Case No. _____

In the

Supreme Court

of the

State of Nevada

Electronically Filed
Jul 15 2020 10:57 a.m.
Elizabeth A. Brown
Clerk of Supreme Court

DEKKER/PERICH/SABATINI LTD.,
NEVADA BY DESIGN, LLC d/b/a NEVADA BY DESIGN,
MELROY ENGINEERING, INC. d/b/a MSA ENGINEERING CONSULTANTS,
JW ZUNINO & ASSOCIATES, LLC, and
NINYO & MOORE, GEOTECHNICAL CONSULTANTS,

Petitioners,

vs.

THE EIGHTH JUDICIAL DISTRICT COURT,
STATE OF NEVADA,
CLARK COUNTY, and
THE HONORABLE TREVOR ATKIN,

Respondents,

CITY OF NORTH LAS VEGAS,

Real Party in Interest.

FROM DECISIONS OF THE EIGHTH JUDICIAL DISTRICT COURT,
CLARK COUNTY, NEVADA
CASE NO. A-19-798346-C
HONORABLE TREVOR ATKIN · DEPARTMENT 8 · PHONE: (702) 671-4338

PETITIONERS'APPENDIX TO
PETITION FOR WRIT OF MANDAMUS OR,
ALTERNATIVELY, PROHIBITION

VOLUME 13

Docket 81459 Document 2020-25983

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CHRONOLOGICAL INDEX - APPENDIX OF EXHIBITS

Exhibit:	Volume:	Bates: PET.APP.	Date:	Description:
10	13	001841 – 002053	11/02/2007	Exhibit 9 - Dekker/Perich/Sabatini's Structural Calculations

ALPHABETICAL INDEX - APPENDIX OF EXHIBITS

Exhibit:	Vol.:	Bates: PET.APP.	Date:	Description:
10	**11**	**001560 – 001562**	**08/20/2019 1:34 PM**	**City of North Las Vegas' Appendix of Exhibits to Opposition to Dekker/Perich/Sabatini, Ltd.'s Motion to Dismiss**
	11	001563 – 001580	07/11/2019	Exhibit 1 – City of North Las Vegas' Complaint
	11	001581 – 001614	02/07/2007	Exhibit 1 – Professional Architectural Services Agreement
	11	001615 – 001680	08/29/2007	Exhibit 2 – Ninyo & Moore's Geotechnical Evaluation
	11	001681 – 001694	01/30/2008	Exhibit 3 – City of North Las Vegas' Letter to Richardson Construction Inc re Construction Contract
	11	001695 – 001696	07/13/2009	Exhibit 4 – Notice of Completion
	12	001697 – 001832	12/11/2017	Exhibit 5 – American Geotechnical Inc's Geotechnical Investigation
	12	001833 – 001836	1988 - Present	Exhibit 6 – American Geotechnical Inc. Resume of Edred T. Marsh, Principal Geotechnical Engineer
	12	001837 – 001838	07/03/2019	Exhibit 7 – Declaration of Edred T. Marsh, P.E.
	12	001839 – 001840	10/17/2007	Exhibit 8 – Ninyo & Moore Letter to Dekker/Perich/Sabatini re Review of 95 Percent Bid Set Construction Documents
	13	001841 – 002053	11/02/2007	Exhibit 9 - Dekker/Perich/Sabatini's Structural Calculations
	14	002054 – 002131	11/02/2007	Exhibit 9 - Dekker/Perich/Sabatini's Structural Calculations
	14	002132 – 002210	11/10/2007	Exhibit 10 - Plans / Record Drawings
8	**7**	**000847 – 000849**	**08/20/2019 1:24 PM**	**City of North Las Vegas' Appendix of Exhibits to Opposition to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultant's Motion to Dismiss or in the Alternative, Motion for Summary Judgment**
	7	000850 – 000867	07/11/2019	Exhibit 1 – City of North Las Vegas' Complaint

	7	000868 – 000901	02/07/2007	Exhibit 1 – Professional Architectural Services Agreement
	7	000902 – 000967	08/29/2007	Exhibit 2 – Ninyo & Moore's Geotechnical Evaluation
	7	000968 – 000981	01/30/2008	Exhibit 3 – City of North Las Vegas' Letter to Richardson Construction Inc re Construction Contract
	7	000982 – 000983	07/13/2009	Exhibit 4 – Notice of Completion
	8	000984 – 001119	12/11/2017	Exhibit 5 – American Geotechnical Inc's Geotechnical Investigation
	8	001120 – 001123	1988 - Present	Exhibit 6 – American Geotechnical Inc's Resume of Edred T. Marsh, Principal Geotechnical Engineer
	8	001124 – 001125	07/03/2019	Exhibit 7 – Declaration of Edred T. Marsh, P.E.
	8	001126 – 001127	10/17/2007	Exhibit 8 – Ninyo & Moore Letter to Dekker/Perich/Sabatini re Review of 95 Percent Bid Set Construction Documents
	9	001128 – 001340	11/02/2007	Exhibit 9 - Dekker/Perich/Sabatini's Structural Calculations
	10	001341 – 001418	11/02/2007	Exhibit 9 - Dekker/Perich/Sabatini's Structural Calculations
	10	001419 – 001497	11/10/2007	Exhibit 10 - Plans / Record Drawings
	10	001498 – 001513	2019	Exhibit 2 – Assembly Bill 421 – 80th Session 2019
	10	001514 – 001546	05/15/2019	Exhibit 3 - Minutes of the Senate Committee on Judiciary, 80th Legislature
1	**1**	**000001 – 000017**	**07/11/2019 4:35 PM**	**City of North Las Vegas' Complaint Against Defendants – Exempt from Arbitration Under N.A.R. 3(A): Seeks Damages in Excess of $50,000**
	1	000018 – 000051	02/07/2007	Exhibit 1 – Professional Architectural Services Agreement
	1	000052 – 000117	08/29/2007	Exhibit 2 – Ninyo & Moore's Geotechnical Evaluation
	1	000118 – 000131	01/30/2008	Exhibit 3 – City of North Las Vegas' Letter to Richardson Construction Inc re Construction Contract
	1	000132 – 000133	07/13/2009	Exhibit 4 – Notice of Completion

	2	000134 – 000269	12/11/2017	Exhibit 5 – American Geotechnical Inc's Geotechnical Investigation
	2	000270 – 000273	1988 - Present	Exhibit 6 – American Geotechnical Inc. Resume of Edred T. Marsh, Principal Geotechnical Engineer
	2	000274 – 000275	07/03/2019	Exhibit 7 – Declaration of Edred T. Marsh, P.E.
	2	000276 – 000277	10/17/2007	Exhibit 8 – Ninyo & Moore Letter to Dekker/Perich/Sabatini re Review of 95 Percent Bid Set Construction Documents
	3	000278 – 000491	11/02/2007	Exhibit 9 - Dekker/Perich/Sabatini's Structural Calculations
	4	000492 – 000568	11/02/2007	Exhibit 9 - Dekker/Perich/Sabatini's Structural Calculations
	4	000569 – 000647	11/10/2007	Exhibit 10 - Plans / Record Drawings
18	**15**	**002307 – 002312**	**09/26/2019**	**City of North Las Vegas' Limited Opposition to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Change Date of Hearing on Motion to Dismiss or, in the Alternative, Motion for Summary Judgment on Order Shortening Time**
	15	002313 – 002318	09/26/2019	Exhibit 1 – Register of Actions Case A-19-798346-C
	15	002319 – 002320	09/20/2019	Exhibit 2 – Weil & Drage, APC's Letter to All Counsel re Hearing of Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' on Motion to Dismiss or, in the Alternative, Motion for Summary Judgment on September 27, 2019
25	**15**	**002407 – 002421**	**11/13/2019 11:58 AM**	**City of North Las Vegas' Motion to Alter Judgment**
	15	002422 – 002430	10/17/2019	Exhibit 1 - Notice of Entry of Order Granting Nevada by Design, LLC d/b/a Nevada By Design Engineering Consultants' Motion to Dismiss or, in the alternative, Motion for Summary Judgment and All Joinders to the Same
	15	002431 – 002448	07/11/2019	Exhibit 2 – City of North Las Vegas' Complaint

	15	002449 – 002455	09/30/2019	Exhibit 3 - Order Granting Nevada by Design, LLC d/b/a Nevada By Design Engineering Consultants' Motion to Change Date
	15	002456 – 002471	2019	Exhibit 4 - Assembly Bill 421 – 80th Session 2019
	16	002472 – 002504	05/15/2019	Exhibit 5 - Minutes of the Senate Committee on Judiciary – Eightieth Session
	16	002505 – 002510	09/30/2019	Exhibit 6 - Richardson Construction, Inc. and The Guarantee Company of North America USA's Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
	16	002511 – 002514	09/30/2019	Exhibit 7 - JW Zunino & Associates LLC's Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
6	**6**	**000821 – 000826**	**08/15/2019 5:02 PM**	**City of North Las Vegas' Motion to Strike and Opposition to Jackson Family Partnership LLC d/b/a Stargate Plumbing's Motion to Dismiss**
	6	000827 – 000828	08/06/2019	Exhibit 1 – Affidavit/Declaration of Service to Jackson Family Partnership LLC d/b/a Stargate Plumbing
62	**20**	**003467 – 003470**	**04/02/2020 4:21 PM**	**City of North Las Vegas' Notice of Entry of Decision and Order Denying Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss**
	20	003471 – 003480	04/02/2020	Exhibit 1 - Order Denying Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss
66	**21**	**003589 – 003592**	**05/05/2020 3:48 PM**	**City of North Las Vegas' Notice of Entry of Decision and Order Denying Richardson Construction, Inc. and The Guarantee Company of North America USA's Motion to Dismiss / Motion for Summary Judgment Based on Laches and All Joinders**
	21	003593 – 003597	05/05/2020	Exhibit 1 – Court's Decision and Order Denying Richardson Construction, Inc. and The Guarantee Company of North America USA's Motion to Dismiss / Motion for Summary Judgment Based on Laches and All Joinders

46	**18**	**003064 – 003067**	**01/24/2020 3:55 PM**	**City of North Las Vegas' Notice of Entry of Decision and Order Granting Its Motion to Alter Judgment**
	18	003068 – 003073	01/23/2020	Exhibit 1 – Court's Decision and Order
9	**11**	**001547 – 001559**	**08/20/2019 1:34 PM**	**City of North Las Vegas' Opposition to Dekker/Perich/Sabatini, Ltd.'s Motion to Dismiss**
52	**19**	**003255 – 003274**	**02/17/2020 4:39 PM**	**City of North Las Vegas' Opposition to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' and Joinders Motion to Dismiss on Order Shortening Time**
60	**20**	**003409 – 003413**	**03/16/2020 4:57 PM**	**City of North Las Vegas' Opposition to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion for Clarification Regarding Court's Minute Order Denying Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss Brought Pursuant to NRS 11.258, on Order Shortening Time**
	20	003414 – 003415	03/13/2020	Exhibit 1 – Email re Proposed Order Denying MSA's Motion to Dismiss on NRS 11.258
	20	003416 – 003425	Undated	Exhibit 2 – Order Denying Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss
	20	003426 – 003428	03/16/2020	Exhibit 3 – Email re Request to Withdraw Motion for Clarification on Order Shortening Time Without Prejudice
7	**6**	**000829 – 000846**	**08/20/2019 1:24 PM**	**City of North Las Vegas' Opposition to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultant's Motion to Dismiss or, in the Alternative, Motion for Summary Judgement**
45	**18**	**003047 – 003063**	**12/19/2019 4:59 PM**	**City of North Las Vegas' Reply in Support of Its Motion to Alter Judgment**

20	**15**	**002326 – 002330**	**09/27/2019 4:18 PM**	**City of North Las Vegas' Surreply to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Change Date of Hearing on Motion to Dismiss or, in the Alternative, Motion for Summary Judgment on Order Shortening Time**
61	**20**	**003429 – 003466**	**03/30/2020 3:09 PM**	**Court Recorder's Transcript of Hearing re All Pending Motions, March 10, 2020**
63	**20**	**003481 – 003491**	**04/10/2020 3:04 PM**	**Court Recorder's Transcript of Hearing re All Pending Motions, March 17, 2020**
23	**15**	**002339 – 002398**	**10/10/2019 1:20 PM**	**Recorder's Transcript of Hearing Re: All Pending Motions, September 30, 2019**
65	**21**	**003541 – 003588**	**04/21/2020 8:19 AM**	**Court Recorder's Transcript of Proceedings re All Pending Motions, February 20, 2020**
64	**21**	**003492 – 003540**	**04/21/2020 8:19 AM**	**Court Recorder's Transcript of Proceedings re City of North Las Vegas' Motion to Alter Judgment, January 21, 2020**
29	**16**	**002678 – 002681**	**11/26/2019 12:35 PM**	**Dekker/Perich/Sabatini, Ltd.'s Joinder to JW Zunino & Associates LLC's Opposition to City of North Las Vegas' Motion to Alter**
49	**19**	**003147 – 003154**	**02/04/2020 3:11 PM**	**Dekker/Perich/Sabatini, Ltd.'s Joinder to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss on Order Shortening Time**
3	**5**	**000718 – 000720**	**08/06/2019 2:44 PM**	**Dekker/Perich/Sabatini, Ltd.'s Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, In the Alternative, Motion for Summary Judgment**

28	**16**	**002651 – 002660**	**11/26/2019 12:28 PM**	**Dekker/Perich/Sabatini, Ltd.'s Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Opposition to Motion to Alter Judgment; Opposition by Incorporation and Request to Reset Prior Motion to Dismiss**
	16	002659 – 002664	10/15/2019	Exhibit 1 – Order Granting Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment and all Joinders to Same
	16	002665 – 002677	08/06/2019	Exhibit 2 – Dekker/Perich/Sabatini, Ltd.'s Motion to Dismiss
4	**6**	**000721 – 000735**	**08/06/2019 2:44 PM**	**Dekker/Perich/Sabatini, Ltd.'s Motion to Dismiss**
	6	000734 – 000751	07/11/2019	Exhibit A – City of North Las Vegas' Complaint
	6	000752 – 000786	02/07/2007	Exhibit B – City of North Las Vegas' Complaint Exhibit 1 – Professional Architectural Services Agreement
	6	000787 – 000789	07/11/2019	Exhibit C – Affidavit of Aleema A. Dhalla, Esq.
	6	000790 – 000793	1988 – Present	Exhibit D – American Geotechnical, Inc.'s Resume of Edred T. Marsh, Principal Geotechnical Engineer
	6	000794 – 000801	03/23/2007	Exhibit E - Excerpts from Legislative History of N.R.S. 11.258
	6	000802 – 000803	07/03/2019	Exhibit F – Declaration of Edred T. Marsh, P.E.
	6	000804 – 000817	12/11/2017	Exhibit G - American Geotechnical, Inc's Geotechnical Investigation
13	**14**	**002219 – 002232**	**08/28/2019 8:48 AM**	**Dekker/Perich/Sabatini, Ltd.'s Reply to City of North Las Vegas' Opposition to Its Motion to Dismiss**
53	**19**	**003275 – 003285**	**02/18/2020 3:00 PM**	**Dekker/Perich/Sabatini, Ltd.'s Reply to City of North Las Vegas' Opposition to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' and Joinders to Motion to Dismiss on Order Shortening Time**
	19	003286 – 003287	07/03/2019	Exhibit A – Declaration of Edred T. Marsh, P.E.

