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November 9, 2015

Denise Ard- Director
North Valley Public Library
208 Main St.
Stevensville, MT 59870

Re: South Building Framing Investigation - North Valley Public Library

Denise:

Per your request, an inspection was completed on the south building of the library. The inspection was completed on October 15, 2015 & November 9, 2015. The inspection was performed by George Mullen, EI. The main floor, basement and crawlspace were visually inspected. No destructive investigation was completed.

This south portion of the building is used for movable, library book shelves. **Design Criteria Used for Analysis (per IBC 2012):** Floor: DL=18 psf/ LL 150 psf (library stack rooms).

The main floor structure consists of 1x planking over 2x12 floor joists @ 12"-16" on center. The joists span north to south. The floor framing is supported at the side walls by concrete foundations. There are two girder beams, offset at mid-span, see Details S1. One girder beams consists of double 4x8 beams. The other girder beam is a 3x16 (3" average X 15 1/2" +/-). The girder beams are supported on concrete piers and basement foundation walls. The girders span 14' to 16'.

The crawlspace has limited visibility, therefore the spacing of the floor beam supports at the front to middle section could not be determined. Based on inspection the double 4x8 beams may be supported on continuous concrete footing. The 3x16 girder beam support could not be determined.

The finished floor of the main floor could not be fully inspected because of the floor and basement ceiling finishes. The north east section of the building has a concrete topping slab applied. The concrete topping slab may have been used to raise the finish floor to align with the rear section of the building. The rear section of the building was added at a later date.

Prior inspections completed by BCE in 1995 determined that the upper floor framing and roof framing are dependent upon each other to create a stable system. The prior reports recommended that new support columns be installed along the upper floor mid-span beams. 4" diameter tube steel columns were subsequently installed to support the upper floor and roof framing. The steel columns align with the main floor support beams. The 1995 report additionally suggested that new knee braces be

installed from the exterior wall to the upper floor framing to decrease the joist spans. The upper floor knee braces were not observed on site. Because the knee braces were not installed, the capacity of the upper floor framing remains to be limited.

Per our conversation on site and prior and recent investigations performed by BCE, the following items we noted.

1. The existing main floor joist are adequate to support the expected loading, per design criteria noted above.
2. The girder beams below the main floor with the 14' and 16' spans falls short of being able to support design loading. Intermediate support posts are required. See Detail S1 for an additional support required in the accessible crawlspace. See Detail S2 for an additional support required in basement. All the columns should be installed at the mid-span of the existing beam. See Note #3 and Note #4 for additional beam and upper floor column support that may be required.
3. See Detail S1 and S2 for additional joist to girder beam fastening. See Details S1 and S2 for additional fastening to the existing 3x ledger plate supporting the floor joists.
4. Because foundation support in the crawlspace could not be completely observed, additional support may be required. Detail S3 was developed to represent BCE's understanding of the existing conditions. Conditions may vary from detail provided.
 - a. Based on calculations the maximum girder beam span should not exceed 10'-0". Once the finish floor is removed opportunity to observe the crawlspace will allow for further investigation.
 - b. The double 4x6 appears to align with the existing concrete foundation, additional support may not be required.
 - c. The 3x16 girder beam does not appear to align with the existing footing. Once the existing conditions can be exposed additional coordination with BCE will be required to develop support at the existing foundation.
5. Additional foundation support may be required at all upper floor column support locations. Because foundation support in the crawlspace could not be completely observed, the additional column support could not be determined.
6. Floor Leveling: The carpet and topping slab are designated to be removed. An additional sheathing layer may be required to provide for a final, level surface.
7. Suspended Ceiling: You have mentioned the desire to install a suspended ceiling, similar to the north building. This is acceptable with the following recommendation;
 - a. Remove the ceiling covering, gypsum and or plaster on wood lath. By removing the existing ceiling, you ensure the upper floor framing is not additionally loaded.
8. Solar Panels: You have mentioned installation of solar panels on the south side of the existing roof framing. With the inter-dependent relationship of the roof and upper floor system (attempted to be explained earlier and in previous reports), this is not recommended. Further upgrade work will be required. Additional bracing, strapping and fastening upgrades would be expected if solar panels were to be installed.

