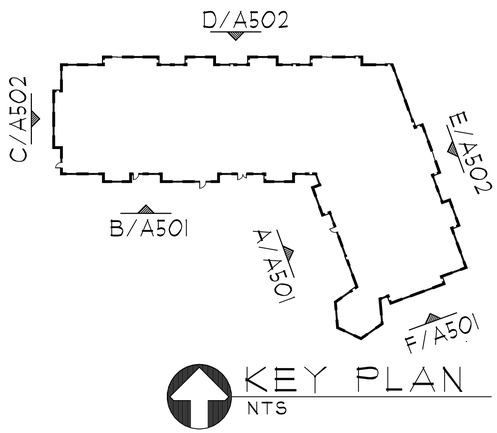


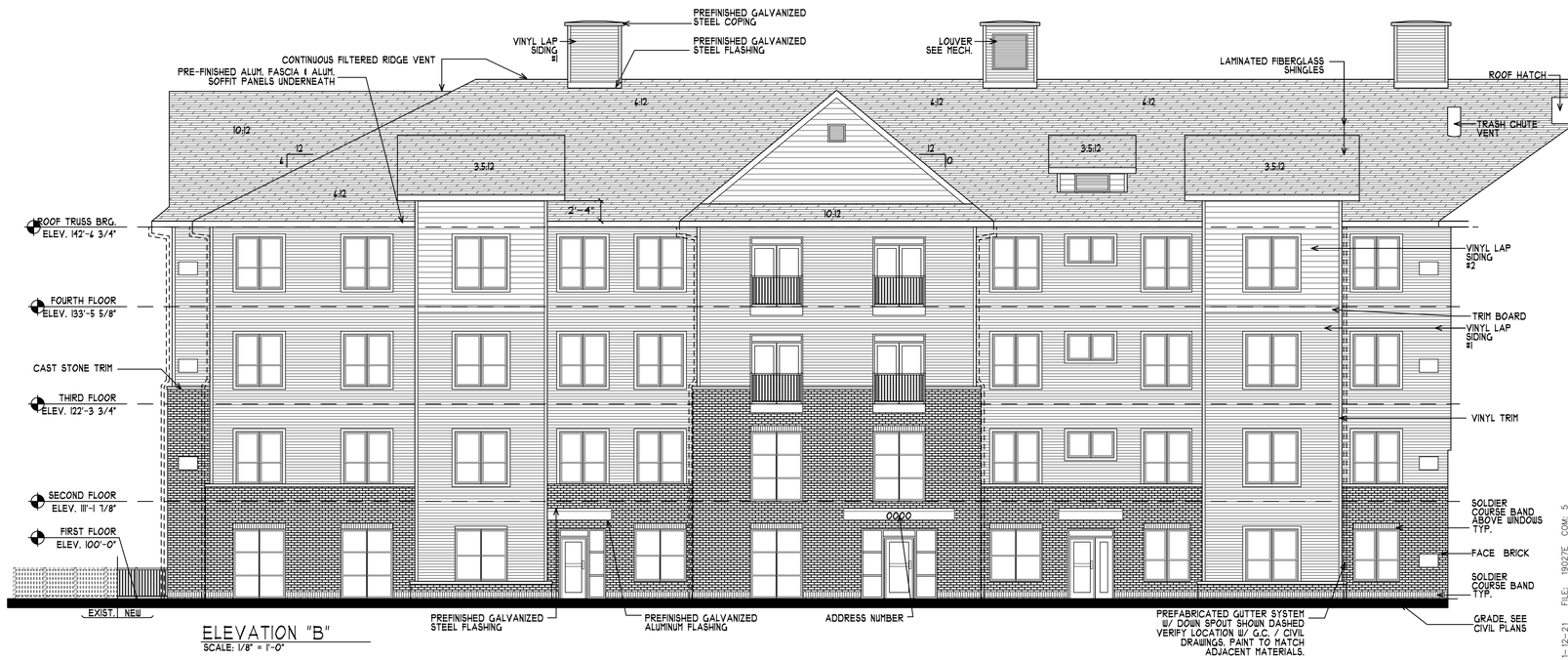
ELEVATION "A"
SCALE: 1/8" = 1'-0"



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



KEY PLAN
NTS



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

COLE GROUP ARCHITECTS LLC.
214 Park Avenue South
Suite 102
Minneapolis, MN 55401
(612) 455-1570
www.colegrouparchitects.com

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Architect under the laws of the state of Minnesota.
DAVID FAUCHRZAK

DEVELOPER:
Duffy Development Company, Inc.

PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS COMMENTS
REVISIONS COMMENTS
REVISIONS COMMENTS

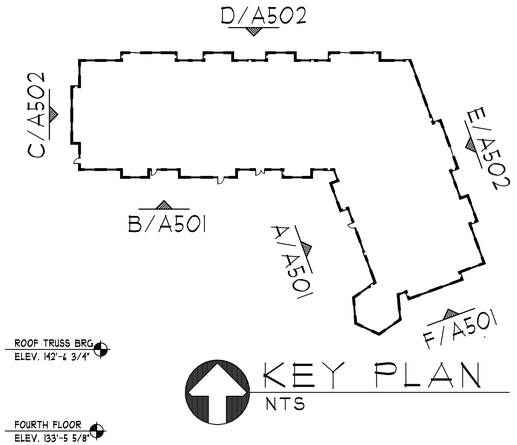
Project No.
19027
Submittal Date:
JAN. 12TH, 2021
Document Set:
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PLOTTED: 1-12-21 FILE: 19027E COM: 5

A501



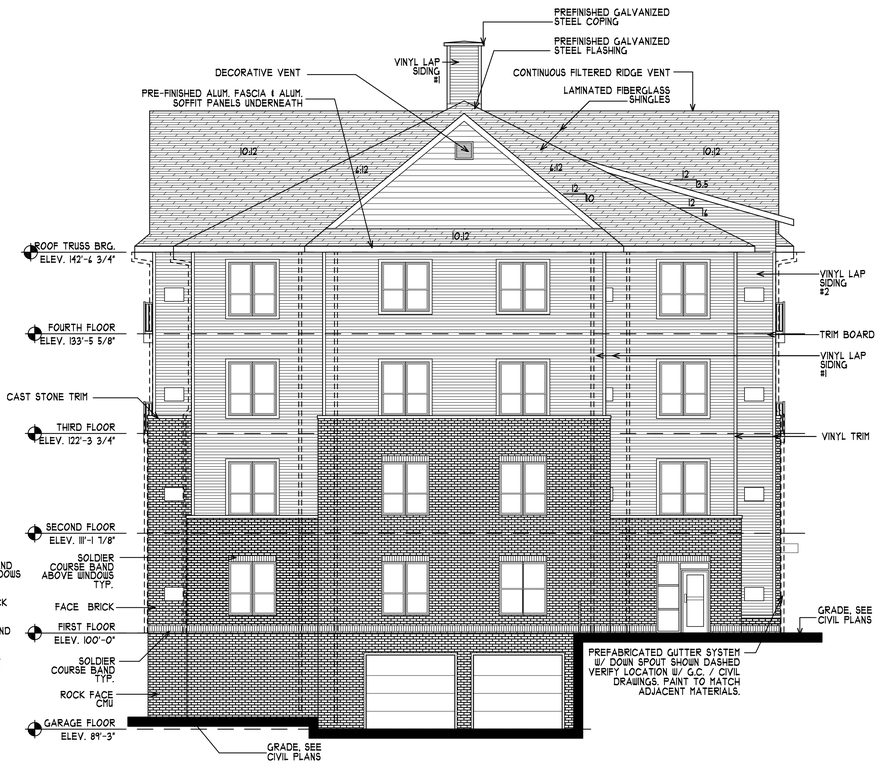
ELEVATION "D"
SCALE: 1/8" = 1'-0"



KEY PLAN
NTS



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



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

COLE GROUP ARCHITECTS LLC.
214 Park Avenue South
Suite 102
Minneapolis, MN 55401
(612) 455-2170
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Name DAVID MAJCHRZAK

DEVELOPER:
Duffy Development Company, Inc.

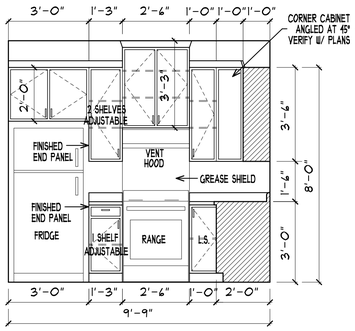
PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS COMMENTS

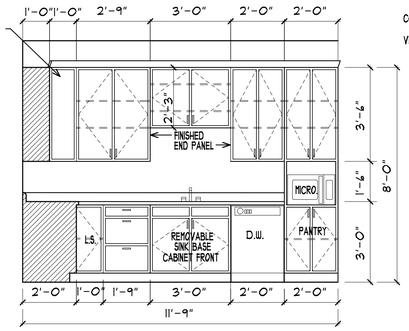
Project No.
19027
Submittal Date:
JAN. 12TH, 2021
Document Set:
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(NOT FOR CONSTRUCTION)

A502

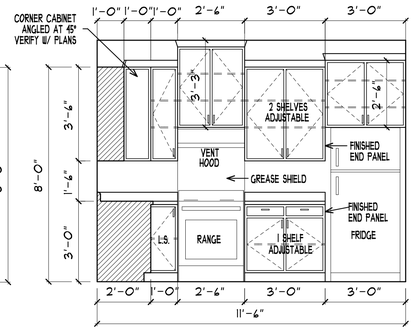
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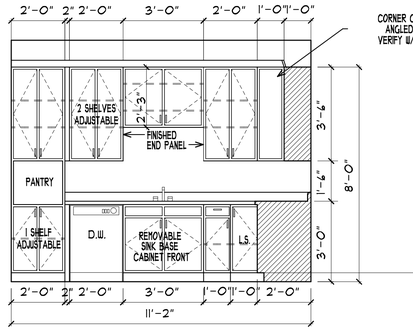
1 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 1A, 2A, 2A.2, 2A.3, 2C



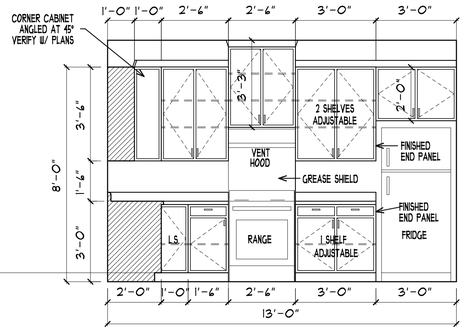
2 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 1A, 2A, 2A.2, 2A.3, 2C, 2B, 3A, 3C



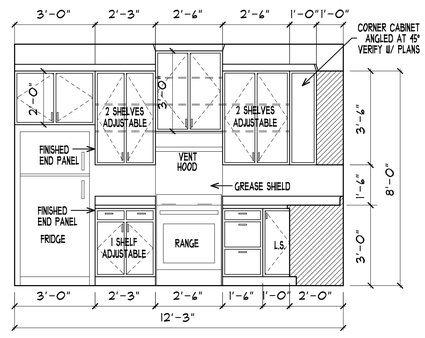
3 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 2B, 3A



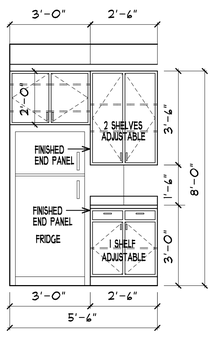
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SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3B



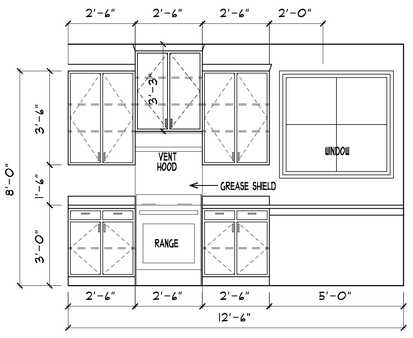
5 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3B



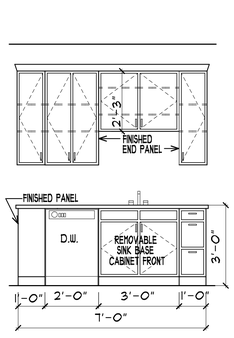
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SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3C



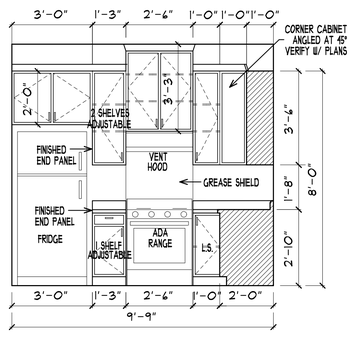
7 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 4A



8. UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 4A

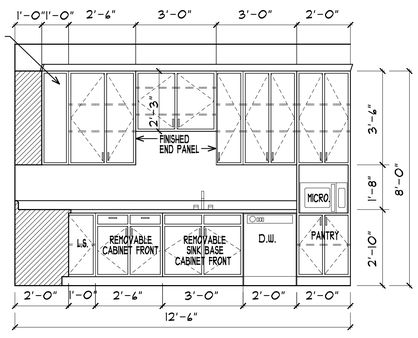


9 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 4A



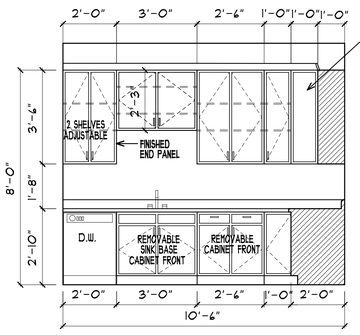
TYPE "A"

11 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 1A.1



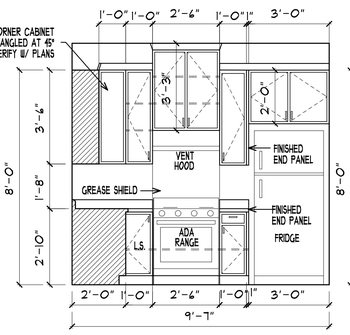
TYPE "A"

12 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 1A.1



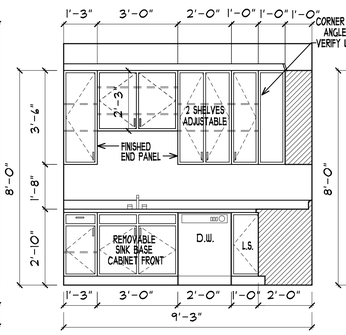
TYPE "A"

13 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 2A.1



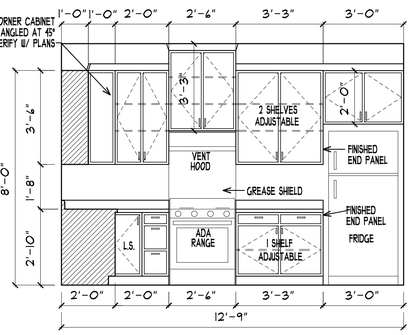
TYPE "A"

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SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 2A.1



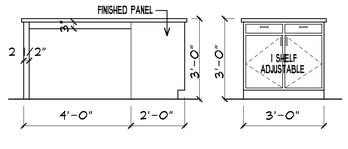
TYPE "A"

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SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3A.1

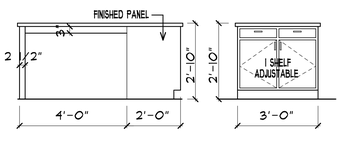


TYPE "A"

16 UNIT KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3A.1



17 18 UNIT KITCHEN ISLAND
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNIT: 1A, 2A, 2A.1, 2A.3, 3A, 2B, 3B, 2B, 2C



TYPE "A"

19 20 UNIT KITCHEN ISLAND
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNIT: 1A.1, 2A.1, 3A.1

COLE GROUP
ARCHITECTS LLC.
214 First Avenue South
Suite 202
Saint Cloud, MN. 56301
(320) 654-6510
www.colegroparchitects.com

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Architect under the laws of the state of
Name DAVID MAJCHRZAK

DEVELOPER:
Duffy Development Company, Inc.

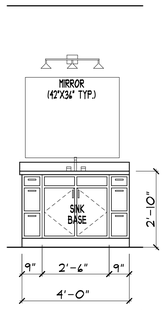
PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS COMMENTS
REVISIONS COMMENTS

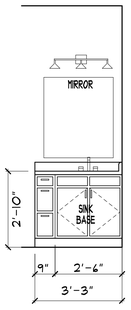
Project No.
19027
Submittal Date:
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Document Set:
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(NOT FOR CONSTRUCTION)

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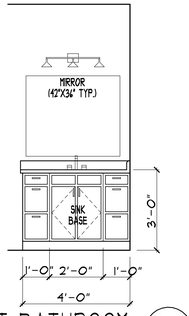
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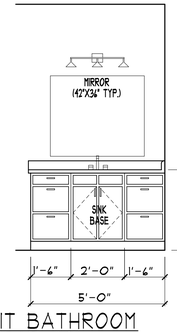
21 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 4A



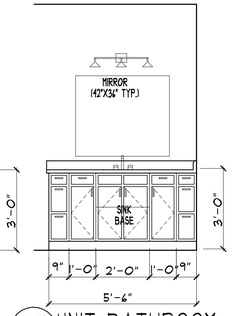
22 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 4A



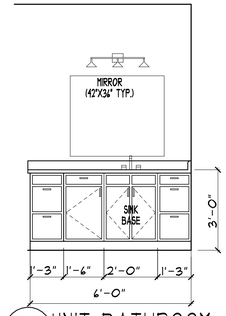
23 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 1A, 2A, 2A.2, 2A.3, 3A, 2A.I, 3A.I, 3B, 3C



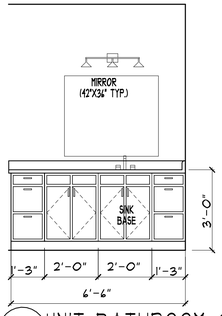
24 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 2C



25 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 2B

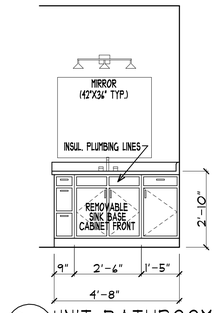


26 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3A, 2C, 3C

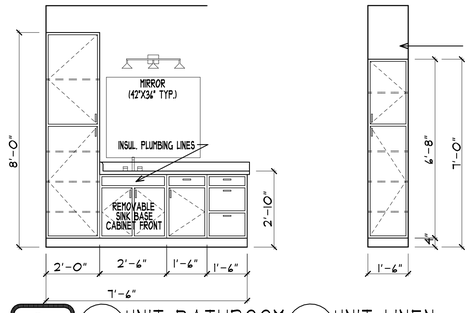


27 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 2A.2, 2A.3, 2A

TYPE "A"



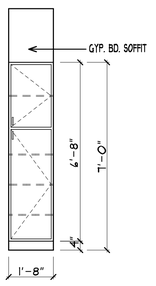
28 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNIT: 1A.I



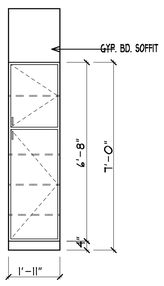
TYPE "A"

29 UNIT BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNIT: 2A.I, 3A.I

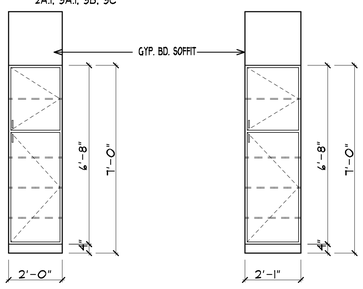
30 UNIT LINEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 2B



31 UNIT LINEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 4A

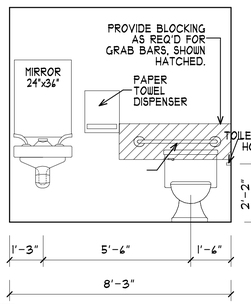


32 UNIT LINEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3A

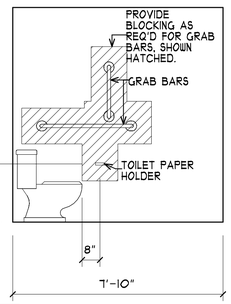


33 UNIT LINEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3C

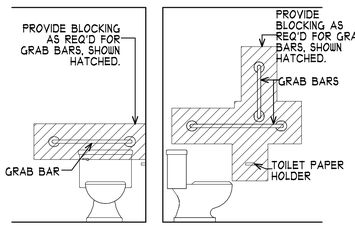
34 UNIT LINEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3B, 4A



35 GUEST BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS



36 GUEST BATHROOM
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS



37 TYP. TOILET
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS

UNIVERSAL DESIGN NOTES:

MINIMUM ESSENTIAL UNIVERSAL DESIGN FEATURES REQUIRED:

A) AT LEAST ONE BEDROOM MUST BE ON AN ACCESSIBLE LEVEL AND ON AN ACCESSIBLE ROUTE.