	19	003288 – 003294	07/11/2019	Exhibit B – City of North Las Vegas' Complaint
12	**14**	**002214 – 002218**	**08/26/2019 4:15 PM**	**Jackson Family Partnership LLC d/b/a Stargate Plumbing's Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, In the Alternative, Motion for Summary Judgment**
36	**18**	**002894 – 002900**	**12/02/2019 2:22 PM**	**Jackson Family Partnership LLC d/b/a Stargate Plumbing's Joinder to JW Zunino & Associates LLC's Opposition to Motion to Alter Judgment with Supplemental Points and Authorities**
7	**18**	**002901 – 002907**	**12/02/2019 2:22 PM**	**Jackson Family Partnership LLC d/b/a Stargate Plumbing's Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Opposition to City of North Las Vegas' Motion to Alter Judgment with Supplemental Points and Authorities**
2	**18**	**003037 – 003039**	**12/03/2019 10:01 AM**	**JW Zunino & Associates LLC's Joinder to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Opposition to Motion to Alter Judgment**
50	**19**	**003155 – 003166**	**02/07/2020 3:04 PM**	**JW Zunino & Associates LLC's Joinder to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss on Order Shortening Time**
22	**15**	**002336 – 002338**	**09/30/2019 4:35 PM**	**JW Zunino & Associates LLC's Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment**
31	**17**	**002686 – 002688**	**11/27/2019 10:43 AM**	**JW Zunino & Associates LLC's Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Opposition to Motion to Alter Judgment**
38	**18**	**002908 – 002910**	**12/02/2019 2:34 PM**	**JW Zunino & Associates LLC's Joinder to Richardson Construction, Inc. and The Guarantee Company of North America USA's Opposition to Motion to Alter Judgment**

26	**16**	**002515 – 002527**	**11/25/2019 5:02 PM**	**JW Zunino & Associates LLC's Opposition to City of North Las Vegas' Motion to Alter Judgment**
	16	002528 – 002530	10/09/2019	Exhibit A – Affidavit of Rita Tuttle
57	**20**	**003385 – 003391**	**02/19/2020 11:29 AM**	**JW Zunino & Associates LLC's Reply to City of North Las Vegas' Opposition to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss on Order Shortening Time**
5	**6**	**000818 – 000820**	**08/08/2019 1:32 PM**	**Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Joinder to Nevada By Design, LLC d/b/a Nevada By Design Engineering Consultants' Motion to Dismiss or, In the Alternative, Motion for Summary Judgment**
40	**18**	**003029 – 003032**	**12/02/2019 3:19 PM**	**Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Joinder to JW Zunino & Associates, LLC's Opposition to City of North Las Vegas' Motion to Alter Judgment**
41	**18**	**003033 – 003036**	**12/02/2019 3:19 PM**	**Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Joinder to Nevada By Design, LLC d/b/a Nevada By Design Engineering Consultants' Opposition to City of North Las Vegas' Motion to Alter Judgment**
39	**18**	**002911 – 002936**	**12/02/2019 3:19 PM**	**Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Opposition to Motion to Alter Judgment**
	18	002937 – 002941	10/15/2019	Exhibit 1 – Order Granting Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment and all Joinders to Same
	18	002942 – 002960	08/20/2019	Exhibit 2 – City of North Las Vegas' Opposition to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
	18	002961 – 003021	10/10/2019	Exhibit 3 – Court Recorder's Transcript of Hearing: All Pending Motions

	18	003022 – 003024	10/15/2019	Exhibit 4 – Order Granting Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Change Date of Haring on Motion to Dismiss or, in the Alternative, Motion for Summary Judgment on Order Shortening Time
	18	003025 – 003028	08/05/2019	Exhibit 5 – Cover Sheet Filings of: Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment; Dekker/Perich/Sabatini, Ltd.'s Motion to Dismiss; and Melroy Engineering, Inc. d/b/a MSA Engineering Consultants Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
7	**18**	**003074 – 003090**	**02/04/2020 12:14 PM**	**Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss on Order Shortening Time**
	19	003091 – 003108	07/11/2019	Exhibit A – City of North Las Vegas' Complaint
	19	003110 – 003111	07/11/019	Exhibit B – Affidavit of Aleema A. Dhalla, Esq.
	19	003112 – 003115	1988 - Present	Exhibit C – American Geotechnical Inc's Resume of Edred T. Marsh, Principal Geotechnical Engineer
	19	003116 – 003123	03/23/2007	Exhibit D – Legislative History of 11.258 Senate Bill 243
	19	003124 – 003137	12/11/2017	Exhibit E – American Geotechnical Inc's Geotechnical Investigation
	19	003138 – 003139	07/03/2019	Exhibit F – Declaration of Edred T. Marsh, P.E.
59	**20**	**003399 – 003408**	**03/16/2020 8:58 AM**	**Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion for Clarification Regarding Court's Minute Order Denying Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss Brought Pursuant to NRS 11.258, on Order Shortening Time**

55	**20**	**003308 – 003318**	**02/18/2020 5:02 PM**	**Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Reply to City of North Las Vegas' Opposition to Its Motion to Dismiss**
	20	003319 – 003325	02/12/2020	Exhibit 1 – Notice of Entry of Order Granting Kittrell Garlock and Associates, Architects, AIA, Ltd.'s Motion to Dismiss; Kittrell Garlock and Associates, Architects, AIA, Ltd.'s Motion to Dismiss City of North Las Vegas' Complaint
	20	003326 – 003340	11/22/2019	Kittrell Garlock and Associates, Architects, AIA, Ltd.'s Motion to Dismiss City of Las Vegas' Complaint
	20	003341 - 003347	11/06/2019	Exhibit A – City of North Las Vegas' Complaint
	20	003348 – 003353	N/A	Exhibit B – Michael Panish Expert Witness & Consultants Construction Systems Curriculum Vitae
	20	003354 – 003361	03/23/2007	Exhibit C - Legislative History of 11.258 Senate Bill 243
	20	003362 – 003366	12/09/2019	A-19-804979-C Kelli Nash' Opposition to Defendant's Motion to Dismiss its Complaint
	20	003367 – 003373	12/26/2019	A-19-804979 Kittrell Garlock and Associates, Architects, AIA, Ltd.'s Reply to Kelly Nash's Opposition to its Motion to Dismiss Kelly Nash's Complaint
	20	003374 – 003378	10/15/2019	Exhibit 1 – Stipulation and Order to Dismiss Kittrell Garlock and Associates, AIA, Ltd.
30	**16**	**002682 – 002685**	**11/26/2019 12:43 PM**	**Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Joinder to JW Zunino & Associates LLC's Opposition to City of North Las Vegas' Motion to Alter**
48	**19**	**003140 – 003146**	**02/04/2020 3:09 PM**	**Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Joinder to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss on Order Shortening Time**

17	**15**	**002282 – 002292**	**09/18/2019 3:07 PM**	**Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Change Date of Hearing on Motion to Dismiss or, in the Alternative, Motion for Summary Judgment on Order Shortening Time**
	15	002293 – 002294	08/06/2019	Exhibit A – Clerk of the Court's Notice of Hearing
	15	002295 – 002296	09/06/2019	Exhibit B – Court's Notice of Rescheduling Motions to Dismiss and Joinders
	15	002297 – 002202	09/09/2019	Exhibit C – Emails re Rescheduling of Hearing
	15	002203 – 002304	09/10/2019	Exhibit D – Emails re Rescheduling of Hearing
	15	002305 – 002306	N/A	Exhibit E – Las Vegas Law Offices of Snell & Wilmer
2	**5**	**000648 – 000663**	**08/05/2019 4:15 PM**	**Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment**
	5	000664 – 000681	07/11/2019	Exhibit A – City of North Las Vegas' Complaint
	5	000682 – 000684	07/13/2009	Exhibit B – City of North Las Vegas' Complaint Exhibit 4 Notice of Completion
	5	000685 – 000690	03/25/2019	Exhibit C - Nevada Legislature Website (80th Session) Concerning the "Effective Date" of the AB 421
	5	000691 – 000693	07/11/2019	Exhibit D – Aleem A. Dhalla, Esq.'s Affidavit of Merit Attached to City of North Las Vegas' Complaint
	5	000694 – 000707	12/11/2017	Exhibit E - American Geotechnical, Inc's Geotechnical Investigation
	5	000708 – 000709	07/03/2019	Exhibit F – Declaration of Edred T. Marsh, P.E.
	5	000710 – 000717	03/23/2007	Exhibit G – Excerpts from Legislative History of N.R.S. 11.258
24	**15**	**002399 – 002406**	**10/17/2019 10:08 AM**	**Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Notice of Entry of Order Granting Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment and All Joinders to Same**

27	**16**	**002531 – 002558**	**11/26/2019 11:17 PM**	**Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Opposition to Motion to Alter Judgment**
	16	002559 – 002563	10/15/2019	Exhibit 1 – Order Granting Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment and all Joinders to Same
	16	002564 – 002582	08/20/2019	Exhibit 2 – City of North Las Vegas' Opposition to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
	16	002583 – 002643	10/10/2019	Exhibit 3 – Court Recorder's Transcript of Hearing: All Pending Motions
	16	002644 – 002646	10/15/2019	Exhibit 4 – Order Granting Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Change Date of Hearing on Motion to Dismiss or, in the Alternative, Motion for Summary Judgment on Order Shortening Time
	16	002647 – 002650	08/05/2019	Exhibit 5 - Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
			08/06/2019	Dekker/Perich/Sabatini, Ltd.'s Motion to Dismiss
			08/08/2019	Melroy Engineering, Inc. d/b/a MSA Engineering Consultants Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
19	**15**	**002321 – 002325**	**09/26/2019 5:16 PM**	**Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Reply to City of North Las Vegas' Limited Opposition to Motion to Change Date of Hearing**
54	**20**	**003295 – 003307**	**02/18/2020 3:57 PM**	**Nevada by Design, LLC d/b/a Nevada By Design Engineering Consultants' Reply to City of North Las Vegas' Opposition to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' and Joinders to Motion to Dismiss on Order Shortening Time**

14	**14**	**002233 – 002249**	**8/28/2019 9:02 AM**	**Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Rely to City of North Las Vegas' Opposition to Motion to Dismiss or, in the Alternative, Motion for Summary Judgement**
	14	002250 – 002255	07/01/019	Exhibit A – Assembly Bill No. 221 – Committee on Judiciary 80th Session (2019)
	14	002256 – 002257	2019	Exhibit B – 80th Session (2019)
	15	002258 – 002271	12/11/2017	Exhibit C – American Geotechnical Inc's Geotechnical Investigation
35	**17**	**002891 – 002893**	**12/02/2019 1:54PM**	**Ninyo & Moore, Geotechnical Consultants' Joinder to JW Zunino & Associates LLC's Opposition to City of North Las Vegas' Motion to Alter Judgment**
44	**18**	**003044 – 003046**	**12/06/2019 10:08 AM**	**Ninyo & Moore, Geotechnical Consultants' Joinder to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Opposition to Motion to Alter Judgment With Respect to Statute of Repose Arguments**
51	**19**	**003167 – 003174**	**02/07/2020 3:36 PM**	**Ninyo & Moore, Geotechnical Consultants' Joinder to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss on Order Shortening Time**
	19	003175 – 003240	08/29/2007	Exhibit A – Ninyo & Moore's Geotechnical Evaluation
	19	003241 – 003254	12/11/2017	Exhibit B – American Geotechnical Inc's Geotechnical Investigation
11	**14**	**002211 – 002213**	**08/23/2019 10:02 AM**	**Ninyo & Moore, Geotechnical Consultants' Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, In the Alternative, Motion for Summary Judgment**
15	**15**	**002272 – 002274**	**09/06/2019 12:14 PM**	**Ninyo & Moore, Geotechnical Consultants' Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, In the Alternative, Motion for Summary Judgment**

34	**17**	**002888 – 002890**	**12/02/2019 1:54 PM**	**Ninyo & Moore, Geotechnical Consultants' Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Opposition to City of North Las Vegas' Motion to Alter Judgment**
58	**20**	**003392 – 003398**	**02/19/2020 2:56 PM**	**Ninyo & Moore, Geotechnical Consultants' Reply to City of North Las Vegas Opposition to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' and Joinders to Motion to Dismiss on Order Shortening Time**
32	**17**	**002689 – 002693**	**11/27/2019 1:15 PM**	**Paffenbarger & Walden, LLC and P & W Bonds, LLC's Joinder in (1) Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Opposition to Motion to Alter Judgment; and (2) JW Zunino & Associates LLC Opposition to Motion to Alter Judgment**
43	**18**	**003040 – 003043**	**12/04/2019 8:35 AM**	**Paffenbarger & Walden, LLC and P & W Bonds, LLC's Joinder in (1) Richardson Construction, Inc. and The Guarantee Company of North America USA's Opposition to Motion to Alter Judgment; and (2) Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Opposition to Motion to Alter Judgment**
16	**15**	**002275 – 002281**	**09/13/2019 4:22 PM**	**Paffenbarger & Walden, LLC and P & W Bonds, LLC's Limited Joinder in Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment**
21	**15**	**002331 – 002335**	**09/30/2019 11:29 AM**	**Richardson Construction, Inc. and The Guarantee Company of North America USA's Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment**

56	**20**	**003379 – 003384**	**02/18/2020 5:06 PM**	**Richardson Construction, Inc. and The Guarantee Company of North America USA's Limited Response to Melroy Engineering, Inc. d/b/a MSA Engineering Consultants' Motion to Dismiss on Order Shortening Times and All Joinder Thereto**
33	**17**	**002694 – 002887**	**11/27/2019 4:51 PM**	**Richardson Construction, Inc. and The Guarantee Company of North America USA's Opposition to Motion to Alter Judgment and Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Opposition to Motion to Alter Judgment**
	17	002706 – 002723	07/11/2019	Exhibit A – City of North Las Vegas' Complaint
	17	002724 – 002740	08/05/2019	Exhibit B - Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
	17	002741 – 002758	07/11/2019	Exhibit A – City of North Las Vegas' Complaint
	17	002759 – 002761	07/13/2009	Exhibit B – City of North Las Vegas' Complaint Exhibit 4 Notice of Completion
	17	002762 – 002767	03/25/2019	Exhibit C – AB421
	17	002768 – 002770	07/11/2019	Exhibit D – Affidavit of Aleema A. Dhalla, Esq.
	17	002771 – 002784	12/11/2017	Exhibit E – American Geotechnical Inc's Geotechnical Investigation
	17	002785 – 002786	07/03/2019	Exhibit F – Declaration of Edred T. Marsh, P.E.
	17	002787 – 002794	03/23/2007	Exhibit G – Senate Bill 243 - 11.258
	17	002795 – 002796	08/06/2019	Exhibit C – Clerk of the Court's Notice of Hearing
	17	002797 – 002815	08/20/2019	Exhibit D – City of North Las Vegas' Opposition to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
	17	002816 – 002822	09/04/2019	Exhibit E – Richardson Construction, Inc.'s and The Guarantee Company of North America USA's Motion to Dismiss

	17	002823 – 002824	09/06/2019	Exhibit F – Clerk of the Court's Notice of Hearing
	17	002825 – 002831	11/27/2019	Exhibit G – Register of Actions
	17	002832 – 002833	09/10/2019	Exhibit H – Emails re Rescheduling of Hearing
	17	002834 – 002846	09/18/2019	Exhibit I - Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Change Date of Hearing of Motion to Dismiss or, in the Alternative, Motion for Summary Judgment
	17	002847 – 002848	08/06/2019	Exhibit A – Clerk of the Court's Notice of Hearing
	17	002849 – 002850	09/06/2019	Exhibit B – Court's Notice of Rescheduling Motions to Dismiss and Joinders
	17	002851 – 002856	09/09/019	Exhibit C – Emails re Rescheduling of Hearing
	17	002857 – 002858	09/10/2019	Exhibit D – Emails re Rescheduling of Hearing
	17	002859 – 002860	N/A	Exhibit E – Las Vegas Law Offices of Snell & Wilmer
	17	002861 – 002862	09/20/2019	Exhibit J – Weil & Drage, APC Letter to All Counsel re Hearing of Nevada By Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment on September 27, 2019
	17	002863 – 002868	09/26/2019	Exhibit K - Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Reply to City of North Las Vegas' Limited Opposition to Motion to Change Date of Hearing
	17	002869 – 002871	11/27/2019	Exhibit L – Register of Actions A-19-798346-C
	17	002872 – 002874	11/27/2019	Exhibit M – Register of Actions A-19-798346-C
	17	002875 – 002880	09/30/3019	Exhibit N – Richardson Construction, Inc. and The Guarantee Company of North America USA's Joinder to Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Dismiss or, in the Alternative, Motion for Summary Judgment

	17	002281 – 002887	10/17/2019	Exhibit O – Notice of Entry of Order Granting Nevada by Design, LLC d/b/a Nevada by Design Engineering Consultants' Motion to Change Date of Haring on Motion to Dismiss or, in the Alternative, Motion for Summary Judgment on Order Shortening Time

EXHIBIT 9

86004

OFFICE COPY

ENGINEERING CALCS HAVE BEEN REVIEWED AND ACCEPTED AS PART OF THE APPROVED PLANS

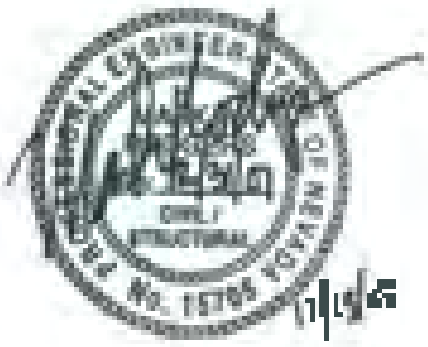
Dekker/Perich/Sabatini

civil structural mechanical electrical plumbing fire protection

STRUCTURAL CALCULATIONS

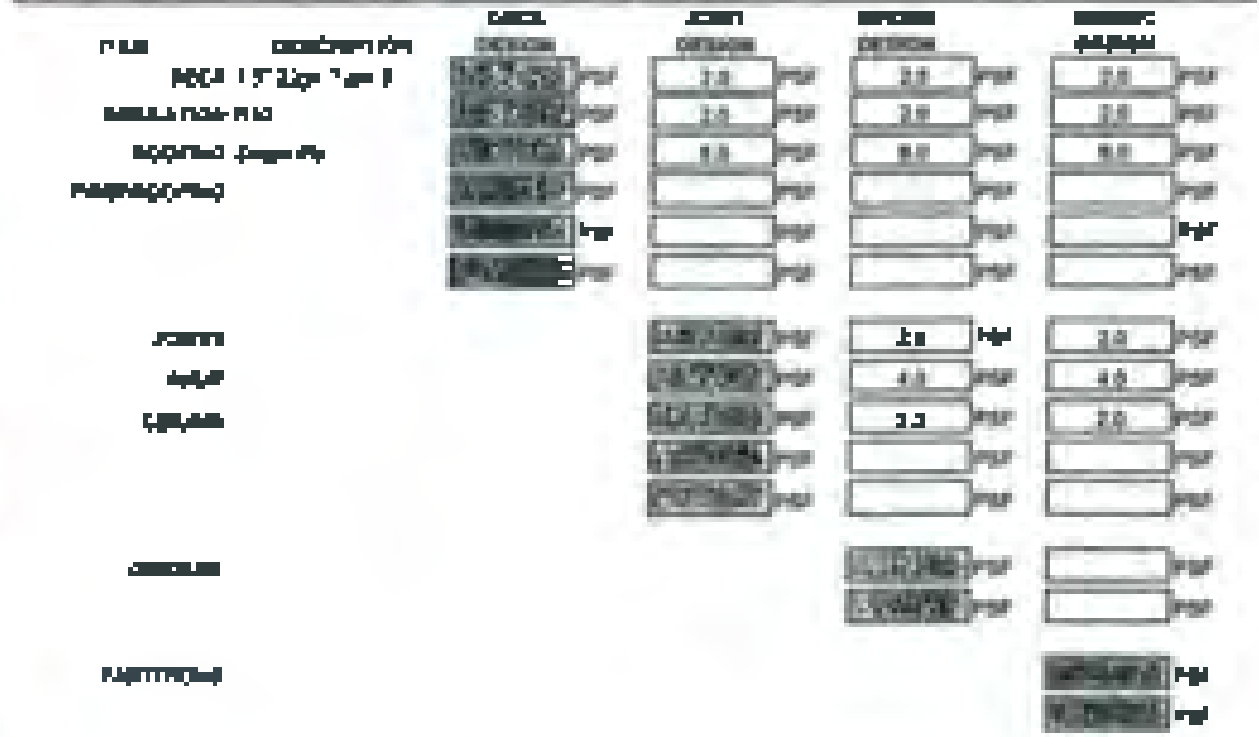
City Of North Las Vegas
Fire Station 53
North Las Vegas, NV

