers, 40 kVA per Lift Station in Elec. Room	1	EA	$ 4,000.00	$ 4,000.00	20.000	20.00	$ 110.00	$ 2,200.00	$ 18,000.00	$ 18,000.00		$ -	$ 24,200.00
ELECTRICAL 26														
ELECTRICAL 26	Duct Bank- 5-Way w/ Spare, Hand-holes, Conc, Encase LF	200	EA	$ 25.00	$ 5,000.00	0.250	50.00	$ 110.00	$ 5,500.00		$ -		$ -	$ 10,500.00
ELECTRICAL 26	*(Sch. 40 4"PVC conduit x 5 LF per fioot of run)*				$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
EARTHWORK 31	CLASS B Trench Excavation CY +Backfill Clean Fill to Sub	200.0	EA	$ 20.00	$ 4,000.00	0.75	150.00	$ 110.00	$ 16,500.00					$ 20,500.00
CONCRETE 03	CONCRETE 4000 PSI Formed and placed CY	28.6	EA	$ 1,500.00	$ 42,857.14		80.00	incl. in matl						$ 42,857.14
					$ -				$ -					$ -
ELECTRICAL 26	Termination Labor	1	EA		$ -		12.00	$ 110.00	$ 1,320.00		$ -		$ -	$ 1,320.00
ELECTRICAL 26	Power Wiring to Pump Stations, via Duct Bank 4-pulls	1000	SF	$ 2.10	$ 2,100.00	0.070	70.00	$ 110.00	$ 7,700.00		$ -		$ -	$ 9,800.00
ELECTRICAL 26	Control Wiring to Pump Stations via Duct Bank TSP 4 pulls	1000	SF	$ 1.65	$ 1,650.00	0.055	55.00	$ 110.00	$ 6,050.00		$ -		$ -	$ 7,700.00
ELECTRICAL 26	*(Wiring Lengths per conductor and ground x OA Length)*				$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
ELECTRICAL 26					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
ELECTRICAL 26	Generator Evaluation, Modifications to Load Profile (Allow.)	1	LS	$ 2,000.00	$ 2,000.00	40.00	40.00	$ 110.00	$ 4,400.00		$ 2,000.00		$ -	$ 8,400.00
ELECTRICAL 26	Testing, Independent- Allowances apportioned per station	1	LS	$ 200.00	$ 200.00	40.00	40.00	$ 110.00	$ 4,400.00		$ -		$ 5,000.00	$ 9,600.00
ELECTRICAL 26	Lights- Vapor-Proof LED, Switched, Pump Stations	4	EA	$ 200.00	$ 800.00	3.25	13.00	$ 110.00	$ 1,430.00	$ 175.00	$ 700.00		$ -	$ 2,930.00
ELECTRICAL 26					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
ELECTRICAL 26					$ -		0.00	$ 110.00	$ -		$ -		$ -	$ -
	SUBTOTAL SINGLE STATION				**$ 65,507.14**		**614.00**	**$ 110.00**	**$ 58,740.00**		**$ 32,450.00**		**$ 5,000.00**	**$ 161,697**
	Number of Stations	**2**			**2**		**2**		**2**		**2**		**2**	**2**
	Total, Both Lift Stations				**$ 131,014.29**	**$ -**	**1,228.00**	**$ -**	**$ 117,480.00**	**$ -**	**$ 64,900.00**	**$ -**	**$ 10,000.00**	**$ 323,394.29**
	NEW ATS, Distribution Panel (Standby vs. EP)	**1**		**$ 3,000.00**	**$ 3,000.00**	**80.00**	**80.00**	**$ 110.00**	**$ 8,800.00**	**$ 50,000.00**	**$ 50,000.00**			**$ 61,800.00**
					$ 134,014.29		**1,308.00**		**$ 126,280.00**		**$ 114,900.00**			
	SHEET TOTAL				**$ 134,014.29**		**1,308.00**		**$ 126,280.00**		**$ 114,900.00**		**$ 10,000.00**	**$ 385,194.29**

APPENDIX C:

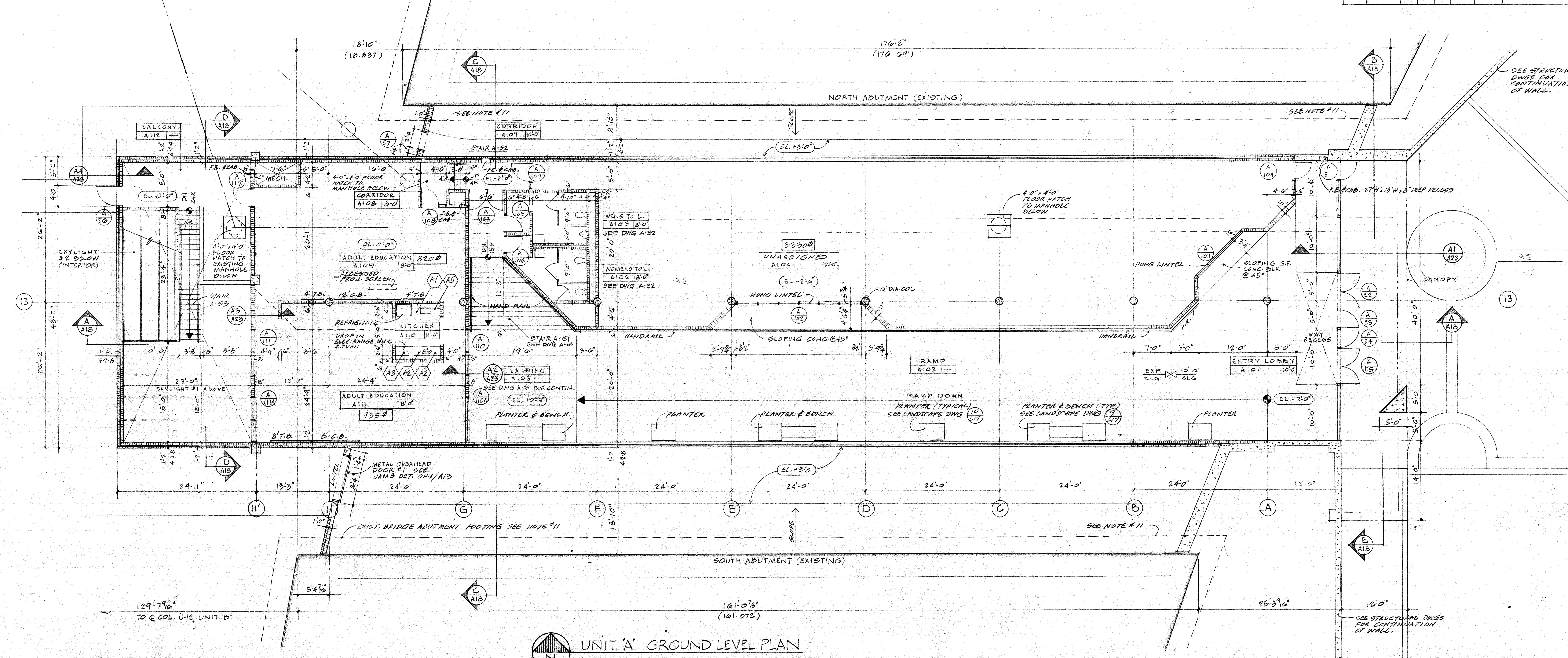
Existing Plans

LEGEND - SYMBOLS

- DOOR DESIGNATION
- ROOM DESIGNATION (ROOM NAME; CEILING HT.; ROOM NO.)
- BUILDING SECTIONS
- WALL SECTIONS
- INTERIOR ELEVATION (ELEV. DWG #)
- DIMEN. REFERENCE
- GLASS TYPE
- EQUIPMENT NO.
- FLOOR ELEVATION

LEGEND - MATERIALS

- ALUMINUM
- BLOCKING
- CERAMIC TILE
- CONCRETE
- CONCRETE BLOCK
- CEM. PLAS.
- EARTH
- GLASS
- GRAVEL
- GYPSUM BD / DRYWALL
- PLYWOOD
- RIGID INSULATION
- BATT INSULATION
- STEEL
- WOOD



UNIT "A" GROUND LEVEL PLAN

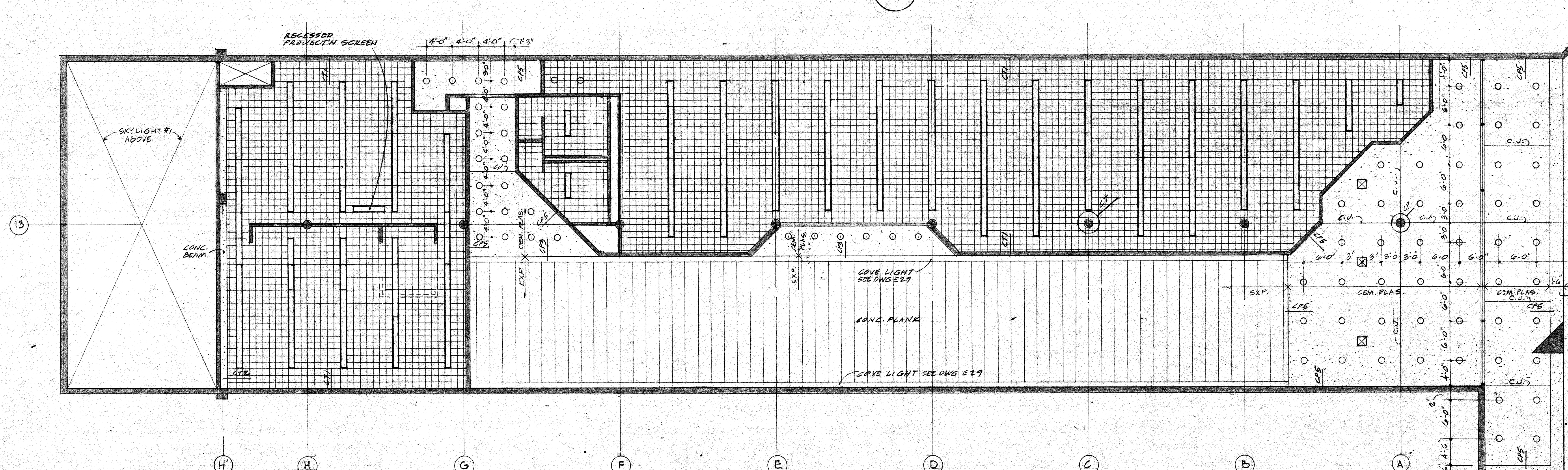
EQUIPMENT SCHEDULE

NO	CAT. NO.	SIZE W	SIZE H	SIZE D	TOP	COLOR	REMARKS
A1	6335	60	36	24	T/2		
A2	6711	30	36	24	T/2		
A3	*	36	36	24	T/2		FRONT / RANGE-OVEN
A5	6288	48	18	12	—		WALL CAB.
A6	6289	60	30	12	—		WALL CAB.

GENERAL NOTES:

1. FINISH SCHEDULE SEE DWG A-14
2. DOOR SCHEDULE SEE DWG A-27
3. STAIR SCHEDULE SEE DWG A-32
4. F.E. & CAB = FIRE EXTINGUISER & CABINET.
   F.E. = FIRE EXTINGUISER ON WALL BRACKET.
5. CONCRETE SCORING PATTERN FOR MALLS IN UNITS A, B, C & D TO BE AS DIRECTED BY ARCHITECT.
6. ALL INTERIOR CONC. BLOCK WALLS ARE 6" THICK UNLESS OTHERWISE NOTED.
7. CARRY ALL CONC. BLOCK WALLS TO UNDERSIDE OF CONSTRUCTION ABOVE UNLESS OTHERWISE NOTED.
8. WHERE DRAWINGS ARE NOT COMPLETELY DELINEATED OR NOTED REPEAT THE SAME CONDITION AND NOTES, AS ON PORTIONS COMPLETELY DESCRIBED. APPLIES.
9. WHERE DUCTS, PIPES OR CONDUITS PASS THRU INTERIOR WALLS G.C. SHALL PROVIDE 1/2" SPACE ALL AROUND PACKED WITH COMPRESSIBLE FILLER & CAULKED WITH ACOUSTICAL CAULKING.
10. G.C. TO PAINT FLAT BLACK (2 COATS) ALL SURFACES BEHIND GRILLES OR OTHER OPENINGS EXPOSED TO VIEW.
11. MINIMUM COVER OVER EXIST'G BRIDGE ABUTMENT FOOTINGS SHALL BE MAINTAINED AT MINIMUM OF 4'-0".

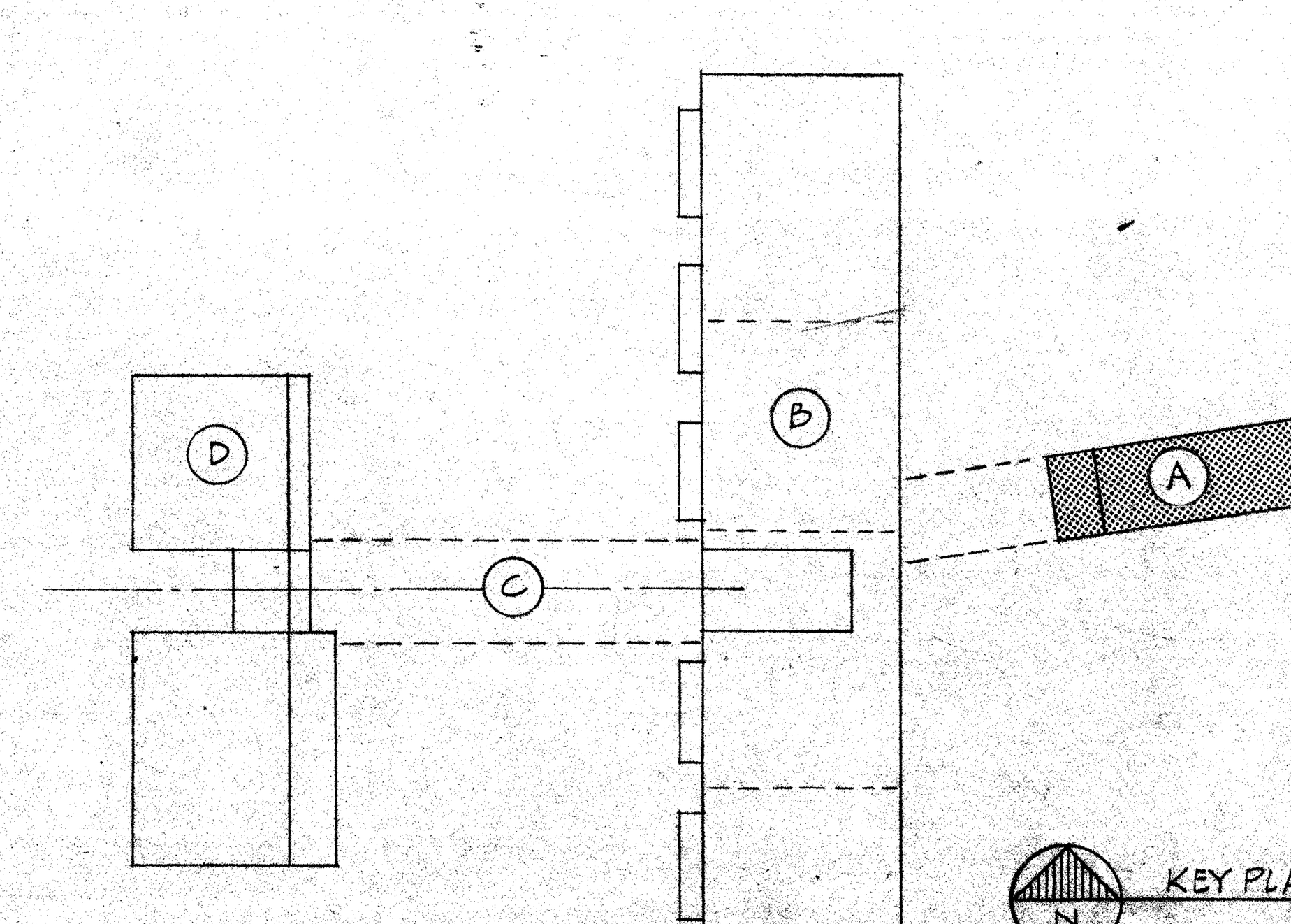
REVISIONS



UNIT "A" GROUND LEVEL REFLECTED CEILING PLAN

FOR CEILING DETAILS SEE DWG A35

"THE MATERIALS AND CONSTRUCTION INDICATED ON THESE PLANS CONFORM WITH AT LEAST THE MINIMUM REQUIREMENTS OF THE BOARD OF SCHOOLHOUSE STRUCTURAL STANDARDS."



KEY PLAN

GROUND LEVEL (EL. -2'-0") DATUM EL 61'-0" = 0'-0"

THE BRIGHTWOOD NORTH END COMMUNITY SCHOOL

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CONSTRUCTION COST CONSULTANT
WOLF AND COMPANY
P.O. BOX 275
PLEASANTVILLE, N.Y.

TITLE UNIT "A" GROUND LEVEL PLANS

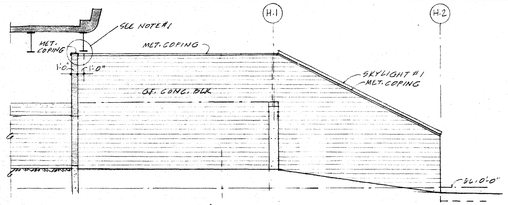
SCALE 1/8" = 1'-0"

DATE AUG. 7, 1972

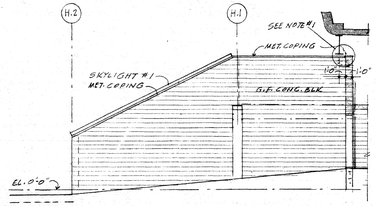
DRAWN BY J. PRIOLO

SHEET

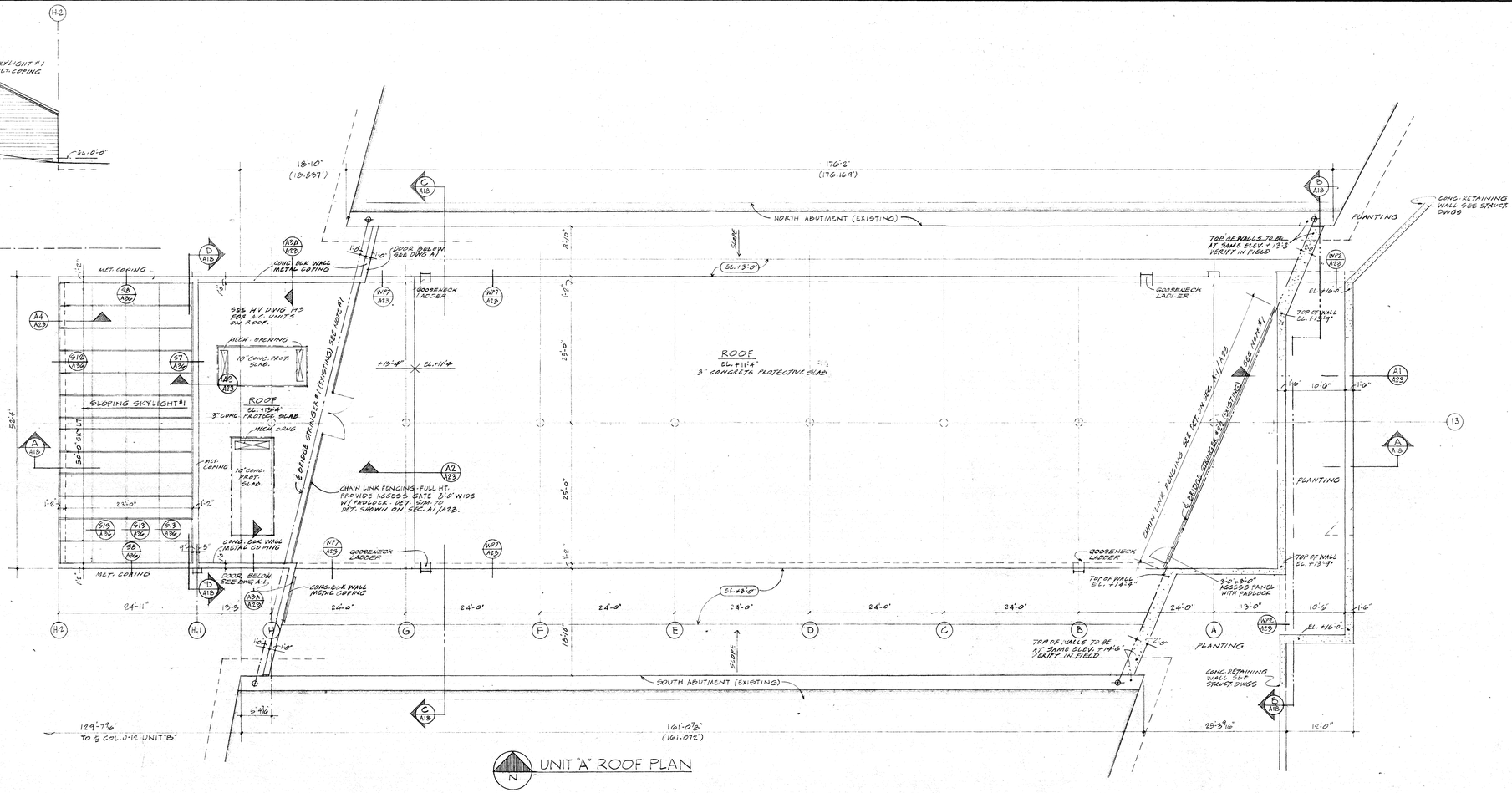
A-1



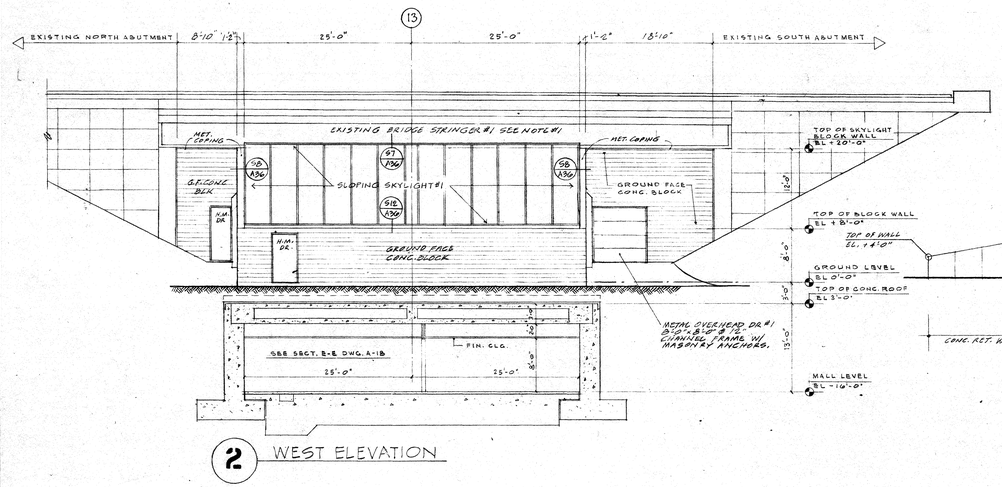
3 NORTH ELEVATION



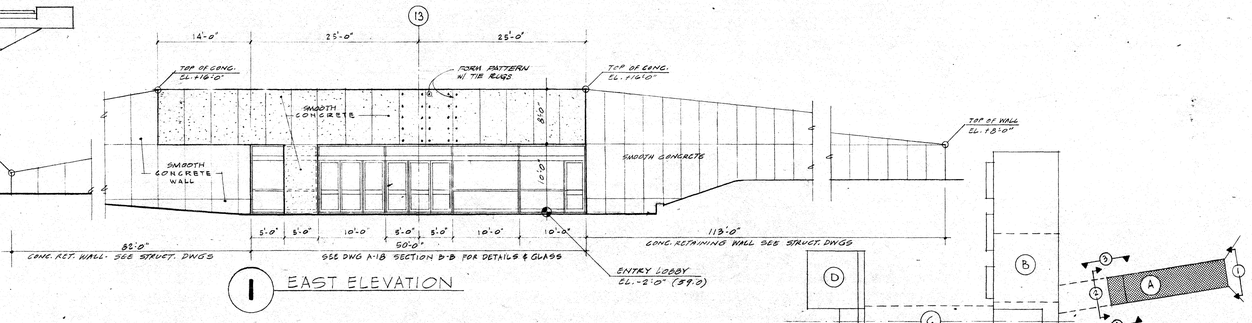
4 SOUTH ELEVATION



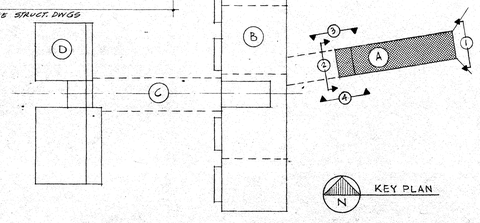
N UNIT "A" ROOF PLAN



2 WEST ELEVATION



1 EAST ELEVATION



GENERAL NOTES.

1. DO NOT ATTACH ANGLES OR ANY OTHER ELEMENT TO EXISTING BRIDGE STRINGERS PROVIDE ADEQUATE CLEARANCE FOR DEFLECTION OF STRINGER UNDER MOVING TRAFFIC ON BRIDGE. PROVIDE ADEQUATE CLEARANCE AT STRINGERS FOR MAINTENANCE.

REVISIONS

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P.O. BOX 275
PLEASANTVILLE, N.Y.

TITLE
UNIT "A" ROOF PLAN ELEVATIONS

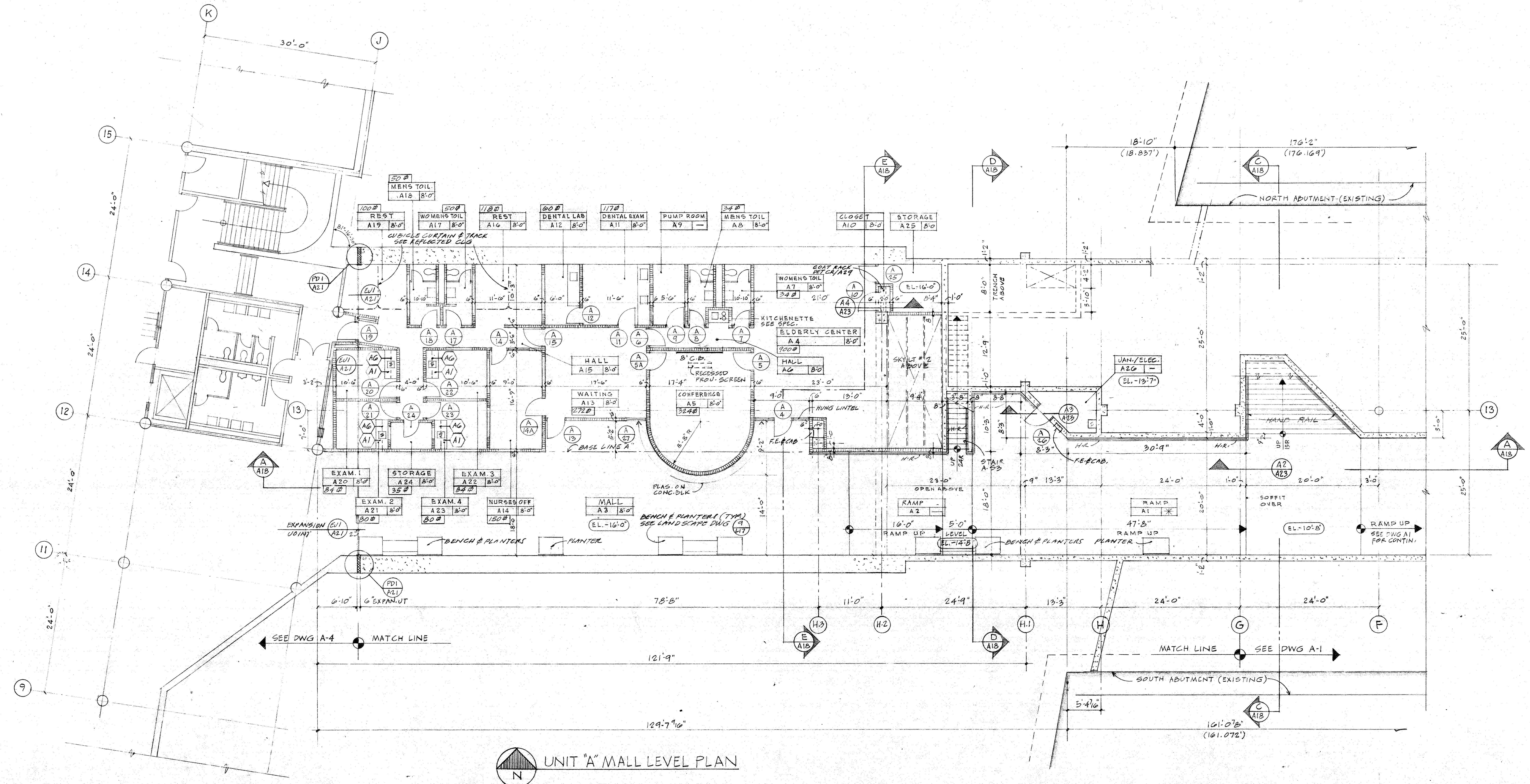
SCALE 1/8" = 1'-0"

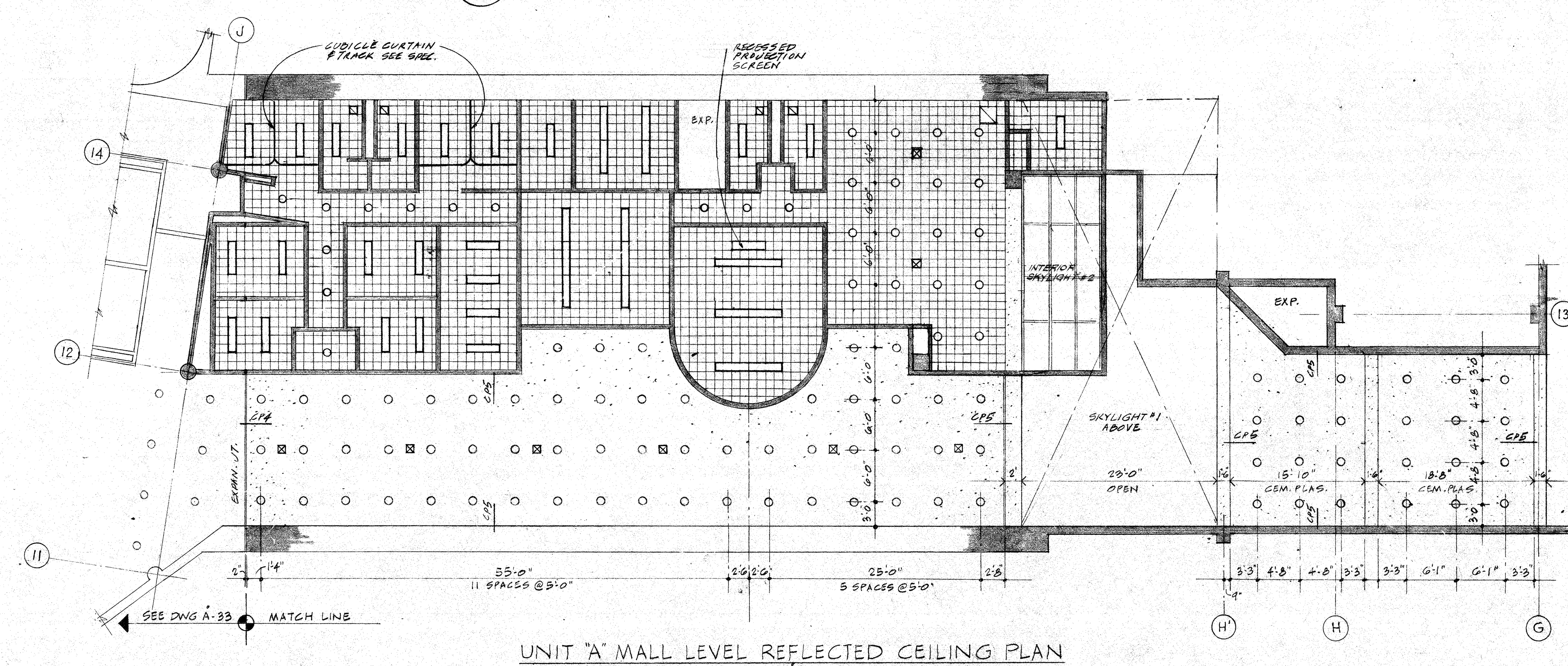
DATE AUG. 7, 1972

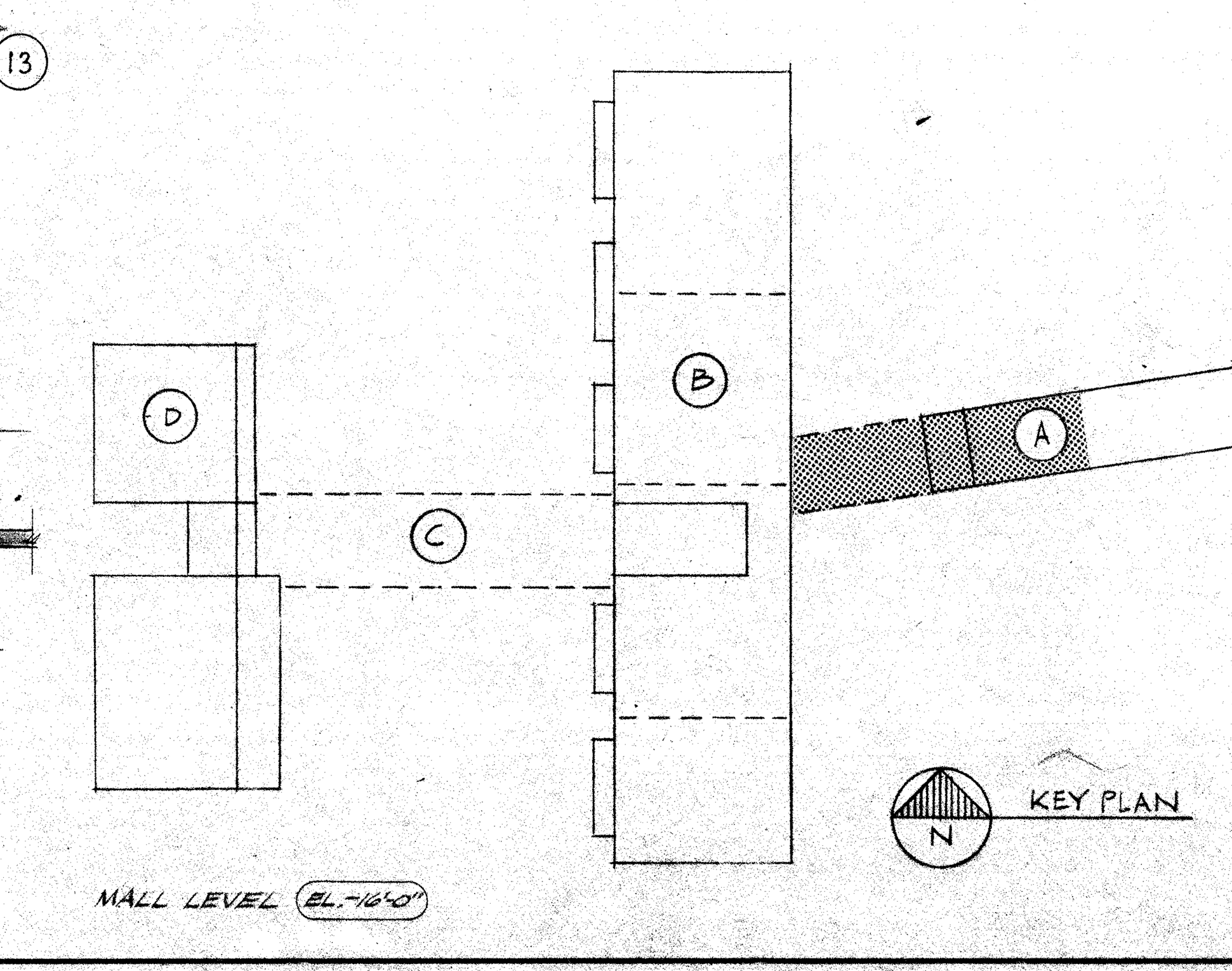
DRAWN BY J. FRIOLO

SHEET

A-9







GENERAL NOTES:

1. FINISH SCHEDULE SEE DWG. A-16
2. DOOR SCHEDULE SEE DWG. A-27
3. EQUIPMENT SCHEDULE SEE DWG A-1

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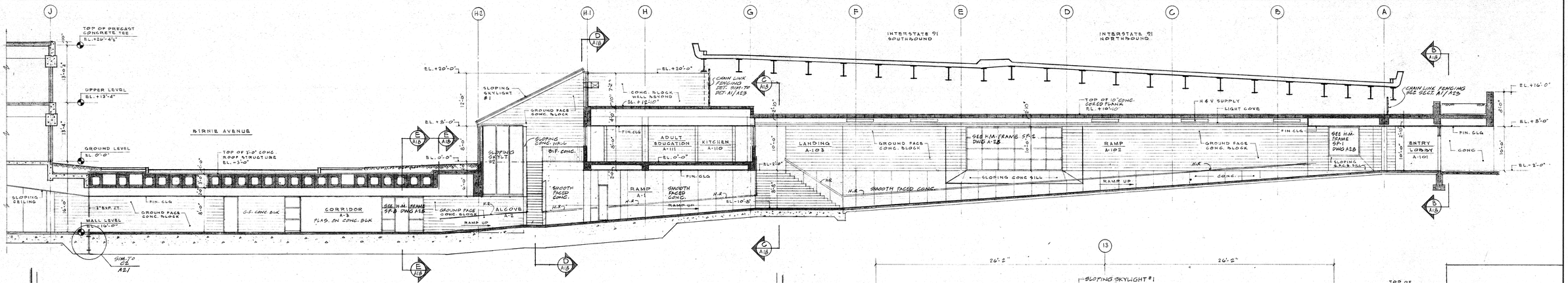
PLEASANTVILLE, N.Y.