B) AT LEAST 42" MIN. HALLWAYS MUST BE INCLUDED WITHIN A UNIT.

C) AT LEAST ONE, THREE QUARTER BATHROOM ON AN ACCESSIBLE LEVEL, WITH A MIN. 5'-0" OPEN RADIUS. ACCESSIBLE "T" TURN CLEARANCE MAY BE ACCEPTED IN LIEU OF 5'-0" OPEN RADIUS.

D) ALL DOORS AND PLUMBING FIXTURES MUST HAVE LEVER HANDLES.

E) WALL BLOCKING MUST BE PROVIDED IN ALL TUB AND SHOWER AREAS.

F) DOOR THRESHOLDS FLUSH WITH THE FLOOR WITH MAX. THRESHOLD HEIGHT OF 1/2" BEVELED OR 1/4" SQUARE EDGE.

G) KITCHEN AND LAUNDRY APPLIANCES MUST HAVE PARALLEL APPROACH, CLEAR FLOOR SPACE WITH ALL CONTROLS WITHIN A MAX. HEIGHT OF 48". OVEN CONTROLS MUST HAVE A LOCK-OUT FEATURE. STACKABLE LAUNDRY UNITS WITH A MAX. REACH RANGE OF 54" WILL MEET THIS REQUIREMENT.

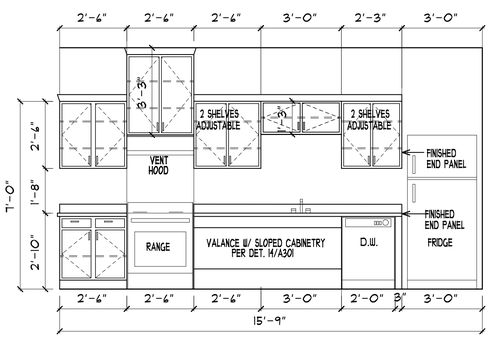
H) IF MICROWAVE/EXHAUST HOOD COMBINATION APPLIANCES ARE PROVIDED IN 95% OF UD UNITS, THEN THE REMAINING 5% OF UD UNITS MUST PROVIDE A COUNTERTOP OR OTHER ACCESSIBLE MICROWAVE OR HAVE ONE IN STOCK AND ON-SITE AND AVAILABLE UPON REQUEST.

I) KITCHEN SINK AREA MUST BE 30" WIDE MIN. WITH A CABINET PANEL CONCEALING PIPING OR A HAVE REMOVABLE BASE CABINET.

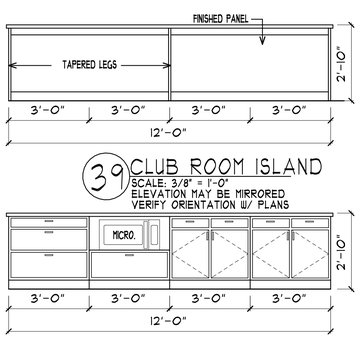
J) ALL COMMON SPACE AMENITIES PROVIDED IN THE DEVELOPMENT MUST BE ON AN ACCESSIBLE ROUTE.

K) DECK AND PATIO SPACES MUST HAVE A STEP-LESS TRANSITION MEETING DOOR THRESHOLD REQUIREMENTS ABOVE, WITH DECKING GAPS NO GREATER THAN 1/4". A STEP-LESS TRANSITION AND DOOR THRESHOLD MEETING REQUIREMENTS AS PROMULGATED BY MINNESOTA ACCESSIBILITY CODE FOR TYPE "A" UNITS IS ALSO PERMITTED.

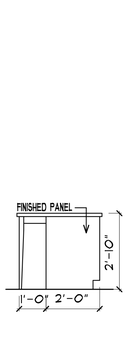
L) UD FEATURES ARE INCORPORATED IN AN AESTHETICALLY PLEASING, MARKETABLE, NON-INSTITUTIONAL MANNER.

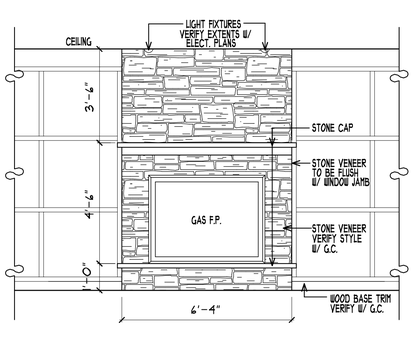


38 CLUB ROOM KITCHEN
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS



39 CLUB ROOM ISLAND
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS

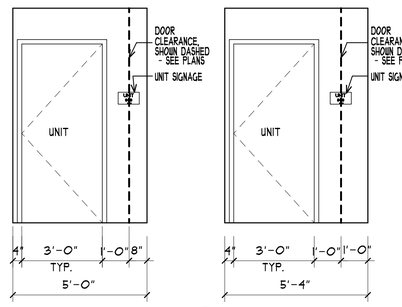




40 CLUB ROOM ISLAND
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS

41 CLUB ROOM ISLAND
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS

42 CLUB ROOM FIREPLACE
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS



43 UNIT ENTRY
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 1A, 1A.I, 2A, 2A.I, 2A.2, 2A.3, 3A, 3A.I, 4A, 2B, 3B, 2C

44 UNIT ENTRY
SCALE: 3/8" = 1'-0"
ELEVATION MAY BE MIRRORED
VERIFY ORIENTATION W/ PLANS
UNITS: 3C

UNIVERSAL DESIGN NOTES:

ADDITIONAL UNIVERSAL DESIGN FEATURES (THIS PROJECT):

A) HIGH CONTRAST FINISH SELECTIONS THAT INCLUDE FLOOR TO WALL TRANSITIONS, TOP TREADS OF STAIRS, COUNTERS AND ADJACENT FLOORINGS AND WALLS.

B) SINGLE LEVER, HANDS FREE OR TOUCH TYPE FAUCETS ARE PROVIDED THROUGHOUT THE UD DWELLING UNIT.

C) AT LEAST 50% OF KITCHEN STORAGE SPACE IS WITHIN REACH RANGES FROM PULL-OUT SHELVES, FULL EXTENSION GLIDE DRAWERS OR IS WITHIN A ROLL-IN PANTRY.

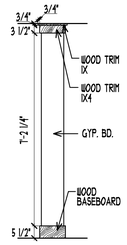
D) ROLL UNDER VANITY OR SINK IN 25% OF UD QUALIFYING UNITS ROUNDED UP TO THE NEAREST WHOLE NUMBER.

E) CABINET HARDWARE WITH "D" TYPE PULL HANDLES OR OPERATION FOR PEOPLE WITH LIMITED DEXTERITY.

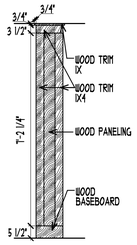
F) ZERO THRESHOLD SHOWER OR TRANSFER SPACE AT TUB IS PROVIDED AT A MINIMUM OF HALF OF THE QUALIFYING UD UNITS ROUNDED UP TO THE NEAREST WHOLE NUMBER.

G) TOILETS WITH SEATS 17" - 19" FROM THE FLOOR.

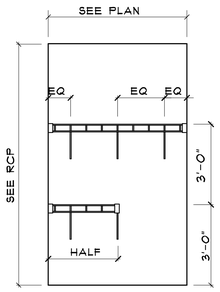
H) A COVERED CANOPY WITH ADEQUATE LIGHTING IS PROVIDED AT EXTERIOR MAIN UNIT ENTRY. AN INTERIOR OR EXTERIOR BENCH SPACE FOR PARCELS OR GROCERIES IS PROVIDED.



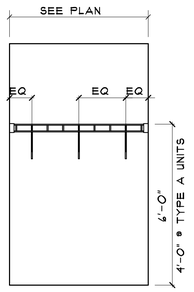
45 1ST FLR. COL. ELEVATION
SCALE: 3/8" = 1'-0"



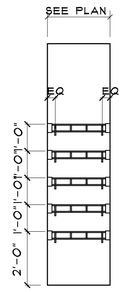
46 2ND FLR. COL. ELEVATION
SCALE: 3/8" = 1'-0"



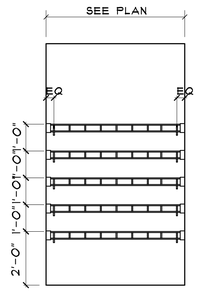
47 BEDROOM
SCALE: 3/8" = 1'-0"



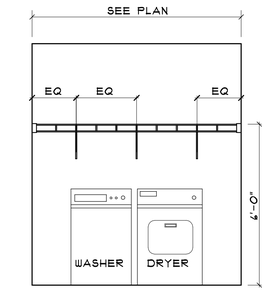
48 UNIT ENTRY
SCALE: 3/8" = 1'-0"



49 LINEN
SCALE: 3/8" = 1'-0"



50 PANTRY
SCALE: 3/8" = 1'-0"



WASHER ALWAYS ON LEFT

51 LAUNDRY
SCALE: 3/8" = 1'-0"

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214 First Avenue South
Suite 222
Saint Cloud, MN. 56301
(320) 654-6510
www.colegroparchitects.com

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Name DAVID MAJCHRZAK

DEVELOPER:
Duffy Development Company, Inc.

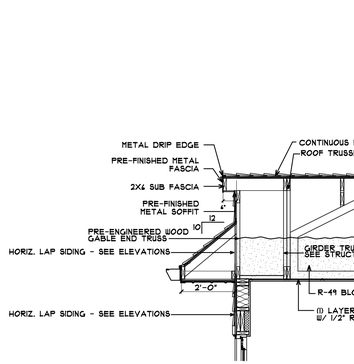
PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

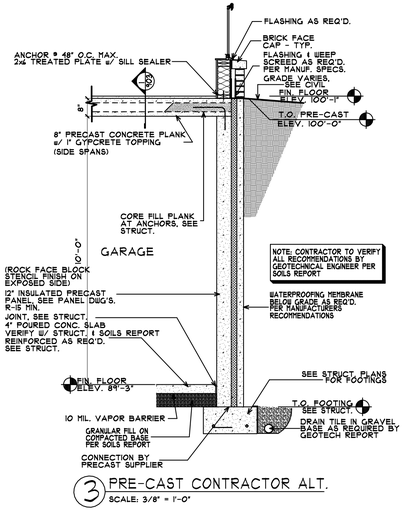
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REVISIONS COMMENTS

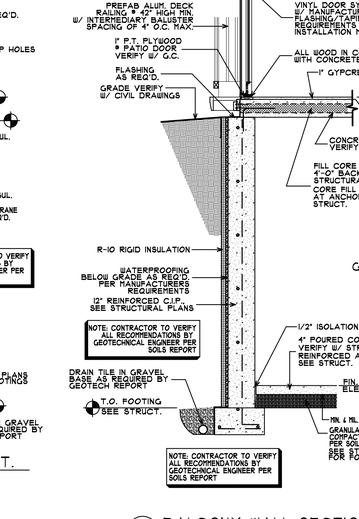
Project No.
19027
Submittal Date:
JAN. 12TH, 2021
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A602

PLOTTED: 1-12-21 FILE: 19027INT COM: 5







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214 Park Avenue South
Suite 1102
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320.654.1451
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Name: DAVID RAUCHRZAK

DEVELOPER: Duffy Development Company, Inc.

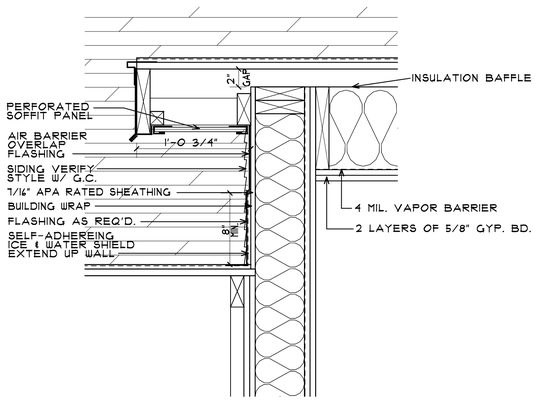
PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS COMMENTS

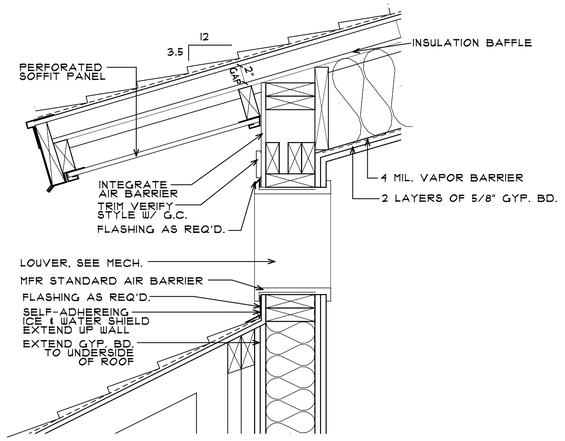
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Submittal Date:
JAN. 12TH, 2021
Document Set:
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(NOT FOR CONSTRUCTION)

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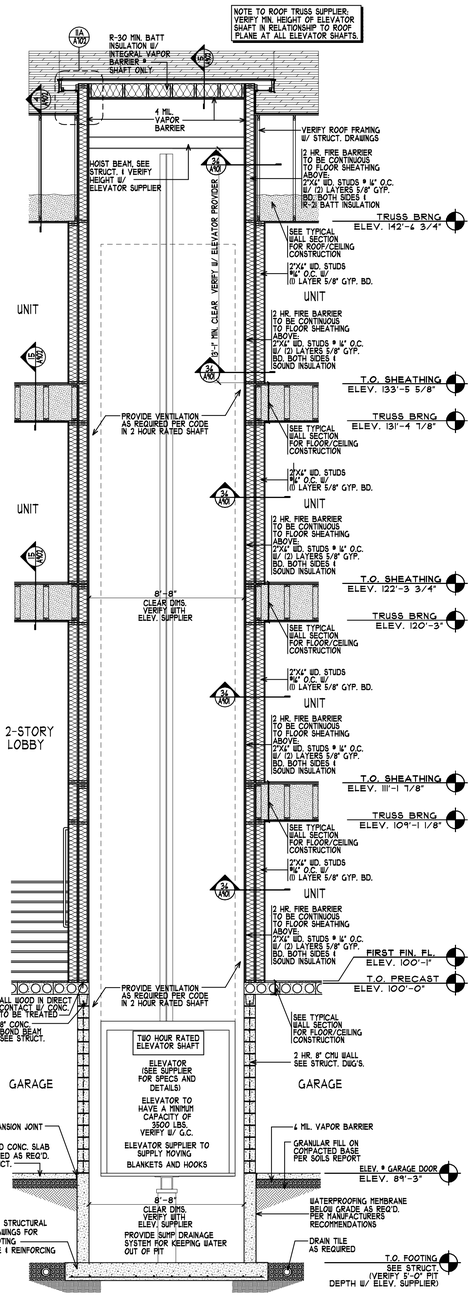
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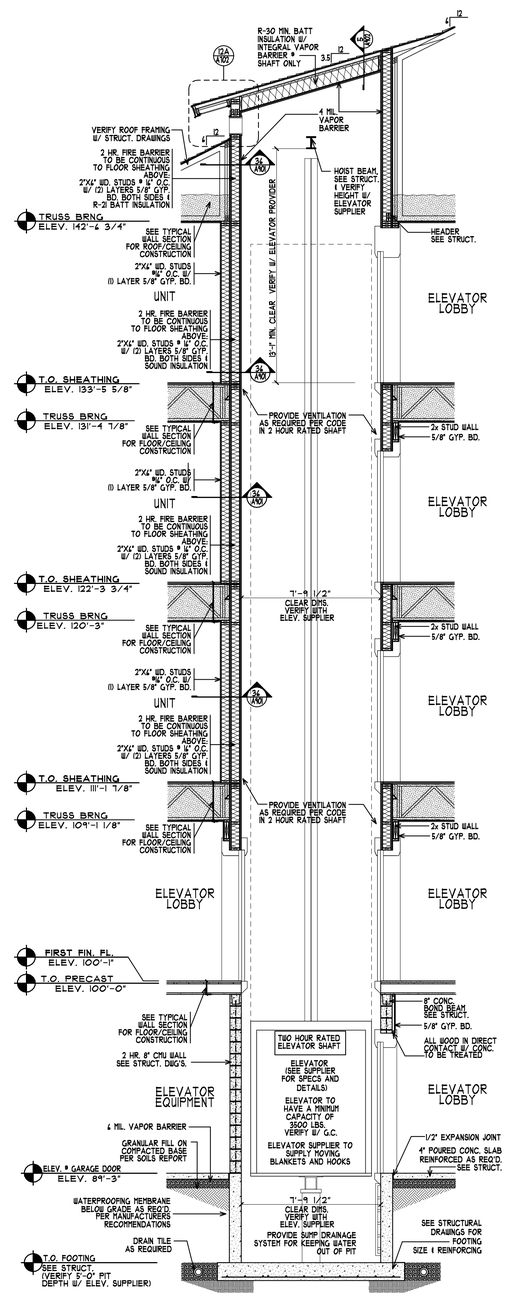
11A ELEVATOR SHAFT/ROOF
SCALE: 1 1/2" = 1'-0"



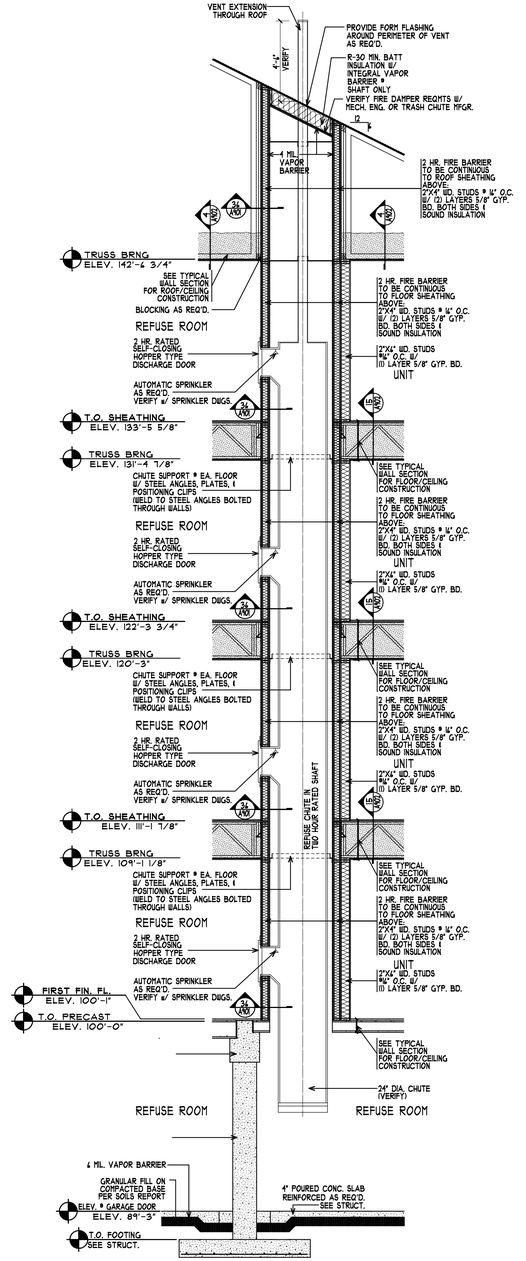
12A ELEVATOR SHAFT/ROOF
SCALE: 1 1/2" = 1'-0"