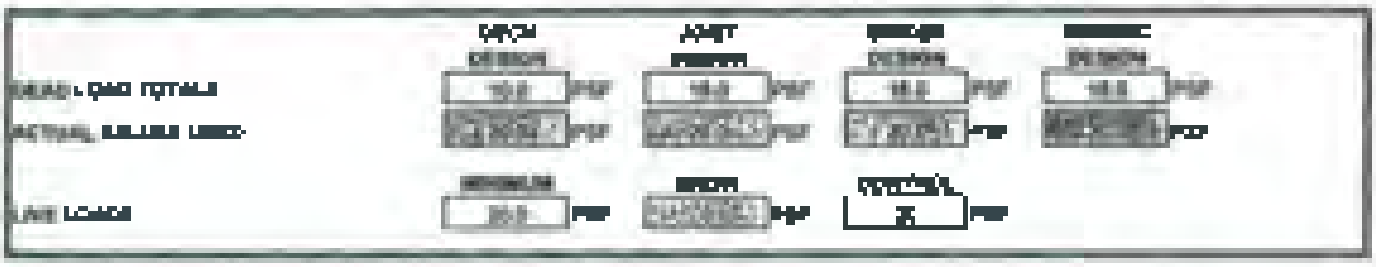
November 2, 2007



Mother Perich Shahine

GRAVITY DESIGN LOAD SUMMARY – ROOF LOADS





STRUCTURAL CALCULATIONS

City Of North Las Vegas
Fire Station 53
North Las Vegas, NV

Gravity Framing – Horizontal

Bekker/Perich/Zabalani

Name NLVFO Station #53
No. 07502-01
Subject Roof Deck Design
By AJB Date 03/26/02
Checked Date
Sheet No. 4

Roof Deck Design

Loads: DL = 20 PSF
LL = 20 PSF
TL = 40 PSF

Joist Spacing @ 6'-0" o.c.

USE Vulcraft 3B - 22 ga. Type Roof Deck

Allow Total Load = 89 PSF >> 40 PSF : OK

* Refer to Diaphragm Calculation in the Lateral Design Section for Additional Deck Design Information.

1.5 B, BI, BA, BIA

Maximum Deck Length at C
Extra Charge for Lengths Under B-C
Factory Mutual Approved (for 22GA, 20GA and 18GA Alt.)
ICBO Approved (No. 3413)





SECTION PROPERTIES

Deck Type	Design Thickness	Weight		I	S	r	y

Type B deck provides excellent structural load carrying capacity per pound of steel utilized and its rectilinear design eliminates the need for cell ends.

1" (or more) rigid insulation is required for Type B deck.

Acoustical deck (Types BA, BIA) is particularly suitable in situations such as auditoriums, schools, and theatres where sound control is important. Acoustic perforations are located in the valleys where the rigid carrying connections are negligibly affected. (see chart p.)

Inert, non-organic glass fiber sound absorbing pads are placed in the rib openings to absorb up to 80% of the sound striking the deck.

Decks are field cuttable and may require adaptation.

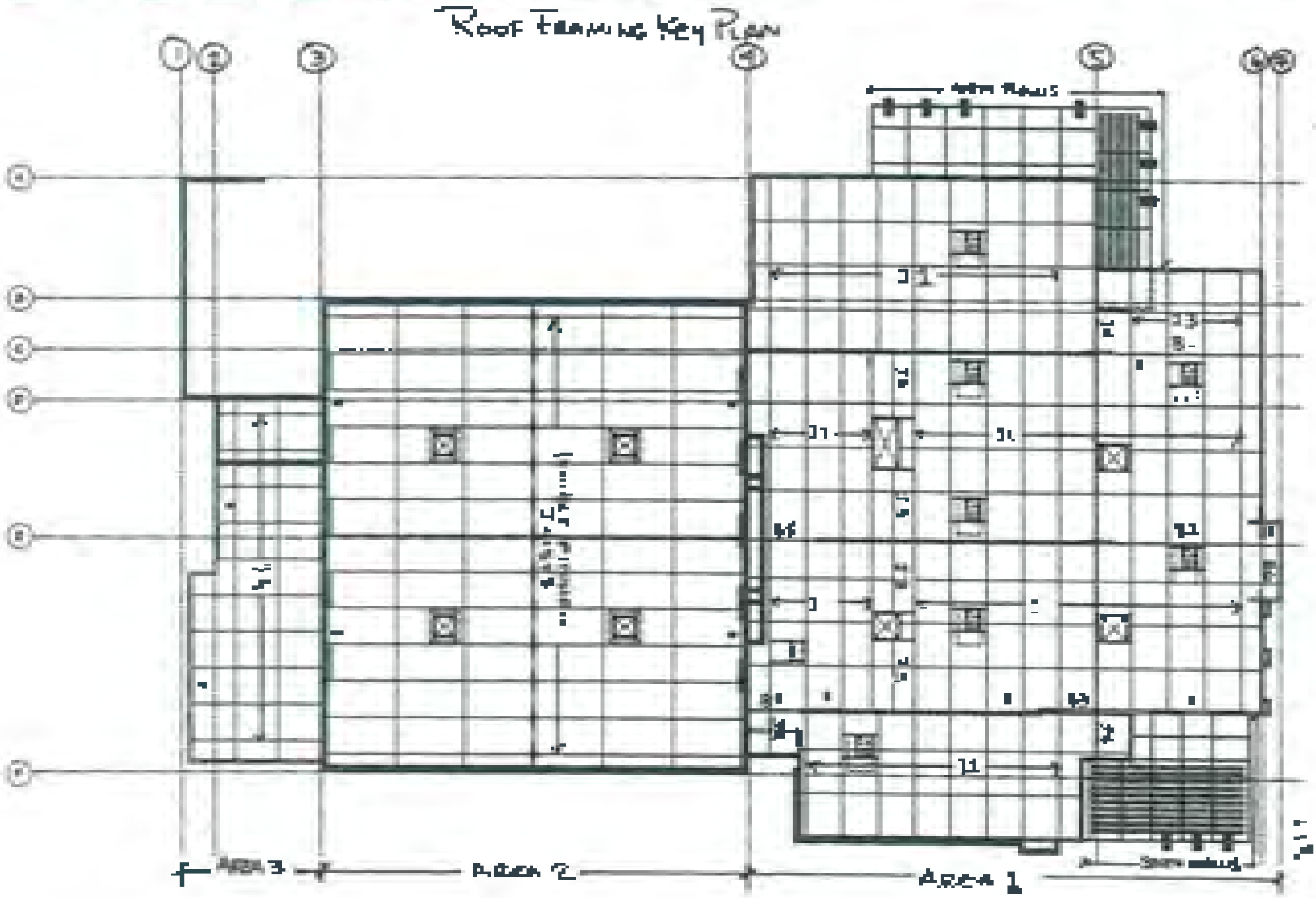
ACOUSTICAL INFORMATION

Deck Type	Noise Reduction Coefficient						Sound Transmission Class
		125	250	500	1000	2000	

VERTICAL LOADS FOR TYPE 1.5B

No. of Spans	Deck Type	Weight	Allowable Total Load (PSF) Span (Ft.-In.)										
1													
2													
3													

PET.APP.001846


Roof Framing Key Plan
Area 3
Area 2
Area 1

Dekker/Perich/Sabatini

Project: NLOFD STATION #53
Number: 07502-01
Subject: ROOF FRAMING
By: AMB Date: 02/20/07
Checked: Sheet:
Page: 44

1) ROOF JOISTS - AREA 1

- JOISTS - J1

SPAN, L = 31'-0"

JOIST SPACING = 6'-0" o.c.

W_DL = 20 psf x 6 ft = 120 PLF
W_LL = 120 PLF

W_TL = 240 PLF

USE 20K4 STEEL JOISTS @ 6'-0" oc.

ALLOW. TOTAL LOAD = 250 PLF > 240 PLF
ALLOW. LIVE LOAD = 162 PLF > 120 PLF } OK

- JOISTS - J2

SPAN, L = 20'-11" ≈ 21'-0"

JOIST SPACING = 6'-0" oc

W_DL = 120 PLF
W_LL = 120 PLF

W_TL = 240 PLF

USE 14K3 STEEL JOISTS @ 6'-0" oc

ALLOW. TOTAL LOAD = 322 PLF > 240 PLF
ALLOW. LIVE LOAD = 212 PLF > 120 PLF } OK

Dekker/Perich/Sabatini

[redacted]

Name: NLVFD Station #53
Name / No.: 07302-01
Subject: ROOF FRAMING
By: AMB Date: 03/20/07
Check: Sheet No.:
Scale: HS

- JOISTS - J3

SPAN, L = 13'-9" ≈ 14'-0"

JOIST SPACING = 6'-0" OC.

DL = 120 PLF
LL = 120 PLF

W_TL = 240 PLF

USE 10K1 STEEL JOISTS @ 6'-0" OC

ALLOW. TOTAL LOAD = 412 PLF > 240 PLF } OK
ALLOW. LIVE LOAD = 284 PLF > 120 PLF }

- JOISTS - J4

SPAN, L = 7'-5" ≈ 8'-0"

JOIST SPACING = 6'-0" OC

W_DL = 20 PLF
W_LL = 120 PLF

W_TL = 240 PLF

USE 2.5K3 JOIST SUBSTITUTES @ 6'-0" OC

ALLOW. TOTAL LOAD = 408 PLF > 240 PLF } OK
ALLOW. LIVE LOAD = 193 PLF > 120 PLF }

2.5K SERIES

2.5K SERIES are steel joist substitutes which are intended for use in roof or floor spans 100' or less where open web steel joists are impractical. They are commonly specified to span over hallways and short spans in stepped bays.



NOTE: 2.5K SERIES NOT U.L. APPROVED

FABRICATION

- Depth 2.5 in
- Maximum Length 100 ft
- Minimum Length 3 ft
- Contact your local Vulcraft sales for slopes or pitched seat information

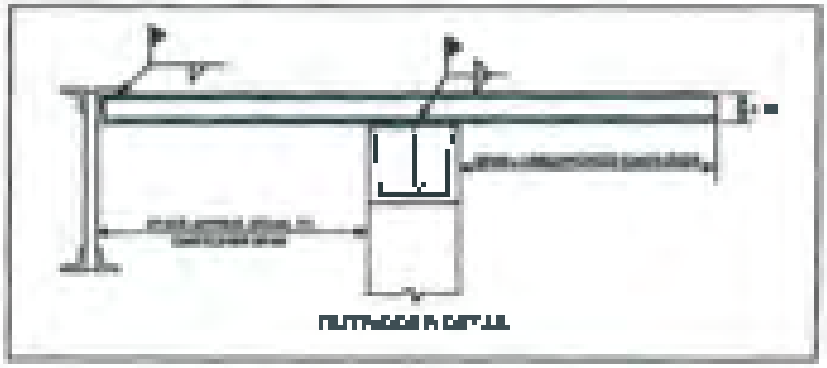
2.5K SERIES SIMPLE SPAN LOAD TABLE

LOAD TABLE SPECIFICATIONS

Joist substitutes are fabricated from material conforming to the 2.5 specifications. F_y = 50 ksi F_y = 36 ksi. Full lateral support to the compression flange is assumed as will be provided by roof deck.

ERECTION STABILITY

Caution must be exercised since joist substitutes exhibit some degree of instability. After erection and before laying of any deck/roof the joists must be welded to the supports per SJI specs and the metal deck installed and welded to the top flange.



OUTRIGGER DETAIL

NOTE: 2.5K SERIES NOT U.L. APPROVED

LOAD TABLE FOR LOOSE OUTRIGGERS

Dokker/Perich/Tabatini

Name: NLVFD Station #53
Number: 07502.051
Subject: Roof Framing
By: AJB Date: 08/15/07
Check: MA

Roof Joist - Area 2

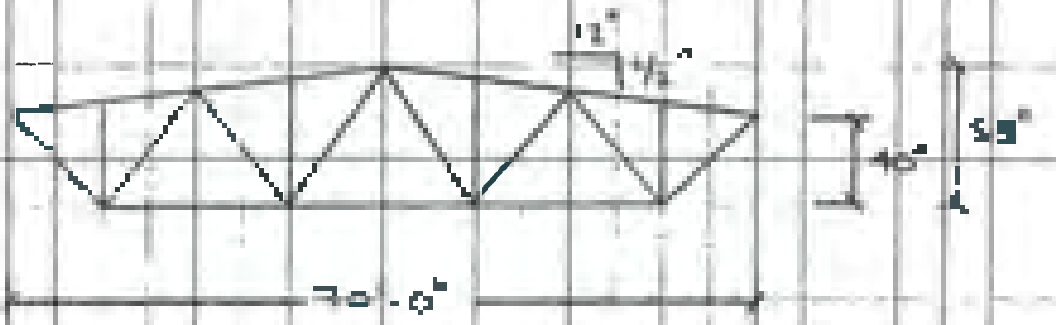
Span, L = 70'-0"

Joist Spacing = 6'-0" o.c.

W_{DL} = 20 psf × 6 ft = 120 PLF

W_{LL} = 120 PLF

W_{TL} = 240 PLF



40-58 Double Pitched Top Chord Underslung

40" TSI TL Allow Load = 288 PLF > 240 PLF ∴ OK
LL Allow Load = 144 PLF > 120 PLF ∴ OK

NOTE: All rows of bridging shall be diagonal bridging with bolted connections at chords and intersection.

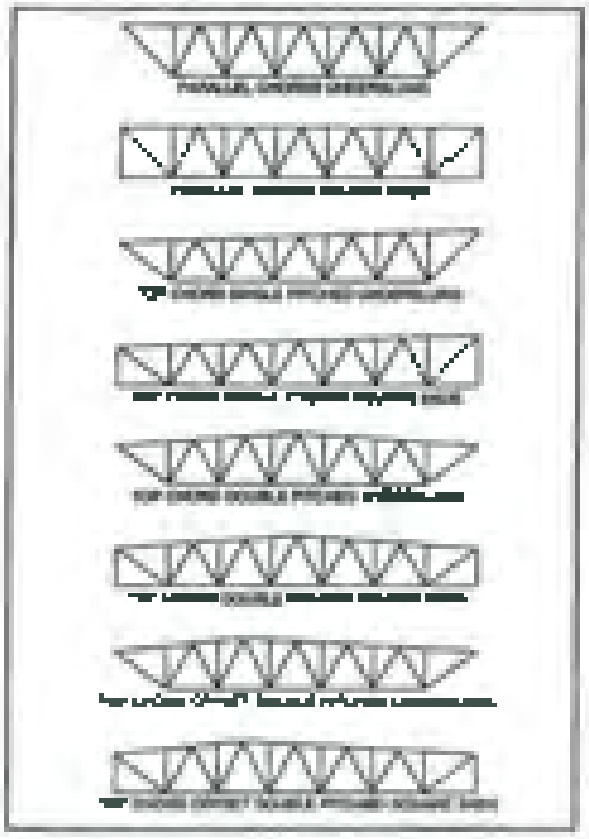
LH & DLH SERIES LONGSPAN STEEL JOISTS

STANDARD TYPES

Longspan steel joists can be furnished with either underslung or square ends, with parallel chords or with single or double pitched top chords to provide sufficient slope for roof drainage.

The Longspan joist designation is determined by the nominal depth at the center of the span, except for pitched double pitched joists, where the depth should be given at the ridge. A joist of the designation should be used so that the maximum number of the joist design load over the design live load (TLL) given in psf.

