Holliston Library 19-07811 PM

Final Schedule Published 03-07-19

	Task Name	Start Date	End Date	% Complete	Duration	Description
20	Engineering documents completed	03/01/19	03/19/19	50%	19d	
21	Building Permit Submitted	03/19/19	03/19/19		1d	
22	Plan review by building official	03/19/19	03/21/19		3d	3 days for review by Building Dept.
23	Permit Issued for Work	03/21/19	03/21/19		1d	
24	Content Pack Out/Floor Protection-Lower Level	03/22/19	03/26/19		5d	Pack out furniture, shelving and books under left hand mezzanine so current temp shoring can be properly aligned. Existing book cases are currently in the way
25	Dumpster Delivery	03/25/19	03/25/19		1d	
26	Temporary Safety Wall/Door	03/25/19	03/25/19		1d	Temp safety wall constructed at front of library where containment is currently to help keep public out of work areas and sound
27	Scaffold/Deck- Erect	03/27/19	04/01/19		6d	Install staging/deck/staircase in middle are of main level to reach the second floor ceiling. This will also provide Servicemaster a way to pack out the second floor as current temp shoring is blocking access points and can not be moved
28	Content Pack Out/Floor Protection- Upper Level	04/01/19	04/04/19		4d	
29	Light Fixtures/Smokes- Remove	04/05/19	04/08/19		4d	
30	HVAC Registers/Duct- Remove	04/08/19	04/08/19		1d	
31	Demo Ceiling/Remove Insulation	04/09/19	04/12/19		4d	
32	Post-demo Matterport scan	04/15/19	04/15/19		1d	
33	Structural Shoring- Install	04/15/19	04/22/19		8d	Marrs Scaffolding will be providing additional structural shoring to give us points under each truss to jack the bottom chord back into place allowing us to properly repair each truss. This will also allow us to continue jacking the entire truss back into place once repaired. This will consist of 17 beams running parallel under each Chord, wall to wall.
34	Framing Repairs	04/22/19	05/01/19		10d	Fabricate gussets per engineers specifications using structural grade plywood. Repair each truss by jacking bottom chord back into place, repair as needed, then set entire truss into position. 1x3 new strapping installed when all Trusses have been repaired and back in position
35	Rough Electrical	05/01/19	05/04/19		4d	Run all conduit back into position to reconnect light fixtures
36	INSP- Rough Elec.	05/06/19	05/06/19		1d	
37	Fire Stopping/Foam	05/06/19	05/06/19		1d	
38	INSP- Framing	05/07/19	05/07/19		1d	
39	Matterport Scan Framing / Electrical Completed	05/07/19	05/07/19		1d	
40	INSPECTION-Design Professional Rough Sign Off	05/07/19	05/07/19		1d	
41	Structural Shoring- Removal	05/08/19	05/14/19		7d	All temp shoring must be removed at this point to clear space for finish trades to begin work. Middle deck will stay in place until project completion
42	Drywall	05/15/19	05/20/19		6d	
43	HVAC Duct- Install	05/16/19	05/16/19		1d	
44	Insulation	05/17/19	05/17/19		1d	
45	Paint	05/22/19	05/27/19		6d	
46	Light Fixtures/ Smokes- Install	05/28/19	05/31/19		4d	
47	HVAC Registers- Install	05/28/19	05/28/19		1d	
48	INSP- Insulation	06/03/19	06/03/19		1d	
49	INSP- Final Elec.	06/03/19	06/03/19		1d	
50	INSP- Fire Alarm/ Sprinkler	06/03/19	06/03/19		1d	
51	INSP- Design Professional Sign-off on all work	06/03/19	06/03/19		1d	
52	INSP- Final Building/ CO	06/04/19	06/04/19		1d	
53	Punch List	06/04/19	06/05/19		2d	
54	Scaffold- Removal	06/05/19	06/07/19		3d	Removal of center staging/ deck/ staircase
55	Content Pack In/ Final Cleaning	06/08/19	06/17/19		10d	Full pack in of main level/second level. Full clean up
56	Final Matterport/ Photos	06/18/19	06/18/19		1d	
57	Dumpster Removal	06/18/19	06/18/19		1d	
58	Library Open to Public	06/20/19	06/20/19		1d	

MAKRIS FIELD REPORT

Date of Field Visit/Observations: 1 March 2019
Project: Holliston Library
Date of This Report: 3 March 2019

1 March 2019, Chris Bromley of RebuildEx and I checked in with Leslie McDonnell and conducted hands-on inspection and layout measurements of the roof trusses. We also reviewed the basic steps necessary to jack the trusses into their original configuration; this requires more specific planning.