TITLE UNIT "A" MALL LEVEL PLANS

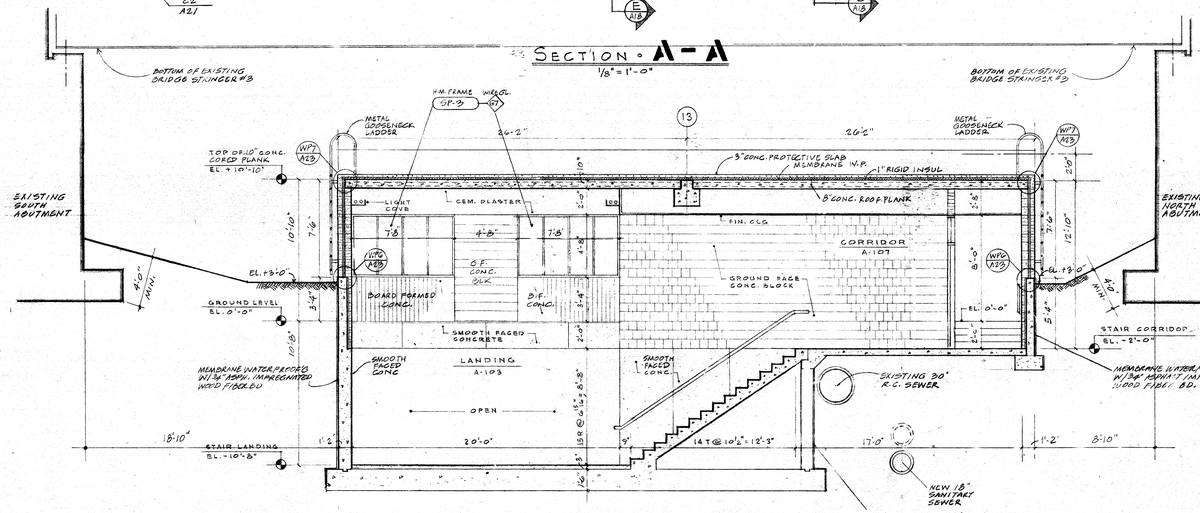
SCALE 1/8" = 1'-0"
DATE AUG. 7, 1972
DRAWN BY J. PRIOLO
SHEET

A-3

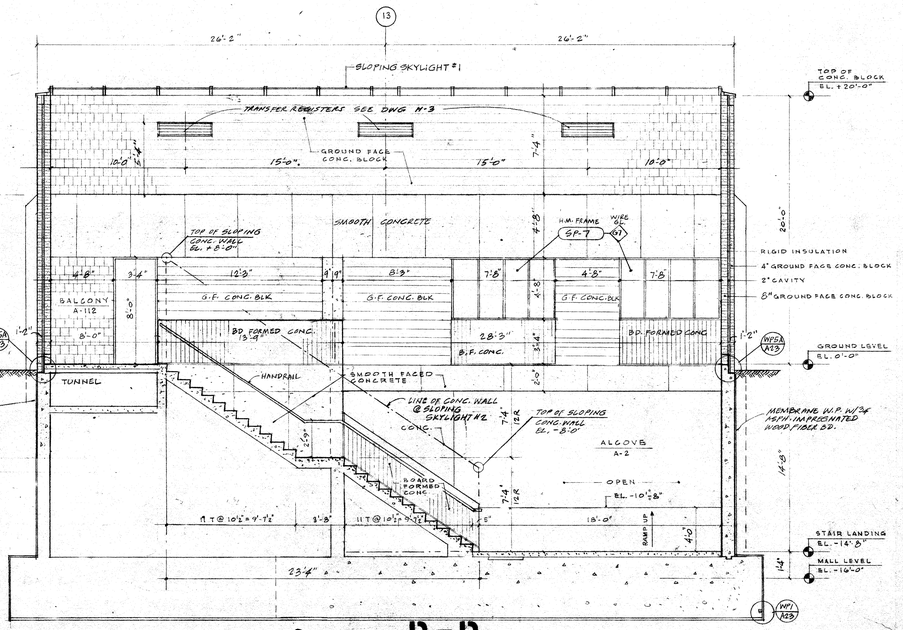


SECTION • A-A

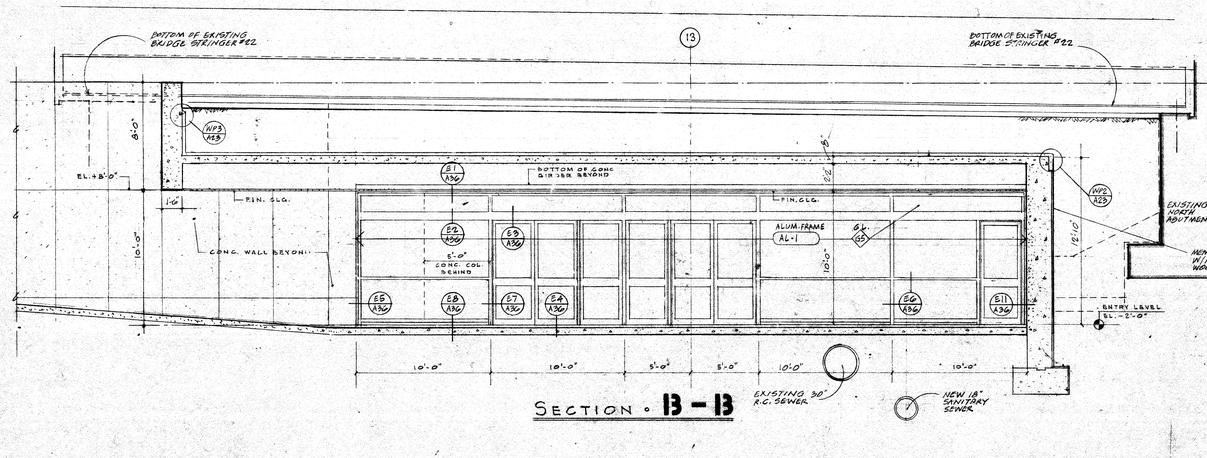
1/8" = 1'-0"



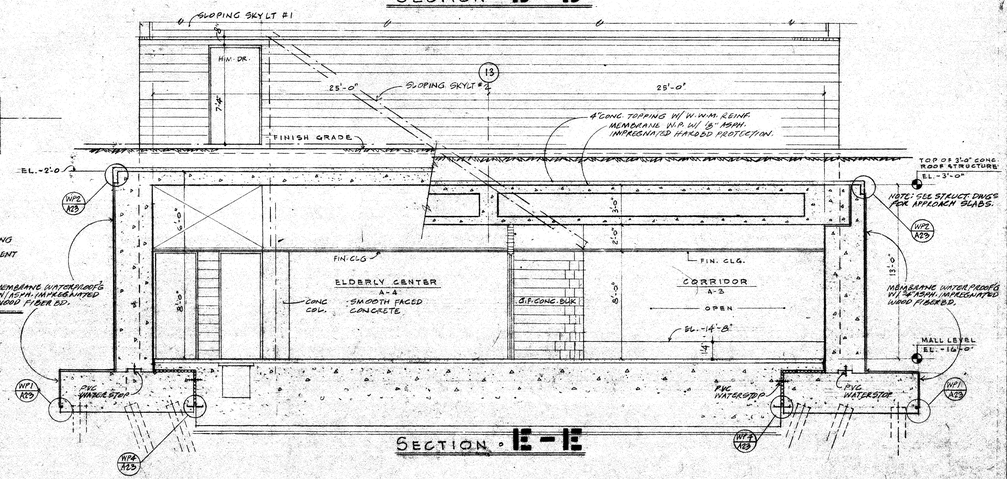
SECTION • C-C



SECTION • D-D



SECTION • B-B



SECTION • E-E

DATUM - EL. 61.0 = 0'-0"

REVISIONS

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PLEASANTVILLE, N.Y.

TITLE
UNIT "A" BUILDING SECTIONS

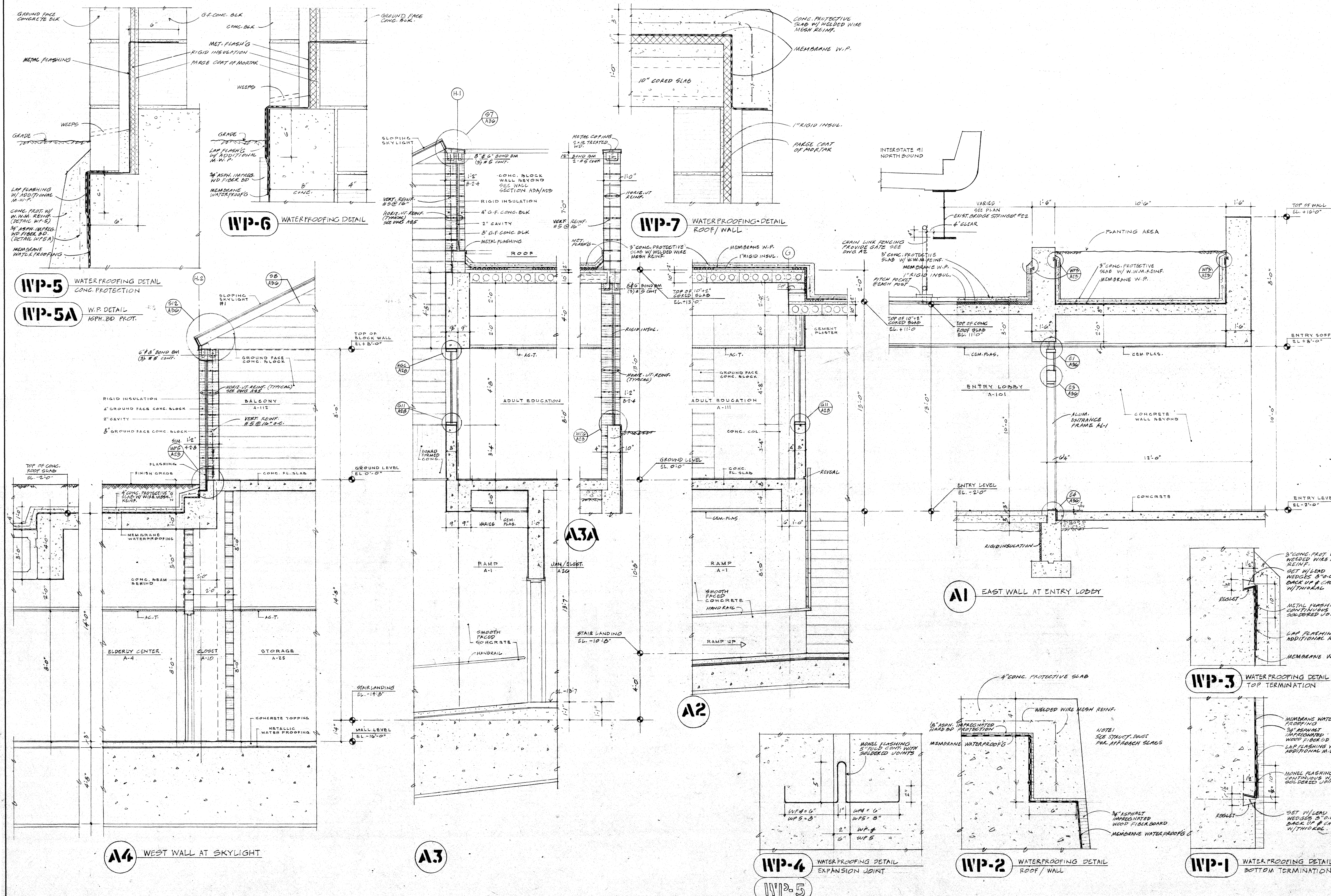
SCALE 1/4"-1'-0" & AS NOTED

DATE AUG. 7, 1972

DRAWN BY

SHEET

A-18



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TITLE UNIT "A" WALL SECTIONS

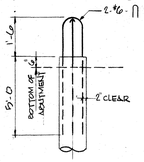
SCALE ½" = 1'-0" & 3" = 1'-0"

DATE AUG. 7, 1972

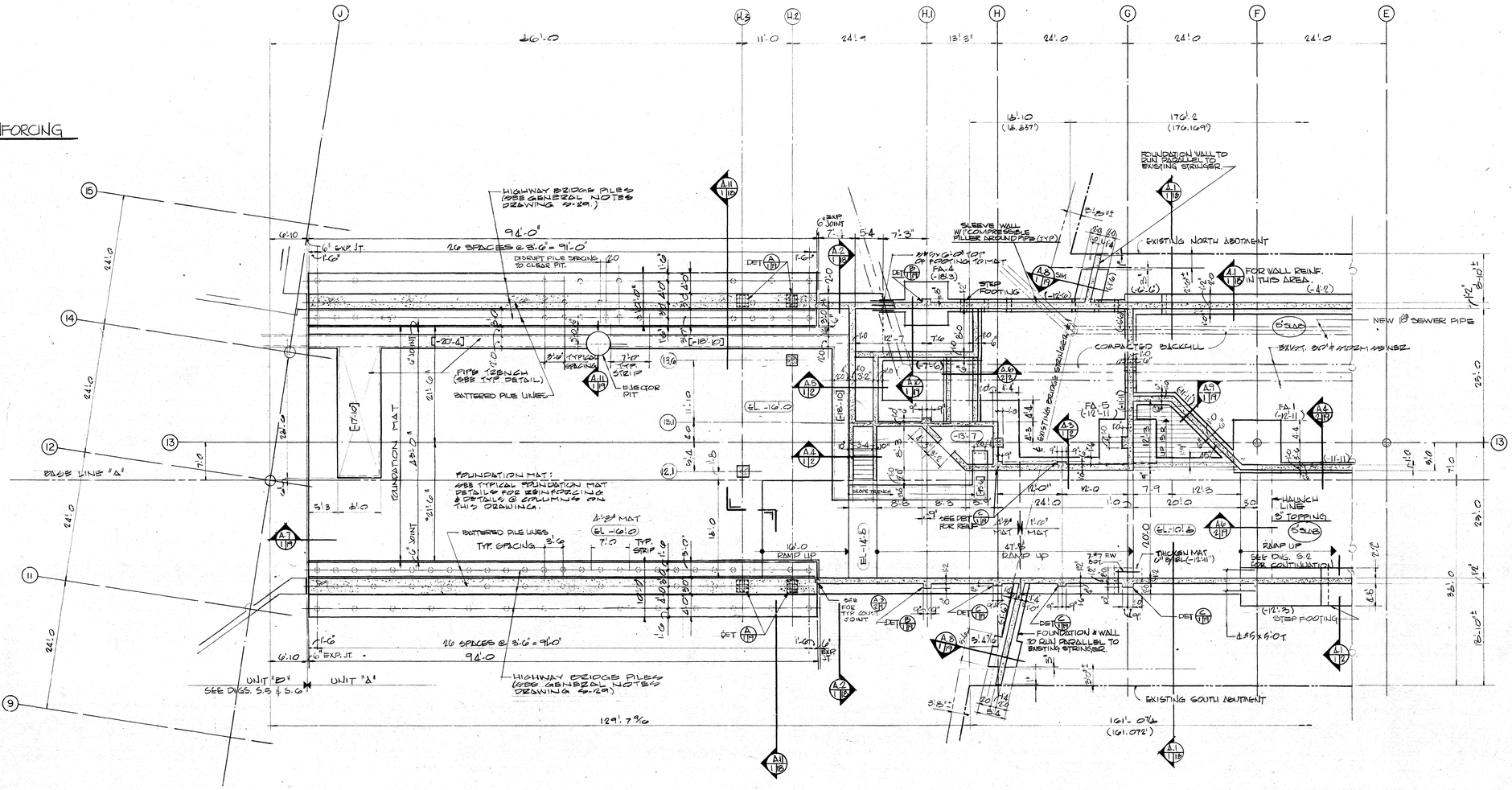
DRAWN BY

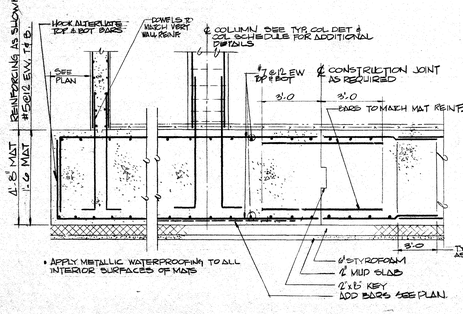
SHEET

A-23

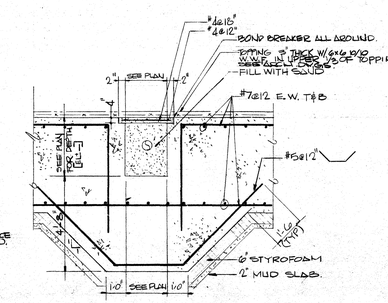


TYPICAL PILE REINFORCING

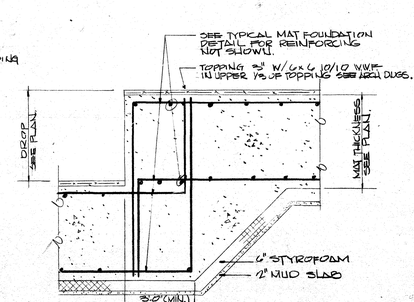




TYPICAL MAT FOUNDATION DETAIL
FOR UNITS "A","C", & "D" SEE S-5 FOR UNIT "B"



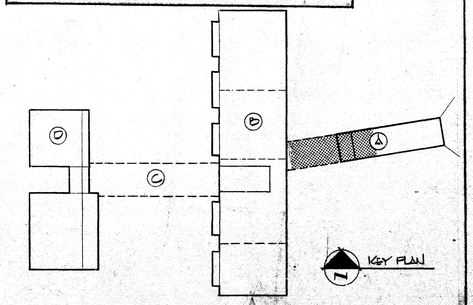
TYPICAL PIPE TRENCH DETAIL



TYPICAL DROP IN MAT

UNIT "A" MALL LEVEL & HIGHWAY BRIDGE FOUNDATION PLAN

THE MATERIALS AND CONSTRUCTION INDICATED ON THESE PLANS CONFORM WITH AT LEAST THE MINIMUM REQUIREMENTS OF THE BOARD OF SCHOOLHOUSE STRUCTURAL STANDARDS.



REVISIONS
J.M. HAUSHALTER PE 21749

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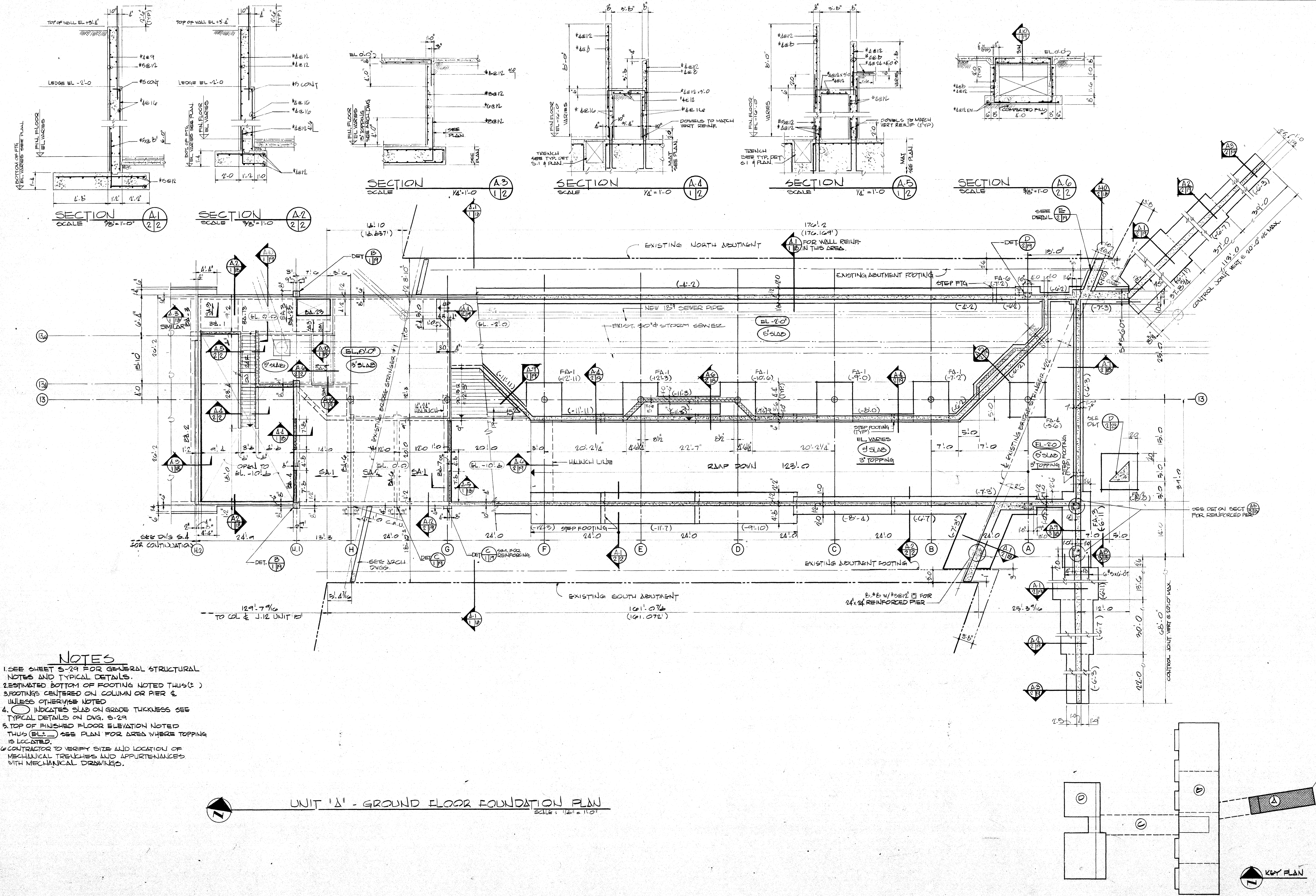
PLEASANTVILLE, N.Y.

TITLE
UNIT A
MALL & HIGHWAY
BRIDGE FOUNDATION

SCALE - 1/8" = 1'-0"
DATE - AUG. 7, 1972
DRAWN BY - DJA
SHEET

S-1



NOTES

1. SEE SHEET S-29 FOR GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS.
2. ESTIMATED BOTTOM OF FOOTING NOTED THUS (±)
3. FOOTINGS CENTERED ON COLUMN OR PIER ℄ UNLESS OTHERWISE NOTED
4. ( ) INDICATES SLAB ON GRADE THICKNESS SEE TYPICAL DETAILS ON DWG. S-29
5. TOP OF FINISHED FLOOR ELEVATION NOTED THUS (EL.± __) SEE PLAN FOR AREA WHERE TOPPING IS LOCATED.
6. CONTRACTOR TO VERIFY SIZE AND LOCATION OF MECHANICAL TRENCHES AND APPURTENANCES WITH MECHANICAL DRAWINGS.

REVISIONS

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WOLF AND COMPANY
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PLEASANTVILLE, N.Y.

TITLE UNIT A GROUND FLOOR FOUNDATION PLAN

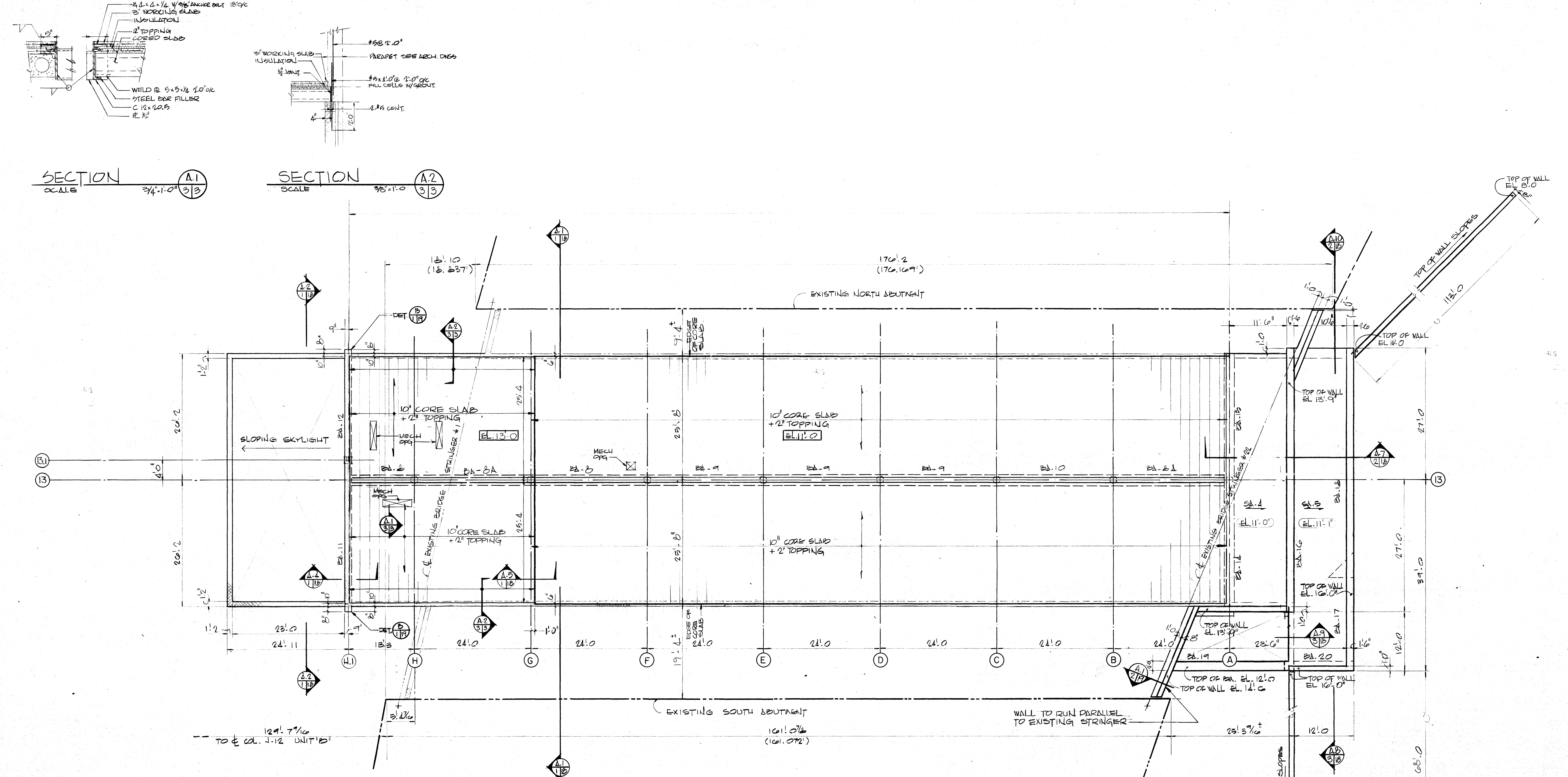
SCALE - 1/8" = 1'-0"

DATE - AUG. 7, 1972

DRAWN BY - DUA

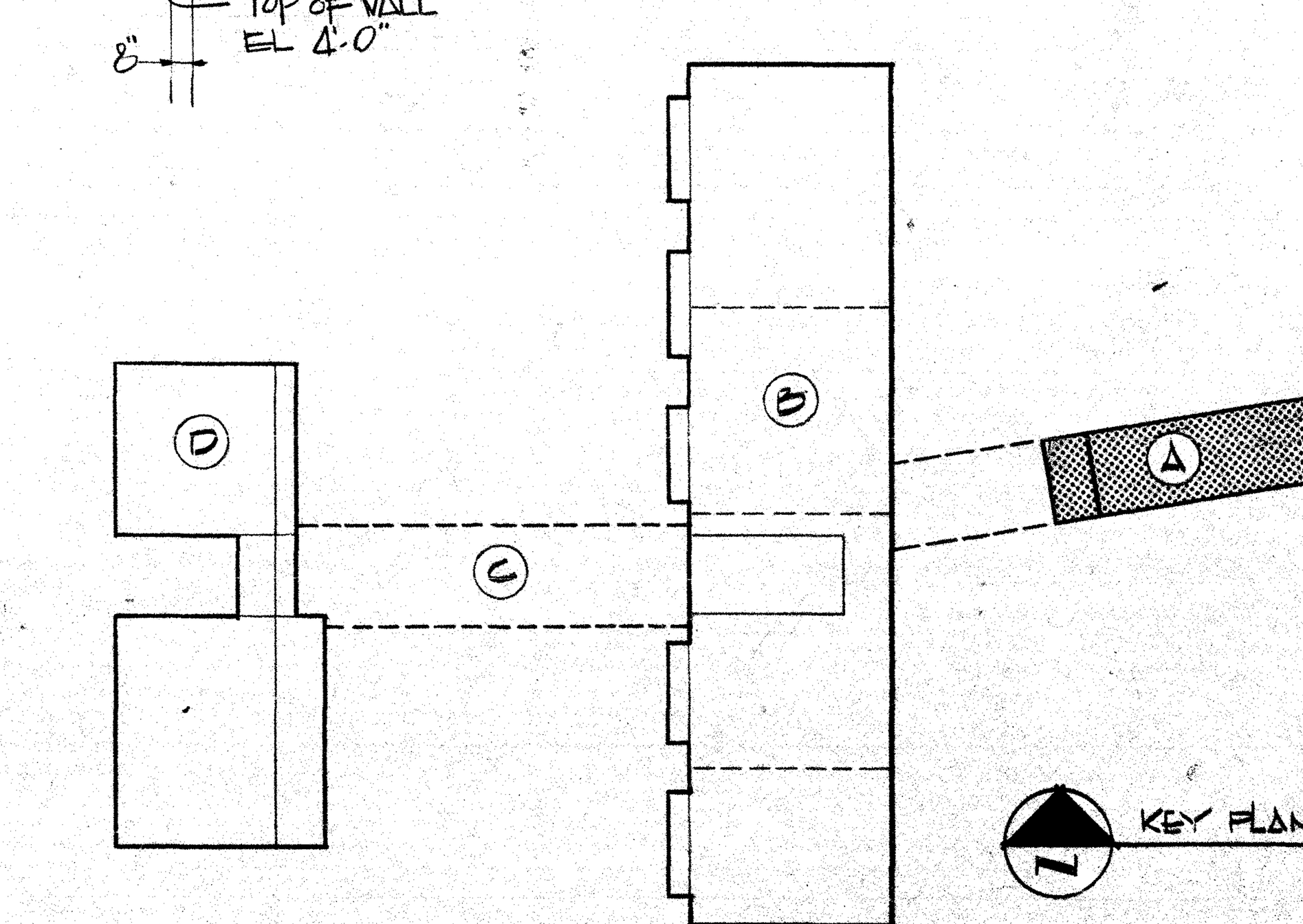
SHEET

S 2



NOTES

1. SEE DRAWING S-29 FOR GENERAL STRUCTURAL NOTES
2. TOP OF 10" CORED SLAB + 2" TOPPING ELEVATION NOTED THUS [EL ± __]
3. TOP OF SLAB ELEVATION NOTED THUS (EL. ± __)
4. CONTRACTOR TO COORDINATE SIZE & LOCATION OF ALL MECHANICAL OPENINGS.
5. PROVIDE 3" WORKING SLAB W/ 6x6 10/10 W.W.F. OVER RIGID INSULATION ON MEMBRAINE WATER PROOFING OVER 10" CORED SLAB + 2" TOPPING
6. 10" CORED SLAB + 2" CONC. TOPPING W/ 6x6 10/10 W.W.F. TO BE DESIGNED AS COMPOSITE DECK.



REVISIONS

J.M. HAUSHALTER P.E. 21749

THE BRIGHTWOOD NORTH END COMMUNITY SCHOOL

SPRINGFIELD, MASS.

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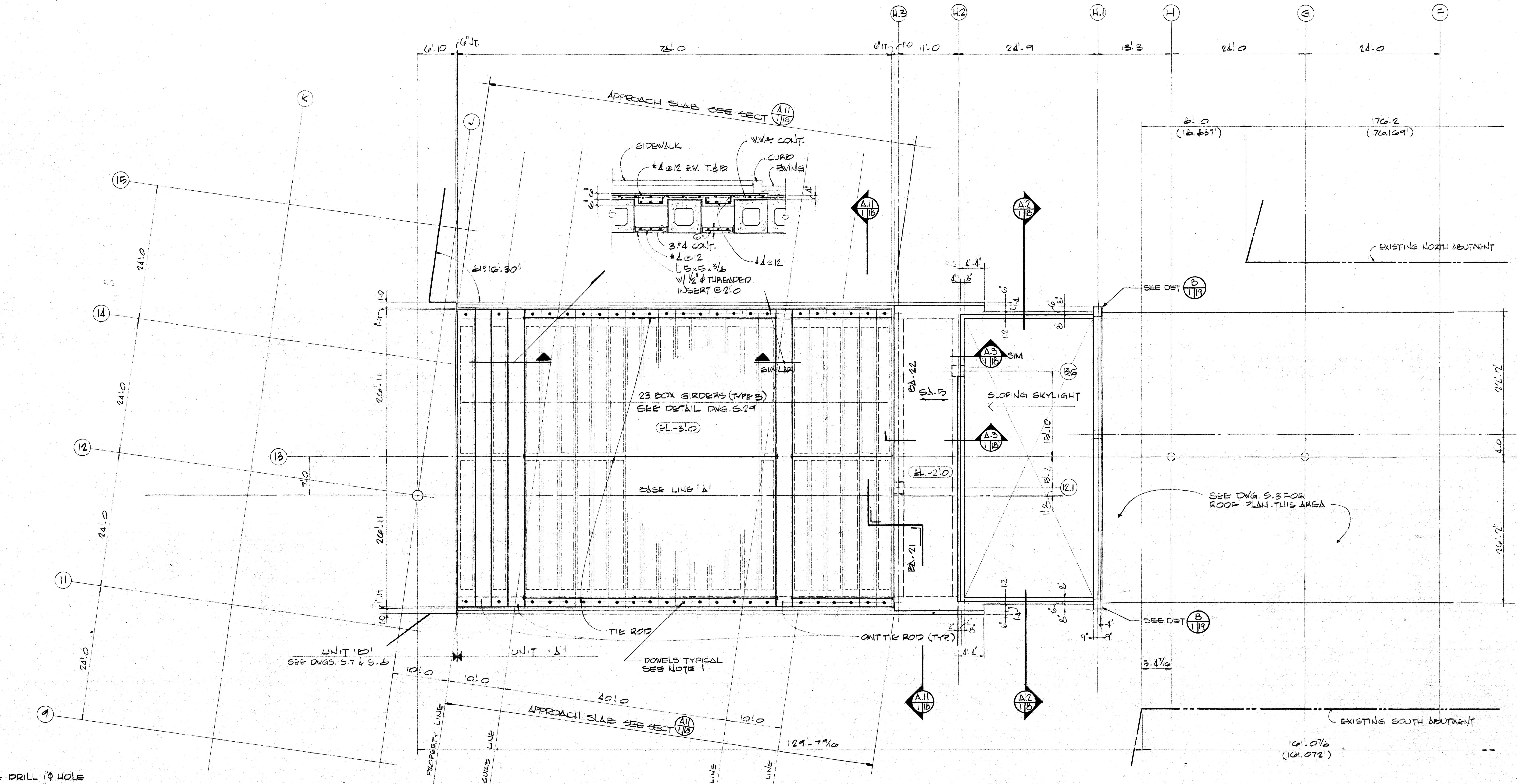
WOLF AND COMPANY
P.O. BOX 275
PLEASANTVILLE, N.Y.

