Department of General Services

PROJECT ANNOUNCEMENT

Post Date: 09.04.2020

Submittal Deadline: 09.18.2020

Project Title: Region 3 Headquarters Buildings Reroof

Facility Name: Region 3 - Middle TN

City: Nashville County: Davidson

SBC Project No.:

Agency: TENNESSEE DEPARTMENT OF TRANSPORTATION

Maximum Allowable Construction Cost (MACC): $2,090,000.00

Development Manager: Shumaker, David

Agency Representative: Durham, Alan

Project Description:
Reroof of buildings A, B, E, and F including new roof membrane, insulation, copings, adjustments to roof curbs, and all required related work.

Additional information about the project can be found in the project's program document included as a part of this announcement.

Special Design or Submission Requirements:
N/A

Note: All information previously made available to consultants, by the State, and all information supplied by consultants to the State, relating to the subject project, will be made available to any potential respondents. Potential respondents desiring to review these documents can submit a request to STREAMDesigner.Interest@TN.gov.

Anticipated SBC Approval Date: 10.08.2020

Anticipated ESC Designer Selection Date: 10.19.2020

Anticipated Designer NTP Date: 10.20.2020

Anticipated Project Bid Date: 04.01.2021

Hurst-Rosche, Inc.

PHASE 1

TDOT Region 3 Complex
Buildings A, B, E, and F Reroof
Nashville, Davidson County, Tennessee
SBC No. 529/000-02-2019-24
Task Authorization # 24-006

PREPARED FOR

State of Tennessee Real Estate Asset Management (STREAM)
Nashville, Davidson County, Tennessee

May 21, 2020

HURST–ROSCHE INC.
561 Murfreesboro Pike Nashville, Tennessee 37210 Ph: 615-454-6615

Phase 1

TDOT Region 3 Complex
Buildings A, B, E, and F Reroof

SBC No. 529/000-02-2019-24
Task Authorization # 24-006

Nashville, Davidson County, Tennessee

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Purpose of Evaluation

On April 27, 2020, at the direction of The State of Tennessee Real Estate Asset Management (STREAM), Hurst-Rosche, Inc. was awarded this project to review and analyzed the current condition of the roofs at buildings A, B, E, and F at the TDOT Region 3 Complex located at 6601 Centennial Boulevard, Nashville, TN 37243. A site visit was set up between all parties involved and occurred on May 6, 2020. The people present at the walk through were Steven Grant (Development Manager, STREAM), Jimmy Kistner (Facility Manager, TDOT) and Deborah Lundberg (Architect, Hurst-Rosche, Inc.).

Evaluation Approach

A visual survey of the existing conditions was performed during the site visit on May 6, 2020. The visual survey of the building's interior and exterior consisted of observations of Building A's top floor and roof, the lobby connecting Building A and Building B, Building B's mechanical space and roof, Building E's roof and Building F's roof. While on site, photographs and information of the existing conditions were collected.

Evaluation Limitations

While every effort has been made to accurately record and report on deficiencies present on site, this document should not be interpreted as an exhaustive study. Instead, this report is our professional opinion of construction rehabilitation needs based on our engineering judgement and experience.

Statement of Need

"Buildings A, B, E, and F are in need of reroofing including comprehensive removal of old roofing, new roof membrane, drains (exterior and interior linings), insulation, coping, adjustments to roof curbs, and all required related work."

Building Background Information

The original buildings were built in the late 1980s.

Observations

Building A – This is a three-story office building. On the third-floor water stains are visible on ceiling tiles along with brighter white tiles which indicate they have been replaced more recently than the other existing ceiling tiles. The ceiling area over the reception desk, towards the center of the third floor, has previously had damaged ceilings tiles and has rusty areas of the decking and metal joists directly above it.

The roof access from the east stairwell has a fixed access ladder approximately 14' tall. There is no cage at the upper level of the ladder. The door to the roof is 40" wide x 63" high (outside frame dimensions). It is missing some weather stripping, is not flashed at the roof level and is not painted or finished for exterior conditions.

The current roofs at the stairwells at this building are a ballasted single-ply roofing membrane on tapered insulation over metal decking. The main roof of the building is a

ballasted single-ply roofing membrane over 1/8" per foot tapered insulation on a 3" reinforced concrete slab over 28-gauge corrugated steel centering and steel joists (as indicated from the existing drawings). On the roof there are three rooftop units on 10" high curbs, two exhausts on 12" high curbs, a new HVAC unit on wood boards and approximately six 4" exhaust pipes. There are eight roof drains with strainers that connect to internal piping. There is a roof drain with internal piping on the top of each stairwell. The perimeter of the roof is created by a 6" metal bullnose frame. There is no coping or edge trim where the bullnose frame meets the roofing membrane.

All the rocks were previously moved over, and an elastic type coating product was applied to seal the roof and then all the rocks were moved back in place. Cracking is visible at this new topcoat that has been applied to the roof.

There is a slanted metal roof over steel tube trusses at the lobby between Building A and Building B with windows at each side. At the vestibule into the lobby, on the west side of the building, water stains are visible on the walls.

Building B – This is a two-story building with a lab for testing chemicals and road materials on the first floor and an interior mechanical space on the second floor. In the first-floor corridor there are water stained ceiling tiles from the roof leaking. On the second floor (mechanical space) the underside of the metal deck ceiling has rust spots in several locations and in the north corner there is server water damage to a gypsum board wall from water leaking from above.

There are two areas at the mechanical level that are "outside" and do not have roofs over them. Because of this they have scuppers at the floor level to allow water to drain out onto the main roof level. There is standing water in both because the floor level where the scuppers are and the roof level of the main roof do not line up properly.

The current roofs on this building are ballasted single-ply roofing membrane on 2" flat rigid insulation with tapered insulation crickets between roof drains over structurally sloped metal decking and steel joists. There is a metal gravel stop around the perimeter of the roofs.

The four concrete walled areas on two sides of the roof are filled with exhaust pipes from equipment below. There are several small exhaust pipes for equipment from below throughout the roof and some are deteriorating and disintegrated. The rocks on the roof are stains with some areas showing up very reddish and in other areas black. The roofing membrane is pulling away from the perimeter in several places and many repair patches are visible. There is equipment on curbs and 13 roof drains with strainers that connect to internal piping.

At the east side of the roof the roofing membrane has pulled away so much that four pipes have moved because of it, two are cast iron exhaust pipes. One of the cast iron pipes has become unusable. It was venting equipment from the lab below but is

currently venting into the mechanical space instead of through the roof since it is disconnected from moving so much at the roof level.

The west side of the roof has a metal equipment screen that has been caulked at every vertical joint. The adjacent concrete wall has visible cracks.

Building E – This is a one-story building for auto and truck repairs. The center space has a taller roof with translucent panels around the clerestory level. The current roofs on this building, at the main level and higher center area, are ballasted single-ply roofing membrane on 2" flat rigid insulation with tapered insulation crickets between roof drains over structurally sloped metal decking and steel joists. There is a metal gravel stop around the perimeter of the roof.

At the northern end of the building a small section of the roof protrudes out over a loading area. This section of the roof has multiple tears in the roof membrane and there are rust stains on the interior walls below. In many places around the entire roof the roof membrane is pulling away from the perimeter. There are multiple tears where insulation can be seen, or insulation is missing. Many repair patches are visible throughout the entire roof. There are 33 roof drains with strainers that connect to internal piping. It appears an elastic type coating product was also applied to a portion of this roof as well.

Roof access is from an interior ladder to the mezzanine level, approximately 12' up and then up another interior ladder approximately 10' up. Neither ladder has a cage on it.

Building F – This is a one-story building where road signs are made and stored. This building has three separate roof areas. The current roofs on this building are ballasted single-ply roofing membrane on 2" flat ridge insulation with tapered insulation crickets between roof drains over structurally sloped metal decking and steel joists. There is a metal gravel stop around the perimeter of the roofs. The metal gravel stop around all three roof areas has peeling and missing paint. This roof has two large roof top units on curbs and several exhausts vents. There are 12 roof drains with strainers that connect to internal piping. There are multiple repair patches visible throughout the entire roof along with multiple tears in the roof membrane.

A section of the metal panels at the roof perimeter of the loading dock is missing.

There is a roof drainpipe leaking on the interior towards the north side of the building. Roof access is gained from an interior ladder approximately 15' -6" high to a roof hatch. There is no cage on the ladder.

Photos are included to help document these observations.

Appendix A

Photographs

Photo No. 1

Building A – Ceiling leaks at east stairwell door on the third floor

Photo No. 2

Building A – Ceiling leaks at west side of the third floor

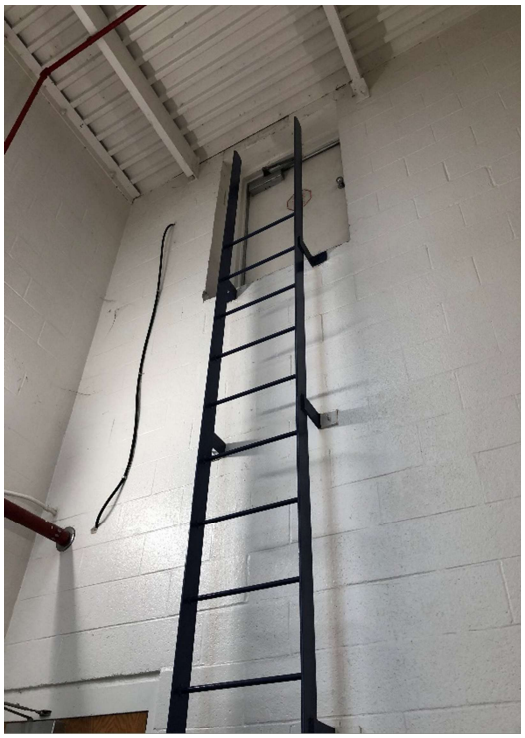
Photo No. 3

Building A – Ceiling leaks at west stairwell door on the third floor

Photo No. 4

Building A – Internal piping at stairwell

Photo No. 5



Building A – Ladder to roof

Photo No. 6

Building A – Rust on joist above reception area on third floor

Photo No. 7

Building A – Rust on corrugated steel above reception area on third floor

Photo No. 8

Building A – Roof access door

Photo No. 9

Building A – Typical roof top drain

Photo No. 10

Building A – HVAC units on curbs

Photo No. 11

Building A – Exhaust vent on curbs

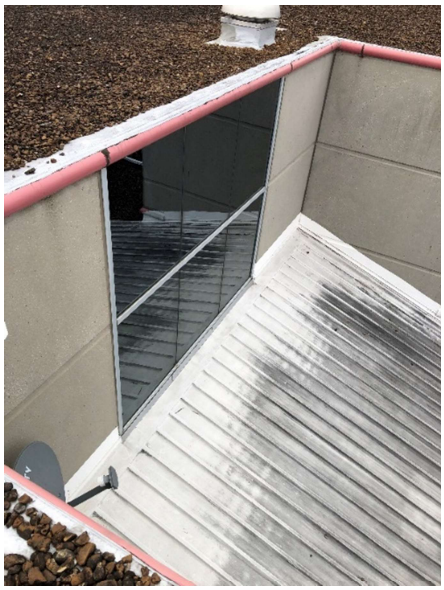
Photo No. 12

Building A – West stairwell and HVAC unit on wood

Photo No. 13

Building A – Edge condition at round metal element and no coping

Photo No. 14



Building A – Windows at the top of the roof over the lobby

Photo No. 15

Building A – Windows on the top of the roof over the lobby (view from Building B)

