August 21, 2025

Joseph Laydon
Town Manager
One Main Street
Upton, MA, 01568

Via Email: *jlaydon@uptonma.gov*
Property: **Holy Angels Church**
**3 Milford St, Upton, MA 01568**
Service: **Capital Needs Assessment**

Dear Mr. Laydon,

As requested, Criterium-Dudka Engineers has completed a Capital Needs Assessment. We submit our confidential report herewith for your review and use.

In addition to making observations during an on-site walk-through on June 12, 2025 we have also reviewed available documentation.

We trust our report contains all information required at this time. Please contact us at 508.589.8020 to discuss any questions or to direct follow up activity.

Criterium-Dudka Engineers appreciates this opportunity to assist you. Thank you.

**Criterium-Dudka Engineers**

Richard P. Michalewich Jr., P.E.[MA]
Chief Engineer

# LIMITED CAPITAL NEEDS REPORT

## Holy Angels Church
## 3 Milford St
## Upton, MA, 01568

*Prepared for:*

**Town of Upton**
**One Main Street**
**Upton, MA, 01568**

*Prepared by:*

**63 South Street, Suite 110**
**Hopkinton, Massachusetts 01748**
**508.589.8020**

Walk-Through Survey performed June 12, 2025
*Submitted August 21, 2025*

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# APPENDICES

DUDKA CRITERIUM ENGINEERS

# 1.0 INTRODUCTION

Criterium-Dudka Engineers is pleased to provide a limited Capital Needs Assessment of the Holy Angels Church located at 3 Milford St, in Upton, MA. This property is a 225-year-old, approximately 7,600 SF, former church. Based on our signed proposal dated May 14, 2025, and attached in the appendix, the Town of Upton requested construction costs to partially rehabilitate Holy Angels Church with a possible future use as a Town Assembly Building. The specific scope of these costs is:

- Structural Stabilization for future use as an assembly space
- Costs to replace the building's mechanical and electrical systems
- Costs to make the building ADA compliant
- Costs to install fire sprinklers, strobes, alarms, fire panels, and pull stations.

As a result of our work in identifying the above costs, Criterium Dudka Engineers has included additional repair costs to successfully implement the repairs above, including:

- Demolition
- Strengthen Roof Trusses
- Replacement of the roof
- Cost to modify the bell tower to be essentially water-tight.
- The replacement of the entirety of the building envelope with modern materials and techniques, including windows and doors
- Insulation and vapor barriers
- Drywall and new ceilings up be ready to paint

The repair costs included in this report were estimated by F.W. Madigan, a fourth-generation, family-owned and operated construction company based in Worcester, MA., who are experienced in quoting and restoring commercial buildings much larger, and some smaller, in Massachusetts and beyond.

Additionally, we have provided brief narratives and photos describing the current conditions of the building and its components.

Richard P. Michalewich Jr., P.E.$^{MA}$, Adelaide Dykstra, Field Engineer, Bruce Dykstra, Senior Field Technician, Patric Grady, Field Engineer, and Andrew Dudka, President and Owner of Criterium-Dudka Engineers visited the site on to inspect the structure. We were met onsite with Joseph Laydon, Town Manager. CDE also performed a limited invasive inspection on July 3, 2025 to determine the choir loft structure and evaluate the exterior walls.

This report has been reviewed by Andrew Dudka, President of Criterium-Dudka Engineers.

# 2.0 EXECUTIVE SUMMARY

Extensive inspections were completed to develop the data associated with providing costs to rehabilitate Holy Angels Church, as described in section 1.0 Introduction. The findings of our inspections revealed the basis for these costs and are detailed in the report.

Estimated Costs:

**Cost Table**

| **Original Scope of requested pricing** | **sub-total** | **totals** |
|---|---|---|
| Structural Stabilization for Future use as an Assembly Space | | $150,000 |
| *Mechanical Estimated Cost* | *$220,000* | |
| *Electric System Estimated Cost* | *$160,000* | |
| *Plumbing System Estimated Cost:* | *$85,000* | |
| Replace Mechanical, Electric Systems, and Plumbing | | $465,000 |
| ADA Compliance | | $185,000 |
| Fire Safety | | $90,000 |
| | **sub-total** | **$890,000** |
| **Pricing of recommened additional repairs** | | |
| Roof and Roof Trusses | | $175,000 |
| Steeple - Make Water Tight | | $35,000 |
| Building Envelope Replacement and Insulation | | $290,000 |
| Drywall and New Ceilings to be Ready for Paint | | $166,000 |
| Demolition | | $55,000 |
| *General Conditions* | *$175,000* | |
| *Staging and Lifts* | *$25,000* | |
| *Shoring and Bracing* | $50,000 | |
| Other Cost Considerations | | $250,000 |
| | **sub-total** | **$971,000** |
| | **Total** | **$1,861,000** |
| **Costs not included:** | | |

| Original Scope of requested pricing | sub-total | totals |
|---|---|---|
| Permit Set Construction Drawings | | |
| Overhead & Fees | | |
| Contingency | | |
| Building Permits | | |
| Sitework | | |
| Lighting Fixtures | | |
| Interior Painting | | |
| Window Replacements, except for stained-glass windows. | | |
| Interior doors and hardware | | |
| Rough Carpentry | | |
| Masonry/Concrete work | | |
| Interior Painting | | |
| Any unforeseen costs that may be revealed during construction | | |

## 3.0 STANDARDS AND LIMITATIONS

Our inspection report is limited to observations made from visual evidence.

Our inspection and report have been conducted consistent with that level of care and skill that is ordinarily exercised by members of the profession providing the same services under similar conditions at the time the services are performed.

Our report is an opinion about the condition of this portion of the building. It is based on evidence available during a diligent inspection of all reasonably accessible areas. No surface materials were removed, no destructive testing undertaken, and no furnishings moved.

We were unable to inspect or excluded the following items:

- Areas covered by finished surfaces;
- Areas covered by personal items; and
- Below ground.

We do not render any opinion on uninspected portions of the facility.

# 4.0 DESCRIPTION

This building was reportedly constructed circa 1800. The building is 1 story, with a basement, choir loft, and a steeple. The building structure is a combination of wood framing and post and beam construction. There was an addition constructed sometime in the past. The main church building is sided with wood shiplap sheathing, wood clapboard, and the addition at the rear is covered in vinyl clapboards.

CDE performed a structural evaluation in April 2019. CDE has summarized salient points from this report as they relate to this current structural evaluation.

For the purposes of this report, the orientation of the building (front, left, right, rear, etc.) will be from the perspective of a person standing on Milford St and facing the building.

# 5.0 PREVIOUS REPORT

In April 2019, CDE performed a structural evaluation of the building for the Town of Upton. Below is a summary of the observations and conclusions from that 2019 report:

- Overall, the building was found to be structurally sound at that time.
- The approximate live load capacity of the 1st floor was 65 pounds per square foot (psf) at the time of the 2019 evaluation. (As mentioned in the Introduction, the 1st floor loading as an assembly space for this current study requires a minimum live load capacity of 100 psf, which is discussed further in Section 5.2)
- Potential asbestos containing materials, such as floor tiles, appear to be present, and the age of the building suggests that there may be lead paint.
- Americans with Disability Act (ADA) requirements would need to be addressed as the ramp is in poor condition.

# 6.0 STRUCTURAL OBSERVATIONS

During the inspection, we entered the building on the first floor to gain access to the basement, inspected the first floor, choir loft, attic space, and the steeple. CDE collected measurements of the structure for use in drawing existing conditions plans and for structural calculations. Refer to Appendix A for the site plans.

We noted the following items during our inspection.

## 6.1 Basement

CDE inspected the basement for potential structural issues concerning the foundation walls and framing.

- **Basement Configuration:** Predominantly above grade due to the building's construction into a slope. The main level aligns with street level at the front elevation, while the rear elevation is at grade at the bottom of the slope.

- **Foundation Construction:**

    - Front portion (approximately 50% of footprint): Stone masonry. There are areas of this stone foundation that require repair,

    - Rear addition: Cast-in-place concrete.

    - Rear foundation walls are not directly observable due to below-grade placement.

- **Masonry Condition:** Mortar joints within the stone foundation exhibit deterioration and require repointing to restore structural integrity and water resistance.

- **Floor System:** Presumed cast-in-place concrete slab, currently covered with vinyl tile. *Note: Vinyl tile may contain asbestos; appropriate testing and precautions are recommended prior to disturbance.*

- **Primary Structural Support:**

    - Five main beams span left-to-right, each supported by three steel lally columns each.

    - Indentations in beams indicate original column locations differ from the current, suggesting replacement and relocation of support columns.

- **Floor Framing:** Wood plank flooring supported by wood joists notched into the main beams. While historically common, this method provides less structural capacity than modern joist-hanger connections.

- **Sill Plate Condition:** Large timber sill beams present. Evidence of water damage and biological deterioration (rot) noted at the left-side door location.

- **Wall Studs & Window/Door rough opening**s: Significant rot on several supporting studs, especially around windows and doors.

- **Exterior Wall Interior Sheathing Condition:** Exposed interior wall sheathing condition shows significant deterioration/rot, water damage, and holes.

- **Deficient Support Condition:** The column supporting the main beam in the rear room is not in direct contact with the beam, resulting in inadequate load transfer to the foundation.

**Basement Photographs**

Stairway to the basement

Basement with first floor framing exposed

Basement with first floor framing exposed


Left side wall that has been impacted by water infiltration


Right side wall around the door impacted by water infiltration

Basement wall resting on the original foundation

Wall to the rear room

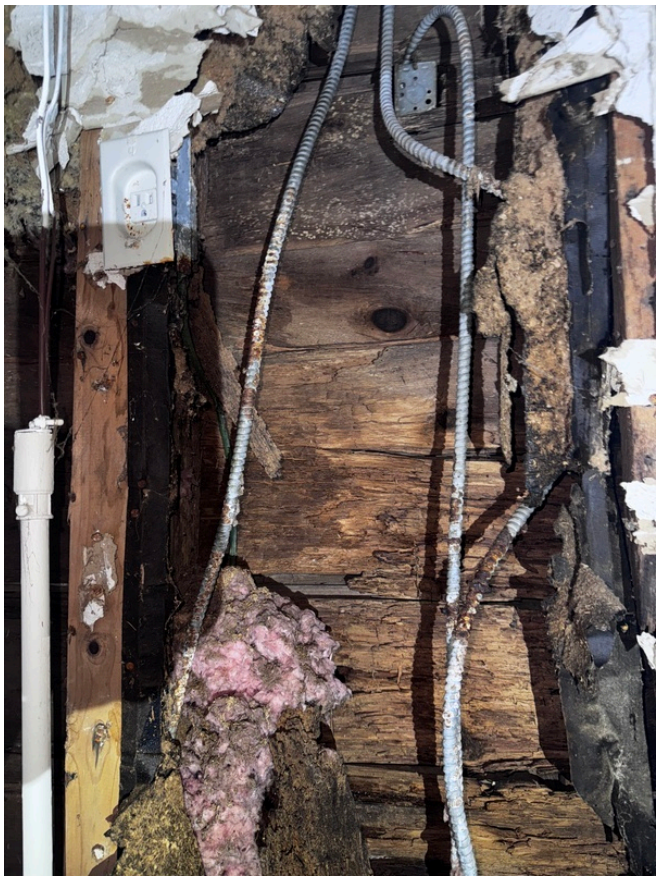
Rear wall

An example of the deteriorating sill plate/beam on the left wall.

The base of the granite stone wall on the left foundation with missing stones.

Exapmle of a window rough opening completely rotted.

All studs, including king and jack studs under weindow is rotted.  Exterior wall sheathing is rotted and daylight is observed.



Another example of rotted exterior wall sheathing
(as viewed from the basement)

## 6.2 First Floor

The main entrance is on the first floor of the building. The first floor is comprised of a nave area with a stage area where the former altar was located at the rear of the building. Two rooms at each side of the stage area are present. There is a choir loft at the front of the building where the main entrance is. CDE observed the following:

- **Roof Support:** Appears to be carried by large timber posts integrated within the wall assemblies.
- **Wall Construction:** Conventional wood stud framing.
- **Fenestration:** Large window openings are present on both sides of the room.
- **Flooring:** Carpet finish with a central aisle surfaced in floor tile.
- **Floor Slope:**

- Measurable slope observed, with laser scan data indicating up to 3.5 inches of downward deflection from the front of the building toward the rear in localized areas.
- Reference Appendix C for the first-floor deformation "Heat Map."

- **Former Altar Area:** Two-tiered platform configuration with enclosed rooms flanking either side.
- **Ceiling:**
  - Spans wall-to-wall in the main building at an approximate height of 21 feet above the finished floor.
  - Insulated assembly exhibiting water damage, particularly beneath the steeple penetration at the gable roof.
- **Interior Finishes:** Peeling paint noted throughout the first floor, suggestive of moisture entrapment within wall assemblies.
- **Invasive Inspection Findings:**
  - CDE removed finishes to expose framing beneath first-floor windows in select locations.
  - No evidence of water damage was observed at the windows examined.

**First Floor Photographs**

View looking toward the rear of the building (former altar area). Carpeting runs down the aisles with vinyl tile on the sides.

View looking toward the front of the building. Note the water staining on the ceiling.

Water damage on the ceiling, located below the steeple.

Typical window on the first floor

Example of peeling paint

View of a support post in the walls.

Cuts made below a window. No water damage was observed.

## 6.3 Choir Loft

The choir loft is above the front entrance of the church. Access to the choir loft is by a stairway on the right side. CDE observed the following:

- **Floor Finish:** Carpeted surface throughout the choir loft.
- **Dimensions:** Approximately 11 feet (depth) by 44 feet (width), including stairway access.
- **Cantilever Section:** Central portion extends approximately 2 feet over the open area below.
- **Framing Investigation:**
    - The floor system is exposed to verify construction details.
    - Supported by a 3" × 4½" beam with full-dimension 2" × 7" joists spaced at 16 inches on center.
    - Joists bear directly on the beam, which appears to be supported by the wall below.
- **Observed Condition:**
    - No significant cracking or wall bulging was detected.
    - The floor surface was observed to be relatively level.

- **Structural Capacity Recommendation:**
    - Based on CDE's calculations and observed framing configuration, limit occupancy to a maximum live load of **30 pounds per square foot (PSF)**.

**Choir Loft Photographs**

Stairs to the choir loft

View of the choir loft

Beam supporting the choir loft

## 6.4 Attic Space

The attic space is located above the ceiling of the first floor and below the roof. CDE observed the following:

- **Framing Visibility:** Roof framing is fully observable from the attic space.
- **Primary Structural System:**
    - Ceiling and roof assembly is supported by a combination of wood and steel rod trusses.
    - Supplemental wood framing spans between trusses to support first-floor ceiling finishes.
    - CDE performed preliminary calculations on the roof trusses. Results of the calculations are presented in Section 8.5, Roof and Roof Trusses.
- **Rafter System:**
    - Rafters: 4" × 8.5", spaced at 16 inches on center.
    - Bearing: Supported by exterior walls, wood trusses, and a ridge board.
    - Collar ties: Full-dimension 2" × 8", spaced approximately every 2 to 4 feet.
- **Condition Observations:**
    - Localized water staining was noted on the roof sheathing.
    - No significant biological deterioration (rot) observed.
    - No visible indicators of structural distress such as sagging, cracking, or bulging.
- **Insulation:** The Ceiling is insulated with what appears to be blown-in cellulose insulation.
- **Rear Roof Construction:** Constructed using dimensional 2" × [*measurement incomplete in provided text*] lumber (exact size to be confirmed).

**Attic Space Photographs**

The entrance to the attic is through the ceiling located in the choir loft area.

Exposed framing in the attic. Note the ceiling insulation

Wood and steel rod truss

Rafters and roof sheathing

Wood trusses help support the rafters at approximately their mid point

## 6.5 Roof

The roof of the building was observed using an insured DJI Mini 2 Drone and was flown and operated by a licensed pilot. The roof is covered with asphalt shingles. CDE made the following observations of the roof:

- **Roof Type:** Gable roof with asphalt shingle sheathing.
- **Deficiencies Observed:**
    - Missing shingles at the transition around the steeple and across portions of the left side of the main roof.
    - Lifted shingles are present throughout the roof surface.
    - Staining and organic growth (likely algae) were observed over multiple areas; such growth can trap moisture, potentially compromising the underlayment and causing deterioration of the roof sheathing.
    - The rear right corner exhibits missing shingles, exposing underlying wood and creating potential for water intrusion.
- **Vegetation Encroachment:** Tree branches overhang the small rear roof, contributing to shading, debris accumulation, and potential moisture retention.
- **Ancillary Roof Element:** Roof over entrance at left elevation exhibits organic staining; the transition detail between siding and roof covering is failing.

- **Exterior Finish Condition:** Peeling paint noted on wood clapboard siding of the steeple, indicating weathering and potential moisture exposure.

**Roof Photographs**

View of the entire roof

Left view of asphalt roof with missing shingles.

Close up of missing shingles and transition from steeple to asphalt roof

Close up of missing shingles and transition from steeple to asphalt roof. Visible staining on shingles

Organic growth on the asphalt shingles

Visible staining and organic growth on asphalt shingles

Right view of roof

Missing shingles at rear right corner of main roof

Rear small roof with lifted shingles

Right side of roof

Right side of roof with raised and loose asphalt shingle

Stained small entrance roof with pealing paint on wood siding

Transition at rear right corner. Tree branches are hanging over small rear roof.

## 6.6 Exterior

CDE inspected the exterior to look for signs of structural damage. CDE observed the following:

- The majority of the building is sided with painted wood clapboard. The lower left and right sides of the building are sided in shiplap. The rear addition is sided in vinyl. Beneath the shiplap and vinyl is tongue and groove wood sheathing. No weather-resistant barrier (WRB) such as tar paper was observed. A WRB is used in modern construction to prevent water from infiltrating into the building. In older buildings that were not originally insulated, a WRB was generally not applied to seal the structure. Any water that made its way through the siding could drain and, with the absence of being sealed with a WRB and insulation, the moisture would dry out, minimizing water damage. Insulation was added to the walls sometime in the past. Without a WRB to prevent water infiltration and condensation, moisture could build up within the walls and cause water damage and mold growth.
- Peeling and delaminated paint was observed throughout the exterior, especially in areas where there is water damage.
- The left rear wall appears to have been damaged by water infiltration near the left side door entrance to the basement.
- The left and right side walls visually bulge in areas where water damage was observed.
- For more information on the exterior walls, refer to Section 6.9, Laser Scan.
- The granite walkways at the front of the church have shifted over the years. This shifting does not appear to have affected the structure as no bulging or significant cracking was observed on the front elevation of the building.

**Exterior Photographs**

Front

Front entrance. The concrete steps are in poor condition.

One of four columns in front of the church.

Right side of the building. Right front brick support wall is damaged

Brick in the right front support wall is displaced and moratr is degraded.

Shiplap siding toward the rear of the building is bulging.

Shiplap siding toward the rear of the building is bulging.

Rear of the church is covered in vinyl siding. Beneath the vinyl siding is shiplap up to the first level and wood clapboard above.

Left and right rear is also covered in vinyl siding.

Left side

Siding in the area where there is water damage

View of the siding. Note the peeling paint

Roof over the side entrance door does not appear to be properly flashed and has resulted in water infiltration

Peeling paint above the side entrance roof

## 6.7 Steeple

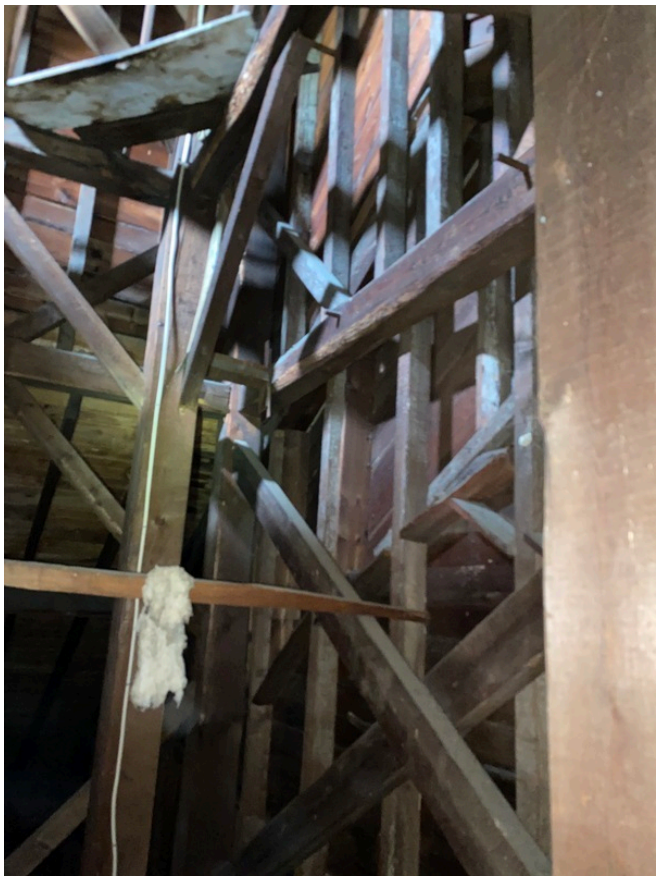
CDE inspected the steeple to look for signs of structural damage. CDE observed the following:

- The steeple is constructed of post and beam framing and is supported by trusses and large beams.
- No evidence of a structural issue was observed with the steeple, such as cracking, bulging, or tilting.
- Currently, the steeple is open to the weather at the top which allows rain to enter the structure and impact the interior.
- Water staining on the ceiling in the interior of the building suggests that water may also be entering around where the steeple penetrates the roof planes.

**Steeple Photographs**

View of the steeple from the exterior

Stairs to the steeple. These were unstable and should be replaced



Post and beam framing of the steeple

Entrance to the top of the steeple where the bell once was

The top of the steeple was open to the elements through louvered openings

## 6.8 ADA Requirements

Since the town desires to transform the church into a public assembly space, there are certain areas that must comply with the accessibility requirements of 521 CMR, also known as the Massachusetts Accessibility Code, which is adopted from the 2010 Americans with Disabilities Act (ADA) standards.

Most prominently, the raised ramp at the right elevation of the building must comply with the ADA standards, specifically 521 CMR 14.00. The ramp must provide the following:

- Ramps sloped not more than 1:12 (8.3%)
- Clear width of no less than 48 inches
- Landings that extend at least 60 inches from the ends of the ramp
- No more than 30 feet of continuous slope

The ramp is not the only area that must be compliant with the ADA standards. Examples of such areas are accessible stalls and lavatories in restrooms, vertical transportation, door and hallway clear width, push and pull clearances for doors, and egress. This is not a comprehensive list of requirements.

For a full scope regarding ADA accessibility, CDE recommends engaging the services of a licensed architect experienced in accessible design, a code consultant, or a combination of the two.

**Photographs**

Entrance to the building at the top of the ramp

View of the ramp going up to the door. According to the laser scan, the slope is 1" per 12".

Bottom portion of the ramp. According to the laser scan, the slope is 1" per 12".

Damage to the ramp decking.

## 6.9 Laser Scan

On June 30, 2025, CDE met with the laser scan contractor GPRS/Existing Conditions (GPRS) at Holy Angels Church to perform a 3-dimensional scan of the interior and exterior of the church. The contractor used a Leica RTC360 3D laser scanner to perform the work. This scanner created a 3D point cloud that provides an accurate model of the current condition of the structure.

GPRS began in the attic, capturing the roof and steeple framing, then moved down to the choir loft. The first floor was then scanned, followed by the basement level and finally the exterior.

The contractor provided CDE with orthographic floor plans of the church along with elevations and section details. Additionally, they produced "heat maps" that show areas of minimum and maximum deflection of the first floor and the right and left exterior walls. The heat maps provide data to evaluate deflection of the floor and the exterior side walls.

The floor at the front of the building is relatively level (green color). As the floor extends into the rear of the building toward the former altar, it slopes downward up to 3.5" in areas (blue color-darker means more deflection).

The majority of the left side clapboard wall is relatively plumb with deflections around the rear-most window up to 0.75" to 1". The bottom shiplap section of the left side wall shows bulging (which is visible with the naked eye) of up to 2" towards the rear of the building. Please note that the shiplap section of the wall (shown as green on the heat map) purposely extends outward from the clapboard by approximately 2" which explains the predominantly green color on the heat map.

The majority of the right side clapboard wall is relatively plumb with deflections around the upper portions of the windows up to 0.5" to 0.75". The shiplap section of the right side wall shows bulging (which is visible with the naked eye) of up to 3" towards the bottom rear of the building and some bulging near the side door. Please note that the shiplap section of the wall (shown as green on the heat map) purposely extends outward from the clapboard by approximately 2" which explains the predominantly green color on the heat map.

Overall, these readings are attributed to the age of the building, combined with water intrusion over a long period of time. As the building is repaired, the above readings will likley improve. Nothing about the current condition of these walls indicated a major structural concern.

The data from the scan can be found in Appendix A.

# 7.0 MECHANICAL, ELECTRICAL, PLUMBING (MEP), AND FIRE PROTECTION OBSERVATIONS

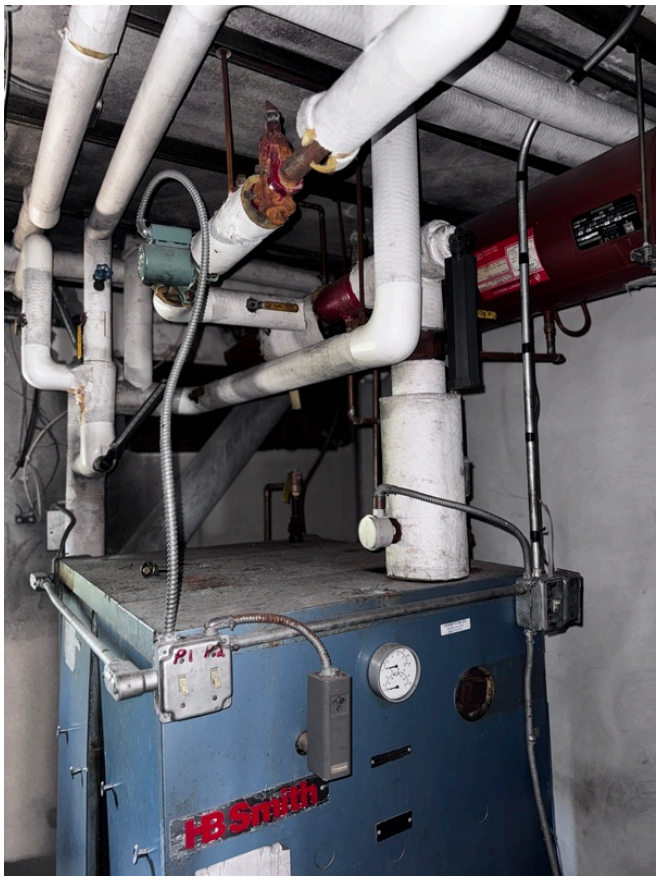
## 7.1 Mechanical

**Boiler:** The oil-fueled boiler is located at the left rear of the basement. Based on our observations, heat was provided to the spaces by forced hot water baseboard registers. The boiler is an H.B. Smith CO. with a manufacturing date of May 1988, making it 37 years old, and it is at the end of its useful life. The heating capacity of the boiler is 407k BTU/HR.

The oil tank is located at the left rear of the building. We could not determine the age of this tank.

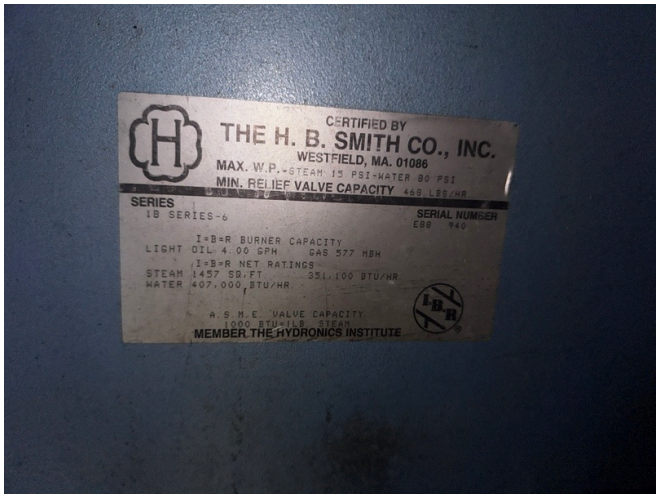
**HVAC:** The HVAC is a York model K1EU180A33A. This is a 15-ton air handler for commercial split systems. It is a belt-drive centrifugal blower, factory DX cooling coil (copper tube/aluminum fin), throwaway filters, motor contactor, and it was originally matched to **R-22** condensing units. This model was designed to pair with either an exterior heat pump or condenser. The heat pump/condenser unit was observed at the rear of the property; however, we were not able to observe the name plates. We opine that this air handler was more likely paired with a heat pump to provide conditioning year-round in the main church floor.