11 ELEVATOR SHAFT SECTION
SCALE: 1/4" = 1'-0"



12 ELEVATOR SHAFT SECTION
SCALE: 1/4" = 1'-0"



13 REFUSE SECTION
SCALE: 1/4" = 1'-0"

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ARCHITECTS LLC.
214 Park Avenue South
Suite 1104
Minneapolis, MN. 55401
(320) 654-6510
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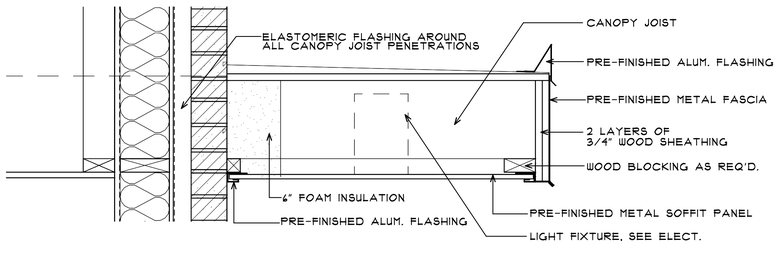
PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS COMMENTS
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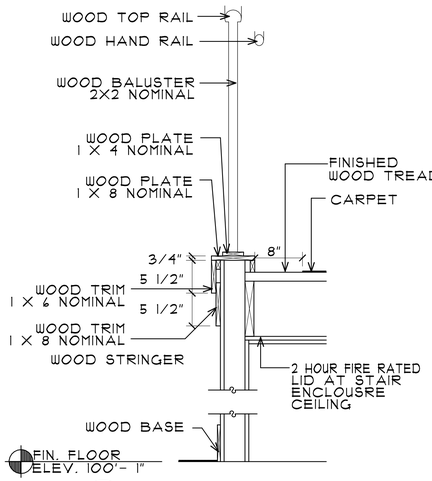
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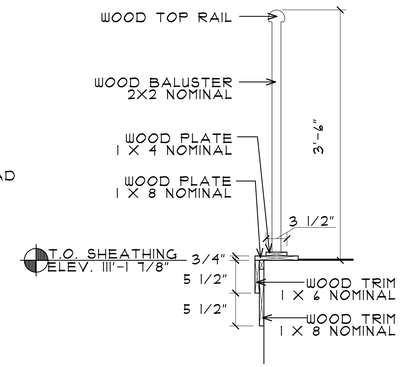
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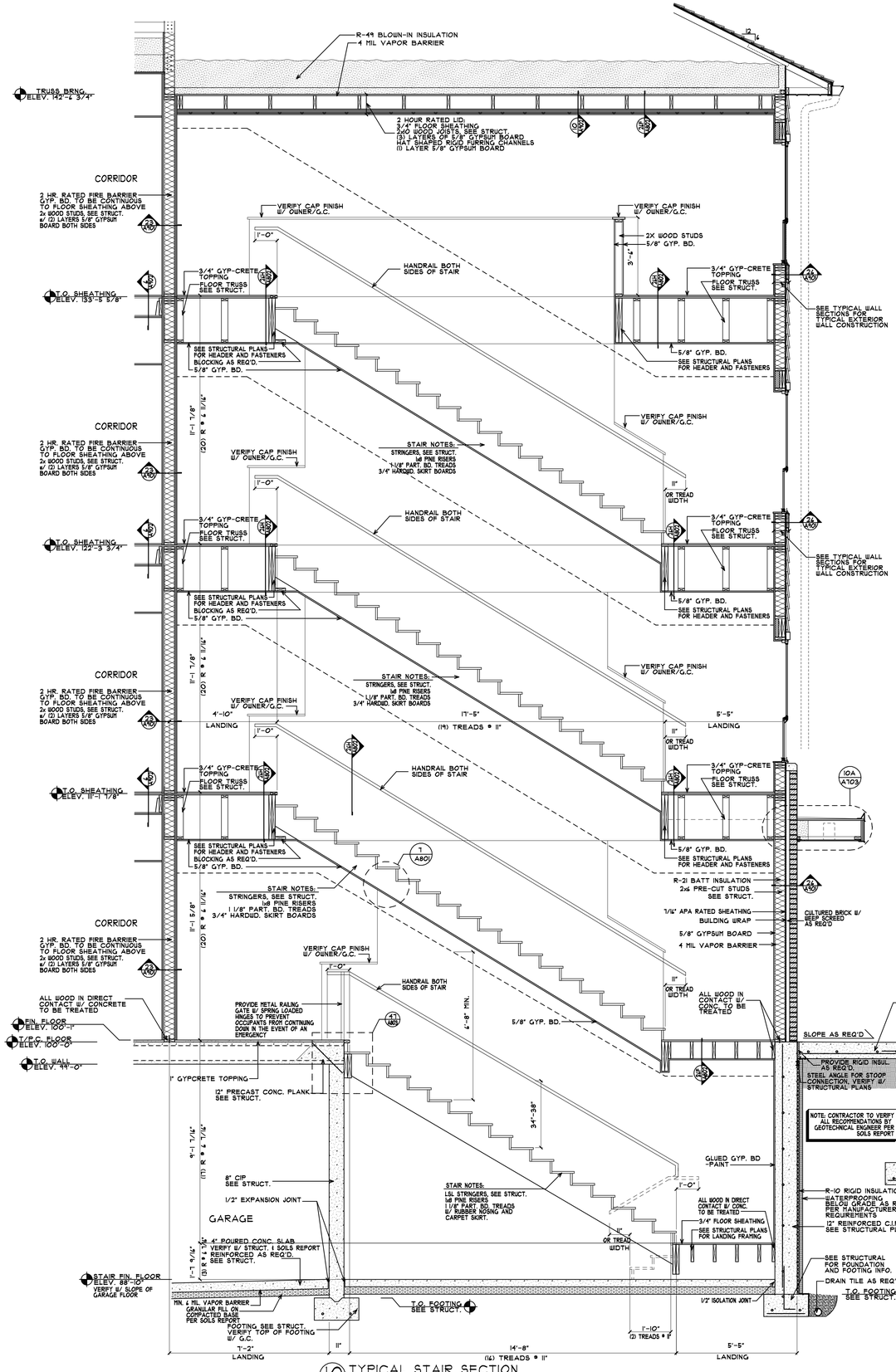
10A ENTRY CANOPY
SCALE: 1 1/2" = 1'-0"



4 LOBBY STAIR DETAIL
SCALE: 1" = 1'-0"



5 LOBBY GUARDRAIL SECTION
SCALE: 1" = 1'-0"



10 TYPICAL STAIR SECTION
SCALE: 3/8" = 1'-0"

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Suite 102
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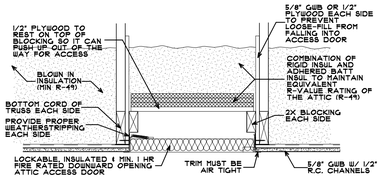
PROPOSED APARTMENT:
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MAPLE GROVE, MN

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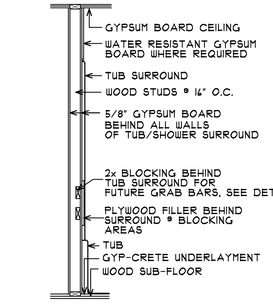
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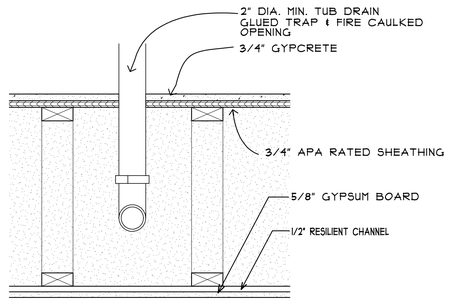
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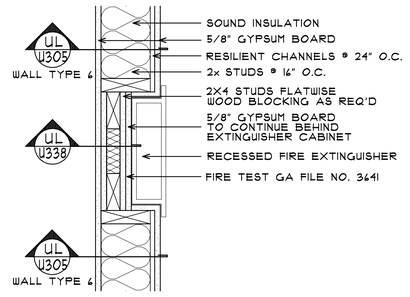
2 ATTIC ACCESS DETAIL
SCALE: 1" = 1'-0"



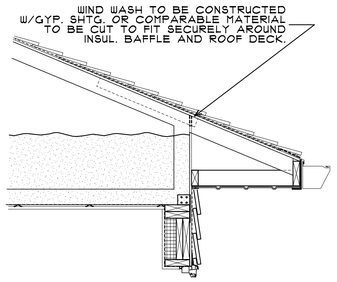
3 TUB SURROUND SECTION
SCALE: 1/2" = 1'-0"



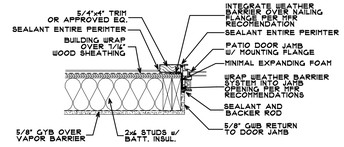
4 TUB DRAIN SECTION
SCALE: 1 1/2" = 1'-0"



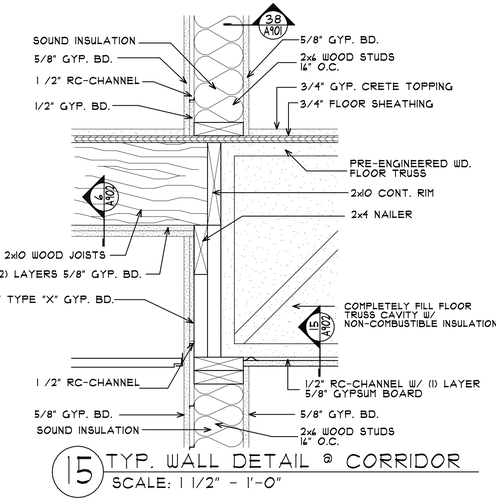
5 RECESSED FIRE EXTINGUISHER DETAIL
SCALE: 1 1/2" = 1'-0"



8 DETAIL OF WIND WASH
SCALE: 3/4" = 1'-0"

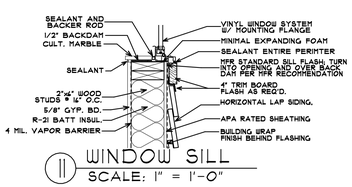


13 PATIO DOOR JAMB
SCALE: 1" = 1'-0"

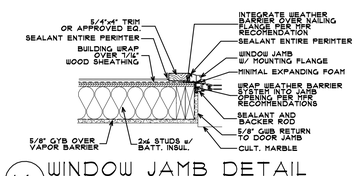


15 TYP. WALL DETAIL @ CORRIDOR
SCALE: 1 1/2" = 1'-0"

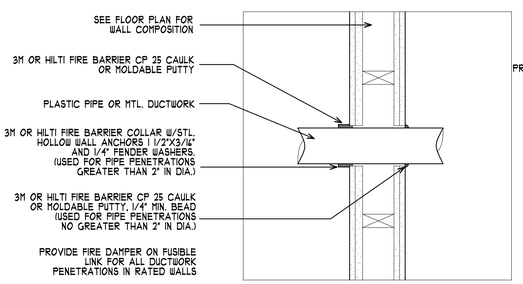
7 STAIR RISER/TREAD DET.
SCALE: 1" = 1'-0"



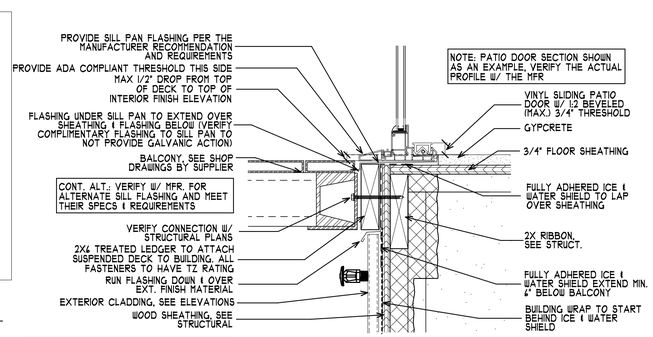
11 WINDOW SILL
SCALE: 1" = 1'-0"



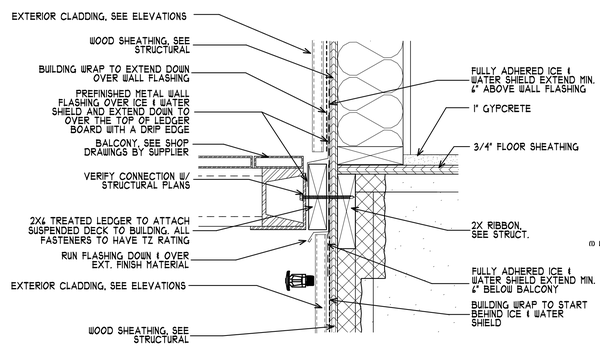
14 WINDOW JAMB DETAIL
SCALE: 1" = 1'-0"



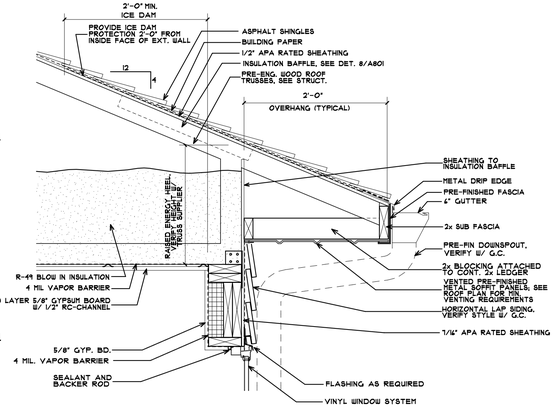
16 PENETRATION @ RATED WALL
SCALE: 3/4" = 1'-0"



17A DECK CONNECTION
SCALE: 2" = 1'-0" @ PATIO DOOR



17B DECK CONNECTION
SCALE: 2" = 1'-0" @ EXTERIOR WALL



18 TYP. EAVE DETAIL
SCALE: 1" = 1'-0"

TYPICAL DETAIL SHEET 1

COLE GROUP ARCHITECTS LLC.
214 Park Avenue South
Suite 102
Saint Cloud, MN. 56301
(320) 654-5910
www.colegrouparchitects.com

These documents are not valid for building permit unless signed in ink and dated. Copies are not valid.
I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Architect under the laws of the state of MINNESOTA
Name: DAVID J. KOCHEVAR

DEVELOPER: Duffy Development Company, Inc.

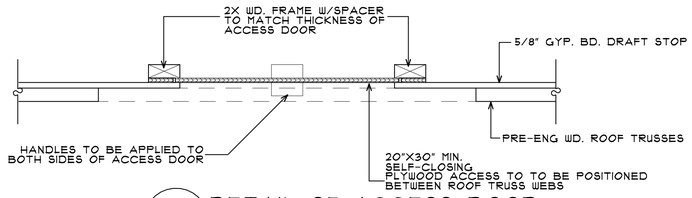
PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS COMMENTS
REVISIONS COMMENTS

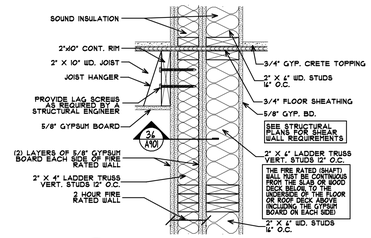
Project No.
19027
Submittal Date:
JAN. 12TH, 2021
Document Set:
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(NOT FOR CONSTRUCTION)

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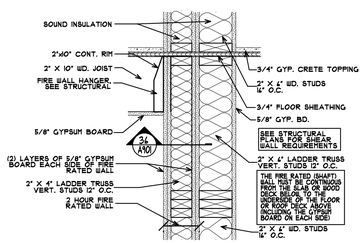
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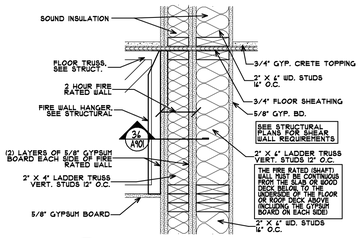
23 DETAIL OF ACCESS DOOR
SCALE: 1 1/2" = 1'-0"



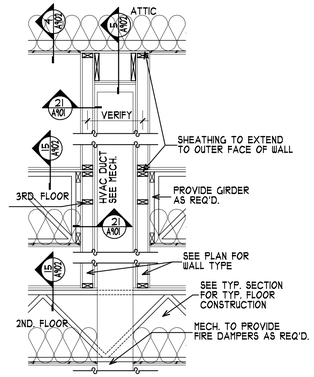
26E BEARING @ SHAFT WALL
SCALE: 1" = 1'-0"
CONTRACTOR ALTERNATE

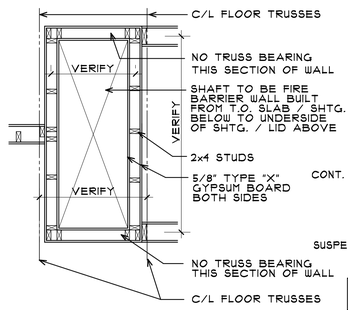


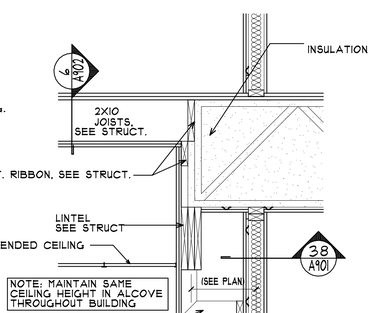
26F BEARING @ SHAFT WALL
SCALE: 1" = 1'-0"



26H BEARING @ SHAFT WALL
SCALE: 1" = 1'-0"



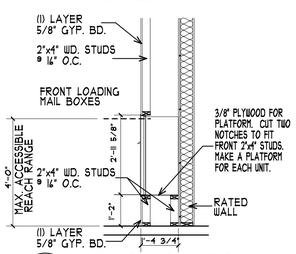




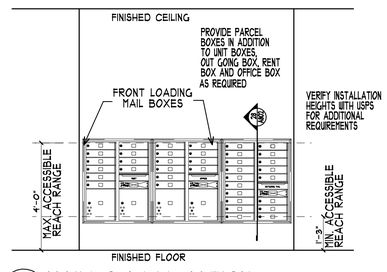
34 UNIT ALCOVE SECTION
SCALE: 1/2 = 1'-0"

INSTALLATION REQUIREMENTS PER USPS STD-4C

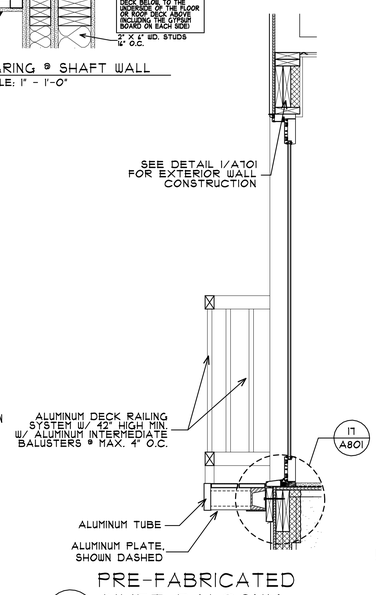
1. AT LEAST ONE CUSTOMER MAILBOX COMPARTMENT SHALL BE POSITIONED LESS THAN 48" ABOVE FINISHED FLOOR (AFF).
2. NO PARCEL LOCKER COMPARTMENT (INTERIOR BOTTOM SHELF) SHALL BE POSITIONED LESS THAN 9" AFF.
3. NO CUSTOMER MAILBOX LOCK SHALL BE LOCATED MORE THAN 48" AFF.
4. NO CUSTOMER MAILBOX COMPARTMENT (INTERIOR BOTTOM SHELF) SHALL BE POSITIONED LESS THAN 28" AFF.
5. THE USPS ARROW LOCK IN THE CARRIER ACCESS DOOR SHALL BE LOCATED BETWEEN 34" AND 48" AFF.



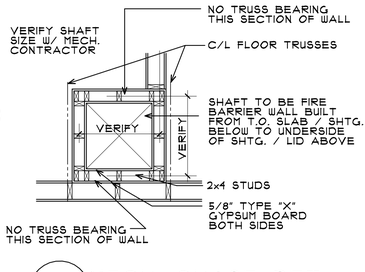
28 MAILBOX SECTION
SCALE: 3/8" = 1'-0"



29 MAILBOX ELEVATION
SCALE: 3/8" = 1'-0"



30 PRE-FABRICATED JULIET BALCONY
SCALE: 3/4 = 1'-0"



33 MECH. CHASE DET.
SCALE: 1/2" = 1'-0"

TYPICAL DETAIL SHEET 2

COLE GROUP ARCHITECTS LLC.
2141 Park Avenue South, Suite 102, Minneapolis, MN. 55404
(612) 767-1770
www.colegroupARCHITECTS.com

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Architect under the laws of the state of MINNESOTA
Name: DAVID TAICHERT-AK

DEVELOPER: Duffy Development Company, Inc.