Photo No. 16

Building A – Windows on the side of the roof over the lobby

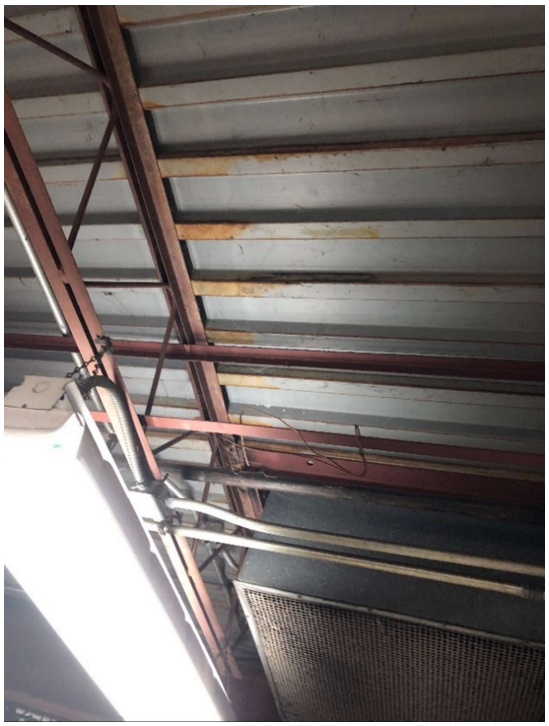
Photo No. 17

Building A – Water stains in west vestibule of lobby

Photo No. 18

Building B – Ceiling tile water stains in the first-floor corridor

Photo No. 19

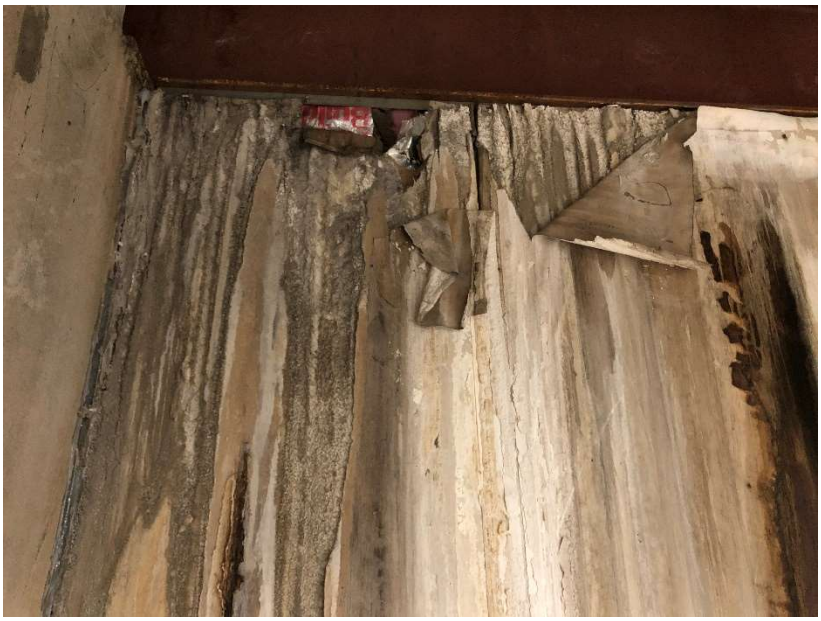


Building B – Rust at undersdie of metal deck

Photo No. 20

Building B – Exhaust pipe disconnected at mechanical level (to the left of the blue pipe)

Photo No. 21



Building B – Water damage to gypsum board wall

Photo No. 22

Building B – Concrete walled area with exhausts (1 of 4 on the roof)

Photo No. 23

Building B – crack in concrete wall

Photo No. 24

Building B – Rocks discolored

Photo No. 25

Building B – Pipes moved because of the roof membrane

Photo No. 26

Building B – Multiple repair patches

Photo No. 27

Building B – Patches at coping and 2' +/- of new roof membrane

Photo No. 28

Building B – Patches for repairs

Photo No. 29

Building B – Deteriorated exhaust pipe

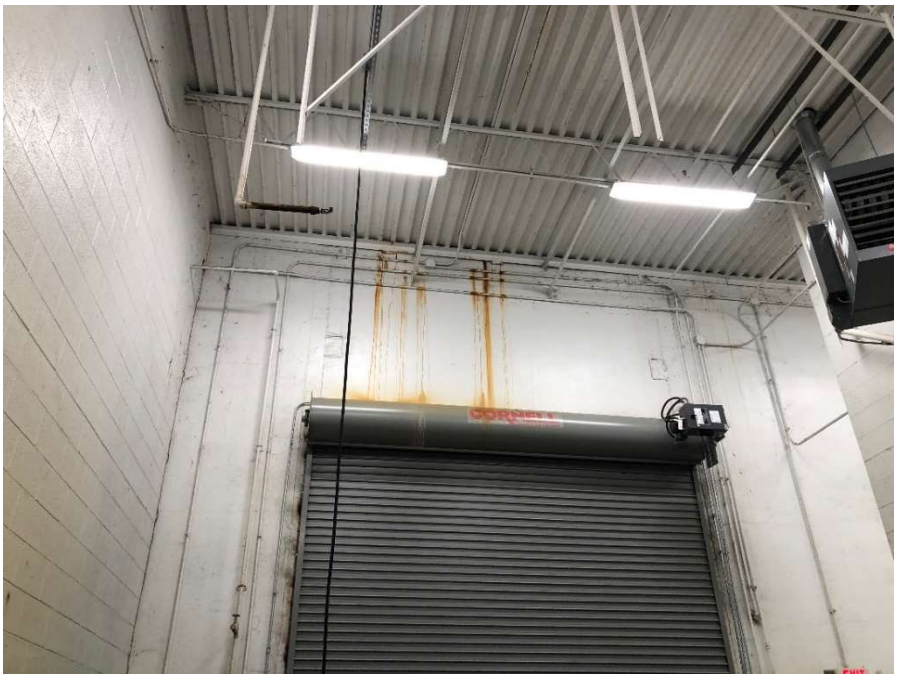
Photo No. 30

Building B – Scupper that is not draining properly (1 of 2 on the roof)

Photo No. 31

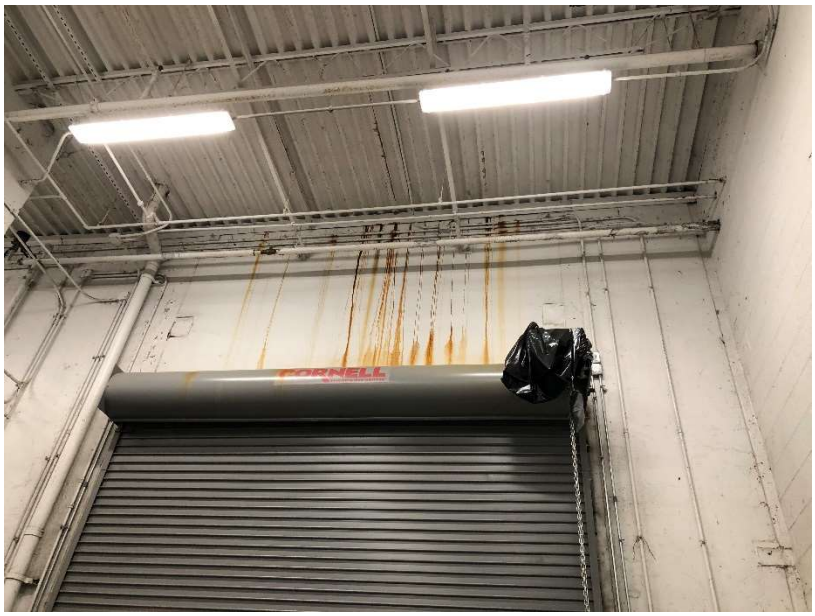
Building B – Screen wall that has been caulked at every joint

Photo No. 32



Building E – Rust at loading area

Photo No. 33



Building E – Rust at other side of loading area

Photo No. 34

Building E – Roof ladder at mezzanine level

Photo No. 35

Building E – Translucent panels at center section of the roof

Photo No. 36

Building E – Edge condition of upper roof at center section

Photo No. 37

Building E – Holes in roof membrane

Photo No. 38

Building E – Roof membrane pulling away from the center area of the roof

Photo No. 39

Building E – Edge condition of the roof

Photo No. 40

Building E – Tears at the edge of the roof

Photo No. 41

Building E – Tears at the edge of the roof

Photo No. 42

Building E – Insulation exposed and missing on some areas

Photo No. 43

Building E – Tears in roof membrane

Photo No. 44

Building F – Bucket under leaking roof drainpipe

Photo No. 45

Building F – Paint pealing at metal coping

Photo No. 46

Building F – Discolored rocks

Photo No. 47

Building F- Roof hatch

Photo No. 48

Building F – Three different sections of roofs

Photo No. 49

Building F – Tears in roof membrane

Photo No. 50

Building F – Close up of tears in roof membrane

Photo No. 51

Building F – Repairs and tears in roof membrane

Photo No. 52

Building F – Missing metal panel at roof perimeter

Hurst-Rosche, Inc.

PHASE 2

TDOT Region 3 Complex
Buildings A, B, E, and F Reroof
Nashville, Davidson County, Tennessee
SBC No. 529/000-02-2019-24
Task Authorization # 24-006

PREPARED FOR

State of Tennessee Real Estate Asset Management (STREAM)
Nashville, Davidson County, Tennessee

June 1, 2020

HURST–ROSCHE INC.
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Phase 2

TDOT Region 3 Complex
Buildings A, B, E, and F Reroof

SBC No. 529/000-02-2019-24
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Nashville, Davidson County, Tennessee

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Appendix B – Drawings
- Site Plan
- Roof Plans

Preliminary Recommendations

Given the current state of the roofs on Buildings A, B, E and F at the TDOT Region 3 Complex we recommend they should be replaced. Due to the age of the roofs and visible damage we recommend removing all of the rock ballast, flashing, roof membrane and insulation to the existing deck.

According to the existing drawings, Building A has a 3" concrete slab over metal centering at the roof level for a future addition. Rebar is extending out 1" above the concrete slab to attach new future columns to the slab. These locations, as well as the roof drains, exhaust pipes and other penetrations in the concrete slab can be the cause of leaks and or visible rust on the underside of the steel decking and joists at the third-floor ceiling. Because of this, the condition at the concrete slab should be inspected once the insulation is removed. Check for any deficiencies including spalling, cracking or deterioration in the concrete and remove or repair as needed. All penetrations thru the concrete slab should be inspected and resealed. All expansion joints in the concrete slab should be inspected and any deteriorated ones should be raked out and resealed to assure proper movement.

At Buildings B, E, and F the metal decking should be inspected for any deficiencies when the insulation is removed.

The insulation on all the roofs should be replaced due to its age and exposed areas of damage. The tapered insulation layout and cricket design should be revised as necessary to provide positive slope to drains and avoid standing water on the roofs.