OBSERVATIONS AND OPINIONS

1. Note, for compass point orientation, the "front" entry of the Library facing Washington Street is assumed to be west elevation. See Figure 1 for the truss orientation plan.
2. 16 T1 single ply trusses are 24 inches on centers, nominal, as per the design drawings.
3. D1 double ply trusses are not equally spaced from the adjacent T1 truss; the westerly D1 is 1'-10" from the T1, while the easterly D1 is 1'-0" distant; the maximum will be used for analysis of the trusses.
4. In addition to the damaged panel point joints listed by RussoBarr, we identified another 26 panel points with damage, and 13 additional splices with damage.
    a. "Damage" was determined by: a)transverse ripples of the metal connector plate; b)actual rips or tears of metal connector plates; c)gaps exceeding 1/8 inch betwen mating ends of truss elements; or c)vertical misalignment of chord elements meeting at a splice.
    b. Three of these additional damage panel points were found on the westerly D1 truss; one of the additional damaged splice points was found on the easterly D1 truss. See Photo 1.
5. With one very minor exception, none of the top or bottom chord wood elements is physically damaged, i.e. broken, cracked or split. The one minor split at the edge of the one top chord can be resolved with a slight oversize dimension of a plywood gusset.
6. The ends of a significant number of diagonal web elements are gouged or ripped at their surface after the diagonal was pulled away from the spikes of the connecting plates. Two of these diagonal web members are also fractured within the zone originally covered by the metal connector plate. None of the web diagonals or vertical members were fractured or cracked away from the metal plate connector.

a. None of these diagonal members needs to be replaced as a result of the observed damage to the ends. Those end zones can remain as is as long as the plywood gusset repair is sized to accomplish the connection beyond this damage.

b. Note, the forthcoming computer analysis will determine if the increased roof snow loading of the present building code will require reinforcement of the truss members.

7. Separation of the diagonals from the panel points at numerous trusses is excessive, up to 3 inches in some cases. See Photo 2. This indicates dramatic redistribution of forces to unintended load paths. The distribution of forces in the trusses should be rebalanced as close as possible to a nominal condition prior to applying joint restraints with plywood gussets.

   a. Rebalancing the forces will require careful jacking of the trusses to restore the geometry of the members meeting at each panel point.

8. A few of the web vertical members are out-of-plumb by as much as an inch due to the loose diagonals being jacked into the side of the vertical during the shoring installation and stabilization of the roof.

9. A few web vertical members are out of alignment with the chord member, i.e. the 1.5 inch width of the 2x4 vertical is not fully seated on the 1.5 inch width of the top chord.

RECOMMENDATIONS

1. With the exception of panel points 8, 15 and 16 at the ends of trusses, many of the panel points of the T1 single ply trusses have some level of damage. Since the event leading to the damage is not fully understood, I recommend that all panel points except #8 and #16 be repaired with plywood gussets. See Figure 2 for panel points numbering.

2. The ceiling system, including strapping, should be removed as one aspect of unloading the trusses.

3. After removal of the ceiling, the shoring posts should be adjusted as previously recommended, and an additional row of shoring should be installed at the midspan of trusses.

4. Prior to installing panel point gusset repairs, the trusses need to be jacked up as near as possible to their "original unloaded" configuration with all diagonals tight to the panel point and web verticals as close to plumb as possible. Jacking of the trusses will require careful planning and execution.