TITLE
UNIT A
ROOF PLAN

SCALE - 1/8" = 1'-0
DATE - AUG. 7, 1972
DRAWN BY - DA
SHEET

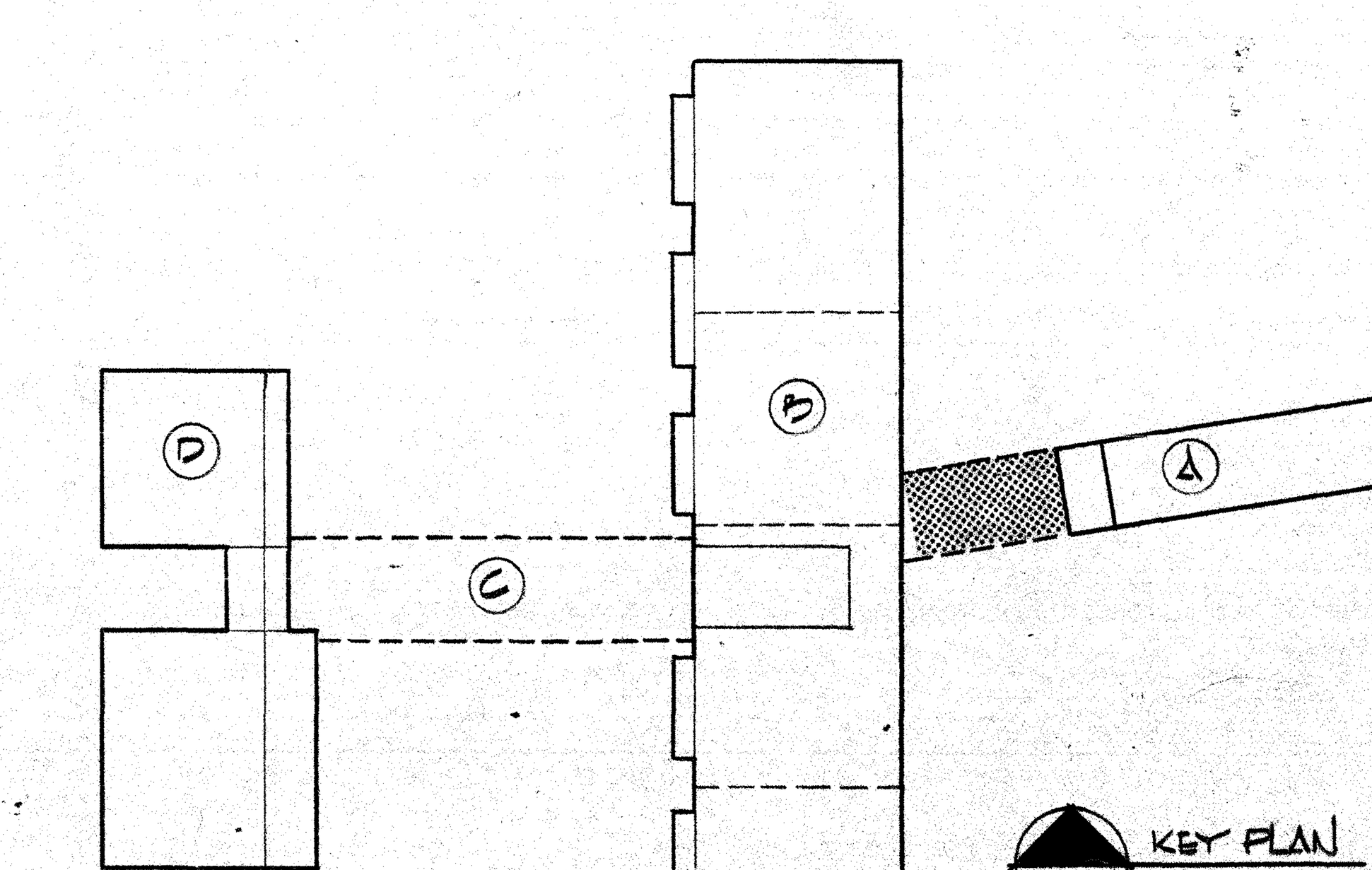
S3



UNIT 'A' - HIGHWAY BRIDGE PLAN
SCALE: 1/16" = 1'-0"

NOTES

1. AFTER BOX GIRDERS ARE IN PLACE DRILL 1"φ HOLE INTO SUPPORTING ABUTMENT TO RECEIVE 3/4"φ DOWEL. AFTER DOWELS ARE IN PLACE FILL 2"φ HOLE IN GIRDER W/ GROUT (1:3) OR MASTIC.
2. TOP OF PRECAST BOX GIRDER ELEVATION (-3'-0)
3. SEE DRAWING S-29 FOR BOX GIRDER DETAILS AND GENERAL NOTES
4. APPLY 4" TOPPING OVER PRECAST BOX GIRDERS REINFORCED W/ 6x6 10/10 W.W.F. SEE ARCH. DWGS. FOR WATERPROOFING ASSOCIATED W/ TOPPING.
5. SEE DRAWING S-28 FOR SCHEDULES



KEY PLAN

REVISIONS
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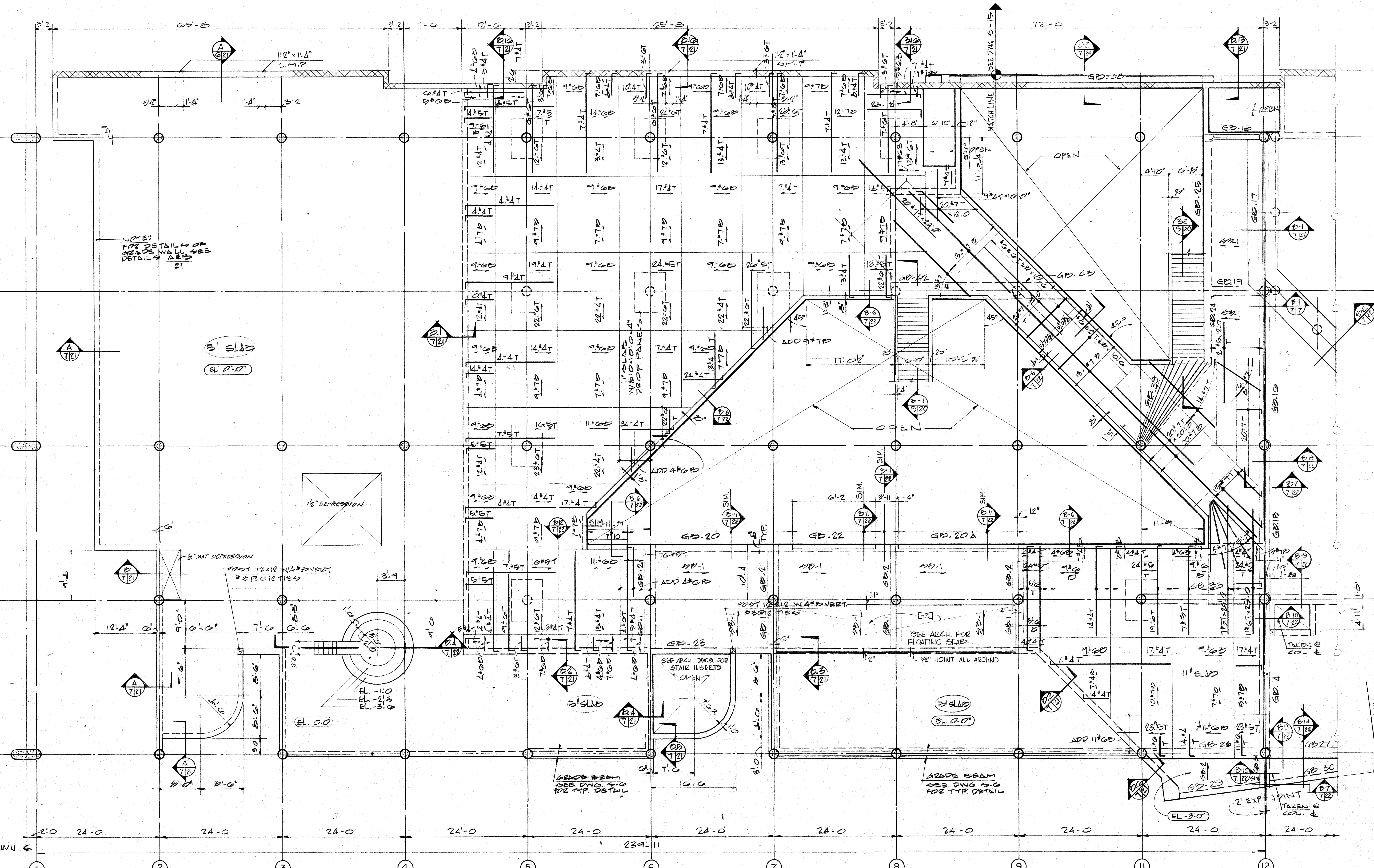
TITLE
UNIT A
HIGHWAY BRIDGE PLAN

SCALE - 1/16" = 1'-0
DATE - AUG. 7, 1972
DRAWN BY - RJA
SHEET

S 4



NOTES

1. ◯ INDICATES SLAB ON GRADE. TOP OF SLAB ON GRADE EL. 0'-0" UNLESS OTHERWISE NOTED.
2. TOP OF FINISHED FLOOR ELEVATION (EL.+0'-0") UNLESS NOTED (EL± ___)
3. TOP OF STRUCTURAL SLAB EL. 0'-0" UNLESS NOTED OTHERWISE.

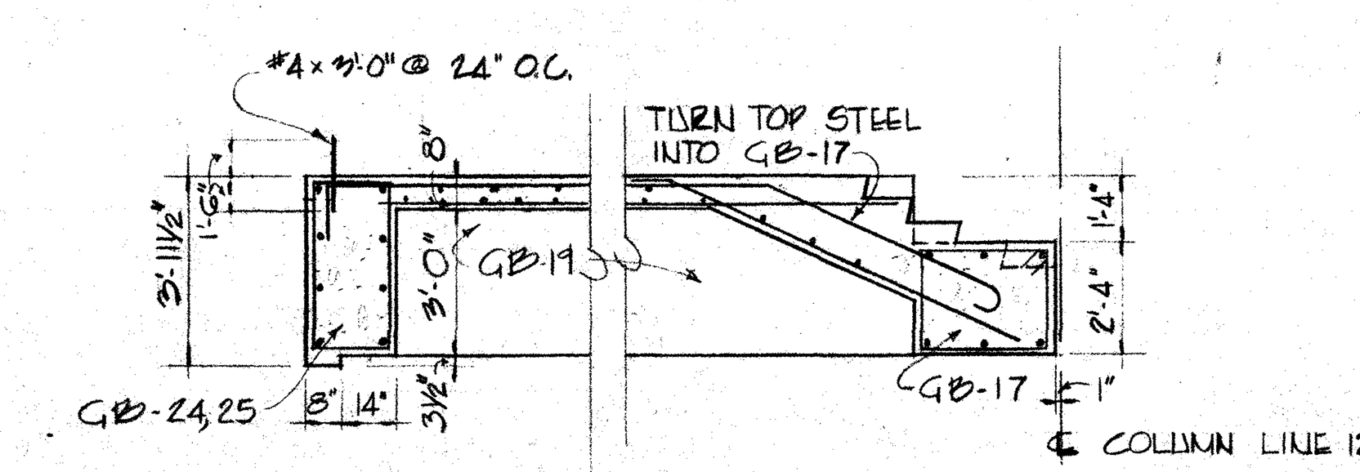
   SLAB PLACING SEQUENCE:

   1) PLACE E.W. BOTTOM BARS IN COLUMN & MIDDLE STRIP
   2) PLACE N.S. BOTTOM BARS IN COLUMN & MIDDLE STRIP
   3) PLACE E.W. TOP BARS IN COLUMN & MIDDLE STRIP
   4) PLACE N.S. TOP BARS IN COLUMN & MIDDLE STRIP

4. "S.M.P." INDICATES SOLID C.M.U. PIER FULL LENGTH SIZE: 1'-4" x 1'-2" (WALL THICKNESS)

UNIT 'B' - GROUND LEVEL FRAMING PLAN (SOUTH)

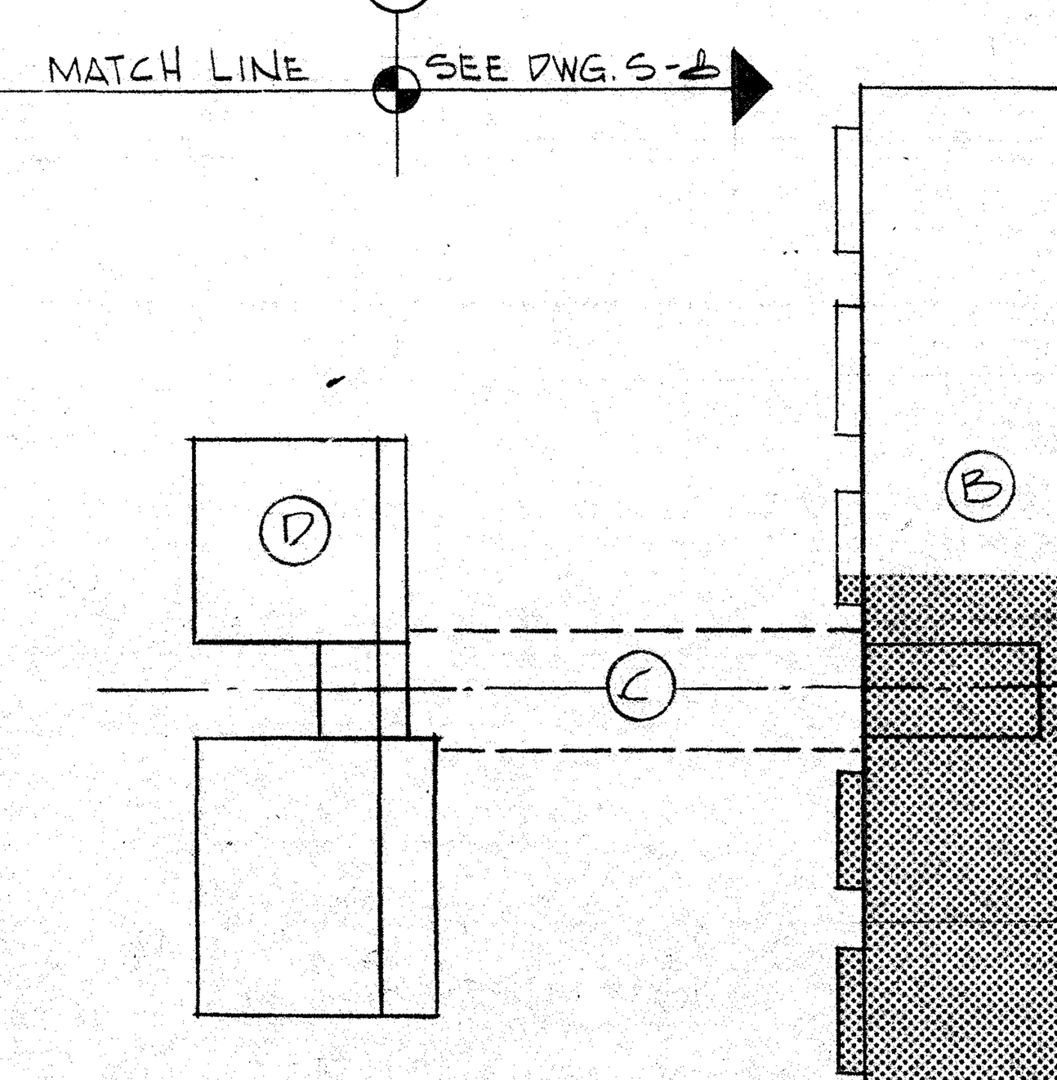
SCALE: 1/16"=1'-0"



SECTION B1/7|7

SCALE: 1/2"=1'-0"

MATCH LINE — SEE DWG. S-4



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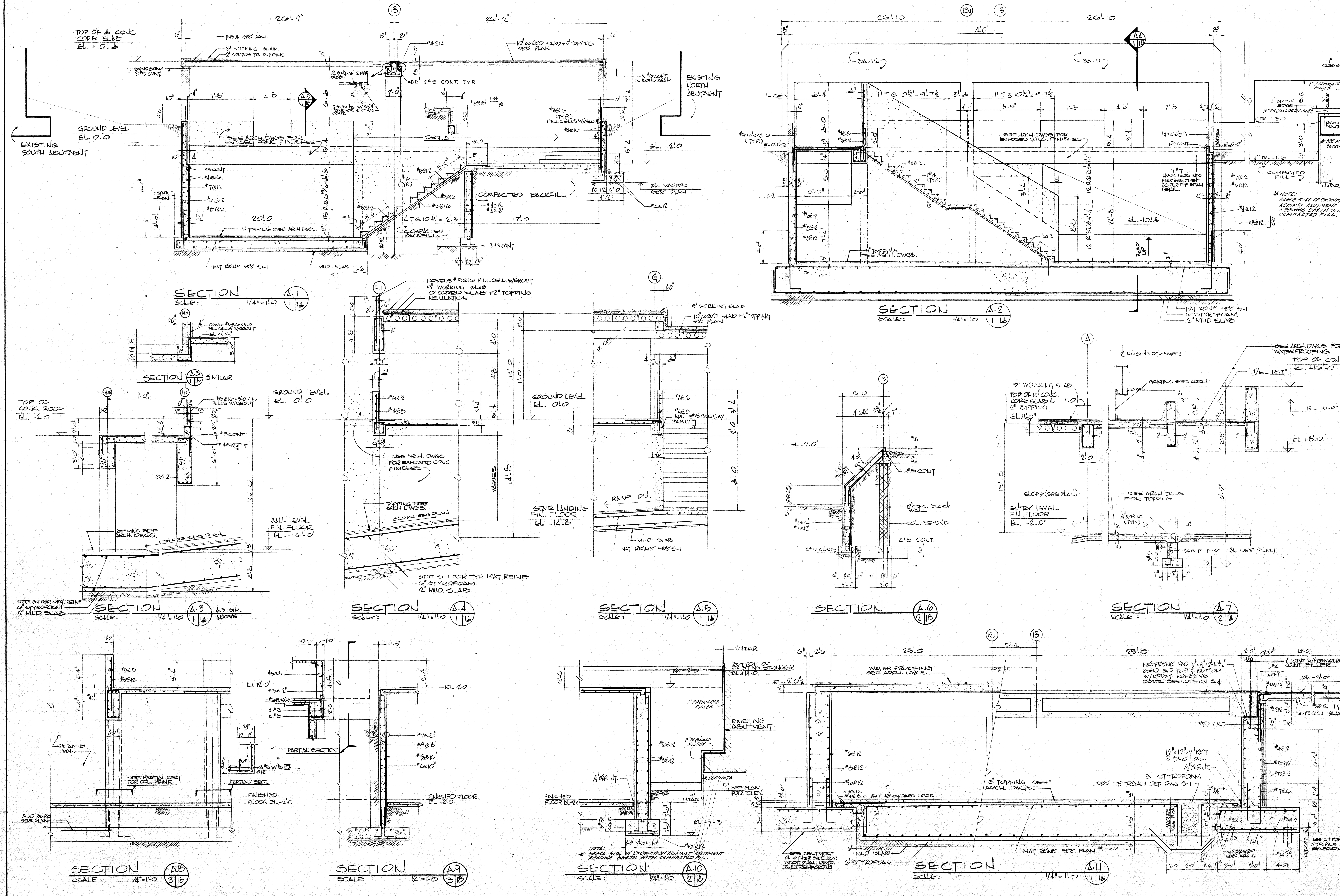
TITLE UNIT B GROUND LEVEL FRAMING - SOUTH
SCALE - 1/16" = 1'-0
DATE - AUG. 7, 1972
DRAWN BY
SHEET

S7



REVISIONS

J.M. HAUSHALTER P.E. 21749

COMMONWEALTH OF MASSACHUSETTS JAMES MAXWELL HAUSHALTER No. 21749 REGISTERED PROFESSIONAL ENGINEER

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TITLE UNIT A SECTIONS & DETAILS

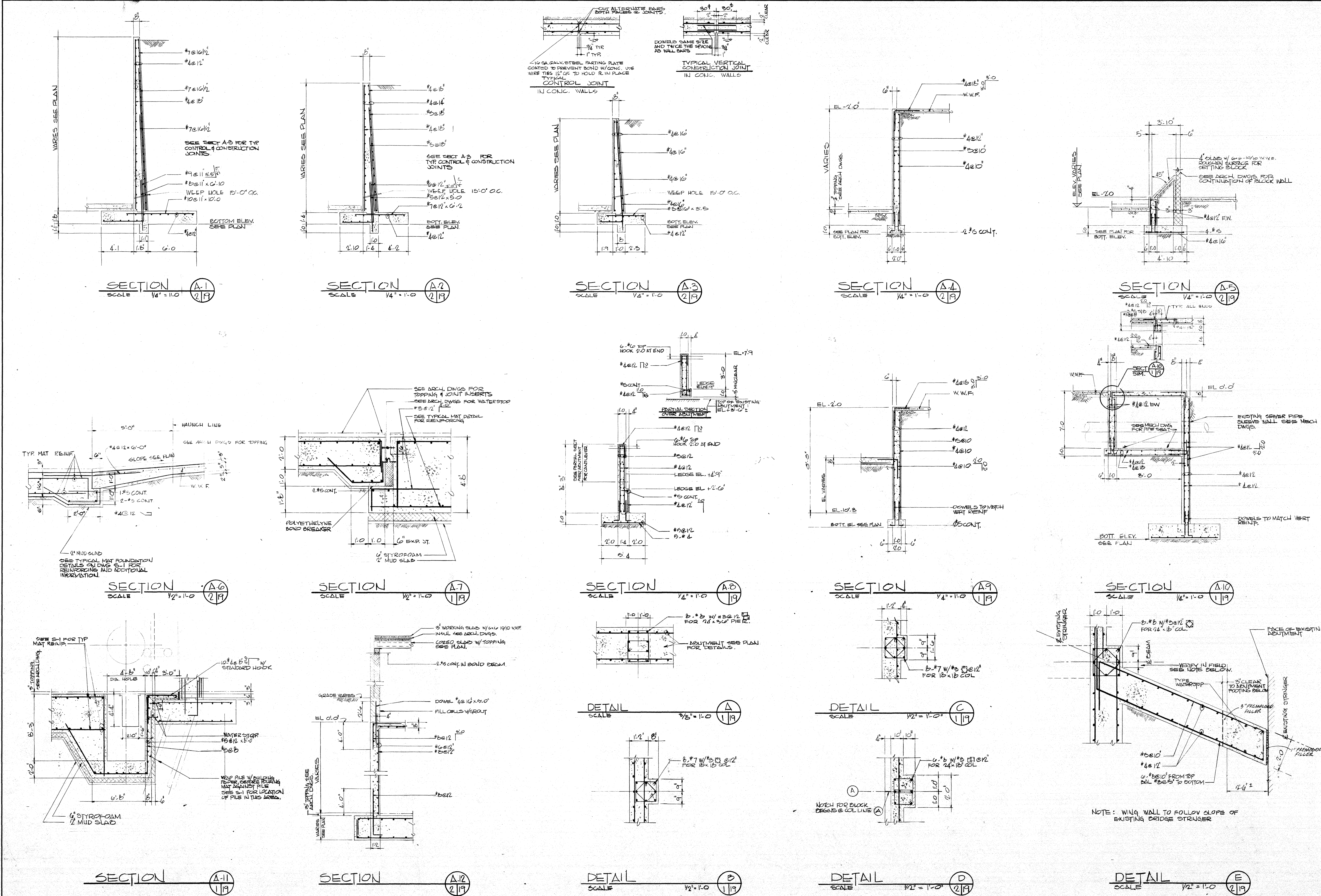
SCALE - AS SHOWN

DATE AUG 7, 1972

DRAWN BY - DHA

SHEET

S18



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TITLE UNIT A SECTIONS & DETAILS

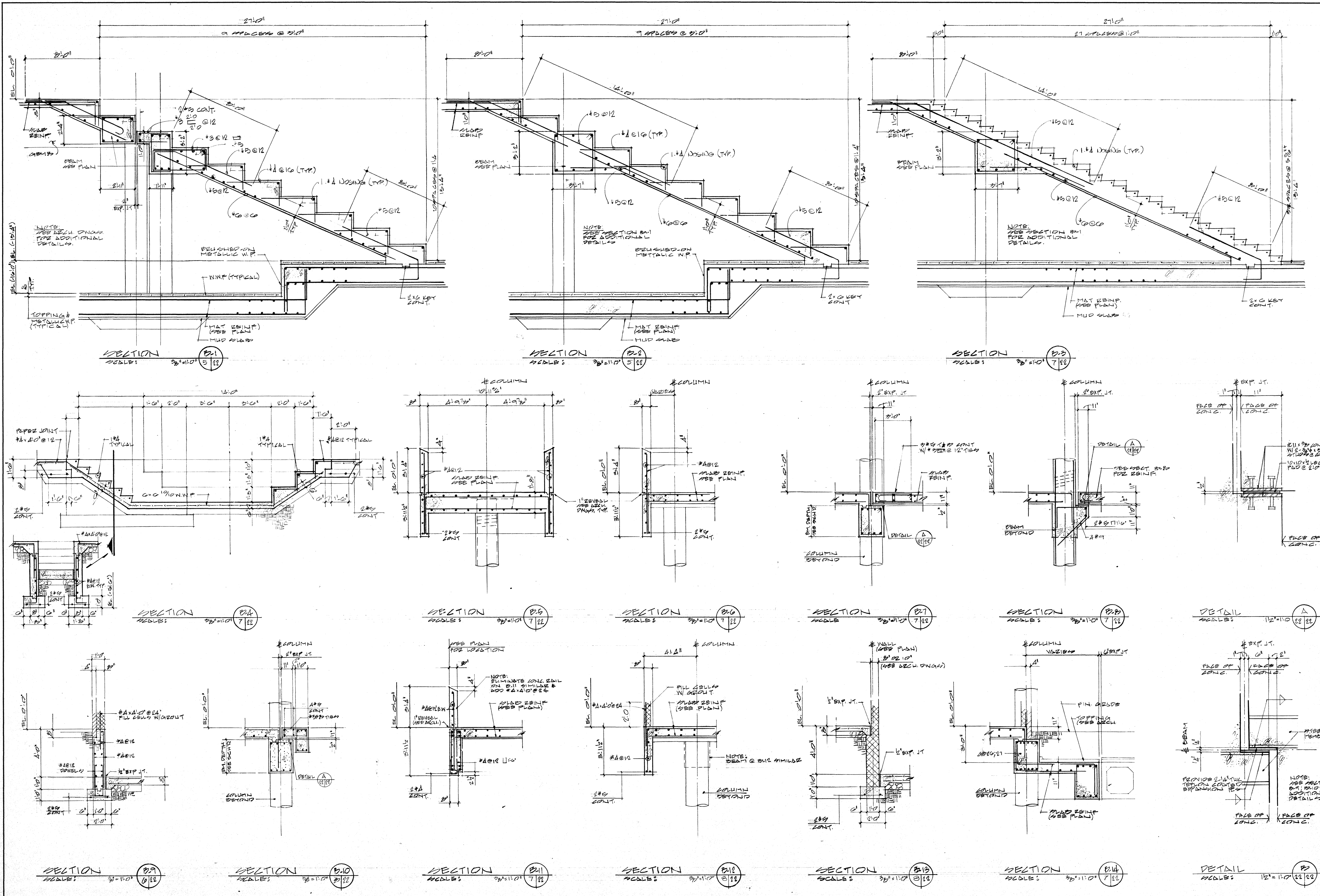
SCALE - AS SHOWN

DATE - AUG. 7. 1972

DRAWN BY - D.H.

SHEET

S 19



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TITLE UNIT B SECTIONS & DETAILS

SCALE · AS SHOWN

DATE · AUG. 7, 1972

DRAWN BY · JWP

SHEET

S 22

UNIT A

FOOTING SCHEDULE

MARK	SIZE	REINFORCING (E.W.)	REMARKS
FA.1	8'.8 × 9'.10 × 2'.0	14.#6 LONG WAY 20.#6 SHORT WAY	
FA.2	9'.0 × 9'.0 × 2'.4	14 #6	
FA.3	7'.0 × 19'.0 × 1'.8	7-#6	
FA.4	8'.8 × 8'.8 × 2'.0	14-#6	
FA.5	8'.0 × 9'.10 × 2'.0	14.#6 LONG WAY 20.#6 SHORT WAY	
FA.6	6'.0 × 4'.0 × 2'.0	7-#6	

CONCRETE SLAB SCHEDULE

MARK	THK'NESS	REINFORCING BOTTOM	TOP L.E.	TOP R.E.	TEMP.	REMARKS
SA.1	8"	#5@8"	#5@12	#5@6	#4@12	
SA.2	8"	#5@8	-	-	#4@12	
SA.3	8"	#5@12	#5@12	#5@12	#4@12	
SA.4	8"	#5@12	#5@12	#5@12	#4@12	
SA.5	8"	#6@8	#5@12	#5@12	#4@12	

CONCRETE BEAM SCHEDULE

MARK	SIZE W	D	REINFORCING BOTT.	TOP L.E.	TOP F.L.	TOP R.E.	STIRRUPS SIZE	TYPE	SPACING (E.E.)	REMARKS
BA.1	24	24	4#9	3#9	-	3#9	#3	□	3@4, 6@6, BAL.@12	SEE SECTION A.3 / 1-18
BA.2	24	72	7#9	5#9	-	5#9	↑	↑	3@4, 6@6, 6@12, BAL@16	SEE SECTION A.3 / 1-18
BA.3	24	28	3#9	-	-	3#9			3@4, 4@6, BAL.@12	
BA.4	18	24	3#9	3#9	-	4#9			3@4, 6@6, BAL.@12	
—	-	-	-	-	-	-			—	
BA.6	18	24	5#9	3#9	-	3#9	↓	↓	3@4, 4@6, BAL.@12	
BA.7	14/18	24	4#9	3#9	-	3#9	#3	□	3@4, 2@6, BAL.@12	SEE SECT. A.5/1-18 EXTEND TOP R.E. BARS TO COL. G-13
BA.8 / BA.8A	10/24	29	6#8	4#8	-	9#8	#4	⊓⊓	11@4, 5@6, BAL @8	TOP R.E. BARS TWO LAYERS 5+4 BA.8A = BA.8 REVERSED 1A / 1-18
BA.9	10/24	29	4#8	-	-	9#8	#4	⊓⊓	11@4, 5@6, BAL @8	TOP BARS IN TWO LAYERS 1A / 1-18
BA.10	24	29	4#8	-	-	-	#4	⊓⊓	11@4, 5@6, BAL @8	" " "
BA.11	18	56	3#8	4#8	-	4#8	#3	□	3@4, 6@6, BAL @12	SEE SECTION A.4 / 1-18
BA.12	18	56	3#8	-	-	4#8	↑	↑	3@4, 6@6, BAL@12	SEE SECTION A.4 / 1-18
BA.13	12	16	3#8	3#8	-	3#8			@8	
BA.14	24	32	5#8	3#8	-	3#8	↓	↓	3@4, 8@6, BAL@12	SEE SECTION A.7 / 2-18
BA.15	24	32	5#8	-	-	3#8	#3	□	3@4, 8@6, BAL@12	SEE SECTION A.7 / 2-18
BA.16	18	65	14#10	8#10	-	8#10	#4	□	18@4, 12@6, 6@12, BAL@18	BOTTOM BARS IN TWO LAYERS A.7 / 2-18
BA.17	18	96	4#9	-	6#9	6#9	#4	□	6@4, 8@6, 6@12 BAL@18 R.E.	TOP R.E. BARS IN TWO LAYERS A.7 / 2-18
BA.18	18	96	8#9	-	-	6#9	#4	□	6@4, 8@6, 6@12, BAL@18	" " "
BA.19	24	48	6#9	6#9	-	-	#3	□	6@4, 4@12, BAL@18	
BA.20	24	48	6#9	-	8#9	-	#3	□	6@4, 4@12, BAL.@18	
BA.21	24	48	6#8	-	6#7	-	#3	□	12@4, 6@8, BAL@18	
BA.22	24	48	6#8	-	-	6#7	#3	□	12@4, 6@8, BAL@18	
BA.23	12	14	3#5	2#6	-	2#6	#3	□	@8	

UNIT B

FOOTING SCHEDULE

MARK	SIZE	REINFORCING (E.W.)	REMARKS
FB-1	17'.0 × 10'.0 × 2'.6	19.#6(L.W.) 25.#6(S.W.)	PLACE 19 BARS IN MIDDLE 10'.0 OF SHORT DIRECTION BAL. EQUALLY DISTRIBUTED ON EA. SIDE.
FB.2	12'.0 × 9'.0 × 2'.6	13.#6(L.W.) 19.#6(S.W.)	PLACE 15 BARS IN MID 9'.0 OF SHORT DIR. BAL. EQ. DIST. E.S.
FB.3	10'.4 × 10'.4 × 2'.4	14.#6	
FB.4	12'.4 × 12'.4 × 2'.9	20.#6	
FB-5	6'-6 × 6'-6 × 1'-8	10-#6	
FB-6	4'-0 × 4'-0" × 1'-8	6-#6	
FB-7	6'.0 × 6'.0 × 7'.6	-	7.#6 VERT. E. FACE, #4 TIES @15"

CONCRETE SLAB SCHEDULE

MARK	THICKNESS	REINFORCING BOTTOM	TOP L.E.	TOP R.E.	TEMP.	REMARKS
SB.1	8"	#4@12	#4@12	#4@12	#4@12	
SB.2	11"	#5@12	#5@12	#5@12	#5@12	

CONCRETE BEAM SCHEDULE

MARK	SIZE W	D	REINFORCING BOTT.	TOP L.E.	TOP F.L.	TOP R.E.	STIRRUPS SIZE	TYPE	SPACING (E.E.)	REMARKS
RB-1 / RB-1A	32	32	4#8	-	5#8		#3	□	8@9, BAL.@14 (R.E.)	RB.1A = RB.1 REVERSED
RB.2 / RB.2A	32	32	4#8	-	-	5#8	↑	↑	16@4, 5@9, BAL@14	RB.2A = RB.2 REVERSED B.2 / 11-23
RB.3 / RB.3*	32	32	4#8	-	-	5#8			12@4, 5@9, BAL@14	RB.3* = END BEAM STIRRUPS @NOTCH B.2 / 11-23
RB.4	32	32	4#8	-	-	6#8			12@4, 5@9, BAL@14	
RB.5	32	32	5#8	4#8		6#8			12@4, 5@9, BAL@14	SEE B.2/11-23 STIRRUPS @ NOTCH
RB.6 / RB.6A	32	32	4#8	-	6#8	-			8@9, BAL.@14 (R.E.)	RB.6A = RB.6 REVERSED
RB.7 / RB.7A	32	32	5#8	-	-	5#9			16@4, 5@9, BAL@14	RB.7A = RB.7 REVERSED
RB.8 / RB.8A	32	32	6#8	-	-	5#9			11@4, 5@9, BAL@14	RB.8A = RB.8 REVERSED
RB-9 / RB.9A	32	32	5#8	-	-	6#8			11@4, 5@9, BAL@14	RB.9A = RB.9 REVERSED
RB-10 / RB.10A	32	32	4#8	-	-	6#8			11@4, 5@9, BAL@14	RB.10A = RB.10 REVERSED
RB-11 / RB.11A	32	32	5#8	-	-	8#8			11@4, 5@9, BAL@14	RB.11A = RB-11 REVERSED STIRRUPS @NOTCH B.2 / 11-23
RB.12 / RB.12A	32	32	7#8	-	-	4#8			11@4, 5@9, BAL@14	RB.12A = RB.12 REVERSED
RB-13	24	32	5#7	4#7	-	5#7	↓	↓	12@4, 5@9, BAL@14	
RB.14	24	32	4#7	-	-	-	#3	□	12@4, 5@9, BAL@14	
UB-1 / UB.1A	32	32	4#8	-	6#8	-	#3	□	11@4, BAL.@9 (RE)	UB.1A = UB-1 REVERSED
UB.2 / UB.2A	↑	↑	4#8	-	-	6#8	↑	↑	12@4, 5@9, BAL@14	UB.2A = UB.2 REVERSED
UB.3 / UB.3A			4#8	-	-	5#8			12@4, 5@9, BAL@14	UB.3A = UB.3 REVERSED
UB.4 / UB.4A			4#8	-	-	5#8			12@4, 5@9, BAL@14	UB.4A = UB.4 REVERSED
UB.5			4#8	-	-	-	↓	↓	12@4, 5@9, BAL@14	
UB.6			4#8	-	5#8	-	#3	□	12@4, 5@9, BAL@14	
UB-7 / UB-7A			4#8	-	10#9	-	#3	⊓⊓	12@4, 5@9, BAL@14 (RE)	UB.7A = UB.7 REVERSED
UB-8 / UB.8A			7#8	-	-	8#8	↑	↑	12@4, 5@9, BAL@14	UB.8A = UB.8 REVERSED
UB-9 / UB.9A			4#8	-	-	6#9			↑ ↑ ↑	UB.9A = UB.9 REVERSED
UB.10			7#8	-	-	7#9				
UB-11			6#8	-	-	7#9				
UB-12			4#8	-	-	8#8				
UB.13			4#8	-	-	-				
UB.14			4#8	-	5#8	-				
UB.15			7#8	-	-	4#8				
UB-16	↓	↓	7#8	8#8	-	8#8	↓	↓	↓ ↓ ↓	
UB-17	32	32	7#8	-	-	-	#3	⊓⊓	12@4, 5@9, BAL@14	
UB.18 / UB.18A	24	32	5#7	4#7		5#8	#3	□	8@6, BAL.@14	UB.18A = UB.18 REVERSED
UB-19 / UB.19A	↑	↑	-	-	-	6#7	↑	↑	↑ ↑	UB.19A = UB.19 REVERSED
UB.20			5#7	-	-	-				
UB.21			6#7	4#7	-	5#8				
UB.22	↓	↓	6#7	-	-	4#7	↓	↓	↓ ↓	
UB.23	24	32	5#8	5#7	-	5#7	#3	□	8@6, BAL.@14	
UB.24 / UB.24A	32	32	5#8	4#8	-	5#8	#3	⊓⊓	12@4, 5@9, BAL@14	UB.24A = UB.24 REVERSED
UB.25	32	32	5#8	-	-	-	#3	⊓⊓	12@4, 5@9, BAL@14	
UB.26	32	32	5#8	-	-	5#8	#3	⊓⊓	12@4, 5@9, BAL@14	
UB.27	12	32	4#7	4#7	-	4#7	#3	□	5@8, BAL@12	
UB.28	12	24	4#6	-	4#6	-	#3	□	5@8, BAL@12	
UB.29	12	18	4#5	-	4#5	-	#3	□	@8	

UNIT B (CONT.)