The roof drains should remain in place while the strainers and clamping rings are removed. New roof drain inserts with a factory TPO coated flange, such as the Hercules RetroDrain, should be inserted and installed per the manufacture's installation instructions. A product like this will help eliminate leaks in two areas. The compression seal between the existing drain and roof membrane is eliminated as the new drains are heat welded to the TPO membrane creating a much stronger connection. Another common leak occurs at the drain connection to the interior drain pipe. The outlet pipe of the new retrofit drain extends past this existing pipe connection eliminating this pipe joint as a potential interior plumbing leak.

Conceptual scope of work

1. **Roof on Building A Only**
    a. Remove and dispose of all rock ballast from the rooftop.
    b. Remove and dispose of all roof drain strainers and clamping rings at all roof drains (roof drains to remain and be retrofitted with new inserts and strainers).
    c. Remove and dispose of all roof membrane and flashing (take care not to damage the bullnose trim around the perimeter where the elastic type

coating has been applied).

d. Remove and dispose of all insulation including all substrate materials to the existing deck.
e. Inspect the condition of the concrete slab.
    i. Remove any deteriorating concrete and replace with new concrete.
    ii. Rake and reseal any deteriorated joints in the concrete slab.
f. Replace any damaged exhaust pipes.
g. Reseal all penetrations.
h. Place HVAC units and exhaust vents next to the existing curbs, remove existing flashing, reflash curbs and set units back in place.
i. Install membrane walk pads under unit on wood sleepers or install curbs for unit to sit on.
j. Install new tapered rigid insulation, including tapered crickets and sump at roof drains.
k. Install coverboards.
l. Install new white TPO roof with flashing at all terminations and penetrations.
m. Install and flash new roof drain inserts and strainers at all roof drain locations.
n. Install new prefinished metal roof edge and coping at perimeter and prefinished metal counter flashing at wall terminations.
o. Replace roof access door with new door to include a pan at the sill and weather stripping.

2. Roofs on Buildings B, E and F

a. Remove and dispose of all rock ballast from rooftop.
b. Remove and dispose of all roof drain strainers and clamping rings at all roof drains (roof drains to remain and be retrofitted with new inserts and strainers).
c. Remove and dispose of all prefinished metal roof edging, coping, roof membrane and flashing
d. Remove and dispose of all insulation including all substrate materials to the existing deck.
e. Inspect the metal roof deck for any damage, rust, or discoloration.
f. Reseal all penetrations.
g. Replace any damaged exhaust pipes.
h. Remove any unused exhaust pipes or equipment.
i. Place HVAC units and exhaust vents next to existing curbs, remove existing flashing, reflash curbs and set units back in place.
j. Install new rigid insulation, including tapered crickets and sump at roof

drains.

k. Install coverboards.
l. Install new white TPO roof with flashing at all terminations and penetrations.
m. Install and flash new roof drain inserts and strainers at all roof drain locations.
n. Install new prefinished metal roof edge and coping at perimeter and prefinished metal counter flashing at wall terminations.

3. Additional items on Roof of Building B

a. Scuppers need to be lowered or tapered insulation modified at the two non-roofed areas at the 2nd floor mechanical alcoves that are not draining properly.

4. Slanting Lobby Roof

a. Power-wash the exterior metal roof.
b. Seal around any fasteners holes or other penetrations with exterior sealant.
c. Inspect and reinstalled flashing as needed at windows and all roof connections
d. Apply an elastomeric roof coating over the entire metal roof and flashings.

5. Interior Items

a. Buildings A and B – Remove and replace all stained ceiling tiles
b. Building A – Investigate the entire area above the ceiling on the 3rd floor. Any open web steel joists that have extensive rust and deterioration will need to be documented further and verified if they need to be reinforced at the bottom chord with another plate or possibly reinforced at the webbing.
c. Lobby – Clean all water stains on walls
d. Building B – Prime the underside of the metal deck with a stain blocking primer and repaint
e. Building B – Remove all water damaged gypsum board and framing on the second level (mechanical space). Clean all surfaces within 10'-0" once wall is removed. Replace any damaged walls with new framing (to match existing) and new gypsum board. Tape, mud, prime and paint all new walls.
f. Building B – Disconnect any exhaust vents not being used below and reattach any pipes disconnected because of movement in the roof that are still in use.
g. Building E – Clean rust stains on interior walls. Prime walls with stain blocking primers and repaint walls.
h. Building F – Clean any water damage caused from leaking roof drainpipe.

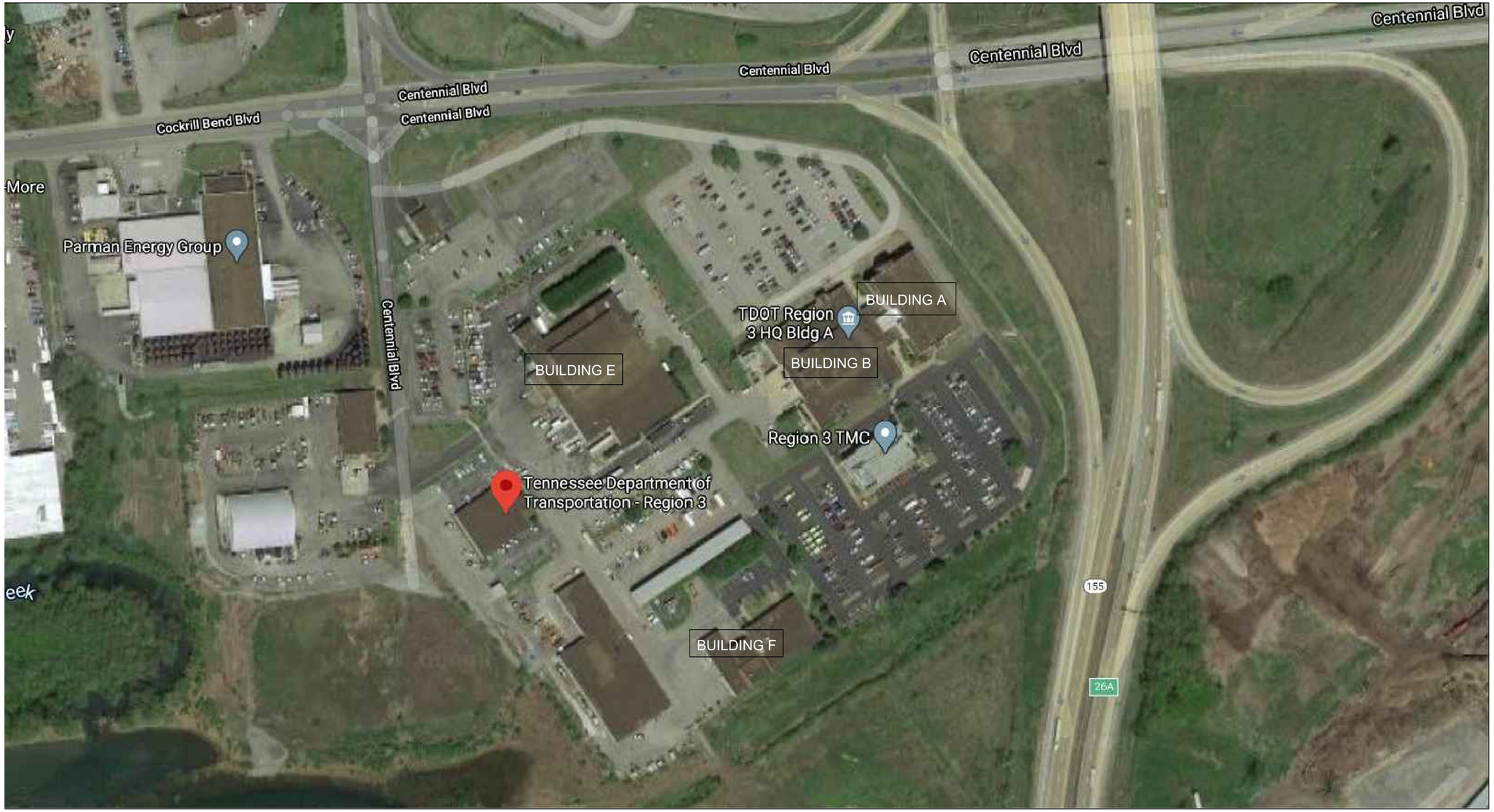
Preliminary Recommendations for Sequencing and Approach

Verify all rooftop equipment and vents are still in use before reroofing occurs. Indicated any items that are not in use any longer so those items can be removed once demolition on the roof occurs. Holes where these items are removed will need to be patched before reroofing occurs.

Attached are a Site Plan, Building A Roof Plan, Building B Roof Plan, Building E Roof Plan and Building F Roof Plan to show the items discussed above.

Appendix B

Drawings



1 A-001 SITE PLAN
SCALE: N.T.S.

Hurst-Rosche, Inc.
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EAST ST. LOUIS, IL
MARION, IL
ARNOLD, MO
NEOSHO, MO

BUILDINGS A, B, E, AND F REROOF

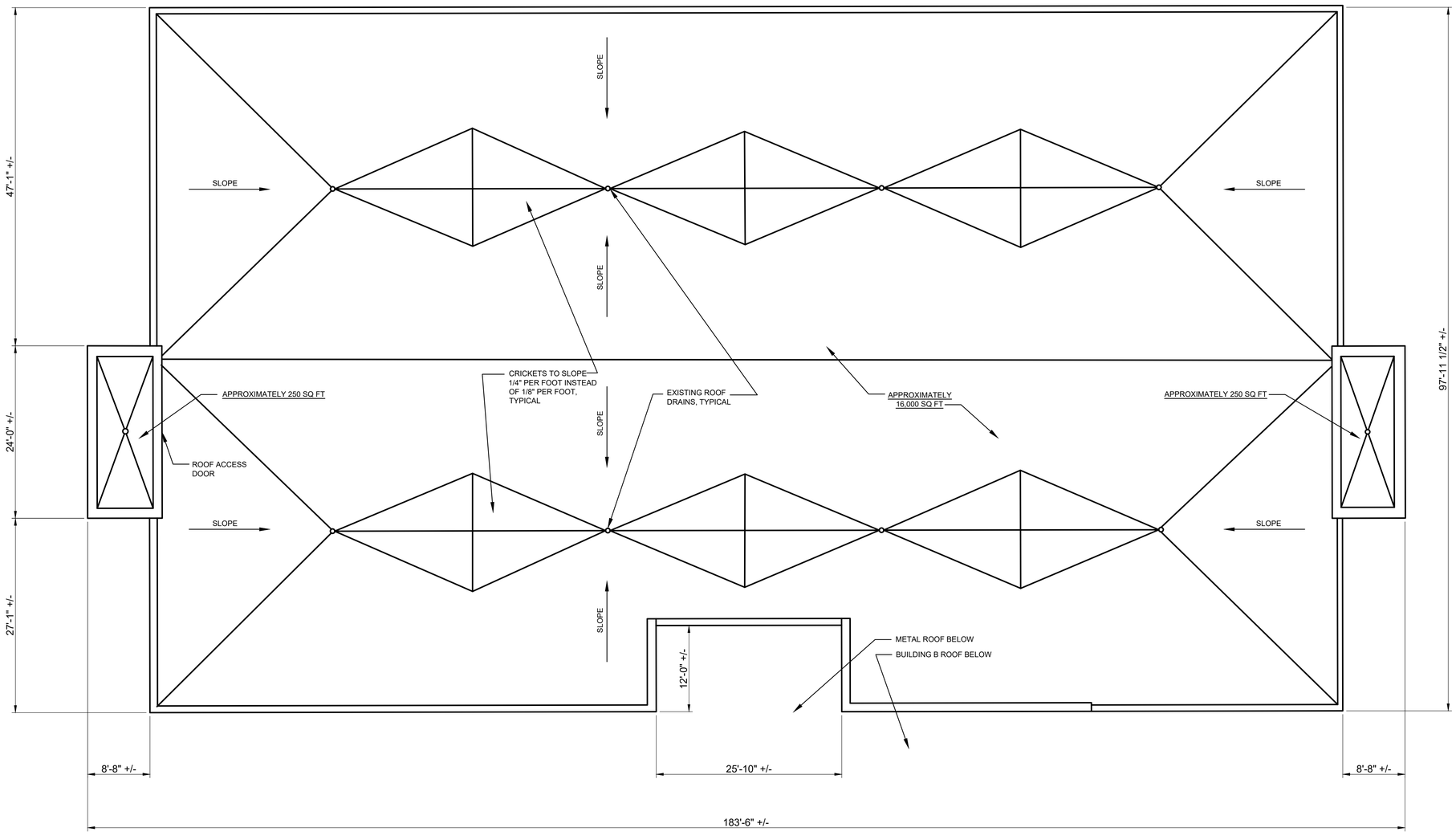
TDOT REGION 3 COMPLEX
6601 CENTENNIAL BLVD.
NASHVILLE, DAVIDSON COUNTY, TENNESSEE
SBC NO. 529/000-02-2019-24
TASK AUTHORIZATION # 24-006