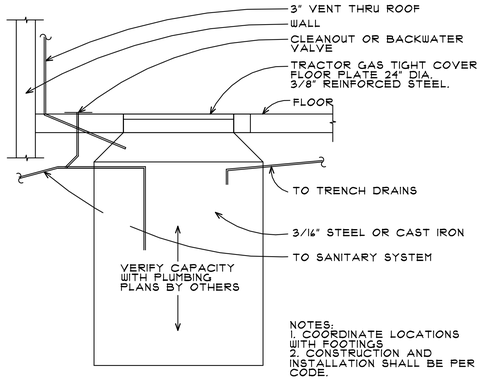
PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS COMMENTS

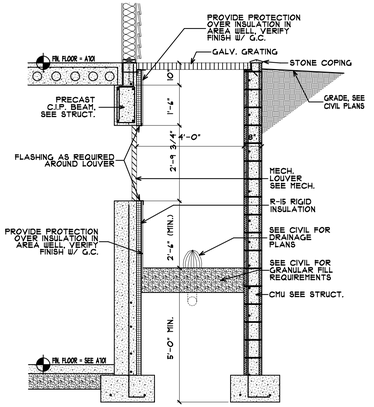
Project No. 19027
Submittal Date: JAN. 12TH, 2021
Document Set: -BID SET- (NOT FOR CONSTRUCTION)

A802

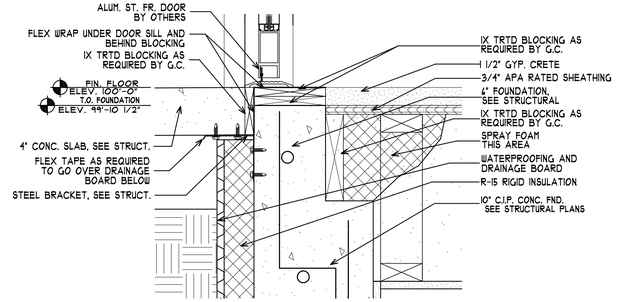
PLOTTED: 1-12-21 FILE: 19027DET COM: 1 UPDATE: 12/29/20



36 INFLAMMABLE WASTE TRAP
NO SCALE

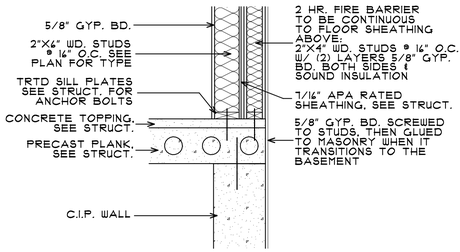


37 AREA WELL SECTION
SCALE 3/8" = 1'-0"

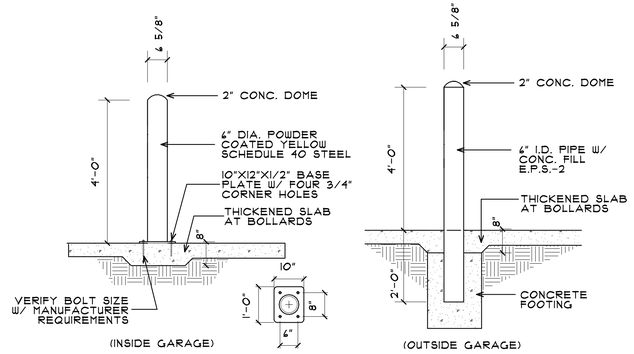


38 STOOP DETAIL @ STAIR LANDING
SCALE: 2" = 1'-0"

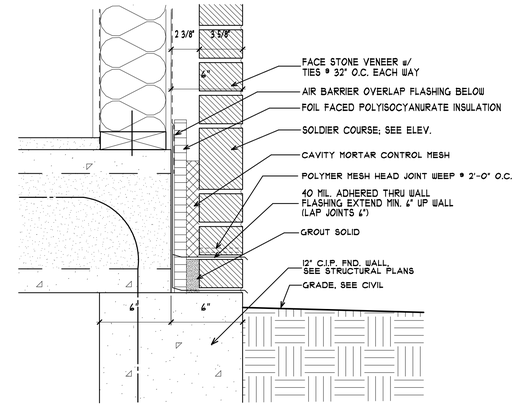
NOTE: SEE PLAN FOR WALL TYPE, ADJUST WALL AS REQ'D SO THE GYPSUM BOARD REMAINS FLUSH WHEN TRANSITIONING. VERIFY W/ STRUCT. FOR SHEATHING.



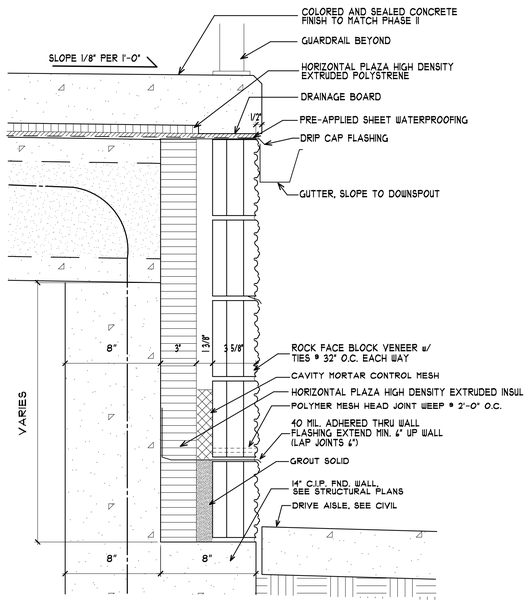
40 GYP. BD. TRANSITION
SCALE: 3/4" = 1'-0"



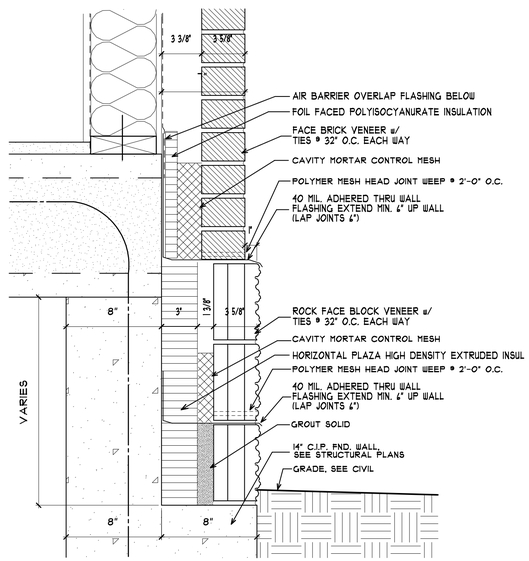
42 PIPE BOLLARD
SCALE: 1/2"=1'-0"



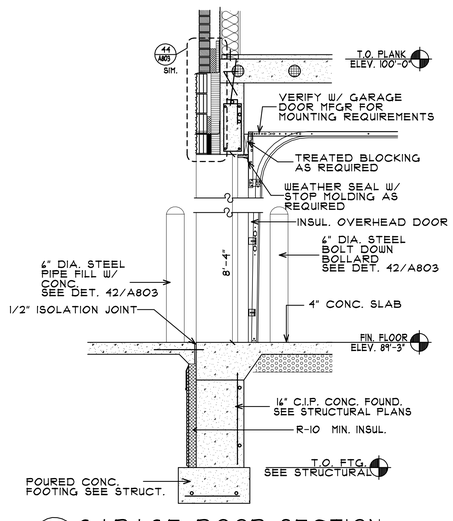
43 T.O. FND. DETAIL
SCALE: 2" = 1'-0" @ BRICK ONLY



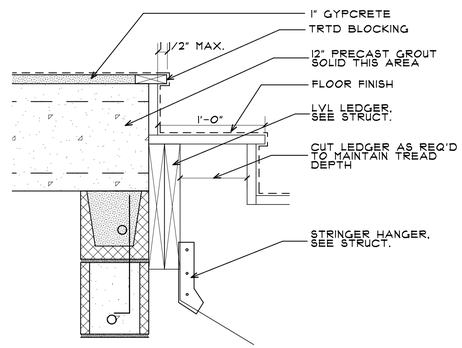
35 PATIO EDGE DETAIL
SCALE: 2" = 1'-0" @ UND. GARAGE



44 T.O. FND. DETAIL
SCALE: 2" = 1'-0" @ ROCK FACE BLOCK



45 GARAGE DOOR SECTION
SCALE: 1/2" = 1'-0"



41 STAIR LEDGER @ PRECAST
SCALE: 1 1/2" = 1'-0"

TYPICAL UNDERGROUND DETAILS

COLE GROUP
ARCHITECTS LLC.
214 First Avenue South
Suite 102
Sartell, MN 56377
(320) 654-6510
www.colegroparchitects.com

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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Architect under the laws of the state of MINNESOTA.
Name DAVID MAJCHRZAK

DEVELOPER:
Duffy Development Company, Inc.

PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS COMMENTS
REVISIONS COMMENTS

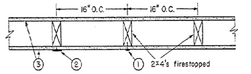
COM: 1 UPDATE: 12/29/20
FILE: 19027DET
PLOTTED: 1-12-21

Project No.
19027
Submittal Date:
JAN. 12TH, 2021
Document Set:
-BID SET-
(NOT FOR CONSTRUCTION)

A803

Design No. U305

Bearing Wall Rating — 1 HR.
Finish Rating — See Items 3 and 6.
STC Rating — 56 (See Item 9)



1. **Nailheads** — Exposed or covered with joint compound.
2. **Joints** — Exposed or covered with fiber tape and joint compound, except where required for specific edge configuration. For tapered, rounded-edge wallboard, joints covered with joint compound or fiber tape and joint compound. As an alternate, nom 3/32 in. thick gypsum veneer plaster may be applied to the entire surface of Classified veneer baseboard. Joints reinforced.
3. **Gypsum Board*** — 5/8 in. thick wallboard paper or vinyl surfaced, with beveled, square, or tapered edges, applied either horizontally or vertically. Wallboard nailed 7 in. OC with 6d cement coated nails 1-7/8 in. long, 0.0915 in. shank diam and 1/4 in. diam heads. When used in widths of other than 48 in., wallboard is to be installed horizontally. For an alternate method of attachment of gypsum boards, refer to Item 6, Wall and Partition Facings and Accessories*, or Item 7, Steel Framing Members*.
   When Item 7, Steel Framing Members*, is used, wallboard attached to furring channels with 1 in. long Type S bugle-head steel screws spaced 12 in. OC.
   - **AMERICAN GYPSUM CO** —Types AGX-1, AGX-2, AGX-3 (finish rating 23 min.), Type AGX-7, AGX-11 (finish rating 26 min) or Type AG-C. Type AGX-5 (finish rating 20 min). Type AGX-9 (finish rating 20 min). Type AGX-10 (finish rating 20 min), Type AGX-5 (finish rating 26 min). Type AGX-4 (finish rating 20 min). Type AGX-C.
   - **BEIJING NEW BUILDING MATERIALS CO LTD** — Type GSN-1 (finish rating 24 min).
   - **BPB AMERICA INC**
   - **BPB CELOTEX** —Type 1, Type SF3 (finish rating 20 min) or FR2.
   - **CANADIAN GYPSUM COMPANY** —Type AR (finish rating 26 min), Type C (finish rating 26 min), Type FCV (finish rating 26 min), Type IP-AR (finish rating 26 min), Type IPC-AR (finish rating 26 min), Type IP-X3 (finish rating 26 min), Type SCX (finish rating 26 min), Type SHX (finish rating 26 min), Type WRX (finish rating 26 min), Type WRC (finish rating 26 min), Type IP-X1 (finish rating 26 min), Type IP-X2 (finish rating 26 min), Type FRX (finish rating 20 min), Type IP-AR (finish rating 29 min), Type IP-AR (finish rating 26 min), Type IPC-AR (finish rating 26 min)
   - **CONTINENTAL GYPSUM COMPANY** —Type CG-1 (finish rating 20 min), Type CG-2 (finish rating 20 min), Type CG-3 (finish rating 20 min), Type CG3-5 (finish rating 20 min), Type CG-5 (finish rating 20 min), Type CG5-5 (finish rating 20 min), Type CG6-6 (finish rating 26 min), Types CG-3W, CG-5W (finish rating 20 min), Types CG-5WS, CG-5WS (finish rating 20 min), Type CG-6 (finish rating 23 min), Type CG6-6 (finish rating 26 min), Type CC-C, Type CGT6-6 finish rating 23 min), Type CG9-9 (finish rating 26 min), Type CGT6-6 (finish rating 23 min), Type CGTC-C (finish rating 20 min).
   - **G-P GYPSUM CORP, SUB OF**
   - **GEORGIA-PACIFIC CORP** —Type 5 (finish rating 26 min), Type 9 (finish rating 26 min), Type C (finish rating 26 min), Type DGG (finish rating 20 min), Type GPT51 (finish rating 26 min), Type GPT52 (finish rating 20 min). Type GPT55 (finish rating 26 min), Type DS.
   - **JAMES HARDIE GYPSUM INC** —Type Fire X (finish rating 26 min), Type Max™C.
   - **LAFARGE NORTH AMERICA INC** —Type LGFC2 (finish rating 20 min), Type LGFC3 (finish rating 20 min), Type LGFC6 (finish rating 26 min), Type LGFC-C (finish rating 20 min), Type LGFC6A (finish rating 34 min), Type LGFC2A, Type LGFC-C/A.
   - **NATIONAL GYPSUM CO** —Type FSK (finish rating 20 min). Type FSK-G (finish rating 20 min), Type FSW (finish rating 20 min), Type FSW-2 (finish rating 24 min), Type FSW-3 (finish rating 20 min), Type FSW-G (finish rating 20 min), Type FSK-C (finish rating 20 min), Type FSW-C (finish rating 20 min).
   - **NORGIPS A/S** —NORFIRE X (finish rating 26 min). NORFIRE XA (finish rating 24 min).
   - **PABCO GYPSUM, DIV OF**
   - **PACIFIC COAST BUILDING PRODUCTS INC** —Types C, PG-2 (finish rating 20 min), FG-3 (finish rating 23 min), Types PG-3W, PG-3W (finish rating 20 min), Type PG-4 (finish rating 20 min), Type PG-6 (finish rating 23 min). Types PG-3WS, PG-3WS (finish rating 20 min), Types PG-5, PG-9 (finish rating 26 min) or Type PG-C.
   - **SIAM GYPSUM INDUSTRY CO LTD** —Type EX-1 (finish rating 26 min)
   - **STANDARD GYPSUM L L C** —Type SGC(finish rating 20 min.) Type SGC-3(finish rating 20 min.) Type SG-C or SGC-C(finish rating 20 min).
   - **TEMPLE-INLAND FOREST PRODUCTS CORP** —Types T (finish rating 20 min). VPB-Type T (finish rating 20 min). WR-Type T (finish rating 20 min). Type T SHTG (finish rating 20 min). FRX-6, VPBX-6, FRWRX-6, TG-C or FRX-6 Exterior Gypsum Sheathing.
   - **UNITED STATES GYPSUM CO** —Type AR (finish rating 26 min). Type SCX (finish rating 26 min), Type C (finish rating 26 min), Type WRX (finish rating 26 min), Type WRC (finish rating 26 min), Type IP-X1 (finish rating 26 min), Type FCV (finish rating 26 min), Type IP-X2 (finish rating 26 min). Type SHX (finish rating 26 min), Type FRX (finish rating 20 min), Type IP-AR (finish rating 29 min), Type IP-AR (finish rating 26 min). Type IPC-AR (finish rating 26 min).
   - **WESTROC INC** — Type Fi-Rok.
   - **USG MEXICO S A DE C V** —Type AR (finish rating 26 min). Type C (finish rating 26 min). Type WRX (finish rating 26 min). Type WRC (finish rating 26 min), Type IP-X1 (finish rating 26 min.) Type FCV (finish rating 26 min), Type IP-X2 (finish rating 26 min), Type SHX (finish rating 26 min). SCX (finish rating 26 min), Type IP-AR (finish rating 26 min), Type IPC-AR (finish rating 26 min), Type FRX (finish rating 20 min).

3A. **Gypsum Board*** — (As an alternate to Item 3) — Nom 3/4 in. thick, installed as described in Item 3.
   - **CANADIAN GYPSUM COMPANY** —Types AR, IP-AR.
   - **UNITED STATES GYPSUM CO** —Types AR, IP-AR.
   - **USG MEXICO S A DE C V** —Types AR, IP-AR.

3B. **Gypsum Board*** — (As an alternate to Items 3 and 3A) — 5/8 in. thick, 4 ft wide, square edge, applied vertically. Wallboard nailed 8 in. OC with 1-3/4 in. long galvanized roofing nails. Joint covering (Item 4) not required.
   - **CANADIAN GYPSUM COMPANY** —Type WSX (finished rating 22 min)
   - **UNITED STATES GYPSUM CO** —Type WSX (finished rating 22 min)
   - **USG MEXICO S A DE C V** —Type WSX (finished rating 22 min).

3C. **Gypsum Board*** — (As an alternate to Items 3, 3A and 3B) - 5/8 in. thick, 2 ft wide, tongue and groove edge, applied horizontally to one side of the assembly. Secured as described in Item 3. Joint covering (Item 4) not required.
   - **CANADIAN GYPSUM COMPANY** — Type SHX.
   - **UNITED STATES GYPSUM CO** —Type SHX.
   - **USG MEXICO S A DE C V** —Type SHX.

4. **Steel Corner Fasteners — Optional** — For use at wall corners. Channel shaped, 2 in. long by 1 in. high on the back side with two 1/8 in. wide cleats protruding into the 5/8 in. side channel, fabricated from 24 gauge galv steel. Fasteners applied only to the end or cut edge (not along tapered edges) of the wallboard, no greater than 2 in. from corner of wallboard, max spacing 16 in. OC. Nailed to adjacent stud through tab using one No. 6d cement coated nail per fastener. Corners of wall board shall be nailed to top and bottom plate using No. 6d cement coated nails.
5. **Batts and Blankets*** — (Optional, Not Shown) glass fiber or mineral wool insulation.
   - **CERTAINTEED CORP**
   - **GUARDIAN FIBERGLASS INC**
   - **JOHNS MANVILLE INTERNATIONAL INC**
   - **KNAUF FIBER GLASS GMBH**
   - **OWENS CORNING HT INC, DIV OF**
   - **OWENS CORNING**—Corning Fiberglas Corp.
   - **ROCK WOOL MANUFACTURING CO**—Delta Board.
   - **ROXUL INC**
   - **THERMAFIBER L L C**—Type SAFB.

5A. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 5) — Spray applied cellulose insulation material. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product. Nominal dry density of 2.0 lb/ft³.
   - **U S GREENFIBER L L C** — Cocoon stabilized cellulose insulation.

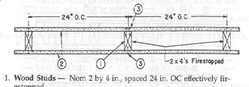
6. **Wall and Partition Facings and Accessories* — (Optional, Not Shown** — Fer use as an alternate to 6d nails described in (Item 3) — Wallboard fastened with 2 in. long 16 gage staples with min 7/16 in. crown at OC along vertical joints and 6 in. OC in the field. When staples are used, wallboard joints covered with paper tape and joint compound. Staples covered with joint compound. Finish rating is 18 min.
   - **PASLODE**
   - **ILLINOIS TOOL WORKS CO**
7. **Steel Framing Members (Optional, Not Shown)*** — Furring channels and Steel Framing Members as described below:
   a. **Furring Channels** — Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item 6. Wallboard attached to furring channels as described in Item 3.
   b. **Steel Framing Members*** — used to attach furring channels (Item 7a) to studs . Clips spaced 48 in. OC., and secured to studs with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips.
      PAC INTERNATIONAL — Type RSIC-1.
8. **Caulking and Sealants** — (not shown, optional) A bead of acoustical sealant applied around the partition perimeter for sound control.
9. **STC Rating** — The STC Rating of the wall assembly is 56 when it is constructed as described by Items 1 through 7, except:
   A. Item 1, above - Nailheads Shall be covered with joint compound.
   B. Item 2, above - Joints As described, shall be covered with fiber tape and joint compound.
   C. Item 5, above - Batts and Blankets* The cavities formed by the studs shall be friction fit with R-19 unfaced fiberglass insulation batts measuring 6-1/4 in. thick and 15-1/4 in. wide.
   D. Item 7, above - Steel Framing Members* Shall be used to attach wallboard to studs on either the acoustical source or receiving side of the wall assembly.
   E. Item 8, above - Caulking and Sealants (not shown) A bead of acoustical sealant shall be applied around the partition perimeter for sound control.
   F. Steel Corner Fasteners (Item 4), Fiber,Sprayed (Item 5A), Wall and Partition Facings and Accessories (Item 6) Not evaluated as alternatives for obtaining STC rating.

*Bearing the UL Classification Mark

1 HR. WALL ASSEMBLY
21

Design No. U309

Bearing Wall Rating — 1 HR.
Finish Rating — 40 Min.