CONCRETE BEAM SCHEDULE

MARK	SIZE W	D	REINFORCING BOTT.	TOP L.E.	TOP F.L.	TOP R.E.	STIRRUPS SIZE	TYPE	SPACING (E.E.)	REMARKS
GB.1	24	28	4#7	-	9#9	-	#3	□	12@3, BAL @6	
GB.2	24	28	4#7	-	9#9	-	↑	↑	12@3, BAL@6 L.E.	
GB.3	12	16	3#8	3#8	-	3#8			3@4, 4@6, BAL@12	
GB.4	12	16	3#9	3#9	-	3#9			3@4, 6@6, BAL@12	
GB.5	17	47½	3#9	3#9	-	-			3@4, 6@6, 4@12, BAL@18	
GB.6	17	47½	3#9	1#9	2#9	-			3@4, 6@6, 4@12, BAL@18	
GB.7	24	47½	4#9	2#9	-	-			3@4, 6@6, 6@12, BAL@18	
GB.8	24	47½	4#9	4#9	-	4#9			3@4, 6@6, 4@12, BAL@18	
GB.9	23	38	5#9	4#9	-	4#9			3@4, 6@6, BAL @12	SEE SECTION B.1 / 7-22
GB.10	23	38	5#9	6#9	-	-			3@4, 6@6, BAL.@12	SEE SECTION B.1 / 7-22 EXTEND TOP L.E BARS INTO GB-11
GB.11	43	38	6#9	6#9	-	-			3@4, 8@6, BAL.@12	SEE SECTION B.2 / 7-22
GB.12	43	38	6#9	3#9	-	-			3@4, 8@6, BAL@12	SEE SECTION B.2 / 7-22
GB.13	43	38	4#9	-	4#9	-			3@4, 10@6, BAL@12 L.E.	SEE SECTION B.3 / 7-22
GB.14	22	33	5#9	4#9	-	-			6@4, 12@6, BAL@12	SEE SECTION B.7 / 7-22
GB.15	22	33	6#9	7#9	-	-			6@4, 12@6, BAL.@12	SEE SECTION B.7 / 7-22
GB.16	22	33	6#9	7#9	-	-			6@4, 12@6, BAL@12	SEE SECTION B.7 / 7-22
GB.17	35	28	5#9	6#9	-	4#9			6@4, 6@6, BAL@12	SEE SECTION B.1 / 7-22 FRAMES INTO GB-18,19
GB.18	24	47½	4#9	4#9	-	4#9			3@4, 2@6, BAL@12	
GB.19	22	44	4#9	4#9	-	4#9			3@4, 2@6, BAL@12 L.E. 6@4, 4@6, BAL.@12 R.E.	SEE SECTION B.1 / 7-7 VARYING DEPTHS @ R.E.
GB.20 / GB.20A	12	47½	4#9	4#9	-	4#9			3@4, 4@6, 4@12, BAL@18	SEE SECTION B.11 / 7-22
GB.21	12	47½	4#9	-	-	4#9			3@4, 4@6, 4@12, BAL@18	SEE SECTION B.11 / 7-22
GB.22	12	47½	4#9	-	-	-			3@4, 4@6, 4@12, BAL@18	SEE SECTION B.11 / 7-22
GB.23	12	16	4#9	3#9	-	3#9			3@4, 6@6, BAL@12	
GB.24	22	44	4#9	3#9	-	4#9			3@4, 2@6, 2@12, BAL@18	SEE SECTION B.1 / 7-7
GB.25	22	44	5#9	-	-	4#9			3@4, 4@6, 6@12, BAL@18	SEE SECTION B.1 / 7-7
GB.26	24	36	6#9	6#9	-	6#9			16@4, 6@6, 6@12, BAL@18	SEE SECTION B.14 / 7-22
GB.27	24	36	6#9	4#9	-	-			14@4, 6@6, 6@12, BAL@18	SEE SECTION B.14 / 7-22
GB.28	24	36	4#9	-	4#9	-			3@4, 6@6, BAL@12	SEE SECTION B.14 / 7-22
GB.29	24	36	4#8	-	4#8	-			3@4, 6@6, BAL@12	
GB.30	24	36	4#8	-	4#8	-			19@4, 10@6, BAL @12	
GB.31	22	36	3#8	-	5#8	-			3@4, BAL @6, R.E.	SEE SECTION B.7 / 7-22
GB.32	24	44	6#9	4#9	-	4#9			3@4, 4@6, 4@12, BAL@18	SEE SECTION B.11 / 7-22
GB.33	24	44	6#9	5#9	-	4#9			3@4, 6@6, 6@12, BAL@18	
GB.34	24	44	7#9	4#9	-	6#9			3@4, 6@6, 6@12, BAL@18	
GB.35	24	44	6#9	-	-	-			3@4, 6@6, 6@12, BAL@18	
GB.36	24	44	5#9	6#9	-	4#9	↓	↓	3@4, 6@6, 6@12, BAL@18	
GB.37	24	36	4#8	4#8	-	4#8	#3	□	3@4, 4@6, 4@12, BAL@18	
GB.38	28	111	9#10	9#10	-	9#10	#4	▯	6@6, 4@12, BAL@18	SEE SECTION C.2 / 7-24
GB.39	SEE PLAN	24	7#9	5#9	-	7#9	#3	□	6@4, BAL@10	SEE PLAN S-7
GB.40	18	47½	4#7	-	6#9	-	#3	□	6@4, BAL.@12	6#9 TOP FROM GB.2 TURN BAL. OF 3#9 DOWN INTO COL
GB.41	12	47½	4#7	4#7	-	4#7	#3	□	6@4, BAL.@12	
GB.42	30	24	5#7	6#7	-	6#7	#3	□	8@6, BAL@10	SEE DWG. S-7
GB.43	30	24	5#7	-	6#7	-	#3	□	@6	
GB.44 / GB.44A	24	36	8#8	7#8	-	-	#3	⊓⊓	12@4, 5@9, BAL.@14	GB44A TOP RE 7.#8
GB.45	12	16	4#7	4#7	-	4#7	#3	□	6@4, BAL @6	

UNIT C

CONCRETE BEAM SCHEDULE

MARK	SIZE W	D	REINFORCING BOTT.	TOP L.E.	TOP F.L.	TOP R.E.	STIRRUPS SIZE	TYPE	SPACING (E.E.)	REMARKS	
BC-1	16	18	4#5	4#6	-	-	#3	□	@8	SEE SECTION C3 / 13-24	BC-1A = BC-1 REVERSED
BC-2	16	18	5#7	5#9	-	-	#3	□	5@6, BAL @8	do	-
BC-3	16	18	5#7	5#9	-	5#9	#3	□	5@6, BAL @8	do	-
BC.1A	16	18	4#5	-	-	4#6	#3	□	@8	do	-

UNIT D

FOOTING SCHEDULE

MARK	SIZE	REINFORCING (E.W.)	REMARKS
FD.1	8'.8 × 8'.8 × 1'-8	10.#6	
FD.2	7'.8 × 7'.8 × 1'.6	8.#6	
FD.3	9'.0 × 9'.0 × 2'.0	10.#6	
FD.4	10'.6 × 10'.6 × 2'.4	12.#6	
FD.5	10'.10 × 10'.10 × 2'.4	10.#7	
FD-6	16'.0 × 7'.6 × 2'.4	12.#7 BOTT L.W. 5.#7 TOP L.W. 16.#6 BOTT S.W.	
FD.7	3'.0 × 3'.0 × 1'.0	4.#5	
FD.8	10'.0 × 10'.0 × 2'.0	12.#6	
FD.9	9'.8 × 9'.8 × 2'.0	10.#6	
FD.10	4'.0 × 4'.0 × 1'.4	5.#5	
FD.11	5'.0 × 5'.0 × 1'.6	7.#6	

CONCRETE SLAB SCHEDULE

MARK	THICKNESS	REINFORCING BOTTOM	TOP L.E.	TOP R.E.	TEMP.	REMARKS
SD-1	8"	#5@12	#5@12	#5@12	#5@12	
SD.2	8"	#5@12	#5@12	#5@12	#4@12	
SD.3	8"	#5@12	-	#5@12	#4@12	
SD.4	8"	#4@6	#4@6	#4@6	#4@12	
SD.5	8"	#6@12	#4@12	#4@12	#4@18	

CONCRETE BEAM SCHEDULE

MARK	SIZE W	D	REINFORCING BOTT.	TOP L.E.	TOP F.L.	TOP R.E.	STIRRUPS SIZE	TYPE	SPACING (E.E.)	REMARKS
BD-1 / BD-1A	28	32	3#9	-	3#9	2#9	#4	□	3@4, 6@8, BAL@12 R.E.	BD.1A = BD.1 REVERSED PROVIDE STD. HOOK @ L.E. OF 4#8 TOP F.L. BARS
BD.2 / BD.2A	28	32	4#9	-	-	6#9	↑	↑	3@4, 6@6, BAL.@12	BD.2A = BD.2 REVERSED
BD-3	28	32	4#9	-	-	-			3@4, 6@6, BAL.@12	
BD.4	28	32	4#9	-	4#9	2#9			3@4, 6@8, BAL@12 R.E.	PROVIDE STD. HOOK @ L.E. OF 4#9 TOP F.L. BARS
BD.5 / BD.5A	28	32	5#9	-	-	6#9			3@4, 6@6, BAL@12	BD.5A = BD.5 REVERSED
BD.6	28	32	3#9	-	-	-			3@4, 6@8, BAL@12	
BD-7	28	32	5#9	-	6#9	-			@4	¢ SPAN; 16"; ADD 6-#9 × 4'-8"; 8"×16" OPNG. - BEAM ELEVATION (BD-7)
BD-8	28	32	7#9	-	-	-			3@4, 6@6, BAL@12	
BD-9	28	32	3#9	2#9	4#9	-			3@4, BAL.@8	
BD.10 / BD.10A	28	32	5#9	-	-	7#9			3@4, 6@6, BAL@12	BD.10A = BD.10 REVERSED
BD.11	28	32	5#9	-	-	-			3@4, 6@6, BAL@12	
BD.12	28	32	3#9	-	5#9	2#9			3@4, BAL.@8	
BD-13 / BD-13A	28	32	6#9	-	-	8#9			12@4, 3@8, BAL@12	BD.13A = BD.13 REVERSED
BD.14	28	32	6#9	-	-	-			12@4, 3@8, BAL@12	
BD.15	28	32	3#9	2#9	4#9	-	↓	↓	3@4, 6@8, BAL@12 L.E.	PROVIDE STD. HOOK @ R.E. OF 4#9 TOP F.L. BARS
BD.16										NONE
BD.17	14	29½	4#9	3#9	-	3#9	#3	□	3@4, 6@8, BAL@12	
BD-18	14	29½	4#9	-	-	3#9	↑	↑	3@4, 6@8, BAL@12	
BD.19 / BD.19A	17	23½	3#8	-	4#8	1#8			3@4, 6@8, BAL@12 R.E.	BD.19A = BD.19 REVERSED PROVIDE STD. HOOK @ L.E. OF 4#8 TOP F.L. BARS
BD.20 / BD.20A	17	23½	4#8	-	-	5#8			12@4, 3@8, BAL@12	BD.20A = BD.20 REVERSED
BD.21 / BD.21A	17	23½	3#8	-	-	3#8			3@4, 6@8, BAL.@12	BD.21A = BD.21 REVERSED
BD.22	17	23½	7#8	6#8	-	6#8			16@3, 4@6, BAL.@12	
BD.23 / BD.23A	17	23½	3#8	1#8	4#8	-			3@4, 6@8, BAL@12	BD.23A = BD.23 REVERSED
BD.24 / BD.24A	17	23½	4#8	-	-	5#8			3@4, 8@6, BAL@12	BD.24A = BD.24 REVERSED
BD.25	17	23½	4#8	-	-	-			3@4, 8@6, BAL@12	
BD.26	12	23½	3#8	3#8	-	3#8			3@4, 2@6, BAL@12	
BD.27	16	54	6#10	3#9	-	3#9			3@4, 4@6, 4@12, BAL@16	BOTTOM BARS IN TWO LAYERS
BD.28	14	100	6#9	3#9	-	3#9			3@4, 2@6, 4@12, BAL@16	BOTTOM BARS IN TWO LAYERS SEE SECTION D.3 / 16-25
BD.29	16	24	5#9	3#9	-	3#9			3@4, 4@6, BAL@12	
BD.30	14	23½	4#9	3#9	-	3#9			3@4, 6@8, BAL@12	
BD.31	14	55½	4#9	3#9	-	3#9			2@6, 2@12, BAL@16	
BD.32	12	24	3#8	-	3#8	-			@6	
BD.33	12	18	3#5	-	3#5	-	↓	↓	@6	HOOK TOP BARS INTO MAT
BD.34	24	18	4#5	-	4#5	-	#3	□	@6	HOOK TOP BARS INTO BD.33 AND MAT.

REVISIONS

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LINDENHURST, N.Y.

CONSTRUCTION COST CONSULTANT
WOLF AND COMPANY
P.O. BOX 275
PLEASANTVILLE, N.Y.

TITLE
UNITS A, B, C, D FOOTING, SLAB, & BEAM SCHEDULES

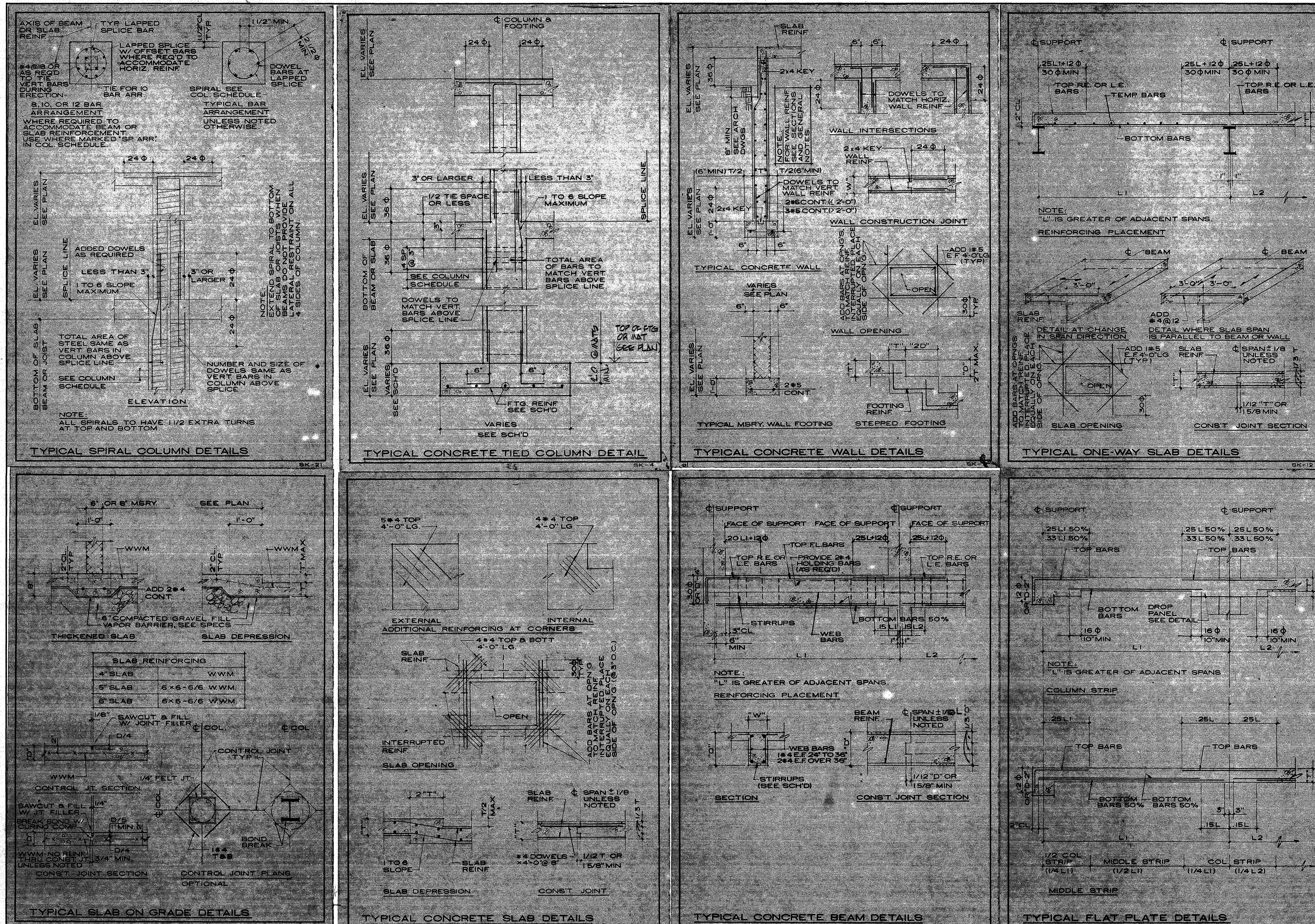
SCALE - NONE

DATE - AUG. 7, 1972.

DRAWN BY - D.M.

SHEET

S28

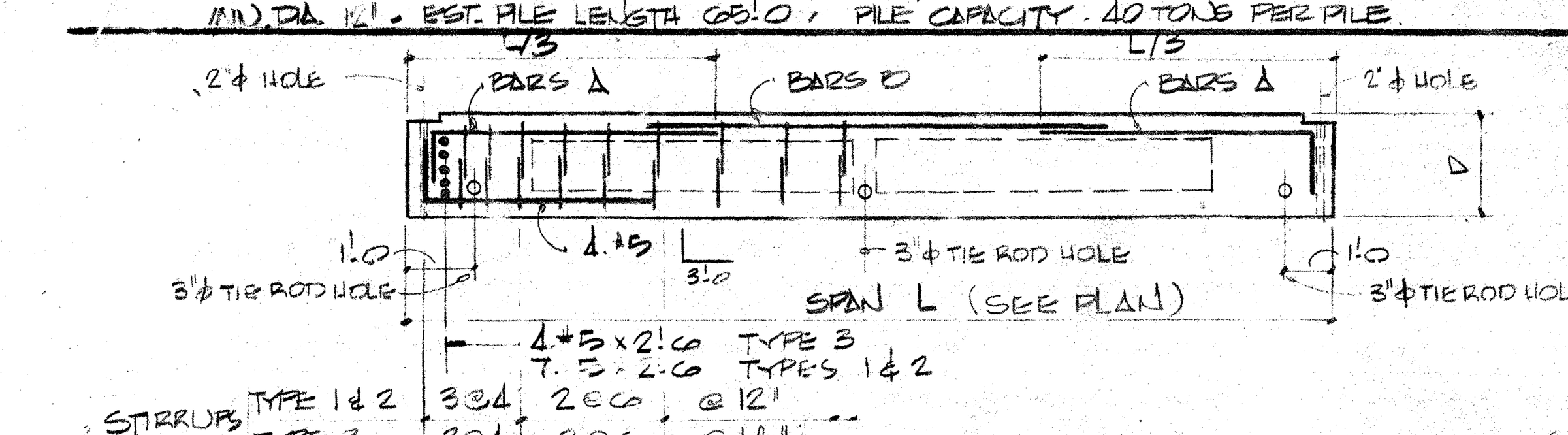


GENERAL NOTES

- **FOUNDATIONS:**
  - MAX. BEARING VALUE ASSUMED 4000 #/SF.
  - FOOTINGS TO REST A MINIMUM OF 1'-0 INTO UNDISTURBED SOIL.
  - ALL INTERIOR SLABS-ON-GRADE TO BE POURED OVER 6" OF POROUS FILL AND VAPOR BARRIER.
  - APPLY METALLIC WATERPROOFING ON ALL CONCRETE WALLS AND MATS BELOW GRADE.
  - CONTROL JOINTS FOR SLABS-ON-GRADE - 600 TO 1000 SF WITH 30'-0 MAX. SIDE.
  - CONSTRUCTION JOINT PANEL MAY REPLACE CONTROL JOINT.
  - PROVIDE 2" MIN. MUD SLAB UNDER ALL FOUNDATION MATS. (2000 PSI MIN.)
  - PROVIDE 6" STYROFOAM UNDER MAT OF UNIT A & UNIT C.
- **DESIGN LIVE LOADS:**
  - ROOF SNOW — 30#/SF
  - CLASS ROOMS — 50#/SF
  - ASSEMBLY — 100#/SF
  - LIBRARY - READING — 60#/SF
  - STACK — 150#/SF
  - MECHANICAL ROOMS — 150#/SF
  - STORAGE — 125#/SF
  - STAIRS & CORRIDORS — 100#/SF
  - WIND — 15#/SF
  - RAILROAD - COOPER E-72 & E-80
  - HIGHWAY — HS20-44
- **CONCRETE:**
  - REINFORCING: ASTM A-615, GRADE 60.
  - KEYS: 2 x 4 UNLESS OTHERWISE NOTED.
  - PREMOLDED JOINT FILLER: 1/2" WHERE SLAB-ON-GRADE ABUTTS WALL.
  - SEE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL OPENINGS, SLEEVES, EQUIPMENT PADS, DEPRESSIONS, CURBS, CHAMFERS, INSERTS, AND OTHER EMBEDDED ITEMS.
  - PROVIDE #4 @ 12 E.W., E.F. IN SLABS OR WALL AREAS NOT SCHEDULED OR NOTED.
  - PROVIDE 2" MUD SLAB UNDER ALL MATS.
- **PRESTRESSED TEES**
  - DESIGN TEES FOR THE FOLLOWING ADDITIONAL DEAD LOADS WHERE SHOWN ON ARCH. DWGS.
    - 4-2-4 WALL — 6600#/LIN.FT.
    - PRECAST ELEMENT — 225#/LIN.FT.
  - TOTAL SUPERIMPOSED LOADS
    - ROOF DL — 45#/SF; LL — 30#/SF
    - FLOOR DL — 60#/SF; LL — 100#/SF
  - PROVIDE 2 1/2" MIN. HARDROCK CONCRETE (145#/CU.FT.) OVER ALL TEES REINFORCED WITH 6x6-10/10 WELDED WIRE FABRIC. BUILD UP TOPPING AND SLOPE TO DIMS. SHOWN ON ARCH. DWGS.
  - REINFORCING SHOWN IS MINIMUM AND SHOULD BE VERIFIED BY P/S MFGR. AS PART OF THE DESIGN.
- **PRESTRESSED BOX GIRDERS**
  - RAILROAD GIRDERS SHALL BE DESIGNED IN ACCORDANCE WITH THE AMERICAN RAILWAY ENGINEERING ASSOCIATION. (AREA)
    - TOTAL SUPERIMPOSED LOADS: DL — 550#/LIN.FT.
    - GIRDER TYPES TO BE DESIGNED FOR THE FOLLOWING ADDITIONAL LOADS:
      - TYPE 1 — COOPER E-72
      - TYPE 2 — COOPER E-80
  - HIGHWAY GIRDERS SHALL BE DESIGNED IN ACCORDANCE WITH THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS (AASHO)
    - TOTAL SUPERIMPOSED LOADS: DL — 530#/LIN.FT.
    - GIRDER TYPE TO BE DESIGNED FOR THE FOLLOWING ADDITIONAL LOAD:
      - TYPE 3 — HS20-44
  - PROVIDE 3" MIN. HARDROCK CONCRETE (150#/CU.FT.) OVER ALL BOX GIRDERS REINF. W/6x6-10/10 W.W.F.
  - REINFORCING SHOWN IS MINIMUM AND SHOULD BE VERIFIED BY P/S MFGR. AS PART OF THE DESIGN.
- **CORED SLABS**
  - DESIGN CORED SLABS FOR THE FOLLOWING ADDITIONAL LOADS WHERE SHOWN ON ARCH DWGS.
    - 4-2-4 WALL — 6600#/LIN.FT.
    - ROOF DL — 45#/SF; LL — 30#/SF
    - UNIT A DL — 45#/SF; LL — 175#/SF
    - FLOOR DL — 60#/SF; LL — 100#/SF
  - CORED SLABS TO BE DESIGNED AS NON-COMPOSITE SECTIONS, EXCEPT AT UNIT 'A' ROOF WHERE 10" CORED SLAB + 2" COMPOSITE SLAB SHALL BE USED.
- **STRUCTURAL STEEL**
  - ASTM SPECIFICATION: A-36 UNLESS OTHERWISE NOTED. BOLTS: ASTM A-325 UNLESS OTHERWISE NOTED. PROVIDE HOLES & OPNGS. FOR WORK REQUIRED BY OTHER TRADES.
  - SUPPLY LOOSE ANGLE LINTELS OVER ALL MASONRY OPNGS. & RECESSES UNLESS NOTED. LINTELS SHALL CONSIST OF A SINGLE ANGLE W/3 1/2" LEG HORIZONTAL FOR EACH 4" OF WALL THICKNESS.

	Opening		Size	Bearing ea. end
MASONRY OPNG.	4'-0 OR LESS	ANGLE SIZE	3 1/2 x 3 1/2 x 5/16	6"
	4'-0 TO 6'-0		4 x 3 1/2 x 5/16	6"
	6'-0 TO 8'-0		5 x 3 1/2 x 5/16	8"
	8'-0 TO 10'-0		6 x 3 1/2 x 3/8	8"
6" PARTITIONS	4'-0" OR LESS	LINTEL SIZE	ST 4 WF 8.5	6"
	4'-0" TO 6'-6"		ST 5 WF 10.5	6"

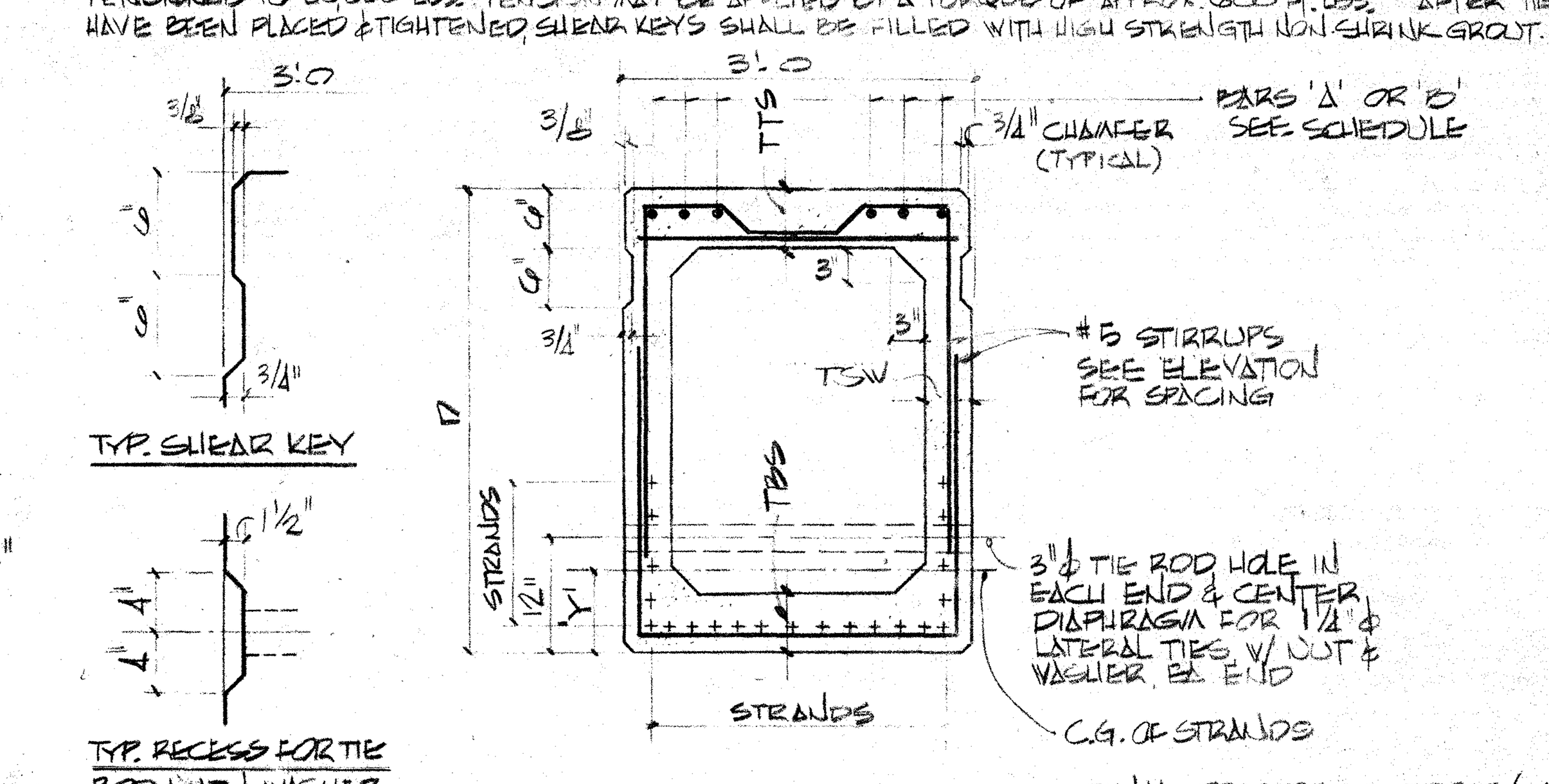
- **PILES (CAST-IN-PLACE)** [SEE S-1 FOR TYPICAL PILE REINF. DETAIL.]
  - RAILROAD BRIDGE PILES - DESIGN IN CONFORMANCE W/AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA) MIN. DIA. 16" - EST. PILE LENGTH 70'-0 - PILE CAPACITY - 65 TONS PER PILE.
  - HIGHWAY BRIDGE PILES - DESIGN IN CONFORMANCE W/ AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. MIN. DIA. 12" - EST. PILE LENGTH 65'-0 - PILE CAPACITY - 40 TONS PER PILE.



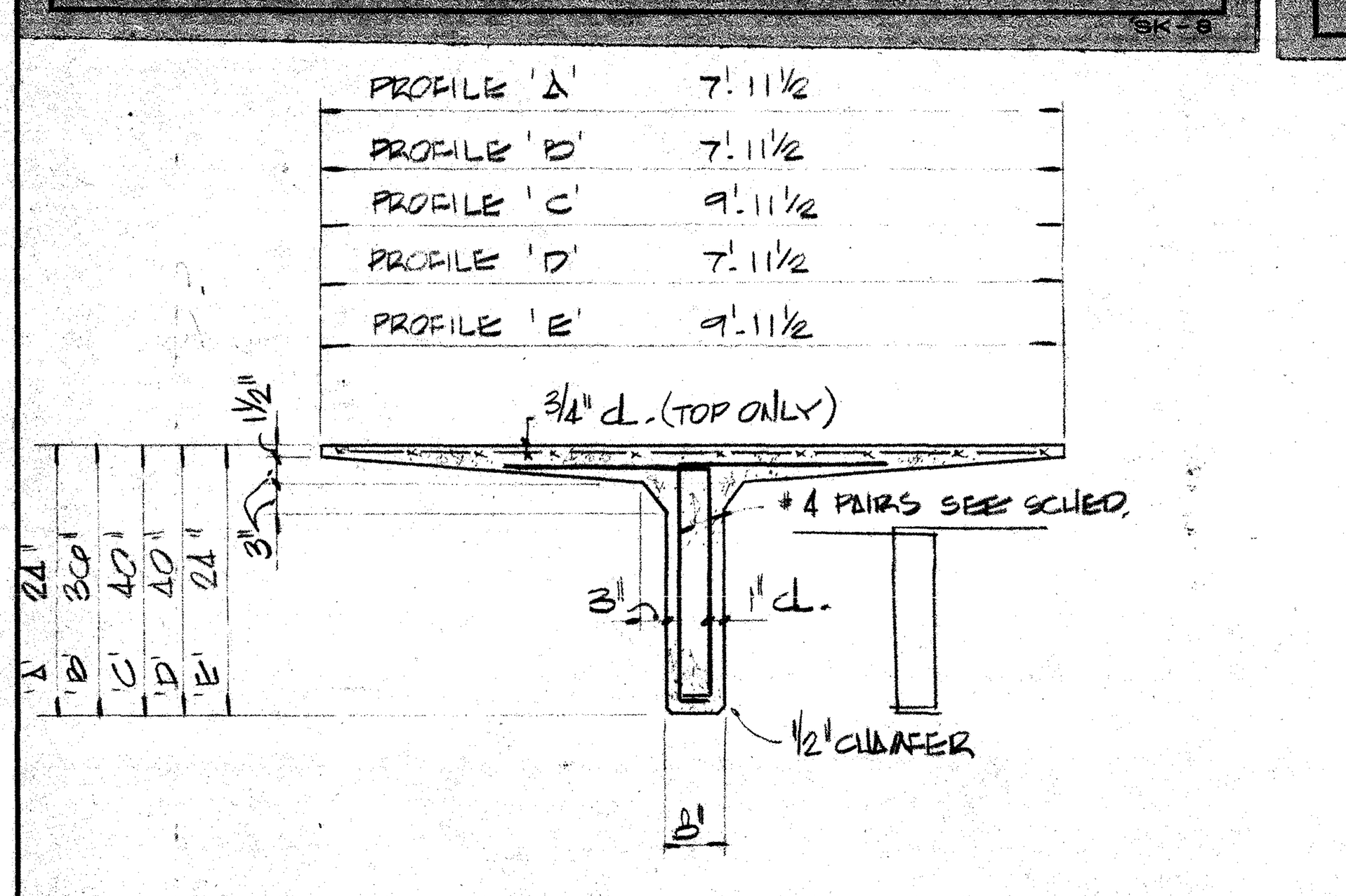
TYPICAL BOX GIRDER - REINFORCING PLACEMENT

NO SCALE

PROVIDE LATERAL TIES THROUGH DIAPHRAGMS & END BLOCKS. EACH TIE SHALL BE EQUIVALENT TO 1 1/4" ф BAR TENSIONED TO 80,000 LBS. TENSION MAY BE APPLIED BY A TORQUE OF APPROX. 600 FT. LBS. AFTER TIES HAVE BEEN PLACED & TIGHTENED, SHEAR KEYS SHALL BE FILLED WITH HIGH STRENGTH NON-SHRINK GROUT.



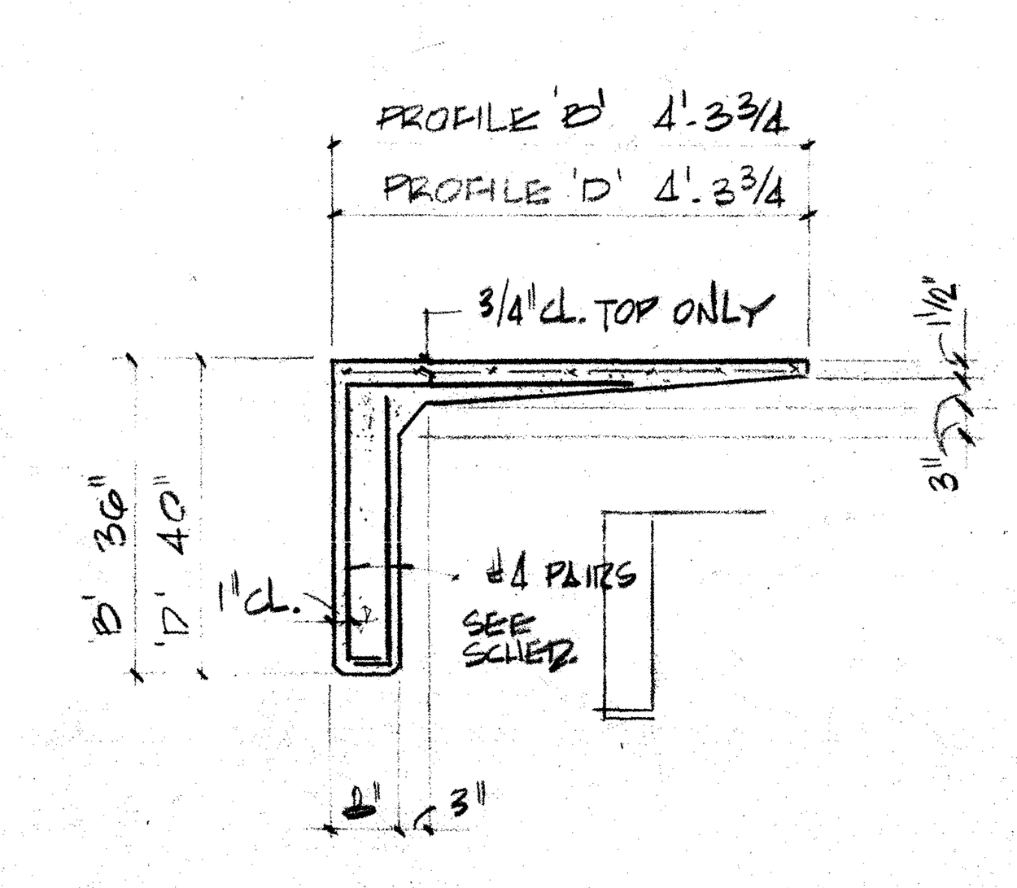
TYPE	DEPTH D IN.	TTS	TBS	TSW	FORCE 'P'	DISTANCE 'Y' FT.	BARS 'A'	BARS 'B'
1	60"	6"	6"	5"	666	8.46"	6-#6	6-#4
2	60"	6"	6"	5"	707	9.02"	6-#6	6-#4
3	36"	5 1/2"	5 1/2"	5"	471	5.51"	6-#5	6-#4



PROFILE 'A'	7'-11 1/2
PROFILE 'B'	7'-11 1/2
PROFILE 'C'	9'-11 1/2
PROFILE 'D'	9'-11 1/2
PROFILE 'E'	9'-11 1/2

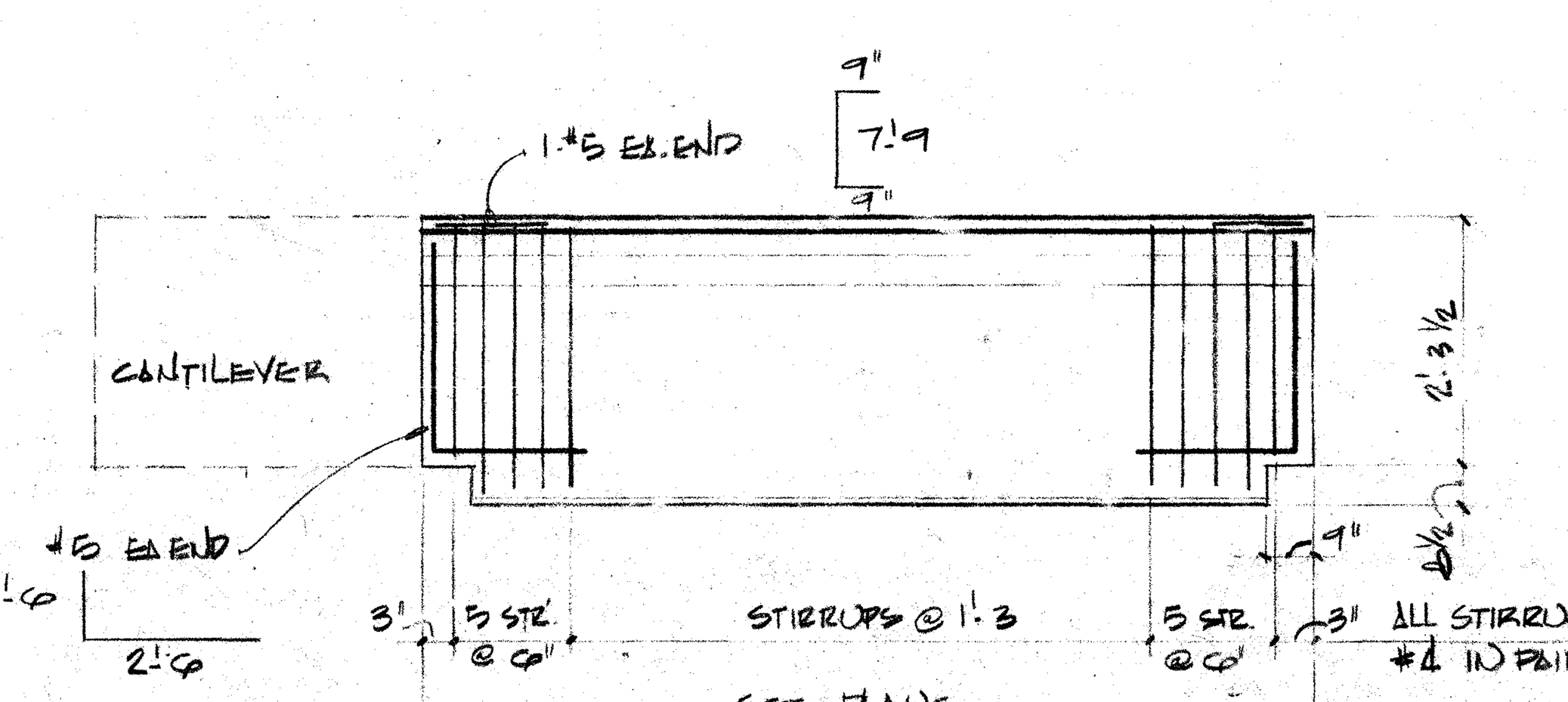
TYPICAL PRE-STRESSED TEE

NO SCALE



TYPICAL END BEAM

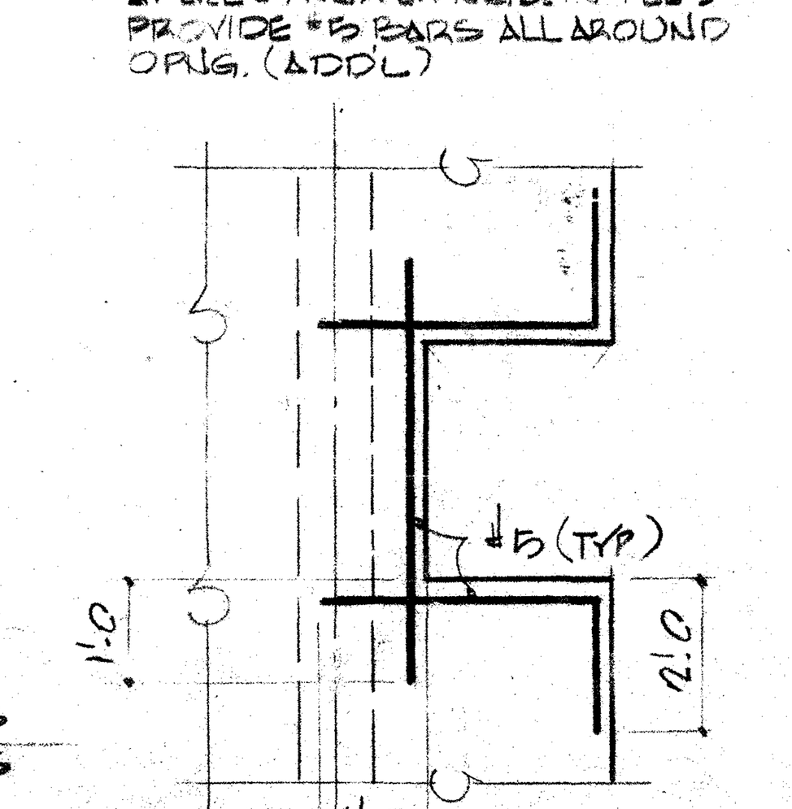
NO SCALE



TYPICAL TEE - REINFORCING PLACEMENT

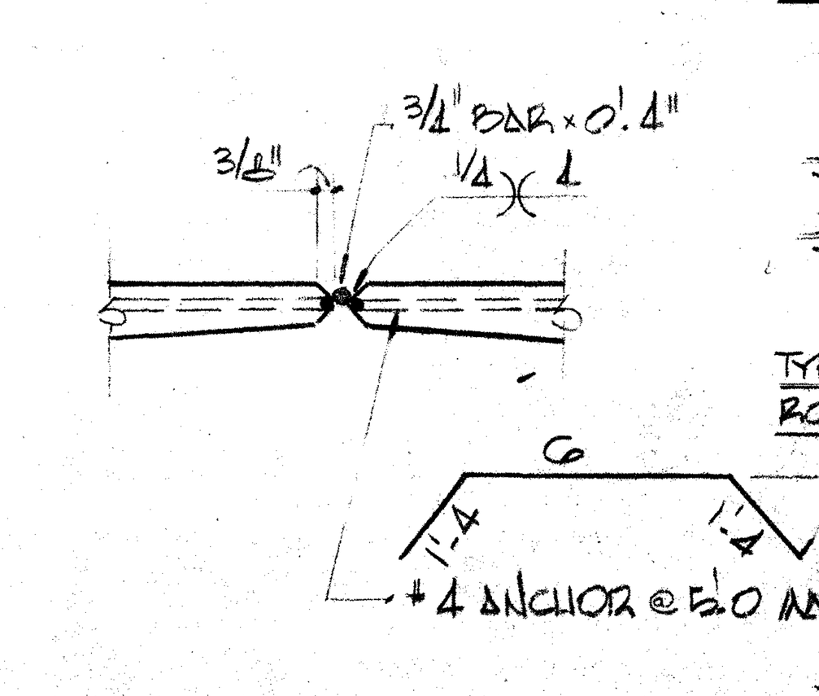
NO SCALE

NOTE: AT ALL OTHER OPNGS. IN TEES PROVIDE #5 BARS ALL AROUND OPNG. (ADD'L)