PROJECT NUMBER: 520-1280

DATE: 06/01/2020

SITE PLAN

A-001



1 A-101 BUILDING A ROOF PLAN
SCALE: 1/8" = 1'-0"

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BUILDINGS A, B, E, AND F REROOF

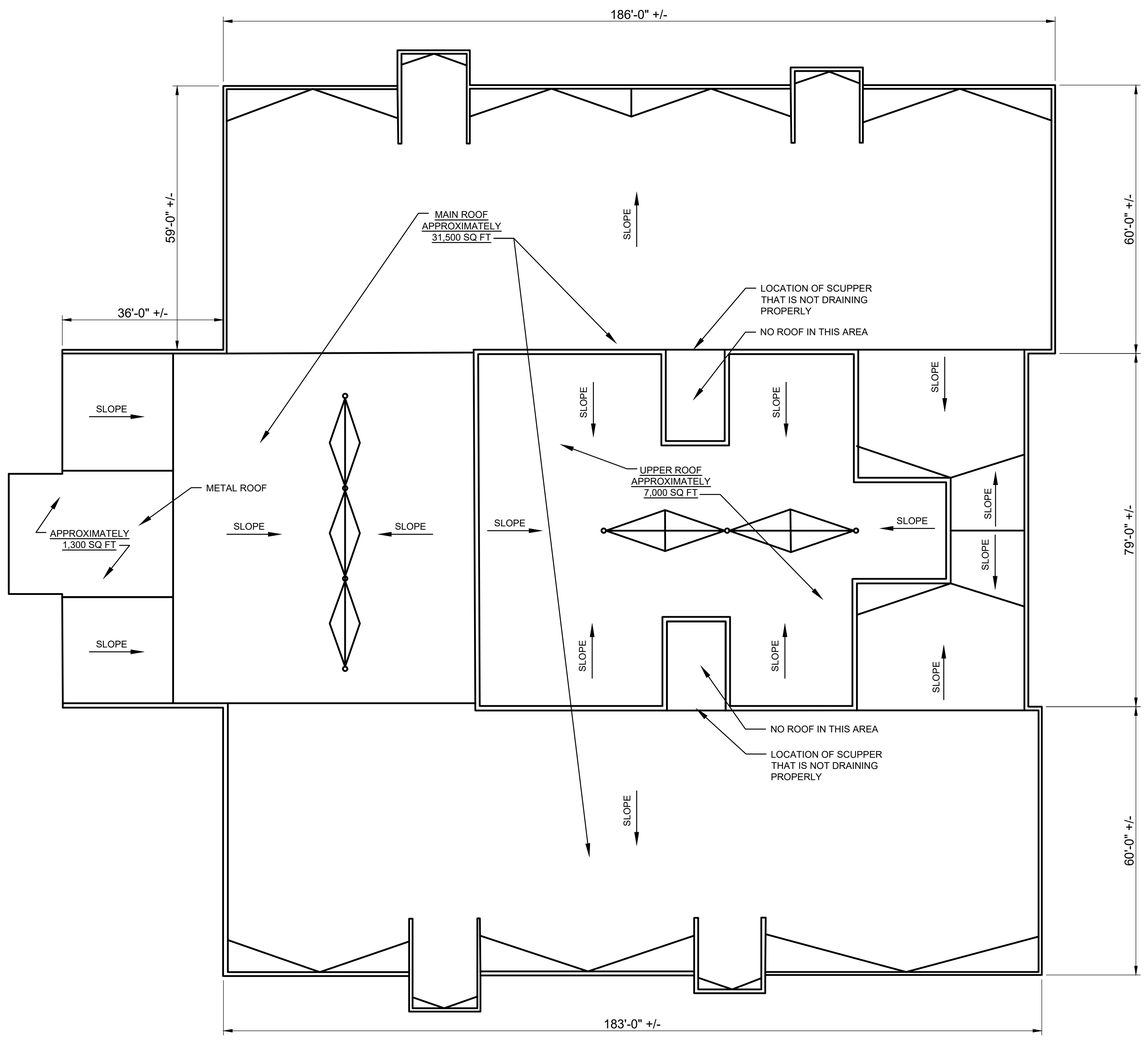
TDOT REGION 3 COMPLEX
6601 CENTENNIAL BLVD.
NASHVILLE, DAVIDSON COUNTY, TENNESSEE
SBC NO. 529/000-02-2019-24
TASK AUTHORIZATION # 24-006

PROJECT NUMBER: 520-1280

DATE: 06/01/2020

BUILDING A ROOF PLAN

A-101



1 A-102 BUILDING B ROOF PLAN
SCALE: 1/16" = 1'-0"

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BUILDINGS A, B, E, AND F REROOF

TDOT REGION 3 COMPLEX
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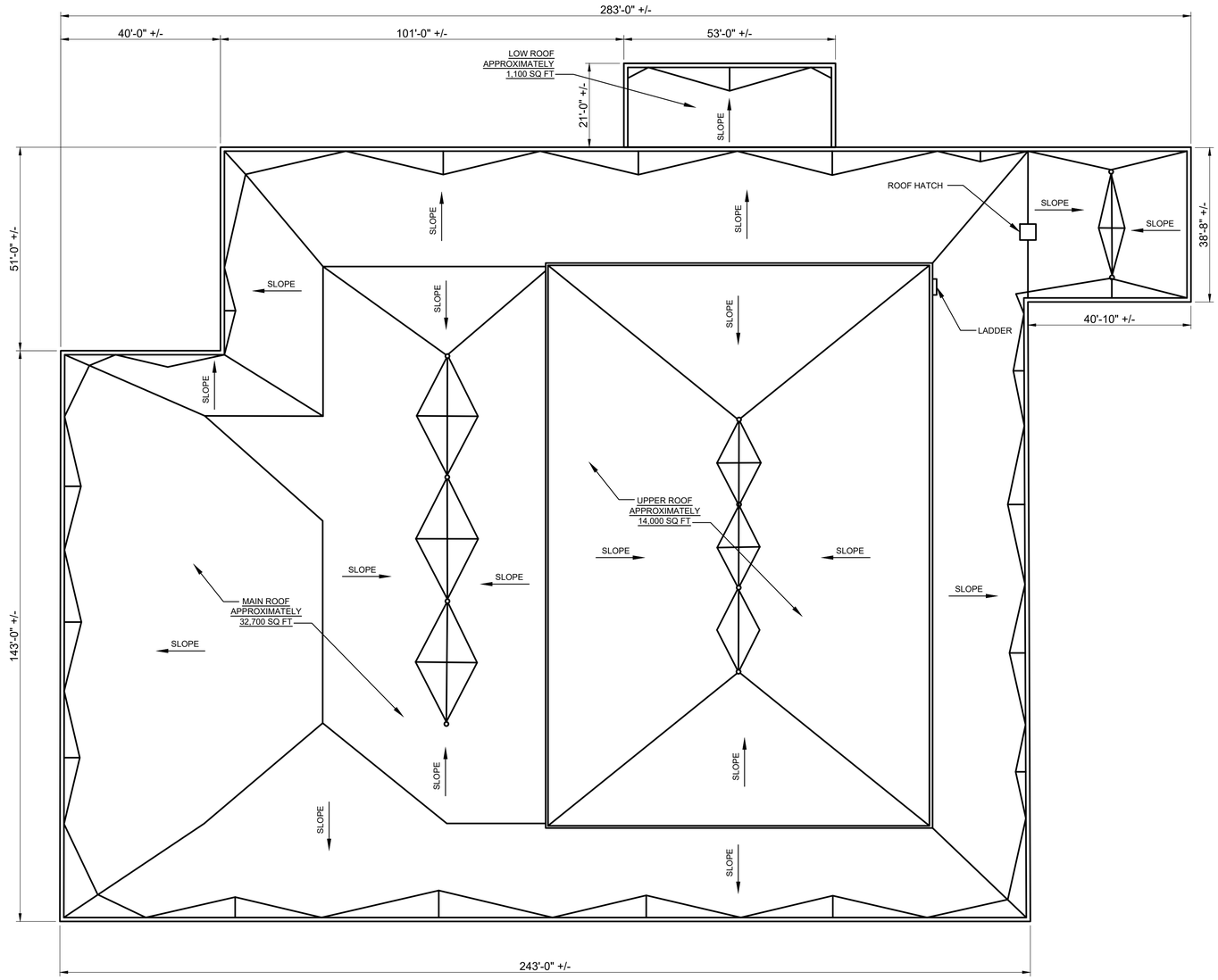
BUILDING B ROOF PLAN

A-102



1 / A-103 BUILDING E ROOF PLAN
SCALE: 1/16" = 1'-0"

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BUILDINGS A, B, E, AND F REROOF

TDOT REGION 3 COMPLEX
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SBC NO. 529/000-02-2019-24
TASK AUTHORIZATION # 24-006