All pitched ends will be dimensioned in addition to the pitch unless specified otherwise.



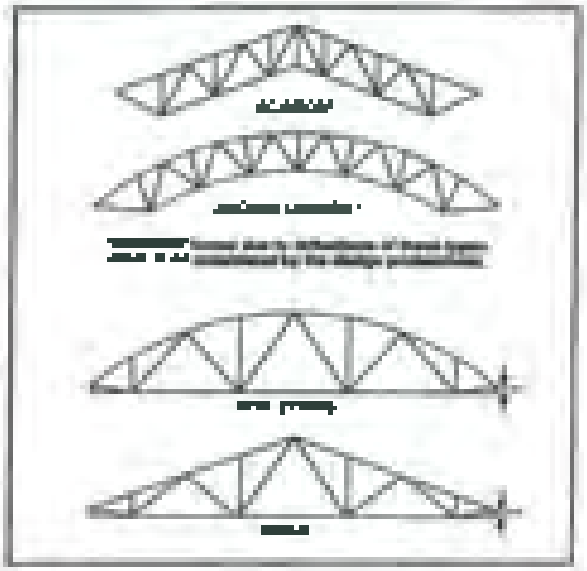
CAMBER

Non-Standard Types: The design professional shall provide on the structural drawings the amount of camber required as a percent of the load and on a per-foot or span basis.

Standard Types: The camber listed in the table will be furnished and the joists unless the design professional specifies otherwise on the structural drawings.

NON-STANDARD TYPES

The following joists can also be supplied by Vulcraft, however, the minimum seating depths will usually be greater than those listed in the load tables. Consult Vulcraft for adjusted joist depths or any questions. Refer also to LONGSPAN JOIST DEPTH ON LEVEL file.



**Consult Vulcraft for minimum depth at ends.

CAMBER FOR STANDARD TYPES

LH SERIES joists shall be cambered in accordance with the following table:

Top Chord Length	Approx. Camber
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

PET.APP.001894



Hitchcock Patrick Associates

Job: NLVFD STATION #53
Job No: 07502-01
Subject: ROOF FRAMING
By: AJB Date: 03/20/07
Checked: Date:
Sheet: H12

ROOF JOISTS - AREA 3 - TYPE J5

SPAN, L = 21'-2" ≈ 22'-0"

JOIST SPACING = 6'-0" OC.

W_{DL} = 120 PLF
W_{LL} = 120 PLF

W_{TL} = 240 PLF

USE 14K3 STEEL JOISTS @ 6'-0" OC

ALLOW. TOTAL LOAD = 293 PLF > 240 PLF ✓ OK
ALLOW. LIVE LOAD = 151 PLF > 120 PLF ✓ OK

Baker/Pereira/Schofield

[redacted]

Job Name: NAVFAC Station #52
Job No.: 07501-01
Subject: Roof Framing
By: AHB Date: 02/20/07
Check: Date:
Sheet: H13

- Beam - B1

Span, L = 27'-3"

Tributary Area = $\frac{13'-9" + 31'-0"}{2} \times 22.375$ sf

Loads:

W_{DL} = 20 psf × 22.375 sf = 448 plf

W_{LL} = 448 plf

W_{TL} = .896 Kif

Unbraced Length = 6'-0" (Joist Spacing Max)

(See Enercalc for Design)

USE W16x26 Beam

- Beam - B2

Span, L = 27'-3"

Tributary Area = $\frac{31'-0" + 27'-9"}{2} \times 30.813$ sf

Loads:

W_{DL} = 20 psf × 30.813 sf = 618 plf

W_{LL} = 618 plf

W_{TL} = 1.236 Kif

(See Enercalc for Design)

USE W18x35 Beam

Miller-Turick Solutions

Name: NLVFD STATION #53
No: 03502-01
Subject: ROOF FRAMING
By: A.L.B. Date: 03/10/21
Check: HJW

- BEAM - B3

SPAN, L = 13'-4"

TRIBUTARY AREA = $\frac{22'-11" + 25'-2"}{2} \times 24.5$ FT

LOADS:

W_{DL} = 20 PSF × 24.5 FT = 490 PLF

W_{LL} = 492 PLF

W_{TL} = 980 PLF

(SEE ENERCALC FOR DESIGN)

W12x19 BEAM

- BEAM - B4

SPAN, L = 8'-8"

TRIBUTARY AREA = $\frac{3'-0" + 28'-2"}{2} \times 15.58$ FT

LOADS:

W_{DL} = 20 PSF × 15.58 FT = 312 PLF

W_{LL} = 312 PLF

W_{TL} = 624 PLF

(SEE ENERCALC FOR DESIGN)

USE W8x10 BEAM

- BEAM - B5

SPAN, L = 11'-8"

TRIBUTARY AREA = 30.875 ft² (SAME AS B2)

LOADS:

W_DL = 618 PLF

W_LL = 618 PLF

W_TL = 1,236 PLF (SAME AS B2)

(SEE ENERCALC FOR DESIGN)

USE W12 x 14 BEAM

Becker/Perlich/Sabatini

[redacted]

Project: Santa Barbara #53
Job No.: 04502-01
Subject: Roof Framing
By: A-1R Date: 08/10/07
Checked: _____ Date: _____
Sheet No.: H16 of _____

T Beam B6

Span = 9'-1"

Loads:

$W_{DL} = 20\ psf \times 6\ ft = 120\ plf$

$W_{LL} = "\ \times 1 = 120\ plf$

$W_{TL} = 240\ plf$

(See Enercalc for Design)

USE HSS6x4x1/8 Beam

[redacted]

Steel Beam Design

Page 1

Description Roof Framing Beam - B1

General Information

[redacted]

Design Loads on Beam

[redacted]

Summary

[redacted]

Forces & Stresses Summary

[redacted]

[redacted]
[redacted]
Las Vegas, [redacted]
Tel: [redacted]
Fax: [redacted]

[redacted]

[redacted]

[redacted]

Steel Beam Design

[redacted]

Description: Roof Framing Beam - B1

Section Properties: W10X33

Depth	[redacted]	Weight	[redacted]
Web Thick	[redacted]	I_x	[redacted]
Flange	[redacted]	I_y	[redacted]
Flange Thick	[redacted]	S_x	[redacted]
Area	[redacted]	S_y	[redacted]
k	[redacted]	R_x	[redacted]
Allowable Stress Design		R_y	[redacted]
J	[redacted]	Z_x	[redacted]
Cw	[redacted]	Z_y	[redacted]
		h	[redacted]

[redacted]

[redacted]

Steel Beam Design

Description: Roof Framing Beam - B2

[redacted]

[redacted]

[redacted]

[redacted]

Summary

[redacted]

Forces & Stress Summary

[redacted]

[redacted]

H2.0

Steel Beam Design

Page 3

Description: Roof Framing Beam - B3

Section Properties: W14X26

[redacted]			

[redacted]

Steel Beam Design

Description Roof Framing Beam - B3

General Information

Design Summary

Force & Stress Summary

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Steel Beam Design

Page 1

Description: Roof Framing Beam - B4

General Information

Steel Section : W8X18

Design Span	8.00 ft	Analysis Method	Load Combination Design
Left Cant.	0.00 ft	Beam Self Weight Calculated	Yes
Right Cant.	0.00 ft	Lateral Bracing	Full Length Top Flange
Total Developed Length	8.00 ft		

Distributed Loads

	B1	B2	B3	B4	B5	B6	B7
Dx	0.017						
Lr	0.017						
S							
Roof Live Load							
Full Length							

Summary

Design OK

Using W8X18 section, Span = 8.000 ft, Fy = 50 ksi
Cantilevers: Left = 0.000 ft, Right = 0.000 ft

	Actual	Allowable		
Moment	3.000 k-ft	40.500 k-ft	Max. Deflection	0.383 in
fb: Bending Stress	8.154 ksi	24.000 ksi	Length/Defl. Ratio	250.0 : 1
Ratio	0.340 : 1		Length/Defl. Limit	1.333 in : 1
Shear	2.100 k	28.000 k		
fv: Shear Stress	2.000 ksi	24.000 ksi		
Ratio	0.083 : 1			

Force & Stress Summary

	Maximum	Dx Case	Lr Case	Lr+0.7S Case	Lr Case	Lr+0.7S Case
Max. M+	3.000 k-ft	0.00	3.00			
Max. M-						
Max. M+ @ Left						
Max. M- @ Right						
Shear @ Left	2.100 k	1.40	2.10			
Shear @ Right	2.100 k	1.40	2.10			
Center Defl.	0.383 in	0.264	0.383	0.383	0.383	0.383 in
Left Cant. Defl.	0.000 in	0.000	0.000	0.000	0.000	0.000 in
Right Cant. Defl.	0.000 in	0.000	0.000	0.000	0.000	0.000 in
Cantilever Defl. @	0.000 in	0.000	0.000	0.000	0.000	0.000 in
Reaction @ Left	2.10 k	1.40	2.10	2.10		k
Reaction @ Right	2.10 k	1.40	2.10	2.10		k

Load Combinations Used: D+Lr, D+S, D+0.75Lr+0.75S
Note: Values shown above are unfactored. See Reaction Load Combinations and Design Parameters for factored values.

[redacted]

Steel Beam Design

Roof Framing Beam - B4

Section Properties W8X10

[redacted]			

[redacted]
[redacted]
Las Vegas, NV 89118
Tel: 702-436-1464
Fax: 702-436-1966

Steel Beam Design

Page 1

Description Steel Framing Beam - B5

General Information

Steel Section: W12x14

Material Properties: ASTM A992/A992M Gr.50

Design Parameters: AISC 360-10 (ASD)

Center Span: 11.00 ft
Left Cant.: 0.00 ft
Right Cant.: 0.00 ft
Total Beam Length: 11.00 ft

Live Load Reduction: Reduce Horizontal

Distributed Loads

Unbalanced Loads for W12x14

	LC1	LC2	LC3	LC4	LC5	LC6	LC7
DL	0.014 k/ft						0.014 k/ft
LL	0.014 k/ft						0.014 k/ft
S							
Start Location							0 ft
End Location							11 ft

Summary

Beam OK

Maximum Load Combination Governs

Load Factor = 1.00, Deflection Factor = 1.00, Stress Factor = 1.00

	Actual	Allowable		
Moment	21.360 k-ft	28.736 k-ft	Max. Deflection	-0.203 in
@ Bending Moment	12.143 ft	23.000 ft	Length/x, Defl	1,296.0 in
Bend No.	0.743 : 1		Length/x-ax. Defl	660.0 in
Shear	1.200 k	47.500 k		
@ Shear Force	3.143 ft	20.000 ft		
Shear No.	0.025 : 1			

Force & Stress Summary

	Maximum	Location ft	LC	Left Support	Right Support	Allowable
Axial, P	21.34 k	11.00	1.4D	21.34		1.4
Major V						1.4
Major V @ Left						1.4
Minor V @ Right						1.4
Shear @ Left	1.200 k	0.00	1.4D	1.20		1
Shear @ Right	1.200 k	0.00	1.4D	1.20		1
Center Defl	-0.203 in	5.496	1.4D	-0.203	0.000	0.000 in
Left Cant Defl	0.000 in	0.000	1.4D	0.000	0.000	0.000 in
Right Cant Defl	0.000 in	0.000	1.4D	0.000	0.000	0.000 in
Beam Self Wt	-0.203 in	5.500	1.4D	-0.203	0.000	0.000 in
Reaction @ Left	21.34 k	0.00	1.4D	21.34		1
Reaction @ Right	21.34 k	11.00	1.4D	21.34		1

Reactions Do Not Include Self Weight

Maximum Moment Does Not Include Self Weight Moment Per Foot

[redacted]

Steel Beam Design

Page 1

Description: Roof Framing Beam W8

Section Properties: W12X14

Depth	[redacted]	Ix	[redacted]
Web Thick	[redacted]	Iy	[redacted]
Width	[redacted]	Sx	[redacted]
Flange Thick	[redacted]	Sy	[redacted]
Area	[redacted]	Zx	[redacted]
Rx	[redacted]	Zy	[redacted]
Values for LRFD Design		Wt/ft	[redacted]
Ag	[redacted]	Cw	[redacted]
Qs	[redacted]	J	[redacted]
		Ro	[redacted]

[redacted]

Steel Beam Design

Description [redacted]

General Information

[redacted]

Design Method [redacted]

[redacted]

Summary

[redacted]

Force & Stress Summary

[redacted]

Section Properties [redacted]

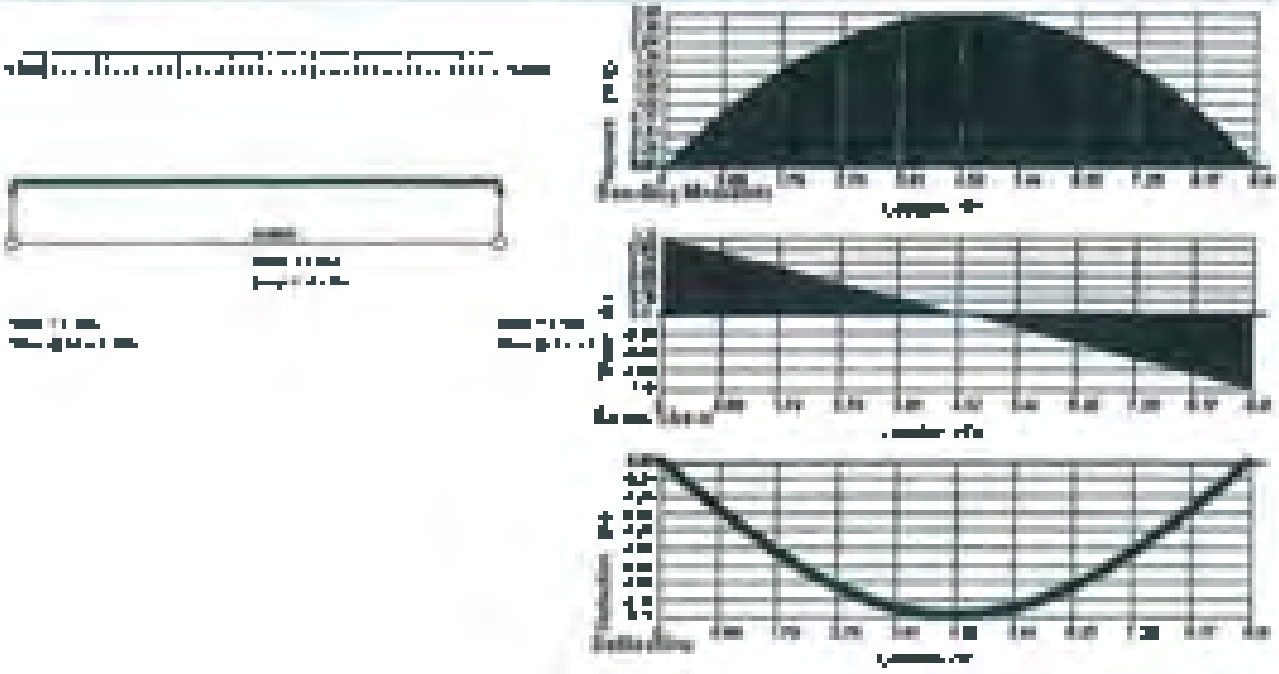
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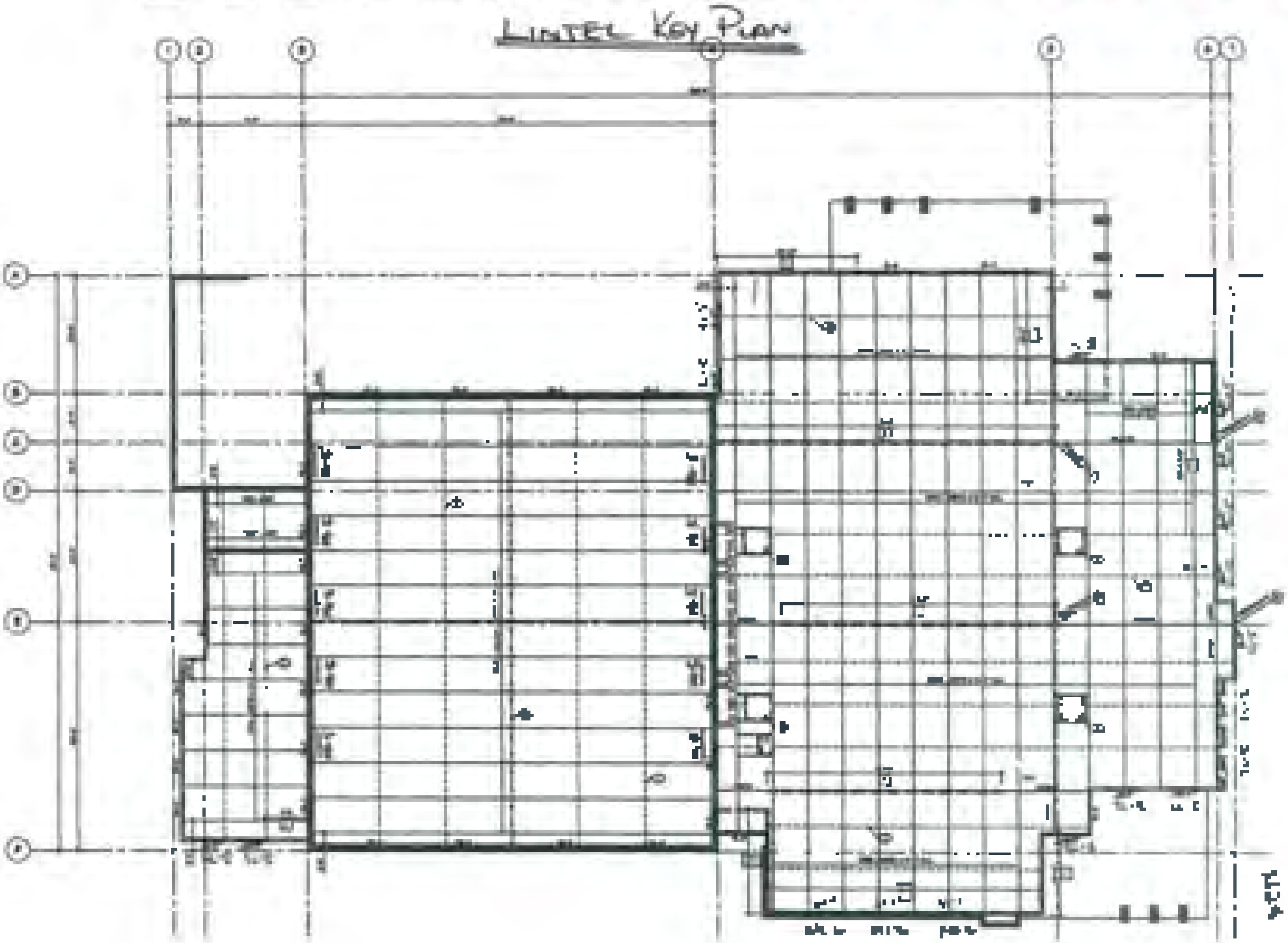
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Steel Beam Design