TYPICAL REINF. FOR CUT OUT TEE FLANGE

NO SCALE



TYPICAL TEE - FLANGE TO FLANGE CONNECTION

NO SCALE

TYPICAL PRE-STRESSED BOX GIRDER

NO SCALE

SEE SPECIFICATIONS FOR WATERPROOFING OF ALL WALLS BELOW GRADE FOR UNITS A, B, C, & D

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TITLE TYPICAL DETAILS

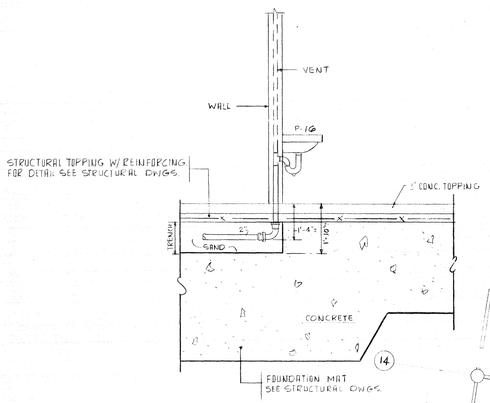
SCALE - NONE

DATE - AUG. 7, 1972

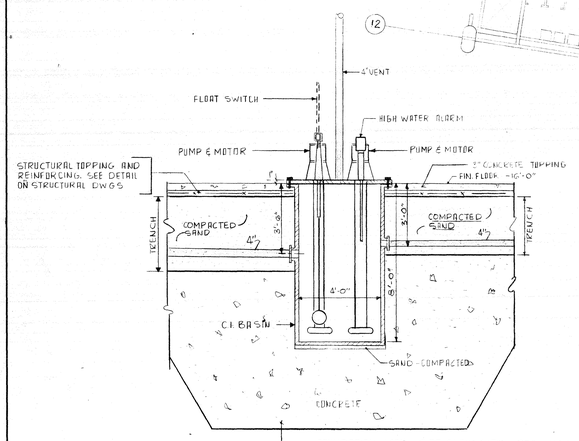
DRAWN BY - DLL

SHEET

S29



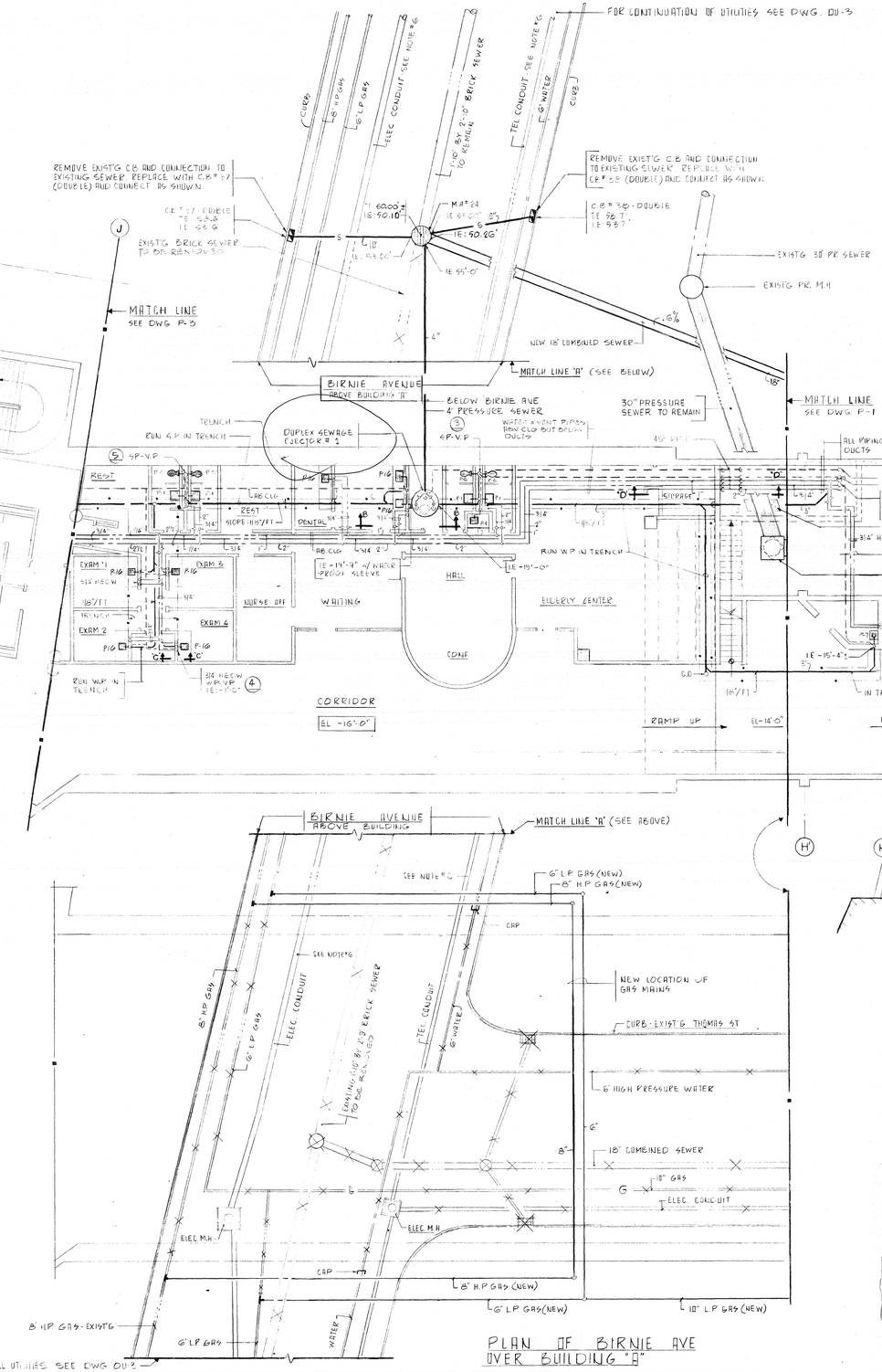
SECTION "C-C" SCALE: 1/8"=1'-0"

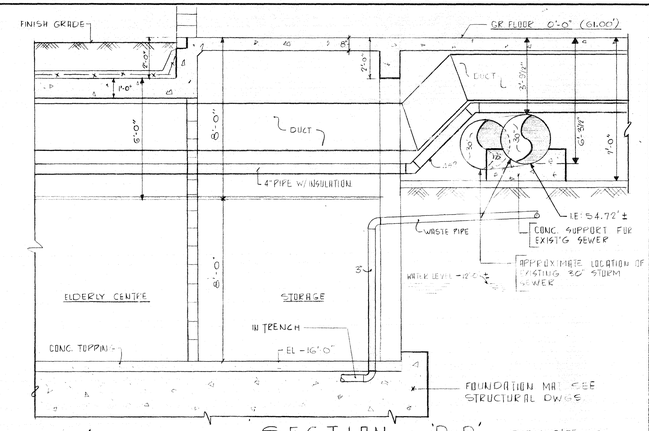


SECTION 'B-B' SCALE 3/8"=1'-0"

GENERAL NOTES

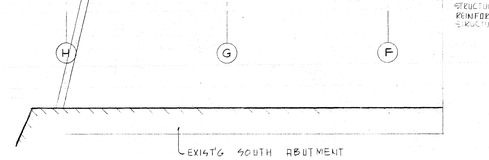
1. FOR ALL SYMBOLS SEE DWG. P-16
2. FOR RISER DIAG. SEE DWG. P-14
3. FOR ALL I.E. NOT SHOWN SEE DWGS. U-2 & U-3
4. CONTRACTOR TO VERIFY LOCATION OF ALL EXIST'G UTILITIES BEFORE PROCEEDING W/ CONSTRUCTION.
5. FOR EXACT SIZE OF TRENCH INSIDE BUILDING SEE STRUCTURAL DWGS.
6. FOR THE STATUS OF EXIST'G ELEC. & TEL. CONDUIT UNDER BIRNIE AVE SEE ELECTRICAL SITE DWGS.
7. ALL ELEVATIONS ARE BASED ON SEA LEVEL EL.
8. FOR SEWAGE EJECTOR SCHEDULE SEE DWG. P-15.
9. RUN WASTE AT 1/4"/FT SLOPE UNLESS NOTED OTHERWISE.
10. ALL TRENCHES (INSIDE) TO BE FILLED W/ SAND. FOR DETAIL SEE STRUCTURAL DWGS. WASTE PIPE TO BE EMBEDDED IN SAND AND SLOPED AS SHOWN



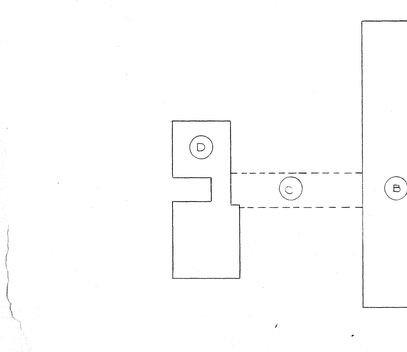


SECTION 'D-D' SCALE 3/8" = 1'-0"

PLAN OF BIRNIE AVE OVER BUILDING "A"



SECTION 'A-A' SCALE 3/8"=1'-0"



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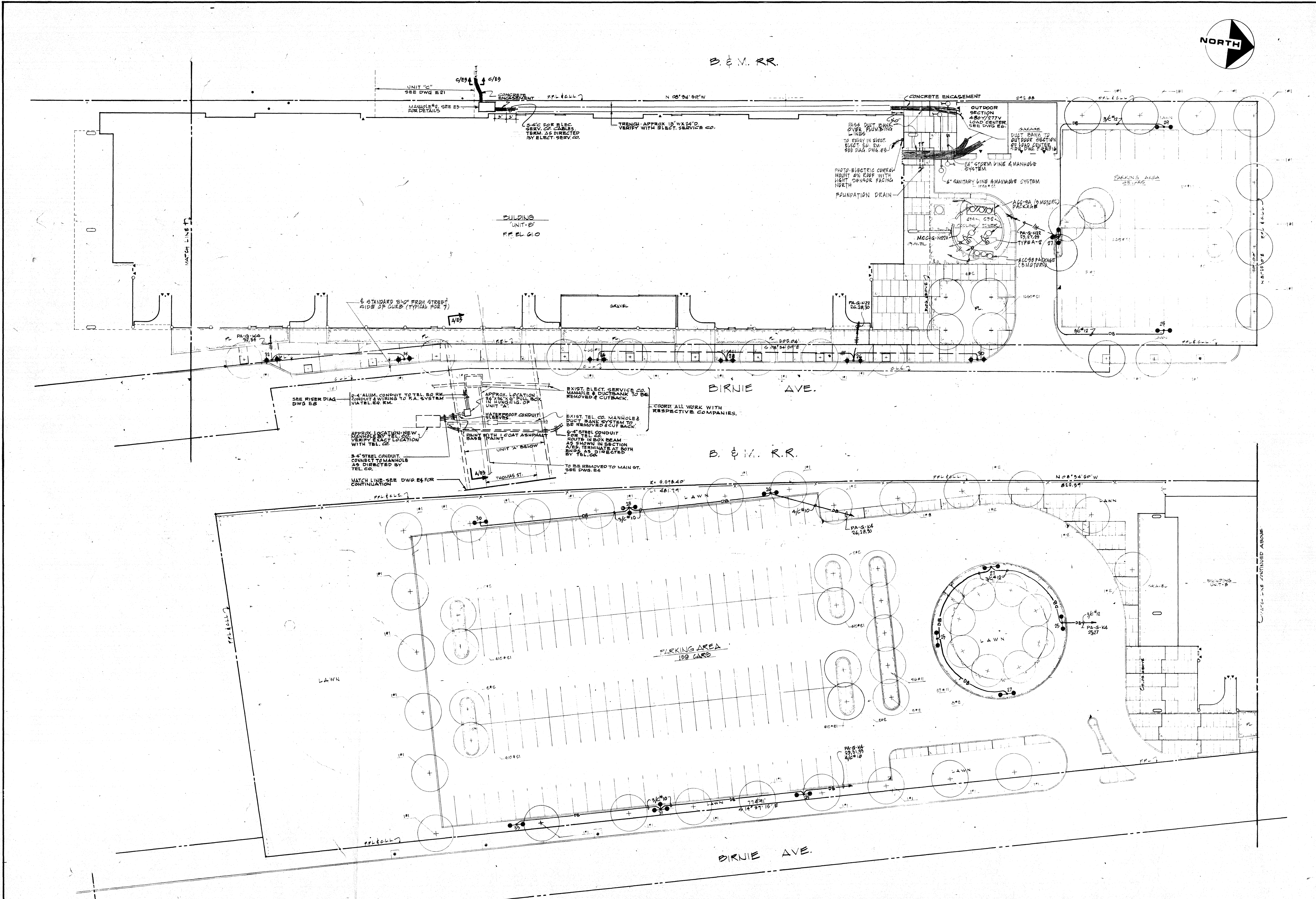
TITLE

UNIT A
MALL LEVEL PLAN

SCALE 1/8" = 1'-0"
DATE AUG. 7, 1972
DRAWN BY S. M.
SHEET

P2



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TITLE SITE PLAN- SHEET Nº 2

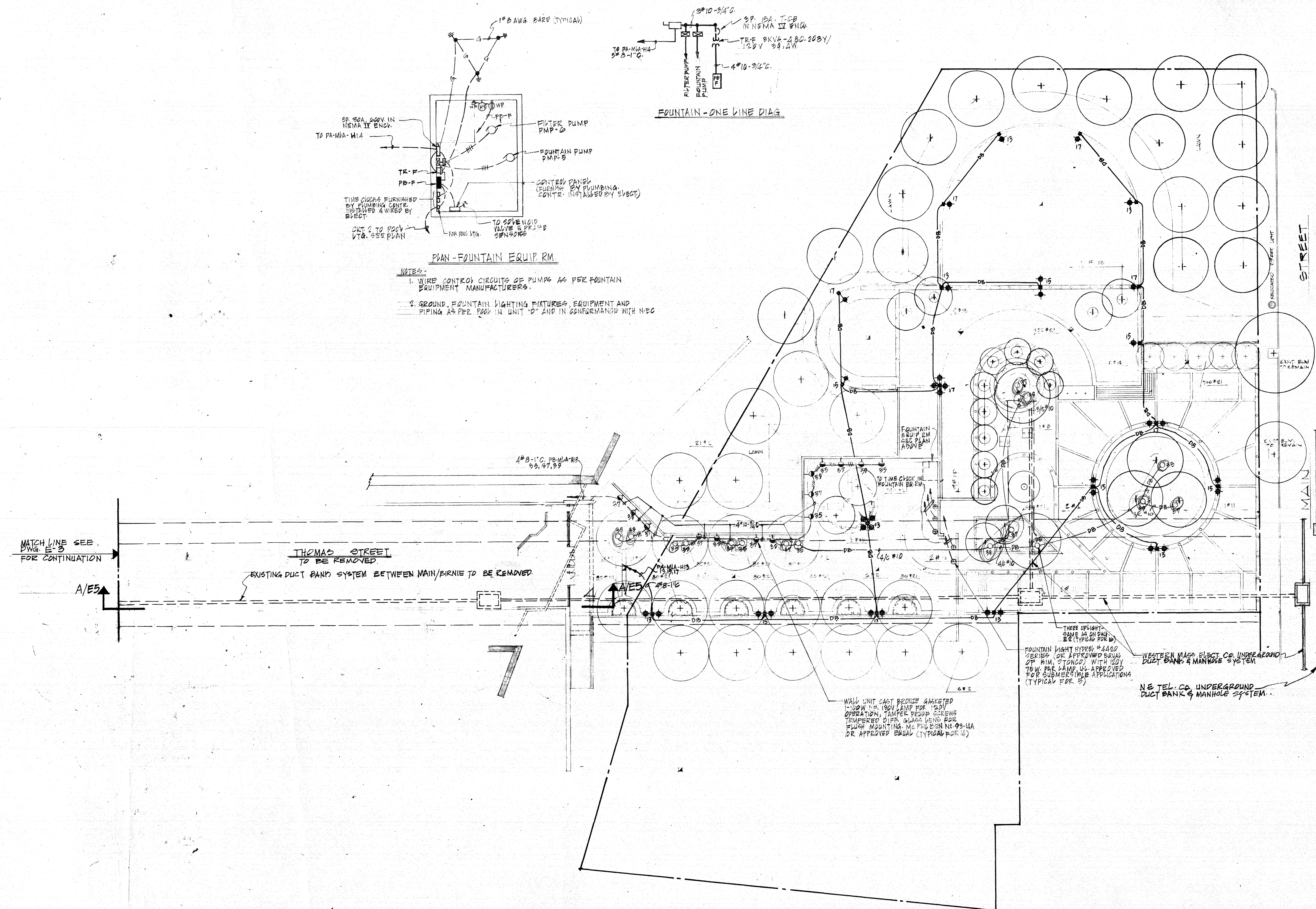
SCALE 1" = 20'-0"

DATE AUG 7, 1972

DRAWN BY: JP

SHEET

E3



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TITLE
SITE PLAN
SHEET No 3

SCALE 1" = 20'-0"

DATE AUG. 7, 1972

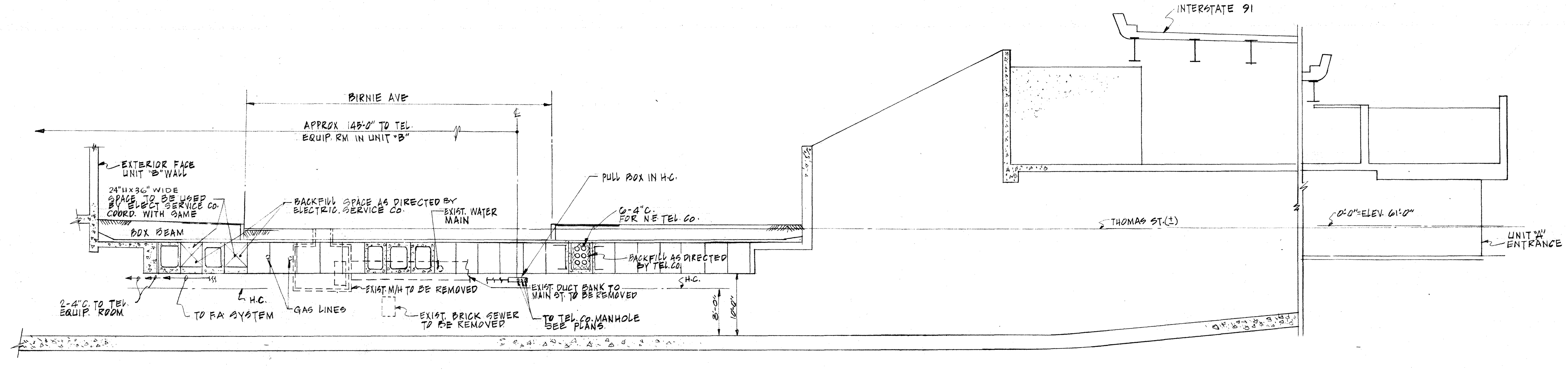
DRAWN BY P

SHEET

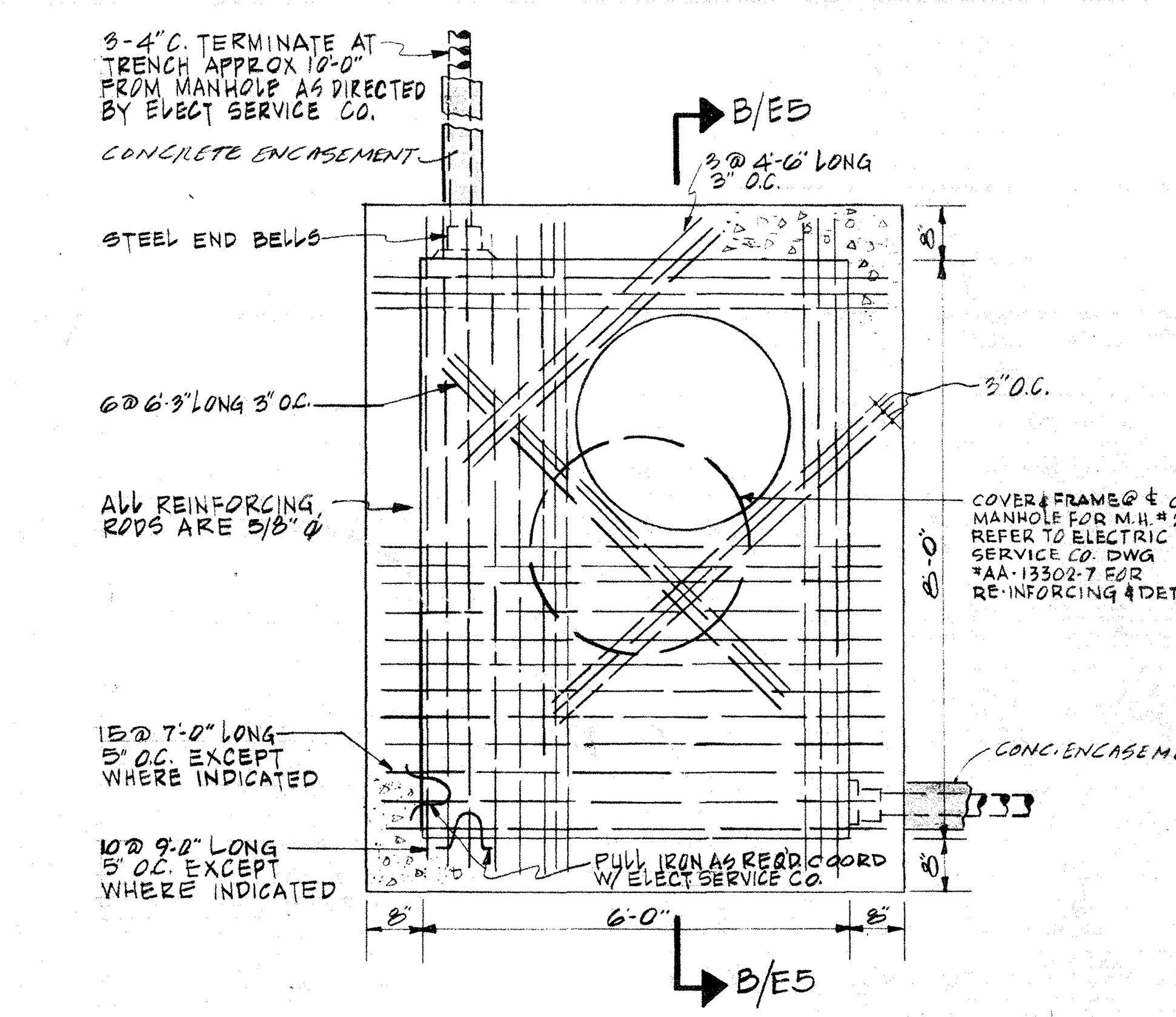
E4

GENERAL NOTES

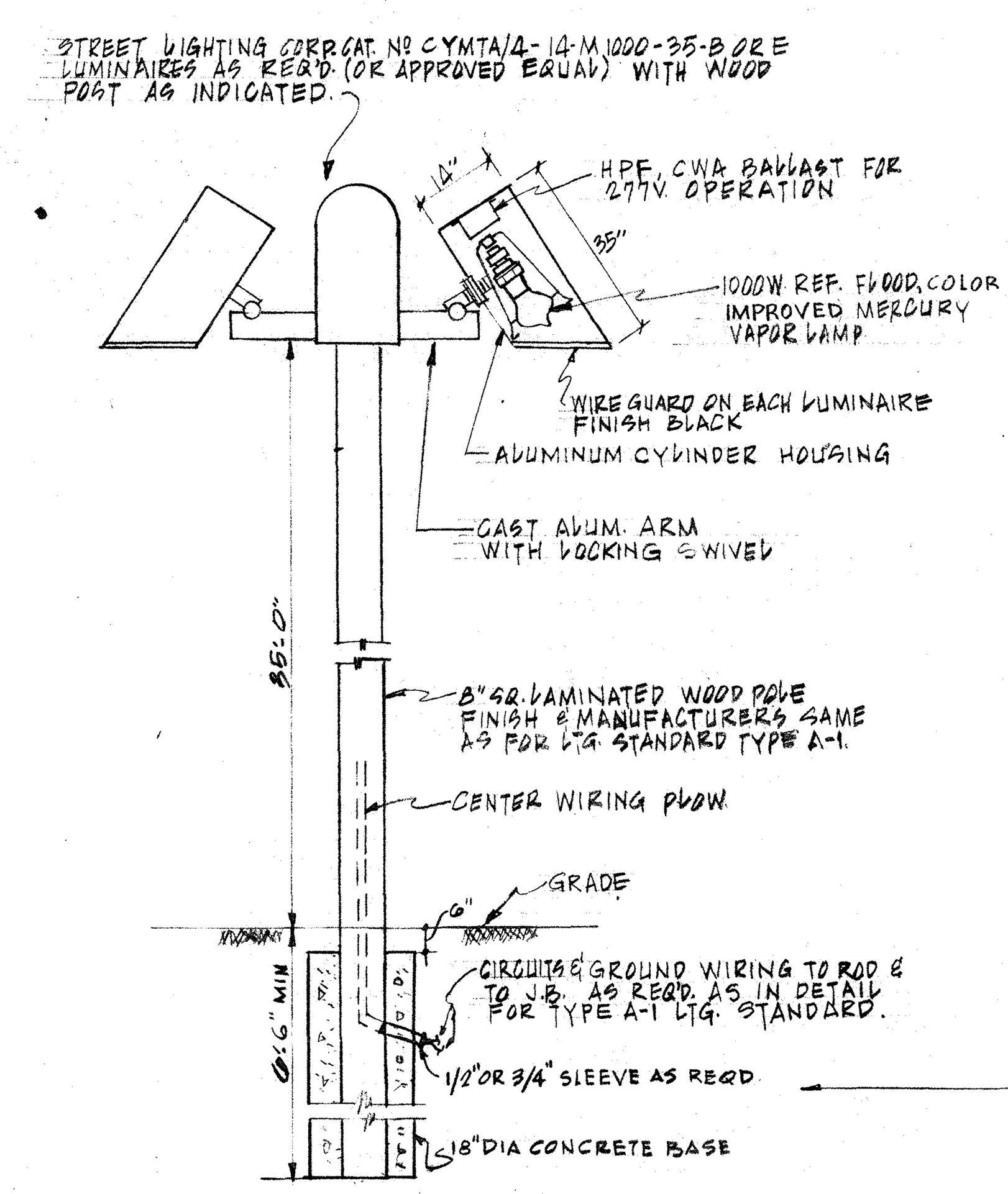
1. SITE CONCRETE WORK TO BE PROVIDED UNDER SITE IMPROVEMENT SECTION.
2. SITE MASONRY WORK TO BE PROVIDED UNDER MASONRY SECTION.



SECTION A-A
SCALE: 1/8" = 1'-0"
(REF. DWGS: E3, E4)

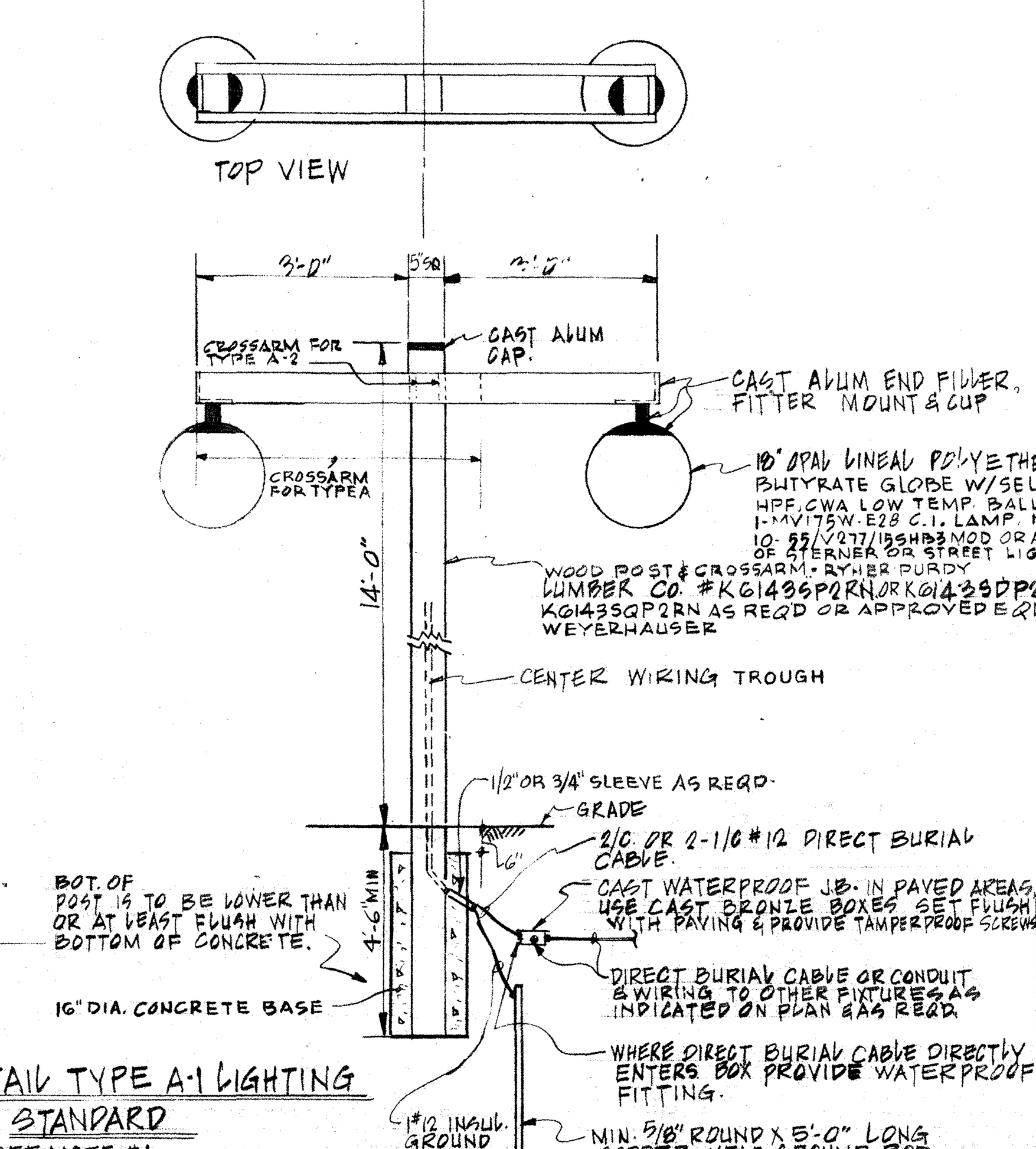


PLAN - MANHOLE #1
(MANHOLE #2 IDENTICAL EXCEPT FOR COVER & DUCT BANK LOCATIONS. REFER TO PLANS FOR ORIENTATIONS.)
NOT TO SCALE

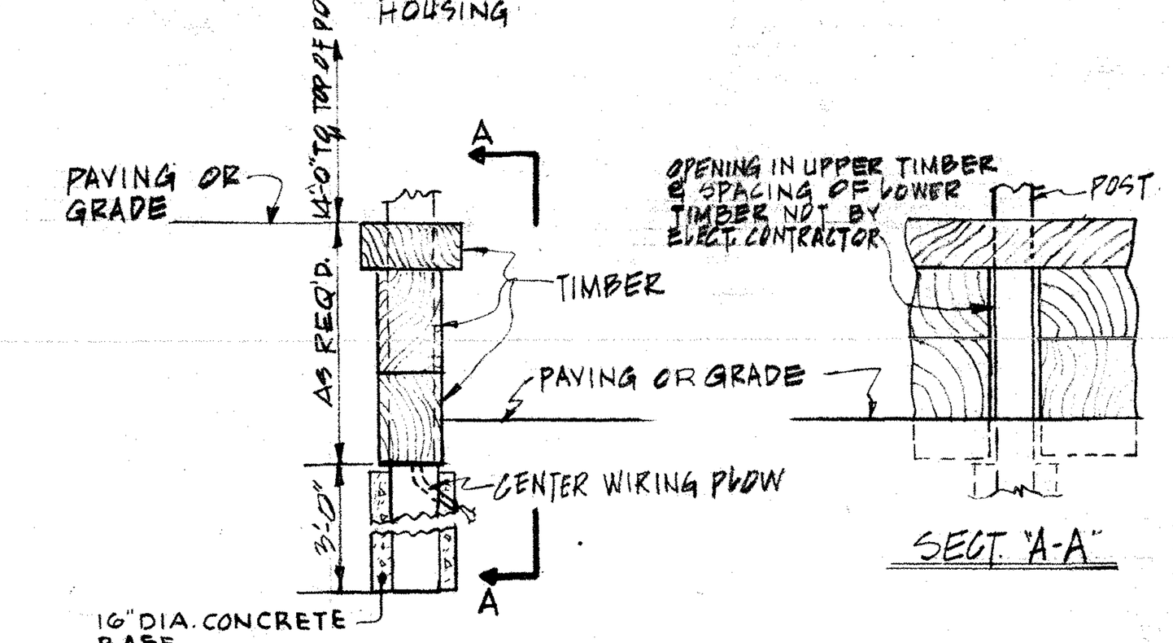


DETAIL - TYPE B-1 LIGHTING STANDARD.
SCALE: 1/2" = 1'-0" (APPROX)

NOTES -
1. TYPE B LIGHTING STANDARD SAME AS TYPE B-1 EXCEPT OMIT CENTER LUMINAIRE & ARM.
2. FINISH ALL ALUMINUM PARTS ANODIZED BLACK
3. SEE NOTES 3, 4, 5 & 6 AT DETAIL FOR TYPE A-1 LIGHTING STANDARD.