**Photographs**




Oil fueled hot water boiler for heat


Hot water boiler

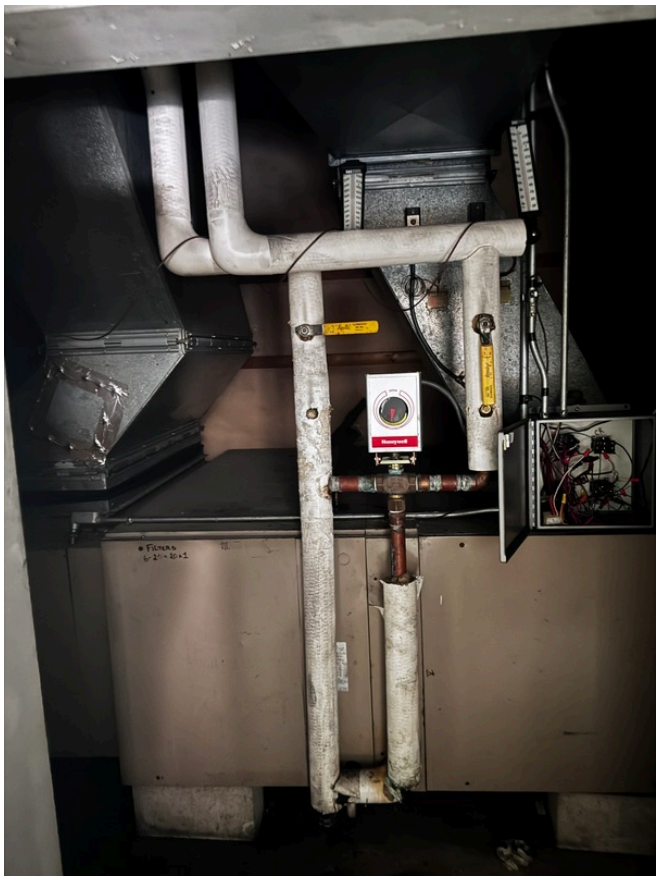



Label of the boiler.

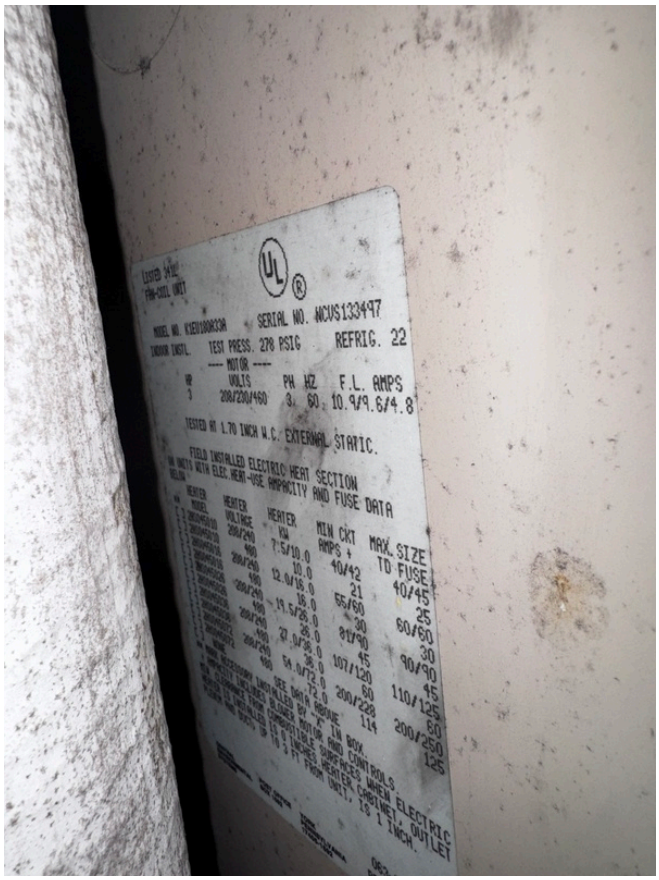
Oil tank enclosure

Inside oil tank enclosure

Inside oil tank enclosure



York Air Handler located at the left rear of the basement




York air handler name plate

Heat pump or condenser only unit at the rear of the building

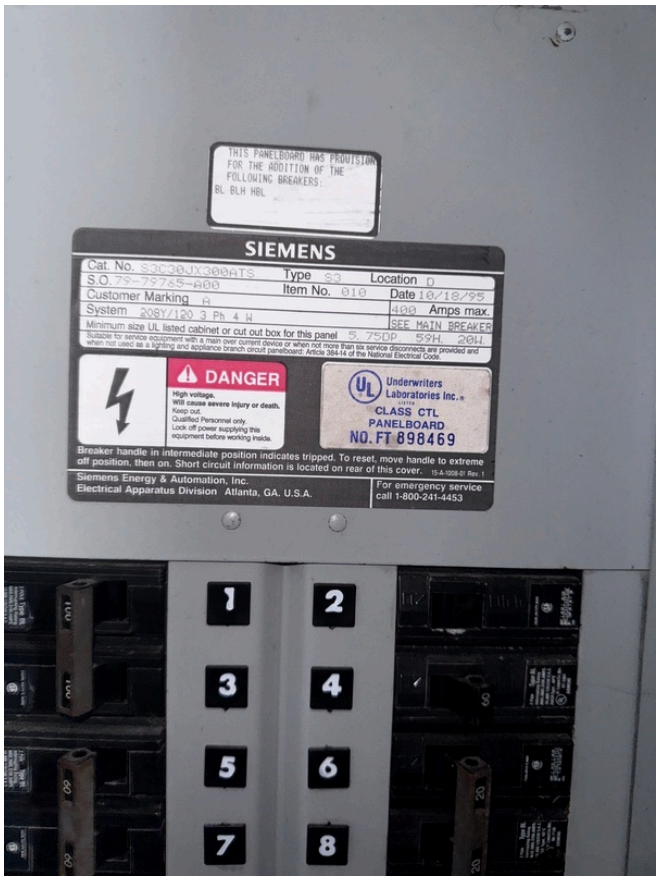
## 7.2 Electrical

**Main Panel:** The main panel is located at the rear left of the basement. The pane is rated at 400amps, and from the main panel, there are a few sub-panels. Exposed wiring consists of Aluminum Sheathed Cable, which may have either copper or electric conductor (EC) grade aluminum, solid or stranded. The panel was grounded to the incoming copper water pipes. We provide no opinion as to the efficacy of this connection. All power was shut off, and most cables were cut off near the panels; however, we cannot guarantee that some circuits and wires are not de-energized. Most breakers are labeled.

One of the panels was labeled "Generator Power", which implies that a generator could have been present on the property at one time.

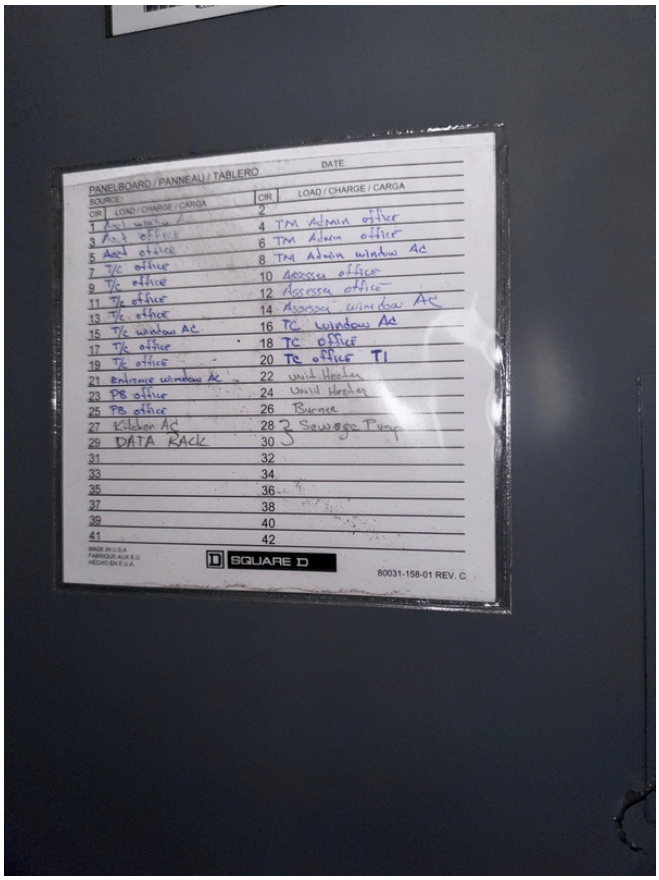
**Photographs**


400amp Main Panel

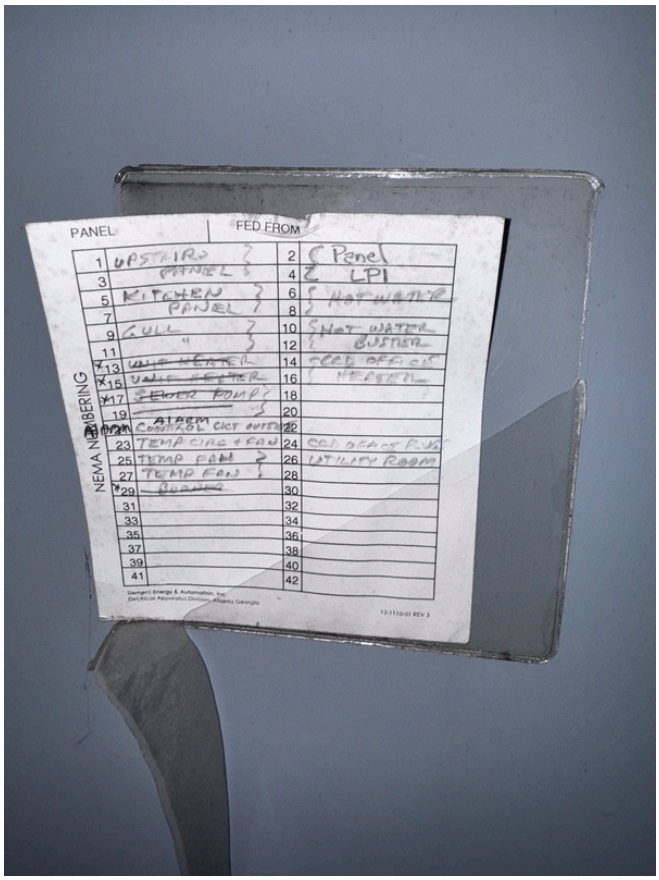



Main Panel Name Plate

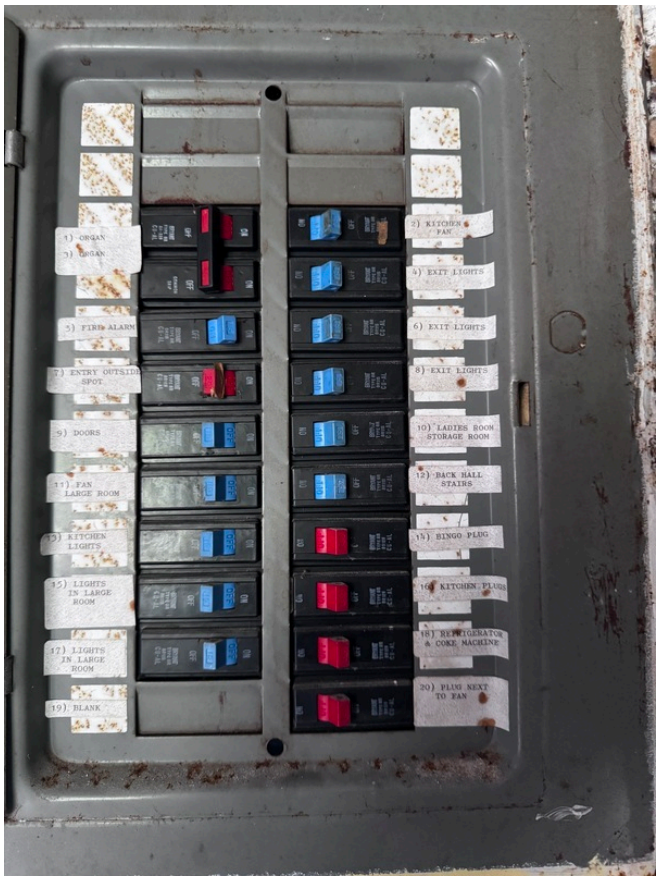

Sub-panel




Breaker names




breaker names



Breaker names

## 7.3 Plumbing

**Water Entrance:** Water enters from the municipality at the rear left corner of the basement via an iron pipe, which was shut off at the time of the evaluation. In turn, water goes through a meter and then to a copper pipe where it is distributed throughout the buildings' faucets and bathrooms.

**Potable Hot Water:** An Electric hot water tank heater is located in the downstairs restroom. According to the breaker panel labels, there may have been as many as three electric water heater tanks. The existing water heater was non-operational and based on its manufacturing date of April 2020, it may still be able to be used after thorough testing. It is a Bradford Model MI80R10DS13 80-gallon 4,500-watt system.

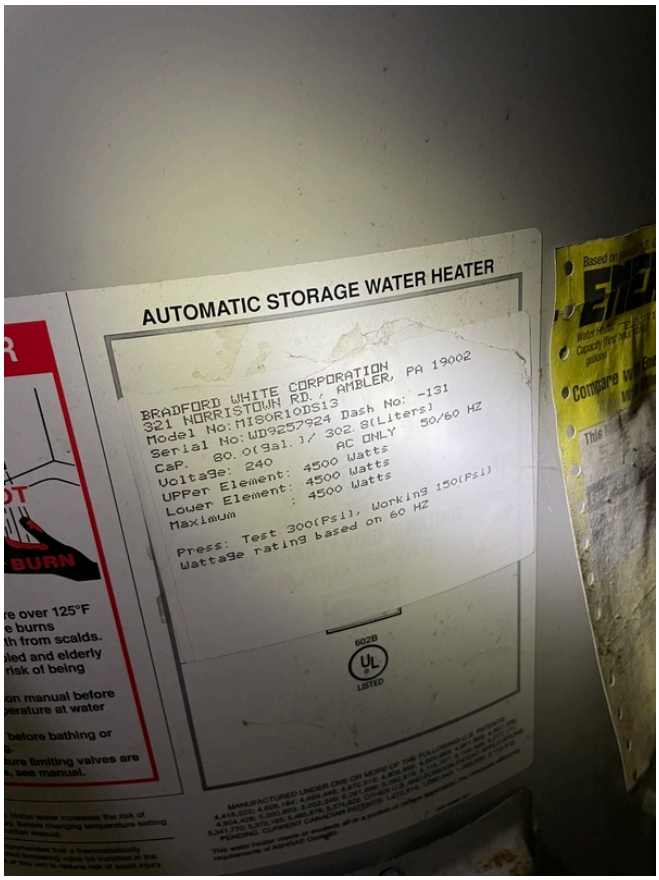
**Waste Disposal:** Liquid and solid waste are directed to the municipal system via PVC and cast iron pipes. The waste is pumped up to the municipal system via a sewage pump.

**Photographs**

Incoming potable water enters the basement at the left rear corner.  Incoming water volume is measured via a meter.


Sewege pump up controller

Electric water heater at left rear basement.




Name plate of electric water heater.

## 7.4 Fire Protection

The building has evidence of previous fire safety systems, such as a fire panel at the front entrance, pull stations, and smoke detectors and alarms. Based on the condition of the building and wiring, it would be advisable to replace all of these systems, including the fire panel, for maximum safety during a fire. Since the fire protection code is updated continuously, more likely than not, the current evidence of fire protection in the building is not to current code.

**Photographs**

Fire alarm panel at front entrance


Fire alarm panel is not on


Example of an audible and strobe alarm

Example of a heat detector


Example of a pull station

# 8.0 ESTIMATED COSTS

As stated in the introduction, structurally stabilizing the building would be pre-mature without first making the building water tight and mechanically conditioned. The reason would be to ensure that the repairs are not exposed to continued water intrusion and water vapor, which may accelerate the deterioration of any repairs. During the evaluation, we observed mold-like spores on structural members and painted surfaces. Mitigating this (if mold or a similar issue) beforehand is an industry best practice.

The following sections estimate repair/rehabilitation costs of:

- Structural Stabilization for future use as an assembly space
- Costs to replace the building's mechanical and electrical systems
- Costs to make the building ADA-compliant
- Costs to install fire sprinklers, strobes, alarms, fire panels, and pull stations
- Demolition
- Strengthen Roof Trusses
- Replacement of the roof
- Cost to modify the bell tower to be essentially water-tight.
- The replacement of the entirety of the building envelope with modern materials and techniques, including windows and doors
- Insulation and vapor barriers
- Drywall and new ceilings up be ready to paint

## 8.1 Structural Stabilization for Future use as an Assembly Space

Structural Stabilization for use as an assembly space would generally include the repair of these items:

- Foundation
- Sill Plate and structural walls, joists, beams, and columns as applicable.
- Strengthen the first floor load capacity to code to accommodate an assembly/pubic space use.
- Choir Loft

Note that these calculations are for cost estimating purposes only; a full design would be necessary to provide all design details for permitting and construction, which is beyond the scope of this report.

Preliminary calculations are included in Appendix B.

**Estimated Cost: $150,000**

## 8.2 Replace Mechanical, Electric Systems, and Plumbing

The scope of work here is to replace the boiler and air handler with a new system that would consist of two heat pump air handling units, which use heat pump technology to heat and cool air pushed through the system by the air handler. The lower level is assumed to be serviced by a 12-ton (cooling tons) unit and the upper level by a 15-ton unit. All ductwork, registers, return ductwork, refrigerant piping, and controls are included in the budget. Exhaust fans are included for the restrooms.

The electrical system appeared to have been recently updated and appeared to be in good condition. This budget assumes the electrical service and switchgear that are existing to remain, and that all wiring, circuits, end devices, etc., downstream will be replaced. This budget includes an allowance of $15,000 for any code-required upgrades to the electrical distribution
system. Also included are all power feeds to HVAC, fire protection, and plumbing equipment, all convenience power, and power and switching to all lighting and fire alarm systems and end devices. Budgeted costs have been included for a low voltage / tel-data system (access control, wireless internet, AV system).

The plumbing budget assumes the existing domestic water service is sized correctly. Includes removal of all existing
plumbing systems back to the service; a new system will be installed, including plumbing fixtures (water closet and lavatory) for two restrooms on each level, with new vent and sanitary piping. A new electric-fired hot water heater will be installed, with new hot and cold water piping feeding each fixture. The budget includes costs for a drinking fountain on each level and for a floor drain in the sprinkler room.

Mechanical Estimated Cost: $220,000

Electric System Estimated Cost: $160,000

Plumbing System Estimated Cost: $85,000

**Sub-Total Estimated Cost for this section: $465,000**

## 8.3 ADA Compliance

Making the Building ADA Compliant – costs included in demolition, misc. metals, rough carpentry, drywall and framing, accessories and specialties, and plumbing line items. The scope of work includes demolition, replacement of concrete stoops at egress doors, replacement of steel stairs at egress doors, replacement of handrails at the ADA ramp and interior stairs, replacement of wood joists and decking at the ADA ramp, drywall work, in-wall wood blocking, toilet accessories, and a complete new plumbing system to accommodate all restrooms and restroom fixtures.

**Estimated Cost: $185,000**

## 8.4 Fire Safety

The budget does include costs for a hydrant flow test and for engineering (hydraulic calculations for permit drawings). The system will include a sprinkler riser, with main and branch piping for a wet system throughout the interior of the building, and for a dry system in the attic of the building. Sprinkler heads will be concealed in most locations. Additionally, this budget includes a code-compliant, fully automated fire alarm system

**Estimated Cost: $90,000**

## 8.5 Roof and Roof Trusses

The entire existing roofing system will be demolished in its entirety down to the existing wood sheathing. Inspections from the attic have shown the roof sheathing to be in good condition. An ice and water shield will be installed at the roof eaves, at the edge, and at the ridge, with felt paper being used as an underlayment over the remaining area. New architectural, 30-year asphalt shingles will be installed, with a metal flashing and gutter system with downspouts along both roof eaves. Budgeted costs for flashing at and around the steeple have been included, as has a $10,000 allowance for roofing
on the steeple itself.

**Estimated Cost: $85,000**

CDE performed a calculation check on the roof trusses to evaluate their structural capacity under modern Massachusetts Building Code loading requirements. Note that these calculations are for cost estimating purposes only; a full design would be necessary to provide all design details for permitting and construction, which is beyond the scope of this report. Results indicate that the bottom horizontal structural member and the diagonal members supporting the roof rafters become overstressed under maximum snow loading. The overstressed members will require reinforcing by sistering with 2-1-3/4"X7-1/4" LVLs

Preliminary calculations are included in Appendix B.

**Estimated Cost: $90,000**

## 8.6 Steeple - Make Water Tight

The scope of work includes recommended repairs to deflect storm water from entering the steeple and interior spaces.

**Estimated Cost: $35,000**

## 8.7 Building Envelope Replacement and Insulation

The scope of work includes demolition, thermal batt cavity insulation in the exterior walls, replacement windows (all stained glass windows to be re-installed), installation of a weather-resistant vapor barrier, replacement of damaged wood sheathing, replacement of wood siding with composite (cement bard) lap siding, misc. flashing and trim, and painting of wood and composite trim. Replacement of the vinyl siding on the back addition to the building is not included.

The assumed removal and abatement of plaster and drywall containing ACM will leave the interior face of the wood studs and insulation in exterior partitions exposed. After the removal of the existing insulation, new closed cell spray foam insulation will be added to all exterior walls. Unfaced batt insulation will be installed between the new LVL floor joists in the ceiling above the lower level multi-purpose space, and foil-faced insulation will be installed above the new gypsum 'hard' ceiling above the Nave.

**Estimated Cost: $290,000**

## 8.8 Drywall and New Ceilings to be Ready for Paint

After the installation of the closed-cell spray foam insulation in exterior walls, a vapor retarder will be installed on the face of the exposed wood studs. Moisture-resistant drywall sheathing will be installed on all interior walls. Budgeted costs have been included to replace damaged wood-framed partitions with new metal-framed partitions in both levels of the building. In-wall blocking has been included for areas with new toilet accessories, railings, etc. An allowance of $7,500 has been included to replicate wood trim at the ceiling. Budgeted costs have been included for a new drywall 'hard' ceiling above the Nave and in the multi-purpose room, and at the underside of the choir loft.

**Estimated Cost: $166,000**

## 8.9 Demolition

Demolition and disposal of

- Existing plumbing, HVAC and mechanical, and electrical equipment
- All toilet accessories, toilet partitions, vanities, countertops, cabinetry, and handrails / railings
- All ceilings, including the high ceiling in the nave.
- All flooring that has been abated

- All wall plaster or drywall that hasn't been abated leaving the wood studs and framing exposed.
- All insulation within the walls
- All doors and door hardware
- At the exterior of the building, the steel stairs leading from the upper level out of the building to grade as well as concrete stoops and landings.
- The roof structure over the egress door from the lower level
- The wood decking and the steel handrails of the handicap ramp
- Costs to prune and clean up some of the trees on the property that are in the proximity of the building.

**Estimated Cost: $55,000**

## 9.0 OTHER COST CONSIDERATIONS

General Conditions including onsite, full-time superintendent, project management, a project accountant, project administration, miscellaneous onsite labor, maintain a construction office in the building, cost for project management software, printing, mailing, and the taking of progress photos, temporary electrical and water usage, small tool rental, and for dumpsters.

**Estimated Costs: $175,000**

Staging and Lifts assumes platform staging will be required in the nave in order to work on the ceilings and on
upper portions of the walls, and costs for a boom lift in order to perform repair work on the church steeple.

**Estimated Costs: $25,000**

Shoring and bracing the framing above the all-purpose room in the lower level will be completely replaced. It isn't known
how the framing is tied into or affects the lateral bracing of the church structure. This budget includes some costs to provide the lateral bracing during work to replace that framing.

**Estimated Cost $5,000**

## 10.0 COSTS NOT INCLUDED

Costs not included to bring the building to its final form as an Assembly Space:

- Permit Set Construction Drawings
- Overhead & Fees
- Contingency
- Building Permits
- Sitework

- Lighting Fixtures
- Interior Painting
- Window Replacements, except for stained-glass windows.
- Interior doors and hardware
- Rough Carpentry
- Masonry/Concrete work
- Interior Painting
- Any unforeseen costs that may be revealed during construction

## 11.0 LIMITATIONS

This information in this study is not to be considered a warranty of condition, quality, compliance or cost. No warranty is implied.

Financial data, records of past expenses, and cost estimates provided by others have been taken in good faith and at face value. No audit or other verification has been performed.

The observations described in this study are valid on the dates of the investigation and have been made under the conditions noted in the report.

This study is limited to the visual observations made during our inspection. We did not undertake any excavation conduct any destructive or invasive testing, remove all surface materials or finishes, or displace furnishings or equipment.

Except as specifically noted or photographed, we did not observe or inspect the following areas and items:

- Buried foundations, utility services and infrastructure
- Locked or inaccessible or confined spaces
- Systems and equipment which were not operating were not tested

In the absence of other information such as records from construction or previous inspections, or indirect evidence of concealed conditions, we cannot form any conclusions about unobserved portions of the facility.

However, our opinion regarding concealed portions of the property and their condition are informed by our experience with other similar facilities.

In some cases, we inspected only a representative sample of site improvements and building spaces, components, systems or equipment. We cannot be responsible for unobserved aberrations.

We did not conduct a comprehensive code compliance investigation.

We did not undertake to completely assess the structural stability of the building or the underlying foundations and soils. CDE performed analysis on portions of the building where visual evidence of a potential structural issue is observed, such as with the floor and the roof. Similarly, we performed no seismic assessment. Although structural calculations were performed on parts of the building based on our observations, no design drawings or documents have been prepared. At the time of restoration activities, detailed design documentation and specifications will be required, which will affect the estimated costs provided.

We did not undertake a comprehensive environmental assessment of the facility, nor perform any sampling or testing for hazardous materials.

Capital expenditure budgets are opinions of likely expenses based on rough cost estimates. We have not obtained competitive quotations or estimates from contractors. Actual costs can vary significantly, based on the eventually determined scope of work, availability of materials and qualified contractors, and many other variables. We cannot be responsible for variances.

Criterium-Dudka Engineers does not offer financial counseling services. Although reasonable rates of inflation must be assumed to calculate projected costs, no one can accurately predict actual economic performance. We are licensed engineers performing cost estimates with industry backed references and do not purport to hold any special qualifications in this area or in the area of economic forecasting.

Criterium-Dudka Engineers prepared this confidential report for the review and use of Town of Upton. We do not intend any other individual or party to rely upon this study without our express written consent. If another individual or party relies on this study, they shall indemnify and hold Criterium Engineers harmless for any damages, losses, or expenses they may incur as a result of its use.

# 12.0 CONCLUSION

This report has been prepared in strict confidence with you as our client. No reproduction or re-use is permitted without express written consent. Further, we will not release this report to anyone without your permission.

Many things have been discussed in this report. However, we realize that there may still be other things of interest to you that have not been discussed. Therefore, we encourage you to call with any additional questions you may have.

There is no one way to build, renovate or remodel a building. As a result, you may encounter contractors whose opinions about the condition of this building will differ from ours. We cannot be responsible for any action you may take based on those opinions unless we have the opportunity to review the situation and examine the relevant conditions before any repairs and/or modifications are made.

We hope that you will call if you have further questions concerning this report.

Respectfully submitted,

**Criterium-Dudka Engineers**

Richard P. Michalewich Jr.,
Chief Engineer

Andrew Dudka, President
President

# APPENDIX A - APPENDIX A-EXISTING CONDITIONS PLANS

GENERAL NOTES:

1. All drawings are not for construction but for budgetary purposes only.
2. The drawings were drawn from the following:
   2.1. E-1.0 through E.14: measurements taken by CDE.
   2.2. A1.0 through A1.6: laser scan by GPRS.
3. Follow all manufacturers installation instructions.
4. Criterium Dudka Engineers owns this document, including all associated copyrights and the right of reuse. Any use, reuse, or modification without written verification is strictly prohibited.

# PROJECT LOCATION:
# HOLY ANGEL CHURCH UPTON, MA

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
4. All dimensions to be field verified by the contractor.
5. Contractor is responsible for adequately shoring the floors prior to wall or beam removal.
6. Any deviations from drawings must be reviewed with and approved by the engineer of record.
7. Criterium Dudka Engineers owns this document/design, including all associated copyrights and the right of reuse. Any use, reuse, or modification without written verification is strictly prohibited.