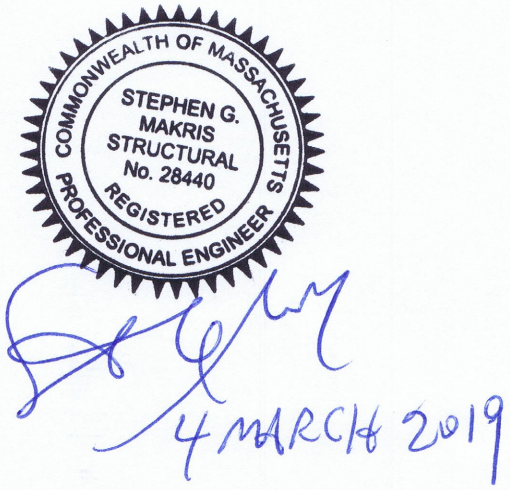
a. All transverse bracing must be released at trusses being jacked to permit movement of the trusses.

b. Adjacent trusses must be monitored to prevent unintended distortion of the roof sheathing.

c. All bottom chord panel points of a truss need to be jacked, concurrently but separately, in a controlled progressive sequence to restore the "original unloaded" configuration.

d. The jacking setup must allow restoration of the web members' alignment, i.e. centering verticals and diagonals with the centerline of the truss chords.

e. Metal plates not otherwise obstructing the plywood repair gussets can remain in place. Minor ripples of metal plates can be mitigated with a C-clamp pressure. Any torn or fractured metal plate obstructing the repositioning of the diagonals should be removed to the extent necessary.