1. **Wood Studs** — Nom 2 by 4 in., spaced 24 in. OC effectively fire-stopped.
2. **Gypsum Board*** — 5/8 in. thick, 4 ft wide, applied either horizontally or vertically, nailed to studs and bearing plates with 6d cement coated nails 1-7/8 in. long, 0.0915 in. shank diam and 1/4 in. diam heads spaced 7 in. OC.
   When Steel Framing Members* (Item 5) are used, wallboard attached to furring channels with 1 in. long Type S bugle-head steel screws spaced 12 in. OC.
   - **AMERICAN GYPSUM CO** —Types AGX-1, AGX-2, AGX-3, AGX-7, AGX-11 (finish rating 26 min) or Type AG-C. Type AGX-5 (finish rating 20 min). Type AGX-9 (finish rating 20 min). Type AGX-10 (finish rating 20 min), Type AGX-5 (finish rating 26 min). Type AGX-4 (finish rating 20 min). Type AGX-C.
   - **BEIJING NEW BUILDING MATERIALS CO LTD** — Type GSN-1 (finish rating 24 min).
   - **BPB AMERICA INC**
   - **BPB CELOTEX** —Type 1, Type SF3 (finish rating 20 min) or FR2.
   - **CANADIAN GYPSUM COMPANY** —Type AR (finish rating 26 min), Type C (finish rating 26 min), Type FCV (finish rating 26 min), Type IP-AR (finish rating 26 min), Type IPC-AR (finish rating 26 min), Type IP-X3 (finish rating 26 min), Type SCX (finish rating 26 min), Type SHX (finish rating 26 min), Type WRX (finish rating 26 min), Type WRC (finish rating 26 min), Type IP-X1 (finish rating 26 min), Type FCV (finish rating 26 min), Type IP-X2 (finish rating 26 min). Type SHX (finish rating 26 min), Type FRX (finish rating 20 min), Type IP-AR (finish rating 29 min), Type IP-AR (finish rating 26 min), Type IPC-AR (finish rating 26 min)
   - **CONTINENTAL GYPSUM COMPANY** —Type CG-1 (finish rating 20 min), Type CG-2 (finish rating 20 min), Type CG-3 (finish rating 20 min), Type CG3-5 (finish rating 20 min), Type CG-5 (finish rating 20 min), Type CG5-5 (finish rating 20 min), Type CG6-6 (finish rating 26 min), Types CG-3W, CG-5W (finish rating 20 min), Types CG-5WS, CG-5WS (finish rating 20 min), Type CG-6 (finish rating 23 min), Type CG6-6 (finish rating 26 min), Type CC-C, Type CGT6-6 finish rating 23 min), Type CG9-9 (finish rating 26 min), Type CGT6-6 (finish rating 23 min), Type CGTC-C (finish rating 20 min).
   - **G-P GYPSUM CORP, SUB OF**
   - **GEORGIA-PACIFIC CORP** —Type 5 (finish rating 26 min), Type 9 (finish rating 26 min), Type C (finish rating 26 min), Type DGG (finish rating 20 min), Type GPT51 (finish rating 26 min), Type GPT52 (finish rating 20 min). Type GPT55 (finish rating 26 min), Type DS.
   - **JAMES HARDIE GYPSUM INC** —Type Fire X (finish rating 26 min), Type Max™C.
   - **LAFARGE NORTH AMERICA INC** —Type LGFC2 (finish rating 20 min), Type LGFC3 (finish rating 20 min), Type LGFC6 (finish rating 26 min), Type LGFC-C (finish rating 20 min), Type LGFC6A (finish rating 34 min), Type LGFC2A, Type LGFC-C/A.
   - **NATIONAL GYPSUM CO** —Type FSK (finish rating 20 min). Type FSK-G (finish rating 20 min), Type FSW (finish rating 20 min), Type FSW-2 (finish rating 24 min), Type FSW-3 (finish rating 20 min), Type FSW-G (finish rating 20 min), Type FSK-C (finish rating 20 min), Type FSW-C (finish rating 20 min).
   - **NORGIPS A/S** —NORFIRE X (finish rating 26 min). NORFIRE XA (finish rating 24 min).
   - **PABCO GYPSUM, DIV OF**
   - **PACIFIC COAST BUILDING PRODUCTS INC** —Types C, PG-2 (finish rating 20 min), FG-3 (finish rating 23 min), Types PG-3W, PG-3W (finish rating 20 min), Type PG-4 (finish rating 20 min), Type PG-6 (finish rating 23 min). Types PG-3WS, PG-3WS (finish rating 20 min), Types PG-5, PG-9 (finish rating 26 min) or Type PG-C.
   - **SIAM GYPSUM INDUSTRY CO LTD** —Type EX-1 (finish rating 26 min)
   - **STANDARD GYPSUM L L C** —Type SGC(finish rating 20 min.) Type SGC-3(finish rating 20 min.) Type SG-C or SGC-C(finish rating 20 min).
   - **TEMPLE-INLAND FOREST PRODUCTS CORP** —Types T (finish rating 20 min). VPB-Type T (finish rating 20 min). WR-Type T (finish rating 20 min). Type T SHTG (finish rating 20 min). FRX-6, VPBX-6, FRWRX-6, TG-C or FRX-6 Exterior Gypsum Sheathing.
   - **UNITED STATES GYPSUM CO** —Type AR (finish rating 26 min). Type SCX (finish rating 26 min), Type C (finish rating 26 min), Type WRX (finish rating 26 min), Type WRC (finish rating 26 min), Type IP-X1 (finish rating 26 min), Type FCV (finish rating 26 min), Type IP-X2 (finish rating 26 min). Type SHX (finish rating 26 min), Type FRX (finish rating 20 min), Type IP-AR (finish rating 29 min), Type IP-AR (finish rating 26 min), Type IPC-AR (finish rating 26 min), Type FRX (finish rating 20 min).
   - **WESTROC INC** — Type Fi-Rok.
   - **USG MEXICO S A DE C V** —Type AR (finish rating 26 min). Type C (finish rating 26 min). Type WRX (finish rating 26 min). Type WRC (finish rating 26 min), Type IP-X1 (finish rating 26 min.) Type FCV (finish rating 26 min), Type IP-X2 (finish rating 26 min), Type SHX (finish rating 26 min). SCX (finish rating 26 min), Type IP-AR (finish rating 26 min), Type IPC-AR (finish rating 26 min), Type FRX (finish rating 20 min).
3. **Steel Corner Fasteners — Optional** — For use at wall corners. Channel shaped, 2 in. long by 1 in. high on the back side with two 1/8 in. wide cleats protruding into the 5/8 in. side channel, fabricated from 24 gauge galv steel. Fasteners applied only to the end or cut edge (not along tapered edges) of the wallboard, no greater than 2 in. from corner of wallboard, max spacing 16 in. OC. Nailed to adjacent stud through tab using one No. 6d cement coated nail per fastener. Corners of wall board shall be nailed to top and bottom plate using No. 6d cement coated nails.
4. **Batts and Blankets*** — (Optional, Not Shown) glass fiber or mineral wool insulation.
   - **CERTAINTEED CORP**
   - **GUARDIAN FIBERGLASS INC**
   - **JOHNS MANVILLE INTERNATIONAL INC**
   - **KNAUF FIBER GLASS GMBH**
   - **OWENS CORNING HT INC, DIV OF**
   - **OWENS CORNING**—Corning Fiberglas Corp.
   - **ROCK WOOL MANUFACTURING CO**—Delta Board.
   - **ROXUL INC**
   - **THERMAFIBER L L C**—Type SAFB.

4A. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 4) — Spray applied cellulose insulation material. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product. Nominal dry density of 2.0 lb/ft³.
   - **U S GREENFIBER L L C** — Cocoon stabilized cellulose insulation.

4B. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 4) and Item 4A - Spray applied cellulose insulation material. The fiber is applied with water to interior surfaces in accordance with the application instructions supplied with the product. Applied to completely fill the enclosed cavity Minimum dry density of 4.5 pounds per cubic ft.
   - **NU WOOL CO INC** — Cellulose Insulation

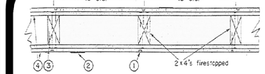
5. **Steel Framing Members (Optional, Not Shown)*** — Furring channels and Steel Framing Members as described below:
   a. **Furring Channels** — Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item 5. Wallboard attached to furring channels as described in Item 3.
   b. **Steel Framing Members*** — used to attach furring channels (Item 5a) to studs . Clips spaced 48 in. OC., and secured to studs with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips.
      PAC INTERNATIONAL — Type RSIC-1.
6. **Caulking and Sealants** — (not shown, optional) A bead of acoustical sealant applied around the partition perimeter for sound control.
7. **STC Rating** — The STC Rating of the wall assembly is 56 when it is constructed as described by Items 1 through 7, except:
   A. Item 1, above - Nailheads Shall be covered with joint compound.
   B. Item 2, above - Joints As described, shall be covered with fiber tape and joint compound.
   C. Item 5, above - Batts and Blankets* The cavities formed by the studs shall be friction fit with R-19 unfaced fiberglass insulation batts measuring 6-1/4 in. thick and 15-1/4 in. wide.
   D. Item 7, above - Steel Framing Members* Shall be used to attach wallboard to studs on either the acoustical source or receiving side of the wall assembly.
   E. Item 8, above - Caulking and Sealants (not shown) A bead of acoustical sealant shall be applied around the partition perimeter for sound control.
   F. Steel Corner Fasteners (Item 4), Fiber,Sprayed (Item 5A), Wall and Partition Facings and Accessories (Item 6) Not evaluated as alternatives for obtaining STC rating.

*Bearing the UL Classification Mark

1 HR EXTERIOR WALL
22

Design No. U301

Bearing Wall Rating — 2 HR.
Finish Rating — 40 Min.



1. **Nailheads** — Exposed or covered with joint finisher.
2. **Joints** — Exposed or covered with fiber tape and joint finisher. As an alternate, nominal 1/32 in. thick gypsum veneer plaster may be applied to the entire surface of Classified veneer baseboard. Joints reinforced.
3. **Nails** — 6d cement coated nails 1-7/8 in. long, 0.0915 in. shank diam, 1/4 in. diam heads, and 8d cement coated nails 2-3/8 in. long, 0113 in. shank diam, 9/32 in. diam heads.
4. **Gypsum Board** — * — 5/8 in. thick, two layers applied either horizontally or vertically, inner layer attached to studs with the 1-7/8 in. nails spaced 6 in. OC. Outer layer attached to studs over inner layer with the 2-3/8 in. long nails spaced 8 in. OC. Vertical joints located over studs. All joints in face layers staggered with joints in base layers. Joints of each face layer offset with joints of base layer on opposite side.
   When used in widths other than 48 in., gypsum board to be installed horizontally.
   When Steel Framing Members* (Item 6) are used, base layer attached to furring channels with 1 in. long Type S bugle-head steel screws spaced max 24 in. OC; face layer attached with 1-5/8 in. long Type S bugle-head steel screws spaced max 12 in. OC.
   - **AMERICAN GYPSUM CO** —Types AGX-1, AGX-2, AGX-3, AGX-7, AGX-11, AGX-9, AG-C, AGX-H.
   - **BEIJING NEW BUILDING MATERIALS CO LTD** —Type DBX-1.
   - **BPB AMERICA INC** —Types 1, FRPC, EGRG, ProRoc Type C or ProRoc Type 1.
   - **BPB CANADA INC** — ProRoc Type C, ProRoc Type X, ProRoc Type Abuse-Resistant.
   - **CANADIAN GYPSUM COMPANY** —Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRC, WRX ,
   - **G-P GYPSUM CORP, SUB OF**
   - **GEORGIA-PACIFIC CORP** —Types 5, 9, C, DAP, DD, DA, DGG, DS, GPR56.
   - **LAFARGE NORTH AMERICA INC** —Types LGFC6, LGFC-C, LGFC8A, LGFC2, LGFC2A, LGFC-C/A
   - **NATIONAL GYPSUM CO** —Types FSK-C, FSW, FSW-3, FSW-5, FSW-G.
   - **PABCO GYPSUM, DIV OF**
   - **PACIFIC COAST BUILDING PRODUCTS INC** —Type C, PG-2, PG-3, PG-3W, PG-4, PG-5, PG-9W, PG-9WS, PG-9 or PG-C.
   - **PANEL REY S A** — Type PRX.
   - **SIAM GYPSUM INDUSTRY (SARABURI) CO LTD** —Type EX-1.
   - **STANDARD GYPSUM L L C** —Type SG-C, SGC or SGC-G.
   - **—TEMPLE-INLAND FOREST PRODUCTS CORP** —Type TG-C.
5. **Joints and Nailheads** — Wallboard joints covered with paper tape and joint compound. Nailheads covered with joint compound. Gypsum plaster not more than 1/8 in. thick shall be applied over the wallboard in addition to the specified joint treatment.
6. **Batts and Blankets*** — (Not Shown) — Optional glass fiber insulation.
   - **CERTAINTEED CORP**
   - **JOHNS MANVILLE INTERNATIONAL INC**
   - **OWENS-CORNING FIBERGLAS CORP**

4A. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 4) — Spray applied cellulose insulation material. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product. Nominal dry density of 3.0 lb/ft³.
   - **U S GREENFIBER L L C** — Cocoon stabilized cellulose insulation.

4A. **Gypsum Board*** — (As an alternate to Item 4) — Nom 3/4 in. thick, installed as described in Item 4.
   - **CANADIAN GYPSUM COMPANY** —Types AR, IP-AR.
   - **UNITED STATES GYPSUM CO** —Types AR, IP-AR.
   - **USG MEXICO S A DE C V** —Types AR, IP-AR.

4B. **Gypsum Board*** — (As an alternate to Items 4 and 4A) —5/8 in. thick, 2 ft wide, tongue and groove edge, applied horizontally as the outer layer to one side of the assembly. Secured as described in Item 4. Joint covering (Item 2) not required.
   - **CANADIAN GYPSUM COMPANY** — Type SHX
   - **UNITED STATES GYPSUM CO** —Type SHX
   - **—USG MEXICO S A DE C V** — Type SHX

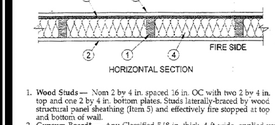
5. **Molded Plastic*** — Not shown, Optional — Solid vinyl siding mechanically secured over the outer layer to framing members in accordance with manufacturer's recommended installation details.
   - **ALSIDE, DIV OF**
   - **ASSOCIATED MATERIALS INC**
   - **GENTEK BUILDING PRODUCTS LTD**
   - **HEARTLAND BUILDING PRODUCTS INC**
   - **VYTEC CORP**
   - **NEBRASKA PLASTICS INC**
6. **Steel Framing Members** — (Optional, Not Shown)* - Furring channels and resilient sound isolation clip as described below:
   A. **Furring Channels** — Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item 6. Ends of adjoining channels are overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping #6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Wallboard attached to furring channels as described in Item 3.
   B. **Steel Framing Members*** — used to attach furring channels (Item 6a) to studs (Item 1) . Clips spaced 48 in. OC., and secured to studs with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips.
      PAC INTERNATIONAL INC — Type RSIC-1.

*Bearing the UL Classification Mark

2 HR. WALL ASSEMBLY
23

Design No. U356

(Exposed to Fire on Interior Face Only)
Bearing Wall Rating — 1 Hr
Finish Rating — 23 Min



1. **Wood Studs** — Nom 2 by 4 in. spaced 16 in. OC with two 2 by 4 in. top and one 2 by 4 in. bottom plates. Studs laterally-braced by wood structural panel sheathing (Item 5) and effectively fire stopped at top and bottom of studs.
2. **Gypsum Board*** — Any Classified 5/8 in. thick, 4 ft wide, applied vertically and nailed to studs and bearing plates 7 in. OC with 6d cement-coated nails, 1-7/8 in. long with 1/4 in. diam head.
   See **Gypsum Board** (CKNX) Category for names of Classified Companies.
3. **Joints and Nailheads** — (Not Shown) — Wallboard joints covered with tape and joint compound. Nail heads covered with joint compound.
4. **Batts and Blankets*** — Mineral fiber or glass fiber insulation, 3-1/2 in. thick, pressure fit to fill wall cavities between studs and plates. Mineral fiber insulation to be unfaced and to have a min density of 3 pcf. Glass fiber insulation to be faced with aluminum foil or kraft paper and to have a min density of 0.9 pcf (min R-13 thermal insulation rating).
   See **Batts and Blankets** (BKNV) Category in the Building Materials Directory and Batts and Blankets (BZIZ) Category in the Fire Resistance Directory for names of Classified Companies.

4A. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 4) — Spray applied cellulose insulation material. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product. Nominal dry density of 3.0 lb/ft³.
   - **U S GREENFIBER L L C**—Cocoon stabilized cellulose insulation.

5. **Wood Structural Panel Sheathing** — Min 7/16 in. thick, 4 ft wide wood structural panels, min grade "C-D" or "Sheathing" . Installed with long dimension of panel (strength axis) or face grain of plywood parallel with or perpendicular to studs. Vertical joints centered on studs. Horizontal joints backed with nom 2 by 4 in. wood blocking. Attached to studs on exterior side of wall with 6d cement coated box nails spaced 6 in. OC at perimeter of panels and 12 in. OC along interior studs.
6. **Exterior Facings** — Installed in accordance with the manufacturer's installation instructions. One of the following exterior facings is to be applied over the sheathing.
   A. **Vinyl Siding — Molded Plastic*** — Contoured rigid vinyl siding having a flame spread value of 20 or less.
      See Molded Plastic (BTAT) category in the Building Materials Directory for names of manufacturers.
   B. **Particle Board Siding** — Hardboard exterior sidings including patterned panel or lap siding.
   C. **Wood Structural Panel or Lap Siding** — APA Rated Siding, Exterior, plywood, OSB or composite panels with veneer faces and structural wood core, per PS 1 or APA Standard PRP-108, including textured, rough sawn, medium density overlay, brushed, grooved and lap siding.
   D. **Cementitious Stucco** — Portland cement or synthetic stucco systems with self-furring metal lath or adhesive base coat. Thickness from 3/8 to 3/4 in., depending on system.
   E. **Brick Veneer** — Any type cn nom 4 in. wide brick veneer. When brick veneer is used, the rating is applicable with exposure on either face. Brick veneer fastened with corrugated metal wall ties attached over sheathing to wood studs with 8d nail per tie; ties spaced not more than each sixth course of brick and not over 32 in. OC horizontally. One in. air space provided between brick veneer and sheathing.
   F. **Exterior Insulation and Finish System (EIFS)** — Nom 1 in. Foamed Plastic* insulation board by UL Classification Marking, attached over sheathing and finished with coating system, or Portland cement or synthetic stucco systems, in accordance with manufacturer's instructions. See **Foamed Plastic** (BRXK and CCVW) categories for names of Classified companies.
   G. **Siding** — Aluminum or steel siding attached over sheathing to studs.

1 HR. WALL ASSEMBLY
26
ALTERNATE

Design No. U338

Nonbearing Bearing Wall Rating — 1 HR.
(See Items 2 and 2A)
Finish Rating — One Layer of Wallboard — Min. 20 Min.
Two Layers of Wallboard — Min. 59 Min

1. **Wood Studs** — Nom 2 by 3 or 2 by 4 in., flat wise, spaced 24 in. O.C. max, effectively firestopped.
2. **Gypsum Board*** — For Nonbearing Wall rating — One layer of 5/8 in. thick, 4 ft wide wallboard each side of studs. Wallboard or lath applied horizontally or vertically with vertical joints centered on studs, and nailed to studs and bearing plates 7 in. OC. with 6d cement coated nails, 1-7/8 in. long, 0.0915 in. shank diam and 1/4 in. diam head. As an alternate, No. 5 bugle head screws, 1-7/8 in. long, may be substituted for the 6d cement coated nails.
   See Gypsum Board* (CKNX) category for names of Classified companies.
2A. **Gypsum Board*** — Same as Item 2. For Bearing Wall rating — Additional layer of 5/8 in. thick, 4 ft wide wallboard each side of studs. Attached to studs over inner layer is in. OC. max, with 8d cement coated nails, 2-3/8 in. long, 0.113 in. shank diam and 9/32 in. diam head.
3. **Joints and Nail Heads** — Wallboard joints of outer layer covered with tape and joint compound. Nail heads of outer layer covered with joint compound. Gypsum plaster, 3/32 in. thick applied over wallboard may be applied to the entire surface of Classified veneer baseboard.
4. **Batts and Blankets*** — (Optional) — Max 1 in. thickness glass or mineral fiber batt insulation.
   See Batts and Blankets (BKNV) Category for names of Classified Companies.