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508.589.8020
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**PROJECT:**
HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

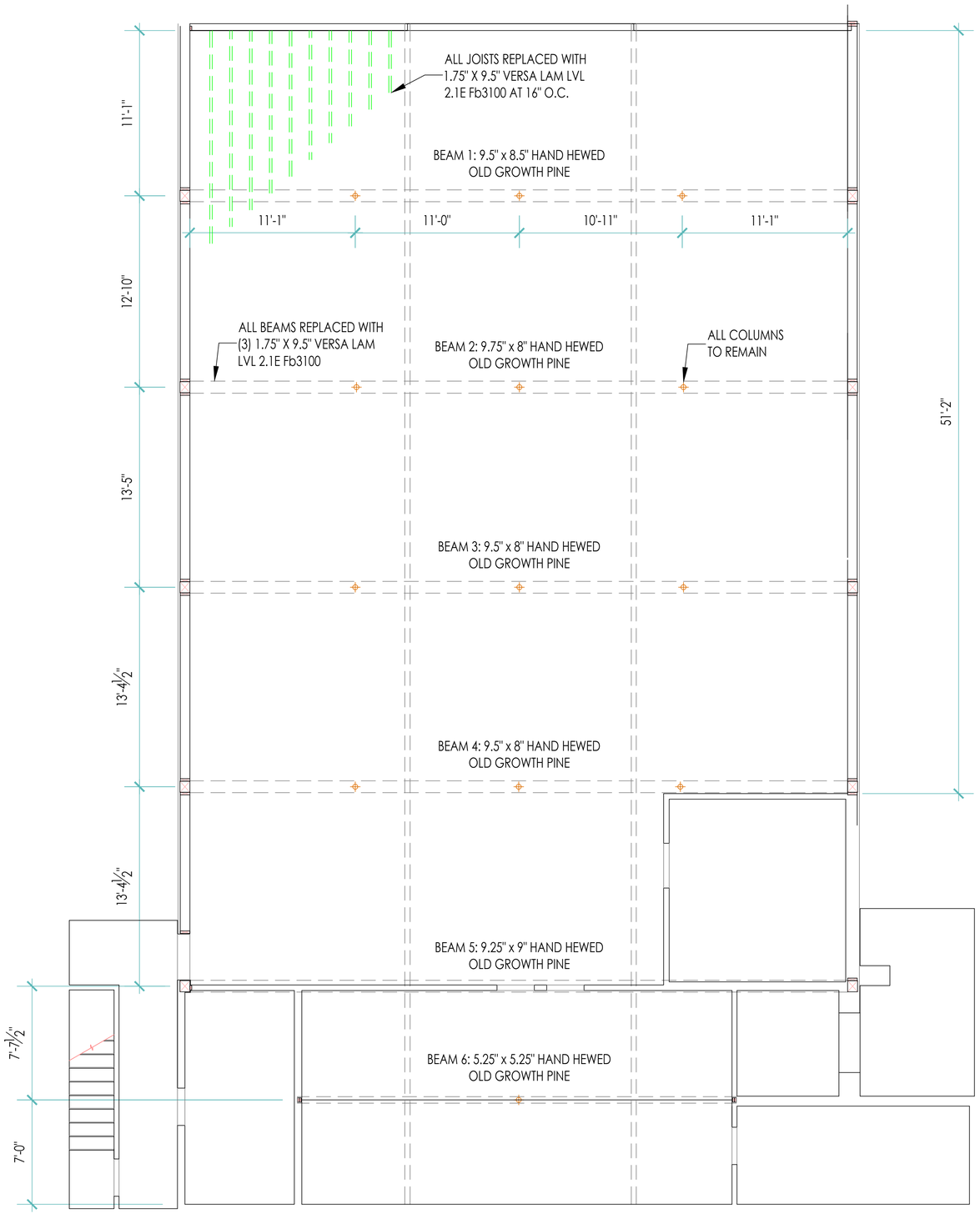
**SHEET:**
PROJECT LOCATION,
CONSTRUCTION NOTES &
GENERAL NOTES

**SCALE:** AS NOTED

| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

T-1




BASEMENT FLOOR PLAN

SCALE: 1/4" = 1'-0"

1 / E-1.0

## GENERAL NOTES:

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BASEMENT FLOOR PLAN

**SCALE:** AS NOTED

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**SHEET NO:**

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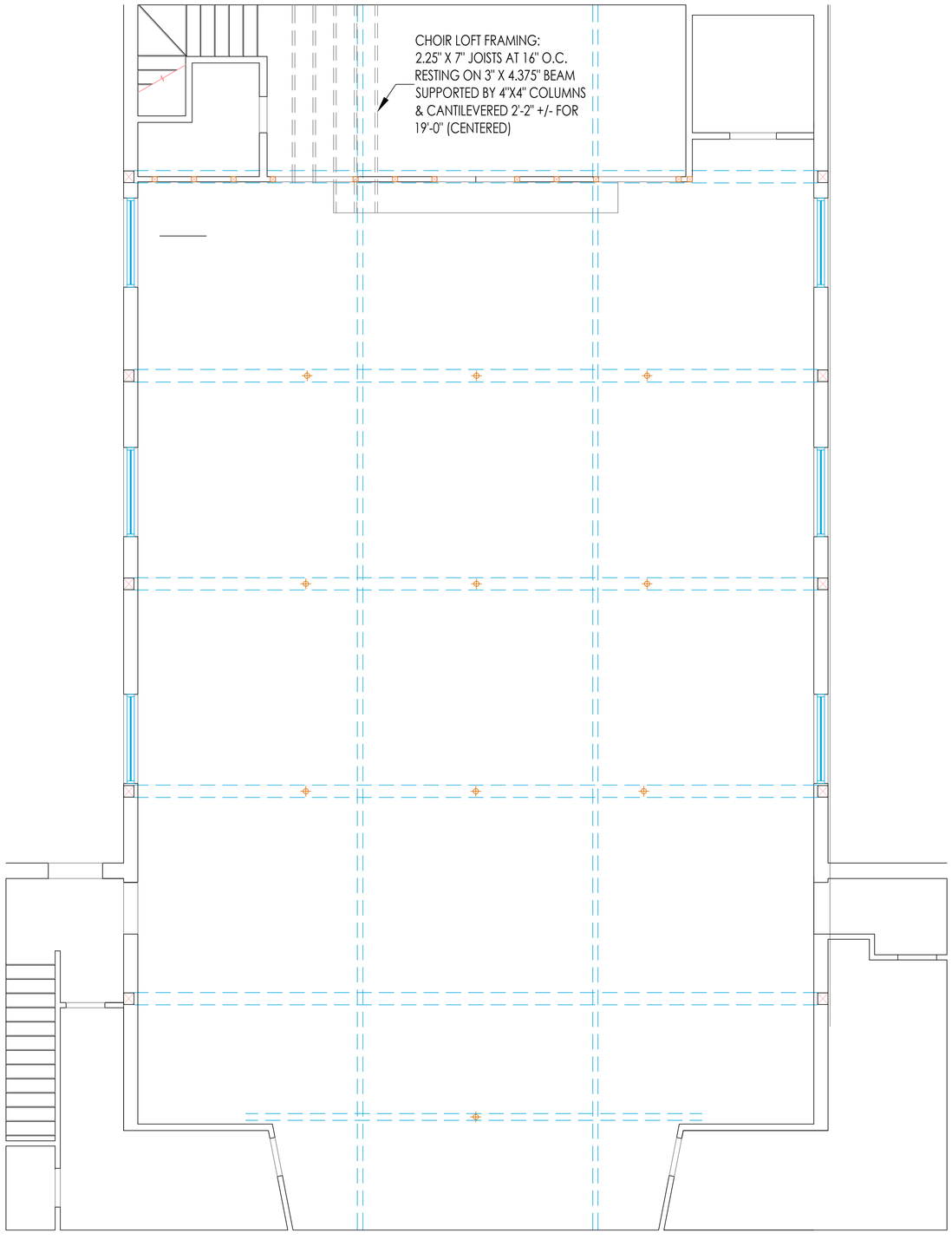


MAIN FLOOR PLAN

SCALE: 3/16" = 1'-0"

1 / E-1.0

## GENERAL NOTES:

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2. Follow all manufacturers installation instructions.
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**SHEET:**

MAIN FLOOR PLAN

**SCALE:** AS NOTED

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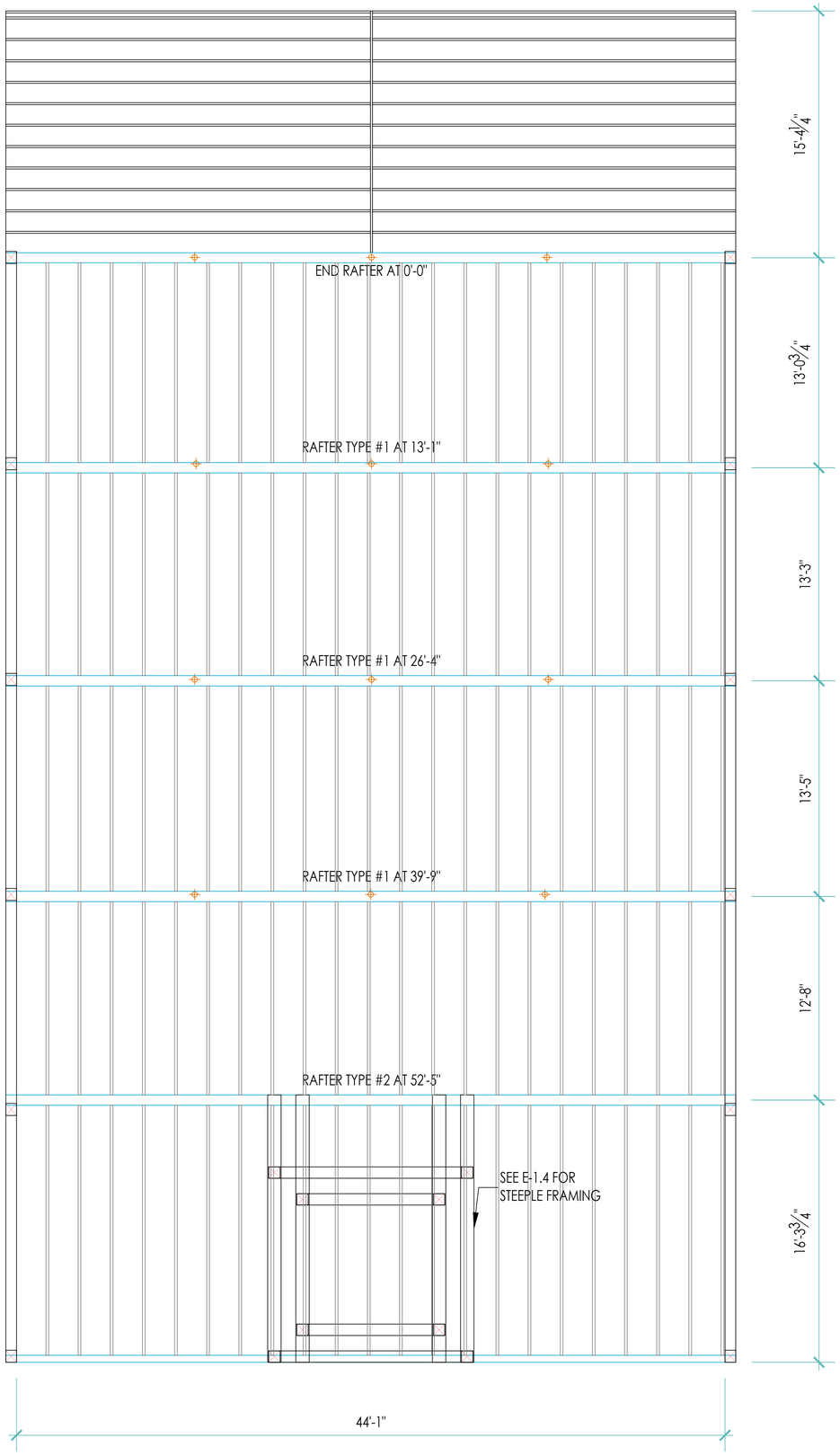
# E-1.0




## ATTIC FRAMING PLAN

1 / E-1.2

SCALE: 1/4" = 1'-0"

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
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**SHEET:**
ATTIC FRAMING PLAN

**SCALE:** AS NOTED

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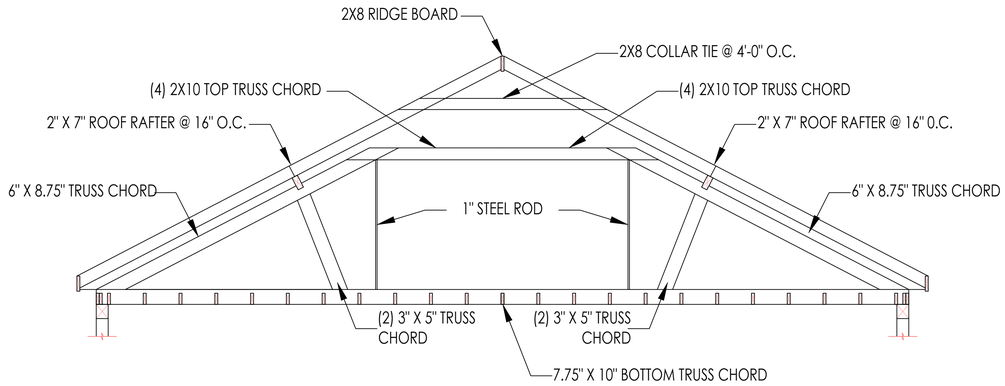
**SHEET NO:**

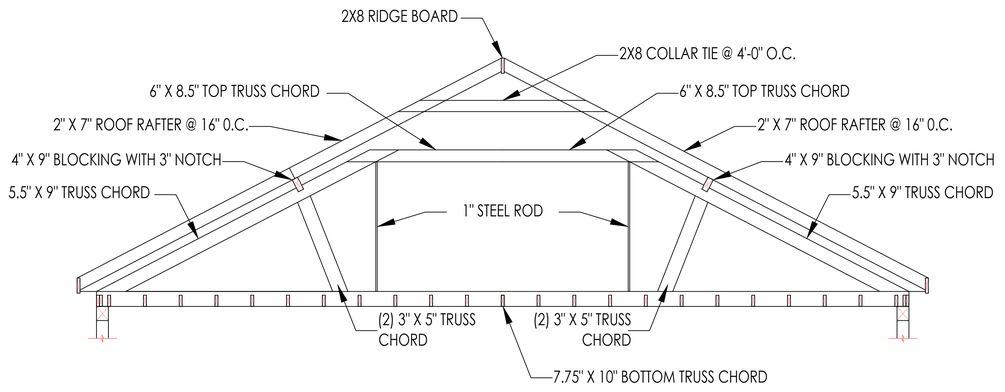
# E-1.2




## ATTIC FRAMING: END TRUSS

1 / E-1.3

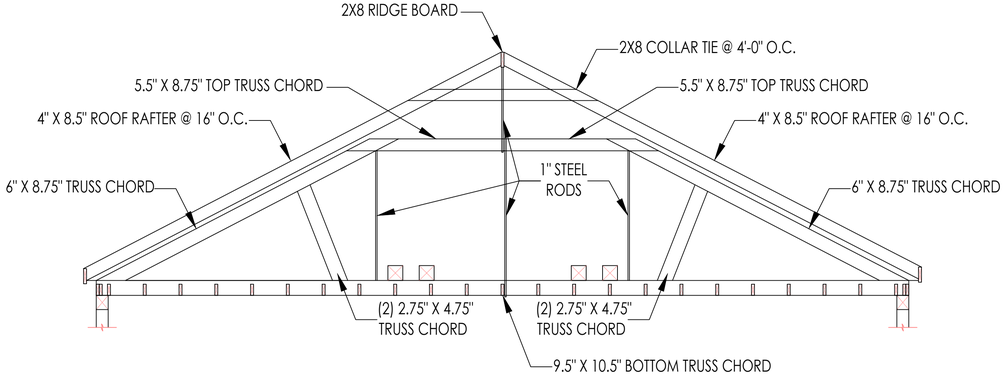
SCALE: 1/4" = 1'-0"




## ATTIC FRAMING: TRUSS #1

4 / E-1.3

SCALE: 1/4" = 1'-0"




## ATTIC FRAMING: TRUSS #2

3 / E-1.3

SCALE: 1/4" = 1'-0"

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
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4. All dimensions to be field verified by the contractor.
5. Contractor is responsible for adequately shoring the floors prior to wall or beam removal.
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**SHEET:**

ATTIC FRAMING OF RAFTERS

**SCALE:** AS NOTED

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| 8.20.2025 | |

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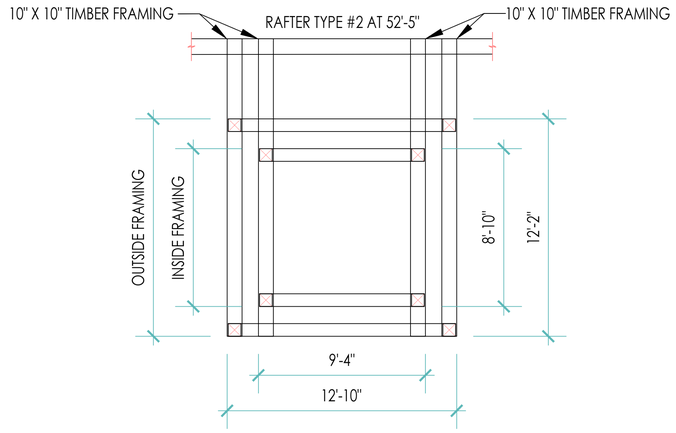
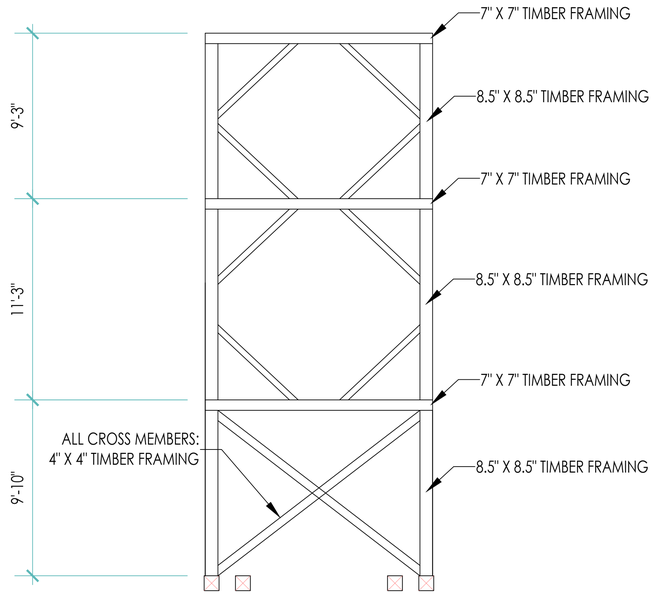



## STEEPLE FRAMING: PLAN

1 / E-1.4

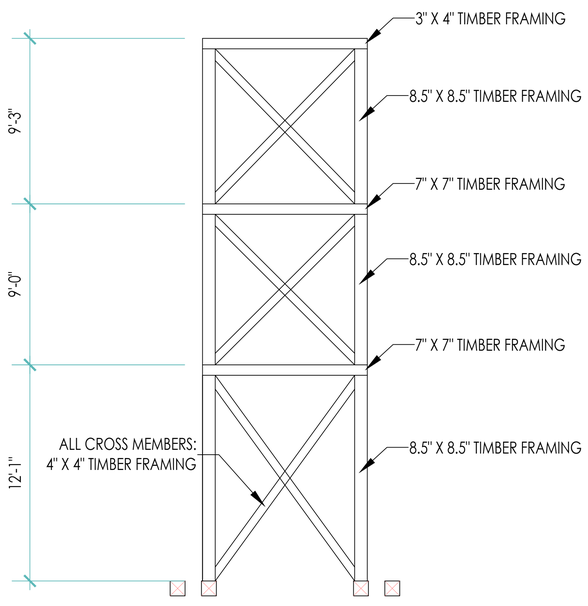
SCALE: 1/4" = 1'-0"




## OUTSIDE STEEPLE FRAMING

2 / E-1.4

SCALE: 1/4" = 1'-0"




## INSIDE STEEPLE FRAMING

3 / E-1.4

SCALE: 1/4" = 1'-0"

## GENERAL NOTES:

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**SHEET:**
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**SCALE:** AS NOTED

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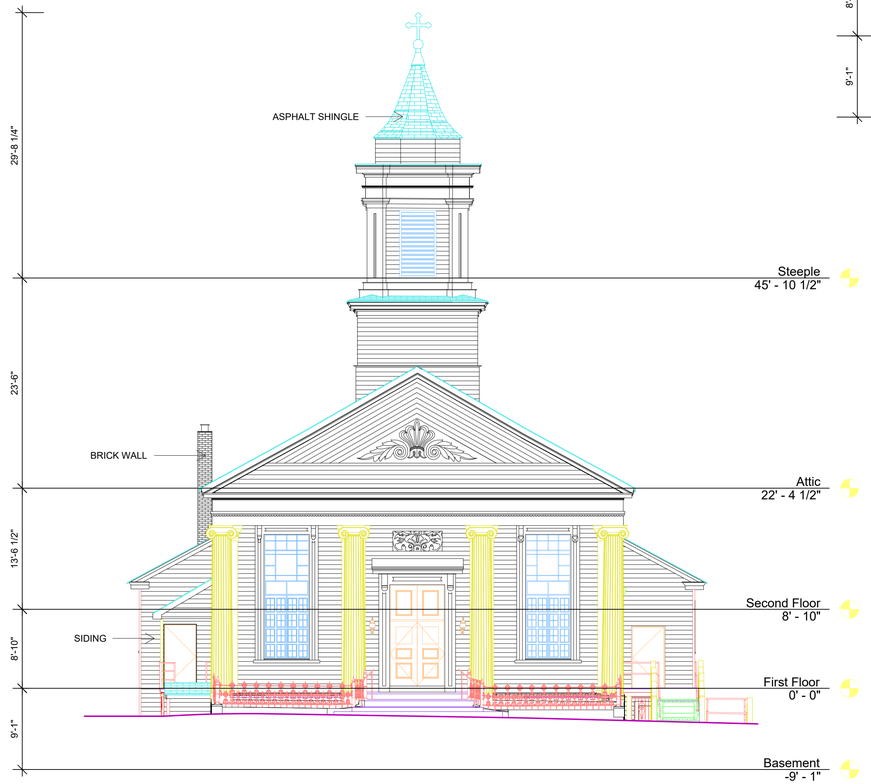


NORTHWEST (FRONT) ELEVATION 1 / A1.0

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


SOUTHWEST (RIGHT) ELEVATION 2 / A1.0

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

## GENERAL NOTES:

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UPTON, MA

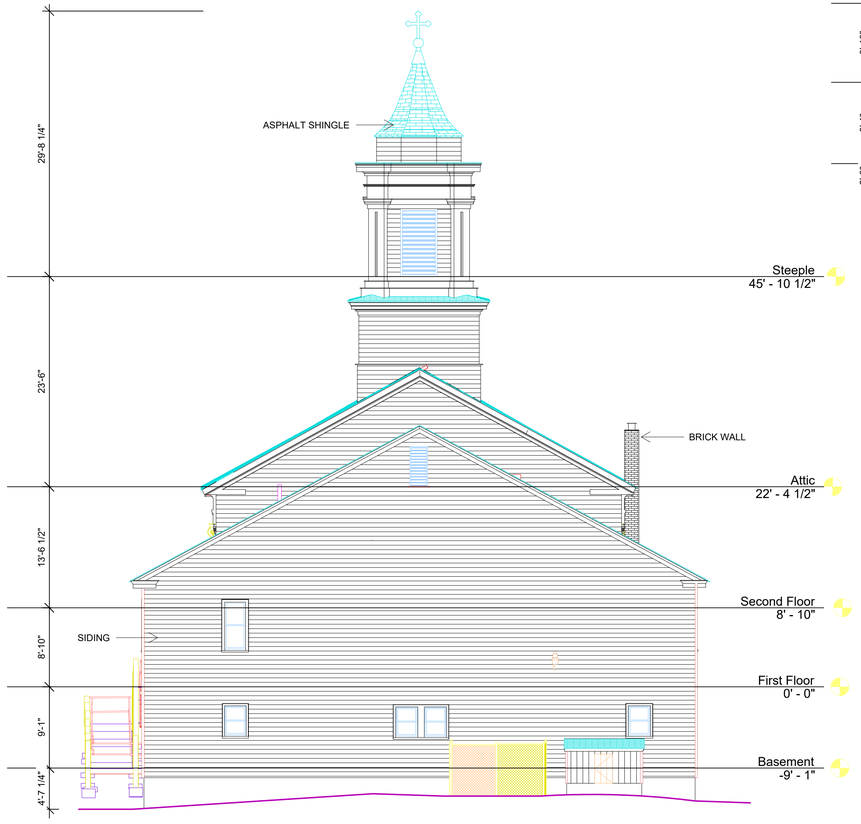
**SHEET:**
NORTHWEST & SOUTHWEST ELEVATIONS [SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

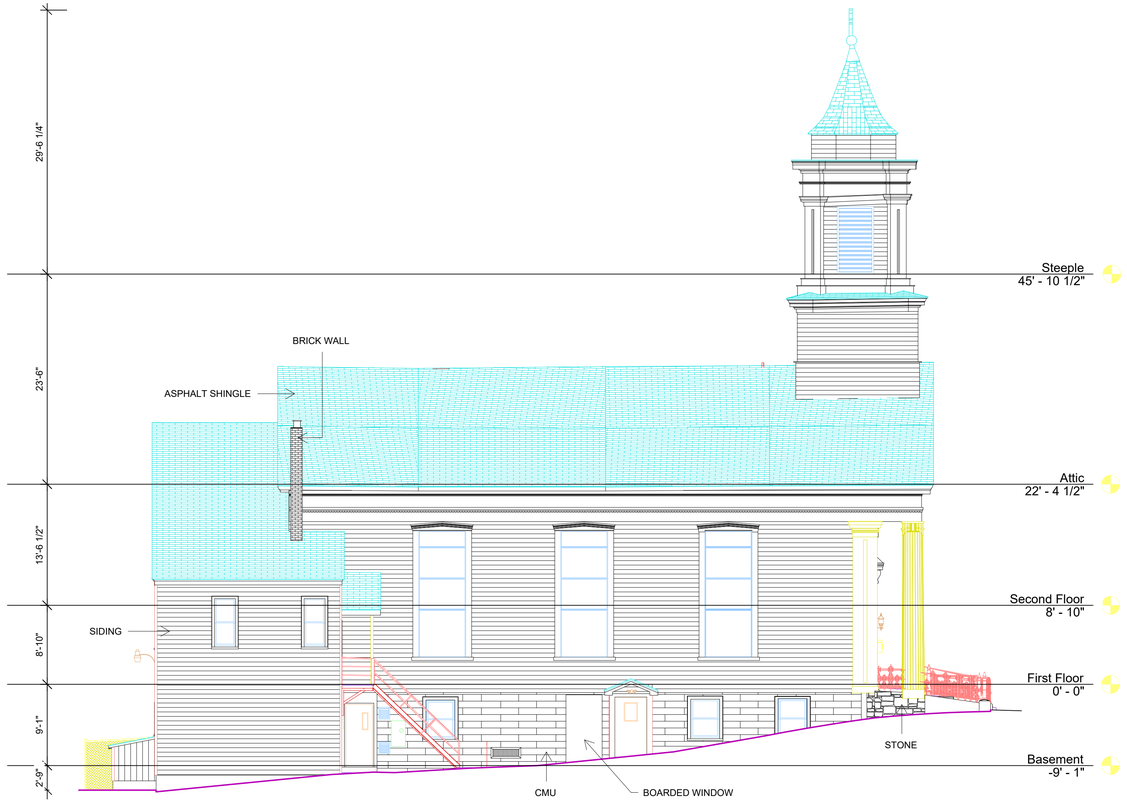
A1.0




SOUTHEAST (REAR) ELEVATION

1 / A1.1

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




NORTHEAST (LEFT) ELEVATION

2 / A1.1

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

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
4. All dimensions to be field verified by the contractor.
5. Contractor is responsible for adequately shoring the floors prior to wall or beam removal.
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**PROJECT:**

HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**

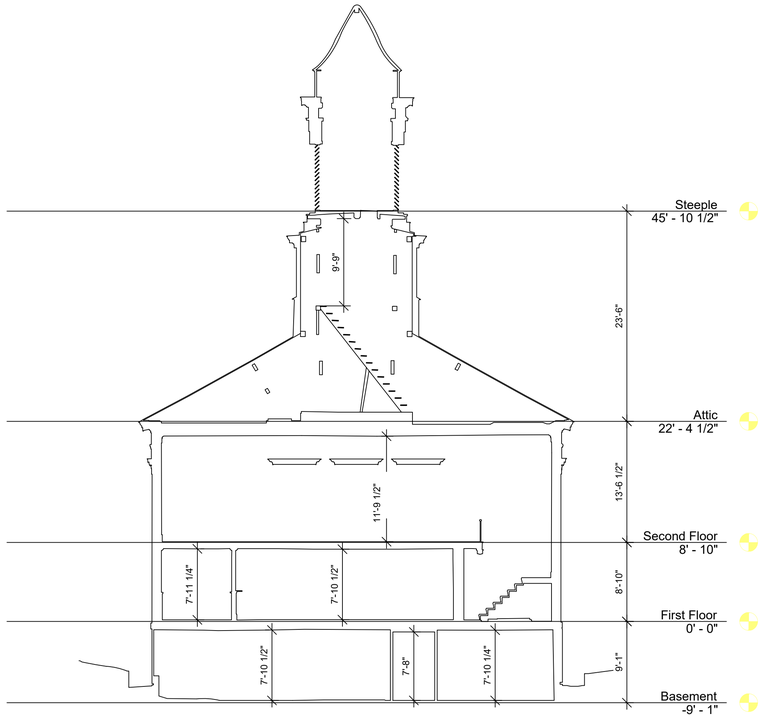
NORTHEAST & SOUTHEAST ELEVATIONS [SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