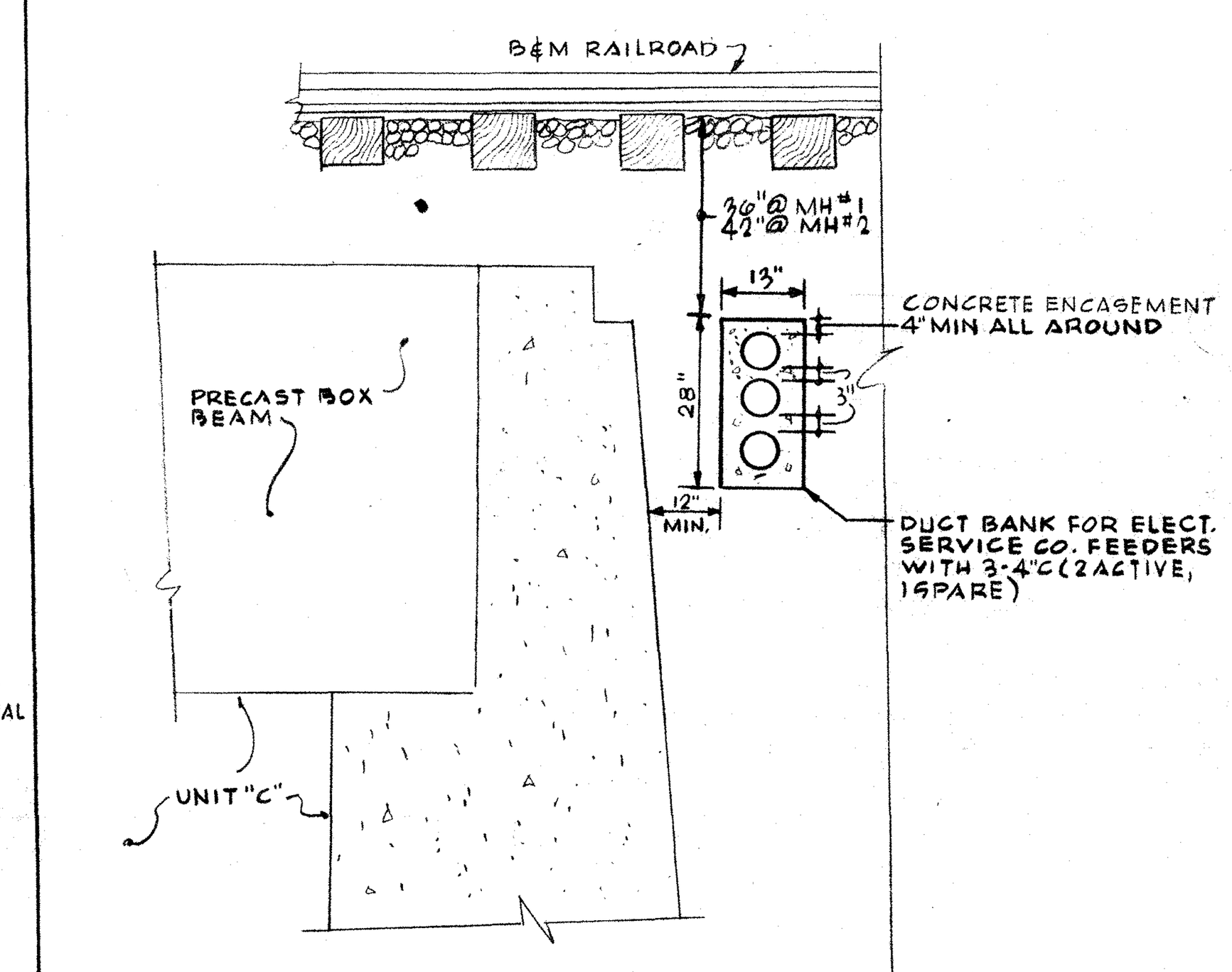


DETAIL TYPE A-1 LIGHTING STANDARD
SEE NOTE #1
SCALE: 1/2" = 1'-0"

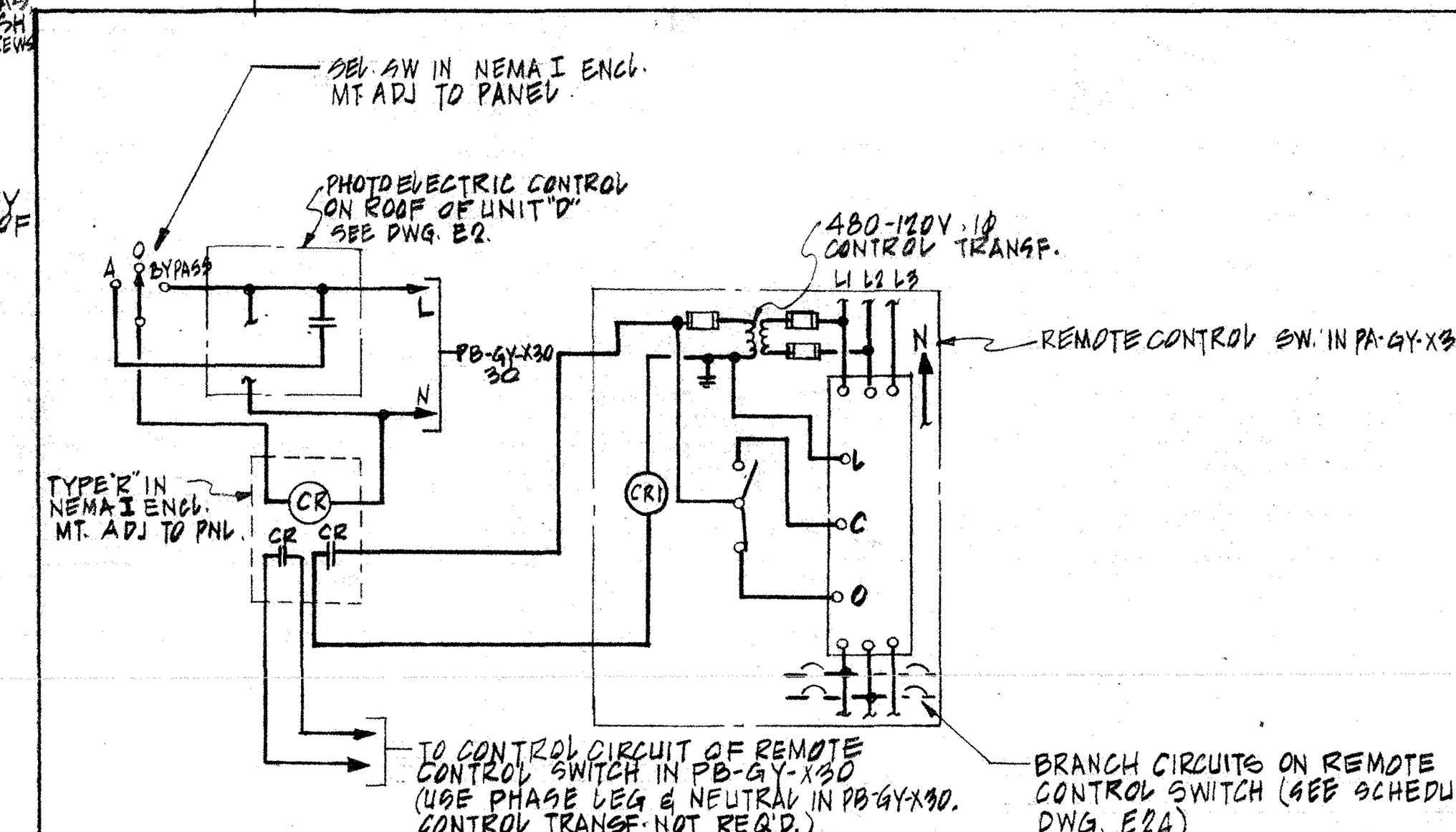


MOUNTING DETAIL IN TIMBER
SEE DWGS L1 THRU L22 FOR APPLICABLE AREAS. SEE DETAIL 6/L17.

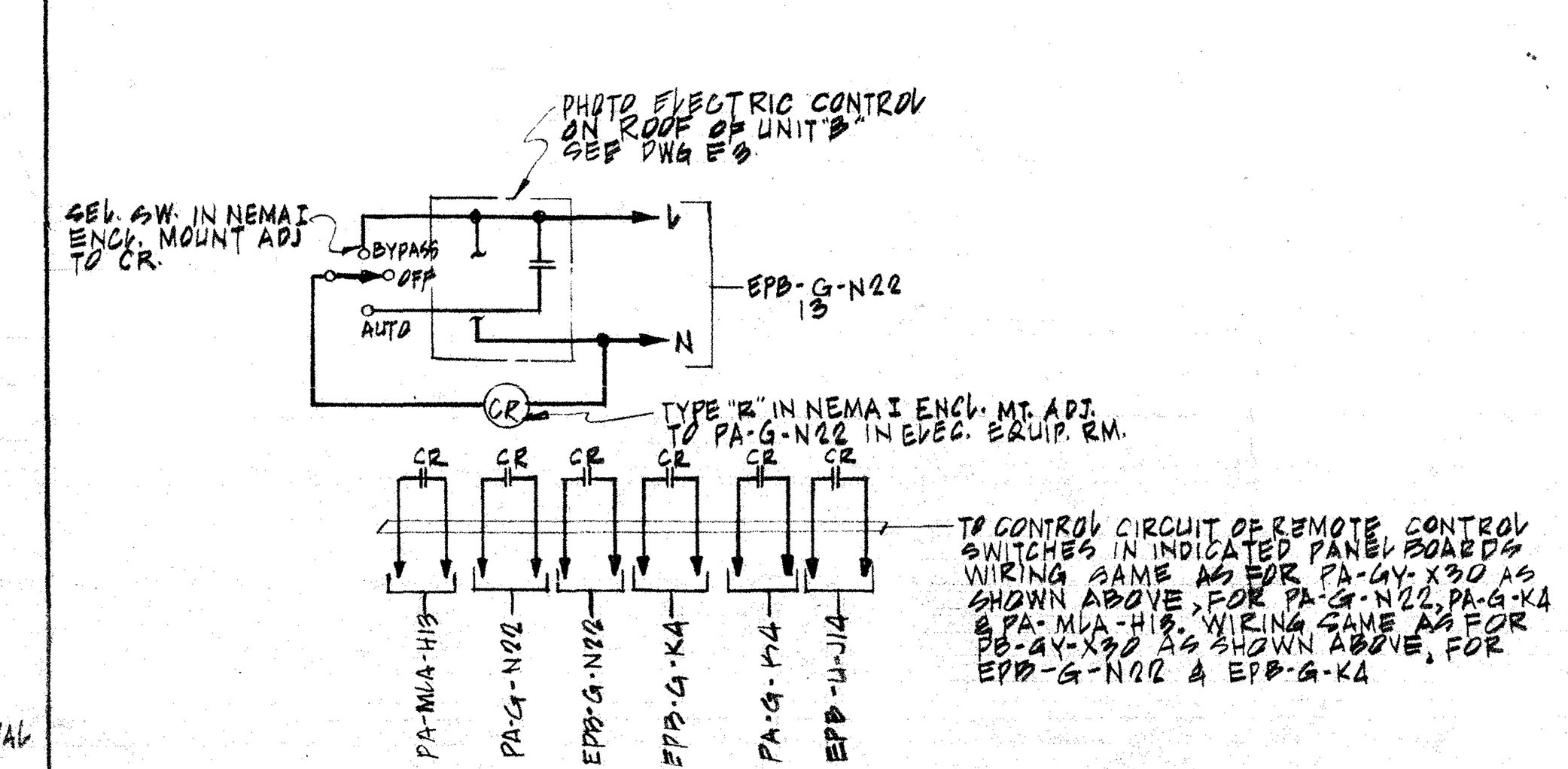
NOTES:-
1. TYPE A-1 LIGHTING STANDARD SHOWN. TYPE "A" TO BE THE SAME EXCEPT WITH SINGLE CROSSARM & LUMINAIRE. TYPE A-2 TO BE THE SAME EXCEPT QUADRUPLE CROSSARM & FOUR LUMINAIRES.
2. FINISH ALL ALUMINUM PARTS ANODIZED BLACK. PROVIDE CROSSARM END FITTING AND NECESSARY LUMINAIRE & CROSS ARM MOUNTING HARDWARE.
3. ENTIRE UNIT TO BE SUITABLE FOR OUTDOOR USE AND IS TO BE CAPABLE OF WITHSTANDING A 100 MPH WIND.
4. REFER TO DWGS. L1 THRU L22 FOR EXACT FIXTURE LOCATIONS AND BASE CONDITIONS.
5. EQUIP EACH LUMINAIRE WITH A FUSE BLOCK & FUSE AND A GROUND TERMINAL FOR INCOMING GROUND CONDUCTOR.
6. PROVIDE 3"X3"X8" DEEP CONCRETE WITH FLUSH 1/2" DIA. MARKER SCREW OVER ALL JUNCTION BOXES INSTALLED BELOW GRADE.



SECTION C-C
(REF. DWGS: E2, E3, E21)
NOT TO SCALE

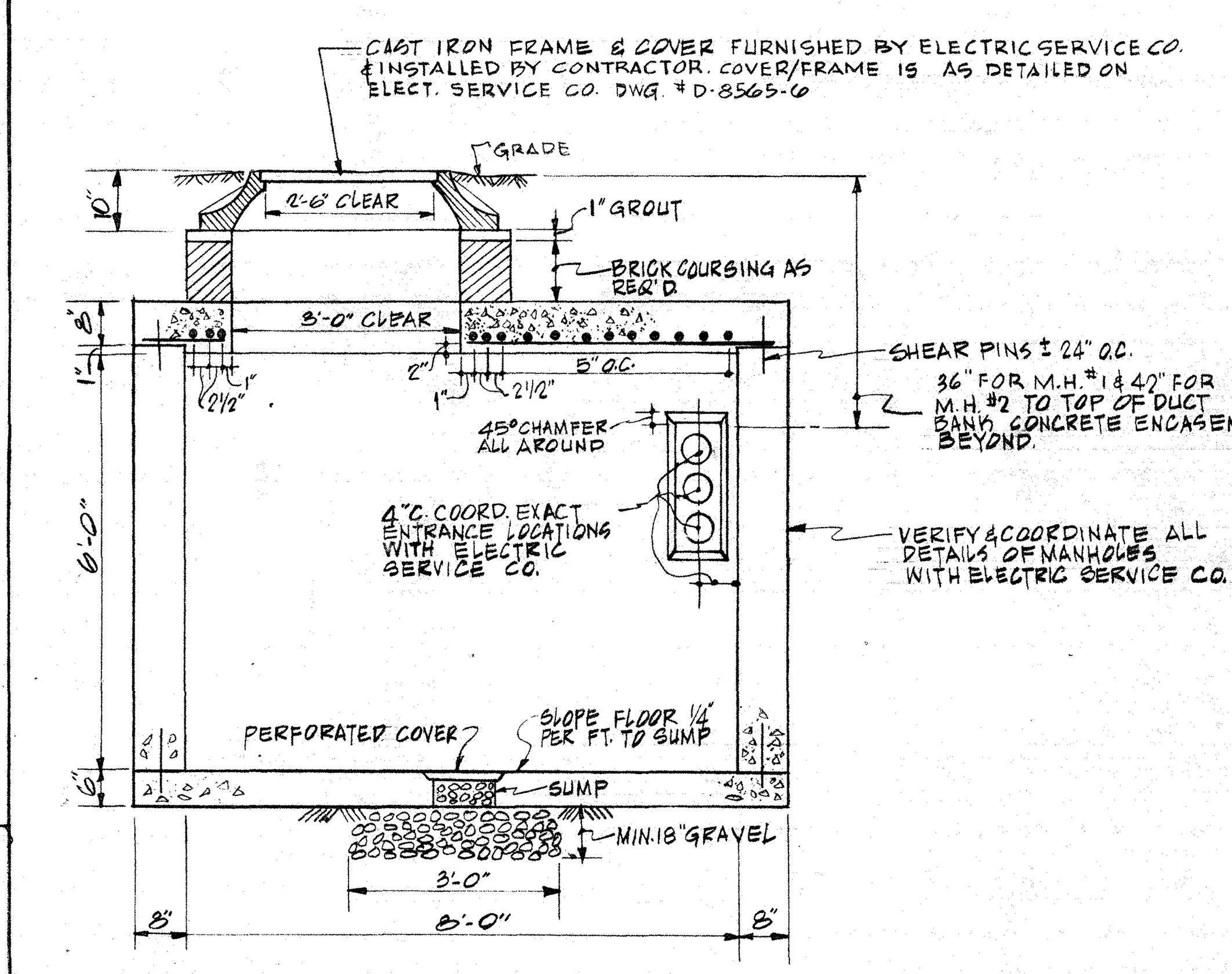


UNIT D



UNITS A & B

SITE LIGHTING CONTROL-WIRING DIAGRAM
ALL REMOTE CONTROL SWITCHES ARE FOR 2 WIRE RELAY CONTROL



SECTION "B-B"

NOTES -
1. REFER TO L1 THRU L22 FOR EXACT LOCATIONS OF LIGHTING FIXTURES AND FOR FINAL GRADES & ELEVATIONS

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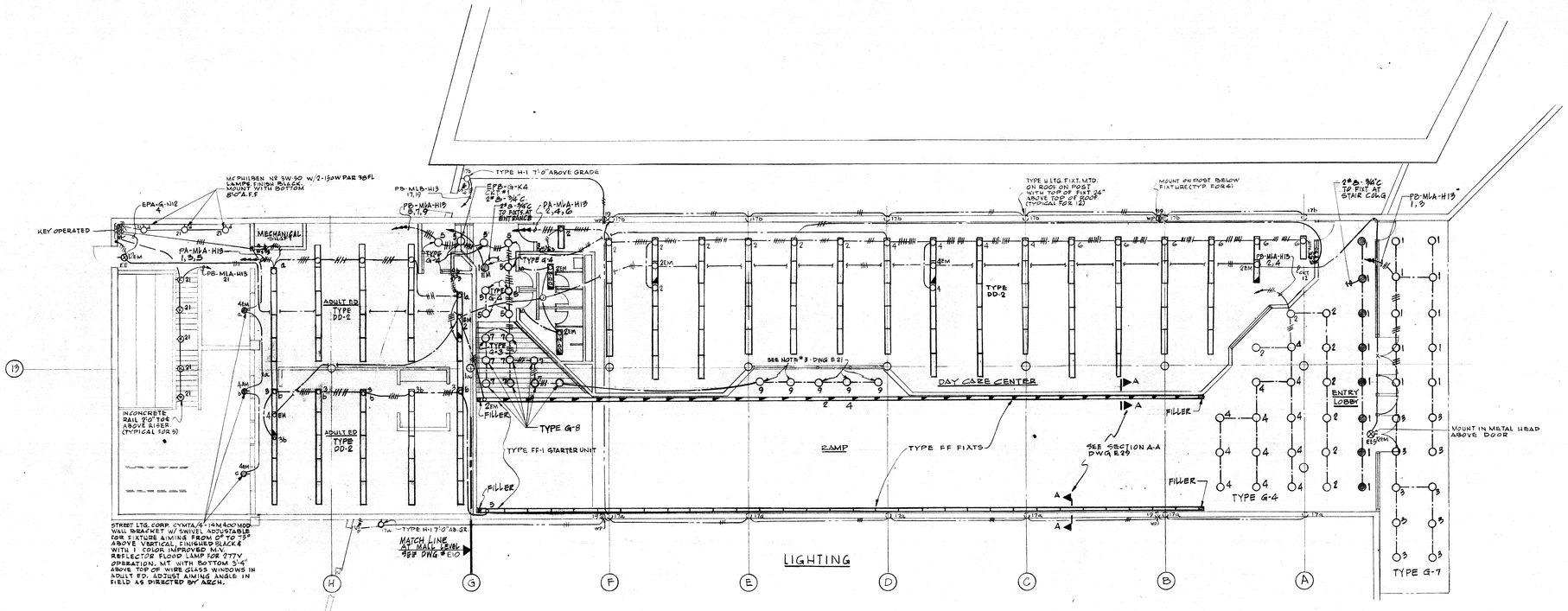
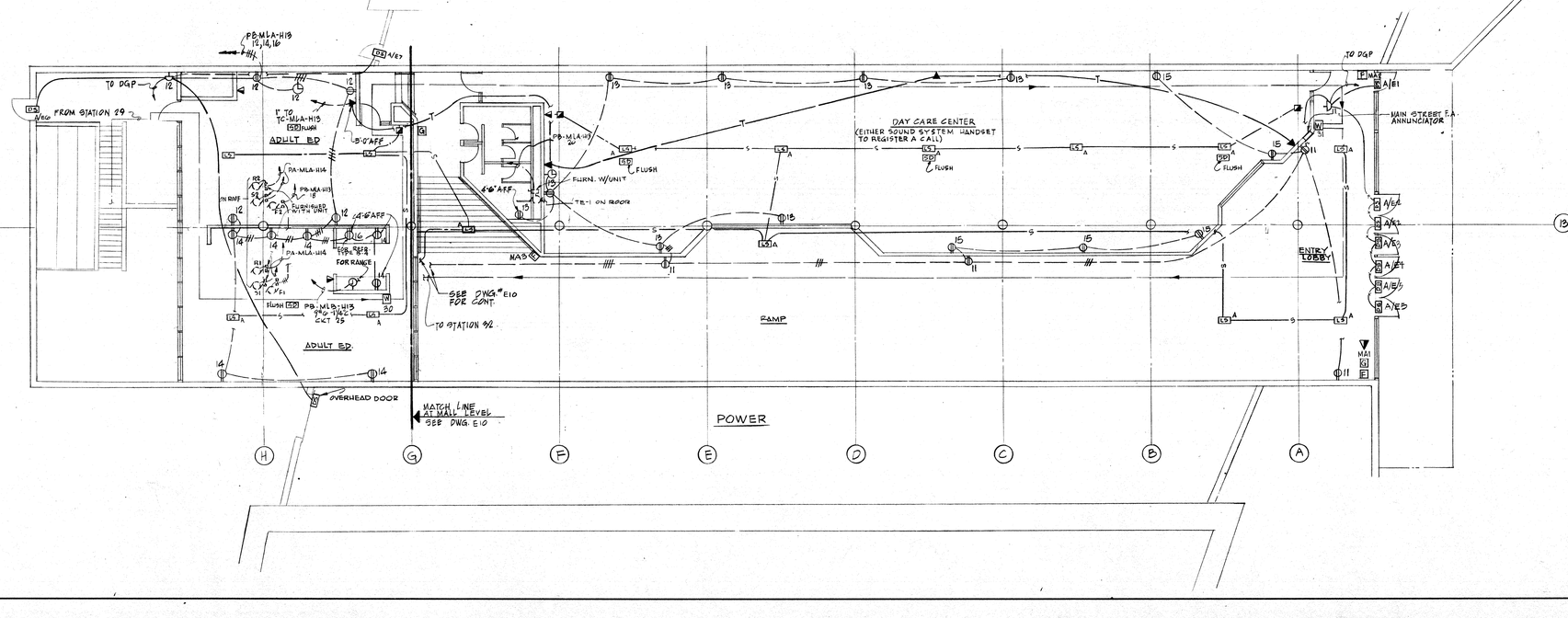
TITLE
SITE DETAILS

SCALE AS NOTED
DATE AUG. 7, 1972
DRAWN BY RCR
SHEET

E5





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TITLE
UNIT A - GROUND LEVEL PLAN
LIGHTING AND POWER

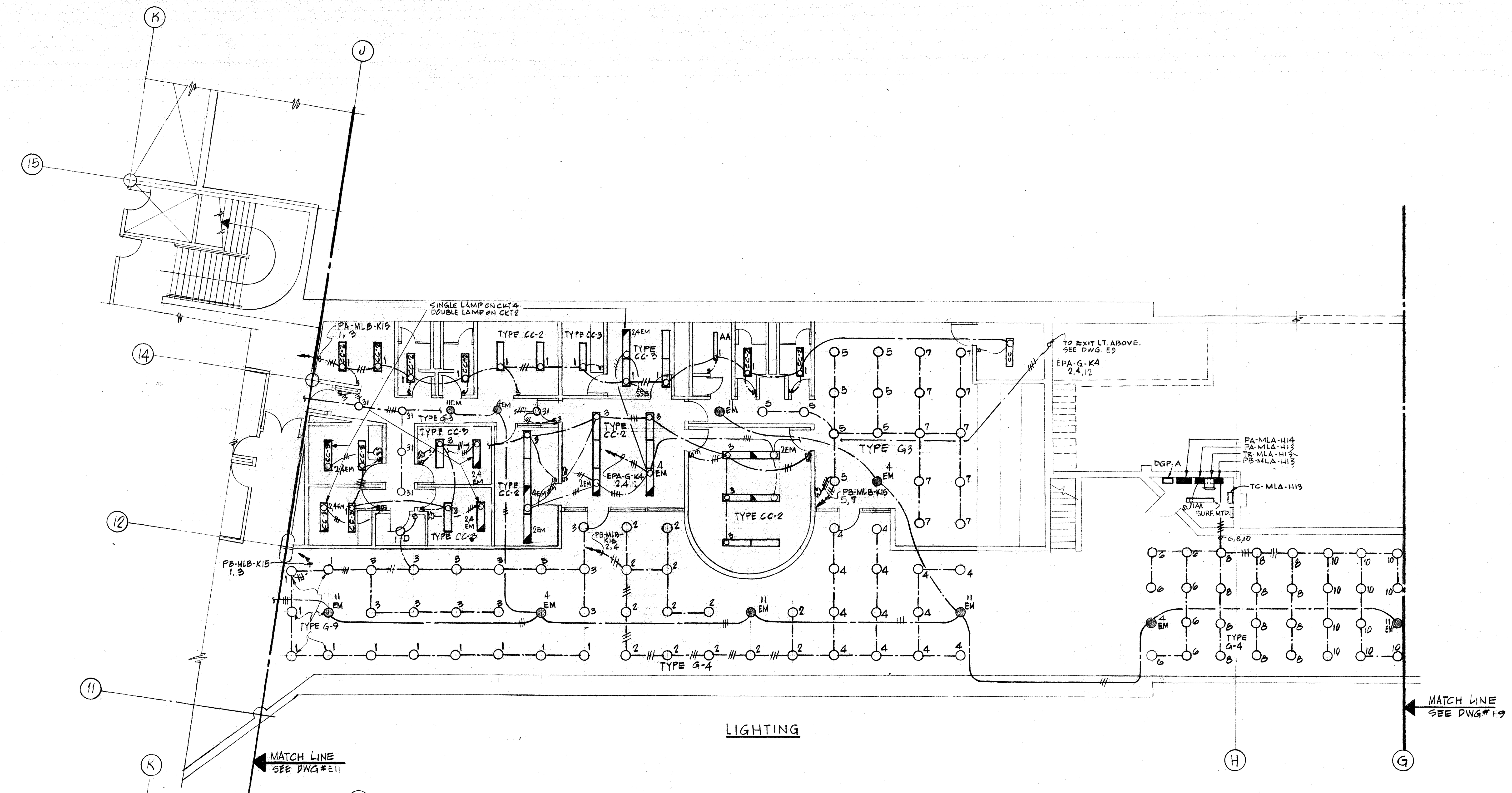
SCALE 1/8"-1'-0"

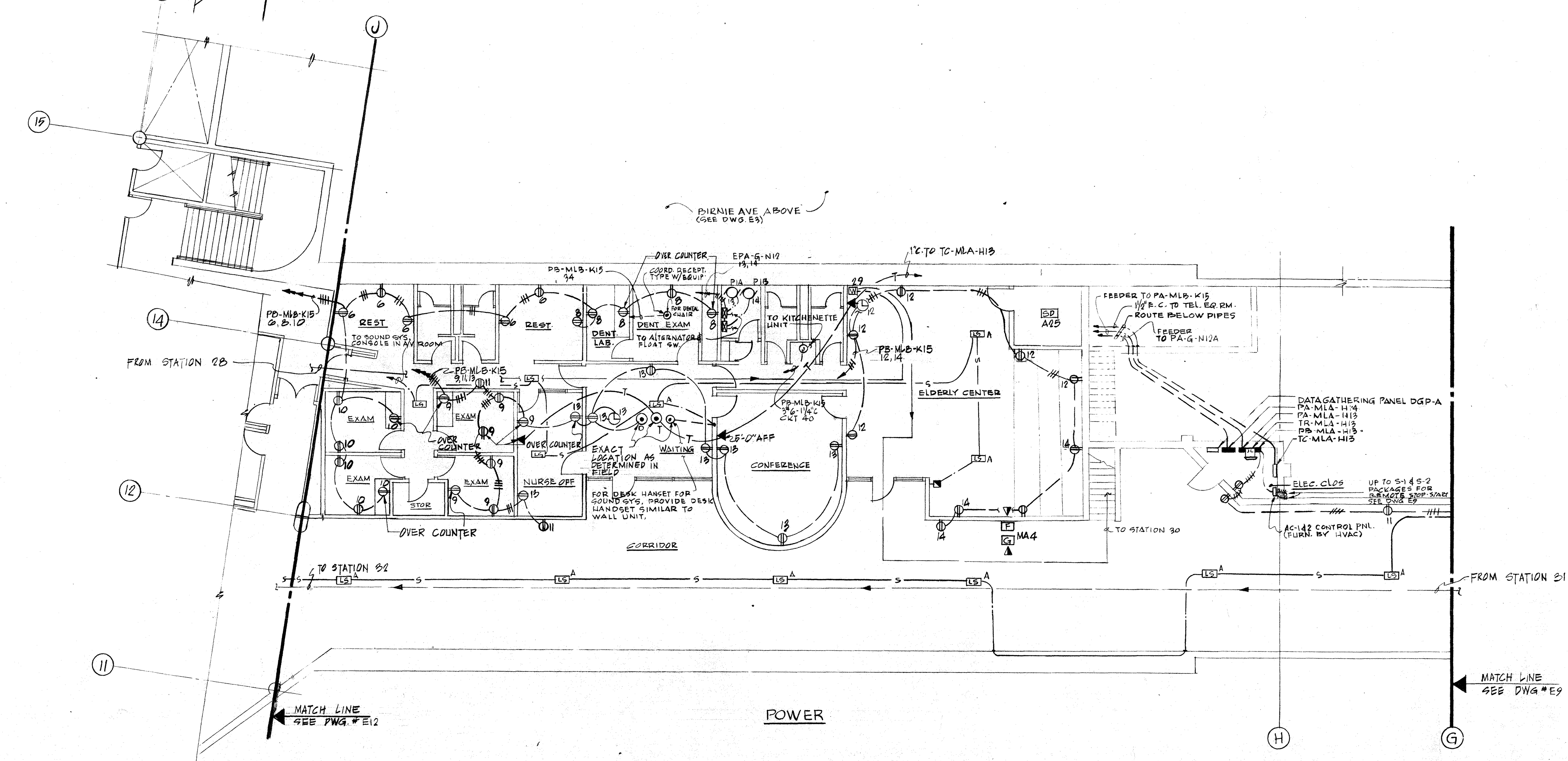
DATE AUG 7 1972

DRAWN BY RGR

SHEET

E 9





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TITLE UNIT A-MALL LEVEL PLAN LIGHTING AND POWER

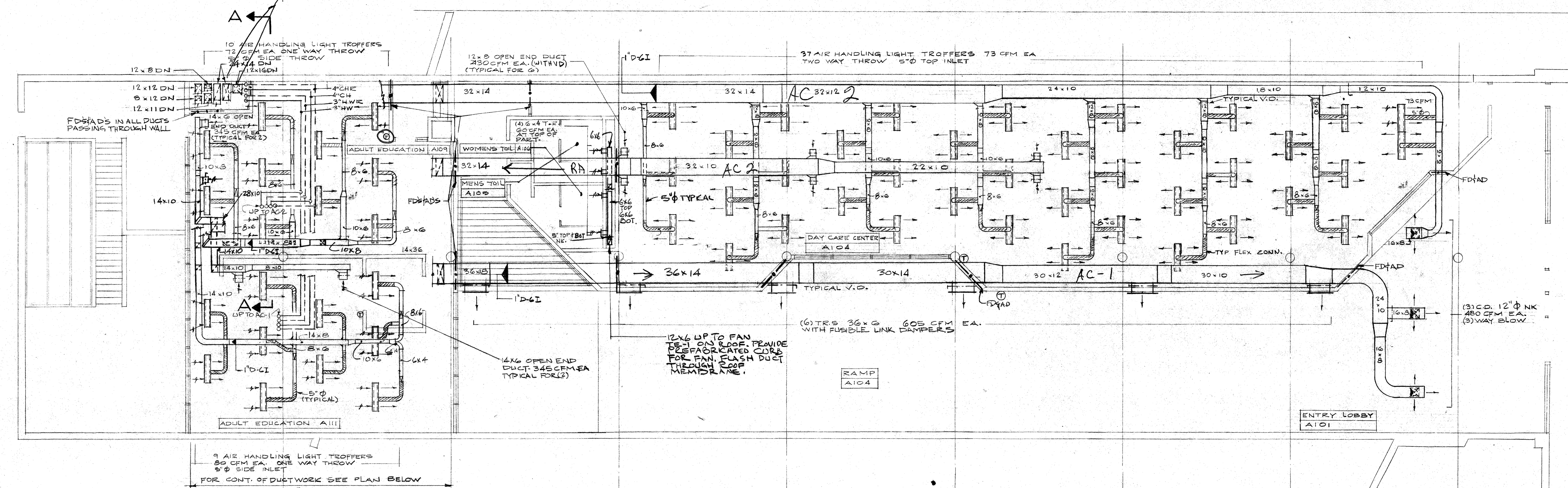
SCALE 1/8" = 1'-0"

DATE AUG. 7, 1972

DRAWN BY RCR

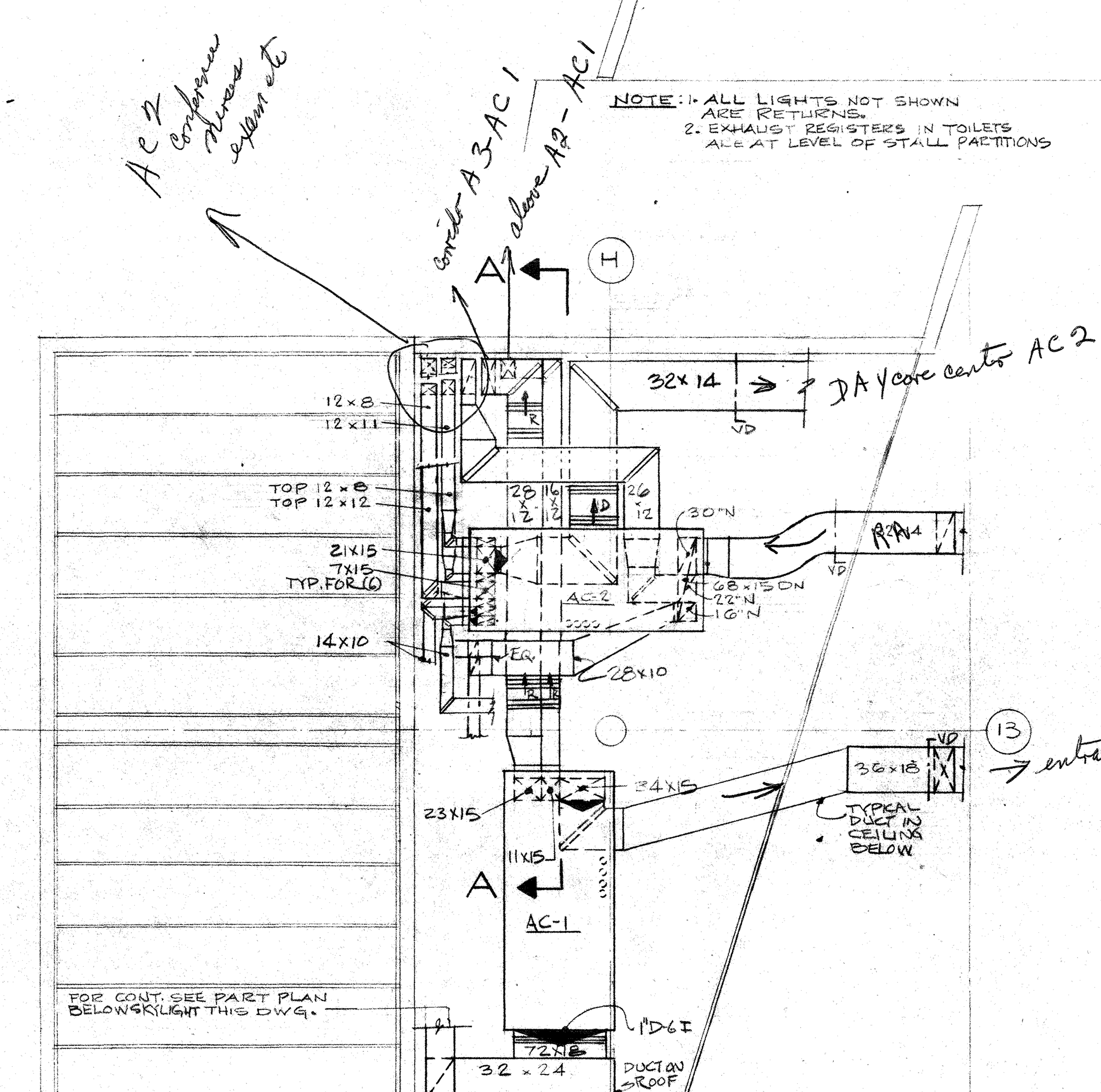
SHEET

E10



NOTE: 1. ALL LIGHTS NOT SHOWN ARE RETURNS. 2. EXHAUST REGISTERS IN TOILETS ALL AT LEVEL OF STALL PARTITIONS.