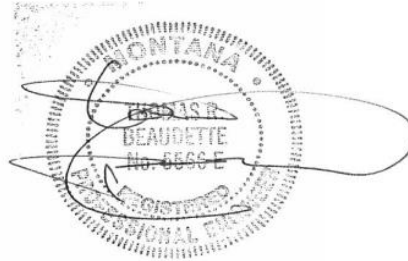
9. Front Entry: The front entry door has a 1" to 1 ¼" step at the threshold. Installation of a ¼"X12" metal plate could be installed to create a safer transition (install at 1:12 with ¼" transition).

Please call with any further questions related to this matter, please contact our office at your earliest convenience.

Sincerely,
Beaudette Consulting Engineers



George Mullen, EI



Tom Beaudette, PE

Attached: Detail Sheets S1, S2, and S3

NEW 'LEDGER LOK'
SCREWS, MIN 3" EMBED,
@ EA SIDE OF JOIST

EXISTING FLOOR
JOISTS

EXISTING 1x PLANKING

EXISTING WOOD BEAMS

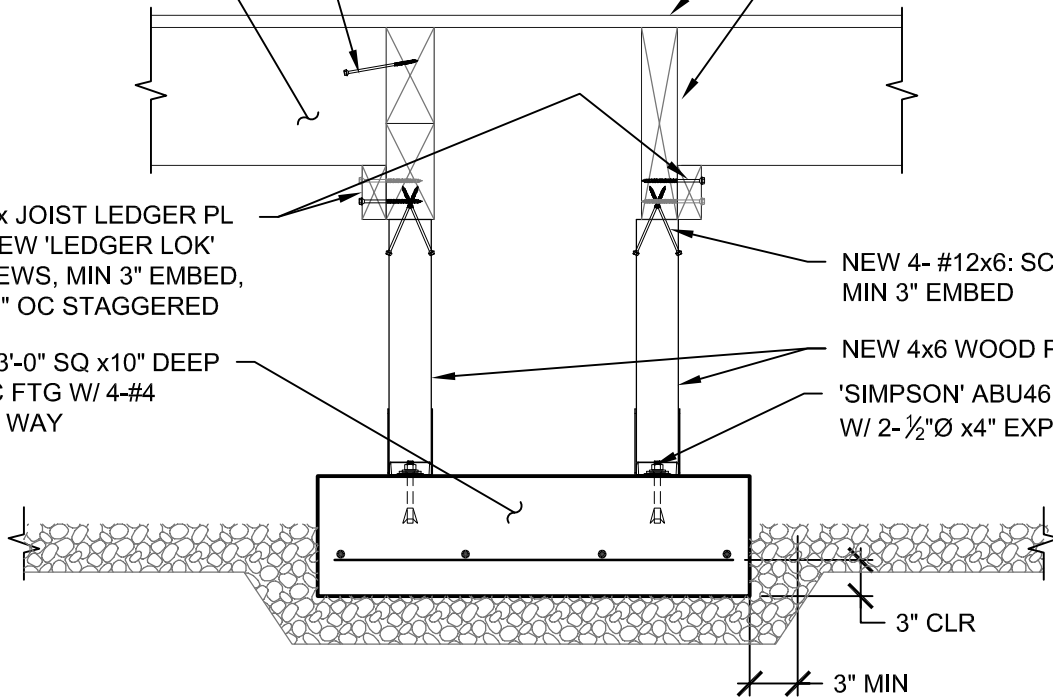
(E) 3x JOIST LEDGER PL
W/ NEW 'LEDGER LOK'
SCREWS, MIN 3" EMBED,
@ 12" OC STAGGERED