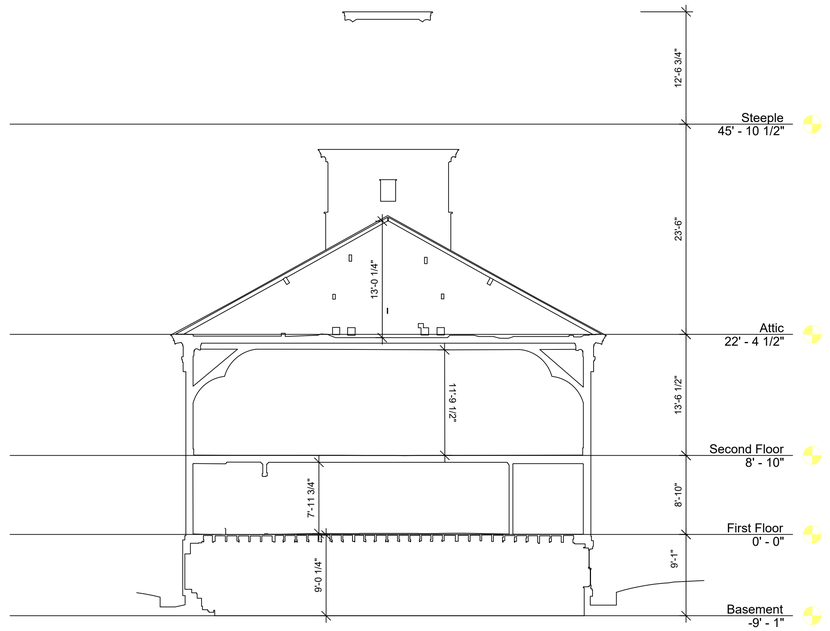
A1.1




## SECTION ONE: AT CENTER OF STEEPLE

1 / A1.2

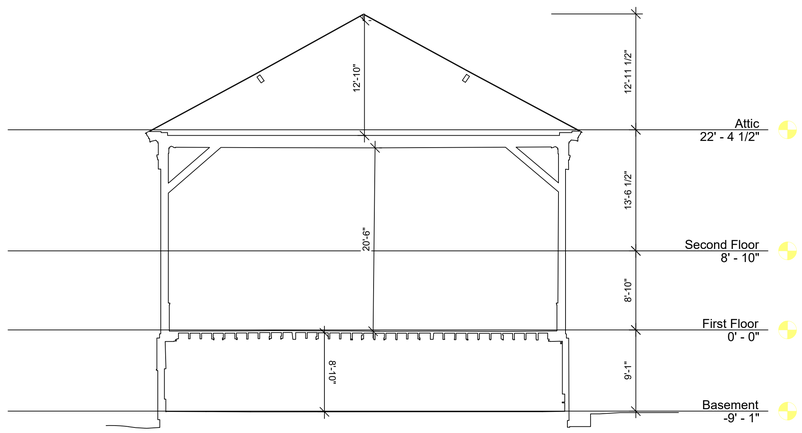
SCALE: 1/8" = 1'-0"




## SECTION TWO: AT STEEPLE

2 / A1.2

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




## SECTION THREE: MAIN AREA

3 / A1.2

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

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
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**PROJECT:**
HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**
BUILDING SECTIONS
[SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

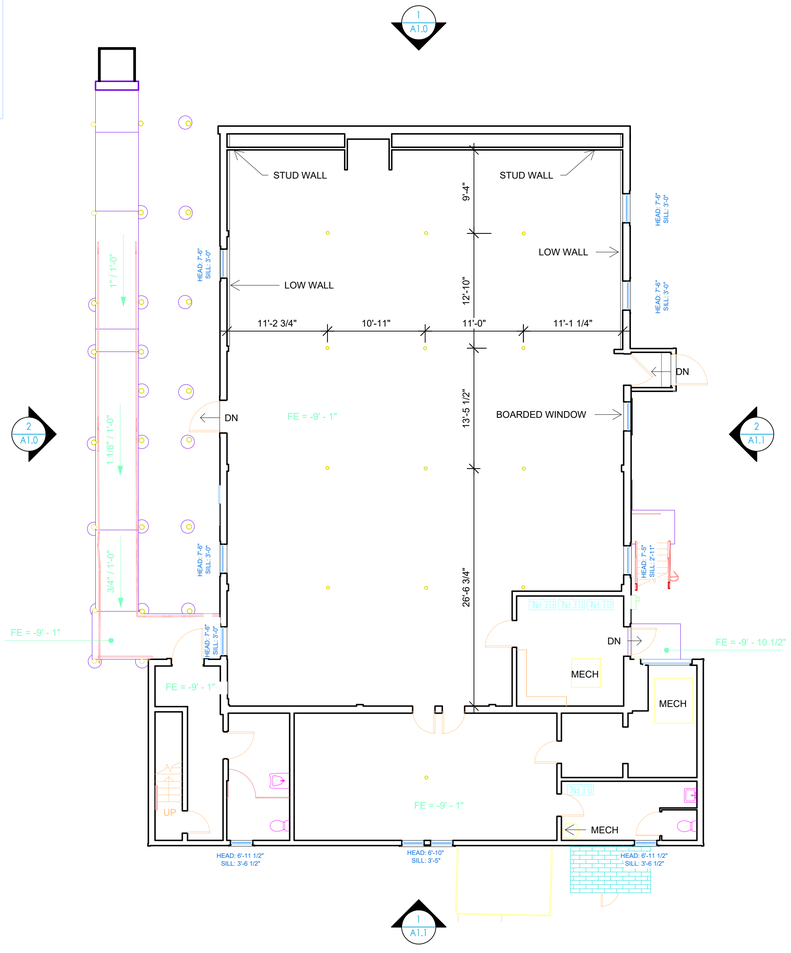
| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

# A1.2

RCP Legend

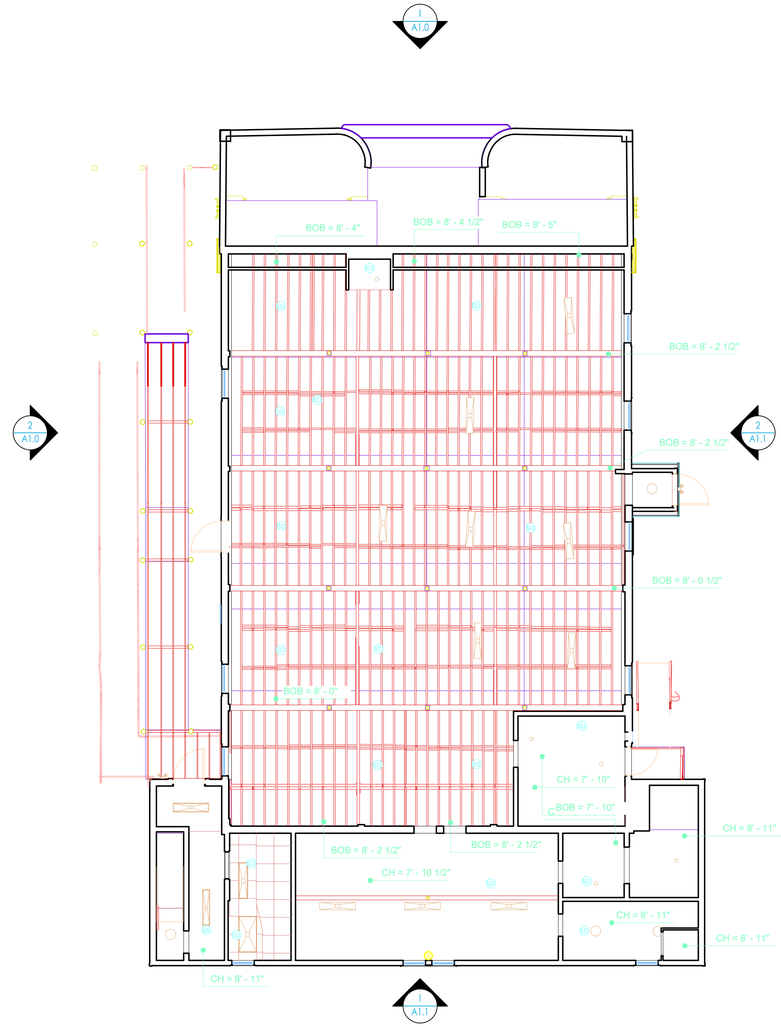
- Recessed Light Fixture
- Pendant Light Fixture
- Recessed Can Light
- Track Light
- Exposed Bulb
- Exposed Linear Bulb
- Camera
- Exit Sign
- Wifi
- Sprinkler
- Smoke Detector
- Motion Sensor
- Access Panel
- Speaker
- Fire Alarm
- Air Terminal




## BASEMENT FLOOR PLAN

1 / A1.3

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




## BASEMENT REFLECTIVE CEILING PLAN

2 / A1.3

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

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
4. All dimensions to be field verified by the contractor.
5. Contractor is responsible for adequately shoring the floors prior to wall or beam removal.
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**PROJECT:**
HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**
BASEMENT FLOOR & REFLECTIVE CEILING PLANS
[SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

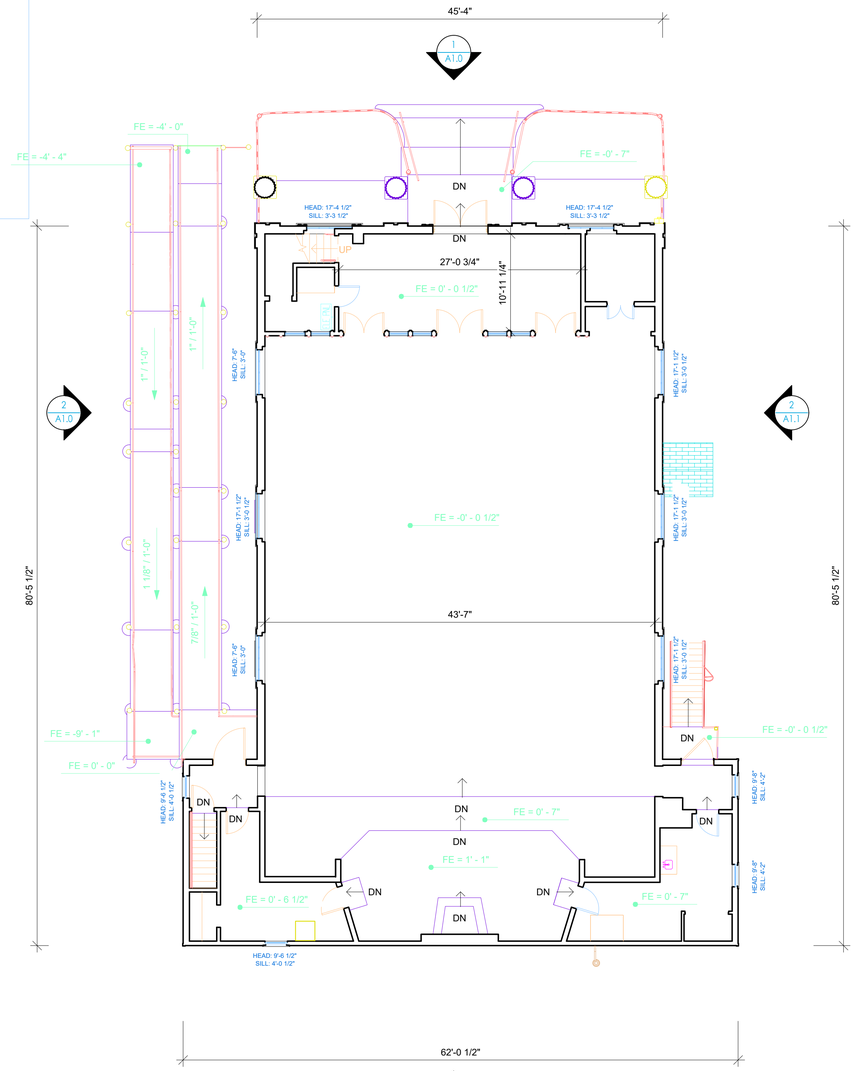
| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

# A1.3

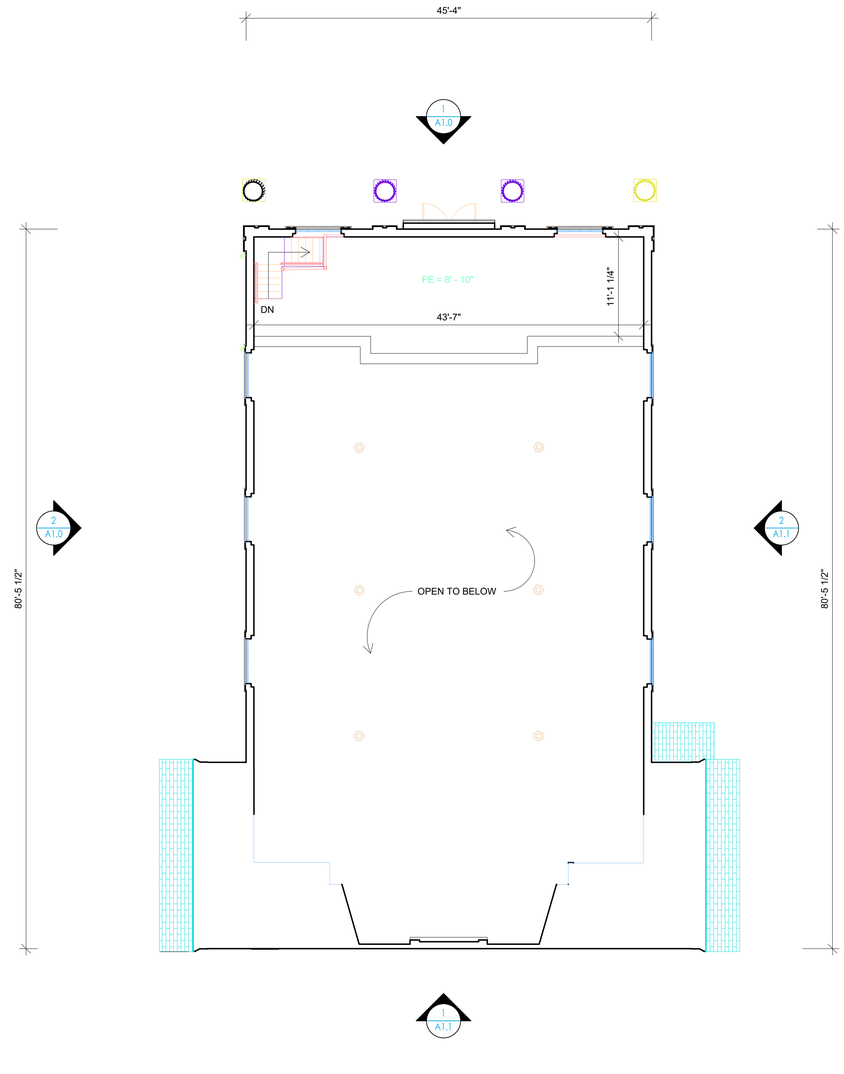
RCP Legend

- Recessed Light Fixture
- Pendant Light Fixture
- Recessed Can Light
- Track Light
- Exposed Bulb
- Exposed Linear Bulb
- Camera
- Exit Sign
- Wifi
- Sprinkler
- Smoke Detector
- Motion Sensor
- Access Panel
- Speaker
- Fire Alarm
- Air Terminal




FIRST (MAIN) FLOOR PLAN 1 / A1.4

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




FIRST (BALCONY) FLOOR PLAN 2 / A1.4

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

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
4. All dimensions to be field verified by the contractor.
5. Contractor is responsible for adequately shoring the floors prior to wall or beam removal.
6. Any deviations from drawings must be reviewed with and approved by the engineer of record.
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**PROJECT:**

HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**

FIRST FLOOR MAIN & BALCONY PLANS
[SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

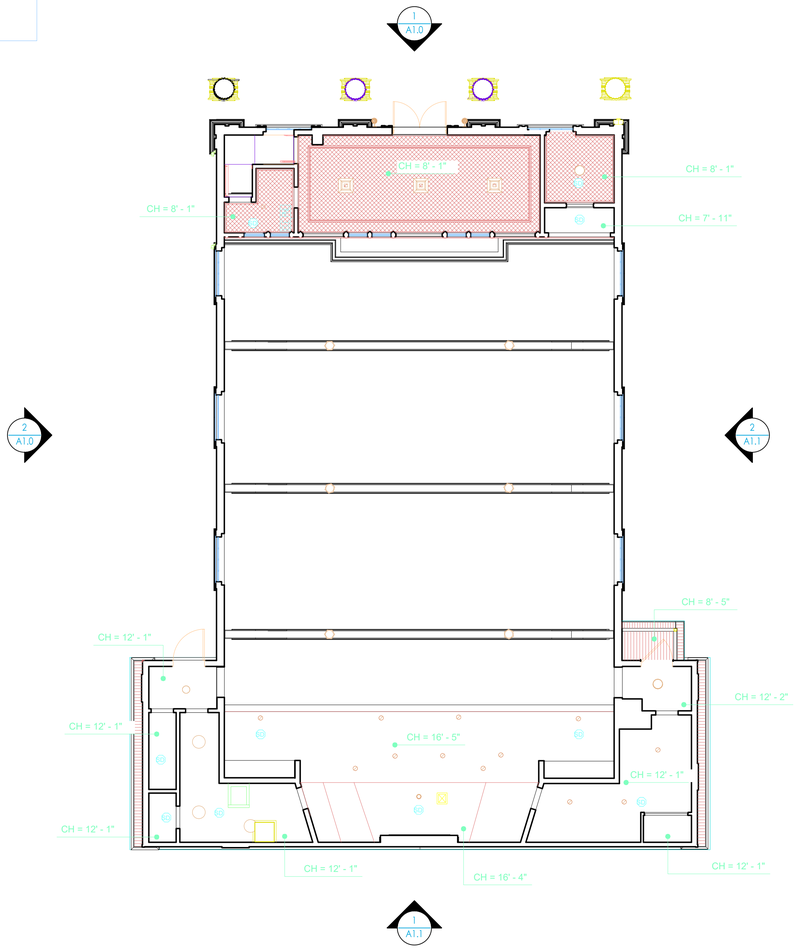
| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

# A1.4

RCP Legend

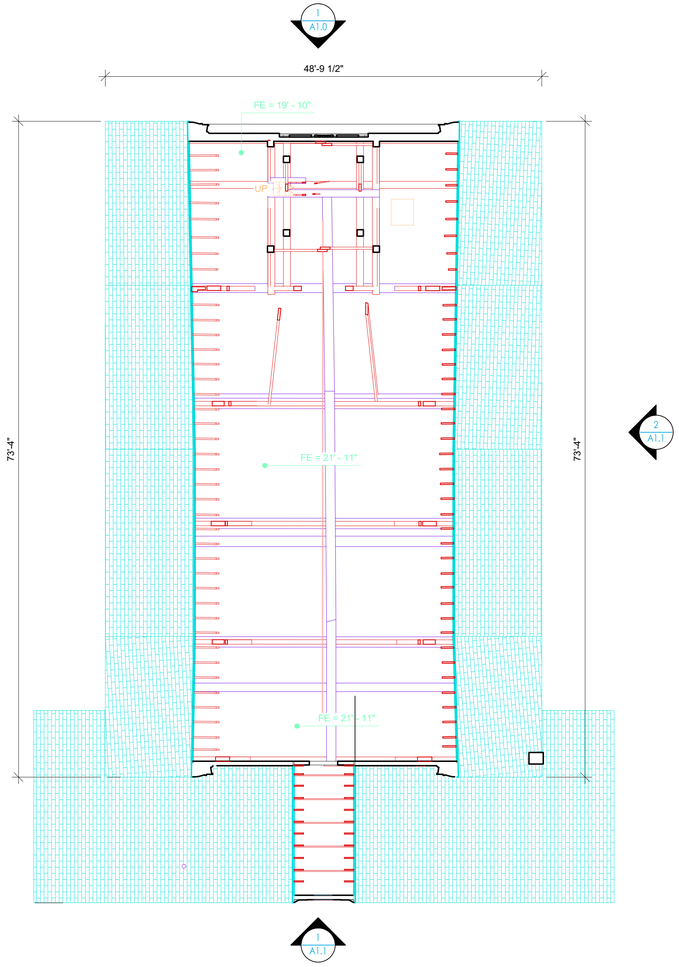
- Recessed Light Fixture
- Pendant Light Fixture
- Recessed Can Light
- Track Light
- Exposed Bulb
- Exposed Linear Bulb
- Camera
- Exit Sign
- Wifi
- Sprinkler
- Smoke Detector
- Motion Sensor
- Access Panel
- Speaker
- Fire Alarm
- Air Terminal




## FIRST (MAIN) CEILING REFLECTIVE PLAN

1 A1.5

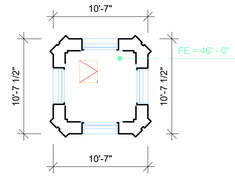
SCALE: 1/8" = 1'-0"




## ATTIC & STEEPLE PLAN

1 A1.5

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




## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
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**PROJECT:**

HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**

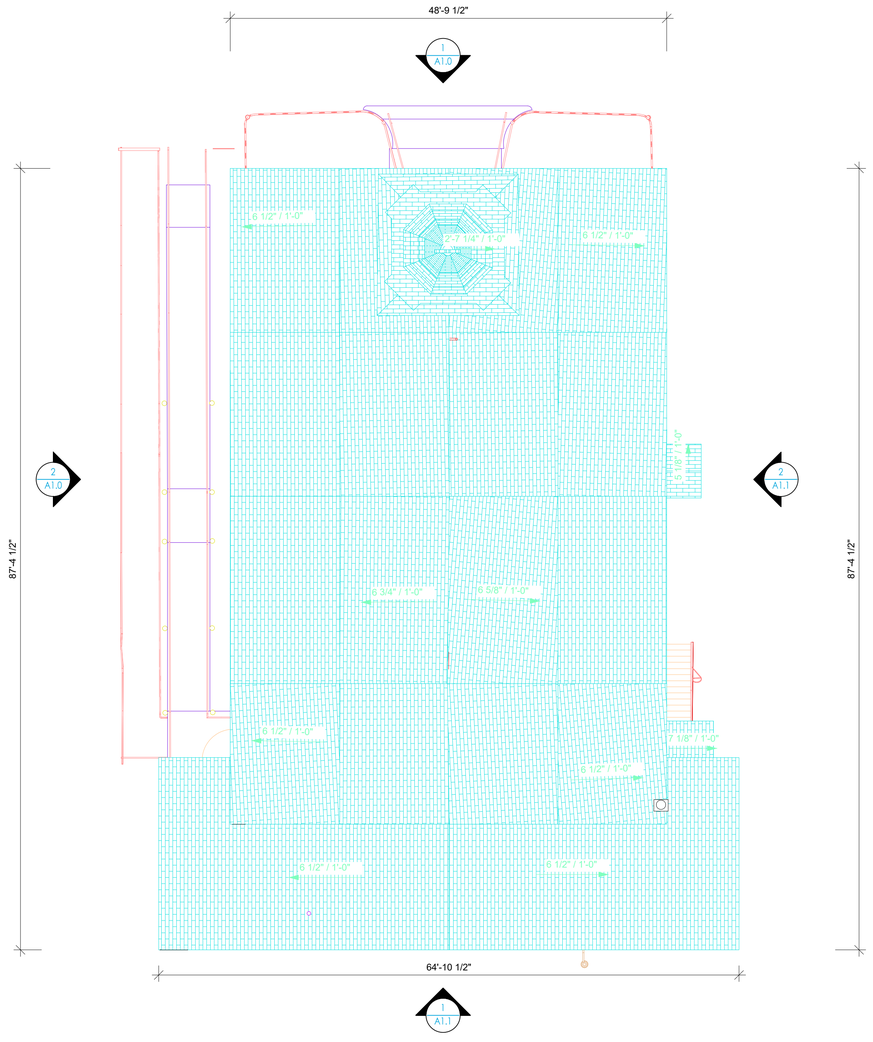
FIRST FLOOR REFLECTIVE CEILING & ATTIC PLANS
[SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

# A1.5




# ROOF PLAN

1
A1.6

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

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
4. All dimensions to be field verified by the contractor.
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**PROJECT:**

HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**

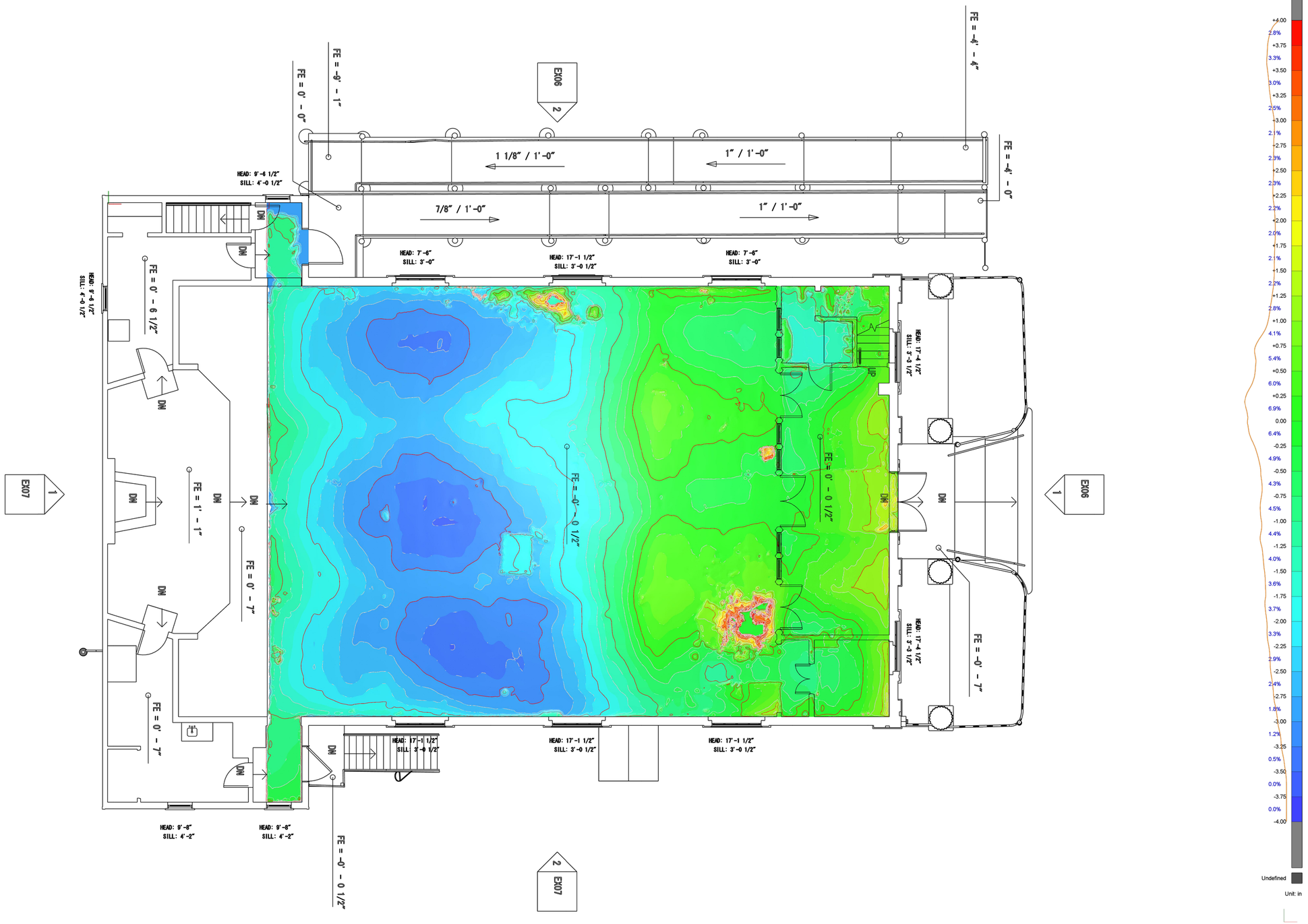
ROOF PLAN
[SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

A1.6







# FIRST FLOOR HEAT MAP

1 / A1.7

NOT TO SCALE

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
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**PROJECT:**

HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**

FIRST FLOOR HEAT MAP
[SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

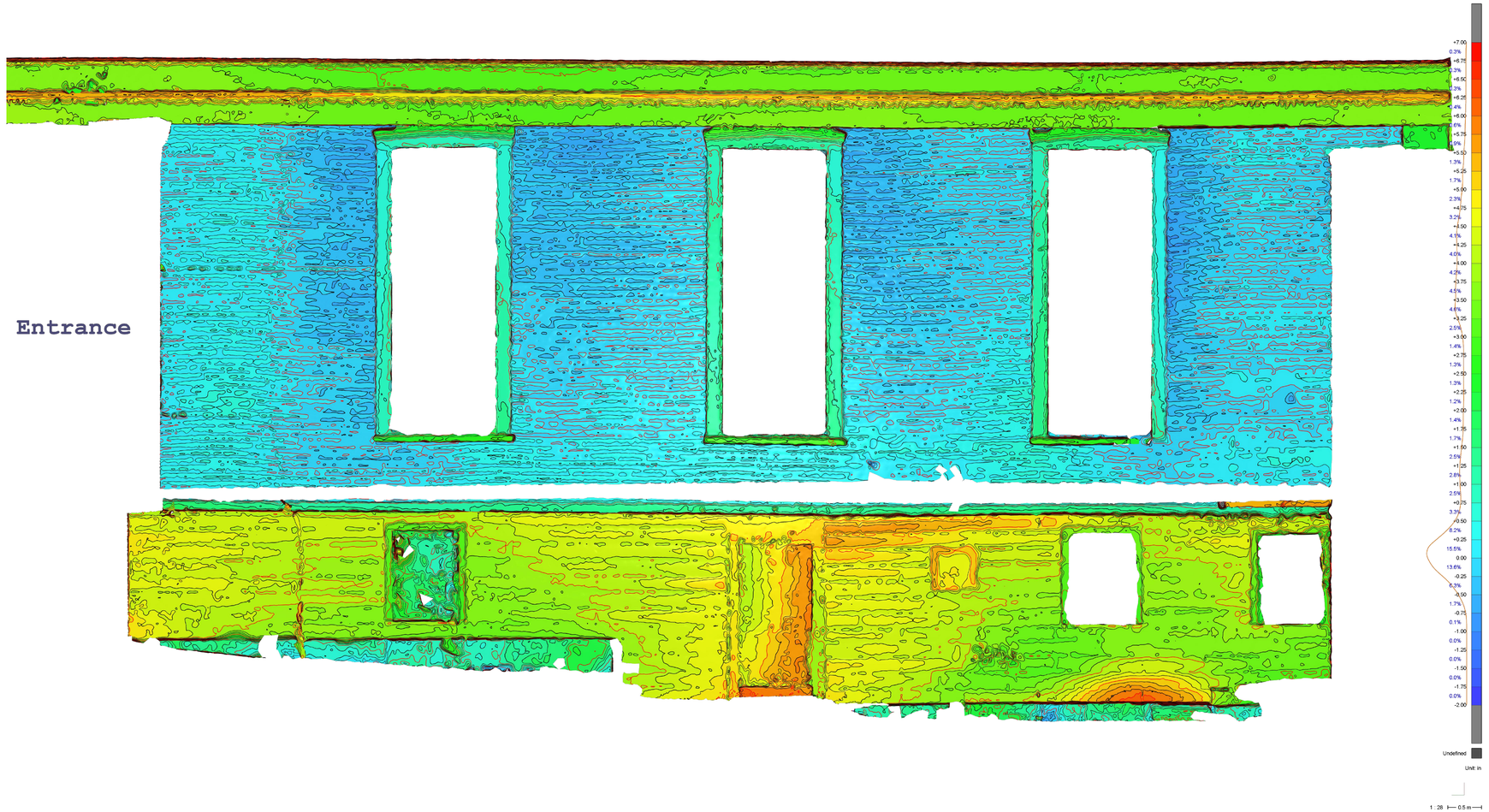
| DATE: | REVISION: |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