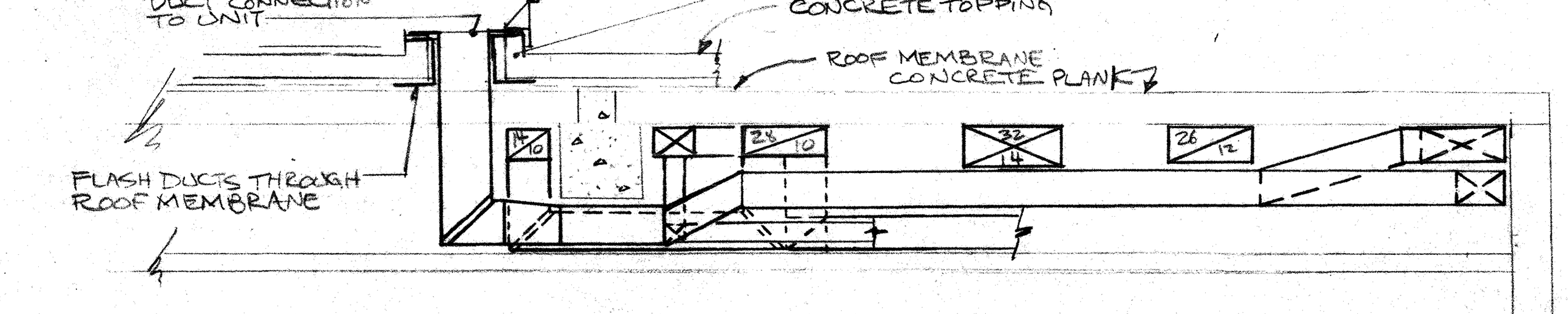
UNIT "A" GROUND LEVEL PLAN



NOTE

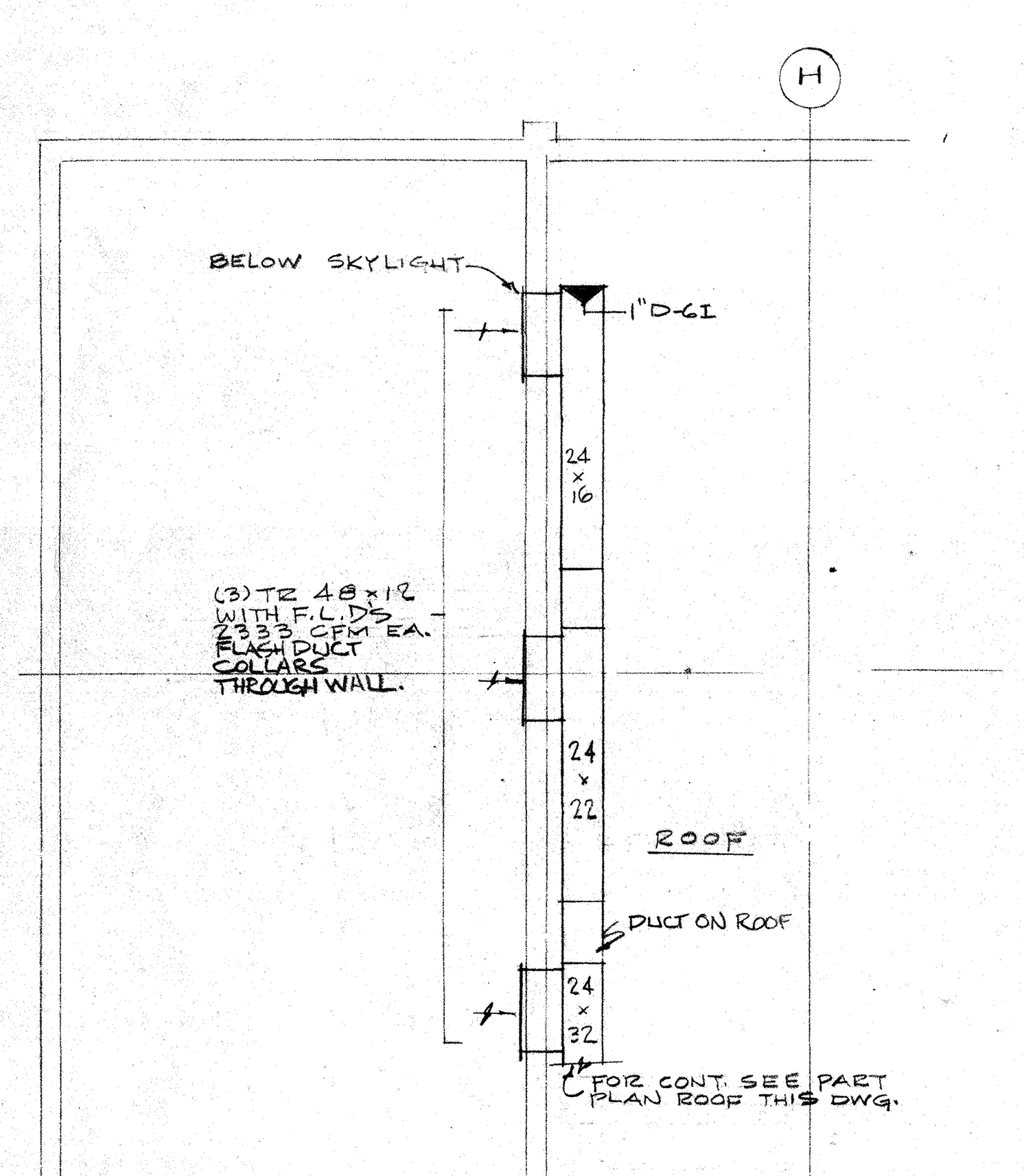
1. RUN SUPPLY DUCTWORK AND AC-2 RETURN IN HUNG CEILING BELOW. FOR CONTINUATION SEE PLAN ABOVE.
2. PROVIDE FLEXIBLE CONNECTIONS WHERE DUCTS CONNECT TO UNITS.
3. MOUNT UNITS AC-1 AND AC-2 ON CONCRETE ROOF CURBS. GASKET UNIT AT CONCRETE CURB AND AT DUCT CONNECTIONS. FLASH DUCTS AND PIPES FROM UNIT WHERE ROOF MEMBRANE IS PENETRATED. FLASH DUCT INTO CURB.

PART PLAN - ROOF



SECTION A-A

1/4"=1'-0"



PART PLAN - BELOW SKYLIGHT

GENERAL NOTES - APPLICABLE TO DRAWINGS H1 THROUGH H20

1. ALL AIR OUTLETS ARE TO BE OF THE FOLLOWING TYPES EXCEPT AS NOTED ON PLANS:

	TYPE
a. SUPPLY OUTLETS:	
(1) AIR HANDLING LIGHT TROFFERS	D-50
(2) RECTANGULAR NECK CR'S WITH INDICATED DISCHARGE DIRECTION	R-150
(3) ROUND NECK CEILING DIFFUSERS:	
(a) SQUARE FRAME - ACOUSTIC TILE CEILING	DS-11
(b) SQUARE FRAME - METAL PAN CEILING	DS-10
(c) ROUND FRAME -	DC-1
(4) SUPPLY REGISTERS	R-100
(5) VARIABLE VOLUME CONTROL UNITS	D-73
(6) LINEAR DIFFUSERS	LD-25
(7) RECTANGULAR NECK OR SQ. NECK CD'S	DR-21
b. RETURN OUTLETS:	
(1) CEILING REGISTERS IN TOILETS	R-352
(2) ALL OTHER CEILING REGISTERS	R-350
(3) WALL REGISTERS	R-317
(4) WALL GRILLES	G-317
(5) DUCT MOUNTED REGISTERS	R-310
(6) LINEAR DIFFUSERS	LD-25

2. ALL TR'S IN TOILET WALLS TO BE LOCATED WITH BOTTOM OF REGISTER AT SAME ELEVATION AS THE TOP OF THE TOILET DIVIDER PARTITIONS.
3. FOR EXACT LOCATIONS OF AIR OUTLETS SEE REFLECTED CEILING PLANS.
4. THE CONTRACTOR IS RESPONSIBLE FOR FILING WITH AND RECEIVING APPROVAL TO CONSTRUCT FROM THE PIONEER VALLEY AIR POLLUTION CONTROL BOARD BEFORE COMMENCING WITH THE CONSTRUCTION OF THE BOILER PLANT. THE ARCHITECT WILL FURNISH SUCH DRAWINGS AS REQUIRED. THE CONTRACTOR MUST OBTAIN THE REQUIRED OPERATING DATA FROM THE MANUFACTURER HE PROPOSES TO USE. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL OPERATING PERMITS THE OWNER WILL REQUIRE.

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TITLE UNIT "A" GROUND LEVEL PLAN

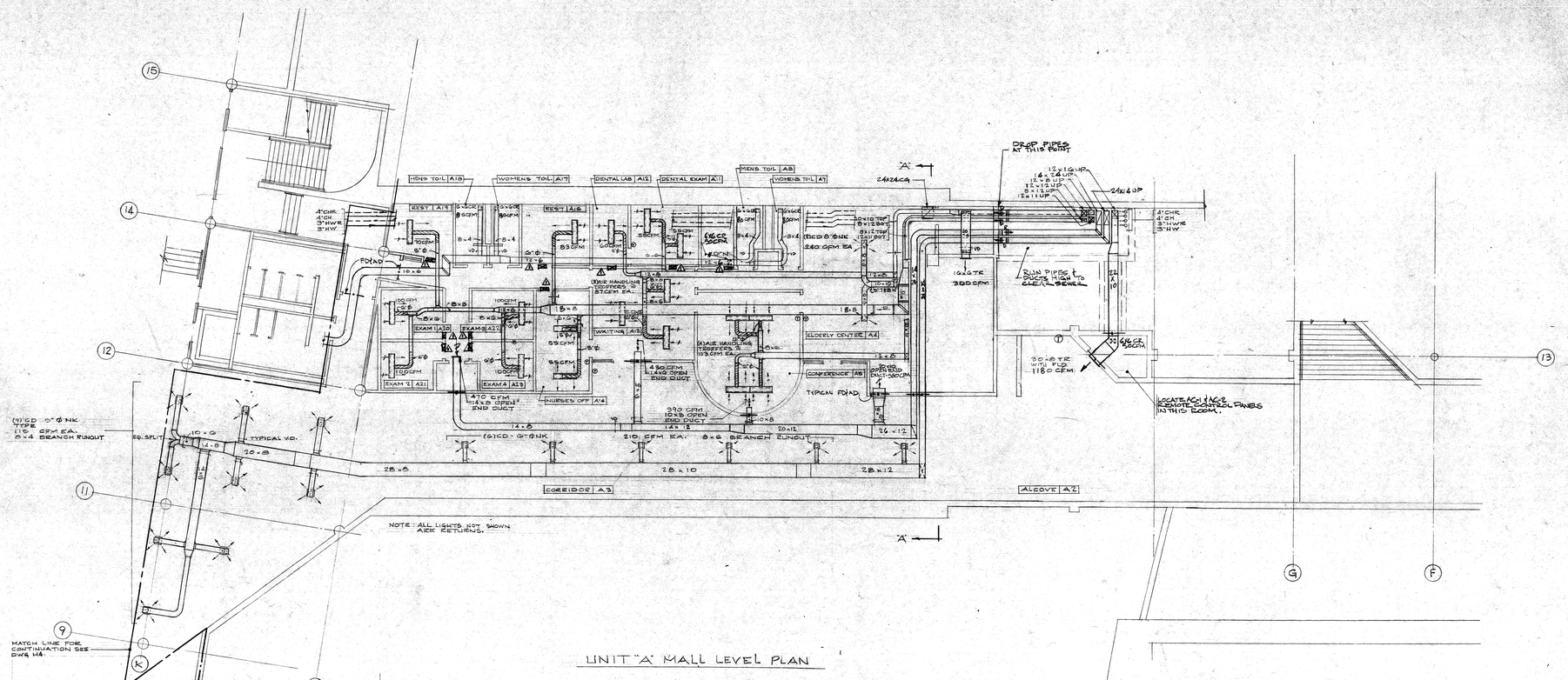
SCALE 1/8"=1'-0"

DATE AUG. 7, 1972

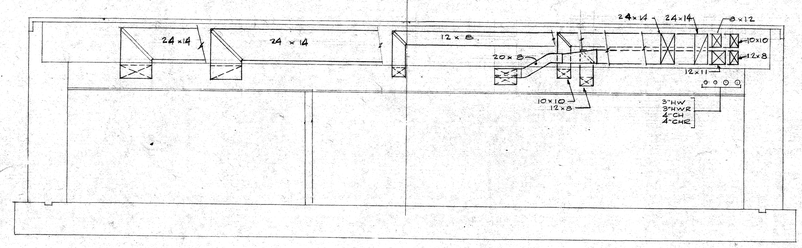
DRAWN BY S.C.

SHEET

H3



UNIT "A" MALL LEVEL PLAN



SECTION "A-A"
SCALE "1/4"=1'-0"

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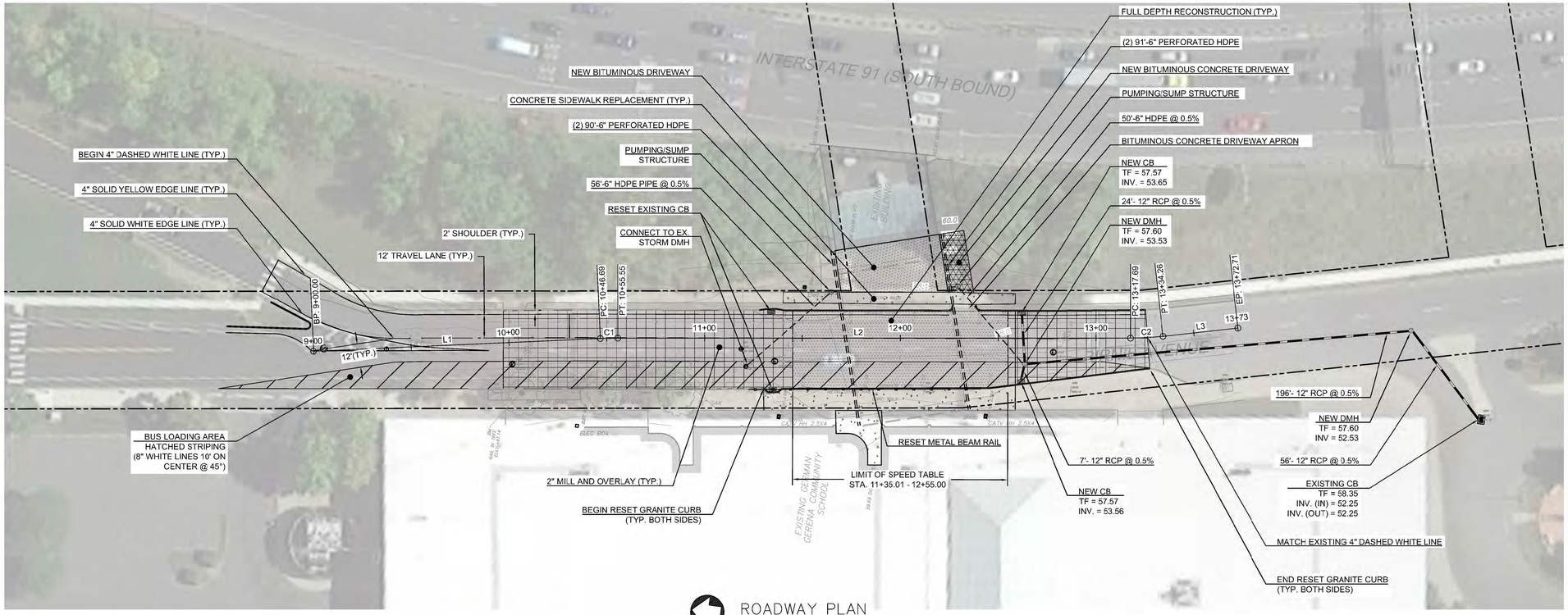
TITLE
UNIT "A"
MALL LEVEL PLAN

SCALE 1/8"=1'-0"
DATE AUG. 7, 1972
DRAWN BY S.C.
SHEET

H4

APPENDIX D:

Preliminary Rehabilitation Plans



ROADWAY PLAN
SCALE: 1" = 30'-0"

LEGEND

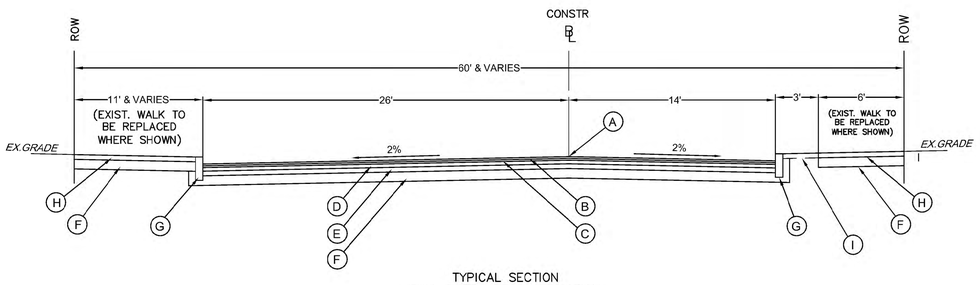
PROPERTY LINE	CATCH BASIN
RESET GRANITE CURB	DRAINAGE MANHOLE
ROADWAY PAVEMENT MARKING	2" MILL AND OVERLAY
12" RCP STORM DRAIN	FULL DEPTH RECONSTRUCTION
6" STORM DRAIN	CONCRETE SIDEWALK REPLACEMENT
RESET METAL BEAM RAIL	

Line Data

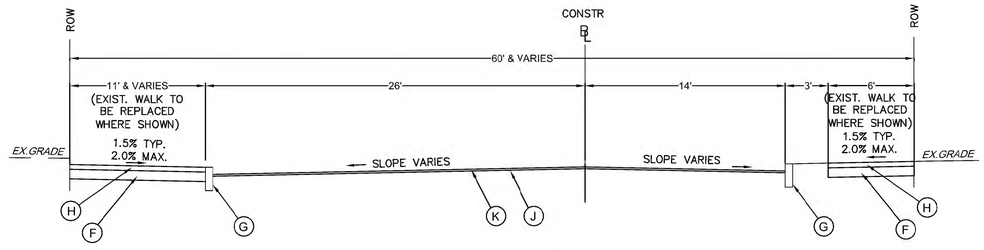
Line #	Length	Direction	Start Point (N, E)	End Point (N, E)
L1	146.69	S10° 24' 11.94"E	(2870575.0343,354903.56)	(2870430.7547,354930.05)
L2	262.13	S7° 51' 51.13"E	(2870422.0046,354931.46)	(2870162.3388,354967.33)
L3	38.45	S14° 11' 37.78"E	(2870146.0822,354970.49)	(2870108.8055,354979.92)

Curve Data

Curve #	Radius	Length	Chord Direction	Start Point (N, E)	End Poin: (N, E)	Delta Angle
C1	200.00	8.86	S9° 08' 01.53"E	(2870394.6395,354733.3400)	(2870422.0046,354931.4591)	2.5391
C2	150.03	16.57	S11° 01' 44.45"E	(2870182.8675,355115.9392)	(2870146.0822,354970.4938)	6.3286



TYPICAL SECTION
FULL DEPTH RECONSTRUCTION
STA. 11+35.01 - 12+55.00
N.T.S.



TYPICAL SECTION
MILL & OVERLAY
STA. 9+97.10 - 11+35.01 &
STA. 12+55.00 - 13+26.40
N.T.S.

LEGEND

- (A) POINT OF APPLICATION OF GRADE
- (B) 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)
- (C) 1-3/4" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5)
- (D) 3.5" SUPERPAVE BASE COURSE 25.0 (SBC-25.0)
- (E) 4" DENSE GRADED CRUSHED STONE FOR SUB-BASE
- (F) 8" GRAVEL BORROW, TYPE b
- (G) 4" GRANITE STONE CURBING
- (H) 4" CLASS D CONCRETE SIDEWALK, 4000 PSI *
- (I) 4" LOAM & SEED
- (J) PAVEMENT MICROMILLING - DEPTH VARIES, REFER TO MILLING AND PAVING NOTES ABOVE.
- (K) 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)
- (L) 4" CLASS D CONCRETE ISLAND, 4000 PSI

* EXISTING SIDEWALK TO REMAIN WHERE SHOWN ON PLANS

MILL AND OVERLAY NOTES

1. PRIOR TO ROADWAY MILLING AND PAVING, CONTRACTOR SHALL SET STRING LINE AT PROPOSED TOP OF CURB AND IDENTIFY CHANGE OF GRADE AT ROADWAY CENTERLINE, BASED ON CONSTRUCTION PLANS AND TYPICAL SECTIONS. RESIDENT ENGINEER SHALL REVIEW GRADES WITH CONTRACTOR PRIOR TO CONSTRUCTION AND MAY MAKE REASONABLE ADJUSTMENTS AS NECESSARY TO THE SIDEWALK AND SHOULDER CROSS SLOPE, TOP OF CURB ELEVATION, CURB REVEAL, AND MILLING DEPTH TO ACHIEVE THE NECESSARY ROADWAY AND SIDEWALK CROSS SLOPES, AND TO ENSURE POSITIVE DRAINAGE TO CATCH BASINS.
2. MAXIMUM MILLING DEPTH TO BE 6" UNLESS OTHERWISE DIRECTED BY THE RESIDENT ENGINEER. REFER TO SPECIAL PROVISIONS FOR INSTRUCTION REGARDING BASE EXPOSURE DURING MILLING OPERATIONS.

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Phone: (860) 633-8341 • Fax: (860) 633-1068

Prepared For:

City of Springfield
Dept. of Public Works
70 Tapley Street
Springfield, MA

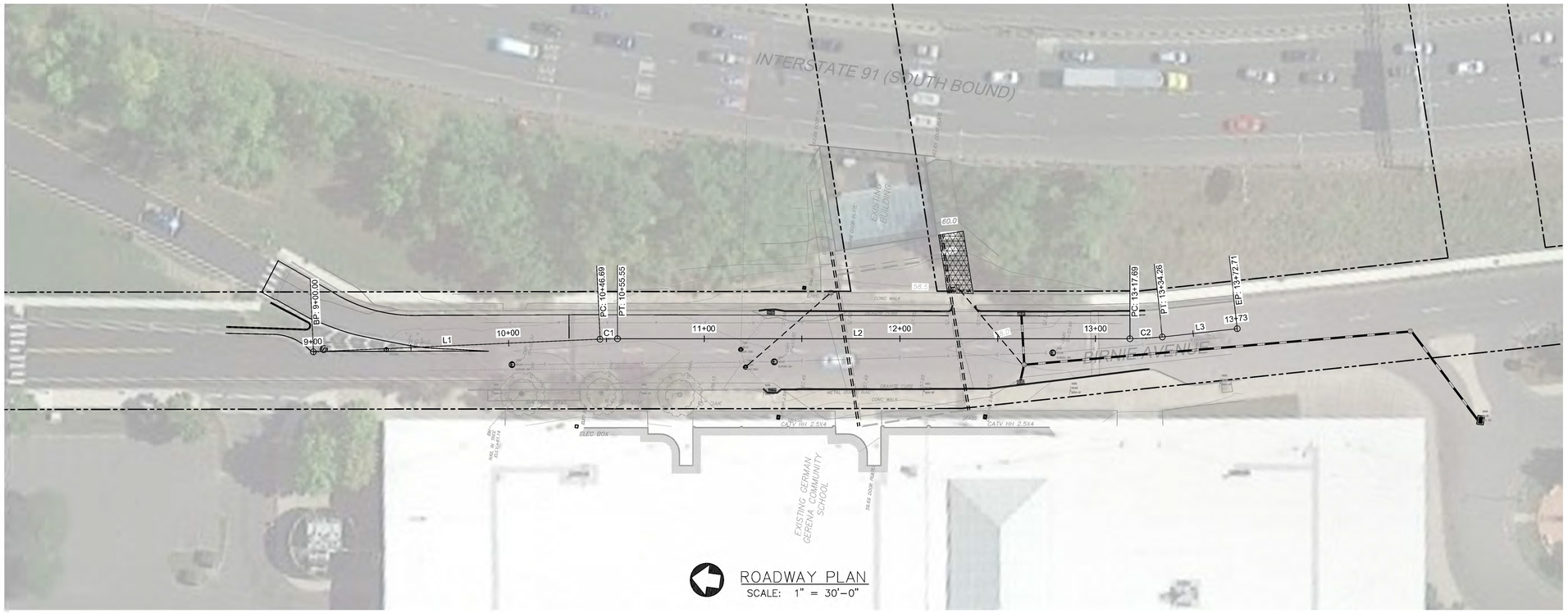
REHABILITAITON OF:
BIRNIE AVENUE BRIDGE / TUNNEL
CITY OF SPRINGFIELD, MA

DATE:	REVISION:

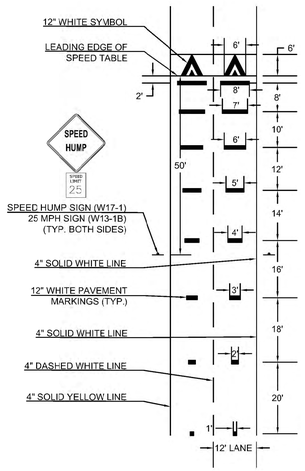
PROJECT NO.: 70559.00
SCALE: AS NOTED
DATE: 08-30-2019
DRAWN BY: JCO
CHECKED BY: SJD

ROADWAY PLAN

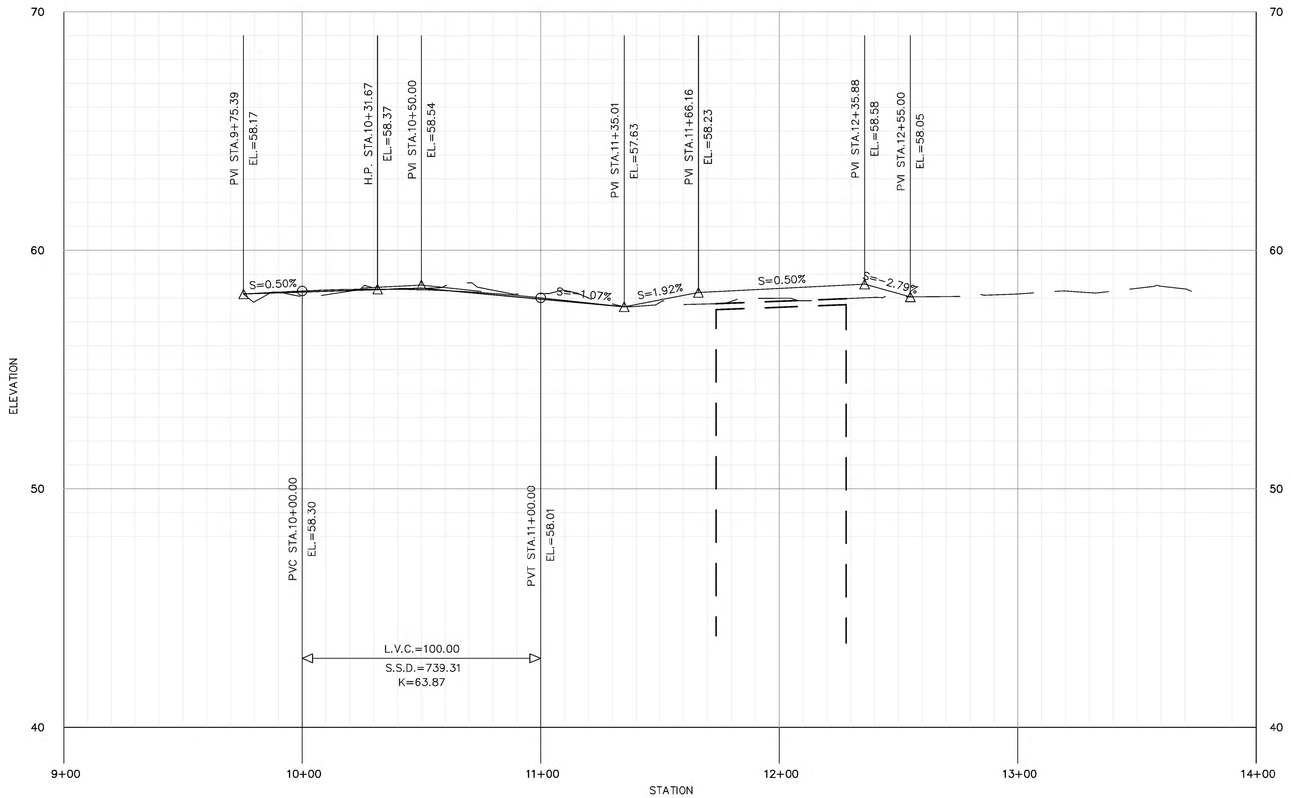
DRAWING NO.:
C-1



ROADWAY PLAN
SCALE: 1" = 30'-0"



BIRNIE AVE. PAVEMENT MARKING PLAN
N.T.S.



ROADWAY PROFILE
SCALE: H: 1" = 30'
V: 1" = 3'

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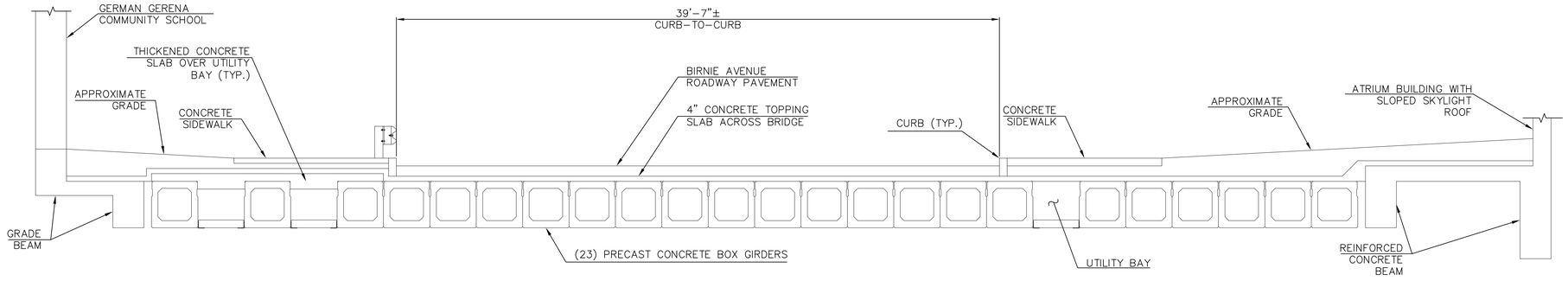
SCALE: AS NOTED
DATE: 08-30-2019
DRAWN BY: JCO
CHECKED BY: SJD

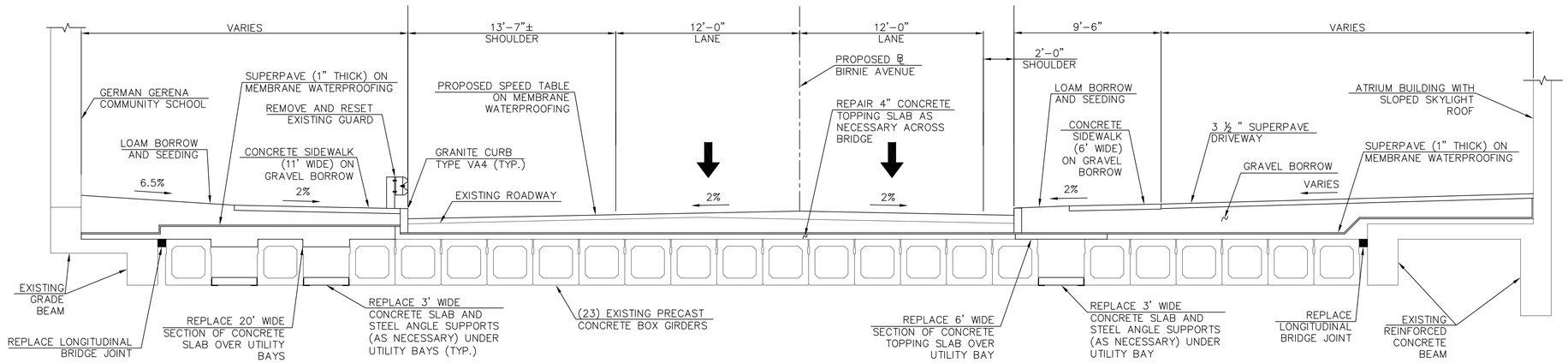
ROADWAY PLAN AND PROFILE

DRAWING NO.:
C-2



EXISTING BRIDGE SECTION

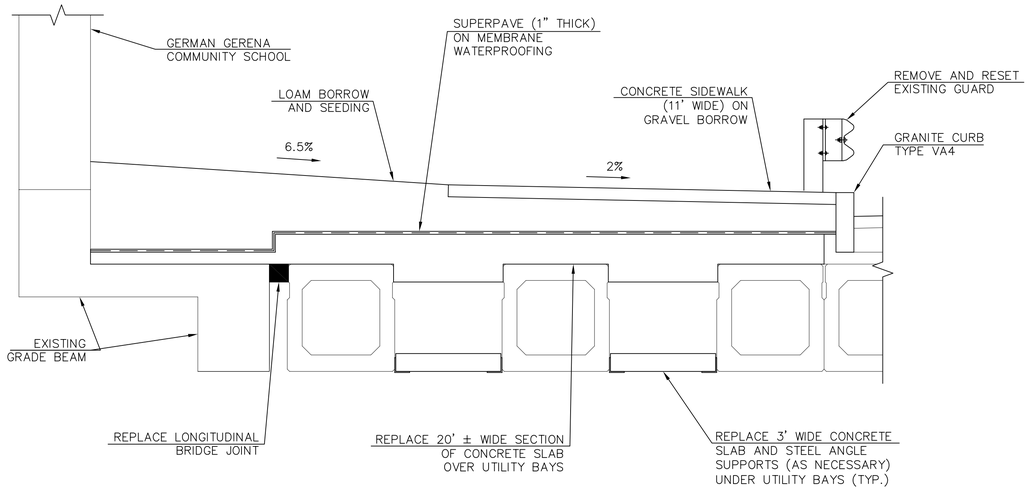
SCALE: ¼" = 1'-0"



PROPOSED BRIDGE SECTION

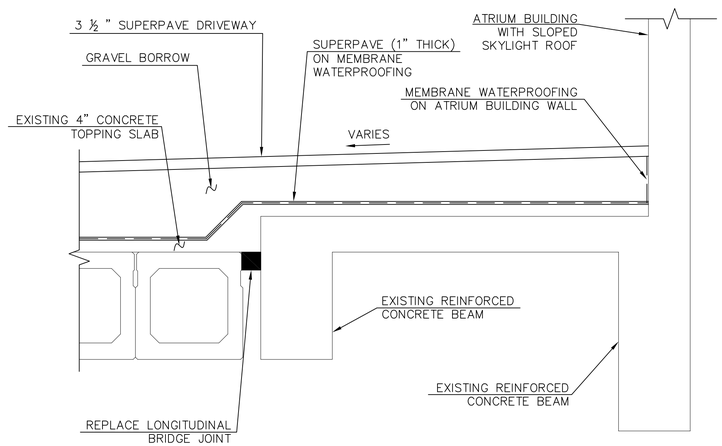
SCALE: ¼" = 1'-0"

NOTE: SECTIONS SHOWN LOOKING DOWN STATION



ENLARGED SECTION (WEST SIDE)

SCALE: ½" = 1'-0"



ENLARGED SECTION (EAST SIDE)

SCALE: ½" = 1'-0"

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CITY OF SPRINGFIELD, MA

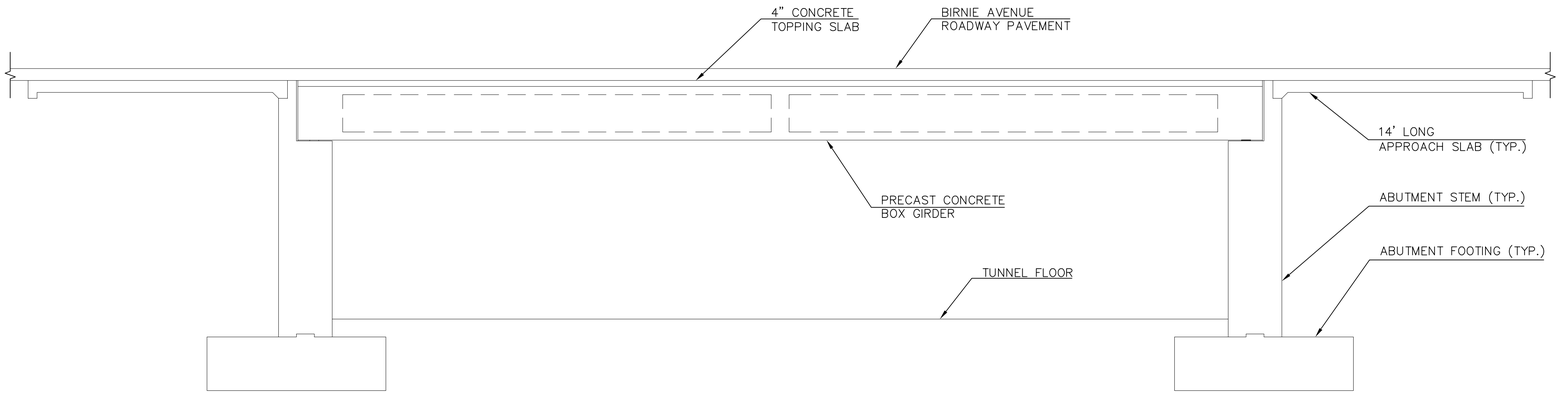
DATE:	REVISION:

PROJECT NO.: 70559.00
SCALE: AS NOTED
DATE: 08-30-2019

DRAWN BY: MHH
CHECKED BY: SJD

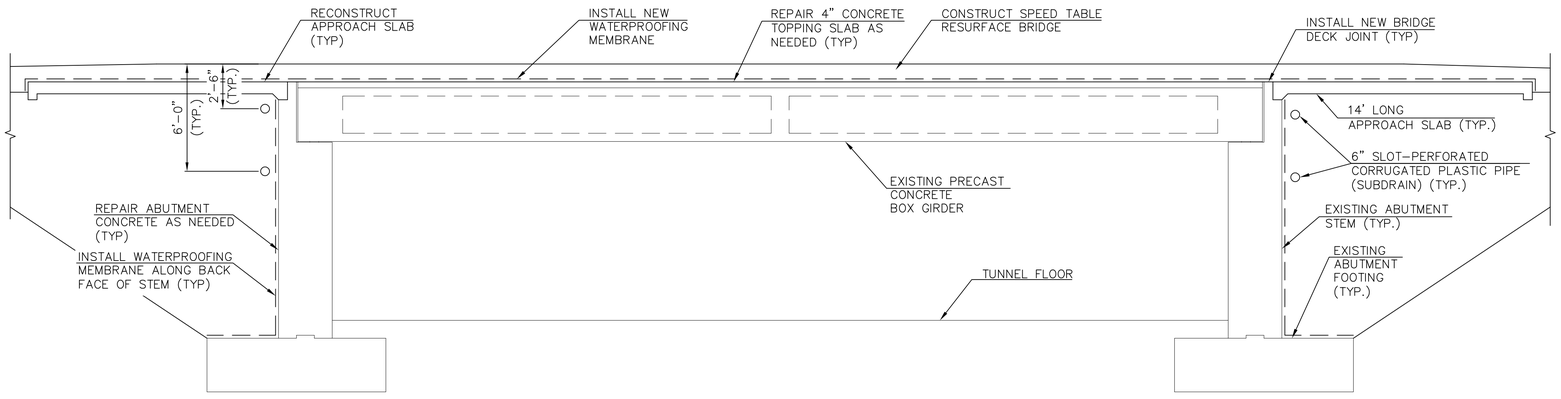
BRIDGE SECTION

DRAWING NO.:
S-1



EXISTING LONGITUDINAL BRIDGE SECTION

SCALE: ¼" = 1'-0"



PROPOSED LONGITUDINAL BRIDGE SECTION

SCALE: ¼" = 1'-0"

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CITY OF SPRINGFIELD, MA

DATE:	REVISION:

PROJECT NO.: 70559.00
SCALE: AS NOTED
DATE: 08-30-2019

DRAWN BY: MHH
CHECKED BY: SJD

LONGITUDINAL BRIDGE SECTION

DRAWING NO.:

S-2

APPENDIX E:

Geotechnical Figures

NOTES:

1. THE BASE PLAN WAS DEVELOPED USING AUTOCAD DRAWINGS PROVIDED BY ALFRED BENESCH & COMPANY ON AUGUST 27, 2019, ENTITLED "70559 BASE." AERIAL IMAGERY WAS DOWNLOADED FROM THE MASSDOT GIS WEBSITE ON AUGUST 29, 2019.
2. LOCATIONS AND SITE FEATURES DEPICTED ARE APPROXIMATE AND GIVEN FOR ILLUSTRATIVE PURPOSES.
3. ALL TEST BORINGS WILL BE COMPLETED TO APPROXIMATELY THIRTY (30) FEET BELOW GROUND SURFACE.
4. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

LEGEND:

NB-1 / OW — APPROXIMATE LOCATION OF PROPOSED TEST BORING. INDICATES TEST BORING WILL BE COMPLETED AS AN OBSERVATION WELL

NB-4 — APPROXIMATE LOCATION OF PROPOSED TEST BORING WHICH REQUIRES GEOPROBE OR SOIL SCOUT DRILL RIG FOR ACCESS

0 20' 40'

GRAPHIC SCALE

nobis

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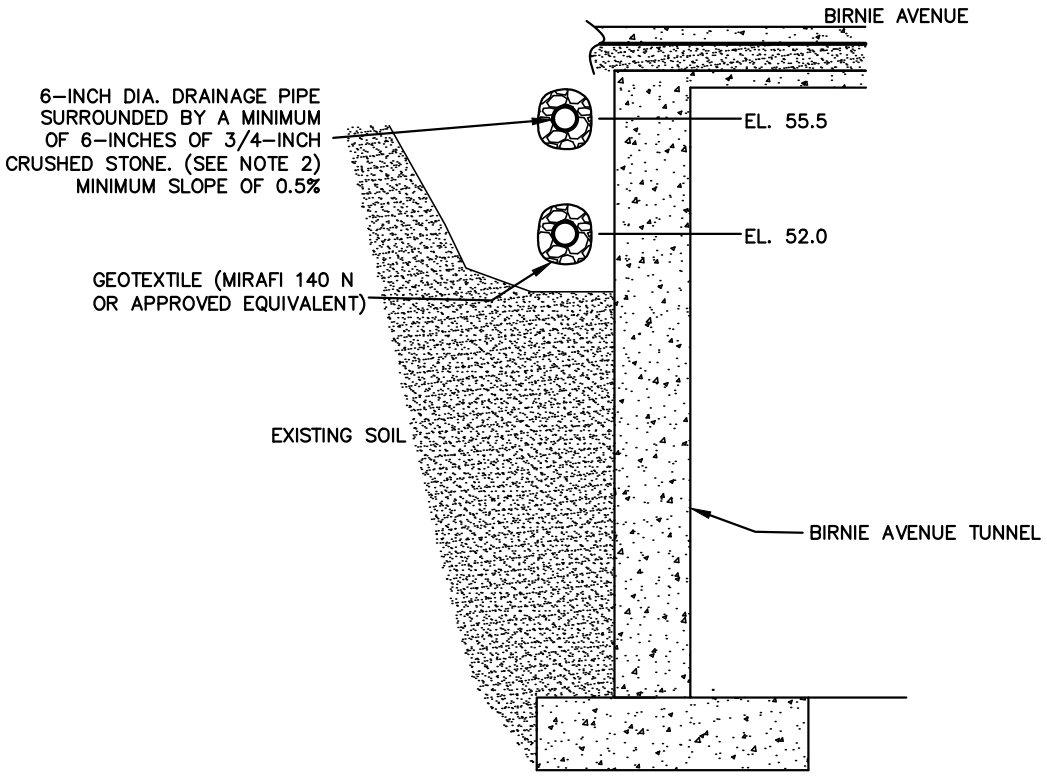
FIGURE 1

PROPOSED BORING LOCATION PLAN
200 BIRNIE AVENUE
SPRINGFIELD, MASSACHUSETTS

DRAWN BY:	JDV	CHECKED BY:	BTW
PROJECT NO.	95920.00	DATE:	AUGUST 2019



NOTES:

1. GEOTEXTILE FABRIC (MIRAFI 140N OR APPROVED EQUIVALENT) SHOULD BE PLACED BETWEEN THE 3/4 INCH CRUSHED STONE AND THE SOIL SUBGRADE.
2. DRAINAGE PIPE SHOULD BE FULLY PERFORATED, PVC (SCH. 80).
3. 3/4 INCH CRUSHED STONE SHOULD CONSIST OF MASSDOT M2.01.4.
4. PROVIDE 2 PIPES ON EACH SIDE OF BIRNIE AVENUE TUNNEL FOR A TOTAL OF 4 PIPES.