NEW 4- #12x6: SCREWS,
MIN 3" EMBED

NEW 3'-0" SQ x10" DEEP
CONC FTG W/ 4-#4
EACH WAY

NEW 4x6 WOOD POST

'SIMPSON' ABU46 POST BASE
W/ 2- 1/2" Ø x4" EXP BOLT



1

NEW FOOTING IN CRAWLSPACE

SCALE: NTS

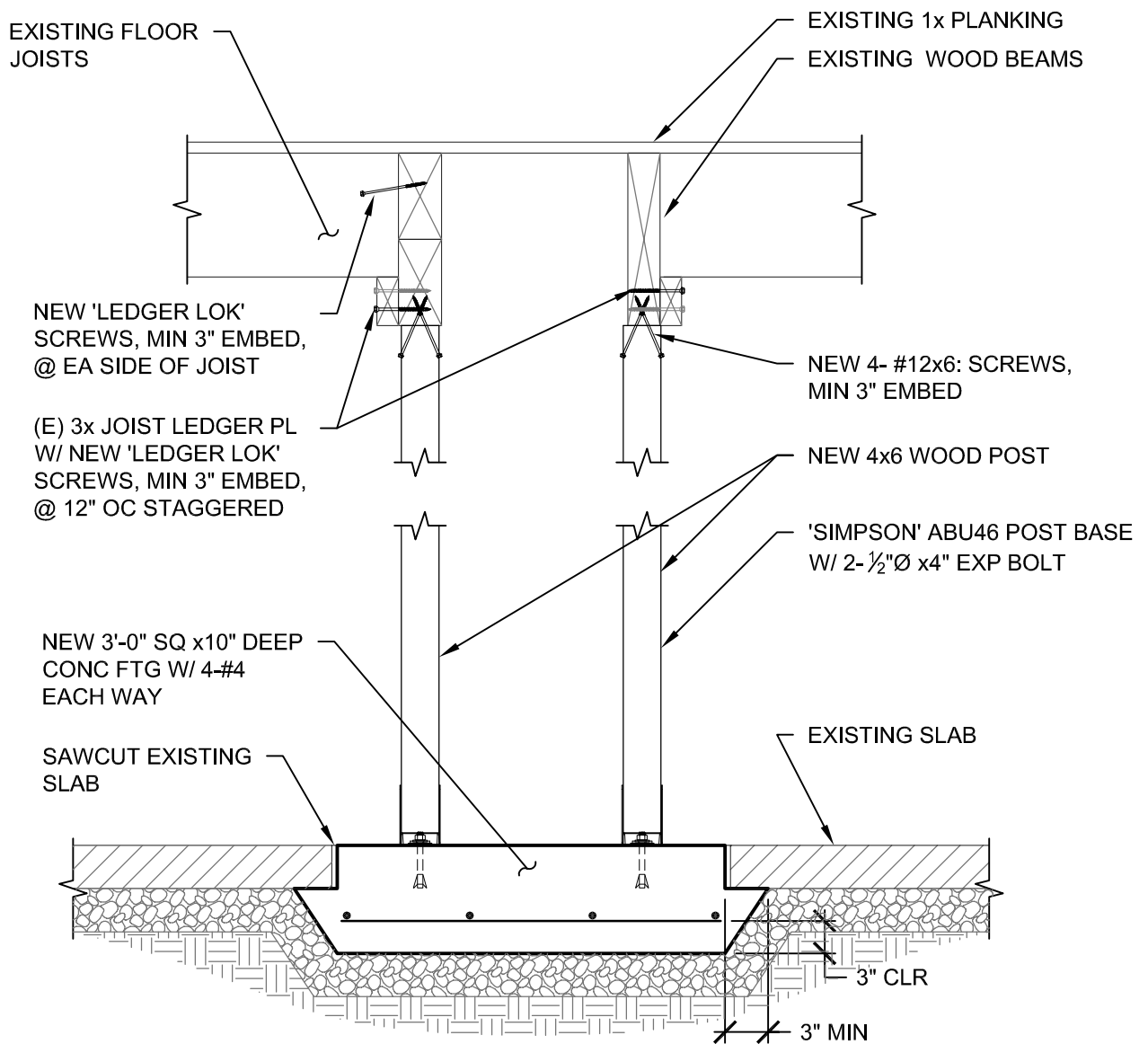
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North Valley
Public Library
Floor Upgrade
South Building
Stevensville, MT