4A. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 4) — Spray applied cellulose insulation material. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product. Nominal dry density of 3.0 lb/ft³.
   - **U S GREENFIBER L L C**—Cocoon stabilized cellulose insulation.

*Bearing the UL Classification Mark

1 HR. WALL ASSEMBLY
27

Design No. U905

Bearing Wall Rating — 2 HR.
Nonbearing Wall Rating — 2 HR



1. **Concrete Blocks*** — Various designs. Classification D-2 (2 hr). See **Concrete Blocks** category for list of eligible manufacturers.
2. **Mortar** — Blocks laid in full bed of mortar, nom. 3/8 in. thick, of net less than 2-1/4 and not more than 3-1/2 parts of clean sharp and be 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime or masonry cement volume). Vertical joints staggered.
3. **Portland Cement Stucco or Gypsum Plaster** — Add 1/2 hr to classification if used. Where combustible members are framed in wall, plaster or stucco must be applied on the face opposite framing to achieve a max. Classification of 1-1/2 hr. Attached to concrete blocks (Item 1).
4. **Loose Masonry Fill** — If all core spaces are filled with loose dry expanded slag, expanded clay or shale (Rotary Kiln Process), water repellant vermiculite masonry fill insulation, or siliceos treated perlite loose fill insulation add 2 hr to classification.
5. **Foamed Plastic*** — (Optional-Not Shown) — 1-1/2 in. thick max, 4 ft wide sheathing attached to concrete blocks (Item 2).
   THE DOW CHEMICAL CO —Type Thermax

*Bearing the UL Classification Mark

2 HR. WALL ASSEMBLY
32

Design No. U905

Bearing Wall Rating — 2 HR.
Nonbearing Wall Rating — 2 HR



1. **Concrete Blocks*** — Various designs. Classification D-2 (2 hr). See **Concrete Blocks** category for list of eligible manufacturers.
2. **Mortar** — Blocks laid in full bed of mortar, nom. 3/8 in. thick, of net less than 2-1/4 and not more than 3-1/2 parts of clean sharp and be 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime or masonry cement volume). Vertical joints staggered.
3. **Portland Cement Stucco or Gypsum Plaster** — Add 1/2 hr to classification if used. Where combustible members are framed in wall, plaster or stucco must be applied on the face opposite framing to achieve a max. Classification of 1-1/2 hr. Attached to concrete blocks (Item 1).
4. **Loose Masonry Fill** — If all core spaces are filled with loose dry expanded slag, expanded clay or shale (Rotary Kiln Process), water repellant vermiculite masonry fill insulation, or siliceos treated perlite loose fill insulation add 2 hr to classification.
5. **Foamed Plastic*** — (Optional-Not Shown) — 1-1/2 in. thick max, 4 ft wide sheathing attached to concrete blocks (Item 2).
   THE DOW CHEMICAL CO —Type Thermax

*Bearing the UL Classification Mark

2 HR. WALL ASSEMBLY
32

GA FILE NO. WP 4135 — GENERIC

GYPSUM WALLBOARD, WOOD STUDS

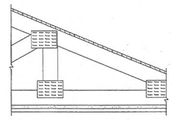
2 HOUR FIRE	40 to 44 STC SOUND

Base layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to each side of 2 x 4 wood studs

GA FILE NO. RC 2602	GENERIC	1 HOUR FIRE

WOOD TRUSSES, GYPSUM WALLBOARD

Base layer 5/8" type X gypsum wallboard applied at right angles to wood roof trusses 24" o.c. with 1¼" Type W or S drywall screws 24" o.c. **Face** layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to trusses with 1⅞" Type W or S drywall screws 12" o.c. at joints and intermediate trusses and 1½" Type G drywall screws 12" o.c. placed 2" back on either side of end joints. Joints offset 24" from base layer joints. Wood trusses supporting ½" wood structural panels applied at right angles to trusses with 8d nails. Appropriate roof covering. **Ceiling provides one hour fire resistance protection for trusses.**



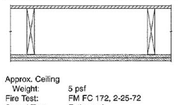
Approx. Ceiling Weight: 5 psf
Fire Test: FM FC 172, 2-25-72; ITS, 8-6-98

12 1 HR. ROOF / CEILING ASSEMBLY

GA FILE NO. FC 5406	GENERIC	1 HOUR FIRE	35 to 39 STC SOUND

WOOD JOISTS, GYPSUM WALLBOARD

Base layer 5/8" type X gypsum wallboard applied at right angles to 2 x 10 wood joists 24" o.c. with 1¼" Type W or S drywall screws 24" o.c. **Face** layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to joists with 1⅞" Type S drywall screws 12" o.c. at joints and intermediate joists and 1½" Type G drywall screws 12" o.c. placed 2" back on either side of end joints. Joints offset 24" from base layer joints. Wood joists supporting ½" plywood with exterior glue applied at right angles to joists with 8d nails. **Ceiling provides one hour fire resistance protection for wood framing, including trusses.**



Approx. Ceiling Weight: 5 psf
Fire Test: FM FC 172, 2-25-72
Sound Test: Estimated

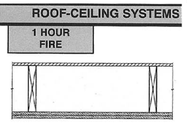
6 1 HR. FLOOR / CEILING ASSEMBLY

ROOF-CEILING SYSTEMS

GA FILE NO. RC 2601	GENERIC	1 HOUR FIRE

GYPSUM BOARD, WOOD JOISTS, ROOF COVERING

Base layer 5/8" type X gypsum wallboard applied at right angles to 2 x 10 wood joists 24" o.c. with 1¼" Type W or S drywall screws 24" o.c. **Face** layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to joists with 1⅞" Type S drywall screws 12" o.c. at joints and intermediate joists and 1½" Type G drywall screws 12" o.c. placed 2" back on either side of end joints. Joints offset 24" from base layer joints. Wood joists supporting ½" plywood with exterior glue applied at right angles to joists with 8d nails. Appropriate roof covering. **Ceiling provides one hour fire resistance protection for wood framing, including trusses.**



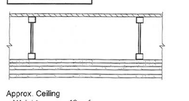
Approx. Ceiling Weight: 5 psf
Fire Test: FM FC 172. 2-25-72

5 1 HR. ROOF / CEILING ASSEMBLY

GA FILE NO. RC 2750	GENERIC	2 HOUR FIRE

GYPSUM WALLBOARD, RIGID FURRING CHANNELS
WOOD JOISTS or WOOD I-JOISTS, ROOF COVERING

Base layer 5/8" type X gypsum wallboard applied at right angles to either 2 x 8 wood joists or 9½" deep wood I-joists 24" o.c. with 1¼" Type W drywall screws 12" o.c. **Second** layer 5/8" type X gypsum wallboard applied at right angles to joists or I-joists with 2" Type W drywall screws 12" o.c. Second layer joints offset 24" from base layer joints. **Third** layer 5/8" type X gypsum wallboard applied at right angles to joists or I-joists with 2½" Type W drywall screws 12" o.c. Third layer joints offset 12" from second layer joints. Hat-shaped rigid furring channels 24" o.c. applied at right angles to joists or I-joists over third layer with two 2½" long Type W drywall screws at each joist or I-joist. **Face** layer 5/8" type X gypsum wallboard applied at right angles to furring channels with 1⅞" Type S drywall screws 12" o.c. Wood joists or I-joists supporting ¾" T & G edge plywood applied at right angles to joists or I-joists with 8d nails 6" o.c. at joints and 12" at intermediate joists or I-joists. Appropriate roof covering. **Ceiling provides two-hour fire-resistance protection for wood framing.**



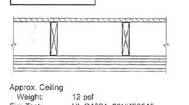
Approx. Ceiling Weight: 12 psf
Fire Test: UL R4024, 00NK28545, 4-27-01; UL R4042, 03NK11206, 3-19-03; UL Design L556; ULC Design M514

11 2 HR. ROOF / CEILING ASSEMBLY

GA FILE NO. FC 5725	GENERIC	2 HOUR FIRE

WOOD FLOOR, WOOD JOISTS, GYPSUM WALLBOARD, RIGID FURRING CHANNELS

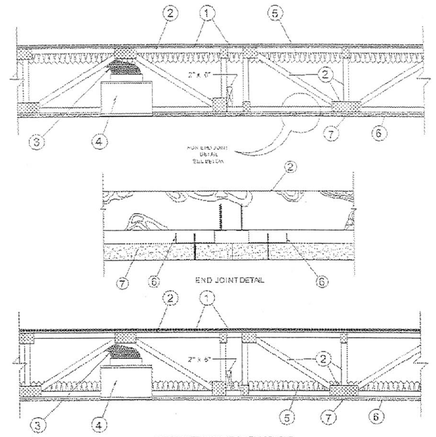
Base layer 5/8" type X gypsum wallboard applied at right angles to 2 x 8 wood joists 24" o.c. with 1¼" Type W drywall screws 12" o.c. **Second** layer 5/8" type X gypsum wallboard applied at right angles to joists with 2" Type W drywall screws 12" o.c. Second layer joints offset 24" from base layer joints. **Third** layer 5/8" type X gypsum wallboard applied at right angles to joists with 2½" Type W drywall screws 12" o.c. Third layer joints offset 12" from second layer joints. Hat-shaped rigid furring channels 24" o.c. applied at right angles to joists over third layer with two 2½" long Type W drywall screws at each joist. **Face** layer 5/8" type X gypsum wallboard applied at right angles to furring channels with 1⅞" Type S drywall screws 12" o.c. Wood joists supporting ¾" T & G edge plywood applied at right angles to joists with 8d nails 6" o.c. at joints and 12" at intermediate joists. **Ceiling provides two-hour fire-resistance protection for wood framing.**



Approx. Ceiling Weight: 12 psf
Fire Test: UL R4024, 00NK28545, 4-27-01; UL R4024, 03NK11206, 3-19-03; UL Design L556; ULC Design M514

10 2 HR. FLOOR / CEILING ASSEMBLY

Design No. L563
December 28, 2007
Unrestrained Assembly Rating - 1 Hr
Finish Rating - 25 Min (See Items 5 or 5A)
Load Restricted for Canadian Applications — See Guide BXUV7



ALTERNATE INSULATION PLACEMENT

1. **Flooring System —** The flooring system shall consists of one of the following:

System No. 1

Subflooring — Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

Vapor Barrier - (Optional) — Nom 0.030 in. thick commercial asphalt saturated felt.

Finish Flooring — Min 1 by 4 in. T & G lumber fastened diagonally to trusses, or min 15/32 in. thick wood structural panels, min grade "Underlayment" or "Single Floor". Face grain of plywood or strength axis of panel to be perpendicular to trusses with joints staggered.

System No. 2

Subflooring — Min 23/32 in. thick T & G wood structural panels installed perpendicular to trusses with end joints staggered 4 ft. Plywood or nonwoven APA rated panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

Floor Mat Materials* - (Optional) — Nom 6 mm thick floor mat material adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of floor-topping mixture. When floor mat material is used, min thickness of floor topping mixture is 1 in.

HACKER INDUSTRIES INC — Type Hacker Sound-Mat

Alternate Floor Mat Materials* — (Optional) — Floor mat material nom 10 mm thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of a min 1-1/2 in. of floor-topping mixture.

HACKER INDUSTRIES INC — Type Hacker Sound-Mat II.

Alternate Floor Mat Materials* — (Optional) — Floor mat material nom 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a min of 1 in.

HACKER INDUSTRIES INC — Type Quiet Qurl 55/025

Alternate Floor Mat Materials* — (Optional) — Floor mat material nom 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/2 in.

HACKER INDUSTRIES INC — Type Quiet Qurl 60/040

Alternate Floor Mat Materials* — (Optional) — Floor mat material nom 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/2 in.

HACKER INDUSTRIES INC — Type Quiet Qurl 65/075

Metal Lath (Optional) — For use with 3/8 in. or 10 mm floor mat materials. 3/8 in. expanded steel diamond mesh, 3.4 lbs/sq yd placed over the floor mat material. Hacker Floor Primer to be applied prior to the placement of the metal lath. When metal lath is used, floor topping thickness is nom 1-1/4 in. over the floor mat.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1100 psi. Mixture shall consist of 6.8 gal of water to 80 lbs of floor topping mixture to 1.9 cu ft of sand.

HACKER INDUSTRIES INC — Firm-Fill Gypsum Concrete, Firm-Fill 2010, Firm-Fill 3310, Firm-Fill 4010, Firm-Fill High Strength, Grip-Span Radiant

2. **Trusses —** Parallel chord trusses, spaced a max of 24 in. OC, fabricated from nom 2 by 4 lumber, with lumber oriented vertically or horizontally. Min truss depth is 12 in. Truss members secured together with min 0.036 0356 in. thick galvanized steel plates. Plates have 5/16 in. long teeth projecting perpendicular to the plane of the plate. The teeth are in pairs facing each other (made by the same punch), forming a split tooth type plate. Each tooth has a chisel point on its outside edge. These points are diagonally opposite each other for each pair. The top half of each tooth has a twist for stiffness. The pairs are repeated on approx. 7/8 in. centers with four rows of teeth per inch of plate width.

3. **Air Duct* —** Any UL Class 0 or Class 1 flexible air duct installed in accordance with the instructions provided by the damper manufacturer.

4. **Ceiling Damper* - (Optional) —** For use with min 18 in. deep trusses Max plenum box size nom 19 in. long by 19 in. wide and 11-7/8 in. high fabricated from galv steel. Aggregate damper openings shall not exceed 128 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper.

AIRE TECHNOLOGIES INC — Models: CRD model 50 w/Boot, CRD model 50EA w/Boot, CRD model 55 w/Boot, CRD model 55 EA w/Boot.

LLOYD INDUSTRIES INC — Model CRD 50-BT, CRD 50-EA-BT, CRD 55-BT, CRD 55 EA-BT

4A. **Alternate Ceiling Damper* - (Optional) —** For use with min 18 in. deep trusses Max plenum box size nom 13 in. long by 13 in. wide and 11-7/8 in. high fabricated from galv steel. Aggregate damper openings shall not exceed 50 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper.

LLOYD INDUSTRIES INC — Model CRD 50-BT-6, CRD 50-EA-BT-6, CRD 55-BT-6, CRD 55 EA-BT-6

4B. **Alternate Ceiling Damper* - (Optional) —** For use with min 18 in. deep trusses Max size ceiling outlet in plenum box nom 12 in. long by 12 in. wide, Plenum box fabricated from galv steel. Aggregate damper openings shall not exceed 72 sq in. per 100 sq ft of ceiling area. Installed in accordance with the manufacturers installation instructions provided with the damper.

AIRE TECHNOLOGIES INC — Models: CRD model 50 w/Boot, CRD model 50EA w/Boot, CRD model 55 w/Boot, CRD model 55 EA w/Boot.

LLOYD INDUSTRIES INC — Model CRD 50-95BT, CRD 50-EA-95BT, CRD 55-95BT, CRD 55 EA-95BT

4C. **Alternate Ceiling Damper* -** (Optional) - For use with min 18 in. deep trusses. Max size ceiling outlet in plenum box nom 16 in. long by 16 in. wide. Aggregate damper openings shall not exceed 128 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper.

CROWN PRODUCTS CO INC — Models CRD50-FGPB-4.2-CP, -6.0-CP; CRD53-FGPB-4.2-EA-CP, -6.0-EA-CP.

LLOYD INDUSTRIES INC — Models CRD 50- FGPB-4.2, - 4.2 NI, -6.0, -6.0 NI; CRD50-EA-FGPB-4.2, -4.2 NI, -6.0, -6.0 NI.

5. **Batts and Blankets* —** Glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. When the resilient channels (Item 6) are spaced 16 in. OC, the insulation shall be a max of 3-1/2 in. thick, and shall be secured against the subflooring with staples at 12 in. OC or held suspended in the concealed space with 0.090 in. diam galv steel wires attached to the wood trusses at 12 in. OC. When the resilient channels are spaced a max of 12 in. OC or when the Steel Framing Members (Item 6A) are used, there is no limit in the overall thickness of insulation, and the insulation can be secured against the subflooring, held suspended in the concealed space or draped over the resilient channels (or Steel Framing Members) and gypsum panel membrane. The finished rating has only been determined when the insulation is secured to the subflooring.

5A. **Loose Fill Material* —** As an alternate to Item 5, when the resilient channels (Item 6) are spaced a max of 12 in. OC, or when the Steel Framing Members (Item 6A) are used - Any loose fill material bearing the UL Classification Marking for Surface Burning Characteristics. There is no limit in the overall thickness of insulation. The finished rating when loose fill material is used has not been determined

6. **Resilient Channels —** Formed from min 0.020 in. thick galv steel, 1/2 in. deep by 2 in. wide at the base and 1-1/4 in. wide at the face, spaced 16 in. OC perpendicular to trusses. When insulation (Items 5 or 5A) is applied over the resilient channel/gypsum panel ceiling membrane, the resilient channel spacing shall be reduced to 12 in. OC. Channels secured to each truss with 1-1/4 in. long Type S bugle head steel screws. Channels overlapped 4 in. at splices. Two channels, spaced 6 in. OC, oriented opposite each gypsum panel end joint as shown in the above illustration. Additional channels shall extend min 6 in. beyond each side edge of panel.

6A. **Alternate Steel Framing Members —** (Not Shown) - As an alternate to Items 6, main runners, cross tees, cross channels and wall angle as listed below:

A. **Main Runners —** Nom 10 or 12 ft long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Hanger wires to be located adjacent to main runners/cross tee intersections. Hanger wires wrapped and twist-tied on 16G nails driven in to side of trusses at least 5 in. above the bottom face.

B. **Cross Tees —** Nom 4 ft long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 16 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted gypsum panel end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

C. **Cross Channels —** Nom 4 or 12 ft long, installed perpendicular to main runners, spaced 16 in. OC.

D. **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum panel.

CGC INC — Type DGL or RX.

USG INTERIORS INC — Type DGL or RX.

6B. **Steel Framing Members*** — (Optional, Not Shown) - Used as an alternate method to attach min. 1/2 in. deep resilient channels (Item 6) to wood trusses (Item 2). Resilient channels are friction fitted into clips, and then clips are secured to the bottom chord of each wood truss with a min. 1-3/4 in. long Type S bugle head steel screw through the center hole of the clip and the resilient channel flange. Adjoining resilient channels are overlapped 4 in. under trusses. The clip flange is opened slightly to accommodate the two overlapped channels. Additional clips required to hold resilient channel that supports the gypsum board butt joints, as described in Item 7.

KEENE BUILDING PRODUCTS CO INC — Type RC Assurance.

7. **Gypsum Board* —** Nom 5/8 in. thick, 48 in. wide gypsum panels. When resilient channels (Item 6) are used, gypsum panels installed with long dimension perpendicular to resilient channels. Gypsum panels secured with 1 in. long Type S bugle head steel screws spaced 12 in. OC and located a min of 1/2 in. from side joints and 3 in. from end joints. When insulation (Items 5 or 5A) is applied over the resilient channel/gypsum panel ceiling membrane the screw spacing shall be reduced to 8 in. OC. End joints secured to both resilient channels as shown in end joint detail. When Steel Framing Members (Item 6A) are used, gypsum panels installed with long dimension perpendicular to cross tees with side joints centered along main runners and end joints centered along cross tees. Panels fastened to cross tees with 1 in. long Type S bugle-head screws spaced 8 in. OC in the field and along end joints. Panels fastened to main runners with 1 in. long Type S bugle-head screws spaced midway between cross tees. Screws along sides and ends of panels spaced 3/8 to 1/2 in. from board edge. End joints of panels shall be staggered with spacing between joints on adjacent panels not less than 2 ft OC.

CANADIAN GYPSUM COMPANY — Types C, IP-X2, IPC-AR

UNITED STATES GYPSUM CO — Types C, IP-X2, IPC-AR

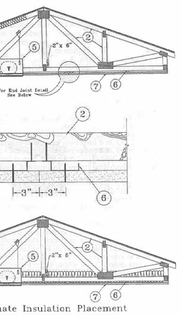
USG MEXICO S A DE C V — Types C, IP-X2, IPC-AR

8. **Finishing System - (Not Shown)** — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.