PROJECT NUMBER: 520-1280

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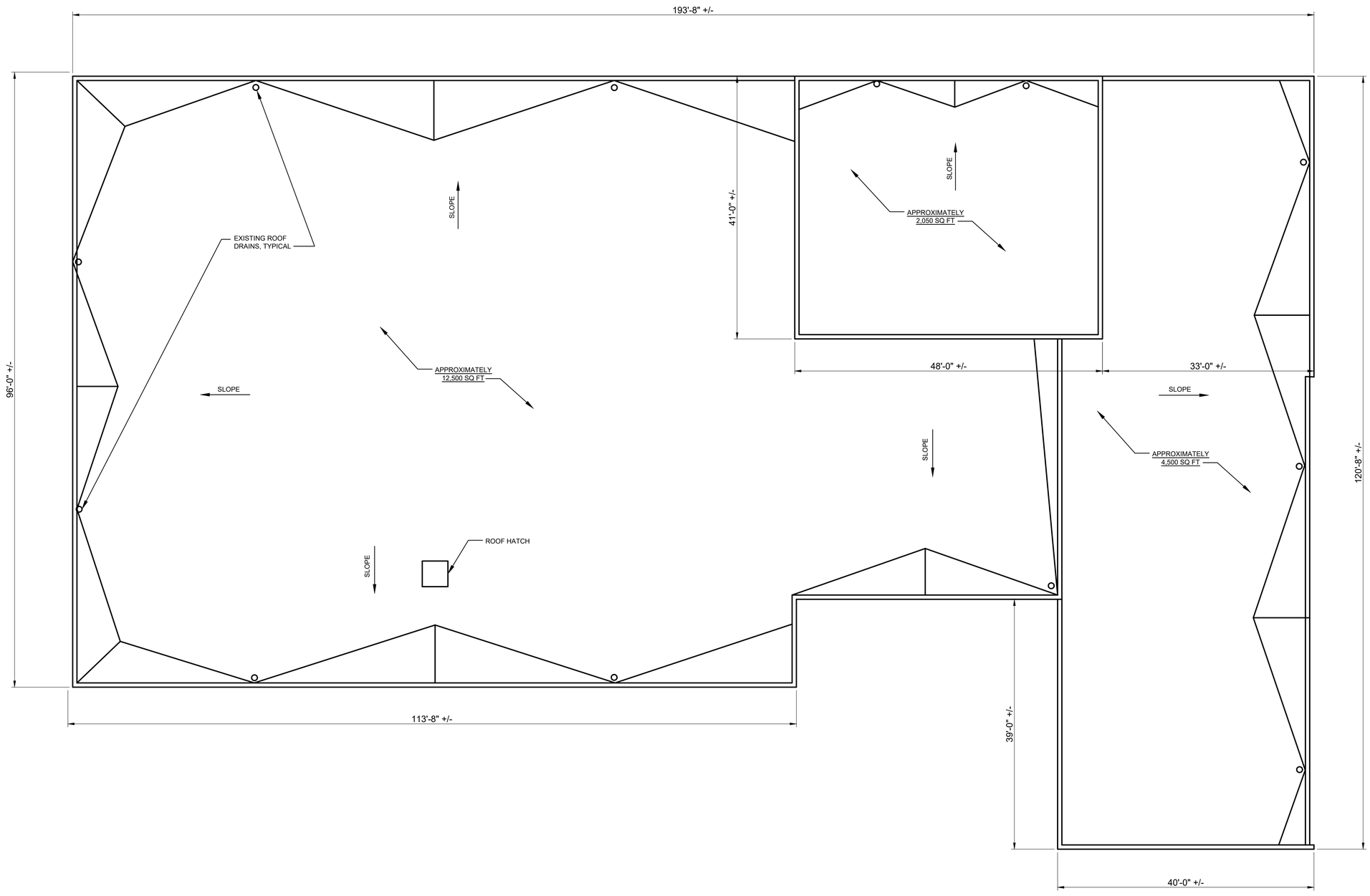
BUILDING E ROOF PLAN

A-103



1 A-104 BUILDING F ROOF PLAN
SCALE: 1/8" = 1'-0"

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BUILDING F ROOF PLAN

A-104

Hurst-Rosche, Inc.

PHASE 3

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State of Tennessee Real Estate Asset Management (STREAM)
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June 16, 2020

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Phase 3

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Nashville, Davidson County, Tennessee

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Appendix D – Opinion of Probable Cost

Executive Summary

Replace the existing roofs on Buildings A, B, E, and F and repair or replace all related elements. Fix all interior damages caused from roof leaks after the roofs are replaced.

Energy Requirements

- Nashville is in climate zone 4
- R Value of 25 is required for these types of roofs (per 2012 International Energy Conservation Code, Table C402.2 (below), Insulation entirely above deck).

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal buildings (with R-5 thermal blocks)[a, b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49

This is a comparison between the existing roofs and the new proposed roofs.

Building A Roof	***Type***	***Average R Value***	***Current Code***
Existing	Ballasted single-ply roofing membrane over 1/8" per foot tapered rigid insulation (3" average thickness)	16.64	Does not meet
New	TPO roof membrane over coverboards, 1/4" per foot tapered (4" average thickness) and underlayment	25.66	Meets

.

Buildings B, E, & F Roofs	***Type***	***Average R Value***	***Current Code***
Existing	Ballasted single-ply roofing membrane over 2" thick rigid insulation	11.31	Does not meet
New	TPO roof membrane over coverboards and 4.2" thick rigid insulation	25.85	Meets

See attached EnergyWise Reports in Appendix C for addition information.

Code Requirements

Adopted Codes List for Nashville, TN (as of June 2020)

- 2012 International Building Code with local amendments*
- 2012 International Residential Code with local amendments*
- 2012 International Energy Conservation Code
- 2009 ICC/ANSI A-117.1 Accessible and Usable Buildings and Facilities
- 2012 International Plumbing Code with local amendments*
- 2012 International Mechanical Code with local amendments*
- 2012 International Fuel Gas Code with local amendments*
- 2011 National Electrical Code with local amendments*
- 2012 International Fire Code with local amendments**
- 2012 Life Safety Code (NFPA 101) with local amendments**

NFPA 101 is to be used in addition to the 2012 International Fire Code for new and existing State of Tennessee and Metropolitan Government of Nashville owned buildings, and for the following new and existing occupancies as defined in the NFPA 101 Life Safety Code 2012 edition:

1. Educational occupancies
2. Day Care occupancies
3. Residential board and care occupancies
4. Health Care occupancies.

1998 Metropolitan Comprehensive Zoning Ordinance***

* See Chapter 16 of Metro Code of Laws for local code amendments.
** See Chapter 10 of Metro Code of Laws for adopted and local amendments.
*** See Chapter 17 of Metro Code of Laws for zoning text.

Ladders at the roof access points were observed to range from 10'-0" to 15'-6" in four locations at buildings A, E and F. According to OSHA, cages are required on ladders taller than 24 feet. Because all of the ladders are shorter than 24 feet, cages were not included in the Opinion of Probable construction costs.

Detailed Program Information

- Remove and dispose of all rock ballast from rooftops, all roof drain strainers, roof membrane, flashing, and insulation.
- Inspect concrete at building A
    - Remove any deteriorating concrete and replace with new concrete.
    - Rake and reseal any deteriorated joints in the concrete slab.
- Inspect the metal deck on buildings B, E, and F
- Replace any damaged exhaust pipes
- Remove any equipment or exhaust pipes not in use
- Reseal all penetrations
- Building A

    - After existing concrete is inspected and rectified as needed
    - Underlayment
    - 4" average thickness of ¼" per foot tapered Polyisocyanurate Insulation
    - ½" Coverboards
    - White TPO membrane roof system
    - Sheet metal roof edge and wall flashings
- Buildings B, E and F
    - After existing metal decking is inspected and rectified as needed
    - 2 layers of 2.1" Polyisocyanurate Insulation
    - ½" Coverboards
    - White TPO membrane roof system
    - Sheet metal roof edge and wall flashings
- Approximate square footages of the Roofs:
    - Building A Roof: 16,000 sf
    - Building A East Stairwell Roof: 250 SF
    - Building A West Stairwell Roof: 250 SF
    - Metal Roof between A and B: 1,300 SF
    - Building B Main Roof: 31,500 SF
    - Building B Upper Roof: 7,000 SF
    - Building E Main Roof: 32,700 SF
    - Building E Upper Roof: 14,00 SF
    - Building E Lower Roof: 1.100 SF
    - Building F Main Roof: 12,500 SF
    - Building F Upper Roof: 2,050 SF
    - Building F Other Roof: 4,500 SF
- Construct crickets and sump as needs for roof drains to drain properly
- Install new roof retro fit roof drains
    - Number of existing roof drains:
        - Building A: 10
        - Building B: 13
        - Building E: 33
        - Building F: 12
- Install new prefinished metal roof edge at perimeters and prefinished metal counter flashing at wall terminations.
    - Approximate linear footages of roof edge:
        - Building A Roof: 510 LF
        - Building A East Stairwell Roof: 70 LF
        - Building A West Stairwell Roof: 70 LF
        - Building B Main Roof: 800 LF
        - Building B Upper Roof: 450 LF
        - Building E Main Roof: 950 LF
        - Building E Upper Roof: 480 LF

        - Building E Lower Roof: 95 LF
        - Building F Main Roof: 420 LF
        - Building F Upper Roof: 180 LF
        - Building F Other Roof: 235 LF
    - Approximate linear footages of wall flashing:
        - Building A Roof: 60 LF
        - Building B Main Roof: 550 LF
        - Building E Main Roof: 480 LF
        - Building E Lower Roof: 55 LF
        - Building F Roof: 175 LF
- Replace roof access door at Building A with proper flashing and weather stripping.
- Once roofs are replaced, interior work can be completed.
    - Investigate underside of metal centering and steel joists at Building A
    - Replace any damaged ceiling tiles
    - Clean water stains on walls
    - Remove and replace damaged gypsum board wall in Building B
    - Clean, prime and paint rust stains on interior walls in Building E
    - Clean any water damage caused from leaking roof drainpipe in Building F

Anticipated Project Design and Construction Durations by Phase

Design Schedule

Construction Documents	60 days
Bidding/Negotiation	45 days

Construction Schedule

Proposed construction schedule	120 days

Construction Costs

Refer to the attached Opinion of Probable construction costs in Appendix D.

Appendix C

EnergyWise Reports

EnergyWise Roof Calculator

2015 Version

The EnergyWise Roof Calculator Online allows the user to determine the minimum thermal insulation requirements for buildings' roofs, and the energy efficiency and approximate annual energy usage costs associated with various roof assembly designs. The calculations used to compile this report are based upon industry-accepted analysis methods utilizing user-defined variables. The results of these analyses are intended for only the specific building and roof assembly design(s) referred to in this report.

The values stated in this report can be valuable when comparing the thermal efficiency of a proposed new roof assemble to an existing assembly, or when considering several possible options for new roof assemblies.

This report focuses solely on the roof assembly and specifically does not include evaluation of other components of the building which also account for energy usage, such as the building's exterior walls, windows, and lighting. The "Annual Energy Cost" referred to in this report is the approximate annual energy usage cost attributable to the roof assembly only, not the total annual energy cost for the building. This value should not be confused with the building owner's overall energy costs, which in most instances will be somewhat larger than the "Annual Energy Cost" that is attributable to the roof assembly only.

It is important to realize energy efficiency and energy usage cost analyses are not an exact science. Actual energy cost for any given period will vary due to a number of factors, including varying climatic conditions, specific building occupancy and hours of operation, and the performance and actual efficiency of any heating and cooling equipment.