A1.7

Right Wall

Entrance




SOUTHWEST (RIGHT) ELEVATION HEAT MAP

NOT TO SCALE

1 / A1.8

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
4. All dimensions to be field verified by the contractor.
5. Contractor is responsible for adequately shoring the floors prior to wall or beam removal.
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**PROJECT:**
HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**
SOUTHWEST (RIGHT) ELEVATION HEAT MAP
[SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

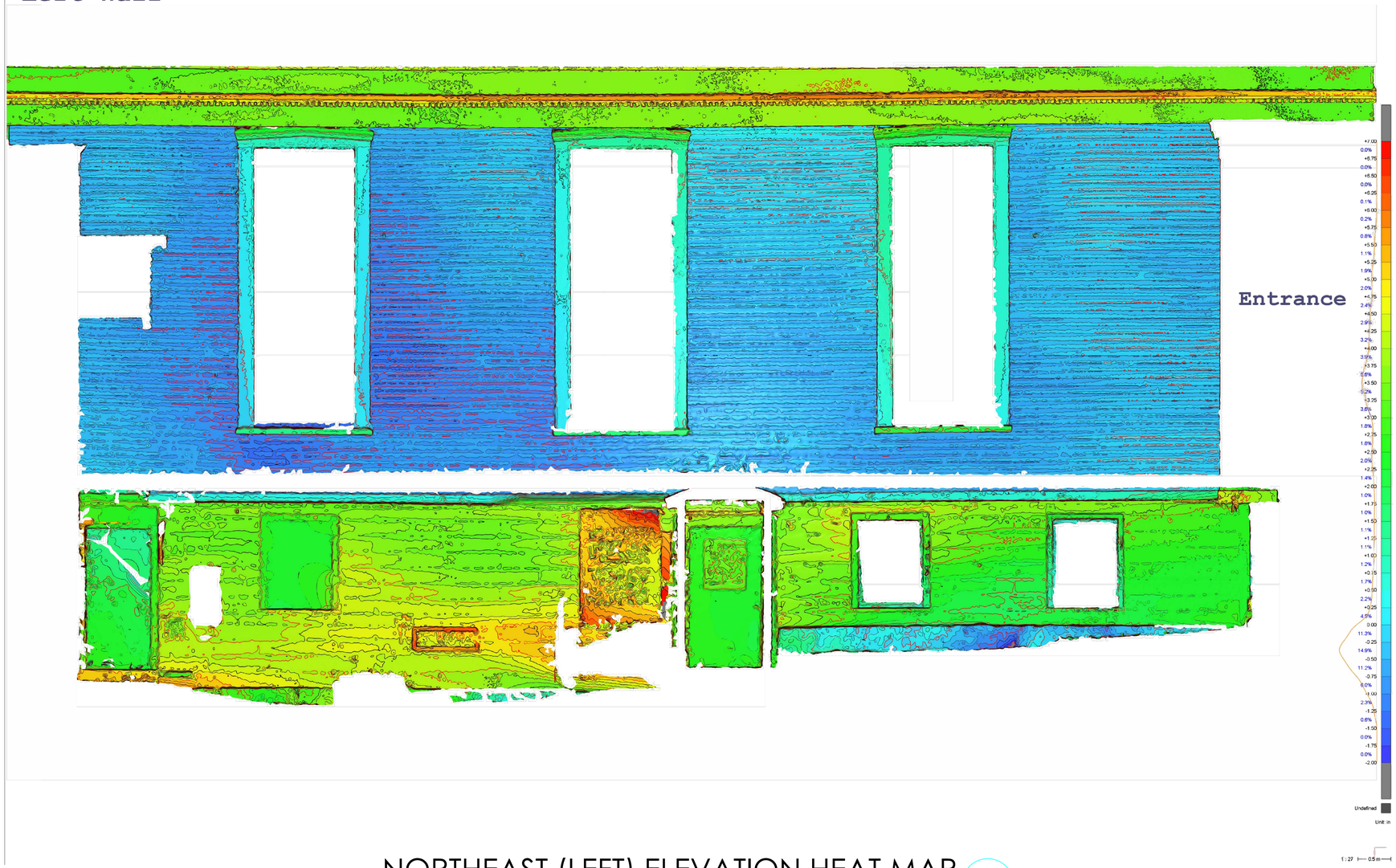
**SCALE:** AS NOTED

| **DATE:** | **REVISION:** |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

# A1.8

Left Wall




NORTHEAST (LEFT) ELEVATION HEAT MAP

1
A1.9

NOT TO SCALE

## GENERAL NOTES:

1. Replace beams as shown on plans.
2. Follow all manufacturers installation instructions.
3. All construction to be built to current Massachusetts Building Codes 780 CMR (10th Edition).
4. All dimensions to be field verified by the contractor.
5. Contractor is responsible for adequately shoring the floors prior to wall or beam removal.
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**PROJECT:**

HOLY ANGELS CHURCH
STRUCTURAL ANALYSIS
UPTON, MA

**SHEET:**

NORTHEAST (LEFT) ELEVATION HEAT MAP
[SOURCE: "3 MILFORD STREET" GPRS EXISTING CONDITIONS DATED 7/28/2025]

**SCALE:** AS NOTED

| **DATE:** | **REVISION:** |
|---|---|
| 8.20.2025 | |

**SHEET NO:**

A1.9

# APPENDIX B - APPENDIX B-PRELIMINARY CALCULATIONS

PROJECT: HOLY ANGELS CHURCH, 3 MILFORD RD UPTON, MA

CUSTOMER: TOWN OF UPTON

CALCULATE EXISTING STRUCTURAL CONDITIONS OF THE FLOOR STRUCTURE IN ASSEMBLY SPACE

GOVERNING CODE: MA STATE BUILDING CODE 10TH ED / IBC 2021

PER SECTION 303, OCCUPANCY IS A-1 OR A-3

PER TABLE 1607.1

LIVE LOADS FOR OTHER ASSEMBLY AREAS: 100 psf

DEAD LOAD: 30 psf

ROOF LIVE LOAD: 20 psf (1607.1)

SNOW LOAD: PER TABLE 1604.5 – RISK CAT. III
PER TABLE 1604.11 FOR UPTON
GROUND SNOW LOAD: 40 psf; MIN FLAT ROOF: 35 psf
WIND SPEED: 128 mph

USE $p_s = 0.7 C_e C_t I_s p_g$

RISK CATEGORY III

$C_e = 1.0$ PARTIAL EXPOSURE TABLE 7-2
$C_t = 1.0$ TABLE 7-3
$I_s = 1.1$ TABLE 1.5-2 FOR RISK CAT. III
$p_g = 40$ psf

$p_s = (0.7)(1.0)(1.0)(1.1)(40\text{psf}) = 30.8$ psf – USE 35 psf

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63 SOUTH STREET, SUITE #110
HOPKINTON, MA 01748
PHONE (844) 885-0153

Project Name HOLY ANGELS Number
Designed by RPM Date 7/15/25
Checked by Date
Sheet 1 of 2

## WIND LOADS

1609.4.2 - SURF ROUGH B EXPOSURE C
MEAN ROOF HEIGHT ~ 30'

WIND SPEED $V_{ULT}$ = 128 mph RISK CAT III SEC. 1604.11

$$q = 0.00256 (K_z)(K_{zt})(K_d)(V)^2$$ (ASCE 7-16)

$K_z = 0.98$ (27.3-1)
$K_d = 0.85$ (26.6-1)
$K_{zt} = 1.0$

$$q = 0.00256(0.98)(0.85)(1)(128)^2$$

$$= 34.9 \text{ psf} \sim \boxed{35 \text{ psf}}$$

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HOPKINTON, MA 01748
PHONE (844) 885-0153

Project Name HOLY ANGELS Number
Designed by RPM Date 7/15/25
Checked by Date
Sheet 2 of 2

| | | |
|---|---|---|
| **Client:** Town of Upton | **Author:** Andrew Dudka | **Date:** Jun 26, 2025 |
| **Project:** Holy Angels Church | | **Job #:** |
| **Address:** | | **Subject:** Member Schedule |

| | Calculation | Member | Quantity | Comments |
|---|---|---|---|---|
| 66% | **Floor Beam New** | 3 - 1-3/4x9-1/2 Versa-Lam LVL 2.1E-3100Fb | 44.1 ft | |
| 71% | **New Joist** | 1-3/4x9-1/4 Versa-Lam LVL 2.1E-3100Fb | 13.5 ft | |
| 42% | **Ceiling Joist** | 2 in × 7.25 in Spruce-Pine-Fir No. 2 (DL) | 13.5 ft | |
| 84% | **Choir Loft Beam** | 3 in × 4.5 in Spruce-Pine-Fir No. 2 (DL) | 44.1 ft | |
| 54% | **Choir Loft Joist** | 2.25 in × 7 in Spruce-Pine-Fir No. 2 (DL) | 13 ft | |

| | | |
|---|---|---|
| **Client:** Town of Upton | **Author:** Andrew Dudka | **Date:** Jun 26, 2025 |
| **Project:** Holy Angels Church | | **Job #:** |
| **Address:** | | **Subject: Project Defaults** |

## Default Roof Loads

Default Roof Loads $loads_{roof} =$

| Superimposed Dead Load $w_D$ (psf) | Roof Live Load $w_{Lr}$ (psf) | Alternative Minimum Live Load $P_{Lr2}$ (lb) | Snow Load $w_S$ (psf) | Ultimate Wind Uplift (C&C) $w_{Wu}$ (psf) | Ultimate Wind Downward (C&C) $w_{Wd}$ (psf) |
|---|---|---|---|---|---|
| 15 | 20 | 300 | 30 | 30 | 30 |

## Default Ceiling Loads

Default Ceiling Loads $loads_{ceiling} =$

| Superimposed Dead Load $w_D$ (psf) | Live Load $w_L$ (psf) | Alternative Minimum Live Load $P_{L2}$ (lb) |
|---|---|---|
| 5 | 20 | 0 |

## Default Floor Loads

Default Floor Loads $loads_{floor} =$

| Superimposed Dead Load $w_D$ (psf) | Live Load $w_L$ (psf) | Alternative Minimum Live Load $P_{L2}$ (lb) |
|---|---|---|
| 10 | 40 | 0 |

## Default Wall & Window Loads

Weight of Exterior Wall $w_{D,EW} = 15$ psf

Default Ultimate Wall & Window Wind Loads $w_{W,wall+window} =$

| Ultimate Inward Wind Load (C&C) $w_{Wd}$ (psf) | Ultimate Outward Wind Load (C&C) $w_{Wu}$ (psf) |
|---|---|
| 30 | 30 |

## Comments

## Building Code

| | | |
|---|---|---|
| Design Code Full Name | $code =$ | International Building Code (IBC) 2021 |
| Design Code Short Name | $code =$ | IBC 2021 |
| Building Risk Category | | II - Regular Building |

## Site Parameters - Wind & Snow

| | | |
|---|---|---|
| Note: | | No address is specified in Project Details. The design wind speed must be entered manually. This can be changed by setting an address in Project Details. |
| Basic Wind Speed | $V =$ | 100 mi/hr |
| Exposure Category | | C: Open terrain with scattered obstructions |
| Ground Snow Load | $p_g =$ | 30 psf |

## Site Parameters - Seismic

| | | |
|---|---|---|
| Note: | | No address is specified in Project Details. The design seismic parameters must be entered manually. This can be changed by setting an address in Project Details. |
| Site Class | | D - Default |

## Seismic Design Parameters

| | | |
|---|---|---|
| Short-Period Spectral Acceleration | $S_s =$ | 0 |
| Long-Period Spectral Acceleration | $S_1 =$ | 0 |
| Long-Period Transition Period | $T_L =$ | 0 s |

## Special Criteria

Load Duration Factor for Snow $C_{D,snow} = 1.15$

## Deflection Criteria

Additionally Include Simplified DL+(LL or SL) Service Load Combination? No

Deflection Span Limits $\Delta_{span} =$

| Member Type $type$ | Short-Term (L, Lr, S, or W) $D_{ST}$ (L/) | Long-Term (kD+L) $D_{LT}$ (L/) |
|---|---|---|
| Roof | 180 | 120 |
| Ceiling | 240 | 180 |
| Floor | 360 | 240 |
| Wall | 240 | 1 |

Absolute Deflection Limit $\Delta_{lim} = 1$ in

## Building Geometry

| | | |
|---|---|---|
| Number of Stories | $n_{story} =$ | 2 |
| Roof Slope | $\alpha =$ | 6 : 12 |
| Default Bearing Length | $l_b =$ | 3 in |

Default Member Spacings $spacings =$

| Rafters $s_{rafi}$ (in) | Joists $s_{joist}$ (in) | Wall Studs $s_{studs}$ (in) |
|---|---|---|
| 16 | 16 | 16 |

Top Floor Height Dimensions $h_{top.floor} =$

| Story Height (Floor to Eave) $h_{story}$ (ft) | Headroom (Floor to Ceiling) $h_{head}$ (ft) | Window Height (Floor to Top of Window) $h_{window}$ (ft) |
|---|---|---|
| 12 | 10 | 8 |

Lower Floors Height Dimensions $h_{lower.floors} =$

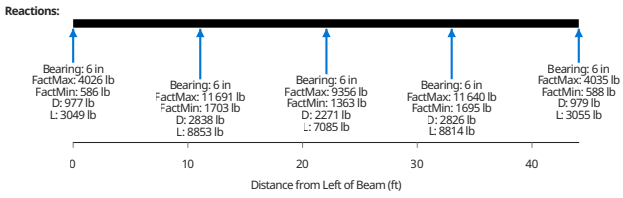
| Story Height (Floor to Floor) $h_{story}$ (ft) | Headroom (Floor to Ceiling) $h_{head}$ (ft) | Window Height (Floor to Top of Window) $h_{window}$ (ft) |
|---|---|---|
| 12 | 10 | 8 |

| | | |
|---|---|---|
| **Client:** Town of Upton | **Author:** Andrew Dudka | **Date:** Jun 26, 2025 |
| **Project:** Holy Angels Church | | **Job #:** |
| **Address:** | | **Subject: Floor Beam New** PASS |
| **References:** NDS 2018 (ASD) | | |

## Summary



| | | | |
|---|---|---|---|
| | Member | | 3 plies - 1-3/4x9-1/2 Versa-Lam LVL 2.1E-3100Fb |
| 56% | Moment Utilization | $M/M' =$ | -12 132 lb*ft* / *21 591 lb*ft |
| 66% | Shear Utilization | $V/V' =$ | 6216 lb / 9476 lb |
| 47% | Bearing Utilization | $R/R' =$ | 11 691 lb / 25 102 lb |
| | Minimum Bearing Length (End Supports) | $\ell_{b,min,end} =$ | 1.02 in |
| | Minimum Bearing Length (Int Supports) | $\ell_{b,min,int} =$ | 2.79 in |
| 43% | Governing Live / Short-Term Deflection | $\delta_{ST} =$ | -0.158 in (L/839) |
| 33% | Governing Long-Term Deflection | $\delta_{LT} =$ | -0.184 in (L/723) |
| | Governing Long-Term Deflection | $\delta_{LT} =$ | $-0.184$ in |




## Key Properties

| | | |
|---|---|---|
| Beam Plan Length | $L_X =$ | 44.1 ft |
| Continuous Bracing for Lateral Torsional Buckling | | No Continuous Bracing |

## Loads

## Design Conditions

International Building Code (IBC) 2021

## Member Properties

| | | |
|---|---|---|
| Cross-Sectional Area | $A =$ | 49.9 in$^2$ |
| Strong Axis Moment of Inertia | $I_{xx} =$ | 375 in$^4$ |
| Section Modulus | $S =$ | 79 in$^3$ |
| Base Allowable Bending Stress | $F_b =$ | 3100 psi |
| Base Allowable Shear Stress | $F_v =$ | 285 psi |
| Base Perpendicular Compression Allowable Stress | $F_{c\perp} =$ | 750 psi |
| True Modulus of Elasticity | $E_{true} =$ | $2.10 \times 10^6$ psi |
| Apparent Modulus of Elasticity | $E_{app} =$ | $2.00 \times 10^6$ psi |
| Modulus of Elasticity for Deflections | $E =$ | $2.00 \times 10^6$ psi |

### Elastic Modulus (NDS 2018 2.3)

| | | |
|---|---|---|
| Adjusted Modulus of Elasticity | $E' =$ | $2.00 \times 10^6$ psi |

### Section Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| Volume Factor | $C_V =$ | 1.03 |

### Positive Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| Governing Duration Factor - Positive Bending | $C^+_{D,b} =$ | 1 |
| Governing Beam Stability Factor - Positive Bending | $C^+_L =$ | 0.991 |
| Adjusted Bending Strength - Positive Bending | $F'^+_b =$ | 3280 psi |

### Negative Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| Governing Duration Factor - Negative Bending | $C^-_{D,b} =$ | 1 |
| Governing Beam Stability Factor - Negative Bending | $C^-_L =$ | 0.992 |
| Adjusted Bending Strength - Negative Bending | $F'^-_b =$ | 3281 psi |

### Shear Design (NDS 2018 3.4)

| | | |
|---|---|---|
| Governing Duration Factor | $C_D =$ | 1 |
| Adjusted Shear Strength | $F'_v =$ | 285 psi |

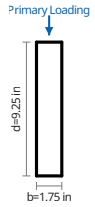
### Bearing (NDS 2018 3.10)

| | | |
|---|---|---|
| Base Bearing Strength | $F'_{c\perp}/C_b =$ | 750 psi |

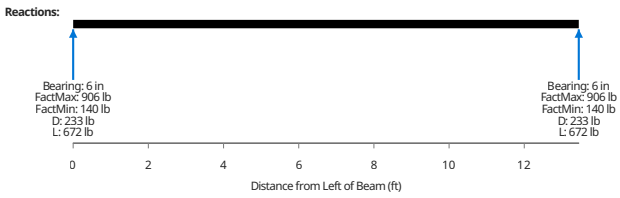
### Comments

| | | |
|---|---|---|
| **Client:** Town of Upton | **Author:** Andrew Dudka | **Date:** Jun 26, 2025 |
| **Project:** Holy Angels Church | | **Job #:** |
| **Address:** | | **Subject:** New Joist PASS |
| **References:** NDS 2018 (ASD) | | |

## Summary



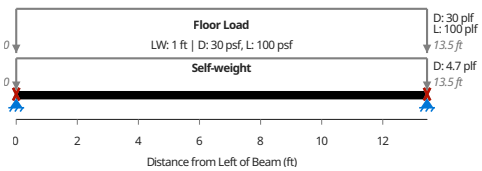

| | | |
|---|---|---|
| | Member | 1-3/4x9-1/4 Versa-Lam LVL 2.1E-3100Fb |
| 44% | Moment Utilization | $M/M' =$ 3046 lb*ft* / *6902 lb*ft |
| 29% | Shear Utilization | $V/V' =$ 906 lb / 3076 lb |
| 12% | Bearing Utilization | $R/R' =$ 906 lb / 7875 lb |
| | Minimum Bearing Length (End Supports) | $\ell_{b,min,end} =$ 0.69 in |
| 71% | Governing Live / Short-Term Deflection | $\delta_{ST} =$ -0.319 in (L/506) |
| 56% | Governing Long-Term Deflection | $\delta_{LT} =$ -0.374 in (L/431) |
| | Governing Long-Term Deflection | $\delta_{LT} = -0.374$ in |




## Key Properties

| | | |
|---|---|---|
| | Beam Plan Length | $L_X =$ 13.5 ft |
| | Continuous Bracing for Lateral Torsional Buckling | Top Braced |

## Loads




| | | |
|---|---|---|
| | Center-to-Center Spacing (= tributary width) | $s =$ 16 in |

## Design Conditions

International Building Code (IBC) 2021

## Member Properties

| | | |
|---|---|---|
| | Cross-Sectional Area | $A =$ 16.2 in$^2$ |
| | Strong Axis Moment of Inertia | $I_{xx} =$ 115 in$^4$ |
| | Section Modulus | $S =$ 25 in$^3$ |
| | Base Allowable Bending Stress | $F_b =$ 3100 psi |
| | Base Allowable Shear Stress | $F_v =$ 285 psi |
| | Base Perpendicular Compression Allowable Stress | $F_{c\perp} =$ 750 psi |
| | True Modulus of Elasticity | $E_{true} =$ $2.10 \times 10^6$ psi |
| | Apparent Modulus of Elasticity | $E_{app} =$ $2.00 \times 10^6$ psi |
| | Modulus of Elasticity for Deflections | $E =$ $2.00 \times 10^6$ psi |

## Elastic Modulus (NDS 2018 2.3)

| | | |
|---|---|---|
| | Adjusted Modulus of Elasticity | $E' =$ $2.00 \times 10^6$ psi |

## Section Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Volume Factor | $C_V =$ 1.03 |

## Positive Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Governing Duration Factor - Positive Bending | $C^+_{D,b} =$ 1 |
| | Governing Beam Stability Factor - Positive Bending | $C^+_L =$ 1 |
| | Adjusted Bending Strength - Positive Bending | $F'^+_b =$ 3319 psi |

## Negative Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Governing Duration Factor - Negative Bending | $C^-_{D,b} =$ 0.9 |
| | Governing Beam Stability Factor - Negative Bending | $C^-_L =$ 0.471 |
| | Adjusted Bending Strength - Negative Bending | $F'^-_b =$ 1406 psi |

## Shear Design (NDS 2018 3.4)

| | | |
|---|---|---|
| | Governing Duration Factor | $C_D =$ 1 |
| | Adjusted Shear Strength | $F'_v =$ 285 psi |

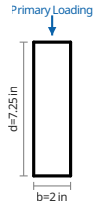
## Bearing (NDS 2018 3.10)

| | | |
|---|---|---|
| | Base Bearing Strength | $F'_{c\perp}/C_b =$ 750 psi |

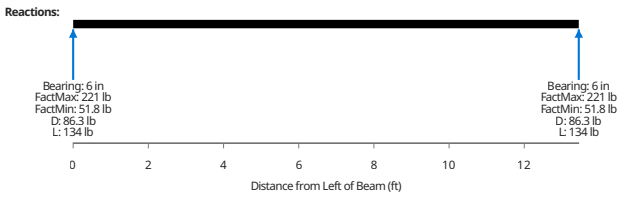
## Comments

| | | |
|---|---|---|
| **Client:** Town of Upton | **Author:** Andrew Dudka | **Date:** Jun 26, 2025 |
| **Project:** Holy Angels Church | | **Job #:** |
| **Address:** | | **Subject:** Ceiling Joist PASS |
| **References:** NDS 2018 (ASD) | | |

## Summary



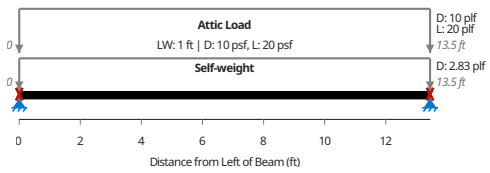

| | | |
|---|---|---|
| | Member | 2 in x 7.25 in Spruce-Pine-Fir No. 2 (DL) |
| 42% | Moment Utilization | $M/M' =$ 742 lb*ft* / *1763 lb*ft |
| 17% | Shear Utilization | $V/V' =$ 221 lb / 1305 lb |
| 4% | Bearing Utilization | $R/R' =$ 221 lb / 5100 lb |
| | Minimum Bearing Length (End Supports) | $\ell_{b,min,end} =$ 0.26 in |
| 37% | Governing Live / Short-Term Deflection | $\delta_{ST} =$ -0.166 in (L/975) |
| 33% | Governing Long-Term Deflection | $\delta_{LT} =$ -0.219 in (L/738) |
| | Governing Long-Term Deflection | $\delta_{LT} = -0.219$ in |




## Key Properties

| | | |
|---|---|---|
| | Beam Plan Length | $L_X =$ 13.5 ft |
| | Continuous Bracing for Lateral Torsional Buckling | Top Braced |

## Loads




| | | |
|---|---|---|
| | Center-to-Center Spacing (= tributary width) | $s =$ 24 in |

## Design Conditions

International Building Code (IBC) 2021

## Member Properties

| | | |
|---|---|---|
| | Cross-Sectional Area | $A =$ 14.5 in$^2$ |
| | Strong Axis Moment of Inertia | $I_{xx} =$ 63.5 in$^4$ |
| | Section Modulus | $S =$ 17.5 in$^3$ |
| | Base Allowable Bending Stress | $F_b =$ 875 psi |
| | Base Allowable Shear Stress | $F_v =$ 135 psi |
| | Base Perpendicular Compression Allowable Stress | $F_{c\perp} =$ 425 psi |
| | True Modulus of Elasticity | $E_{true} =$ $1.40 \times 10^6$ psi |
| | Apparent Modulus of Elasticity | $E_{app} =$ $1.40 \times 10^6$ psi |
| | Modulus of Elasticity for Deflections | $E =$ $1.40 \times 10^6$ psi |

## Elastic Modulus (NDS 2018 2.3)

| | | |
|---|---|---|
| | Adjusted Modulus of Elasticity | $E' =$ $1.40 \times 10^6$ psi |

## Section Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Size Factor | $C_{F,b} =$ 1.2 |
| | Incising Factor | $C_{i,b} =$ 1 |

## Positive Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Governing Duration Factor - Positive Bending | $C^+_{D,b} =$ 1 |
| | Governing Beam Stability Factor - Positive Bending | $C^+_L =$ 1 |
| | Adjusted Bending Strength - Positive Bending | $F'^+_b =$ 1207 psi |

## Negative Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Governing Duration Factor - Negative Bending | $C^-_{D,b} =$ 0.9 |
| | Governing Beam Stability Factor - Negative Bending | $C^-_L =$ 0.844 |
| | Adjusted Bending Strength - Negative Bending | $F'^-_b =$ 917 psi |

## Shear Design (NDS 2018 3.4)

| | | |
|---|---|---|
| | Governing Duration Factor | $C_D =$ 1 |
| | Adjusted Shear Strength | $F'_v =$ 135 psi |

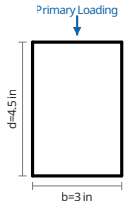
## Bearing (NDS 2018 3.10)

| | | |
|---|---|---|
| | Base Bearing Strength | $F'_{c\perp}/C_b =$ 425 psi |

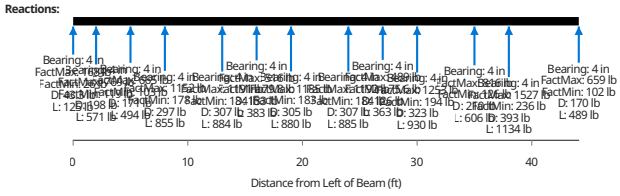
## Comments

| | | |
|---|---|---|
| **Client:** Town of Upton | **Author:** Andrew Dudka | **Date:** Jun 26, 2025 |
| **Project:** Holy Angels Church | | **Job #:** |
| **Address:** | | **Subject:** Choir Loft Beam PASS |
| **References:** NDS 2018 (ASD) | | |

## Summary



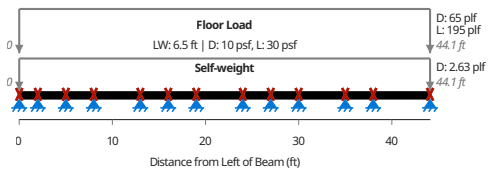

| | | | |
|---|---|---|---|
| | Member | | 3 in x 4.5 in Spruce-Pine-Fir No. 2 (DL) |
| 84% | Moment Utilization | $M/M' =$ | -867 lb*ft / 1027 lb*ft |
| 78% | Shear Utilization | $V/V' =$ | 943 lb / 1215 lb |
| 27% | Bearing Utilization | $R/R' =$ | 1527 lb / 5578 lb |
| | Minimum Bearing Length (End Supports) | $\ell_{b,min,end} =$ | 0.517 in |
| | Minimum Bearing Length (Int Supports) | $\ell_{b,min,int} =$ | 1.09 in |
| 54% | Governing Live / Short-Term Deflection | $\delta_{ST} =$ | -0.11 in (L/664) |
| 42% | Governing Long-Term Deflection | $\delta_{LT} =$ | -0.129 in (L/566) |
| | Governing Long-Term Deflection | $\delta_{LT} =$ | $-0.129$ in |