INFILTRATION PIPE DETAIL

NOT TO SCALE

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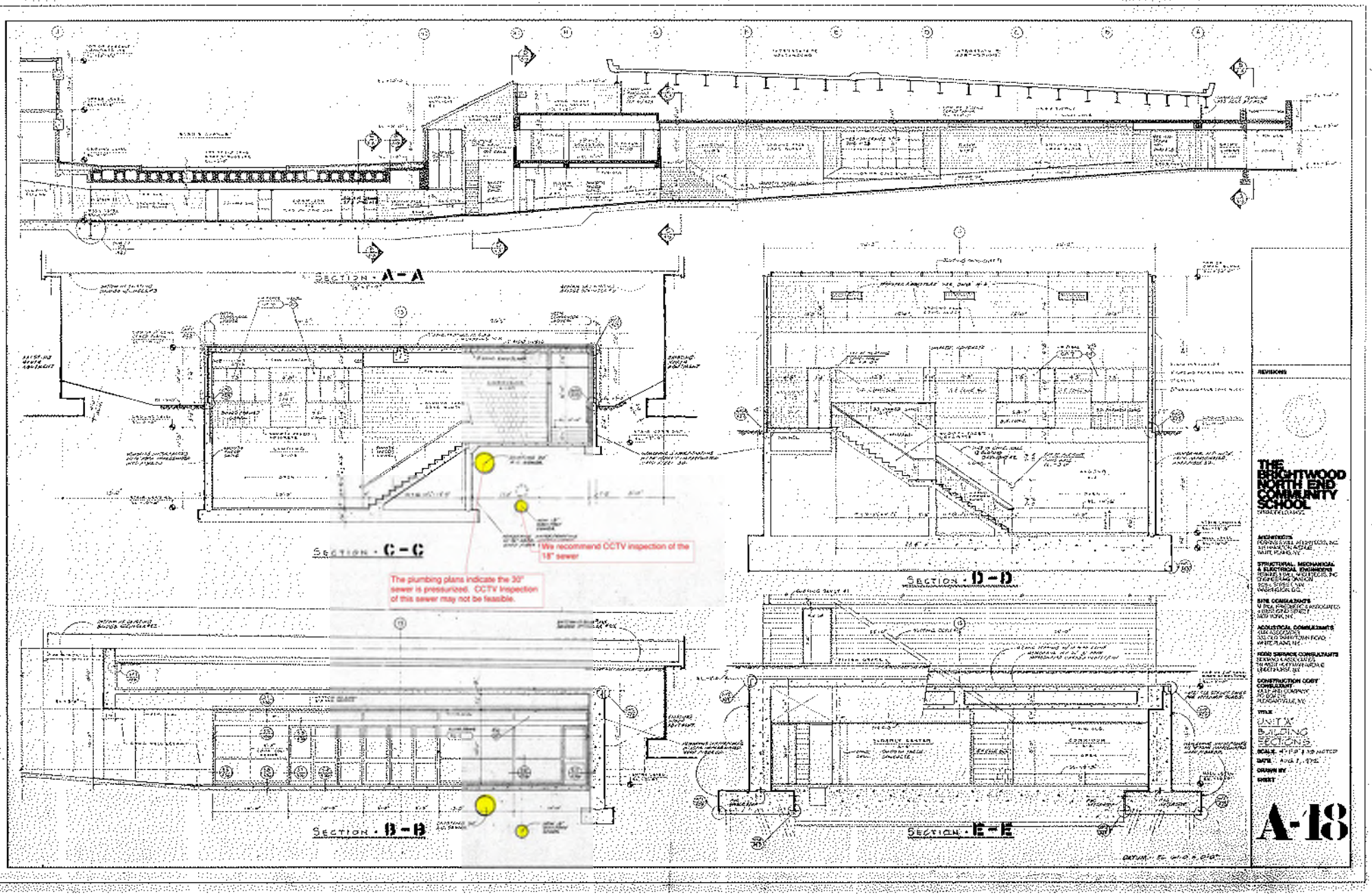
FIGURE 2

INFILTRATION PIPE DETAIL

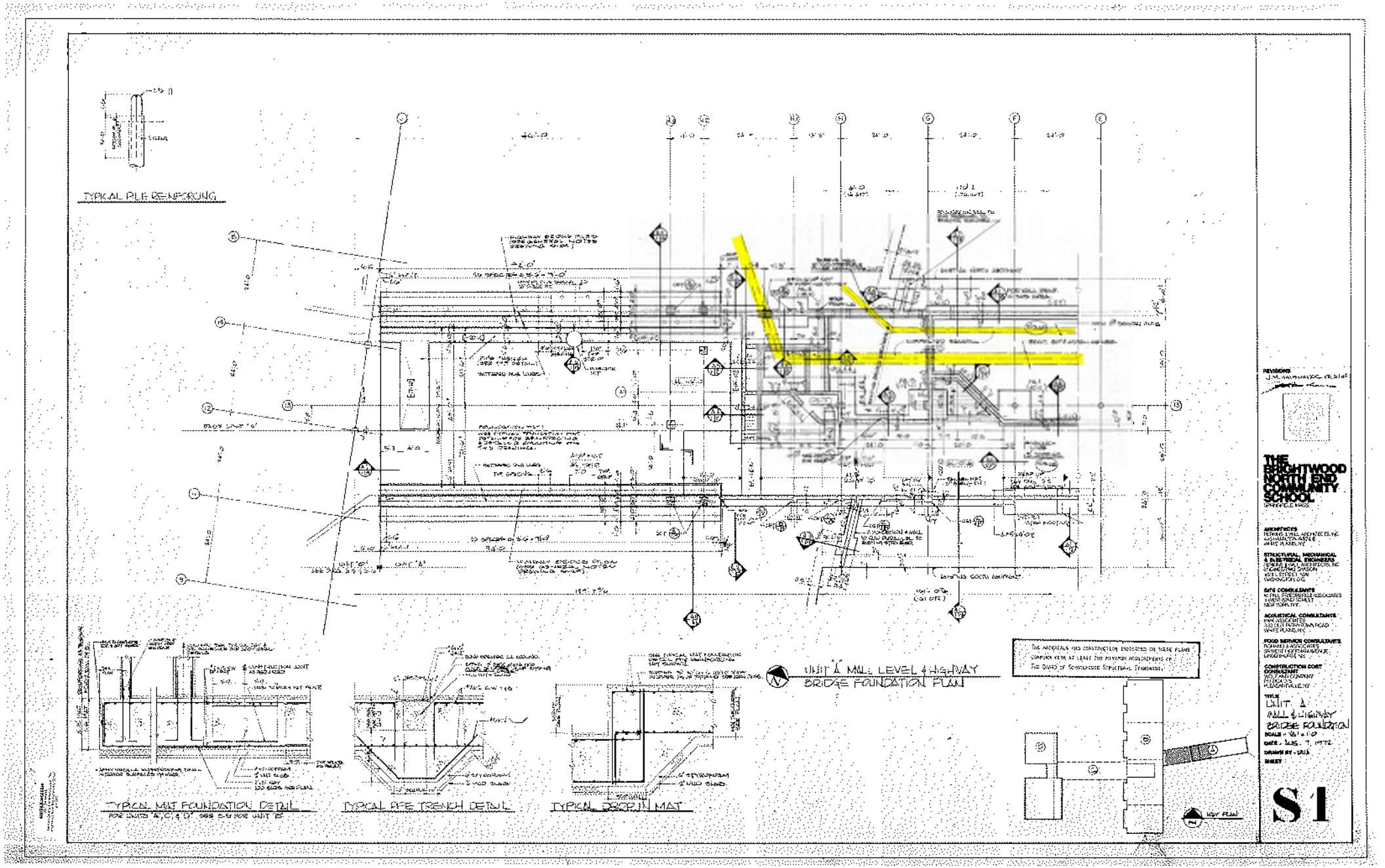
BIRNIE AVENUE TUNNEL
SPRINGFIELD, MA

DRAWN BY: BTW	APPROVED BY: AJ
PROJECT: 95920.00	AUGUST 27, 2019

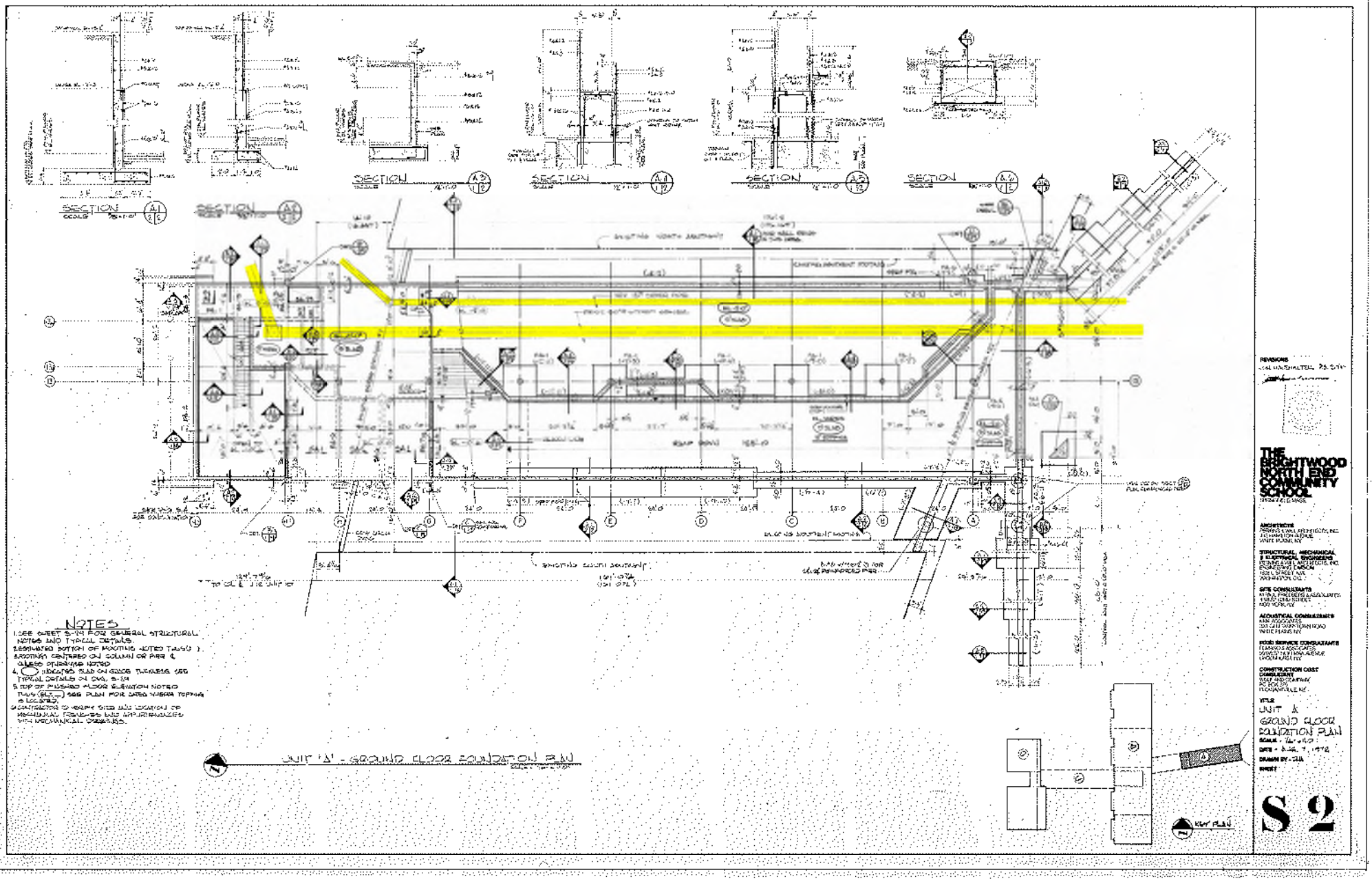
J:\95920.00 – Birnie Avenue Tunnel – Springfield\CAD\dwg\Infiltration Pipe Detail.dwg



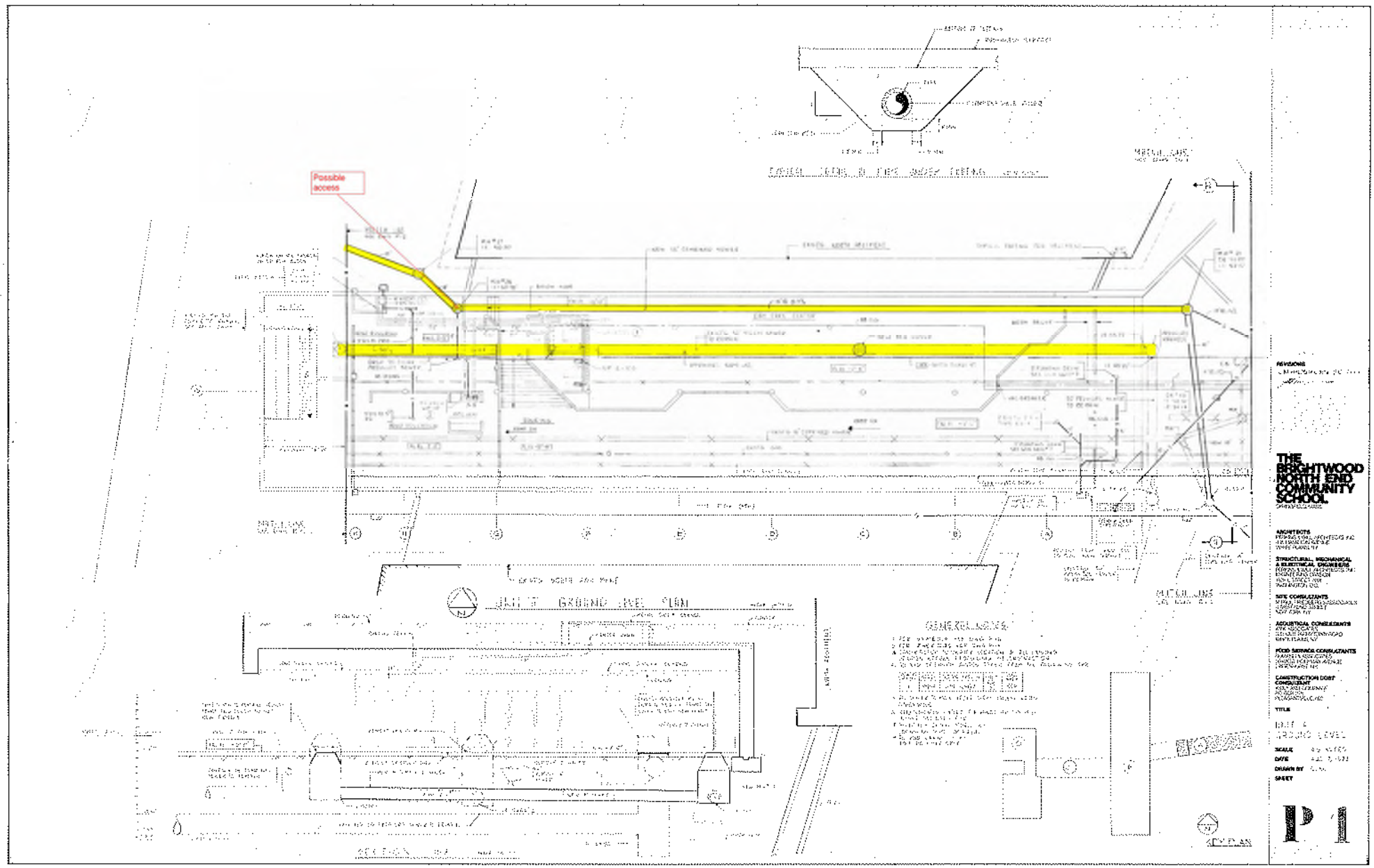
RECOMMENDED LIMITS OF UTILITY INSPECTION



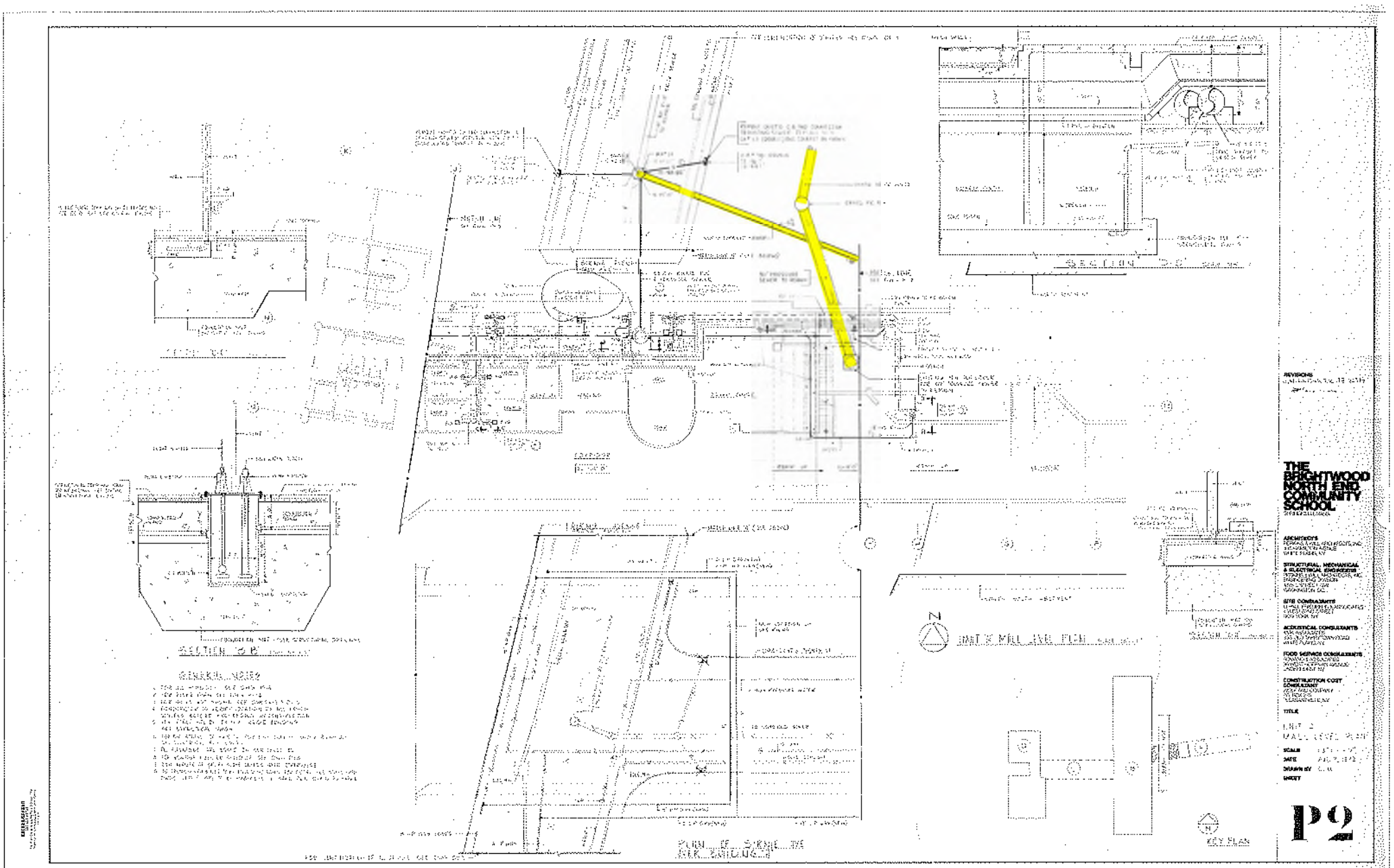
RECOMMENDED LIMITS OF UTILITY INSPECTION



RECOMMENDED LIMITS OF UTILITY INSPECTION



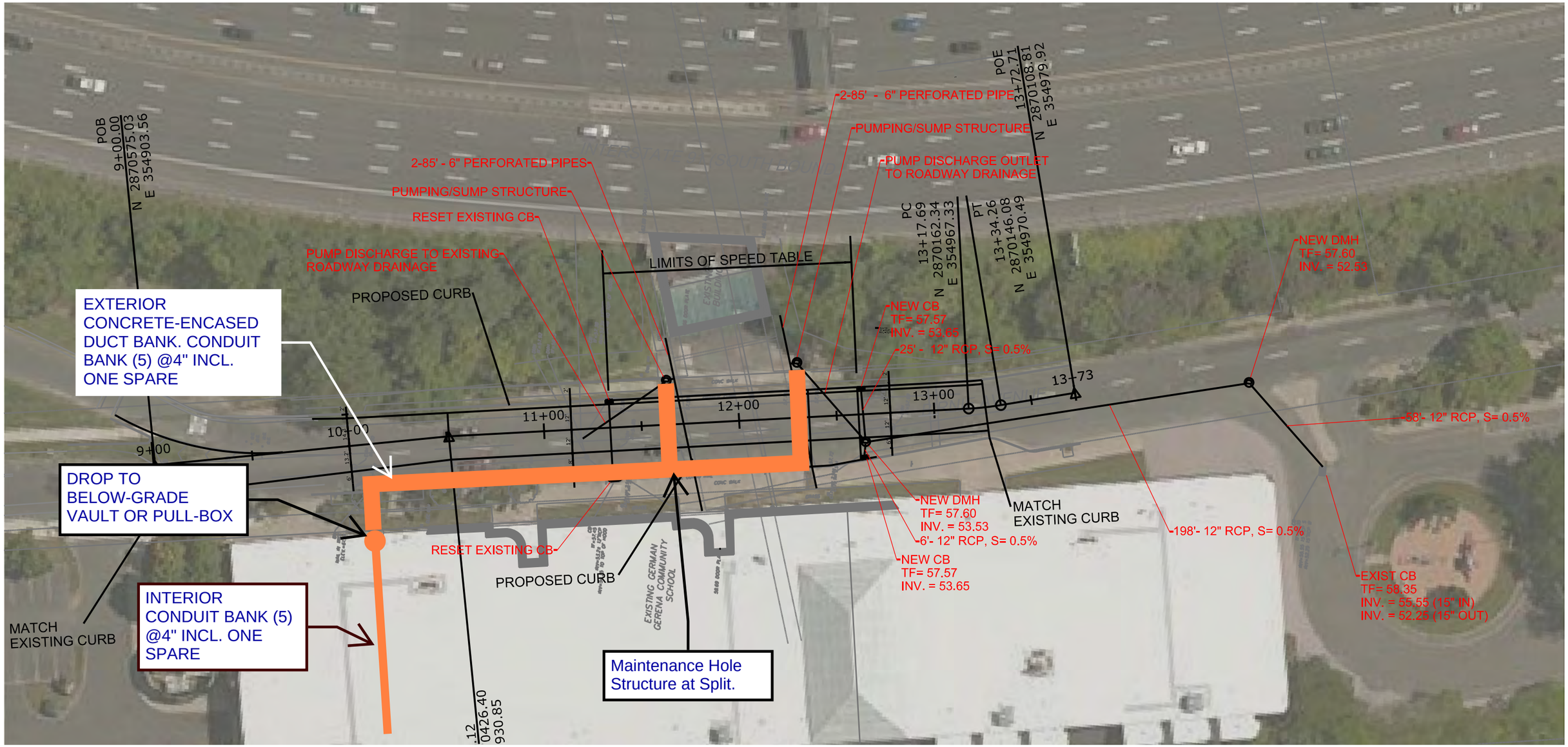
RECOMMENDED LIMITS OF UTILITY INSPECTION



RECOMMENDED LIMITS OF UTILITY INSPECTION

APPENDIX F:

Mechanical / Electrical Figures



ELECTRICAL DISTRIBUTION-SPLIT OUTSIDE GERENA SCHOOL

(COMMON SHARED PATH; BRANCH FEEDS TO EACH PUMP STATION)

FLYGT
a xylem brand

SCHEMATIC PUMP CHAMBER CONFIGURATION

Issued: 11/11 Supersedes: 2/09

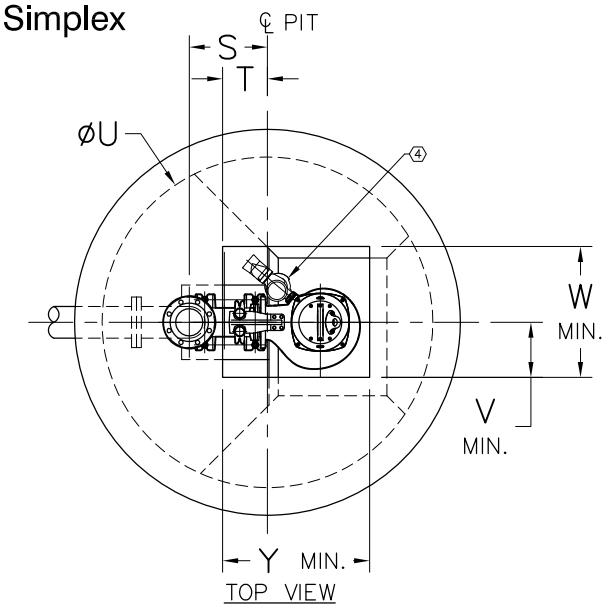
682020C

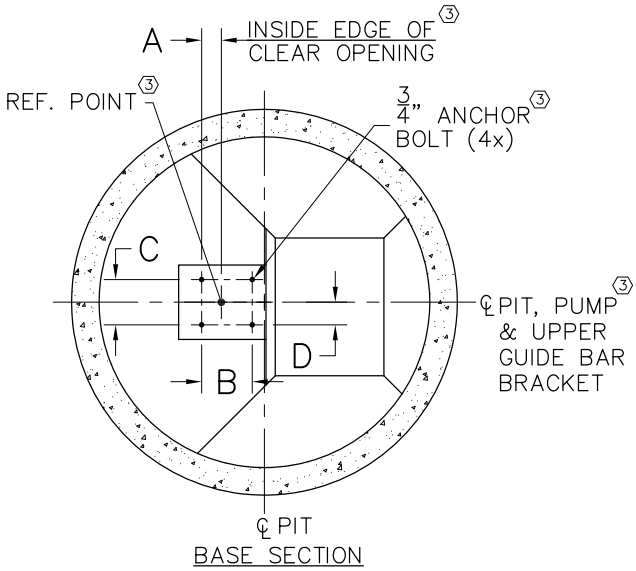
FP/NP-3153

NOTES:

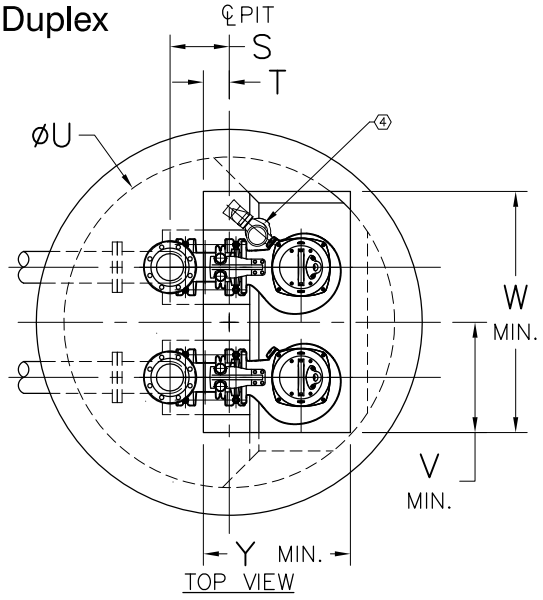
1. CONFIGURATION AND DIMS. SHOWN ARE SUGGESTED REQUIREMENTS ONLY. ALL DETAILS, INCLUDING SIZING OF PIT, TYPE, LOCATION AND ARRANGEMENT OF VALVES AND PIPING, ETC. ARE TO BE SPECIFIED BY THE CONSULTING ENGINEER AND ARE SUBJECT TO THEIR APPROVAL.
2. REFERENCE GENERIC DUPLEX LIFT STATION LAYOUT FOR ELEVATION VIEW.
3. LOCATE ANCHOR BOLTS USING INSIDE EDGE OF CLEAR OPENING AND PUMP CENTERLINE AS REFERENCE POINT. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP TO CLEAR OPENING.
4. ITT FLYGT MIX-FLUSH VALVE.

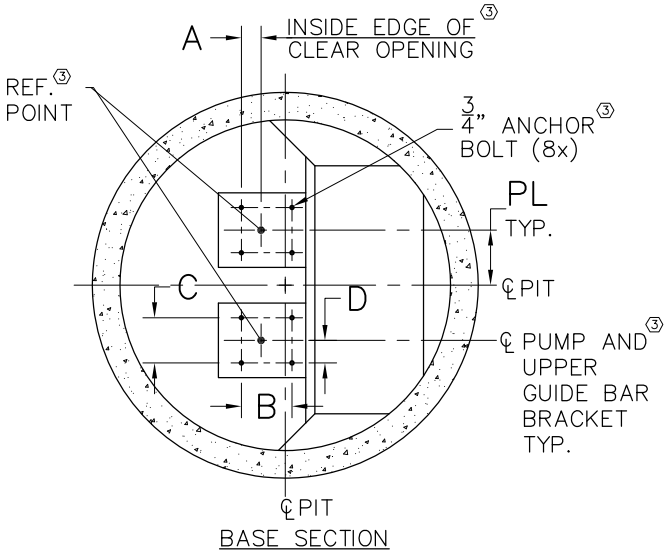
Simplex





Duplex





ALL DIMENSIONS ARE IN INCHES

MODEL	NOM. SIZE	VERSION	A	B	C	D	SIMPLEX S	T	U	V	W	Y	DUPLEX S	T	U	PL	V	W	Y
FP/NP	3"	SH	2½	9⅞	8	4	21¼	15¼	72	9	27	29½	18⅜	12⅜	72	11	20	49	29½
FP/NP	4"	SH	2¾	9⅞	8	4	19¾	13¼	72	9	27	29½	16½	10	72	11	20	49	29½
FP/NP	4"	HT	2¾	9⅞	8	4	19¾	13¼	72	11	27½	30½	16½	10	72	11	22	49½	30½
FP/NP	6"	MT	4⅜	11	10	5	17⅜	9¾	72	12	28½	32	12⅝	5¼	72	12	24	52½	32
NP	8"	LT	5½	11	10	5	14¼	5⅜	72	14	30½	35	16½	7⅝	84	13	27	56½	35
NP	10"	LT	14⅛	19¾	10	5	23¾	13	96	16½	35½	40	16¾	6	96	18	34½	71½	40

APPENDIX G:

Field Notes

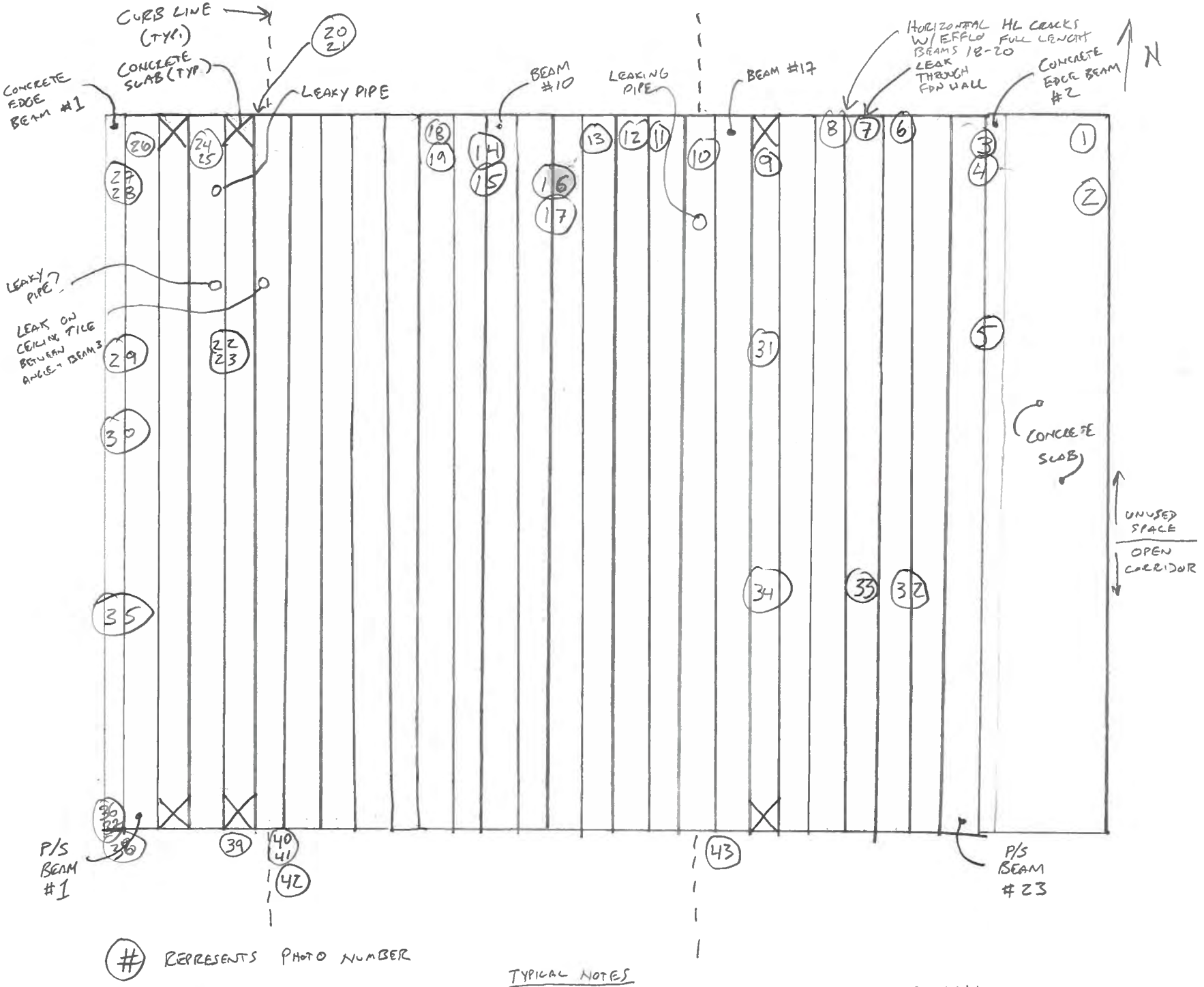
benesch

Comp. by: RM/MH Date: 6/6/19 Sheet 1 of 1

Chkd. by: Date: Job No. 70559

Project: GERENA SCHOOL INSPECTION

Element: BRIDGE INSPECTION



TYPICAL NOTES

- WATER STAINING ALONG TOP OF NORTH ABUTMENT WALL
- NO JOINT MATERIAL BETWEEN P/S BEAMS