Roof Framing Beam - B5

Shears & Diagram





PET.APP.001879

MASONRY LINTEL M1-1

- Span = 4'-8"

L_c = 5'-4"

- Check Bearing

$h_c = \frac{L_c}{2} + 8" = 3'-4"$

$2(1'-8") - 8" - 0" + 1'-8" > h_c$

∴ Bearing Occurs

- Loads:

w_{beam} = 88 plf

w_{lintel} = 52 plf

w_{brick} (3 ft, 81 psf) = 270 plf

w_{block} = (5 in · 20 psf) = 700 plf

w_{max} = 1,146 plf

- Flexure:

$M = \frac{w L^2}{8} = \frac{1146\ plf\ (4.67\ ft)^2}{8} = 3,124\ ft\text{-}lb$

$\Rightarrow M = \frac{f_m}{6} b_w\ jk\ d^2$

$jk = \frac{6M}{f_m b_w d^2} = \frac{6(3,124\ lb\text{-}ft)(12"/ft)}{(1,500\ psi)(11.25")^2(6")} = 0.94$

Dekker/Perich/Sabatini

[redacted]

Project: SILVER STATION #53
Job No.: 07502-01
Subject: MASONRY LINTELS
By: A-DR Date: 02/01/07
Client: [redacted]
Ref: HSI

(ML-1 cont.)

$j = 1 - \frac{k}{3}$ .....

$k\left(1 - \frac{k}{3}\right) = 0.198$

$k = 0.40$

$\frac{k}{3} = \frac{0.40}{3} = 0.133$

$j = 1 - 0.133 = 0.867$

$A_s = \frac{M}{f_s j d} = \frac{3,129 \text{ lb-ft}(12 \text{ in/ft})}{(24{,}000 \text{ psi})(0.867)(6 \text{ in})}$

$A_s = 0.30$

USE 2 - #6 bars / $A_s = 0.88 \text{ in}^2 > 0.30 \text{ in}^2$ - OK

- Check Shear:

$V = w\left(\frac{L}{12} - \frac{d}{2}\right) = 1.46 \text{ psf}\left(\frac{8.33'}{2} - \frac{6 \text{ in}}{2(12)}\right)$

$V = 2,195 \text{ lbs}$

$f_v = \frac{V}{b_w d} = \frac{2,195 \text{ lbs}}{(11.25 \text{ in})(6 \text{ in})} = 31.5 \text{ psi}$

$F_v = \sqrt{f'_m} = \sqrt{1500 \text{ psi}} = 39 \text{ psi} > 31.5 \text{ psi}$

∴ No Shear Reinf. Req'd ∴ OK

Bakker/Portich/Sabatini

Project Name: NEVADO STATION 453
Project No.: 23502-01
Subject: MASONRY LINTELS
By: AJB Date: 05/10/19
Check: Date:
Sheet: M32

MASONRY LINTEL M1-2

L_c = 13'-11"

L_x = 14'-0"

- CHECK FOR ARCHING

$h_c = \frac{L_c}{2} = 8' - 7.8"$

$20'-8" - 15'-4" = 5'-4" < h_c$

∴ ARCHING DOES NOT OCCUR



- LOADS:

W_{BEAM} = 88 PLF

W_{WALL} = 1,134 PLF

$W_{MASS\ WALL}$ = 972 PLF

W_{ROOF} = 60 PLF

W_{TOTAL} = 1,196 PLF

- FLEXURAL:

$M = \frac{wL^2}{8} = \frac{0.196\ k/ft\ (13.83\ ft)^2}{8} = 28.786\ k\text{-}ft$

$j_k = \frac{\phi M}{\frac{1}{2} m\, b d^2} = \frac{0.9\,[28.786\ k\text{-}ft)(12"/ft)}{(1500\ psi)(0.45)(12")(14")^2}$

$j_k = 0.606$

$K\left(1 - \frac{K}{3}\right) = 0.606 \Rightarrow K = 0.843$

(ML 2 cont.)

$$j = 1 - \frac{k}{3} = 1 - \frac{0.843}{3} = 0.719$$

$$A_s = \frac{M}{f_s\, j\, d} = \frac{28.786\ k\text{-}ft\ (12"/ft)}{(24{,}000\ psi)(0.719)(14"\ ?)}$$

$$A_s = 1.43\ in^2$$

⇒ TRY A DEEPER BEAM

24" deep Beam

$d = 21"$?

- assume:

$W_{beam\ self} = 88$ plf
$W_{slab} = 264$ plf
$W_{roof\ (8\ psf \times 11'8")} = 918$ plf
$W_{roof\ (snow = 30\ psf)} = 120$ plf
$W_{total} = 1{,}390$ plf

- Recalculate

$$M = \frac{wL^2}{8} = \frac{(1.390\ klf)(15.33')^2}{8} = 40.873\ k\text{-}ft$$

$$k = \frac{f_c M}{f_s b d^2} = \frac{(1)(40.873\ k\text{-}ft)(12"/ft)}{(500\ psi)(11.25"?)(21"?)^2}$$

$$k = 0.263$$

$$k\left(1 - \frac{k}{3}\right) = 0.263 \Rightarrow k = 0.291$$

Bekker-Parish/Sabatini

Name: NAVD Storage 853
Job No.: 29502.01
Subject: MASONRY LINTELS
By: AJB Date: 05/01/07
Chkd: Date:
Sheet: HSW of

$$J = 1 - \frac{k}{3} = 1 - \frac{0.231}{3} = 0.903 \qquad (M_L = 2\ \text{wall})$$

$$A_s\ (\text{req'd}) = \frac{M}{F_s\ J\ d} = \frac{30{,}823\ \text{lb-ft}\ (12\ \text{in/ft})}{(24{,}000\ \text{psi})(0.903)(22\ \text{in})}$$

$$A_s\ (\text{req'd}) = 0.78\ \text{in}^2$$

USE 2 - #6 @ 8" w/ $A_s = 0.88\ \text{in}^2 > 0.78$ in^2

- Check Shear:

$$V = w\left(\frac{\ell}{2} - \frac{d}{2}\right) = 1{,}390\ \text{plf}\left(\frac{13.33\ \text{ft}}{2} - \frac{2.2\ \text{ft}}{2\ (\text{ft/ft})}\right)$$

$$V = 7{,}990\ \text{lbs}$$

$$f_v = \frac{V}{b_w\ d} = \frac{7{,}990\ \text{lbs}}{(6.625\ \text{in})(22\ \text{in})} = 31.2\ \text{psi}$$

$f_{v,allow} = 1500 = 39$ psi > 31.2 psi $\therefore$ OK

$\therefore$ No Shear Reinf. Req'd

Job: NUVEO STATION #53
Job No: 03502-01
Subject: MASONRY LINTELS
By: AJB Date: 05/01/17
Chkd: Date:
Sheet: KBS

MASONRY LINTEL M2.1

L = 16'-0"

L_c = 15'-8"

- Check Trib Area:

$l_c = \frac{L_c}{2} + 8' = 9'-0"$

$29'-8" - 14'-0" < 6.8" < 9'-0"$

∴ Arching Does Not Occur

- Loads:

(D) Superimposed = 88 PLF
(D) Lintel = 528 PLF
(D) Wall (8"nom x 12.67ft) = 1,026 PLF
(L) Snow (40PSF x 35ft) = 1,400 PLF

w_{total} = 3,042 PLF

Moment:

$M = \frac{w l^2}{8} = \frac{(3,042 PLF)(16ft)^2}{8} = 97,344 lb\cdot ft$

$\rho = \frac{\rho_m}{f'_m} \cdot \frac{M}{b d^2} = \frac{(0.85)(97,344 lb\cdot ft)(12 in/ft)}{(1,500 psi)(11.625 in)(44 in)^2}$

$\rho_{req} = 0.190$

Dekker/Perich/Sabatini

NAVFO Station #53
07502-01
MASONRY UNITS
A-4B 05/01/07
[redacted]
H36

(K-3 cont'd)

$j = 1 - \frac{k}{3}$

$\therefore k\left(1 - \frac{k}{3}\right) = 0.190$

$\therefore k = 0.204$

$j = 1 - \frac{k}{3} = 1 - \frac{0.204}{3} = 0.932$

$A_s = \frac{M}{f_s\, j\, d} = \frac{47,344 \text{ lb-ft } (12''/\text{ft})}{(24,000 \text{ psi})(0.932)(46 \text{ in})}$

$A_s = 1.14 \text{ in}^2$

USE 4-#5's ($A_s = 1.23 \text{ in}^2 > 1.14 \text{ in}^2$ ∴ OK)

- CHECK SHEAR:

$V = w\left(\frac{l}{2} - \frac{d}{2}\right) = 3.092 \text{ klf}\left(\frac{20 \text{ ft}}{2} - \frac{46 \text{ in}}{2(12)}\right)$

$V = 28,506 \text{ lbs}$

$f_v = \frac{V}{b \cdot d} = \frac{28,506 \text{ lbs}}{(11.625 \text{ in})(46 \text{ in})} = 39.6 \text{ psi}$

$F_v = 39 \text{ psi} \geq f_v$ ∴ OK

∴ NO SHEAR REINF. REQ'D

Dekker/Perich/Sabatini

[redacted]

Project: NAVFAC Station #53
Job No.: 03507-01
Subject: MASONRY LINTELS
By: AJB Date: 05/01/07
Checked: Date:
Sheet No.: H37

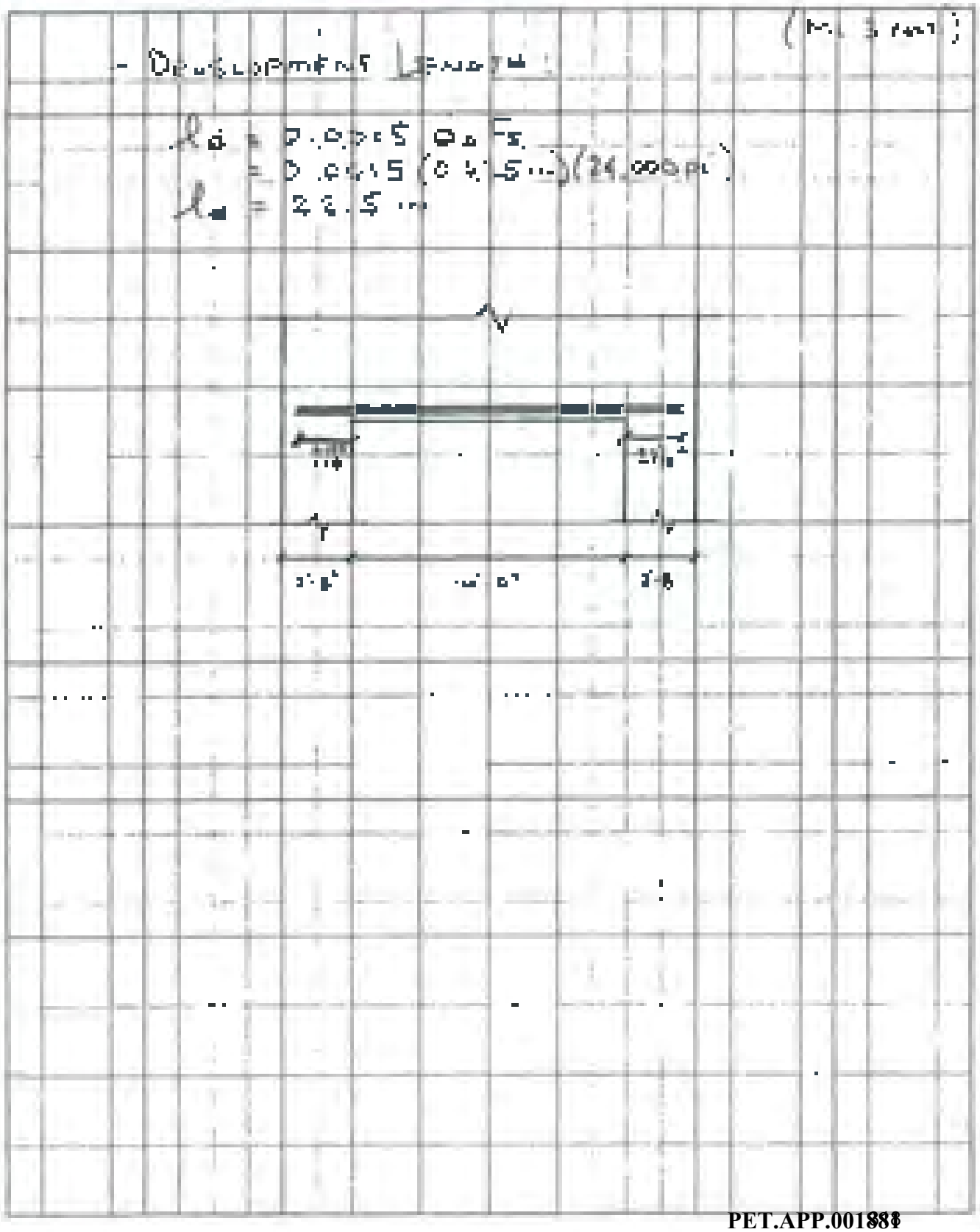
(M.I. 3 mm)

- Development Length:

$l_d = 0.04 A_b F_y$

$= 0.04(0.5\ in)(60{,}000\ psi)$

$l_d = 22.5\ in$



Bakker/Perrich/Bakalinsky

Project: NLVFD Station #5
Job No.: 07502-01
Subject: MASONRY LINTELS
By: AMB Date: 05/01/07
Checked:
Sheet: HSS

MASONRY LINTEL ML-4

L = 6'-0"

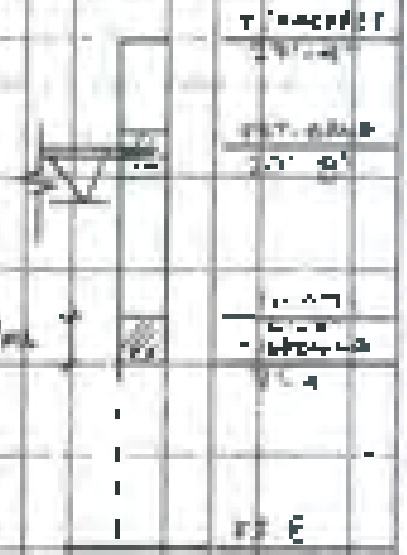
L.L. = 6' 8"

- Check for Arching:

$h_{req} = \frac{L_c}{2} + 8" = 4'-0"$

$16"\phi - 8" - 8" = 1'-0" > 4'-0"$

∴ Arching Occurs



Loads:

W (Bond Beam) = 85 PLF
W (Lintel) = 89 PLF
W (Wall) = (8) psf x 4' = 574 PLF
W (Roof + Floor) = 1,400 PLF
W (Total) = 1,900 PLF

- Flexural:

$M = \frac{wL^2}{8} = \frac{1{,}900\ plf\ (6'-0")^2}{8} = 8{,}550\ lb\text{-}ft$

$\rho = \frac{\phi M}{f'm\ b\ d^2} = \frac{(0.9)(8{,}550\ lb\text{-}ft)(12"/ft)}{(1{,}500\ psi)(11.25")(14")^2}$

$\rho = 0.150$

Dokker/Perich/Sabatini

[redacted]

Name: NLRD STATION #53
Proj. No.: 09501-01
Subj: MASONRY LINTELS
By: AMB Date: 5/5/09
Checked: Date:
Sht. No.: M09

(MAX Cont.)