## Key Properties

| | | |
|---|---|---|
| Beam Plan Length | $L_X =$ | 44.1 ft |
| Continuous Bracing for Lateral Torsional Buckling | | No Continuous Bracing |

## Loads




## Design Conditions

International Building Code (IBC) 2021

## Member Properties

| | | |
|---|---|---|
| Cross-Sectional Area | $A =$ | 13.5 in$^2$ |
| Strong Axis Moment of Inertia | $I_{xx} =$ | 22.8 in$^4$ |
| Section Modulus | $S =$ | 10.1 in$^3$ |
| Base Allowable Bending Stress | $F_b =$ | 875 psi |
| Base Allowable Shear Stress | $F_v =$ | 135 psi |
| Base Perpendicular Compression Allowable Stress | $F_{c\perp} =$ | 425 psi |
| True Modulus of Elasticity | $E_{true} =$ | $1.40 \times 10^6$ psi |
| Apparent Modulus of Elasticity | $E_{app} =$ | $1.40 \times 10^6$ psi |
| Modulus of Elasticity for Deflections | $E =$ | $1.40 \times 10^6$ psi |

## Elastic Modulus (NDS 2018 2.3)

| | | |
|---|---|---|
| Adjusted Modulus of Elasticity | $E' =$ | $1.40 \times 10^6$ psi |

## Section Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| Size Factor | $C_{F,b} =$ | 1.4 |
| Incising Factor | $C_{i,b} =$ | 1 |

## Positive Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| Governing Duration Factor - Positive Bending | $C^+_{D,b} =$ | 1 |
| Governing Beam Stability Factor - Positive Bending | $C^+_L =$ | 0.993 |
| Adjusted Bending Strength - Positive Bending | $F'^+_b =$ | 1217 psi |

## Negative Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| Governing Duration Factor - Negative Bending | $C^-_{D,b} =$ | 1 |
| Governing Beam Stability Factor - Negative Bending | $C^-_L =$ | 0.993 |
| Adjusted Bending Strength - Negative Bending | $F'^-_b =$ | 1217 psi |

## Shear Design (NDS 2018 3.4)

| | | |
|---|---|---|
| Governing Duration Factor | $C_D =$ | 1 |
| Adjusted Shear Strength | $F'_v =$ | 135 psi |

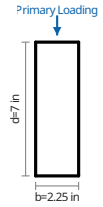
## Bearing (NDS 2018 3.10)

| | | |
|---|---|---|
| Base Bearing Strength | $F'_{c\perp}/C_b =$ | 425 psi |

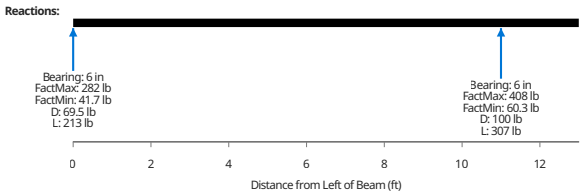
## Comments

| | | |
|---|---|---|
| **Client:** Town of Upton | **Author:** Andrew Dudka | **Date:** Jun 26, 2025 |
| **Project:** Holy Angels Church | | **Job #:** |
| **Address:** | | **Subject: Choir Loft Joist** PASS |
| **References:** NDS 2018 (ASD) | | |

## Summary




| | | |
|---|---|---|
| | Member | 2.25 in x 7 in Spruce-Pine-Fir No. 2 (DL) |
| 41% | Moment Utilization | $M/M' =$ 751 lb*ft* / *1849 lb*ft |
| 21% | Shear Utilization | $V/V' =$ 302 lb / 1417 lb |
| 7% | Bearing Utilization | $R/R' =$ 408 lb / 6096 lb |
| | Minimum Bearing Length (End Supports) | $\ell_{b,min,end} =$ 0.295 in |
| | Minimum Bearing Length (Int Supports) | $\ell_{b,min,int} =$ 0.401 in |
| 54% | Governing Live / Short-Term Deflection | $\delta_{ST} =$ 0.0724 in (L/332) |
| 42% | Governing Long-Term Deflection | $\delta_{LT} =$ 0.0842 in (L/285) |
| | Governing Long-Term Deflection | $\delta_{LT} =$ 0.0842 in |

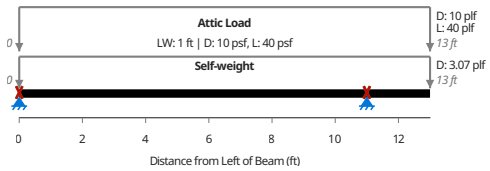



## Key Properties

| | | |
|---|---|---|
| | Beam Plan Length | $L_X =$ 13 ft |
| | Continuous Bracing for Lateral Torsional Buckling | Top Braced |

Top and bottom flange bracing corresponds to positive and negative bending respectively, but cantilever spans typically require a brace on the top flange despite being in negative bending.

## Loads




| | | |
|---|---|---|
| | Center-to-Center Spacing (= tributary width) | $s =$ 16 in |

## Design Conditions

International Building Code (IBC) 2021

## Member Properties

| | | |
|---|---|---|
| | Cross-Sectional Area | $A =$ 15.7 in$^2$ |
| | Strong Axis Moment of Inertia | $I_{xx} =$ 64.3 in$^4$ |
| | Section Modulus | $S =$ 18.4 in$^3$ |
| | Base Allowable Bending Stress | $F_b =$ 875 psi |
| | Base Allowable Shear Stress | $F_v =$ 135 psi |
| | Base Perpendicular Compression Allowable Stress | $F_{c\perp} =$ 425 psi |
| | True Modulus of Elasticity | $E_{true} =$ $1.40 \times 10^6$ psi |
| | Apparent Modulus of Elasticity | $E_{app} =$ $1.40 \times 10^6$ psi |
| | Modulus of Elasticity for Deflections | $E =$ $1.40 \times 10^6$ psi |

## Elastic Modulus (NDS 2018 2.3)

| | | |
|---|---|---|
| | Adjusted Modulus of Elasticity | $E' =$ $1.40 \times 10^6$ psi |

## Section Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Size Factor | $C_{F,b} =$ 1.2 |
| | Incising Factor | $C_{i,b} =$ 1 |

## Positive Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Governing Duration Factor - Positive Bending | $C^+_{D,b} =$ 1 |
| | Governing Beam Stability Factor - Positive Bending | $C^+_L =$ 1 |
| | Adjusted Bending Strength - Positive Bending | $F'^+_b =$ 1207 psi |

## Negative Bending (NDS 2018 2.3)

| | | |
|---|---|---|
| | Governing Duration Factor - Negative Bending | $C^-_{D,b} =$ 1 |
| | Governing Beam Stability Factor - Negative Bending | $C^-_L =$ 0.929 |
| | Adjusted Bending Strength - Negative Bending | $F'^-_b =$ 1122 psi |

## Shear Design (NDS 2018 3.4)

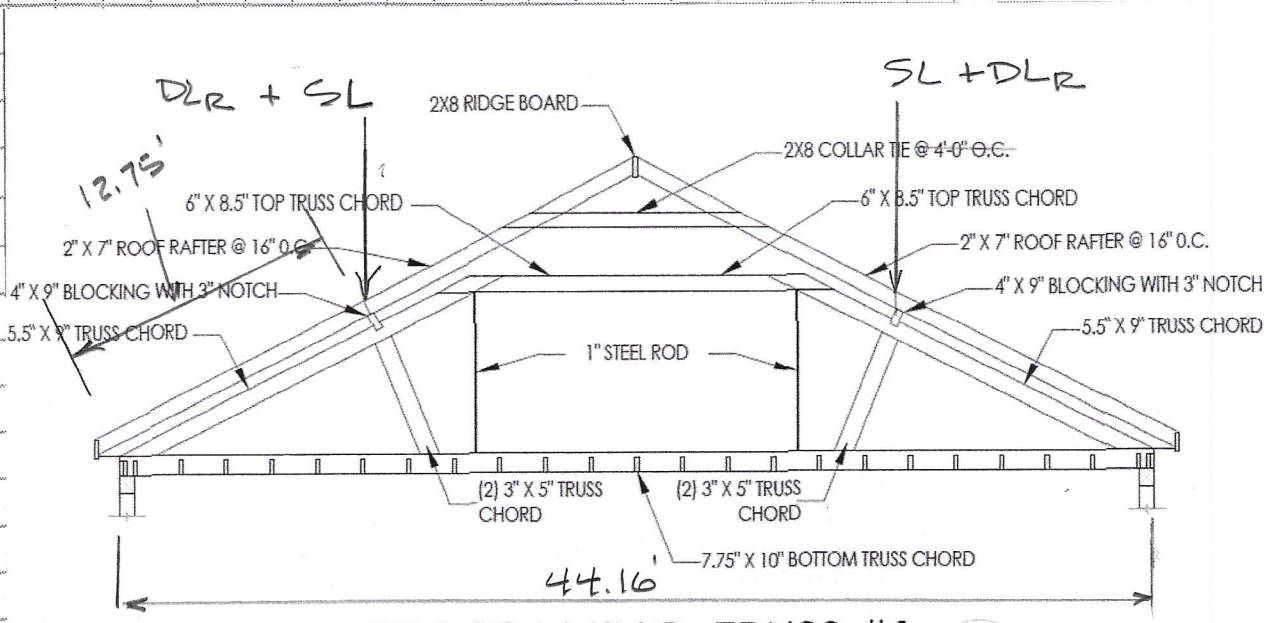
| | | |
|---|---|---|
| | Governing Duration Factor | $C_D =$ 1 |
| | Adjusted Shear Strength | $F'_v =$ 135 psi |

## Bearing (NDS 2018 3.10)

| | | |
|---|---|---|
| | Base Bearing Strength | $F'_{c\perp}/C_b =$ 425 psi |

## Comments

# CALCULATE LOADS ON TRUSS #1




ATTIC FRAMING: TRUSS #1 (4 / E-1.3)

SCALE: 1/4" = 1'-0"

ASSUME EASTERN WHITE PINE SS,

TRUSS SPAN 44'-2" PITCH: 6 3/4 : 12 (29.4°)

DESIGN SNOW LOAD = 35 PSF

TRIBUTARY WIDTH FOR SNOW LOAD AT (2) 3"x5" DIAGONAL SUPPORT =

$12.75' (\cos(29.4°))/2 + 44.16'/2 - 12.75' \cdot \cos(29.4)$

$= 16.53'$

TRUSS SPACING @ 13.1'

SL = $13.1' \times 16.53' \times 35$ PSF $= 7579^{\#}$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Project Name HOLLY ANGELS Number
Designed by CCM Date 8-9-25
Checked by Date
Sheet of

DESIGN DEAD LOAD ROOF = 30 PSF

TRIBUTARY WIDTH FOR ROOF DL =

$12.75'/2 + (\sec(29.4) \cdot 44.16'/2) - 12.75' = 18.97'$

TRUSS SPACING ≈ 13.1'

$DL_R = 18.97' \times 13.1' \times 30\ psf = 7455\ \#$

ASSUME DEAD LOAD ATTIC = 20 PSF

$20\ psf \times 13.1' = 262\ plf$

ROOF LIVE LOAD = 20 PSF

$RLL = 18.67' \times 13.1' \times 20\ psf = 4892\ \#$

RISA 2D ANALYSIS INDICATES SLOPED TOP CHORD AND HORIZONTAL TOP CHORD MEMBERS ARE OVERSTRESS. SEE ATTACHED. HORIZONTAL MEMBER CAN BE IMPROVED WITH PERPENDICULAR BRACING.

CHECK TRUSS WITH METAL ROOF AND REDUCED SNOW LOAD.

$P_s = C_s \times 35\ psf$. $C_s = 0.68$ FOR 6.75:12 PITCH

$P_s = 0.68 \times 35\ psf = 23.8\ PSF$

$SL = 13.1' \times 16.53' \times 23.8\ psf = 5,154\ \#$

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RESULT OF RISA ANALYSIS INDICATE SLOPING TOP CHORDS ARE STILL OVER-STRESSED WITH REDUCED SNOW LOAD.

ADD 3/16" FLITCH PLATES AND RE-ANALYZE

SHEAR D/C = 1.537 AT 29.75' IN M1. CHECK SHEAR d FROM SUPPORT.

$V_{@\ 30.55'} = 3.72^{k}$

$f_v = \frac{3.72}{10'' \cdot 7.75''} \cdot \frac{3}{2} = 0.072$

$F'_v = 0.144$

$D/C = \frac{0.072}{0.144} = 0.5$ O.K.

RECOMMEND REPLACING ASPHALT SHINGLES WITH STANDING SEAM METAL TO REDUCE SNOW LOADS AND ADDING 13.5' LONG 3/16" x 9" FLITCH PLATES TO THE SLOPING TOP CHORDS.

THE HORIZONTAL TOP CHORD MEMBER SHOULD BE BRACED AT MID-SPAN.

NOTE! THIS ANALYSIS DID NOT EVALUATE THE CONNECTIONS.

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Sheet_____ of_____

PROJECT: HOLY ANGELS CHURCH, 3 MILFORD RD
UPTON, MA

CUSTOMER: TOWN OF UPTON

CALCULATE EXISTING STRUCTURAL CONDITIONS OF THE FLOOR STRUCTURE IN ASSEMBLY SPACE

GOVERNING CODE: MA STATE BUILDING CODE 10TH ED / IBC 2021

PER SECTION 303, OCCUPANCY IS A-1 OR A-3

PER TABLE 1607.1

LIVE LOADS FOR OTHER ASSEMBLY AREAS: 100 psf

DEAD LOAD: 30 psf

ROOF LIVE LOAD: 20 psf (1607.1)

SNOW LOAD: PER TABLE 1604.5 – RISK CAT. III
PER TABLE 1604.11 FOR UPTON
GROUND SNOW LOAD: 40 psf; MIN FLAT ROOF: 35 psf
WIND SPEED: 128 mph

USE $p_s = 0.7 C_e C_t I_s p_g$

RISK CATEGORY III

$C_e = 1.0$ PARTIAL EXPOSURE TABLE 7-2
$C_t = 1.0$ TABLE 7-3
$I_s = 1.1$ TABLE 1.5-2 FOR RISK CAT. III
$p_g = 40$ psf

$p_s = (0.7)(1.0)(1.0)(1.1)(40\text{psf}) =$ 30.8 psf – USE 35 psf

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## WIND LOADS

1609.4.2 - SURF ROUGH B EXPOSURE C
MEAN ROOF HEIGHT ~ 30'

WIND SPEED $V_{ULT}$ = 128 mph RISK CAT III SEC. 1604.11

$$q = 0.00256 (K_z)(K_{zt})(K_d)(V)^2$$ (ASCE 7-16)

$K_z = 0.98$ (27.3-1)
$K_d = 0.85$ (26.6-1)
$K_{zt} = 1.0$

$$q = 0.00256(0.98)(0.85)(1)(128)^2$$

$$= 34.9 \text{ psf} \sim \boxed{35 \text{ psf}}$$

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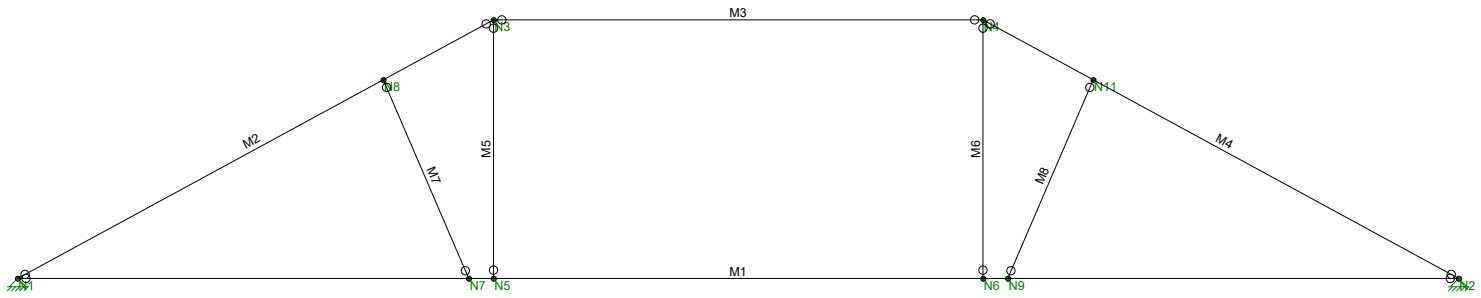



| | | |
|---|---|---|
| Criterium-Dudka Engineers | | SK -1 1 |
| CCB | Type 1 Truss | Aug 13, 2025 at 10:16 PM |
| | BAse Truss Model | Holly Angels Church Base model.r2d |

## Hot Rolled Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (/1E5 F) | Density[k/ft^3] | Yield[ksi] |
|---|---|---|---|---|---|---|---|
| 1 | A36 Gr.36 | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 36 |
| 2 | A572 Gr.50 | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 50 |
| 3 | A992 | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 50 |
| 4 | A500 Gr.B RND | 29000 | 11154 | 0.3 | 0.65 | 0.527 | 42 |
| 5 | A500 Gr.B Rect | 29000 | 11154 | 0.3 | 0.65 | 0.527 | 46 |
| 6 | A53 Gr.B | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 35 |
| 7 | A1085 | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 50 |

## Wood Material Properties

| | Label | Type | Database | Species | Grade | Cm | Ci | Emod | Nu | Therm ... | Dens[k... |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DF | Solid S... | Visually Graded | Douglas Fir-Larch | No.1 | | | 1 | 0.3 | 0.3 | 0.035 |
| 2 | SP | Solid S... | Visually Graded | Southern Pine | No.1 | | | 1 | 0.3 | 0.3 | 0.035 |
| 3 | HF | Solid S... | Visually Graded | Hem-Fir | No.1 | | | 1 | 0.3 | 0.3 | 0.035 |
| 4 | SPF | Solid S... | Visually Graded | Spruce-Pine-fir | No.1 | | | 1 | 0.3 | 0.3 | 0.035 |
| 5 | 24F-1.8E ... | Glulam | NDS Table 5A | 24F-1.8E_DF_BAL | na | | | 1 | 0.3 | 0.3 | 0.035 |
| 6 | 24F-1.8E ... | Glulam | NDS Table 5A | 24F-1.8E_DF_UNBAL | na | | | 1 | 0.3 | 0.3 | 0.035 |
| 7 | 24F-1.8E ... | Glulam | NDS Table 5A | 24F-1.8E_SP_BAL | na | | | 1 | 0.3 | 0.3 | 0.035 |
| 8 | 24F-1.8E ... | Glulam | NDS Table 5A | 24F-1.8E_SP_UNBAL | na | | | 1 | 0.3 | 0.3 | 0.035 |
| 9 | Bottom C... | Solid S... | Visually Graded | Eastern White Pine | Select Struct... | | | 1 | 0.3 | 0.3 | 0.035 |
| 10 | Top Chord | Solid S... | Visually Graded | Eastern White Pine | Select Struct... | | | 1 | 0.3 | 0.3 | 0.035 |
| 11 | Sloped to... | Solid S... | Visually Graded | Eastern White Pine | Select Struct... | | | 1 | 0.3 | 0.3 | 0.035 |
| 12 | Diagonal | Solid S... | Visually Graded | Eastern White Pine | Select Struct... | | | 1 | 0.3 | 0.3 | 0.035 |

## Hot Rolled Steel Design Parameters

| | Label | Shape | Length[... | Lb-out[ft] | Lb-in[ft] | Lcomp top... | Lcomp bot... | L-torq... | K-out | K-in | Cb | Chan... | a[ft] | Functi... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M5 | Rod1 | 7.92 | | | | | | | | | N/A | N/A | Lateral |
| 2 | M6 | Rod1 | 7.92 | | | | | | | | | N/A | N/A | Lateral |

## Wood Design Parameters

| | Label | Shape | Length[... | Le-out[ft] | Le-in[ft] | le-bend to... | le-bend bo... | K-out | K-in | CV | Cr | Out sw... | In sway |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | 7.75X10FS | 44.16 | 1.33 | 1.33 | Lb out | 1.33 | | | | | | |
| 2 | M2 | 5.5X9FS | 16.592 | 0 | 0 | Lb out | 0 | | | | | | |
| 3 | M3 | 6X8.5FS | 15 | 7.5 | 7.5 | Lb out | 7.5 | | | | | | |
| 4 | M4 | 5.5X9FS | 16.592 | 0 | 0 | Lb out | 0 | | | | | | |
| 5 | M7 | 2-3X5FS | 6.624 | | | | | | | | | | |
| 6 | M8 | 2-3X5FS | 6.624 | | | | | | | | | | |

## Joint Loads and Enforced Displacements (BLC 1 : Roof Dead Load)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (... | Inactive |
|---|---|---|---|---|---|
| 1 | N8 | L | Y | -7.455 | |
| 2 | N11 | L | Y | -7.455 | |

## Joint Loads and Enforced Displacements (BLC 2 : Snow Load)

| Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (... | Inactive |
|---|---|---|---|---|

## Joint Loads and Enforced Displacements (BLC 2 : Snow Load) (Continued)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (... | Inactive |
|---|---|---|---|---|---|
| 1 | N8 | L | Y | -7.579 | |
| 2 | N11 | L | Y | -7.579 | |

## Joint Loads and Enforced Displacements (BLC 4 : Roof Live Load)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (... | Inactive |
|---|---|---|---|---|---|
| 1 | N8 | L | Y | -4.892 | |
| 2 | N11 | L | Y | -4.892 | |

## Member Distributed Loads (BLC 3 : Attic Dead Load)

| | Member Label | Direction | Start Magnitude[k... | End Magnitude[k/... | Start Location[ft,%] | End Location[ft,%] | Inactive |
|---|---|---|---|---|---|---|---|
| 1 | M1 | Y | -0.262 | -0.262 | 0 | 0 | |

## Member Section Forces

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 1 | 4 | M1 | 1 | -1.867 | 1.978 | 0 |
| 2 | | | 2 | -1.867 | -0.915 | -5.866 |
| 3 | | | 3 | 3.125 | 0 | 0.522 |
| 4 | | | 4 | -1.867 | 0.915 | -5.866 |
| 5 | | | 5 | -1.867 | -1.978 | 0 |
| 6 | 4 | M2 | 1 | 39.423 | 0.218 | 0 |
| 7 | | | 2 | 39.423 | 0.218 | -0.903 |
| 8 | | | 3 | 39.423 | 0.218 | -1.807 |
| 9 | | | 4 | 39.423 | 0.218 | -2.71 |
| 10 | | | 5 | 33.437 | -0.722 | 0 |
| 11 | 4 | M3 | 1 | 29.641 | 0 | 0 |
| 12 | | | 2 | 29.641 | 0 | 0 |
| 13 | | | 3 | 29.641 | 0 | 0 |
| 14 | | | 4 | 29.641 | 0 | 0 |
| 15 | | | 5 | 29.641 | 0 | 0 |
| 16 | 4 | M4 | 1 | 33.437 | 0.722 | 0 |
| 17 | | | 2 | 39.423 | -0.218 | -2.71 |
| 18 | | | 3 | 39.423 | -0.218 | -1.807 |
| 19 | | | 4 | 39.423 | -0.218 | -0.903 |
| 20 | | | 5 | 39.423 | -0.218 | 0 |
| 21 | 4 | M5 | 1 | -15.461 | 0 | 0 |
| 22 | | | 2 | -15.461 | 0 | 0 |
| 23 | | | 3 | -15.461 | 0 | 0 |
| 24 | | | 4 | -15.461 | 0 | 0 |
| 25 | | | 5 | -15.461 | 0 | 0 |
| 26 | 4 | M6 | 1 | -15.461 | 0 | 0 |
| 27 | | | 2 | -15.461 | 0 | 0 |
| 28 | | | 3 | -15.461 | 0 | 0 |
| 29 | | | 4 | -15.461 | 0 | 0 |
| 30 | | | 5 | -15.461 | 0 | 0 |
| 31 | 4 | M7 | 1 | 12.682 | 0 | 0 |
| 32 | | | 2 | 12.682 | 0 | 0 |
| 33 | | | 3 | 12.682 | 0 | 0 |
| 34 | | | 4 | 12.682 | 0 | 0 |

## Member Section Forces (Continued)

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 35 | | | 5 | 12.682 | 0 | 0 |
| 36 | 4 | M8 | 1 | 12.682 | 0 | 0 |
| 37 | | | 2 | 12.682 | 0 | 0 |
| 38 | | | 3 | 12.682 | 0 | 0 |
| 39 | | | 4 | 12.682 | 0 | 0 |
| 40 | | | 5 | 12.682 | 0 | 0 |

## Member AISC 14th (360-10): ASD Steel Code Checks

| | LC | Member | Shape | UC Max | Loc[ft] | Shear UC | Loc[ft] | Pnc/om [k] | Pnt/o... | Mn/om... | Cb | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | M5 | Rod1 | 0.913 | 7.92 | 0 | 7.92 | 0.817 | 16.931 | 0.282 | 1 | H1-1... |
| 2 | 4 | M6 | Rod1 | 0.913 | 7.92 | 0 | 7.92 | 0.817 | 16.931 | 0.282 | 1 | H1-1... |

## Member Wood Code Checks

| | LC | Member | Shape | UC Max | Loc[ft] | Shear... | Loc[ft] | Fc' [ksi] | Ft' [ksi] | Fb' [k... | Fv' [ksi] | RB | CL | CP | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | M1 | 7.75X10... | 0.65 | 36.8 | 1.809 | 29.9 | 0.832 | 0.747 | 1.121 | 0.144 | 1.63 | 1 | 0.998 | 3.9-1 |
| 2 | 4 | M2 | 5.5X9FS | 1.42 | 12.6... | 0.152 | 16.5... | 0.776 | 0.805 | 1.208 | 0.144 | 0 | 1 | 1 | 3.9-3 |
| 3 | 4 | M3 | 6X8.5FS | 0.873 | 15 | 0 | 15 | 0.666 | 0.805 | 1.204 | 0.144 | 4.61 | 0.997 | 0.858 | 3.6.3 |
| 4 | 4 | M4 | 5.5X9FS | 1.42 | 3.975 | 0.152 | 3.802 | 0.776 | 0.805 | 1.208 | 0.144 | 0 | 1 | 1 | 3.9-3 |
| 5 | 4 | M7 | 2-3X5FS | 0.592 | 6.624 | 0 | 6.624 | 0.714 | 0.926 | 2.008 | 0.155 | 3.323 | 0.998 | 0.47 | 3.6.3 |
| 6 | 4 | M8 | 2-3X5FS | 0.592 | 6.624 | 0 | 6.624 | 0.714 | 0.926 | 2.008 | 0.155 | 3.323 | 0.998 | 0.47 | 3.6.3 |

Model with 2-3/16"x9"x13.5' flitch plates extending from nodes N10 to N3 and N4 to N11.


| | | |
|---|---|---|
| Criterium-Dudka Engineers | | SK -1 1 |
| CCB | Type 1 Truss | Aug 13, 2025 at 9:47 PM |
| | Truss Model with Flitch plates | Holly Angels Truss reinforced with flitch plate re... |

## Hot Rolled Steel Design Parameters

| | Label | Shape | Length[... | Lb-out[ft] | Lb-in[ft] | Lcomp top... | Lcomp bot... | L-torq... | K-out | K-in | Cb | Chan... | a[ft] | Functi... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M5 | Rod1 | 7.92 | | | | | | | | | N/A | N/A | Lateral |
| 2 | M6 | Rod1 | 7.92 | | | | | | | | | N/A | N/A | Lateral |
| 3 | M9 | Flitch Plate | 13.481 | 0 | 0 | Lb out | 0 | 0 | | | | N/A | N/A | Lateral |
| 4 | M10 | Flitch Plate | 13.481 | 0 | 0 | Lb out | 0 | 0 | | | | N/A | N/A | Lateral |

## Wood Design Parameters

| | Label | Shape | Length[... | Le-out[ft] | Le-in[ft] | le-bend to... | le-bend bo... | K-out | K-in | CV | Cr | Out sw... | In sway |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | 7.75X10FS | 44.16 | 1.33 | 1.33 | Lb out | 1.33 | | | | | | |
| 2 | M2 | 5.5X9FS | 3.111 | 0 | 0 | Lb out | 0 | | | | | | |
| 3 | M3 | 6X8.5FS | 15 | 7.5 | 7.5 | Lb out | 7.5 | | | | | | |
| 4 | M4 | 5.5X9FS | 3.111 | 0 | 0 | Lb out | 0 | | | | | | |
| 5 | M7 | 2-3X5FS | 6.624 | | | | | | | | | | |
| 6 | M8 | 2-3X5FS | 6.624 | | | | | | | | | | |

## Hot Rolled Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (/1E5 F) | Density[k/ft^3] | Yield[ksi] |
|---|---|---|---|---|---|---|---|
| 1 | A36 Gr.36 | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 36 |
| 2 | A572 Gr.50 | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 50 |
| 3 | A992 | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 50 |
| 4 | A500 Gr.B RND | 29000 | 11154 | 0.3 | 0.65 | 0.527 | 42 |
| 5 | A500 Gr.B Rect | 29000 | 11154 | 0.3 | 0.65 | 0.527 | 46 |
| 6 | A53 Gr.B | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 35 |
| 7 | A1085 | 29000 | 11154 | 0.3 | 0.65 | 0.49 | 50 |