» Customized Report For

Roof Area Name:	TDOT Region 3 Building Complex
Building:	Building A
Building Address:	6601 Centennial Boulevard
Building Location:	Nashville, TN
Roof Area (sq. ft.):	16000

» Climate Information

Climate state:	Tennessee
Climate region:	Nashville
Climate county:	Davidson

Winter Condition		Summer Condition	
Outside Design Temp. (°F):	10	**Cooling Degree Days (65 °F):**	4689
Heating Degree Days (65 °F):	3729	**Equivalent Operating Hours:**	1440

» Building Information

Construction Type:	Medium
Roof Class:	Above Deck
Space Class:	All other

Heating		Cooling	
Fuel Type:	Electricity	**Unit Energy Cost:**	0.103
Fuel Value:	3413		
Appliance:	Direct electric		
Appliance Efficiency (%):	100		
Unit Energy Cost:	0.103		

System Description

Roof Name Existing Roof - Ballasted Roof

R-Values	
Heating	16.44
Cooling	16.83
Minimum IECC 2012	25.64

Annual Costs	
Heating	$2628.59
Cooling	$611.02
Total	$3239.61

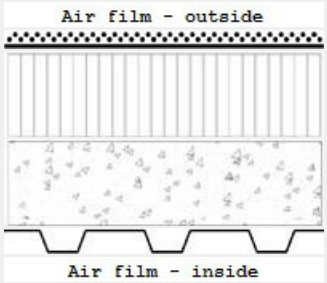
Verify Vapor Retarder Design

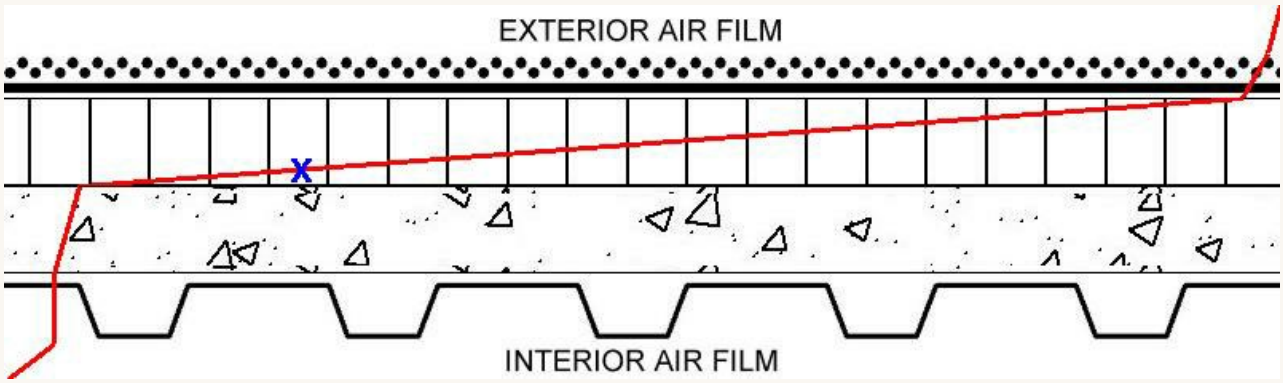
Interior Design Temp. (°F):	75	**Dew Point Temp. (°F):**	60
Design Relative Humidity (%):	60	**Temperature at Vapor Retarder (°F):**	N/A *
Winter Design Dry Bulb (°F):	10	**Effective Vapor Retarder Placement:**	N/A *

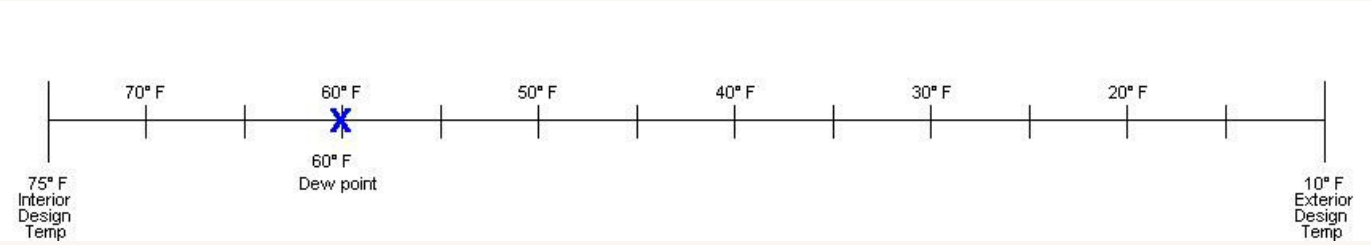
* No vapor retarder layer was found.

Description	R-value (Heating)	R-value (Cooling)
Air film - outside *Thickness:* N/A	0.17	0.25
EPDM (aggregate ballast surfaced) *Thickness:* N/A	0.33	0.33
Polyisocyanurate, 3.0 in. *Thickness:* 3	15	15
LTWT struct. conc. (120 pcf density) *Thickness:* 3	0.33	0.33
Metal Deck *Thickness:* N/A	0	0
Air film - inside *Thickness:* N/A	0.61	0.92

Roof Cross Section







Material	Temperature at top face of material (° F)
Air film - inside	72.6
Metal Deck	72.6
LTWT struct. conc. (120 pcf density)	71.3
Polyisocyanurate, 3.0 in.	12.0
EPDM (aggregate ballast surfaced)	10.7
Air film - outside	10.0

» Roofs: 2 of 2

System Description

Roof Name New Roof - TPO Roof

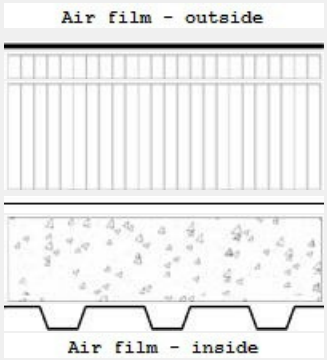
R-Values		Annual Costs	
Heating	25.46	**Heating**	$1697.66
Cooling	25.85	**Cooling**	$397.89
Minimum IECC 2012	25.64	**Total**	$2095.55

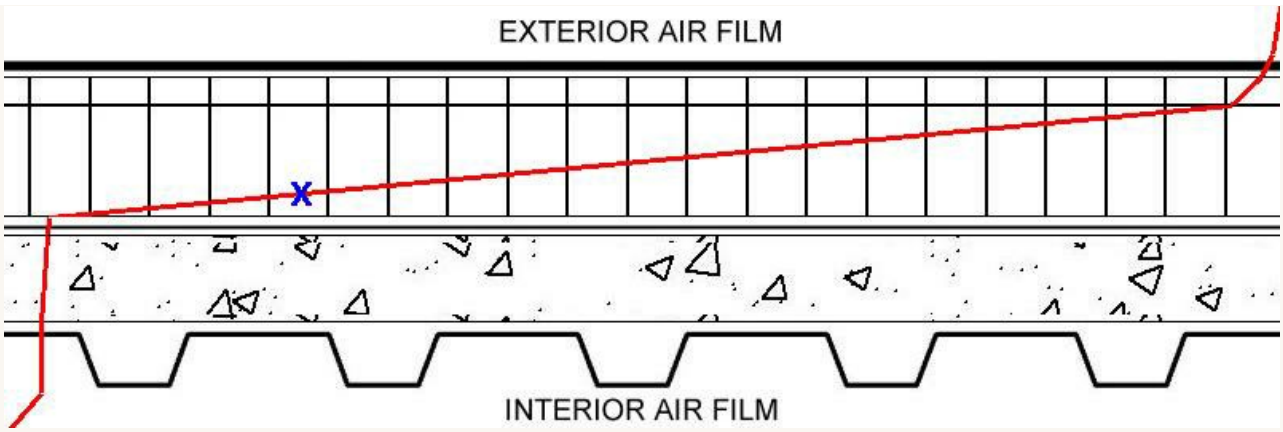
Verify Vapor Retarder Design

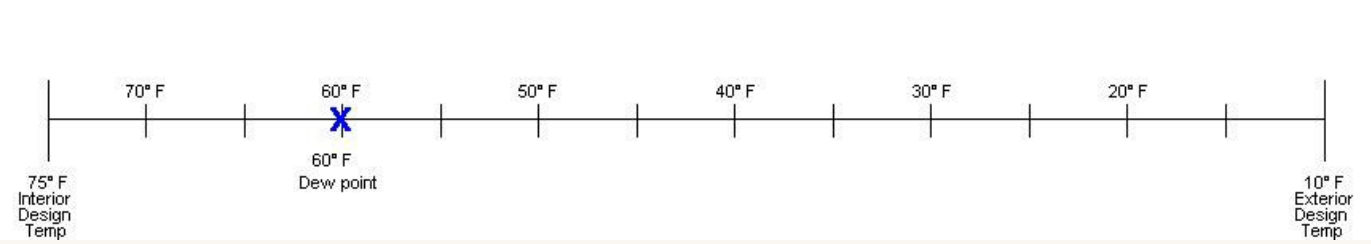
Interior Design Temp. (°F):	75	**Dew Point Temp. (°F):**	60
Design Relative Humidity (%):	60	**Temperature at Vapor Retarder (°F):**	73
Winter Design Dry Bulb (°F):	10	**Effective Vapor Retarder Placement:**	Yes

Description	R-value (Heating)	R-value (Cooling)
Air film - outside *Thickness:* N/A	0.17	0.25
TPO (unsurfaced: ρ≥0.70, ε≥0.75 or SRI≥82) *Thickness:* N/A	0.24	0.24
High-density polyisocyanurate, 0.5 inch *Thickness:* 0.5	0.63	0.63
Polyisocyanurate, 4.0 in. [LTTR] *Thickness:* 4	23.6	23.6
Permeable felt *Thickness:* N/A	0.06	0.06
NLWT struct. conc. (150 pcf density) *Thickness:* 3	0.15	0.15
Metal Deck *Thickness:* N/A	0	0
Air film - inside *Thickness:* N/A	0.61	0.92