$K\left(1 - \frac{K}{3}\right) = 0.180 \Rightarrow K = 0.192$

$j = 1 - \frac{K}{3} = 0.936$

$A_s = \frac{M}{f_s\, j\, d} = \frac{8,550 \text{ lb-ft} \times (12 \text{ in/ft})}{(24,000 \text{ psi}) \times 0.936 \times (14 \text{ in})}$

$A_s = 0.326 \text{ in}^2$

USE 2 - #6's w/ $A_s = 0.88 \text{ in}^2 > 0.326 \text{ in}^2$ ∴ OK

- Check Shear:

$V = w\left(\frac{l}{2} - \frac{d}{2}\right) = 1,000 \text{ plf}\left(\frac{16 \text{ ft}}{2} - \frac{14 \text{ in}}{2(12 \text{ in/ft})}\right)$

$V = 7,592 \text{ lbs}$

$f_v = \frac{V}{b\, d} = \frac{7,592 \text{ lbs}}{(12 \text{ in})(14 \text{ in})} = 28 \text{ psi}$

$f_{v,c} = \sqrt{1500} = 39 \text{ psi} > 28 \text{ psi}$ ∴ OK

No Shear Reinf Reqd

Pfeiffer Partners Structural

[redacted]

Name: NUVO Section #53
Job No.: 07502 - 01
Subject: MASONRY LINTELS
By: A.L.G. Date: 08/17/07
Client:
Sheet: Hand

Masonry Lintel ML-01

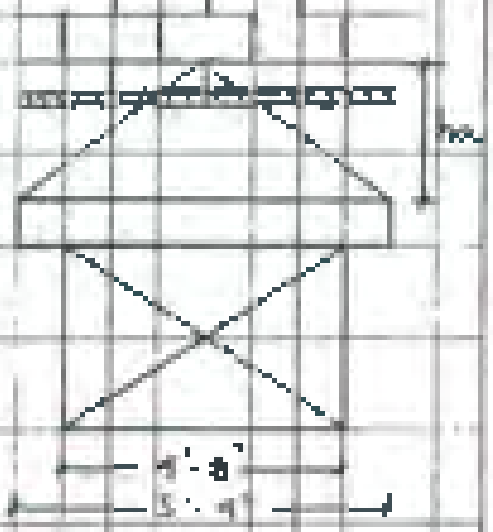
Span = 9'-8"

$L_{eff} = 5'-4" + 8" = 5'-4"$

$h_a = \frac{5'-4"}{2} + 8" = 3'-4"$

$(20'-8") \cdot (19'-4") = 1'-4"$

* Arching does NOT occur.



Loads:

$L_{wall} = 170$ PLF
$L_{floor} = 9$ psf x 8' = 72 PLF
Beam Reaction = 88 PLF

$W_{DL} = 20$ PSF x 3' = 60 PLF
$W_{LL} = 20$ PSF x 3' = 60 PLF

$W_{TOTAL} = 378$ PLF

Flexural:

$M = \frac{wL^2}{8} = \frac{(2.378\ k/ft)(9.67\ ft)^2}{8} = 6.719\ k\text{-ft}$ (80.952 in-k)

$\rho_{req} = \frac{6M}{f'_m b d^2} = \frac{6(80.952\ k\text{-in})}{(1500\ psi)(7.625\ in)(9\ in)^2} = 0.142$

Dobkin Reich/Sabatini

[redacted]

Name: NLVFO Station #53
Job No.: 07502-01
Subject: MASONRY LINTELS
By: MB Date: 6/27/07
Checked: ___ Date: ___
Date: MAY (M = 5 ksi)

$K\left(1 - \frac{K}{3}\right) = 0.142$

$K = 0.149$

$j = 1 - \frac{0.149}{3} = 0.95$

$A_s\ (req'd) = \frac{M}{f_s \cdot j \cdot d} = \frac{80{,}352\ lb\text{-}in}{(24{,}000\ psi)(0.95)(14\ in)}$

$= 0.253\ in^2$

USE 2 - #6's $\rightarrow A_s = 0.88\ in^2 > 0.253\ in^2$ ∴ OK

- CHECK SHEAR

$V = w\left(\frac{L}{2} - \frac{d}{2}\right) = 2376\ plf\left(\frac{11.67'}{2} - \frac{1.167'}{2}\right)$

$= 9{,}162\ lbs$

$f_v = \frac{V}{b \cdot d} = \frac{9{,}162\ lbs}{(15.25\ in)(19\ in)} = 25.57\ psi$

$F_v = \sqrt{1500} = 38.7\ psi > f_v$ ∴ OK

∴ NO SHEAR REINF. REQ'D

Dekker/Perich/Sabatini

Project: NAVFAC STATION #53
075057.01
Subject: MASONRY LINTELS
By: AJB Date: 08/18/97
Check: NMB Sheet #:

[redacted]

MASONRY LINTEL ML-6

8" CMU WALL

SPAN = 4'-8"

L_e = 5'-4"

P_D = 1'-4" + 8" x 5'-4"

(ONLY WALL LOADS APPLIED, NO ROOF AT THIS LOCATION)

--DEAD--

LINTEL = 58 PLF

WALL = 61 PSF x 3.33' = 205 PLF

w_{TOTAL} = 266 PLF

--FLEXURAL--

$$M = \frac{wL^2}{8} = \frac{(266\ plf)(4.67\ ft)^2}{8} = 726\ lb\text{-}ft\ (8.538\ lb\text{-}in)$$

$$J_K = \frac{6M}{f'm\ b\ n\ d^2} = \frac{6(8.538\ lb\text{-}in)}{(1500\ psi)(3.625\ in)(6\ in)^2} = 0.124$$

$$k\left(1 - \frac{k}{3}\right) = 0.124$$

$$k = 0.1296$$

$$j = 1 - \frac{0.1296}{3} = 0.957$$

Dekker/Perich/Sabatini

Name: NCVFD STATION #53
Job No.: 07502-01
Subject: MASONRY LINTELS
By: AB Date: 01/18/07
Checked: Date:
Sheet: MW3 of:
(Wall Segment)

A_s (REQ'D) = $\frac{M}{\phi f_y d}$ = $\frac{8,538 \text{ lb-in}}{(24,000 \text{ psi})(0.95)(6 \text{ in})}$

= 0.062 in²

USE 2 - #5 w/ A_s = 0.41 in² > 0.062 in² ∴ OK

* 24 INSPECTION No. 5 REQUIRED PER IBC

Dekker/Perich/Sabatini

Name: NLVFD Station #53
Project Number: 07502-01
Subject: Steel Headers
By: AJB Date: 05/03/07
Checked: Date:
Sheet: HMF #:

Steel Header S-1

L = 3'-4" Load Bearing Header

$w_{DL} = (20\ psf \times 20'-8'/2) \times 20\ plf = 227\ plf$

$w_{LL} = 20\ psf \times 20'-8'/2 = 207\ plf$

$w_{TOTAL} = 414\ plf$

USE 2 - 600S162-43 Boxed Header

$w_{allow} = 1257\ plf > 414\ plf$ ∴ OK

(See Attached SSMA Header Load Table)

Header Support:

- Jack Studs:

$R_{DL} = \frac{wL}{2} = \frac{227\ plf \times (3.33'-)}{2}$

$R_{DL} = 378\ lbs$

$R_{LL} = 345\ lbs$

H = 10'-0"

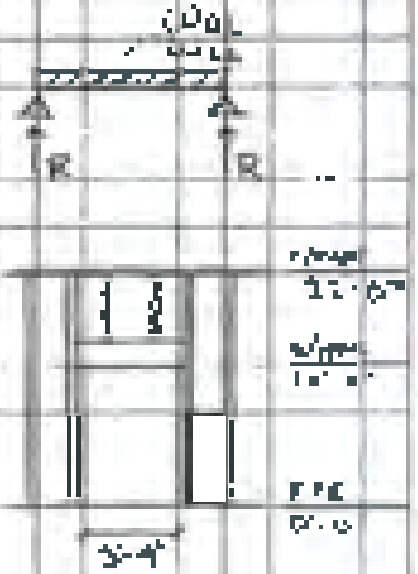
USE 4 - 600S162-43 Stud

$I_{eff} = 2.316\ in^4$

$S_{eff} = 0.963\ in^3$

$r = 2.276\ in$

$A_g = 0.487\ in^2$



[redacted]

Project: HLTO Storage #53
Project Number: 07502-01
Subject: STEEL HEADERS
By: AJB Date: 05/03/07
Chk'd: Date:
Scale: NTS

SI. 1. (cont.)

$$F_e = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2 (29{,}000\ ksi)}{\left(\frac{(1.0)(2.0\ in - 0.125\ in)}{0.276\ in}\right)^2} = 189\ ksi$$

$$\lambda_c = \sqrt{\frac{F_y}{F_e}} = \sqrt{\frac{33\ ksi}{189\ ksi}} = 0.564$$

$$F_{cr} = (0.658^{\lambda_c^2}) F_y = (0.658^{(0.564)^2}) 33\ ksi$$

$$= 28.86\ ksi$$

$$P_n = A_g F_{cr} = 0.344\ in^2 (28.86\ ksi) = 9{,}928\ lbs$$

$$P_a = \frac{P_n}{\Omega_c} = \frac{9{,}928\ lbs}{1.8} = 5{,}516\ lbs$$

$P = 723\ lbs < P_a \therefore$ OK

- FULL HEIGHT STUDS:

$$P_{studs} = \left[\left(\frac{3.33\ klf}{2}\right) + \left(\frac{1.33\ klf}{2}\right)\right](14.0\ ft) = 34.5\ kips$$

$$M = \frac{wL^2}{8} = \frac{(34.5\ kips)(22\ ft)^2}{8} = 2{,}087\ lb\text{-}ft$$

$$= 25\ k\text{-}in$$

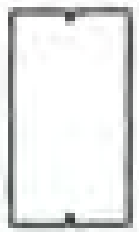
USE 2 - 600S162-43 FULL HEIGHT STUDS

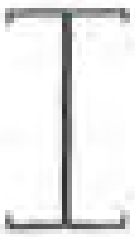
$$\phi_b M_n = (2)\ 16.68\ k\text{-}in = 33.36\ k\text{-}in \therefore$$ OK

Header Load Tables

Header Load Table Notes

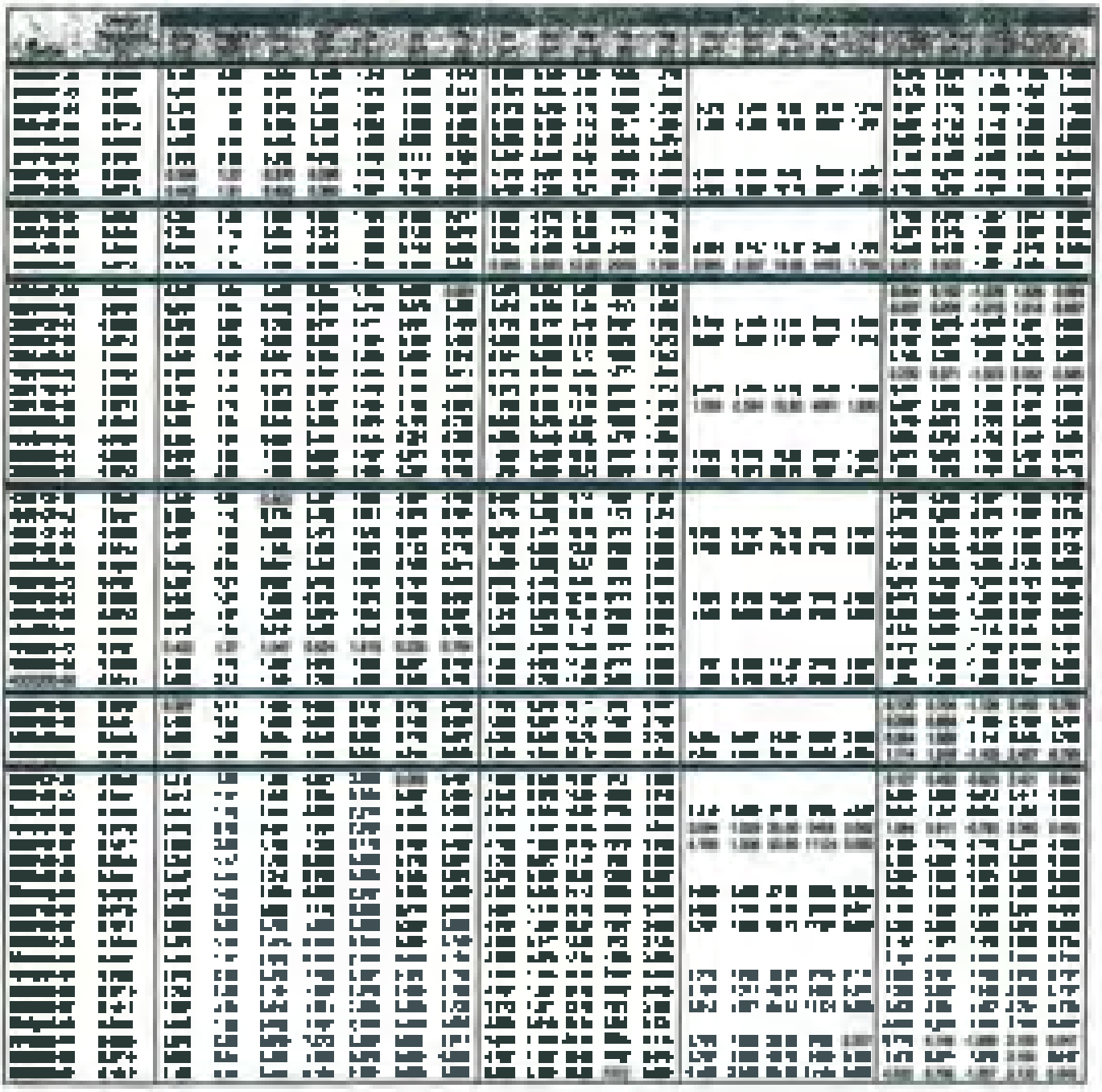
1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]





Header Allowable Uniform Loads (lb/ft)

Structural (S) Stud Section Properties



Dokker/Perich/Sabatini

[redacted]

Project: SVFD Station #53
Job No.: 07502-01
Subject: Steel Headers
By: A.L.B. Date: 6/09/11
Checked: Page:
Scale: NTS

Steel Header S1-2

L = 7'-6" (Load Bearing)

$W_{DL} = \left(\frac{27'-10'}{2} \times 20\ PSF\right) + 20\ PLF = 278\ PLF$

$W_{LL} = \left(\frac{27'-0'}{2} \times 20\ PSF\right) = 270\ PLF$

$W_{TOTAL} = 548\ PLF$

(See Enercalc Sheet T-1 Design)

USE (1) 5-3"x14" Headers

- Jack Studs

$R_{DL} = 1150\ lbs$
$R_{LL} = 1040\ lbs.$
} From Enercalcs

H = 10'-0"

USE (2) 1-600S162-43 Stud

$P = 1,150 + 1040 = 2,190\ lbs$

From S1-1 Calculations

$P_a = 5,516\ lbs > P$ 1, OK

FULL HEIGHT STUDS:

$P_{studs} = \left(\frac{1.5ft}{2} + \frac{13ft}{2}\right)(10.8)\,plf = 65.4\,plf$

$M = \frac{w\ell^2}{8} = \frac{(65.4\,plf)(12ft)^2}{8} = 3,956\,lb\text{-}ft$

$= 47.5\,k\text{-}in$

USE (3) 600S162-43 FULL HEIGHT STUDS

$M_n = (3)\,16.68\,k\text{-}in. = 50.04\,k\text{-}in > 47.5$

∴ OK



Steel Beam Design

Page 1

Description: Reaction - SL-3

General Information

Steel Section: HSS20X12X716

Design Type		Flexural Planning		Fy	
Left Cant.				Load Duration Factor	1.00
Right Cant.				Beam Weight	
Lb, Unbraced Length					

Distributed Loads

	#1	#2	#3	#4	#5	#6	#7
DL							
LL							
SL							
Beam Location							
End Location							

Summary

Beam OK

Moment			Max Deflection	
Shear			Length/Δ LL Limit	
			Length/Δ TL Limit	

Flexural & Shear Summary

	Moment	Ω Ωb	LL Ωb (@ Center)	LL Ωb (@ Center)	TL Ωb (@ Center)	TL Ωb (@ Center)	
Beam Ωb Left							
Beam Ωb Right							
Center Defl							
Left Cant. Defl							
Right Cant. Defl							
Beam Defl Ratio							
Reaction Ωb Left							
Reaction Ωb Right							

Fy applied per Fb, Ω=1.67 & Ωv

Section Properties

Depth		Weight	
Web Thick		Ag	
Width		Ix	
Flange Thick		Sx	
Area		Zx	
Iy		Sy	
Values for Left Cantilever:		Zy	
		J	
Cw		rT	

Bekker/Perich/Sabatini

Project: NUFO Station #53
Project No.: 07502.01
Subject: Steel Headers
By: AJB Date: 02/09/07
Checked: Date:
Sheet: WSJ #:

Steel Header SL-3

L = 11'-2" (Long Bearing)

$W_{DL} = \left(\frac{28'-9"}{2} \times 20 \text{ psf}\right) + 20 \text{ plf} = 305 \text{ plf}$