## Wood Material Properties

| | Label | Type | Database | Species | Grade | Cm | Ci | Emod | Nu | Therm ... | Dens[k... |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DF | Solid S... | Visually Graded | Douglas Fir-Larch | No.1 | | | 1 | 0.3 | 0.3 | 0.035 |
| 2 | SP | Solid S... | Visually Graded | Southern Pine | No.1 | | | 1 | 0.3 | 0.3 | 0.035 |
| 3 | HF | Solid S... | Visually Graded | Hem-Fir | No.1 | | | 1 | 0.3 | 0.3 | 0.035 |
| 4 | SPF | Solid S... | Visually Graded | Spruce-Pine-fir | No.1 | | | 1 | 0.3 | 0.3 | 0.035 |
| 5 | 24F-1.8E ... | Glulam | NDS Table 5A | 24F-1.8E_DF_BAL | na | | | 1 | 0.3 | 0.3 | 0.035 |
| 6 | 24F-1.8E ... | Glulam | NDS Table 5A | 24F-1.8E_DF_UNBAL | na | | | 1 | 0.3 | 0.3 | 0.035 |
| 7 | 24F-1.8E ... | Glulam | NDS Table 5A | 24F-1.8E_SP_BAL | na | | | 1 | 0.3 | 0.3 | 0.035 |
| 8 | 24F-1.8E ... | Glulam | NDS Table 5A | 24F-1.8E_SP_UNBAL | na | | | 1 | 0.3 | 0.3 | 0.035 |
| 9 | Bottom C... | Solid S... | Visually Graded | Eastern White Pine | Select Struct... | | | 1 | 0.3 | 0.3 | 0.035 |
| 10 | Top Chord | Solid S... | Visually Graded | Eastern White Pine | Select Struct... | | | 1 | 0.3 | 0.3 | 0.035 |
| 11 | Sloped to... | Solid S... | Visually Graded | Eastern White Pine | Select Struct... | | | 1 | 0.3 | 0.3 | 0.035 |
| 12 | Diagonal | Solid S... | Visually Graded | Eastern White Pine | Select Struct... | | | 1 | 0.3 | 0.3 | 0.035 |

## Joint Loads and Enforced Displacements (BLC 1 : Roof Dead Load)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (... | Inactive |
|---|---|---|---|---|---|
| 1 | N8 | L | Y | -7.455 | |
| 2 | N12 | L | Y | -7.455 | |

## Joint Loads and Enforced Displacements (BLC 2 : Snow Load)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (... | Inactive |
|---|---|---|---|---|---|
| 1 | N8 | L | Y | -5.154 | |
| 2 | N12 | L | Y | -5.154 | |

## Joint Loads and Enforced Displacements (BLC 4 : Roof Live Load)

| | Joint Label | L,D,M | Direction | Magnitude[(k,k-ft), (in,rad), (... | Inactive |
|---|---|---|---|---|---|
| 1 | N8 | L | Y | -4.892 | |
| 2 | N12 | L | Y | -4.892 | |

## Member Distributed Loads (BLC 3 : Attic Dead Load)

| | Member Label | Direction | Start Magnitude[k... | End Magnitude[k/... | Start Location[ft,%] | End Location[ft,%] | Inactive |
|---|---|---|---|---|---|---|---|
| 1 | M1 | Y | -0.262 | -0.262 | 0 | 0 | |

## Member Section Forces (By Combination)

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 1 | 4 | M1 | 1 | -1.525 | 1.887 | 0 |
| 2 | | | 2 | -1.525 | 1.278 | -3.679 |
| 3 | | | 3 | -1.525 | 0.669 | -5.942 |
| 4 | | | 4 | -1.525 | 0.06 | -6.79 |
| 5 | | | 5 | -1.525 | -0.549 | -6.223 |
| 6 | | | 6 | -1.525 | -1.157 | -4.24 |
| 7 | | | 7 | 2.543 | -11.294 | 0.351 |
| 8 | | | 8 | 2.552 | 1.522 | 4.627 |
| 9 | | | 9 | 2.552 | 0.913 | 1.797 |
| 10 | | | 10 | 2.552 | 0.304 | 0.381 |
| 11 | | | 11 | 2.552 | -0.304 | 0.381 |
| 12 | | | 12 | 2.552 | -0.913 | 1.797 |
| 13 | | | 13 | 2.552 | -1.522 | 4.627 |
| 14 | | | 14 | 2.543 | 11.294 | 0.351 |
| 15 | | | 15 | -1.525 | 1.157 | -4.24 |
| 16 | | | 16 | -1.525 | 0.549 | -6.223 |
| 17 | | | 17 | -1.525 | -0.06 | -6.79 |
| 18 | | | 18 | -1.525 | -0.669 | -5.942 |
| 19 | | | 19 | -1.525 | -1.278 | -3.679 |
| 20 | | | 20 | -1.525 | -1.887 | 0 |
| 21 | 4 | M2 | 1 | 34.376 | 0.352 | 0 |
| 22 | | | 2 | 34.376 | 0.352 | -0.058 |
| 23 | | | 3 | 34.376 | 0.352 | -0.115 |
| 24 | | | 4 | 34.376 | 0.352 | -0.173 |
| 25 | | | 5 | 34.376 | 0.352 | -0.23 |
| 26 | | | 6 | 34.376 | 0.352 | -0.288 |
| 27 | | | 7 | 34.376 | 0.352 | -0.346 |
| 28 | | | 8 | 34.376 | 0.352 | -0.403 |
| 29 | | | 9 | 34.376 | 0.352 | -0.461 |
| 30 | | | 10 | 34.376 | 0.352 | -0.519 |
| 31 | | | 11 | 34.376 | 0.352 | -0.576 |
| 32 | | | 12 | 34.376 | 0.352 | -0.634 |
| 33 | | | 13 | 34.376 | 0.352 | -0.691 |
| 34 | | | 14 | 34.376 | 0.352 | -0.749 |

## Member Section Forces (By Combination) (Continued)

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 35 | | | 15 | 34.376 | 0.352 | -0.807 |
| 36 | | | 16 | 34.376 | 0.352 | -0.864 |
| 37 | | | 17 | 34.376 | 0.352 | -0.922 |
| 38 | | | 18 | 34.376 | 0.352 | -0.979 |
| 39 | | | 19 | 34.376 | 0.352 | -1.037 |
| 40 | | | 20 | 34.376 | 0.352 | -1.095 |
| 41 | 4 | M3 | 1 | 26.08 | 0 | 0 |
| 42 | | | 2 | 26.08 | 0 | 0 |
| 43 | | | 3 | 26.08 | 0 | 0 |
| 44 | | | 4 | 26.08 | 0 | 0 |
| 45 | | | 5 | 26.08 | 0 | 0 |
| 46 | | | 6 | 26.08 | 0 | 0 |
| 47 | | | 7 | 26.08 | 0 | 0 |
| 48 | | | 8 | 26.08 | 0 | 0 |
| 49 | | | 9 | 26.08 | 0 | 0 |
| 50 | | | 10 | 26.08 | 0 | 0 |
| 51 | | | 11 | 26.08 | 0 | 0 |
| 52 | | | 12 | 26.08 | 0 | 0 |
| 53 | | | 13 | 26.08 | 0 | 0 |
| 54 | | | 14 | 26.08 | 0 | 0 |
| 55 | | | 15 | 26.08 | 0 | 0 |
| 56 | | | 16 | 26.08 | 0 | 0 |
| 57 | | | 17 | 26.08 | 0 | 0 |
| 58 | | | 18 | 26.08 | 0 | 0 |
| 59 | | | 19 | 26.08 | 0 | 0 |
| 60 | | | 20 | 26.08 | 0 | 0 |
| 61 | 4 | M4 | 1 | 34.377 | -0.352 | -1.095 |
| 62 | | | 2 | 34.377 | -0.352 | -1.038 |
| 63 | | | 3 | 34.377 | -0.352 | -0.98 |
| 64 | | | 4 | 34.377 | -0.352 | -0.922 |
| 65 | | | 5 | 34.377 | -0.352 | -0.865 |
| 66 | | | 6 | 34.377 | -0.352 | -0.807 |
| 67 | | | 7 | 34.377 | -0.352 | -0.75 |
| 68 | | | 8 | 34.377 | -0.352 | -0.692 |
| 69 | | | 9 | 34.377 | -0.352 | -0.634 |
| 70 | | | 10 | 34.377 | -0.352 | -0.577 |
| 71 | | | 11 | 34.377 | -0.352 | -0.519 |
| 72 | | | 12 | 34.377 | -0.352 | -0.461 |
| 73 | | | 13 | 34.377 | -0.352 | -0.404 |
| 74 | | | 14 | 34.377 | -0.352 | -0.346 |
| 75 | | | 15 | 34.377 | -0.352 | -0.288 |
| 76 | | | 16 | 34.377 | -0.352 | -0.231 |
| 77 | | | 17 | 34.377 | -0.352 | -0.173 |
| 78 | | | 18 | 34.377 | -0.352 | -0.115 |
| 79 | | | 19 | 34.377 | -0.352 | -0.058 |
| 80 | | | 20 | 34.377 | -0.352 | 0 |
| 81 | 4 | M5 | 1 | -13.406 | 0 | 0 |
| 82 | | | 2 | -13.406 | 0 | 0 |
| 83 | | | 3 | -13.406 | 0 | 0 |
| 84 | | | 4 | -13.406 | 0 | 0 |
| 85 | | | 5 | -13.406 | 0 | 0 |
| 86 | | | 6 | -13.406 | 0 | 0 |

## Member Section Forces (By Combination) (Continued)

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 87 | | | 7 | -13.406 | 0 | 0 |
| 88 | | | 8 | -13.406 | 0 | 0 |
| 89 | | | 9 | -13.406 | 0 | 0 |
| 90 | | | 10 | -13.406 | 0 | 0 |
| 91 | | | 11 | -13.406 | 0 | 0 |
| 92 | | | 12 | -13.406 | 0 | 0 |
| 93 | | | 13 | -13.406 | 0 | 0 |
| 94 | | | 14 | -13.406 | 0 | 0 |
| 95 | | | 15 | -13.406 | 0 | 0 |
| 96 | | | 16 | -13.406 | 0 | 0 |
| 97 | | | 17 | -13.406 | 0 | 0 |
| 98 | | | 18 | -13.406 | 0 | 0 |
| 99 | | | 19 | -13.406 | 0 | 0 |
| 100 | | | 20 | -13.406 | 0 | 0 |
| 101 | 4 | M6 | 1 | -13.406 | 0 | 0 |
| 102 | | | 2 | -13.406 | 0 | 0 |
| 103 | | | 3 | -13.406 | 0 | 0 |
| 104 | | | 4 | -13.406 | 0 | 0 |
| 105 | | | 5 | -13.406 | 0 | 0 |
| 106 | | | 6 | -13.406 | 0 | 0 |
| 107 | | | 7 | -13.406 | 0 | 0 |
| 108 | | | 8 | -13.406 | 0 | 0 |
| 109 | | | 9 | -13.406 | 0 | 0 |
| 110 | | | 10 | -13.406 | 0 | 0 |
| 111 | | | 11 | -13.406 | 0 | 0 |
| 112 | | | 12 | -13.406 | 0 | 0 |
| 113 | | | 13 | -13.406 | 0 | 0 |
| 114 | | | 14 | -13.406 | 0 | 0 |
| 115 | | | 15 | -13.406 | 0 | 0 |
| 116 | | | 16 | -13.406 | 0 | 0 |
| 117 | | | 17 | -13.406 | 0 | 0 |
| 118 | | | 18 | -13.406 | 0 | 0 |
| 119 | | | 19 | -13.406 | 0 | 0 |
| 120 | | | 20 | -13.406 | 0 | 0 |
| 121 | 4 | M7 | 1 | 10.347 | 0 | 0 |
| 122 | | | 2 | 10.347 | 0 | 0 |
| 123 | | | 3 | 10.347 | 0 | 0 |
| 124 | | | 4 | 10.347 | 0 | 0 |
| 125 | | | 5 | 10.347 | 0 | 0 |
| 126 | | | 6 | 10.347 | 0 | 0 |
| 127 | | | 7 | 10.347 | 0 | 0 |
| 128 | | | 8 | 10.347 | 0 | 0 |
| 129 | | | 9 | 10.347 | 0 | 0 |
| 130 | | | 10 | 10.347 | 0 | 0 |
| 131 | | | 11 | 10.347 | 0 | 0 |
| 132 | | | 12 | 10.347 | 0 | 0 |
| 133 | | | 13 | 10.347 | 0 | 0 |
| 134 | | | 14 | 10.347 | 0 | 0 |
| 135 | | | 15 | 10.347 | 0 | 0 |
| 136 | | | 16 | 10.347 | 0 | 0 |
| 137 | | | 17 | 10.347 | 0 | 0 |
| 138 | | | 18 | 10.347 | 0 | 0 |

## Member Section Forces (By Combination) (Continued)

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 139 | | | 19 | 10.347 | 0 | 0 |
| 140 | | | 20 | 10.347 | 0 | 0 |
| 141 | 4 | M8 | 1 | 10.347 | 0 | 0 |
| 142 | | | 2 | 10.347 | 0 | 0 |
| 143 | | | 3 | 10.347 | 0 | 0 |
| 144 | | | 4 | 10.347 | 0 | 0 |
| 145 | | | 5 | 10.347 | 0 | 0 |
| 146 | | | 6 | 10.347 | 0 | 0 |
| 147 | | | 7 | 10.347 | 0 | 0 |
| 148 | | | 8 | 10.347 | 0 | 0 |
| 149 | | | 9 | 10.347 | 0 | 0 |
| 150 | | | 10 | 10.347 | 0 | 0 |
| 151 | | | 11 | 10.347 | 0 | 0 |
| 152 | | | 12 | 10.347 | 0 | 0 |
| 153 | | | 13 | 10.347 | 0 | 0 |
| 154 | | | 14 | 10.347 | 0 | 0 |
| 155 | | | 15 | 10.347 | 0 | 0 |
| 156 | | | 16 | 10.347 | 0 | 0 |
| 157 | | | 17 | 10.347 | 0 | 0 |
| 158 | | | 18 | 10.347 | 0 | 0 |
| 159 | | | 19 | 10.347 | 0 | 0 |
| 160 | | | 20 | 10.347 | 0 | 0 |
| 161 | 4 | M9 | 1 | 34.376 | 0.201 | -1.095 |
| 162 | | | 2 | 34.376 | 0.201 | -1.237 |
| 163 | | | 3 | 34.376 | 0.201 | -1.38 |
| 164 | | | 4 | 34.376 | 0.201 | -1.523 |
| 165 | | | 5 | 34.376 | 0.201 | -1.666 |
| 166 | | | 6 | 34.376 | 0.201 | -1.809 |
| 167 | | | 7 | 34.376 | 0.201 | -1.951 |
| 168 | | | 8 | 34.376 | 0.201 | -2.094 |
| 169 | | | 9 | 34.376 | 0.201 | -2.237 |
| 170 | | | 10 | 34.376 | 0.201 | -2.38 |
| 171 | | | 11 | 34.376 | 0.201 | -2.522 |
| 172 | | | 12 | 34.376 | 0.201 | -2.665 |
| 173 | | | 13 | 34.376 | 0.201 | -2.808 |
| 174 | | | 14 | 34.376 | 0.201 | -2.951 |
| 175 | | | 15 | 29.324 | -0.789 | -2.8 |
| 176 | | | 16 | 29.324 | -0.789 | -2.24 |
| 177 | | | 17 | 29.324 | -0.789 | -1.68 |
| 178 | | | 18 | 29.324 | -0.789 | -1.12 |
| 179 | | | 19 | 29.324 | -0.789 | -0.56 |
| 180 | | | 20 | 29.324 | -0.789 | 0 |
| 181 | 4 | M10 | 1 | 29.324 | 0.789 | 0 |
| 182 | | | 2 | 29.324 | 0.789 | -0.56 |
| 183 | | | 3 | 29.324 | 0.789 | -1.12 |
| 184 | | | 4 | 29.324 | 0.789 | -1.68 |
| 185 | | | 5 | 29.324 | 0.789 | -2.24 |
| 186 | | | 6 | 29.324 | 0.789 | -2.8 |
| 187 | | | 7 | 34.377 | -0.201 | -2.95 |
| 188 | | | 8 | 34.377 | -0.201 | -2.808 |
| 189 | | | 9 | 34.377 | -0.201 | -2.665 |
| 190 | | | 10 | 34.377 | -0.201 | -2.522 |

## Member Section Forces (By Combination) (Continued)

| | LC | Member Label | Sec | Axial[k] | Shear[k] | Moment[k-ft] |
|---|---|---|---|---|---|---|
| 191 | | | 11 | 34.377 | -0.201 | -2.38 |
| 192 | | | 12 | 34.377 | -0.201 | -2.237 |
| 193 | | | 13 | 34.377 | -0.201 | -2.094 |
| 194 | | | 14 | 34.377 | -0.201 | -1.952 |
| 195 | | | 15 | 34.377 | -0.201 | -1.809 |
| 196 | | | 16 | 34.377 | -0.201 | -1.666 |
| 197 | | | 17 | 34.377 | -0.201 | -1.524 |
| 198 | | | 18 | 34.377 | -0.201 | -1.381 |
| 199 | | | 19 | 34.377 | -0.201 | -1.238 |
| 200 | | | 20 | 34.377 | -0.201 | -1.095 |

## Member AISC 14th (360-10): ASD Steel Code Checks (By Combination)

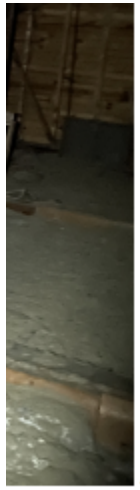
| | LC | Member | Shape | UC Max | Loc[ft] | Shear UC | Loc[ft] | Pnc/om [k] | Pnt/o... | Mn/om... | Cb | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | M5 | Rod1 | 0.792 | 7.92 | 0 | 7.92 | 0.817 | 16.931 | 0.282 | 1 | H1-1... |
| 2 | 4 | M6 | Rod1 | 0.792 | 7.92 | 0 | 7.92 | 0.817 | 16.931 | 0.282 | 1 | H1-1... |
| 3 | 4 | M9 | Flitch Plate | 0.795 | 9.508 | 0.027 | 13.481 | 57.422 | 72.754 | 13.641 | 1.2... | H1-1a |
| 4 | 4 | M10 | Flitch Plate | 0.795 | 3.973 | 0.027 | 3.831 | 57.422 | 72.754 | 13.641 | 1.24 | H1-1a |

Flitch plates are (2) 3/16"x9" plates

0.5 at d from support. See sheet 3.

## Member Wood Code Checks (By Combination)

| | LC | Member | Shape | UC Max | Loc[ft] | Shear... | Loc[ft] | Fc' [ksi] | Ft' [ksi] | Fb' [k... | Fv' [ksi] | RB | CL | CP | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | M1 | 7.75X10... | 0.589 | 37.1... | 1.537 | 29.75 | 0.832 | 0.747 | 1.121 | 0.144 | 1.63 | 1 | 0.998 | 3.9-1 |
| 2 | 4 | M2 | 5.5X9FS | 0.947 | 3.111 | 0.074 | 3.111 | 0.776 | 0.805 | 1.208 | 0.144 | 0 | 1 | 1 | 3.9-3 |
| 3 | 4 | M3 | 6X8.5FS | 0.768 | 15 | 0 | 15 | 0.666 | 0.805 | 1.204 | 0.144 | 4.61 | 0.997 | 0.858 | 3.6.3 |
| 4 | 4 | M4 | 5.5X9FS | 0.947 | 0 | 0.074 | 3.111 | 0.776 | 0.805 | 1.208 | 0.144 | 0 | 1 | 1 | 3.9-3 |
| 5 | 4 | M7 | 2-3X5FS | 0.483 | 6.624 | 0 | 6.624 | 0.714 | 0.926 | 2.008 | 0.155 | 3.323 | 0.998 | 0.47 | 3.6.3 |
| 6 | 4 | M8 | 2-3X5FS | 0.483 | 6.624 | 0 | 6.624 | 0.714 | 0.926 | 2.008 | 0.155 | 3.323 | 0.998 | 0.47 | 3.6.3 |



12'-9"

2X8 RIDGE BOARD

2X8 COLLAR TIE @ 4'-0" O.C.

6" X 8.5" TOP TRUSS CHORD

6" X 8.5" TOP TRUSS CHORD

2" X 7" ROOF RAFTER @ 16" O.C.

2" X 7" ROOF RAFTER @ 16" O.C.

4" X 9" BLOCKING WITH 3" NOTCH

4" X 9" BLOCKING WITH 3" NOTCH

5.5" X 9" TRUSS CHORD

5.5" X 9" TRUSS CHORD

1" STEEL ROD

12

(2) 3" X 5" TRUSS CHORD

(2) 3" X 5" TRUSS CHORD

7.75" X 10" BOTTOM TRUSS CHORD

7'-11"

15'

ATTIC FRAMING: TRUSS #1

4

F-1.3

44'-2"

17'-3.5"

# APPENDIX C - APPENDIX C - PROPOSAL

**AGREEMENT FOR PROFESSIONAL ENGINEERING SERVICES BETWEEN THE TOWN OF UPTON, MASSACHUSETTS AND CRITERIUM DUDKA ENGINEERS FOR TOWN OF UPTON HOLY ANGELS CHURCH STRUCTURAL COST ESTIMATE PROJECT**

THIS AGREEMENT made this 14th day of May, 2025 between Criterium Dudka Engineers, with a usual place of business at 63 South Street, Suite 110, Hopkinton, MA 01748, hereinafter called the "ENGINEER," and the Town of Upton, MA, acting by its Town Manager, with a usual place of business at Upton Town Hall, 1 Main Street, Upton, MA 01568 hereinafter called the "TOWN".

The ENGINEER and the TOWN, for the consideration hereinafter named, agree as follows:

1. Scope of Work

The ENGINEER shall perform the Work set forth in the Proposal dated March 12, 2025 attached hereto as Exhibit A.

2. Contract Price

The TOWN shall pay the ENGINEER for services rendered in the performance of this Agreement a lump sum of $34,825, subject to any additions and deductions as may be requested in writing or provided for herein. The amount to be paid to the ENGINEER shall not exceed the stated amount without the prior written consent of the TOWN.

3. Commencement and Completion of Work

A. This Agreement shall commence on May 15, 2025 and shall expire on October 1, 2025, unless terminated sooner in accordance with this Agreement.

B. Progress and Completion: ENGINEER shall commence work promptly upon execution of this Agreement and shall prosecute and complete the work regularly, diligently and uninterruptedly at such a rate of progress as will allow completion in a timely manner.

4. Performance of the Work

The ENGINEER shall supervise and direct the Work, using his best skills and attention, which shall not be less than such state of skill and attention generally rendered by the engineering/design profession for projects similar to the Project in scope, difficulty and location.

A. Responsibility for the Work:

(1) The ENGINEER shall be responsible to the TOWN for the acts and omissions of his employees, subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the ENGINEER. Consistent with the standard of care referenced above, the ENGINEER shall be responsible for the professional and technical accuracy for all work or services furnished by him or his consultants and subcontractors. The ENGINEER shall perform his work under this Agreement in such a competent and professional manner that detail checking and reviewing by the TOWN shall not be necessary. The ENGINEER is not responsible for conditions outside of their control.

(2) The ENGINEER shall not employ additional consultants, nor sublet, assign or transfer any part of his services or obligations under this Agreement without the prior approval and written consent of the TOWN. Such written consent shall not in any way relieve the ENGINEER from his responsibility for the professional and technical accuracy for the work or services furnished under this Agreement.

(3) All consultants must be registered and licensed in their respective disciplines if registration and licensor are required under the applicable provisions of Massachusetts law.

(4) The ENGINEER and all consultants and subcontractors shall conform their work and services to any guidelines, standards and regulations of any governmental authority applicable to the type of work or services covered by this Agreement.

(5) The ENGINEER shall not be relieved from its obligations to perform the work in accordance with the requirements of this Agreement either by the activities or duties of the TOWN in its administration of the Agreement, or by inspections, tests or approvals required or performed by persons other than the ENGINEER.

(6) Neither the TOWN's review, approval or acceptance of, nor payment for any of the work or services performed shall be construed to operate as a waiver of any rights under the Agreement or any cause of action arising out of the performance of the Agreement.

B. Deliverables, Ownership of Documents: One (1) reproducible copy of all drawings, plans, specifications and other documents prepared by the ENGINEER shall become the property of the TOWN upon payment in full therefor to the ENGINEER. Ownership of stamped drawings and specifications shall not include the ENGINEER's certification or stamp. Any re-use of such documents without the ENGINEER's written verification of suitability for the specific purpose intended shall be without liability or legal exposure to the ENGINEER or

to the ENGINEER's independent professional associates, subcontractors or consultants. Distribution or submission to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as an act in derogation of the ENGINEER's rights under this Agreement.

C. Compliance With Laws: In the performance of the Work, the ENGINEER shall comply with all applicable federal, state and local laws and regulations, including those relating to workplace and employee safety.

5. Site Information Not Guaranteed; Contractor's Investigation

The TOWN shall furnish to the ENGINEER available surveys, data and documents relating to the area which is the subject of the Scope of Work. All such information, including that relating to subsurface and other conditions, natural phenomena, existing pipes, and other structures is from the best sources at present available to the TOWN. All such information is furnished only for the information and convenience of the ENGINEER and is not guaranteed. It is agreed and understood that the TOWN does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes, or other structures will be the same as those indicated in the information furnished. Notwithstanding the foregoing, ENGINEER shall be entitled to rely on information furnished by the TOWN, and not be responsible for relying on the information subject to the standard of care described in Section 4 above. If, in the opinion of the ENGINEER, such information is inadequate or questionable, the ENGINEER may request the TOWN's approval to verify such information through the use of consultants or additional exploration. In no case shall the ENGINEER commence such work without the TOWN's prior written consent. Such work shall be compensated as agreed upon by TOWN and ENGINEER.

6. Payments to the Contractor

A. Cost incurred on this project shall be billed monthly and proportional to the work as outlined in the attached Scope of Services. Payment shall be due 30 days after receipt of an invoice by the TOWN.

B. If there is a material change in the scope of work, the TOWN and the ENGINEER shall mutually agree to an adjustment in the Contract Price.

C. If the TOWN authorizes the ENGINEER to perform additional services, the ENGINEER shall be compensated in an amount mutually agreed upon, in advance, in writing. Except in the case of an emergency, the ENGINEER shall not perform any additional services until such compensation has been so established.

7. Reimbursement

Except as otherwise included in the Contract Price or otherwise provided for under this Agreement, the ENGINEER shall be reimbursed by the TOWN: (a) at 1.0 times the actual cost to the ENGINEER of consultants retained to obtain information pursuant to Article 5 hereof or otherwise. No such reimbursement shall be made unless the rates of compensation have been approved, in advance, by the TOWN; (b) at 1.0 times the actual cost of additional or specially

authorized expense items, as approved by the TOWN: unless done in an emergency as outlined in Section 6.C.

8. Final Payment, Effect

The acceptance of final payment by the ENGINEER shall constitute a waiver of all claims by the ENGINEER arising under the Agreement.

9. Terms Required By Law

This Agreement shall be considered to include all terms required to be included in it by the Massachusetts General Laws, and all other laws, as though such terms were set forth in full herein.

10. Indemnification

A. General Liability: The ENGINEER shall indemnify and hold harmless the TOWN from and against any and all claims, damages, losses, and expenses, including attorney's fees, in connection with any third party claim arising out of the performance of this Agreement and to the extent the same relate to matters of general commercial liability, but only to the extent such claims, damages, losses, and expenses are caused, in whole or in part, by the negligent or wrongful acts or omissions of the ENGINEER or his employees, agents, subcontractors or representatives.

B. Professional Liability: The ENGINEER shall indemnify and hold harmless the TOWN from and against any and all claims, damages, losses, and expenses, including attorney's fees, in connection with a third party claim arising out of the performance of this Agreement and to the extent the same relate to the professional competence of the ENGINEER's services, but only to the extent such claims, damages, losses, and expenses are caused, in whole or in part, by the negligent acts, negligent errors or omissions of the ENGINEER or his employees, agents, subcontractors or representatives.

11. Insurance

A. The ENGINEER shall at his own expense obtain and maintain a Professional Liability Insurance policy for errors, omissions or negligent acts arising out of the performance of this Agreement in a minimum amount of $1,000,000.00.

B. The coverage shall be in force from the time of the agreement to the date when all construction work for the Project is completed and accepted by the TOWN. If, however, the policy is a claims made policy, it shall remain in force for a period of six (6) years after completion.

Since this insurance is normally written on a year-to-year basis, the ENGINEER shall notify the TOWN should coverage become unavailable.

C. The ENGINEER shall, before commencing performance of this Agreement, provide by insurance for the payment of compensation and the furnishing of other benefits in accordance with M.G.L. c.152, as amended, to all its employees and shall continue such insurance in full force and effect during the term of the Agreement.

D. The ENGINEER shall carry insurance in a sufficient amount to assure the restoration of any plans, drawings, computations, field notes or other similar data relating to the work covered by this Agreement in the event of loss or destruction until the final fee payment is made or all data are turned over to the TOWN.

E. The ENGINEER shall also maintain public liability insurance, including property damage, bodily injury or death, and personal injury and motor vehicle liability insurance against claims for damages because of bodily injury or death of any person or damage to property.

F. Evidence of insurance coverage and any and all renewals substantiating that required insurance coverage is in effect shall be filed with the Agreement. Any cancellation of insurance, whether by the insurers or by the insured, shall not be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the TOWN at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice.