DRAWN BY: GLM
CHECK BY: TRB
PROJECT NO.: 15991

11/9/2015
Revision
10/21/2015

S1



1

NEW FOOTING IN BASEMENT

SCALE: NTS

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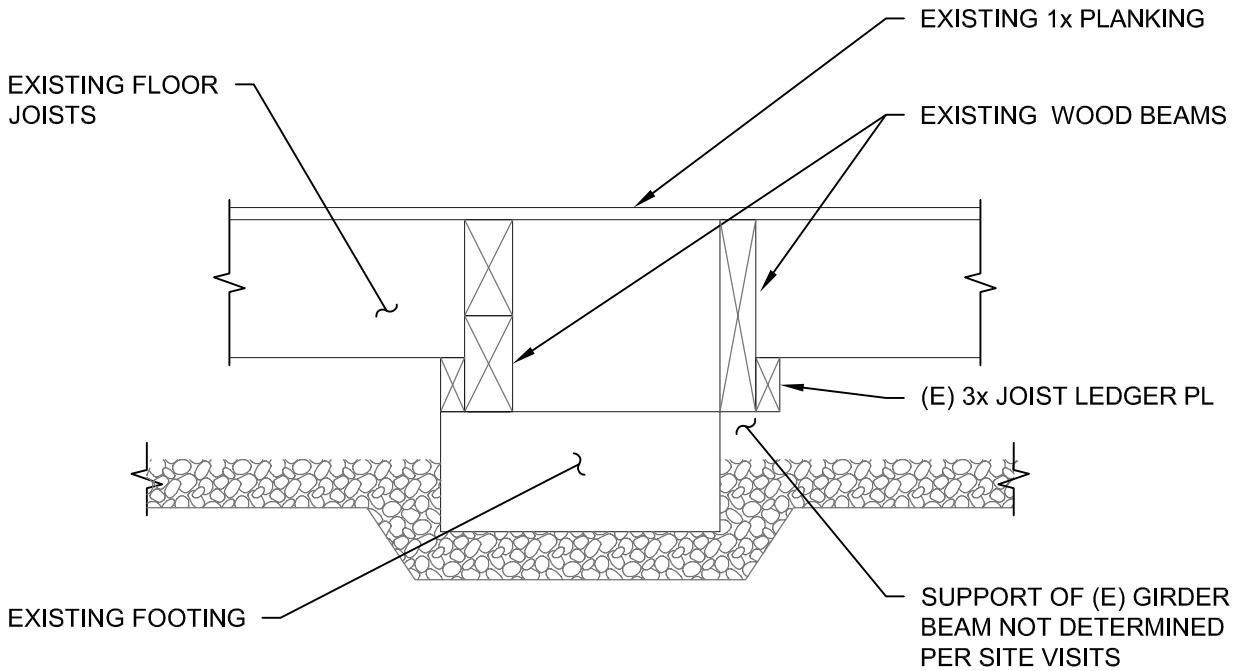
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S2

NOTE:
 DETAIL S3 DEVELOPED TO REPRESENT
 BCE'S UNDERSTANDING OF THE
 EXISTING CONDITIONS. CONDITIONS
 MAY VARY FROM INDICATED BELOW.



1

(E) FOOTING IN CRAWLSPACE

SCALE: NTS

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S3