*Bearing the UL Classification Mark

15 1 HR. FLOOR / CEILING ASSEMBLY

Design No. P522
Unrestrained Assembly Rating — 1 Hr
Finish Rating — 25 Min (See Items 3 or 3A)



Alternate Insulation Placement

1. **Roofing System* —** Any UL Class A, B or C Roofing System (TGFU) or Prepared Roof Covering (TFWZ) acceptable for use over nom 15/32 in. thick wood structural panels, min. grade "C-D" or "Sheathing". Nom 15/32 in. thick wood structural panels secured to trusses with No. 6d ringed shank nails spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Construction adhesive may be used with either the nails or staples.
2. **Trusses —** Pitched or parallel chord wood trusses, spaced a max of 24 in. OC, fabricated from nom 2 by 4 lumber, with lumber oriented vertically or horizontally. Truss members secured together with min. 0.0356 in. thick galv steel plates. Plates have 3/16 in. long teeth projecting perpendicular to the plane of the plate. The teeth are in pairs facing each other (made by the same punch), forming a split tooth type plate. Each tooth has a chisel point on its outside edge. These points are diagonally opposite each other for each pair. The top half of each tooth has a twist for stiffness. The pairs are repeated on approximately 7/8 in. centers with four rows of teeth per inch of plate width. Where the truss intersects with the interior face of the exterior walls, the min truss depth shall be 5-1/4 in. with a min roof slope of 3/12 and a min. area in the plane of the truss of 21 sq/ft. Where the truss intersects with the interior face of the exterior walls, the min truss depth may be reduced to 3 in. if the batts and blankets (Item 3) are used as shown in the above illustration (Alternate Insulation Placement) and are firmly packed against the intersection of the bottom chords and the plywood sheathing.
3. **Batts and Blankets* —** (Optional) — Glass fiber insulation, secured to the wood structural panels with staples spaced 12 in. OC or to the trusses with 0.090 in. diam galv steel wires spaced 12 in. OC. Any glass fiber insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance, having a min density of 0.5 pcf. As an option, the insulation may be fitted in the concealed space, draped over the resilient channel/gypsum board ceiling membrane when resilient channels and gypsum board attachment is modified as specified in Items 6 and 7. The finished rating has only been determined when the insulation is secured to the decking.

3A. **Loose Fill Material* —** As an alternate to Item 3 — Any thickness of loose fill material bearing the UL Classification Marking for Surface Burning Characteristics, having a min density of 0.5 pcf, applied within the concealed space, over the resilient channel/gypsum board ceiling membrane when resilient channels and gypsum board attachment is modified as specified in Items 6 and 7. The finished rating when loose fill material is used has not been determined.

U S GREENFIBER L L C —Cocoon stabilized cellulose insulation.

4. **Air Duct* —** Any UL Class 0 or Class 1 flexible air duct installed in accordance with the instructions provided by the damper manufacturer.
5. **Ceiling Damper* —** Max nom area, 196 sq in. Max square size, 14 in. by 14 in. Rectangular sizes not to exceed 196 sq in. with a max width of 24 in. Max overall damper height is 7 in. Installed in accordance with the manufacturers installation instructions provided with the damper. Max damper openings not to exceed 196 sq in. per 100 sq ft of ceiling area.

C&S AIR PRODUCTS —Model RD-521-BT
POTTORFF —Model CFD-521-BT

5A. **Alternate Ceiling Damper* —** Max nom area, 196 sq in. Max square size, 14 in. by 14 in. Rectangular sizes not to exceed 196 sq in. with a max width of 24 in. Max overall damper height is 7 in. Installed in accordance with the manufacturers installation instructions provided with the damper. Max damper openings not to exceed 196 sq in. per 100 sq ft of ceiling area.

C&S AIR PRODUCTS —Model RD-521-BT
POTTORFF —Model CFD-521-BT

6. **Furring Channels —** Resilient channels, nom. 1/2 in. deep by 2-3/8 in. wide at the base and 1-3/8 in. wide at the face, formed from 0.020 in. thick galv steel, installed perpendicular to the trusses (Item 2), spaced a max of 16 in. OC when no insulation (Item 3 or 3A) is fitted in the concealed space, or a max of 12 in. OC when insulation (Item 3 or 3A) is fitted in the concealed space, draped over the resilient channel/gypsum board ceiling membrane. Two courses of resilient channel positioned 6 in. OC at wall/board butt-joints (3 in. from each end of wallboard). Channels oriented opposite at wallboard butt-joints. Channel splices overlapped 4 in. beneath wood trusses. Channels secured to each truss with 1-1/4 in. long Type S screws.

6A. **Steel Framing Members —** (Not Shown)* — As an alternate to Item 6, furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to trusses when no insulation (Items 3 or 3A) is fitted in the concealed space or 12 in. OC when insulation (Items 3 or 3A) is fitted in the concealed space, draped over the furring channel/gypsum board ceiling membrane and a second layer of gypsum board is attached as described in Item 7 for steel framing members. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members —** Used to attach furring channels (Item a) to trusses (Item 2). Clips spaced 48 in. OC, and secured to alternating trusses with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping #6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 7.

C&S AIR PRODUCTS INC — Type RSIC-1.

7. **Gypsum Board* —** One layer of nom 5/8 in. thick by 48 in. wide boards, installed with long dimension parallel to trusses. Attached to the resilient channels using 1 in. long Type S bugle-head screws. Screws spaced a max of 12 in. OC along butted end-joints and in the field when no insulation (Item 3 or 3A) is fitted in the concealed space, or a max of 8 in. OC along butted end-joints and in the field when insulation (Item 3 or 3A) is fitted in the concealed space, draped over the resilient channel/gypsum board ceiling membrane.

When Steel Framing Members* (Item 6A) are used, sheets installed with long dimension perpendicular to furring channels and side joints of sheet located beneath trusses. Gypsum board screws are driven through channel spaced 12 in. OC in the field when no insulation (Item 3 or 3A) is fitted in the concealed space, or 8 in. OC in the field when insulation (Item 3 or 3A) is fitted in the concealed space, draped over the furring channel/gypsum board ceiling membrane. Gypsum board butt joints shall be staggered min. 2 ft. within the assembly, and occur between the main furring channels. At the gypsum board butt joints, each end of the gypsum board shall be supported by a single length of furring channel equal to the width of the wallboard plus 6 in. on each end. The furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to the trusses with one #SIC-1 clip at each end of the channel. Screw spacing along the butt joint to attach the gypsum board to the furring channels shall be 8 in. OC. Second (outer) layer of gypsum board required when furring channels (Item 6A, a) are spaced 24 in. OC and insulation is fitted in the concealed space, draped over the furring channel/gypsum board ceiling membrane. Outer layer of gypsum board attached to the furring channels using 1-5/8 in. long Type S bugle-head screws spaced 8 in. OC at butted joints and 12 in. OC in the field. Butted end joints of outer layer to be offset a minimum of 8 in. from base layer end joints. Butted side joints of outer layer to be offset minimum 18 in. from butted side joints of base layer.

CANADIAN GYPSUM COMPANY —Types C, IP-X2, IPC-AR.
UNITED STATES GYPSUM CO —Types C, IP-X2, IPC-AR.
USG MEXICO S A DE C V —Types C, IP-X2, IPC-AR

8. **Finishing System —** (Not Shown) — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads; paper tape, 2 in. wide, embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.

Alternate **Ceiling Membrane** — Not Shown.

9. **Steel Framing Members —**
   a. **Main runners —** Installed perpendicular to Structural Steel Members — Nom 10 or 12 ft long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft OC. Main runners hung a min of 2 in. from bottom cleat of Structural Steel Members with 12 SWG galv steel wire. Wires located a max of 48 in. OC.
   b. **Cross tees or channels —** Nom 4 ft long, 15/16 in. or 1-1/2 in. wide face or cross channels, nom 4 ft long, 1-1/2 wide face, installed perpendicular to the main runners, spaced 16 in. OC. Additional cross tees or channels used at 8 in. from each side of butted gypsum board end joints. The cross tees or channels may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.
   c. **Wall angles or channels —** Used to support steel framing member ends and for screw-attachment of the gypsum wallboard — Min 0.016 in. thick painted or galvanized steel angle with 1 in. legs or min. 0.016 in. thick painted or galvanized steel channel with a 1 by 1-1/2 by 1 in. profile, attached to walls at perimeter of ceiling with fasteners 16 in. OC.
     CGC INTERIORS, DIV OF
     CGC INC — Type DGL or RX.
     USG INTERIORS INC — Type DGL or RX.
10. **Gypsum Board* —** For use with Steel Framing Members (Item 9) when Batts and Blankets* (Item 3) are not used - One layer of nom 5/8 in. thick by 48 in. wide boards, installed with long dimension parallel to the main runners. Gypsum board fastened to each cross tee or channel with five wallboard screws, with one screw located at the midspan of the cross tee or channel, one screw located 12 in. from and on each side of the cross tee or channel mid span and one screw located 1-1/2 in. from each gypsum board side joint. Except at wallboard end joints, wallboard screws shall be located on alternating sides of cross tee flange. At gypsum board end joints, gypsum board screws shall be located 1/2 in. from the joint. Gypsum board fastened to main runners with wallboard screws 1/2 in. from side joints, midway between intersections with cross tees or channels (16 in. OC). End joints of adjacent gypsum board sheets shall be staggered not less than 32 in. Gypsum board sheets screw attached to leg of wall angle with wallboard screws spaced 12 in. OC. Joints treated as described in Item 7.For use with **Steel Framing Members*** (Item 9) when **Batts and Blankets*** (Item 6) are used - Same as Item 7, except 1 Hour - 5/8 in. thick, 4 ft wide, installed with long dimension perpendicular to cross tees with side joints centered along main runners and end joints centered along cross tees. Fastened to cross tees with 1 in. long steel gypsum board screws spaced 8 in. OC in the field and 8 in. OC along end joints. Fastened to main runners with 1 in. long gypsum board screws spaced midway between cross tees. Screws along sides and ends of boards spaced 3/8 to 1/2 in. from board edge. End joints of the sheets shall be staggered with spacing between joints on adjacent boards not less than 4 ft OC.

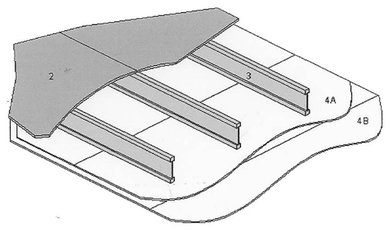
CANADIAN GYPSUM COMPANY — Type C or IP-X2.
UNITED STATES GYPSUM CO — Type C or IP-X2.
USG MEXICO S A DE C V — Type C or IP-X2.

*Bearing the UL Classification Mark

4 1 HR. ROOF / CEILING ASSEMBLY

WIJ-1.5 One-Hour Fire-Resistive Ceiling Assembly

Floor[a]/Ceiling - 100% Design Load - 1 Hour Rating - ASTM E 119 / NFPA 251



1. **Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping.
2. **Floor Sheathing:** Minimum 23/32 inch thick tongue-and-groove wood sheathing (Exposure 1). Installed per code requirements with minimum 8d common nails.
3. **Structural Members:** Wood I-joists spaced a maximum of 24 inches on center.
   Minimum I-joist flange depth: 1-1/2 inches
   Minimum I-joist flange area: 2.25 inches[2]
   Minimum I-joist web thickness: 3/8 inch
   Minimum I-joist depth: 9-1/4 inches
4. **Gypsum Wallboard:** Two layers of minimum 1/2 inch Type X gypsum wallboard attached with the long dimension perpendicular to the I-joists as follows:
   4a. Wallboard Base Layer: Base layer of wallboard attached to bottom flange of I-joists using 1-5/8 inch Type S drywall screws at 12 inches on center. End joints of wallboard centered on bottom flange of the I-joist and staggered.
   4b. Wallboard Face Layer: Face layer of wallboard attached to bottom flange of I-joists through base layer using 2 inch Type S drywall screws spaced 12 inches on center on intermediate joists and 8 inches on center at end joints. Edge joints of wallboard face layer offset 24 inches from those of base layer. End joints centered on bottom flange of I-joists and offset a minimum of one joist spacing from those of base layer. Additionally, wallboard face layer attached to base layer with 1-1/2 inch Type G drywall screws spaced 8 inches on center, placed 6 inches from face layer end joints.
5. **Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

Fire Tests conducted at Factory Mutual Research	September 29, 1978
Third Party Witness: Factory Mutual Research	Report No: FC-268
PFS Test Report #86-09-1	July 28, 1986

STC and IIC Sound Ratings for Listed Assembly

Without Gypsum Concrete				With Gypsum Concrete			
Cushioned Vinyl		Carpet & Pad		Cushioned Vinyl		Carpet & Pad	
STC	IIC	STC	IIC	STC	IIC	STC	IIC
-	-	-	-	-	-	49 [b]	55 [b]

[a] This assembly may also be used in a fire-rated roof/ceiling application, but only when constructed exactly as described.

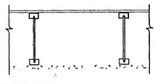
[b] STC and IIC values estimated by David L. Adams Associates, Inc

3 1 HR. ROOF / CEILING & FLOOR / CEILING ASSEMBLY

NOTE:
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NOTE:
SEE FULL UL BOOK FOR ADDITIONAL MANUFACTURER'S PROTECTS, & ALTERNATIVE SYSTEMS FOR EA. LISTING HERE. THE ARCHITECT & OWNER NEED TO BE CONSULTED BEFORE USING A DIFFERENT SYSTEM THAN SPECIFIED HERE.

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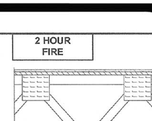
G-P Design No. EL60.1
One-Hour Fire-Resistive Floor-Ceiling Assembly
(Applicable to all Wood I Beam joists)
Floor—⅝" APA Rated Sturd-I-Floor® T&G wood structural panel, face grain perpendicular to joists, glued-nailed to joists with ⅞" bead of subfloor construction adhesive and 8d common nails spaced per code requirements. Maximum joist spacing 24" o.c.
Ceiling—Two layers ⅝" Type X gypsum wallboard applied with long dimension perpendicular to joists—base layer attached to bottom flange of joists with 1⅛" Type S drywall screws, 24" o.c. face layer attached to joists through base layer with 1⅝" Type S drywall screws 12" o.c. at joints and intermediate joists and 1⅞" Type G drywall screws 12" o.c. placed 2" back on either side of end joints. Joints offset 24" from base layer end and edge joints.

2 1 HR. FLOOR / CEILING ASSEMBLY

GA FILE NO. FC 5752	PROPRIETARY*	2 HOUR FIRE

WOOD TRUSSES, WOOD STRUCTURAL PANELS, GYPSUM FLOOR TOPPING, RESILIENT CHANNELS, GLASS OR MINERAL FIBER BATT OR LOOSE FILL INSULATION, GYPSUM WALLBOARD

Base layer ⅝" proprietary type X gypsum wallboard or gypsum veneer base applied at right angles to minimum 12" deep parallel chord wood trusses 24" o.c. with 1¾" Type S drywall screws 24" o.c. Resilient channels 16" o.c. applied at right angles to trusses with 1⅝" Type S drywall screws to each truss. **Second** layer ⅝" proprietary type X gypsum wallboard or gypsum veneer base applied at right angles to resilient channels with end joints centered on channels with 1" Type S-12 drywall screws 8" o.c. **Face** layer ⅝" proprietary type X gypsum wallboard or gypsum veneer base applied at right angles to channels with 1¾" Type S-12 drywall screws 8" o.c. Face layer joints offset 16" from second layer joints. Glass or mineral fiber batt, blanket, or loose-fill insulation applied directly over gypsum board. Wood trusses supporting ¾"x2" nominal wood structural panel subfloor applied at right angles to trusses with construction adhesive and 8d ring shank nails 12" o.c. Minimum ½" proprietary gypsum floor topping applied over subfloor.



Approx. Ceiling Weight: 3 psf
Fire Test: UL

MOLIN

Since 1897
CONCRETE PRODUCTS COMPANY

Multi-Family Dwelling Fire Rating

- **Typical Construction**

A typical project for Molin Concrete is the Precast Beams Columns and Hollow Core Plank to serve as a fire separation between the underground parking and the wood framed structure above. In most cases, a 3 hour fire rating is required for the precast.

This type of structure typically consists of two lines of beam and columns on either side of the main drive isle with 12" plank between them and 8" plank on the exterior spans. The exterior foundation walls that support the 8" plank and retain the earth loads can be precast walls, masonry or cast in place concrete. Two to four floors of wood frame structure are then added above the precast floor with a central corridor and apartment units on either side.

The wood frame is constructed using a wood roof and floor truss system or a conventional floor frame and truss roof. In floor truss system the roof and floor trusses span from the exterior wall to a bearing wall at either side of the corridor. This system results in 2 line loads centered on the 12" plank with a magnitude of 2.5-4.5 KLF. The conventional system consists of dimensional lumber spanning between bearing walls that are parallel to the plank span and roof trusses spanning from exterior wall the corridor bearing walls. This system results in a line load at the corridor walls of about 1.1 KLF and bearing wall loads parallel to the plank at 8-16 feet on center of 1.2-2.0 KLF.

Molin Concrete's products meet the IBC requirements in all cases for 2 hour un-restrained construction with their standard reinforcement cover. The following sections for the various product types discuss how a 3 hour fire rating is arrived at.

- **Codes and References**

The current building code in the Molin Concrete's market area is the 2012 International Building Code. The IBC section 722.2 specify methods of calculating the fire resistance of concrete construction. These sections provide tables, which define the minimum wall and slab thickness, column size and minimum concrete cover over tension reinforcement.

Another valuable reference is the Precast/Prestressed Concrete Institutes (PCI) MNL-124-11 Design for Fire Resistance of Precast Prestressed Concrete. This document is noted in IBC 722.2.3.1 as being an acceptable means to calculate fire resistance. This reference details a rational design method by which one can determine the temperature and strength of the steel reinforcement at a given time period and concrete cover. This information can then be used to determine the ultimate strength of a member at the elevated temperature using conventional analysis methods. It is important to note that load factors need not be applied to the service loads when comparing to the ultimate capacity at temperature because the fire rating period is providing the factor of safety against failure.

ASTM E119 is the standard which defines the methods for testing an assembly for fire endurance. Appendix X.3 and table X3.1 of this standard provide a guide for determining conditions of restraint. This table indicates that interior bays of flooring systems or floors that have continuous structural concrete topping can be considered restrained. The apartment buildings that are under discussion here typically have gypcrete topping and do not qualify for the second of these conditions.

- **12" Hollow Core Plank**

Because the 12" plank is contained between the two lines of precast beams it can be considered a restrained condition. Per Table 722.2.3(2) of the 2012 IBC a 3 hour fire rating can be achieved with ¾" concrete cover. This is much less that 1 7/8" provided by our standard 12" hollow core products.

In the event that the 12" plank is located on the building such that it can not be considered restrained, the methods of PCI MNL-124 can be used to demonstrate the fire resistance. Through investigation of the rational design method it has been determined that the worst case configuration of our 12" plank yields a 20% reduction in service load capacity. Therefore, 12" hollow core plank can conservatively be designed for a 3 hour unrestrained fire rating by designing for 120% of the service loads.

With an equivalent thickness of 5.76 inches or more, Molin Concrete's 12" products are in compliance with 2012 IBC table 722.2.2.1 without consideration of concrete or gypcrete topping.

- **8" Hollow Core Plank**

The exterior 8" plank spans typically can not be considered a restrained construction and therefore requires 2 1/8" of cover to meet the 3-hour requirements of Table 722.2.3(2) of the 2012 IBC. Molin Concrete's standard 8" plank has 1 7/8" of cover over the prestressing strand and therefore, the methods of PCI MNL-124 will again have to be used to justify a 3 hour fire rating.

Through investigation of the rational design method it has been determined that the worst case configuration of our 8" plank yields a 20% reduction in service load capacity. Therefore, 8" hollow core plank can conservatively be designed for a 3 hour unrestrained fire rating by designing for 120% of the service loads.

If the structure incorporates a 2" concrete topping, the capacity reductions are not required as the plank may be considered restrained per ASTM E119.

The equivalent thickness of Molin Concrete's 8" plank with ¾" of gypcrete topping is 5.84" or more which is in compliance with 2012 IBC table 722.2.2.1.

- **24" Wide Inverted Tee Beams**

The beams used for this type of structure are 24" wide and 24" to 36" tall depending on the span. There is a 4"x12" and 4"x8" block out at either side of the beam to create a ledge for supporting the plank. These beams can have up to 26 prestressing strands located in three layers at 2 ½", 4 ½" and 6 ½" from the bottom of the beam and a minimum of 3" from the side of the beam.

Table 722.2.3(4) of the 2012 IBC indicates that 2 ½" of clear cover is required for an unrestrained condition and 1 ½" of cover is required for a restrained condition to meet a 3 hour fire rating. The interior spans of the beam line can be considered restrained and therefore meet the requirements of the IBC. The beams at the ends of the beam lines, being unrestrained, however are ½ a strand diameter shy of the requirements. The rational design methods of PCI MNL-124 never control over the service loads for beams of this configuration. Therefore, the inverted tee beams used in this type of structure meet a 3 hour fire rating.