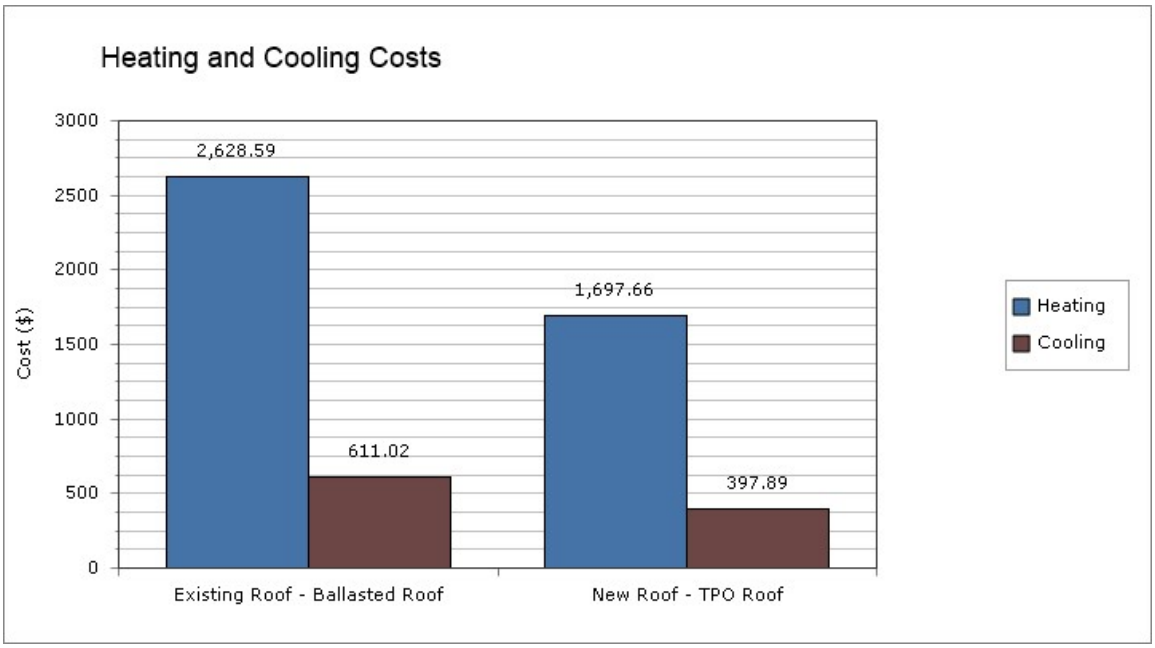
Roof Cross Section

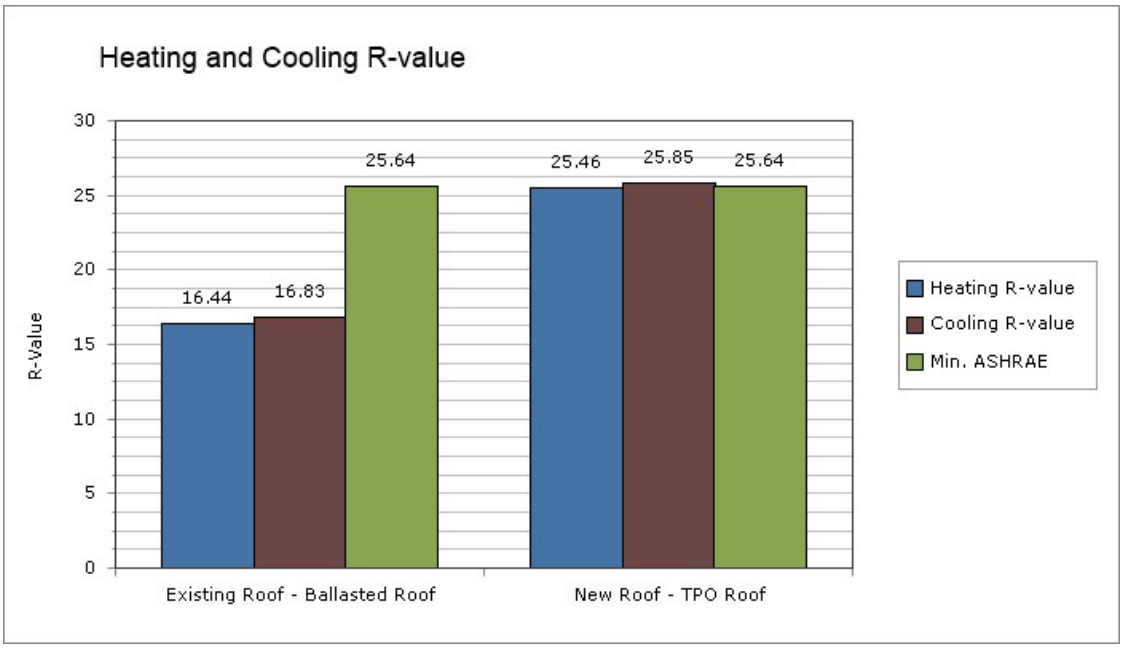






Material	Temperature at top face of material (° F)
Air film - inside	73.4
Metal Deck	73.4
NLWT struct. conc. (150 pcf density)	73.1
Permeable felt	72.9
Polyisocyanurate, 4.0 in. [LTTR]	12.6
High-density polyisocyanurate, 0.5 inch	11.0
TPO (unsurfaced: ρ≥0.70, ε≥0.75 or SRI≥82)	10.4
Air film - outside	10.0


Heating and Cooling Costs
Cost ($)
3000
2500
2000
1500
1000
500
0
2,628.59
611.02
1,697.66
397.89
Existing Roof - Ballasted Roof
New Roof - TPO Roof
Heating
Cooling


Heating and Cooling R-value
R-Value
30
25
20
15
10
5
0
16.44
16.83
25.64
25.46
25.85
25.64
Existing Roof - Ballasted Roof
New Roof - TPO Roof
Heating R-value
Cooling R-value
Min. ASHRAE

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National Roofing Contractors Association
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EnergyWise Roof Calculator

2015 Version

The EnergyWise Roof Calculator Online allows the user to determine the minimum thermal insulation requirements for buildings' roofs, and the energy efficiency and approximate annual energy usage costs associated with various roof assembly designs. The calculations used to compile this report are based upon industry-accepted analysis methods utilizing user-defined variables. The results of these analyses are intended for only the specific building and roof assembly design(s) referred to in this report.

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This report focuses solely on the roof assembly and specifically does not include evaluation of other components of the building which also account for energy usage, such as the building's exterior walls, windows, and lighting. The "Annual Energy Cost" referred to in this report is the approximate annual energy usage cost attributable to the roof assembly only, not the total annual energy cost for the building. This value should not be confused with the building owner's overall energy costs, which in most instances will be somewhat larger than the "Annual Energy Cost" that is attributable to the roof assembly only.

It is important to realize energy efficiency and energy usage cost analyses are not an exact science. Actual energy cost for any given period will vary due to a number of factors, including varying climatic conditions, specific building occupancy and hours of operation, and the performance and actual efficiency of any heating and cooling equipment.

» Customized Report For

Roof Area Name:	TDOT Region 3 Building Complex
Building:	Buildings B, E and F
Building Address:	6601 Centennial Boulevard
Building Location:	Nashville, TN
Roof Area (sq. ft.):	31500

» Climate Information

Climate state:	Tennessee
Climate region:	Nashville
Climate county:	Davidson

Winter Condition		Summer Condition	
Outside Design Temp. (°F):	10	**Cooling Degree Days (65 °F):**	4689
Heating Degree Days (65 °F):	3729	**Equivalent Operating Hours:**	1440

» Building Information

Construction Type:	Medium
Roof Class:	Above Deck
Space Class:	All other

Heating		Cooling	
Fuel Type:	Electricity	**Unit Energy Cost:**	0.103
Fuel Value:	3413		
Appliance:	Direct electric		
Appliance Efficiency (%):	100		
Unit Energy Cost:	0.103		

System Description

Roof Name Existing Roof - Ballasted Roof

R-Values	
Heating	11.11
Cooling	11.50
Minimum IECC 2012	25.64

Annual Costs	
Heating	$7657.75
Cooling	$1760.49
Total	$9418.24

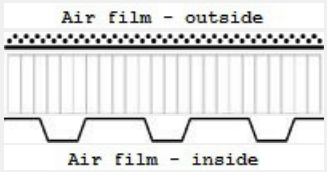
Verify Vapor Retarder Design

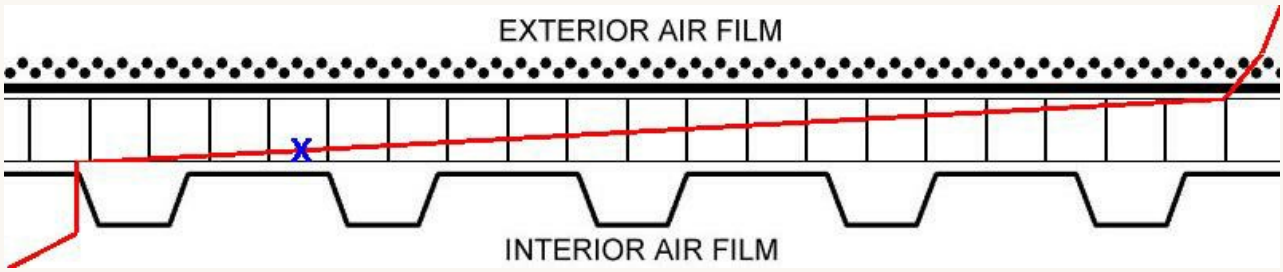
Interior Design Temp. (°F):	75	**Dew Point Temp. (°F):**	60
Design Relative Humidity (%):	60	**Temperature at Vapor Retarder (°F):**	N/A *
Winter Design Dry Bulb (°F):	10	**Effective Vapor Retarder Placement:**	N/A *

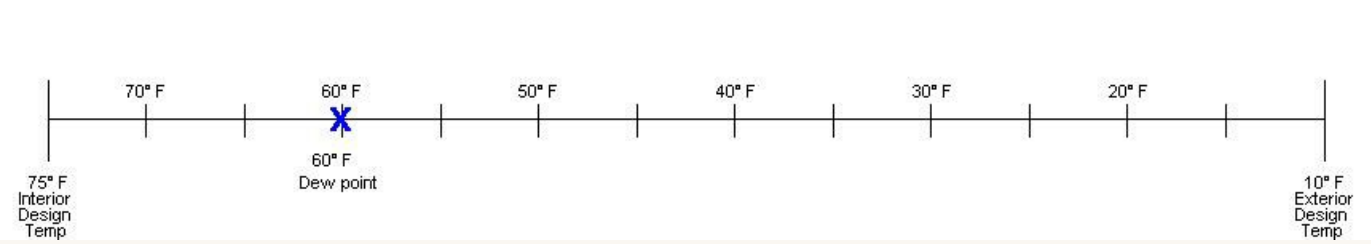
* No vapor retarder layer was found.

Description	R-value (Heating)	R-value (Cooling)
Air film - outside *Thickness:* N/A	0.17	0.25
EPDM (aggregate ballast surfaced) *Thickness:* N/A	0.33	0.33
Polyisocyanurate, 2.0 in. *Thickness:* 2	10	10
Metal Deck *Thickness:* N/A	0	0
Air film - inside *Thickness:* N/A	0.61	0.92

Roof Cross Section







Material	Temperature at top face of material (° F)
Air film - inside	71.4
Metal Deck	71.4
Polyisocyanurate, 2.0 in.	12.9
EPDM (aggregate ballast surfaced)	11.0
Air film - outside	10.0

System Description

Roof Name New Roof - TPO Roof

R-Values	
Heating	25.65
Cooling	26.04
Minimum IECC 2012	25.64

Annual Costs	
Heating	$3317.51
Cooling	$777.63
Total	$4095.14

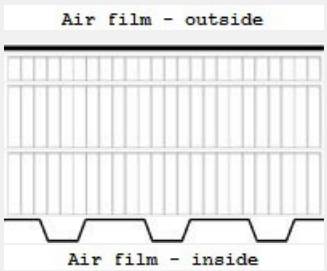
Verify Vapor Retarder Design

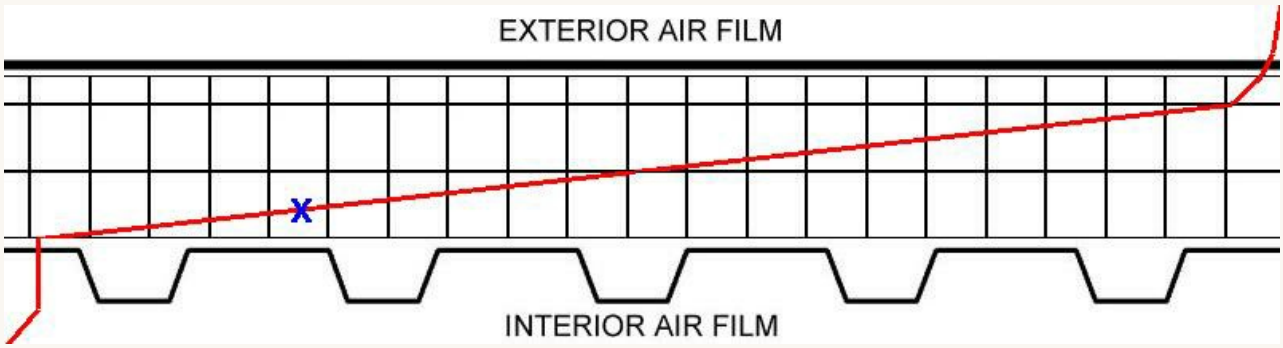
Interior Design Temp. (°F):	75	**Dew Point Temp. (°F):**	60
Design Relative Humidity (%):	60	**Temperature at Vapor Retarder (°F):**	N/A *
Winter Design Dry Bulb (°F):	10	**Effective Vapor Retarder Placement:**	N/A *