G. Upon request of the ENGINEER, the TOWN reserves the right to modify any conditions of this Article.

12. Notice

All notices required to be given hereunder shall be in writing and delivered to, or mailed first class to, the parties' respective addresses stated above. In the event that immediate notice is required, it may be given by telephone or facsimile, but shall, to the extent possible, be followed by notice in writing in the manner set forth above.

13. Termination

A. Each party shall have the right to terminate this Agreement in the event of a failure of the other party to comply with the terms of the Agreement. Such termination shall be effective upon seven days' notice to the party in default and the failure within that time of said party to cure its default.

B. The TOWN shall have the right to terminate the Agreement without cause, upon ten (10) days' written notice to the ENGINEER. In the event that the Agreement is terminated pursuant to this subparagraph, the ENGINEER shall be reimbursed in accordance with the Agreement for all work performed up to the termination date.

14. Miscellaneous

A. Assignment: The ENGINEER shall not assign or transfer any of its rights, duties or obligations under this Agreement without the written approval of the TOWN.

B. Governing Law: This Agreement shall be governed by and construed in accordance with the law of the Commonwealth of Massachusetts.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals, the TOWN by its authorized representative who, however, incurs no personal liability by reason of the execution hereof or of anything herein contained, as of the day and year first above written.

CRITERIUM DUDKA ENGINEERS:

By: _____

Name: Andrew Dudka
Type or Print

Title: Owner

TOWN OF UPTON:

By: _____
Joseph Laydon, Town Manager

Availability of Funds: Account #_____

By: _____
Kenneth Costa, Town Accountant

519856/KOPE/0003

DUDKA CRITERIUM® ENGINEERS

March 12, 2025

Town of Upton
Joseph Laydon – Town Manager
One Main Street
Upton, MA 01568
Via email: jlaydon@uptonma.gov

Re: Holy Angels Church Structural Cost Estimate Project

Dear Mr. Laydon,

Thank you for giving us the opportunity to be of service to you and the Town of Upton in providing a fee proposal of the estimated costs to stabilize the building for use as an assembly space, including costs to upgrade the mechanical, electrical, ADA access to enter and exit the building, and fire sprinklers/protection. Holy Angels Church property located at 3 Milford Street, Upton, MA. Based on your request, Criterium Dudka Engineers submits its Fee Proposal which presents our;

- Criterium Engineers Qualifications;
- Scope of Services;
  - An invasive structural evaluation
  - Laser scan to document current "as-built" existing conditions of the entire space
  - Cost Estimation of the Project limited to the above building systems.

**Criterium Engineers Qualifications**

Criterium Engineers specializes in working with existing buildings and building owners; from problem solving to maintenance planning. We have been involved in evaluating buildings since 1957. Projects have ranged in scope from pre-purchase single family home inspections to major commercial buildings. We have been doing comprehensive facilities evaluations, structural evaluations and designs, construction monitoring, transition studies, and reserve studies for numerous condominium associations in New England for more than 25 years.

To summarize our qualifications, Criterium Engineers has:

- Examined more than 750,000 buildings throughout the United States.
- Senior staff member involvement throughout project.
- Collaborative approach to all projects.

**Project Team**

Chief Engineer – Richard Michalewich, P.E., has over 25 years in, forensic investigation, project management, and remediation system design of contaminated sites and property's in the United States and abroad. Rich has led large teams focused on highly complicated civil engineering projects, including developing the process, budgets and oversite of environmental clean-up projects. On top of Rich's extensive Geotechnical Engineering background, Rich has a broad structural engineering background assisting in developing structural solutions for both existing and new buildings.

Lead Structural Engineer – Chris Benda, P.E. Chris is a structural engineer with over 40 years' experience in engineering related services. His experience includes civil engineering, structural design, construction, materials and geotechnical engineering. In addition, he has experience in all phases of new home construction and renovation. Chris is a licensed Professional Engineer (P.E.) in Vermont, New Hampshire, Maine, Massachusetts, and other states. Chris's resume is attached.

Lead Mechanical Engineer – Rick Lalancette, P.E., Senior Engineer. Rick is a mechanical engineer with over 40 years' experience in engineering related services. Rick is the Founding President of our Vermont office (Criterium-Lalancette & Dudka Engineers). He has conducted over 6,500 inspections personally, and has overseen the work of over 20,000 inspections conducted by licensed, Professional Engineers working for the firm. His experience includes project and construction management, building and mechanical maintenance, a wide range of capital improvement plans, needs assessments, and estimating. Rick's resume is attached.
Lead Field Technician – Bruce Dykstra – Field Technician – Bruce received his Bachelors of Environmental Design Studies from the Technical University of Nova Scotia, Halifax and Associates in Architecture from Calvin College, Grands Rapids, MI. Bruce has a broad experience in working side by side with contractors to coach, mentor, and provide collaborative solutions. Bruce specializes in visiting site and monitoring workmanship at all levels for compliance to all necessary specifications. Bruce also completes all CAD development work for approval by the engineers.

F.W. Madigan - As a fourth-generation, family-owned and operated construction company, our firm has come a long way from its humble origins of Frank Madigan and a single pickup truck. Our Worcester, MA based team has grown, and we've diversified from our public sector roots to help businesses, colleges, manufacturers, private schools, nonprofits, religious organizations and more – all across the Northeast. After spending 15 years building the foundation for the business, Frank welcomed his son Bud to the team in 1953, igniting a period of major growth for our firm. We started crossing state borders to serve municipalities and private clients throughout New England. In the late 1970's/early 1980's after learning the business firsthand from their father, Bud's sons Fran and Jim, alongside their father, participated in the next level of Madigan

growth and geographic expansion. Under Bud's leadership, the years that followed were the time of a strategic shift away from public-sector work to the more collaborative private sector, where the three Madigans felt that they could provide the most value.

Project Manager – Andrew Dudka, President of Criterium Dudka Engineers. Andrew Dudka is a mechanical engineer/MBA and accomplished global executive successful at building corporate value for both public and private $20 million to $300+ million dollar OEM and contract/job shop manufacturing companies including high tech measurement and control instruments, consumer electronics, high tech insulation textiles for petroleum industry, machine shop/specialized medical devices and implants, and capital equipment space. Andrew's resume is attached.

We'll also have field engineers, project coordinators, and administrator's assisting in this work.

**Scope of Services**

Criterium Dudka Engineers (CDE) completed a non-invasive structural evaluation of the Holy Angels Church on April 4, 2019 and documented our opinion of the existing conditions at that time in report "FR_Holy Angels Church_Upton_Structural_Insp 4-26-2019", the "Report".

The Town of Upton Town Manager contacted CDE to continue our services to include a more detailed study of possible ways to re-purpose the church to be used for public gatherings in the town. Most importantly, to provide a cost estimate to transform this structure for public use limited to the following buildings systems to make it occupiable:

- Structural Stabilization for future use as an assembly space.
- Building Mechanical and electrical systems
- ADA accessibility.
- Fire sprinklers/protection.

Not included in the cost estimate is any custom specialty interior finishes or upgrades, windows, doors, appliances, cabinets, kitchens, painting, trim, wallpaper, finish carpentry, flooring, furniture, and any other building components outside of the four systems listed above.

Our services will include the following:

- An invasive structural analysis – This evaluation provide an understanding of the current condition and loading tolerances of the main structures of the building. This is important when deciding how the building will be re-purposed verse the cost, if necessary, to upgrade structural elements to meet the load conditions of the possible future uses.
- Existing Conditions - We will convert the digital files of the existing conditions completed by a third party to our graphic standards.

- Estimated Project Costs for Implementation to make the building occupiable with the noted exceptions above.

**Estimated Not to Exceed Fee: $34,825.00**

This fee assumes no significant change in the scope of work that you have requested of us.

It is understood that existing condition Revit and AutoCAD documentation of the existing building will be provided by the Town of Upton before commencement of work. No specifications will be provided as part of this proposal.

Please note, no public meetings have been included in this proposal, and standard meetings with the board will occur during regular business hours. Additional services outside of the scope of work as presented in this proposal will be billed on an hourly basis at our standard hourly rates:

- Principle Licensed Engineer - $250.00/hour
- Senior Architect - $225.00/hour
- Junior Architect - $185.00/hour
- Field Engineer - $185.00/hour
- Job Captain - $150.00/hour
- CAD Drafter - $145/hour
- Administration - $75.00/hour

You will be billed for the activities and/or actual hours that we spend on this project plus related out-of-pocket expenses. If additional work is requested, we will revise this estimate accordingly.

Our engineering fees and expenses will be billed monthly.

Your payment(s) will be due and appreciated within 10 days of invoice date.

Our Standard Terms and Conditions which are the basis of this agreement are attached to this proposal.

These fees are valid for 30 days and are subject to change beyond 30 days.

## Conclusion

Please sign the attached **Client Authorization** under the "**Authorization to Proceed**" notation. When we receive your authorization, along with the requested retainer fee, we will begin work.

In the event that you stop this project for any reason, you will only be responsible for the time that we have accumulated up to the date when we received written notice of your wish to stop.

If you have any questions, or if anything in this letter is inconsistent with your understanding of our agreement, please advise us as soon as possible.

We look forward to working with you on this project and are pleased that you selected Criterium Dudka Engineers.

Sincerely,

Andrew Dudka
President

Encl: Client Authorization
Standard Terms and Conditions

DUDKA CRITERIUM ENGINEERS

## CLIENT AUTHORIZATION

DATE: March 12, 2025

CLIENT:
Town of Upton
Joseph Laydon – Town Manager
One Main Street
Upton, MA 01568
Via email: jlaydon@uptonma.gov

Project Title: Holy Angels Church Structural Cost Estimate Project

Fee & Authorization to Proceed: **Estimated Engineer Fees Not to Exceed Fee: $34,825.00**

*This signed Authorization is due to begin work.*

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I hereby authorize *AJD Engineering Ventures, LLC., d/b/a Criterium Dudka Engineers* to undertake the engineering services as described in the accompanying proposal letter dated **March 12, 2025** and guarantee payment of all fees and expenses when invoiced, less any credits due by prepayments or retainers. I further agree to make payment(s) for the services rendered in accordance with the enclosed Standard Terms and Conditions of Criterium Dudka Engineers. I have read and understand the description of services to be provided, any noted limits on those services and the Standard Terms and Conditions.

5/14/2025
Date

Authorized Signature *(one signature binds all parties)*

Joseph Laydon
Print Name

For: Town of Upton

**STANDARD TERMS AND CONDITIONS**
**CRITERIUM DUDKA ENGINEERS**

## Section 1: Standard of Service

AJD Engineering Ventures, LLC d/b/a Criterium Dudka Engineers is dedicated to providing its clients with quality service. Services performed by Criterium Dudka Engineers under this agreement will be conducted in a manner consistent with that level of care and skill that is ordinarily exercised by members of the profession currently practicing under similar conditions at the time the services are performed. No other warranty or guarantee whatsoever, express or implied, is made. Client recognizes that interpretations and recommendations of Criterium Dudka Engineers are based solely on the information available to the company and the experience, technical qualifications, and professional judgement of the individual(s) performing services. Criterium Dudka Engineers will be responsible for those data, interpretations and recommendations, but shall not be responsible for the interpretation by others of the information developed.

## Section 2: Charges

Services are generally provided on a lump sum or an hourly basis plus necessary out-of-pocket costs. Where appropriate, company and personal vehicles used in conjunction with project work will be charged at the current IRS rate, or other stated rate, per mile. Vehicle rental or special vehicle requirements will be charged directly to the Client. Out-of-pocket costs such as printing, word processing, reproduction, special consultant fees, permits, special equipment, extraordinary insurance, fares, telephone, overnight lodging or meals expense, and other similar project related costs are billed at actual cost plus 10% percent. In the event that Criterium Dudka Engineers shall be charged more than a nominal fee to obtain public information or documents of record from government offices and public agencies Criterium Dudka Engineers may pass those costs along to you, our client, at cost plus 10 percent in addition to all other fees in our proposal.

## Section 3: Terms of Payment, Invoice Submittals

Criterium Dudka Engineers requires a retainer fee to be paid before commencing any project. Extended engagements may require interim invoicing on a weekly, monthly, or other basis. At the completion of the project, we will issue a final invoice.

Payment of each invoice is due upon presentation of our report or as scheduled in the project agreement unless credit terms have been established and are included in our project agreement. Unless otherwise agreed to in writing, invoices issued to Clients with established credit will be due within 10 days from date of invoice. Failure to pay invoices within the allotted time period will constitute a breach of contract and may result in suspension of work until such time as all overdue payments are made in full. Should any suspension occur because of overdue payments, the time for contract completion, if any is stated, shall be extended by the period of the suspension.

All outstanding invoiced balances remaining unpaid for thirty (30) days after date of invoice will be charged a finance charge in the amount of 1½ percent per month from the date of invoice, with the annual percentage rate being 18 percent, computed on a monthly basis. In the event that any invoice remains unpaid and it becomes necessary, in the opinion of Criterium Dudka Engineers, to initiate collection procedures, the Client hereby agrees to pay all collection costs including, but not limited to, reasonable fees for attorneys retained by Criterium Dudka Engineers and court costs at our standard billing rate for time necessitated in court appearances or presentation of claim to the appropriate court jurisdiction. Exceptions to the foregoing "Terms of Payment, Invoice Submittal" must be specified in writing as part of our confirmation letter or project agreement. Payments by credit card may result in an adjusted higher fee. The Client shall indemnify and save harmless Criterium Dudka Engineers for any claim or liability resulting from suspension of work due to non-current payments.

## Section 4: Right of Entry

The Client agrees to furnish Criterium Dudka Engineers with the right-of-entry on the land or represents and warrants, if the site is not owned by the Client, that permission has been granted to make site reconnaissance and other exploration pursuant to the scope of services described in the fee proposal.

## Section 5: CONSTRUCTION OBSERVATION SERVICES

If construction observation services are included as part of the scope of services in the Fee Proposal, Criterium Dudka Engineers will provide personnel to observe construction to ascertain that it is being performed in general accordance with the plans and specifications. Criterium Dudka Engineers cannot provide its opinion on the suitability of any part of the work performed unless measurements, readings, and observations of that part of the construction are made by Criterium Dudka Engineers personnel. Construction Observation Services made by Criterium Dudka Engineers do not make Criterium Dudka Engineers a guarantor of the contractor's work, and the contractor will continue to be responsible for the accuracy and adequacy of all construction or other activities performed by the contractor. The contractor will be solely responsible for the means and methods of construction, direction of personnel, control of machinery, other temporary construction aids, safety on the jobsite, DIGSAFE notification and compliance with OSHA regulations.

## Section 6: Drafting Basic Services

In this Section 6, Criterium Dudka Engineers is referred to as "the Drafter."

1. The Drafter's basic services are described in the preceding Fee Proposal. The professional obligations of the Drafter are undertaken and performed in the interest of the Client.
2. Based upon the Preliminary Design Documents provided by the Client, the Drafter shall provide the Construction Documents listed in the Fee Proposal, for review and approval by the Client, and shall review all Construction Documents as indicated in Fee Proposal.
3. Instructions to the Subcontractors shall be forwarded through the Client or General Contractor unless otherwise directed by the Client.
4. The Drafter shall not have control or charge of and shall not be responsible for construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, for the acts or omissions of the Contractor, the Contractor's subcontractors or any other persons performing any of the Work, or for the failure of any of them to carry out the Work in accordance with the Construction Documents.
5. The Drafter shall at all times have access to the Work wherever it is preparation or progress.
6. The Drafter shall provide written or graphic interpretations of the Construction Documents necessary for the proper execution or progress of the Work with reasonable promptness on written request of the Client, and shall, upon written request of the Client, provide written opinion, within a reasonable time, on all matters relating to the execution of the Work or the interpretation of the Construction Documents.
7. Whenever, in the Drafter's reasonable opinion, it is necessary or advisable for their implementation of the intent of the Construction Documents, the Client shall provide special inspection or testing of the Work by qualified laboratories or experts, whether or not such Work be then fabricated, installed or completed.
8. The extent of the duties, responsibilities and limitations of authority of the Drafter as the Client representative during construction shall not be modified or extended without written consent of the Client and the Drafter.

## Section 7: Confidentiality

Criterium Dudka Engineers shall maintain confidential and not disclose to others without Client's prior written consent, all information received from Client, not otherwise previously known to Criterium Dudka Engineers or part of the public domain through the lawful publication or communication by others. On behalf of itself or any other person, Criterium Dudka Engineers shall not, without prior written consent, use any portion of the information for any purpose except for the services being provided.

## Section 8: Copyright and Proprietary Data

These Standard Terms and Conditions and the accompanying Proposal are protected by copywrite, and the technical and pricing information contained in this document and the accompanying Proposal is to be considered Confidential and Proprietary. These documents and the information are not to be disclosed or made available to third parties without Criterium Dudka Engineers express written consent.

## Section 9: Insurance

Criterium Dudka Engineers represents and warrants that it has obtained Workers Compensation insurance and has such coverage under Public Liability and Property Damage insurance policies which Criterium Dudka Engineers deems adequate. Certificates for all such policies of insurance shall be provided to the Client upon request in writing. Criterium Dudka Engineers shall not be responsible for any loss, damage or liability caused in whole or in part, or otherwise from any acts by Client, its agents, staff and other consultants employed by it.

## Section 10: Fee Proposal Agreement

Fee Proposals are good for a period of 30 days from date of issuance. Criterium Dudka Engineers reserves the right to revise and update the Fee Proposal and Terms if the same is not signed and returned within 30 days of date of issuance.

## Section 11: Limitation of Liability

To the fullest extent permitted by law, neither Criterium Dudka Engineers, its consultants, nor their agents or employees shall be jointly, severally, or individually liable to client in excess of the compensation to be paid pursuant to this agreement or of Twenty-Five Thousand Dollars ($25,000.00), whichever is greater, by reason of any claim, loss, costs, or damages whatsoever arising out of, resulting from or in any way related to this Project or Contract, including but not limited to breach of contract or negligence. Professional negligence as required by law is not included with this limitation. Please refer to the applicable proposal and any attached addenda to the Agreement for additional disclosures and limitations of liability for the particular engagement, all of which shall apply to the services being provided pursuant to the proposal.

Criterium Dudka Engineers is not responsible for site conditions or the contractor's performance of the work, including supervision and safety measures.

Mutual Waiver of Consequential Damages: In no event shall Criterium Dudka Engineers or client be liable to each other for any indirect or consequential damages arising out of or relating to this Contract.

## Section 12: Indemnification

Criterium Dudka Engineers agrees to defend (subject to the provisions herein), indemnify, and hold harmless Client from and against any claims, liabilities, actions, demands, losses, damages, costs and expenses sustained by any person or entity to the extent caused by Criterium Dudka Engineers negligent acts, errors or omissions in connection with the services performed hereunder. Except however, and notwithstanding any other terms in or applicable to this agreement, in regards to claims, liabilities, actions, demands, losses, damages, costs and expenses caused by the negligent acts, errors or omissions of Criterium Dudka Engineers during the performance of professional services, it is expressly agreed that Criterium Dudka Engineers duty to defend Client shall be limited to reimbursing Client's reasonable costs, attorney fees and expenses incurred in its own defense to the extent of the claim caused by Criterium Dudka Engineers.

Client agrees to defend, indemnify, and hold harmless Criterium Dudka Engineers from and against any claims, liabilities, actions, demands, losses, damages, costs and expenses arising out of or resulting from the use, reuse or modification of the information for any project other than the named project or any third-party not granted reliance on Criterium Dudka Engineers reports and services.

## Section 13: Ownership of Documents

All reports, field data, field notes, calculations, estimates and other documents prepared by Criterium Dudka Engineers, as instruments of service, shall remain the property of Criterium Dudka Engineers. Our ownership includes all associated copyrights and the right of reuse, regardless of whether or not the Project is completed. Criterium Dudka Engineers shall, upon receipt of full payment for services rendered, grant Client a limited, exclusive, revocable license to use the reports and other deliverables for the project specified (only). Any use other than on the named project is strictly prohibited. Any reuse or modification of the documents, without written verification, completion, or adaptation by Criterium Dudka Engineers, as appropriate for the specific purpose, will be at Criterium Dudka Engineers sole risk and without liability or legal exposure to Criterium Dudka Engineers. . Client agrees that all reports furnished to Client or its agents, which are not paid for, will be returned upon demand and will not thereafter by Client for any purpose whatever. Client shall defend, indemnify, and hold harmless Criterium Dudka Engineers from any and all claims arising from Client's reuse, modification, or disclosure of the instruments of service or other work product produced hereunder to any third parties.

Criterium Dudka Engineers will retain all pertinent records relating to the services performed for a period of five years following submission of the report, during which period the records will be made available to Client at all reasonable times.

## Section 14: Document Distribution

Subject to the terms in the preceding section, Criterium Dudka Engineers agrees to furnish Client with an electronic copy of documents, drawings or reports relating to the services performed, and this is to be considered Criterium Dudka Engineer's work product. Hard copies, bound or unbound, may be provided upon request at a charge of $100 per copy or cost-plus 10 percent at Criterium Dudka Engineers sole discretion, unless the project agreement stipulates otherwise, in which case the project agreement fees for hard copies prevails. Criterium Dudka Engineers shall retain an electronic copy of the final reports in its files at the corporate office for a period of five (5) years.

## Section 15: Client Responsibilities

Client agrees to provide all requested and relevant information in a timely manner. Failure to provide information within the agreed upon timeframe may delay the completion of the services within the agreed upon timeframe. It is not the responsibility of Criterium Dudka Engineers to verify the accuracy or relevance of the information supplied. Criterium Dudka Engineers is relying on the accuracy, completeness and appropriateness of client-provided information.

Criterium Dudka Engineers is performing the Services so that Client may utilize the information and recommendations contained in the reports, produced as instruments of service, which are not intended to be comprehensive, to effect prudent and timely decisions necessary for, among other things, the purchase, refinance, budgeting, planning, care, operation and maintenance of the property, as well as the safety of the occupants and other users.

Unless clearly defined in the project's scope, it is understood and agreed that Criterium Dudka Engineers shall not be responsible for implementing the recommendations as part of its Services. Criterium Dudka Engineers shall not be responsible or liable for Client's determination to implement or not implement Criterium Dudka Engineers recommendations, or for the services performed by any consultant(s) and/or contractor(s) whom Client may select to implement such recommendations. Further, it is understood that Criterium Dudka Engineers is not responsible or liable, and Client shall hold Criterium Dudka Engineers harmless, for any effects or hazardous conditions on the property, including the services or work performed by the consultant(s) and/or contractor(s) in the design and construction of the property.

**Section 16: Images**

Client hereby acknowledges and agrees that Criterium Dudka Engineers and/or its agents may create or obtain images, photographs, and/or video and/or audio recordings of the Property during the Project, including inspection of the Property (collectively, "Images"). Client agrees that Criterium Dudka Engineers may use such Images for Criterium Dudka Engineers purposes, including but not limited to education, internal training, scholarship, research, marketing, advertisement, and promoting Criterium Dudka Engineers website, products, services, or ideas.

**Section 17: Force Majeure**

The engineer shall not be responsible or liable for any failure or delay in the performance of its obligations under this contract arising out of or resulting from any cause or event beyond our control, such as war, strike, crime, epidemic/pandemic, regulations and/or restriction imposed by any government agency, or other event.

**Section 18: Termination**

This agreement to perform engineering services may be terminated by either party by written notice. In the event of termination, Criterium Dudka Engineers shall be paid for services performed and expenses incurred up to the date of its receipt of the termination notice, plus any expenses or penalties resulting from the termination.

**Section 19: Assignment**

Neither the Client nor Criterium Dudka Engineers may delegate, assign, sublet or transfer his duties or interest in this agreement without the written consent of the other party.

**Section 20: Controlling Agreement**

To the extent the accompanying Proposal and these Standard Terms and Conditions are inconsistent or contradictory, the Proposal takes precedence. Except when specifically acknowledged by Criterium Dudka Engineers, any terms and conditions set forth in Client's purchase order, requisition, notice, authorization or other documentation are inapplicable to the services.

**Section 21: Disputes**

If, in your opinion as our client, or that of any third party granted reliance on Criterium Dudka Engineers reports or services, Criterium Dudka Engineers was negligent or in breach of contract, to the fullest extent permitted by law, any action arising out of or related to the services provided must be brought to our attention no later than one (1) year after

our field visit. In the event this limiting period is not enforceable under the applicable jurisdiction, then the period shall be revised to reflect the shortest duration legally enforceable or, if no limiting period is enforceable, then this provision shall be stricken without voiding the remaining provisions of the Agreement.

If, in your opinion as our client, Criterium Dudka Engineers was negligent or in breach of contract, you shall make no claim for professional negligence, either directly or in a third party claim, against Criterium Dudka Engineers unless you have first provided Criterium Dudka Engineers with a written certification (Certificate of Merit) executed by an independent licensed Professional Engineer currently practicing in the same discipline as Criterium Dudka Engineers and licensed in the State in which the claim arises. This certification shall: a) contain the name and license number of the certifier; b) specify each and every act or omission that the certifier contends is a violation of the standard of care expected of a Professional Engineer performing professional services under similar circumstances; and c) state in complete detail the basis for the certifier's opinion that each such act or omission constitutes such a violation. This certificate shall be provided to Criterium Dudka Engineers not less than thirty (30) calendar days prior to the presentation of any claim or the institution of any institution or legal or equitable proceeding.

This Agreement is to be governed by and construed in accordance with the laws in the state where the project is performed.

Any controversy or claim arising out of or relating to this agreement, or the breach thereof, shall be settled by binding arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. The site of the arbitration shall be Boston, Massachusetts.

In addition to and prior to arbitration, the parties agree to negotiate all disputes in good faith for a period of thirty (30) days from the date of bringing the concerns to our attention. If such negotiations do not resolve the concerns, the parties shall further endeavor to settle disputes by mediation in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect unless the parties mutually agree otherwise. Demand for mediation shall be filed in writing with the other party to this Agreement and with the American Arbitration Association. A demand shall be made within a reasonable time after the claim, dispute, or other matter in question has arisen. In no event shall the demand for mediation be made after the date when institution or legal or equitable proceedings based on such claim, dispute or other matter in question would be barred by the applicable statute of limitations.

If the Client brings an action against Criterium Dudka Engineers and Criterium Dudka Engineers prevails, Criterium Dudka Engineers shall be entitled to recover costs and expenses, including reasonable attorneys' fees and costs.

**Section 22: Miscellaneous**

The Agreement, together with the applicable proposal and any attached Addenda, expresses the complete and final understanding between the parties with respect to the subject matter hereof and is applicable, by reference, to all Agreements executed as of the date noted above until amended or superseded at a later date. If any provision hereof is declared invalid by a court of competent jurisdiction, such provision will be ineffective only to the extent of such invalidity, so that the remainder of that provision and all remaining provisions of the Agreement will continue in full force and effect. Any notices pursuant to the Agreement shall be sent to the addresses as set forth at the beginning of the Agreement and shall be solely in writing, sent certified mail, return receipt requested and shall be effective whether such return receipt is accepted or rejected by receiver.

# APPENDIX D - QUALIFICATIONS OF THE ENGINEERS

CRITERIUM DUDKA ENGINEERS

BUILDING INSPECTION ENGINEERS
PROUDLY SERVING NORTH AMERICA SINCE 1957

# Richard P. Michalewich, Jr., P.E.
## Chief Engineer

**Senior Global Engineer**

Mr. Michalewich is a civil engineer with over 25 years of experience in line management, project management and engineering analysis and design. Mr. Michalewich has managed projects over $40M for both public and private clients in the US, South America, and Vietnam. Mr. Michalewich is in responsible charge of program and project management, engineering technical support, preparation of deliverables, and review of technical documents for structural, geotechnical and environmental remediation projects in the US and abroad.

Prior to joining Criterium-Dudka Engineering, Mr. Michalewich was a Senior Engineer for various private national engineering companies in responsible charge of program and project management of multi-million dollar projects, engineering technical support, preparation of deliverables, and review of technical documents for geotechnical and remediation projects in the US and abroad.

***Key Qualifications Include:***

- Structural Analysis and Design
- Project Management
- Home and Building Inspections
- Geotechnical Analysis and Design
- Environmental Remediation and Design
- Hydrological Analysis
- OSHA HAZWOPER
- Business Management

**EDUCATION AND PROFESSIONAL AFFILIATION**

UNIVERSITY OF RHODE ISLAND - Kingston, RI Master of Science in Civil and Environmental Engineering
WORCESTER POLYTECHNIC INSTITUTE - Worcester, MA Bachelor in Civil Engineering

Professional Engineer licensed in the states of Massachusetts, Rhode Island, Connecticut, Maine, and Vermont.

CRITERIUM®
DUDKA ENGINEERS

## Andrew Dudka
## President & Owner

**Accomplished Global Executive** successful at building corporate value for both public and private $20 million to $300+ million dollar OEM and contract/job shop manufacturing companies including high tech measurement and control instruments, consumer electronics, high tech insulation textiles for petroleum industry, machine shop/specialized medical devices and implants, and capital equipment space.

**Also President & Owner of two holding company's in service industry:**

- **AJD Ventures Inc.**
- **AJD Ventures II, LLC**

*Key qualifications include:*

- Building Structure Analysis
- Mechanical Systems Condition Assessments
- Software Development
- Building Material Optimization and Design
- Finite Element Analysis of Beams and Joists
- Financial Analysis and Budgeting for HOA's
- Home and Building Inspections
- Safety, OSHA, & ISO 9000/13485 Specialist

**Master of Business Administration** (Cum Laude) ●Finance & Operations ●Boston University, Boston
**Bachelor of Science** ● Mechanical Engineering ● University of New Hampshire, Durham, NH