$W_{LL} = \left(\frac{28'-9"}{2} \times 20 \text{ psf}\right) = 288 \text{ plf}$

$W_{TOTAL} = 593 \text{ plf}$

(See Enercalc for Design)

USE HSS6x4x5/16 HEADER

∴ Jack Studs:

$R_{DL} = 1,800 \text{ lbs}$
$R_{LL} = 1,620 \text{ lbs}$ } from Enercalc

$P = 3,420 \text{ lbs}$

H = 10'-6"

From SL-1 Calculations (1) 6003.62-.43

$P_a = 5,516 \text{ lbs} > 3,420 \text{ lbs}$ ∴ OK

∴ USE 2 - 6003.62-.43 Stud

(2 for Bearing)

Dekker/Perich/Sabatini

Project Name: NLVFD Stations
Project Number: 07502-01
Subject: Steel Headers
By: MB Date: 05/04/07
Checked: Date:
Sheet: W32

- Full Height Studs: (2-3 Unit)

$W_{HEAD} = \frac{11'}{2} \times 14.81 = 81.7$ PLF

$W_{STUDS} = \frac{1.5^2}{2} \times 14.81 = 9.0$ PLF

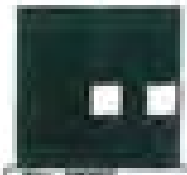
$M_L = 3.94$ K-FT $\times 12'' = 44.86$ K-IN

USE STRUCTURE Beam Analysis

USE (3) 600S162-43 Full Height Studs

$M_L = (3)\ 16.68$ K-IN $= 50$ K-IN > 44.86

$\therefore$ OK



H53

Steel Beam Design

General Information

Distributed Loads

Summary

Force & Stress Summary

Section Properties

[redacted]

1454

Single Span Beam Analysis

Description: Full Height Stud - SL-3

General Information

[redacted]			
Left Cantilever	ft	[redacted]	
Right Cantilever	ft	[redacted]	

Uniform Loads

On Center Span...		On Left Cantilever...		On Right Cantilever...	
#1	[redacted]	#1	[redacted]	#1	[redacted]

Trapezoidal Loads

Magnitude @ Left	[redacted]	[redacted]	[redacted]	[redacted]
Magnitude @ Right	[redacted]	[redacted]	[redacted]	[redacted]
Dist. To Left Side	[redacted]	[redacted]	[redacted]	[redacted]
Dist. To Right Side	[redacted]	[redacted]	[redacted]	[redacted]

Query Values

Center Location	[redacted]	Left Cant.	[redacted]	Right Cant.	[redacted]
[redacted]	[redacted]		[redacted]		[redacted]
[redacted]	[redacted]		[redacted]		[redacted]
[redacted]	[redacted]		[redacted]		[redacted]

Summary

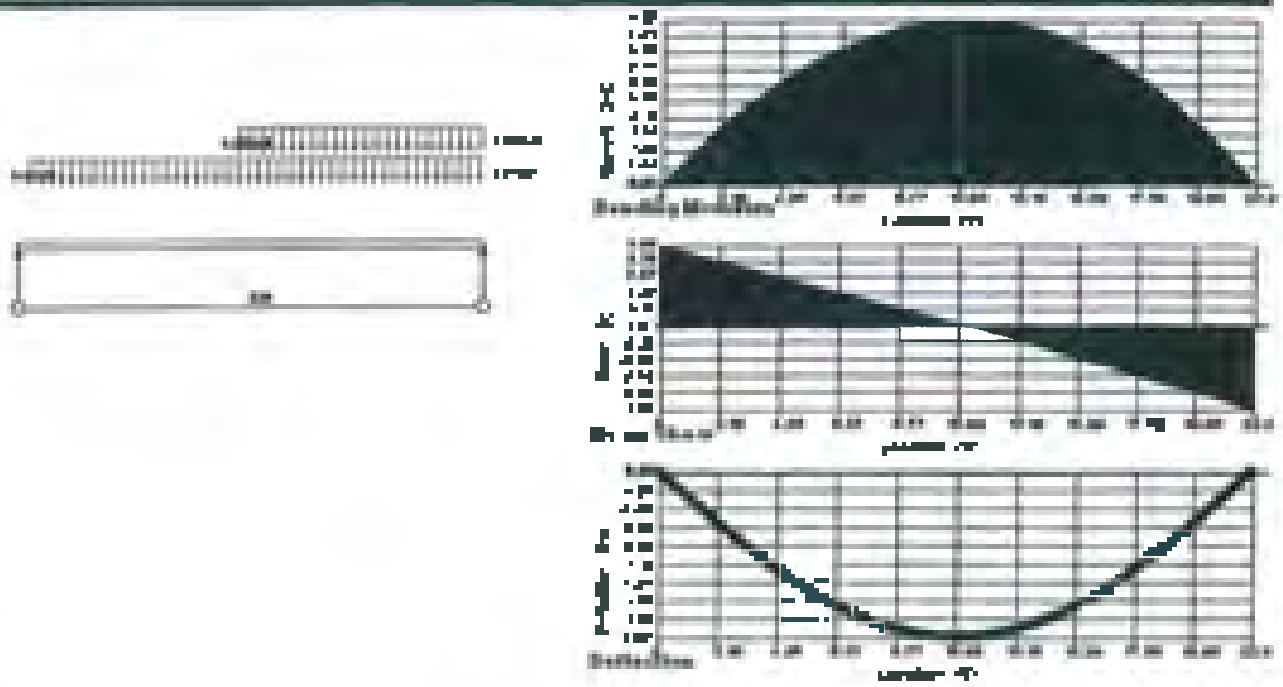
[redacted]				Reactions...		Reactions...	
[redacted]	[redacted]	at	[redacted]	@ Left	[redacted]	@ Left	[redacted]
[redacted]	[redacted]	at	[redacted]	@ Right	[redacted]	@ Right	[redacted]
@ Left Cant.	[redacted]			Shear/Mom	[redacted]		
@ Right Cant.	[redacted]			Deflections...			
[redacted]	[redacted]			@ Center	[redacted]	at	[redacted]
				@ Left Cant.	[redacted]	at	[redacted]
				@ Right Cant.	[redacted]	at	[redacted]

Title
Job #
Date
Designer

Single Span Beam Analysis

Description

Sketch & Diagram



Dekker·Perich·Sabatini

[redacted]

Project: MetroPCS Station #453
07502-01
Subject: Steel Headers
By: AJB Date: 05/09/07
Check: Date:
Sheet: Wall

STEEL HEADER SL-4

L = 16'-0" (LOAD BEARING)

$W_{DL} = \left(\frac{28'-1"}{2} \times 20 psf\right) + 20 PLF = 308 PLF$

$W_{LL} = \left(\frac{28'-9"}{2} \times 20 psf\right) = 288 PLF$

$W_{TOTAL} = 596 PLF$

(SEE ENERCALC SHEET FOR D

USE HSS9x3x1/4 HEADER

- JACK STUDS:

$R_{DL} = 2,610$ lbs
$R_{LL} = 2,300$ lbs
} FROM ENERCALC

$P_u = 4,910$ lbs

H = 10'-0"

FROM SL-1 CALCULATIONS: 2@2.62-93

$P_a = 5,516$ lbs > 4,910 lbs

USE (2) 2.62-93 JACK STUDS

(2 FOR BEARING)

Keller Zerich Cuhaj

NLYPD Station #53
07502-01
Type: Heaters
Age: 03/08/07
Hgt

- Full Height Studs: (SL-4 Stud)

Wind = $\frac{16\,FT}{2} \times 14\,\frac{lb}{ft^2} = 112\,plf$

Studs = $\frac{1.33\,FT}{2} \times 14\,\frac{lb}{ft^2} = 9.8\,plf$

(See Energy Beam Analysis)

M = 5.09 k-ft × 12 in/ft = 60.84 k-in

S = 1(0.967 in²) + 3.068 in³
↳ Full Height Studs

$\phi M_n = \phi S F_y = (0.95)(3.068\,in^3)(33\,ksi)$
$= 96.8\,k\text{-}in > 60.84\,k\text{-}in$ OK

Use 9-600S 162-43 Full Height Studs

[redacted]

Steel Beam Design

[redacted]

Optional Information

Steel Section : [redacted]

Distributed Loads

Summary

Force & Stress Summary

Section Properties

[redacted]

#457

Single Span Beam Analysis

Description: Full Height Stud - SC-4

General Information

Center Span	[redacted]	[redacted]	[redacted]
Left Cantilever	[redacted]	[redacted]	[redacted]
Right Cantilever	[redacted]	[redacted]	[redacted]

Uniform Loads

On Center Span...		On Left Cantilever...		On Right Cantilever...	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Trapezoidal Loads

Magnitude @ Left	[redacted]	[redacted]	[redacted]	[redacted]
Magnitude @ Right	[redacted]	[redacted]	[redacted]	[redacted]
Dist. To Left Edge	[redacted]	[redacted]	[redacted]	[redacted]
Load Length	[redacted]	[redacted]	[redacted]	[redacted]

Query Values

Center Location	[redacted]	Left Cant.	[redacted]	Right Cant.	[redacted]
Moment	[redacted]		[redacted]		[redacted]
Shear	[redacted]		[redacted]		[redacted]
Deflection	[redacted]		[redacted]		[redacted]

Summary

Reactions -				Moments		Maximums	
Left @ Center	[redacted]	at	[redacted]	@ Left	[redacted]	@ Left	[redacted]
Right @ Center	[redacted]	at	[redacted]	@ Right	[redacted]	@ Right	[redacted]
@ Left Cant.	[redacted]			Maximum	[redacted]		
@ Right Cant.	[redacted]			Deflections			
Maximum =	[redacted]			@ Center	[redacted]	at	[redacted]
				@ Left Cant.	[redacted]	at	[redacted]
				@ Right Cant.	[redacted]	at	[redacted]

Ammann & Whitney/Bahalini

Project Name: NLVPD STATION #53
Project Number: 09502-01
Subject: STEEL LINTELS
By: AJB Date: 05/09/07
Checked: Date:
Sheet: H60

STEEL HEADER SL-5

L = 7'-6" (NON BEARING)

W_{PLF} (3FT x 20 PSF) = 60 PLF
WALL: (3FT x 20 PSF) + 60 PLF

W_{TOTAL} = 140 PLF

(SEE SSMA HEADER LOAD TABLE)

USE (2) 600S162-43 BACK TO BACK HEADER

W_{ALLOW} = 343 PLF > 140 PLF ∴ OK

- JACK STUDS:

$R_{DL} = \frac{(80\,PLF)(7.5\,FT)}{2} = 300\,\#$

$R_{LL} = \frac{(60\,PLF)(7.5\,FT)}{2} = 225\,\#$

525 lbs

H_J = 10'-0"

FROM SL-1 JACK STUD CALCULATIONS FOR (1) 600S162-43:

P_a = 5,516 lbs > 525 lbs ∴ OK

USE 1-600S162-43 JACK STUD

Bekker/Perich/Sabatini

Name: NUFO STATION #53
Job No: 01502.01
Subject: STEEL LINTELS
By: AJB Date: 05/04/17
Note:
Sheet:

---- = FULL HEIGHT STUDS: (SL 5 PORT.)

SAME AS SL:2

USE (2) C600S162-43 FULL HEIGHT STUDS

PET.APP.001906

Bekker/Perich/Sabatini

Project: ALVEO STATION #53
Job No.: 07502.01
Subject: TRELLIS FRAMING
By: AJB Date: 06/01/07
Chkd: Date:
Sheet: 8.3

SOUTH TRELLIS

- BEAM B1:

LOADS:

w_{DL} = 5 psf × 5.5 ft = 28 plf

w_{LL} = 20 psf × 5.5 ft = 111 plf

L = 7'-6"

(SEE ENERCALC FOR DESIGN)

USE HSS 5×3×¼

- BEAM B2

w_{DL} = 5 psf × 5.5 ft = 28 plf

w_{LL} = 20 psf × 5.5 ft = 111 plf

L = 13'-8½"

(SEE ENERCALC FOR DESIGN)

USE HSS 5×3×¼

Dokker/Pekich/Sabatini

Name: NAVFD STATION #53
Project No.: 01202-01
Subject: CANOPY FRAMING
By: AJB Date: 06/07/07
Checked: _____ Date: _____
Sheet: Wind of _____

- Beam B3

P_{DL} = 140 lbs + 250 lbs = 390 lbs

P_{LL} = 200 lbs + 760 lbs = 1170 lbs

L = 19'

L_n = 6' - 1 5/8"

(See Envelope for Design)

USE HSS 10 x 3 x 3/16

- Beam B4

W_{DL} = 5psf x 3.1 ft = 15.5 plf

W_{LL} = 20psf x 3.1 ft = 62 plf

P_{DL} = 640 lbs } from B3 reactions

P_{LL} = 1,510 lbs }

L = 2' + 3'

L_n = 5' - 9"

(See Envelope For Design)

USE HSS 10 x 3 x 3/16

[redacted]

Steel Beam Design

Description: South Trellis - B7

Summary

Forces & Stress Summary

Section Properties



Steel Beam Design

Description: South Trellis - AC

General Information

Steel Section : HSS5X3X3/16

Distributed Loads

Summary

Force & Stress Summary

Section Properties HSS5X3X3/16



Steel Beam Design

Page 1

General Information

Point Loads

Summary

Beam OK

Force & Stress Summary

Section Properties

[redacted]

[redacted]
[redacted]
[redacted]
Tel: 702-434-1999
Fax: 702-434-1998

[redacted]
[redacted]

[redacted]

Steel Beam Design

Page 1

Description South Trellis

General Information

[redacted]

Input Section : [redacted]

Center Span	[redacted]	Flexural Phi	[redacted]	[redacted]
Left Cant.	[redacted]	Shear Phi	[redacted]	[redacted]
Right Cant.	[redacted]			
Le : Unbraced Length	[redacted]			

Distributed Loads

[redacted]

	[redacted]						
	[redacted]						
Start Location							
End Location							

Point Loads

[redacted]

Dead Load	[redacted]						
Live Load	[redacted]						
Short Term							
Location	[redacted]						

Summary

[redacted]

Beam OK

[redacted]

Moment	[redacted]	[redacted]	Max. Deflection	[redacted]
Max. Moment Envelope	[redacted]	[redacted]	Length of Cant.	[redacted]
Ag / Ps	[redacted]		Length/Overall Depth	[redacted]
Shear	[redacted]	[redacted]		
Max. Shear Envelope	[redacted]	[redacted]		
Av / Ps	[redacted]			

Forces & Stress Summary

[redacted]

	Moments	Shear	Axial	Deflection	Left Cant.	Right Cant.
Max. M +	[redacted]	[redacted]	[redacted]			[redacted]
Max. M -						[redacted]
Max. V @ Left						[redacted]
Max. M @ Right						[redacted]
Shear @ Left	[redacted]	[redacted]	[redacted]			[redacted]
Shear @ Right	[redacted]	[redacted]	[redacted]			[redacted]
Comp. Def.	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Left Cant Def.	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Right Cant Def.	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Quarry Def. @	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Reaction @ Left	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]
Reaction @ Right	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]

[redacted]



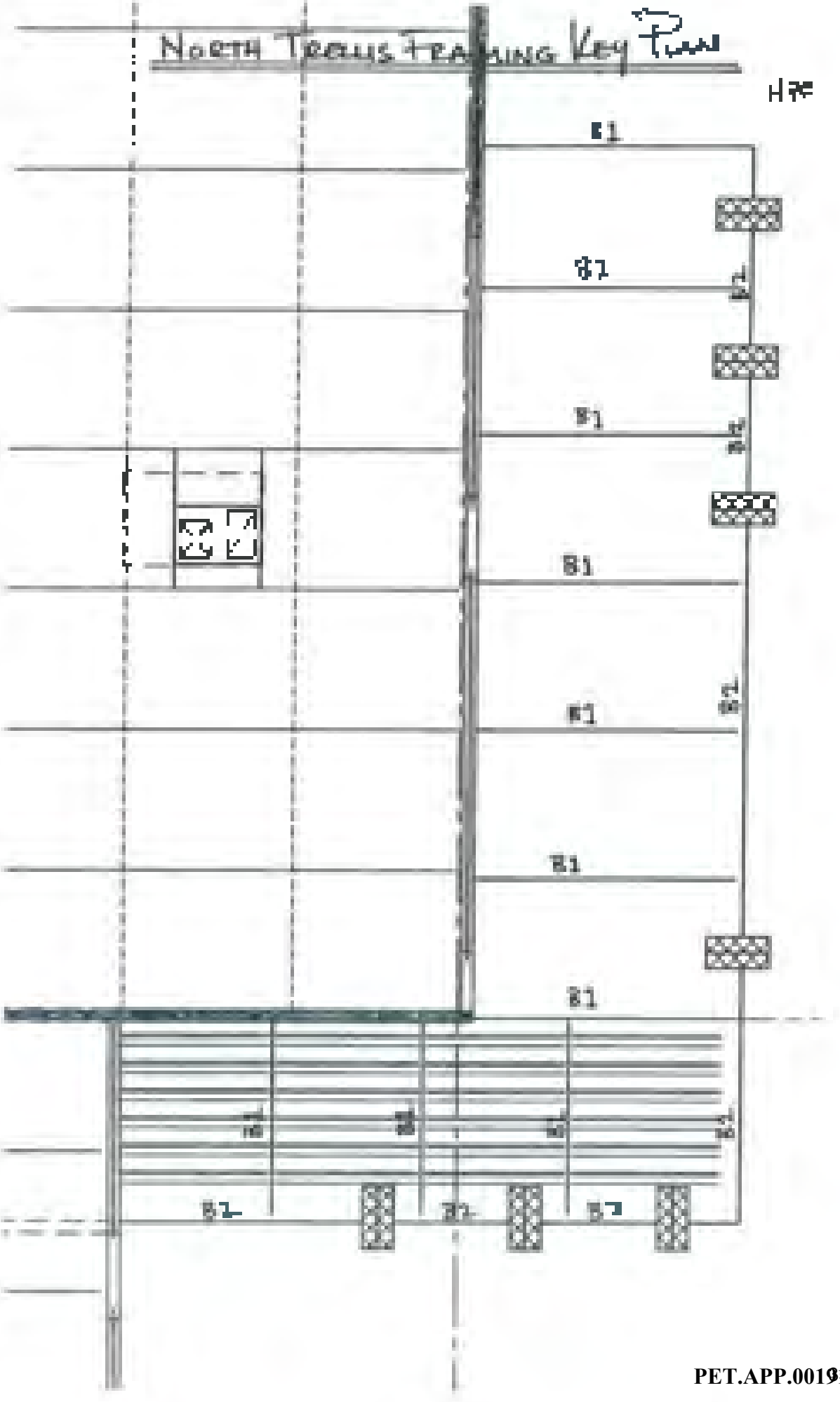
[redacted]