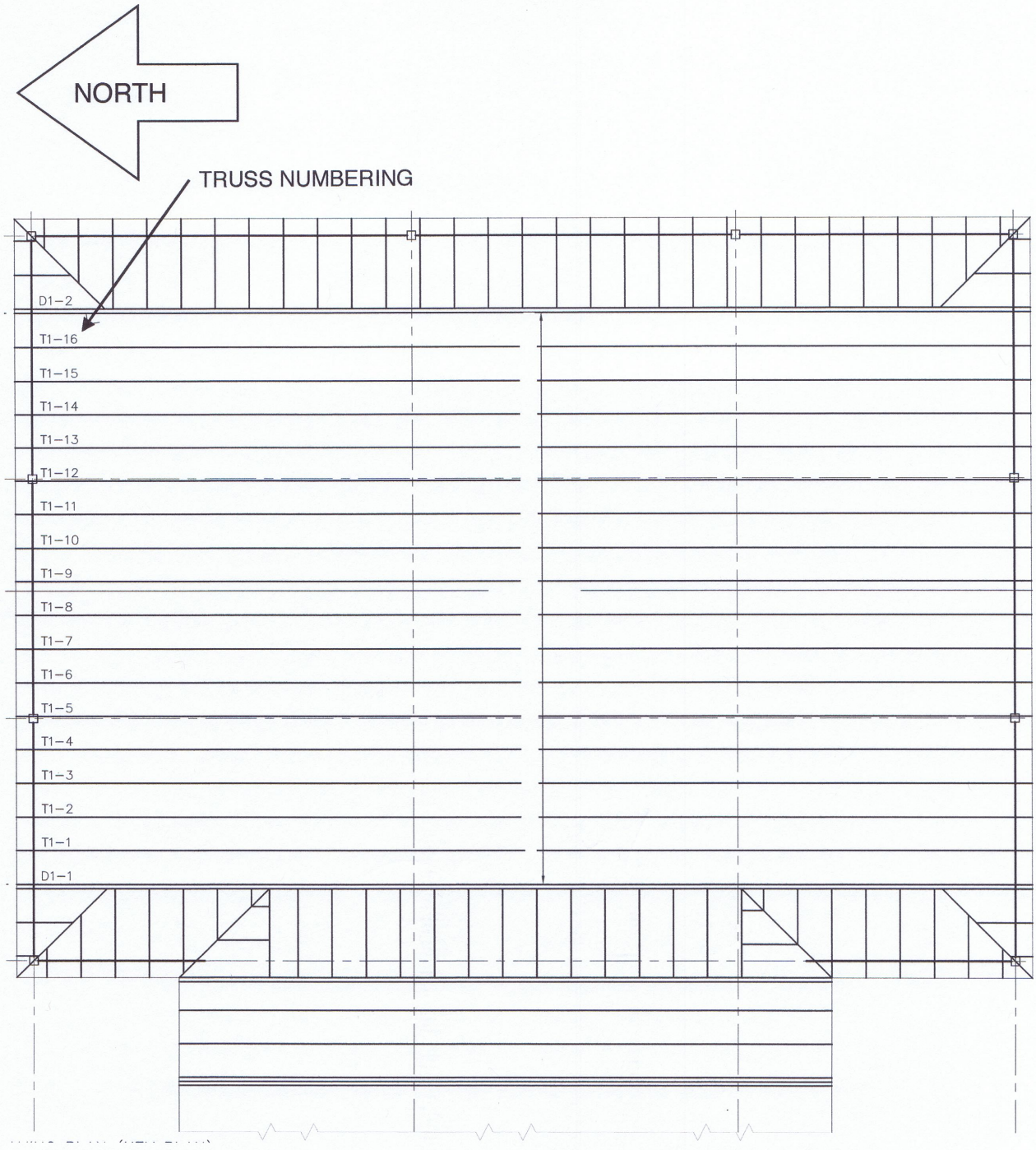


Figure 1 - General Plan of Trusses (Linework Copied from RussoBarr Drawing)

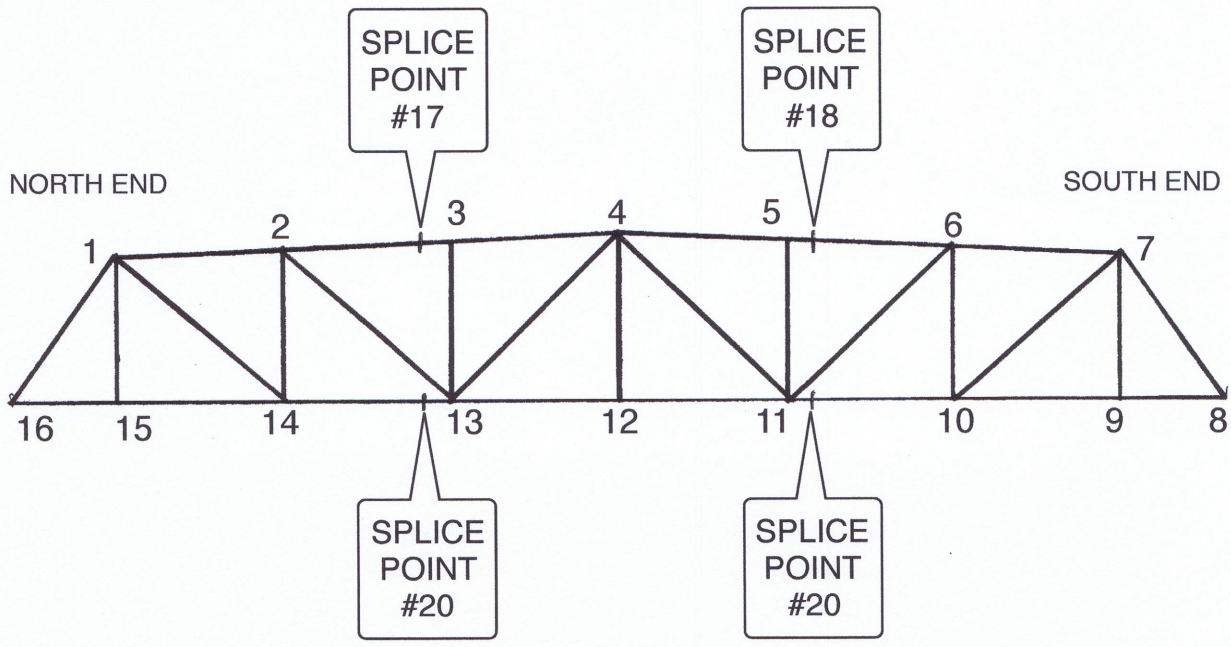


Figure 2 - Panel Point Numbering, for T1 and D1 Trusses

PHOTO 1 - Example of previously unreported damage at truss D1-1. The metal connector plate at panel point #3 has nearly released from the web vertical which has slightly separated from the top chord. This likely resulted from the transverse bracing transferring loads from the adjacent trusses.

PHOTO 2 - Examples of web members' misalignment.