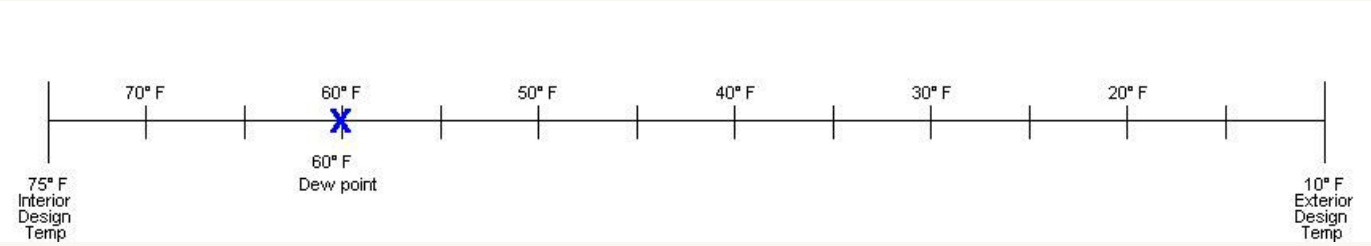
* No vapor retarder layer was found.

Description	R-value (Heating)	R-value (Cooling)
Air film - outside *Thickness:* N/A	0.17	0.25
TPO (unsurfaced: ρ≥0.70, ε≥0.75 or SRI≥82) *Thickness:* N/A	0.24	0.24
High-density polyisocyanurate, 0.5 inch *Thickness:* 0.5	0.63	0.63
Polyisocyanurate, 2.1 in. [LTTR] *Thickness:* 2.1	12	12
Polyisocyanurate, 2.1 in. [LTTR] *Thickness:* 2.1	12	12
Metal Deck *Thickness:* N/A	0	0
Air film - inside *Thickness:* N/A	0.61	0.92

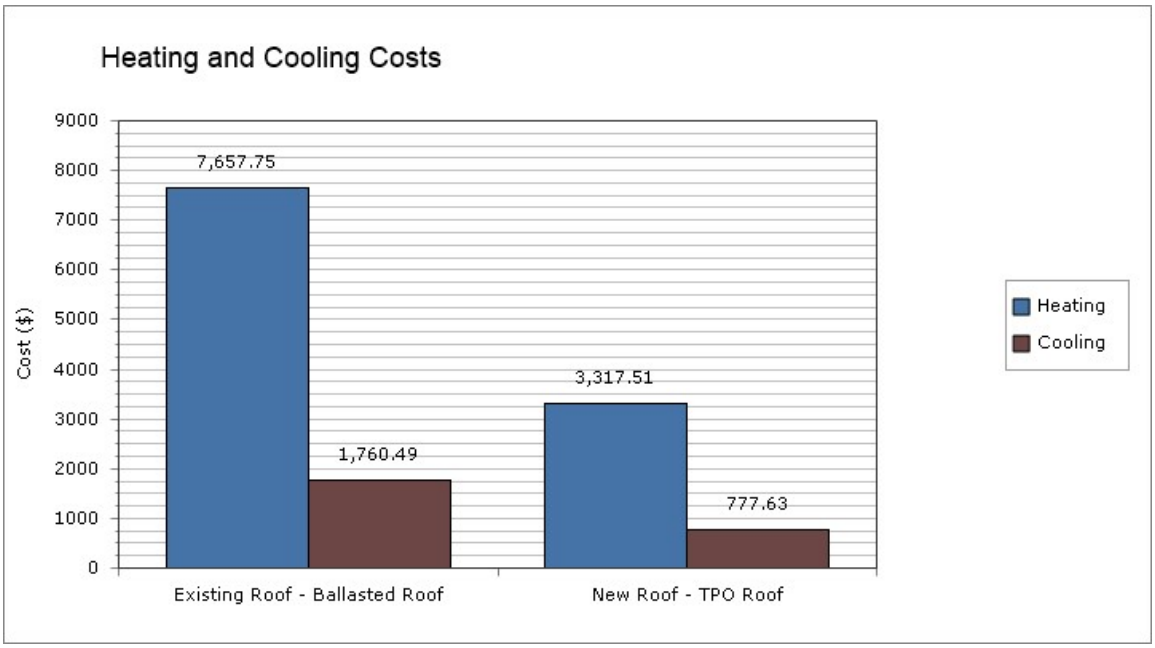
Roof Cross Section

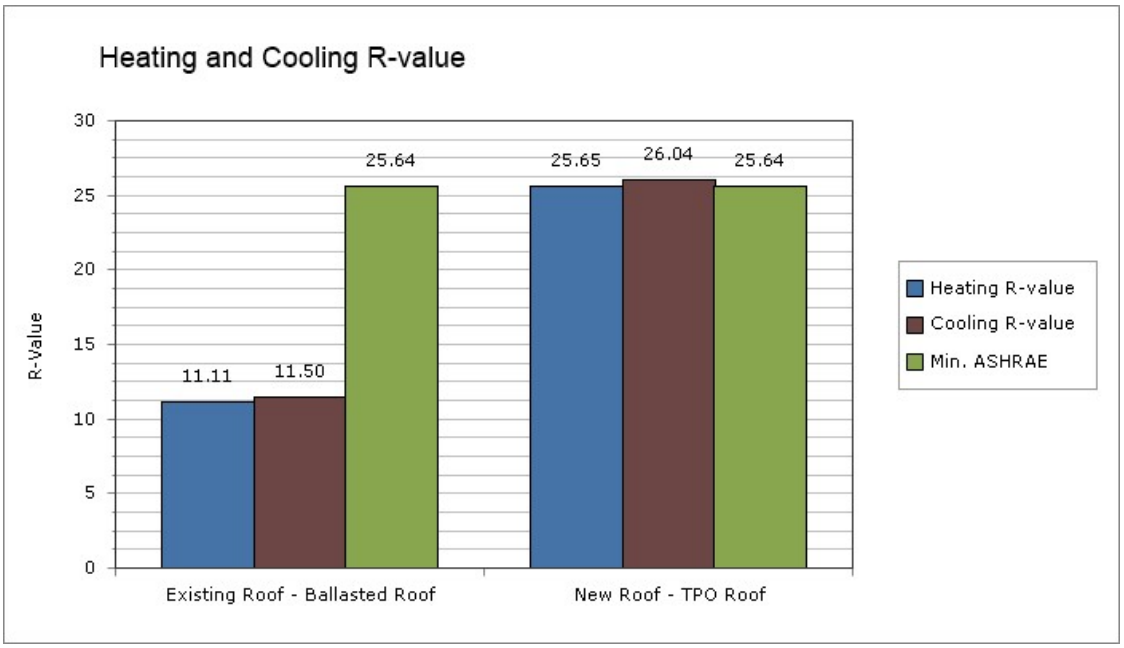






Material	Temperature at top face of material (° F)
Air film - inside	73.5
Metal Deck	73.5
Polyisocyanurate, 2.1 in. [LTTR]	43.0
Polyisocyanurate, 2.1 in. [LTTR]	12.6
High-density polyisocyanurate, 0.5 inch	11.0
TPO (unsurfaced: ρ≥0.70, ε≥0.75 or SRI≥82)	10.4
Air film - outside	10.0


Heating and Cooling Costs
Cost ($)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
7,657.75
1,760.49
3,317.51
777.63
Existing Roof - Ballasted Roof
New Roof - TPO Roof
Heating
Cooling


Heating and Cooling R-value
R-Value
30
25
20
15
10
5
0
11.11
11.50
25.64
25.65
26.04
25.64
Existing Roof - Ballasted Roof
New Roof - TPO Roof
Heating R-value
Cooling R-value
Min. ASHRAE

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National Roofing Contractors Association
EnergyWise Roof Calculator Online

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Appendix D

Opinion of Probable Cost

HURST-ROSCHE, INC.

Buildings A, B, E and F Reroof
TDOT Region 3 Complex
SBC No.529/000-02-2019-24 Task Authorization # 24-006

CALC: Deborah Lundberg DATE: 6.15.20
CHECKED: Jason Vandever DATE: 6.15.20

Divisional Breakdown (as applicable)				
Division	Description	Work to preform	Cost per GSF	Estimate
1	General Requirements		$0.05	$5,780.00
2	Existing Conditions		$0.00	$0.00
3	Concrete		$0.00	$0.00
4	Masonry		$0.00	$0.00
5	Metals		$0.00	$0.00
6	Woods, Plastics, Composites		$0.26	$32,080.00
7	Thermal and Moisture Protection		$10.08	$1,241,782.00
8	Openings		$0.01	$860.00
9	Finishes		$0.01	$1,125.00
10	Building Specialties		$0.00	$0.00
11	Equipment		$0.00	$0.00
12	Furnishings		$0.00	$0.00
13	Special Conditions		$0.00	$0.00
14	Conveying Equipment		$0.00	$0.00
21	Fire Suppression		$0.00	$0.00
22	Plumbing		$0.22	$27,200.00
23	Mechanical		$0.00	$0.00
26	Electrical and Communications		$0.00	$0.00
31	Earthwork		$0.00	$0.00
32	Exterior Improvements		$0.00	$0.00
33	Utilities		$0.00	$0.00
			Subtotal Direct Cost of Work	**$1,308,827.00**
General Conditions - 8% of Subtotal Direct Cost of Work				$104,706.16
Permitting Fee for Subtotal Direct Cost of Work + General Conditions				$4,875.60
Add Other Items as Applicable				$0.00
			Subtotal w/ Direct Overhead	**$1,418,408.76**
General Contractor Overhead - 5% of Subtotal w/Direct Overhead				$70,920.44
General Contractor Profit - 5% of Subtotal w/Direct Overhead + GC Overhead				$74,466.46
			Subtotal w/ General Contractor's Markup	**$1,563,795.66**
Construction Contingency 10%				$156,379.57
			Subtotal w/ Construction Contingency	**$1,720,175.22**
Builder's Risk Insurance - 3% of Subtotal w/ Contruction Contingency				$51,605.26
Performance & Payment Bond - 1% of Subtotal w/ Construction Contingency				$17,201.75
			Total Construction Cost	**$1,788,982.23**
Escalation - 2 Years at 4% of Total Construction Cost per Year (8.16%)			$72,990 x 2	$145,980.95
			Total Escalated Construction Cost to the Year 2022	**$1,934,963.18**

$1,788,982.23
+ $72,990
$1,861,972
Justifies a conservative
$1,900,000 Bid Target
- SG - 6/16/20