- **Columns**

The columns used in this type of structure are typically 12"x12", 12"x16" or 16"x16" depending on the size and span of the beams. The standard placement for the main bars is 2" clear of the face of the column. Table 722.2.4 of the 2012 IBC requires that a minimum column dimension of 11" and section 722.2.4.2 requires a minimum cover of 2" to the main longitudinal reinforcement. Molin Concrete's standard columns comply with both of these requirements.

- **Wall Panels**

The 2012 IBC table 722.2.1.1 requires that a load bearing or non-load bearing precast wall panel have an equivalent thickness of 5.7" to achieve a 3 hour fire rating. This is less than the 8" solid panel typically provided by Molin Concrete. Neither reference specifies a requirement for concrete cover. Because the intended fire separation is between the garage and living space above and not between the garage and the outside, it is not necessary to fire protect the joints between the precast foundation walls.

- **Conclusion**

Based on the above information, the standard products provided by Molin Concrete for a fire separation in an apartment with underground parking meet the requirements for a 3 hour fire rating. The fire design does not control the design of these structures with the exception of the 8" plank which requires a reduction in service load capacity.

1 3 HR. PRECAST ASSEMBLIES

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*WHEN FIELD ISSUES ARISE, IT IS RECOMMENDED THE FIRST CONTACT FOR ASSISTANCE BE THE TECHNICAL SERVICE STAFF PROVIDED BY THE PRODUCT MANUFACTURER NOTED FOR THE DESIGN. USERS OF FIRE RESISTANCE ASSEMBLIES ARE ADVISED TO CONSULT THE GENERAL GUIDE INFORMATION FOR EACH PRODUCT CATEGORY AND EACH GROUP OF ASSEMBLIES. THE GUIDE INFORMATION INCLUDES SPECIFICS CONCERNING ALTERNATE MATERIALS AND ALTERNATE METHODS OF CONSTRUCTION.
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Horizontal Shaftwall Duct and Ceiling Assemblies

09 21 16.23/NGC

DESCRIPTION

I-Stud Cavity Shaftwall Systems can be erected horizontally and used as economical fire resistive assemblies for corridor ceilings, stair soffits, and protection for mechanical ducts.

The I-Stud Cavity Shaftwall System for Horizontal Duct Protection consists of I-Studs 24" o.c. with 1" Fire-Shield Shaftliner panels inserted in the stud tabs, and three layers of 1/2" Fire-Shield C Gypsum Board attached to the stud flanges opposite the Shaftliner panels. This System provides fire protection for mechanical ducts and has been tested from both sides.

Two layers of 1/2" Fire-Shield C Gypsum Board attached to the stud flanges opposite the Shaftliner provide 2-hour fire protection when used as a corridor ceiling or stair soffit.*

Similarly, single layer 5/8" Fire-Shield or Fire-Shield C Gypsum Board attached to the stud flanges opposite the Shaftliner panels provide 1-hour fire protection when used as a corridor ceiling or stair soffit.*

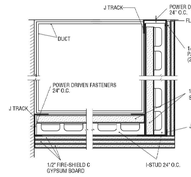
LIMITATIONS

I-Stud Cavity Shaftwall Systems erected horizontally for corridor ceilings or stair soffits are designed to carry their own deadweight only, and should not be used where there is access to an attic or loft above, or any probability of storage.

In addition, the 2-hour horizontal duct protection system is not designed to carry live loads or the weight of the mechanical ducting it is protecting.

Maximum allowable horizontal spans of each system are shown in the table below.

DETAILS



TWO HOUR HORIZONTAL DUCT PROTECTION
WHI 694-0300.1
09209516
Scale: 3" = 1'-0"

TECHNICAL DATA

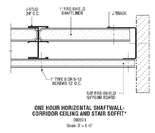
MAXIMUM HORIZONTAL SPANS FOR I-STUD ASSEMBLIES

Stud Size in. (mm)	Minimum Steel Thickness in. (mm)	Corridor Ceilings And Stair Soffits: 1-Hour Fire Resistive Rating	Corridor Ceilings And Stair Soffits: 2-Hour Fire Resistive Rating	Horizontal Membrane And Duct Protection: 2-Hour Fire Resistive Rating
2 1/2" (63.5 mm)	0.020 (.508)	7'-8" (2337 mm)	7'-8" (2337 mm)	7'-2" (2184 mm)
2 1/2" (63.5 mm)	0.0329 (.836)	8'-8" (2642 mm)	9'-4" (2845 mm)	8'-8" (2642 mm)
4" (102 mm)	0.020 (.508)	10'-3" (3124 mm)	10'-9" (3277 mm)	10'-0" (3045 mm)
4" (102 mm)	0.0329 (.836)	11'-9" (3581 mm)	12'-1" (3683 mm)	11'-3" (3429 mm)
6" (152 mm)	0.0329 (.836)	14'-10" (4521 mm)	14'-10" (4521 mm)	13'-10" (4216 mm)

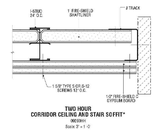
Note: Spans based on L/240 deflection and twice the dead load weight, and 24" o.c. stud spacing.

09 21 16.23

DETAILS



ONE HOUR HORIZONTAL SHAFTWALL-CORRIDOR CEILING AND STAIR SOFFIT*
WHI0010
Scale: 3" = 1'-0"



TWO HOUR CORRIDOR CEILING AND STAIR SOFFIT*
WHI0009
Scale: 3" = 1'-0"

*See ICBO Evaluation Services, Inc. Evaluation Report No. 3579 for allowable values and/or conditions of use concerning material presented in this document. It's subject to re-examinations, revisions, and possible cancellations.

SPECIFICATIONS

SECTION 09 21 16.23
SHAFTWALL SYSTEMS

THE FOLLOWING PARAGRAPHS ARE FOR INSERTION INTO SECTIONS OF GENERIC SPECIFICATIONS OR GENERIC/PROPRIETARY SPECIFICATIONS COVERING SHAFTWALL PRODUCTS. THE NATIONAL GYPSUM COMPANY PRODUCT NAME FOLLOWS THE GENERIC DESCRIPTION IN PARENTHESES.

PART 1 GENERAL

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. C 840, Specification for Application and Finishing of Gypsum Board.
2. C 1396, Specification for Gypsum Board.

PART 2 PRODUCTS

2.02 MATERIALS

A. Gypsum Board:
1. Fire-Resistant Gypsum Shaftliner Board: A gypsum core shaftwall panel with additives to enhance fire resistance of the core and surfaced with water repellent paper on front, back, and long edges and complying with ASTM C 1396, Type X (Gold Bond BRAND Fire-Shield Shaftliner).
a. Thickness: 1"
b. Width: 2'
c. Length: 7' through 14'
d. Edges: Beveled
2. Fire-Resistant Mold-Resistant Gypsum Shaftliner Board: A gypsum core shaftwall board with additives to enhance fire resistance of the core and surfaced with a moisture/mold/mildew resistant paper on front, back, and long edges; and complying with ASTM C 1396, Type X (Gold Bond BRAND Fire-Shield Shaftliner XP).
a. Thickness: 1"
b. Width: 2'
c. Length: 7' through 14'
d. Edges: Beveled
e. Mold and Mildew Resistance: Panel score of 10, when tested in accordance with ASTM D 3273.
3. Fire-Resistant Gypsum Board: A gypsum core wall panel with additives to enhance fire resistance of the core and surface with paper on front, back, and long edges and complying with ASTM C 1396, Type X.
a. Thickness: 1/2" (Gold Bond BRAND Fire-Shield C Gypsum Board), 5/8" (Gold Bond BRAND Fire-Shield Gypsum Board), or 5/8" (Gold Bond BRAND Fire-Shield C Gypsum Board).
b. Width: 4'
c. Length: 6' through 16'
(1/2" Fire-Shield C Gypsum Board,
5/8" Fire-Shield Gypsum Board)
Length: 8' through 14'
(5/8" Fire-Shield C Gypsum Board)
d. Edges: Square, Tapered, or Beveled Taper (Sta-Smooth edge)
4. Fire-Resistant Mold-Resistant Gypsum Board: A gypsum core wall panel with additives to enhance fire resistance and the water resistance of the core; surfaced with a moisture/mold/mildew resistant paper on front, back and long edges and complying with ASTM C 1396, type X.
a. Thickness: 1/2" (Gold Bond BRAND XP Fire-Shield C Gypsum Board) 5/8" (Gold Bond BRAND XP Fire-Shield Gypsum Board.
b. Widths: 4'
c. Length: 8', 10' or 12'
d. Edges: Square or Tapered
e. Mold and Mildew Resistance: Panel score of 10, when tested in accordance with ASTM D 3273
5. Fire-Resistant Plaster Base: A gypsum core panel with additives to enhance the fire resistance of the core and surfaced with absorptive paper on front, back, and long edges and complying with ASTM C 1396; Type X.
a. Thickness: 1/2" (Kal-Kore BRAND Fire-Shield C Plaster Base); 5/8" (Kal-Kore BRAND Fire-Shield Plaster Base).
b. Width: 4'
c. Length: 8' and 12'
d. Edges: Tapered

B. Joint Treatment
1. Tape: 2 1/16" wide paper reinforcing tape (ProForm BRAND Joint Tape).
2. Compound: Drying type pre-mixed compound (ProForm BRAND Multi-Use Joint Compound, ProForm BRAND All-Purpose Joint Compound, regular grade and machine grade, ProForm BRAND Lite Joint Compound, ProForm BRAND Ultra Joint Compound, and ProForm BRAND XP Joint Compound).
3. Compound: Drying type job mixed vinyl base compound (ProForm BRAND Triple-T Compound).
4. Compound: Drying type topping compound, pre-mixed (ProForm BRAND Topping Joint Compound, ProForm BRAND Ultra Joint Compound.
5. Compound: Setting type job mixed chemical-hardening compound (ProForm BRAND Sta-Smooth Joint Compound, ProForm BRAND Sta-Smooth Lite Joint Compound).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install studs, tracks, shaftliner, gypsum board, accessories, and finish gypsum board joints in accordance with the following ASTM Standards and manufacturer's recommendations:
1. ASTM Standards:
a. Metal Framing: C 754
b. Joint Treatment: C 840.
2. Manufacturer's Recommendations: National Gypsum Company *"Gypsum Construction Guide."*

2 1 & 2 HR. SHAFT LID ASSEMBLY

SECTION 721
PRESCRIPTIVE FIRE RESISTANCE

721.1 General.
The provisions of this section contain prescriptive details of fire-resistance-rated building elements, components or assemblies. The materials of construction listed in Tables 721.1(1), 721.1(2), and 721.1(3) shall be assumed to have the fire-resistance ratings prescribed therein. Where materials that change the capacity for heat dissipation are incorporated into a fire-resistance-rated assembly, fire test results or other substantiating data shall be made available to the building official to show that the required fire-resistance-rating time period is not reduced.

TABLE 721.1(3)—continued
MINIMUM PROTECTION FOR FLOOR AND ROOF SYSTEMS[a, q]

21. Wood joists, wood I-joists, floor trusses and flat or pitched roof trusses spaced a maximum 24" o.c. with 1/2" wood structural panels with exterior glue applied at right angles to top of joist or top chord of trusses with 8d nails. The wood structural panel thickness shall not be less than nominal 1/2" nor less than required by Chapter 23.	21-1.1	Base layer 5/8" Type X gypsum wallboard applied at right angles to joist or truss 24" o.c. with 1 1/4" Type S or Type W drywall screws 24" o.c. Face layer 5/8" Type X gypsum wallboard or veneer base applied at right angles to joist or truss through base layer with 1 7/8" Type S or Type W drywall screws 12" o.c. at joints and intermediate joist or truss. Face layer Type G drywall screws placed 2" back on either side of face layer end joints, 12" o.c.	—	—	—	Varies	—	—	—	1 1/4

(continued)

3 1 HR. PRESCRIPTIVE FLOOR/ROOF SYSTEM

TABLE 722.6.2(1)
TIME ASSIGNED TO WALLBOARD MEMBRANES[a, b, c, d]

DESCRIPTION OF FINISH	TIME[e](minutes)
3/8-inch wood structural panel bonded with exterior glue	5
15/32-inch wood structural panel bonded with exterior glue	10
19/32-inch wood structural panel bonded with exterior glue	15
3/8-inch gypsum wallboard	10
1/2-inch gypsum wallboard	15
5/8-inch gypsum wallboard	30
1/2-inch Type X gypsum wallboard	25
5/8-inch Type X gypsum wallboard	40
Double 3/8-inch gypsum wallboard	25
1/2-inch + 3/8-inch gypsum wallboard	35
Double 1/2-inch gypsum wallboard	40

For SI: 1 inch = 25.4 mm.

a. These values apply only when membranes are installed on framing members which are spaced 16 inches o.c. or less.

b. Gypsum wallboard installed over framing or furring shall be installed so that all edges are supported, except 5/8-inch Type X gypsum wallboard shall be permitted to be installed horizontally with the horizontal joints staggered 24 inches each side and unsupported but finished.

c. On wood frame floor/ceiling or roof/ceiling assemblies, gypsum board shall be installed with the long dimension perpendicular to framing members and shall have all joints finished.

d. The membrane on the unexposed side shall not be included in determining the fire resistance of the assembly. When dissimilar membranes are used on a wall assembly, the calculation shall be made from the least fire-resistant (weaker) side.

e. The time assigned is not a finished rating.

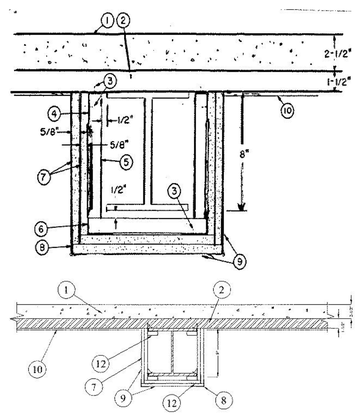
4 TIME ASSIGNED TO WALLBOARD MEMBRANES

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada Design Criteria and Allowable Variances

July 06, 2018
Restrained Beam Rating 4 2 Hr.
Unrestrained Beam Rating 4 2 Hr.
This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used 4 See Guide BXUV or BXUV7

4 Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



Steel Beam 4 Min size, a W8X24 with outside dimensions of 7-1/8x4-1/2 in. with a flange thickness of 3/8 in., a web thickness of 1/4 in., and a cross-sectional area of 7.04 sq in.

1. Normal Weight Concrete 4 148 pcf.
2. Steel Floor and Form Units* 4 1-1/2 in. fluted type, welded to beam.
3. Drill Screw 4 No. 8-18 by 1/2-in. long Phillips panhead drill screws, self-drilling and self-tapping, made of case-hardened steel.
4. Runner Angle 4 24 MSG galv steel with 1 and 2-in. legs. Fastened to steel deck 12 in. O.C. with Item 3.
5. Channel Bracket 4 Fabricated from 25 MSG galv steel, 1-11/16 in. deep with 1-in. legs and spaced 24 in. O.C. Fastened to the runner angles with Item 3.
6. Corner Angle 4 Same material as Item 4, fastened to channel brackets with Item 3.
7. Gypsum Board* 4 5/8 in. thick. First layer fastened with 1-1/4 in. long, 0.150 in. diam screws spaced 16 in. O.C. Second layer attached with 1-3/4 in. long, 0.150 in. diam screws spaced 8 in. O.C. Screws are self-drilling and self-tapping Phillips head made of case-hardened steel.
ACADIA DRYWALL SUPPLIES LTD 4 Type X, 5/8 Type X, Type Bluegless Exterior Sheathing

AMERICAN GYPSUM CO 4 Types AGX-1, AG-C, LightRoc.

BEIJING NEW BUILDING MATERIALS PUBLIC LTD CO 4 Type DBX-1.

CERTAINTEED GYPSUM INC 4 Types FRPC, SF3, EGRG, GlasRoc, GlasRoc-2, Type C, Type X, Type X-1, Ease-Lite Type X-2.

CGC INC 4 Type C, IP-X1, IP-X2, IPC-AR, SCX, SHX or WRX.

CONTINENTAL BUILDING PRODUCTS OPERATING CO, L L C 4 Types LGFC5A, LGFC-C/A.

GEORGIA-PACIFIC GYPSUM L L C 4 Types 5, C, DAP, DD, DA, DAPC, DGG, DS, GPFS1, GPFS4, TG-C, Type X, Veneer Plaster Base-Type X, Water Rated-Type X, Sheathing Type-X, Soffit-Type X, GreenGlass Type X, Type LGX, Veneer Plaster Base-Type LGX, Water Rated-Type LGX, Sheathing Type-LGX, Soffit-Type LGX, Type LGX2X, Veneer Plaster Base - Type LGX2X, Water Rated - Type LGX2X, Sheathing - Type LGX2X, Soffit - Type LGX2X.

NATIONAL GYPSUM CO 4 Types FSK, FSK-C, FSK-G, FSL, FSMR-C, FSW, FSW-C, FSW-G, FSW-3, FSW-4, FSW-8.

NATIONAL GYPSUM CO 4 Riyadh, Saudi Arabia 4 Type FR, or WR.

PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM 4 Types C, PG-3, PG-4, PG-N, PG-C, or PGS-URS.

PANEL REY S A 4 Type PRC

SIAM GYPSUM INDUSTRY (SARABURI) CO LTD 4 Type EX-1

THAI GYPSUM PRODUCTS PCL 4 Type C, Type X.

UNITED STATES GYPSUM CO 4 Types C, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX, ULIX.

USG BORAL DRYWALL SFZ LLC 4 Types C, SCX

USG MEXICO S A DE C V 4 Types C, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX.

8. Corner Bead 4 Fabricated from 20 MSG galv steel to form an angle with 1-1/4 in. legs. Legs perforated with 1/4 in. diam holes approx 1 in. OC. Attached to wallboard with special crimping tool approx 4 in. OC. As an alternate, the bead may be nailed to the wallboard.
9. Joint Compound 4 1/32 in. thick on bottom and sides of wallboard from corner beads and feathered out. Paper tape embedded in joint compound over joints with edges of compound feathered out.
10. Protective Material 4 Spray-Applied Fire Resistive Materials* 4 Spray applied to the underside of the steel floor units, filling the flutes of the units and providing a smooth ceiling which was 1/4 in. thick as measured from the bottom plane of the floor units.
See Spray-Applied Fire Resistive Materials (CHPX) category for names of manufacturers.

11. Alternate Joint System 4 (Not Shown) 4 For lath only. A 1/16 in. thickness of gypsum plaster applied to entire exposed surface over either paper tape on joints embedded in cementitious compound or 2 1/2 in. wide glass fiber tape stapled 8 in. OC on joints.
12. Alternate Construction — Steel Framing Members* 4 As an alternate to Items 3, 4, 5 and 6, steel clips attached to both sides of beam flanges 2 ft OC and at ends of beam. First layer of gypsum board fastened to steel clips with 1-1/4 in. long Type S drywall screws. 2 in. by 2 in. 25 MSG angle fastened to clips on bottom portion of assembly with 2 in. long Type S drywall screws. Second layer of gypsum board fastened to angle and steel clips with 2 in. long Type S drywall screws, spaced 2 ft. OC. Screws are self-drilling and self-tapping Phillips head made of case-hardened steel.
JOHN WAGNER ASSOCIATES INC, DBA GRABBER 4 Type CB Clip.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.
Last Updated on 2018-01-04

5 1 & 2 HR. STEEL BEAM (Design No. N501)

These documents are not valid for building permit unless signed in ink and over sealed. Copies are not valid.
I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed Architect under the laws of the state of
Name DAVID MAJCHRZAK

COLE GROUP ARCHITECTS LLC.
216 Fifth Avenue South
Suite 205
Saint Cloud, MN 56301
(320) 654-4510
www.colegrouparchitects.com

DEVELOPER:
Duffy Development Company, Inc.

PROPOSED APARTMENT:
BOTTINEAU RIDGE
PHASE III
MAPLE GROVE, MN

REVISIONS	COMMENTS
REVISIONS	COMMENTS

PLOTTED: 1-12-21 FILE: 19027IL COM: 1 UPDATE: 7/7/20

Project No.
19027
Submittal Date:
JAN. 12TH, 2021
Document Set:
-BID SET-
(NOT FOR CONSTRUCTION)

A903