Steel Beam Design

[redacted]

[redacted] Properties

[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			


North Trellis Framing Key Plan
B1
B1
B1
B1
B1
B1
B1
B2
B2
B2

Baker/Perich/Sakahini

[redacted]

Name: NAVY STATION #53
No. .09501.01
Title: TRELLIS FRAMING
By: AJS Date: 06/01/07
Check: Date:
Sheet: M1

NORTH TRELLIS

- BEAM B1:

W_{DL} = 5 psf × 7.25 ft = 36.25 plf
W_{LL} = 20 psf × 7.25 ft = 145 plf

L = 11'-9"

(See Enercalc For Design)

USE HSS 5x3x3/16

- BEAM B2:

P_{DL} = 260 lbs } From B1 Reactions
P_{LL} = 850 lbs }

L = 18 ft

L = 3'-9"

(See Enercalc For Design)

USE HSS10x3x3/16

[redacted]

Steel Beam Design

Description: North Trellis B1

General Information

[redacted]

Distributed Loads

[redacted]

Summary

[redacted]

Forces & Stress Summary

[redacted]

Section Properties

[redacted]

Title:
Job #:
Date:
Designer:
Description:
Checked:

Steel Beam Design

Description North Trailing - 65'

General Information

Steel Section : W8X31

Span Length		Fy		
Left Cant		Load Duration Factor		
Right Cant		Deflection Limit		
Unbraced Length				

Point Loads

	#1	#2	#3	#4	#5	#6	#7
Dead Load							
Live Load							
Short Term							
Location							

Summary

Steel Section

	Actual	Allowable		
Moment			Max Deflection	
fb / Fb			Length/x, Dead	
			Length/x, Live	
Shear				
fv / Fv				

Force & Stress Summary

	Moment	Shear	fb / Fb	fv / Fv	Deflection	Length/x
Dead Load						
Live Load						
Short Term						
Total						
Allowable						

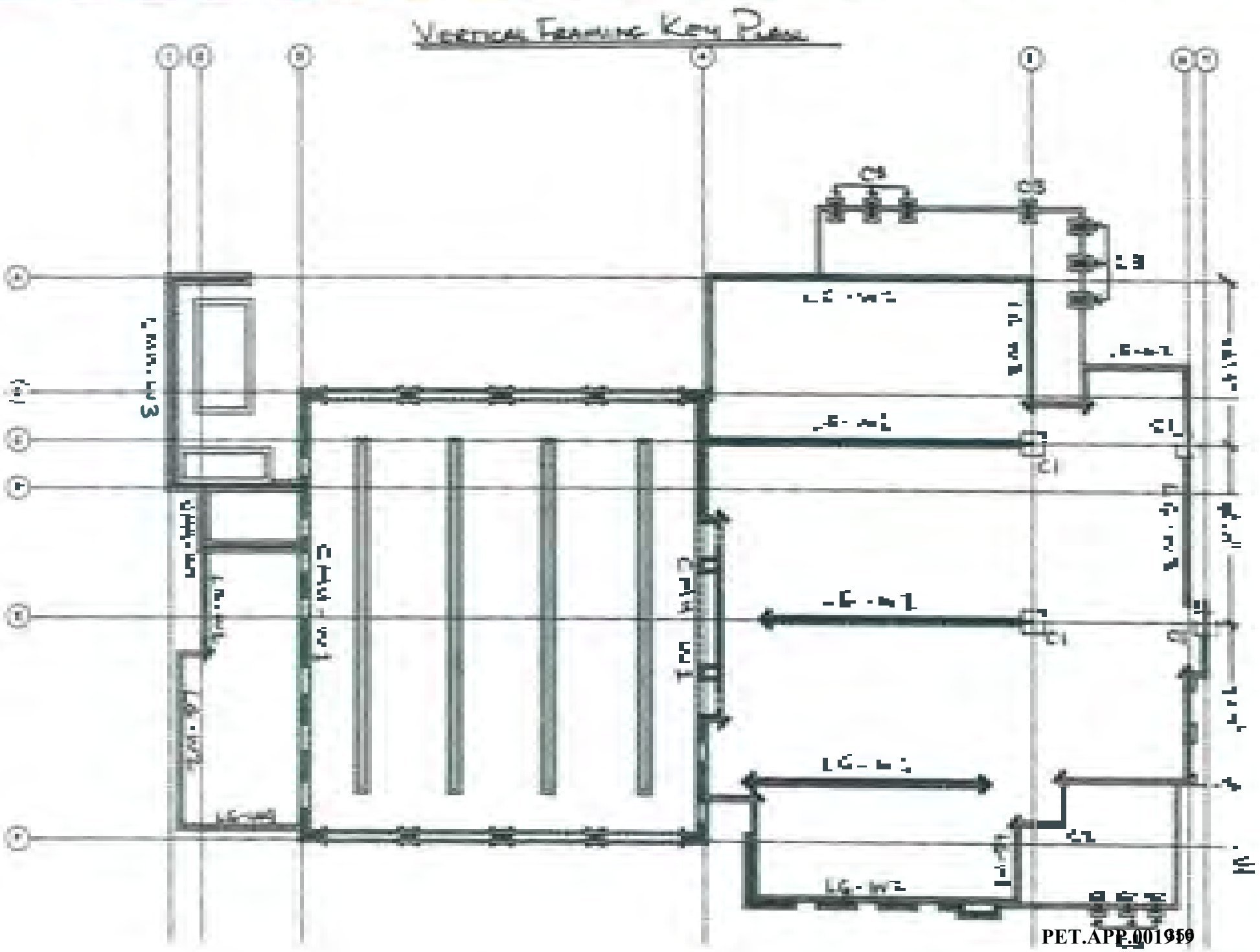
Section Properties

Depth		Weight	
Web Thick		Area	
Flange		Ix	
Flange Thick		Sx	
Area		Rx	
Iy		Sy	
Yielding Load Strength		Ry	
J		Cw	
Zx		Zy	

STRUCTURAL CALCULATIONS

City Of North Las Vegas
Fire Station 53
North Las Vegas, NV

Gravity Design – Vertical


VERTICAL FRAMING KEY PLAN

Dekker/Perich/Sabatini

[redacted]

Project Name: MIXED STATION #53
Project Number: 07502.01
Subject: COLUMN DESIGN
By: JLB Date: 09/30/09
Checked: Date:
Sheet: 10 of

COLUMN DESIGN - COLUMN C1

LOADS:

$P_{DL} = 8.9^k$
$P_{LL} = 8.4^k$
} FROM BEAM B2 REACTIONS

LENGTH = 15'-0"

(SEE ENERCALC DESIGN)

USE HSS4x4x1/4 COLUMN

BEAM - C2

SL-2 REACTIONS:

$P_{DL} = 1150$ lbs
$P_{LL} = 1090$ lbs

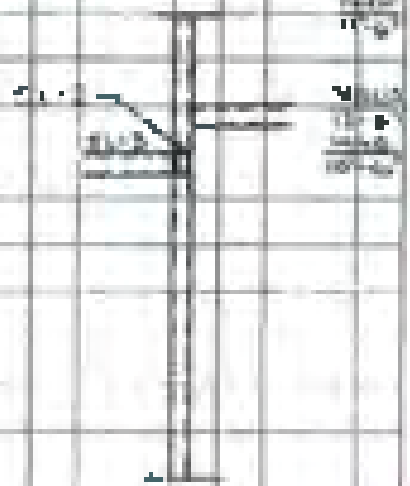
SL-B REACTIONS:

$P_{DL} = 1800$ lbs
$P_{LL} = 1610$ lbs

CANOPY BEAM REACTIONS:

$P_{DL} = 810$ lbs
$P_{LL} = 2,910$ lbs
(SEE ENERCALC FOR DESIGN)

USE HSS4x4x1/4 COLUMN



Becker·Parick/Sabatini

Name: NWPD STATION #53
Number: 03502.01
Subject: COLUMN DESIGN
By: AJB Date: 06/01/12
Checked: _____ Sheet: _____
Scale: NTS

CMU COLUMN C3

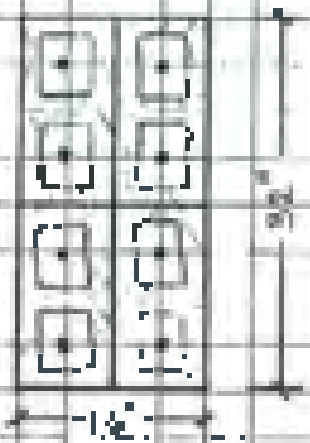
Loads:

P_{DL} = 500 lbs
P_{LL} = 1,300 lbs
} FROM NORTH TRUSS B2

Wind = 20 psf

(SEE ENDECAVE FOR DESIGN)

USE 6" x 32" CMU COLUMN W/ #5's @ EA CELL



[redacted]

Steel Column

Description: Interior Column - C1

General Information

Code Ref: AISC 360, ASCE, IBC, ACI 318, 2018 IBC/ASCE 7-16

Steel Section	W14x257	Fy	50.00 ksi	Axial Shortening	Neglected
		Curvature Factor	1.000	Shear Deformation	Neglected
Column Height	13.500 ft	Beam Moment	0.00 kip-ft		
End Fixity	Pin-Pin	X-X Unbraced	13.500 ft	K-x	1.000
Use 0.85tau4 Tree Leaning Conditional		Y-Y Unbraced	13.500 ft	K-y	1.000

Loading

Axial Load:

Dead Load	0.00 k	Live Load Reduction Method	0.000 in
Live Load	0.00 k	Live Load Reduction	0.000 in
Roof Live Load	k		

Summary

Column Design OK

Section: W14x257, Height = 13.5 ft, Axial Load = 0.0 k, Mx = 0.0 k-ft, My = 0.0 k-ft, Ecc = 0.000 in

Unbraced Lengths: X-X = 13.500 ft, Y-Y = 13.500 ft

Combined Stress Ratio	Equation	Value	Ratio	Status
AISC Equation H1-1	0.0000	0.0000	0.0000	0.0000
AISC Equation H1-2	0.0000	0.0000	0.0000	0.0000
AISC Equation H1-3				

AISC Equation H1-1 governs per Eq. H1-1, ASCE 7-16

AISC Equation H1-2 governs per Eq. H1-2, ASCE 7-16

Summary

Allowable & Actual Stresses	Equation	Value	Ratio	Status
Axial Compression	0.00 ksi	0.00 ksi	0.00 ksi	0.00 ksi
fa Applied	0.00 ksi	0.00 ksi	0.00 ksi	0.00 ksi
Major Axis Bending	0.00 ksi	0.00 ksi	0.00 ksi	0.00 ksi
fbx Applied	0.00 ksi	0.00 ksi	0.00 ksi	0.00 ksi
Minor Axis Bending	0.00 ksi	0.00 ksi	0.00 ksi	0.00 ksi
fby Applied	0.00 ksi	0.00 ksi	0.00 ksi	0.00 ksi

Analysis Values

Pmax (X-X)	10,000 psi	Cmx (X-X)	0.85	Cmy (X-X)	0.85
Pmax (Y-Y)	10,000 psi	Cmy (X-X)	0.85	Cmy (X-X)	0.85
Pmax (X-X, H1-1)	10,000 psi	Cmx (X-X, H1-1)	0.85	Cmy (X-X, H1-1)	0.85
Pmax (X-X, H1-1)	10,000 psi	Cmy (X-X, H1-1)	0.85	Cmy (X-X, H1-1)	0.85
Major Axis Slenderness	0.000 in	0.000 in	Minor Axis Slenderness	0.000 in	0.000 in

[redacted]

Steel Solution

Description: Interior Column - G1

Section Properties

Depth		Weight			
				J	

Section Type = HSS-Square

Sketch & Diagram



[redacted]

Steel Column

Design Section: Interior Column - C2

General Information

[redacted]

Loading

[redacted]

Summary

[redacted]

Stresses

[redacted]

Analysis Values

[redacted]

[redacted]

Steel Column

Description: Interior Column - C3

Section Properties: HSS4X4X1/4

Depth	[redacted]	Weight	[redacted]	Values for LRFD Design	
Web Thick	[redacted]	Ag	[redacted]	J	[redacted]
Width	[redacted]	Ipy	[redacted]	Cw	[redacted]
Flange Thick	[redacted]	Ix	[redacted]	Zx	[redacted]
Area	[redacted]	Sy	[redacted]	Zy	[redacted]
rg	[redacted]	Rx	[redacted]		[redacted]
		Ry	[redacted]		

Section Type = HSS-Square

Sketch & Diagram

[redacted]



[redacted]

Masonry Column Design

Description [redacted]

General Information

Column Height	[redacted]	Fm	[redacted]	Seismic Factor	[redacted]
Width	[redacted]	Fy	[redacted]	[redacted]	[redacted]
Depth	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Column Area	[redacted]			[redacted]	[redacted]
Pedestal	[redacted]			[redacted]	
[redacted]	[redacted]				
[redacted]	[redacted]				
Pedestal Depth	[redacted]				

Applied Loads

Vertical Load		Lateral Load	
Dead Load	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	Load Type	[redacted]
Live Load	[redacted]	[redacted]	[redacted]

Design Values

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Load Combinations & Stress Details Summary

	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Summary

Column Design OK

[redacted]

Max. Bending + Axial Comp. Stress	[redacted]	[redacted]
Allowable	[redacted]	[redacted]
Max. Axial Only Compressive Stress	[redacted]	[redacted]
Allowable	[redacted]	[redacted]
Max. Shear Bending Stress	[redacted]	[redacted]
Allowable	[redacted]	[redacted]

Description: Cold Column - C3

Summary of Loads & Moments

Vertical Loads...

Lateral Loads...

Concentrated Moments:

Baker-Perich/Sabatini

[redacted]

Job: MSFD Station #53
Job No: 07501-01
Subject: Base Plates
By: A.B. Date: 06/01/07
Checked: _____ Date: _____
Sheet: VD

- Base Plate A

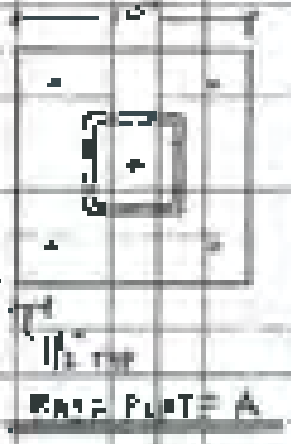
Axial Loads

P = 8.91 + 8.41 = 17.32 k (From Column C3)

f'_c = 4,500 psi
F_y = 36,000 psi

(See Excel for Design)

Use 8"x10"x¾" Base Plate



Base Plate A

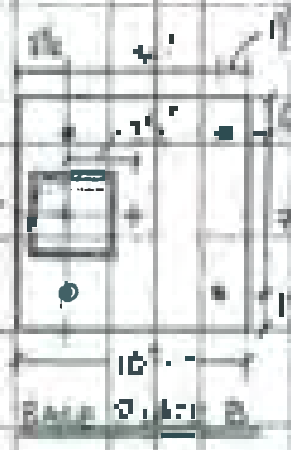
- Base Plate B

P = 17.32 k (Same as BP.A)

f'_c = 4,500 psi
F_y = 36,000 psi

(Same as A except Geometry)

Use 8"x10"x¾" Base Plate



Base Plate B

Dekker/Perich/Sabatini

[redacted]

Name: HVAC 5 Option #5.3
Job Number: 07502-01
Subject: BASE PLATES
By: AMB Date: 4/8/08
Checked: [redacted] Date: [redacted]
Sheet: V1

BASE PLATE C

ANALYSIS:

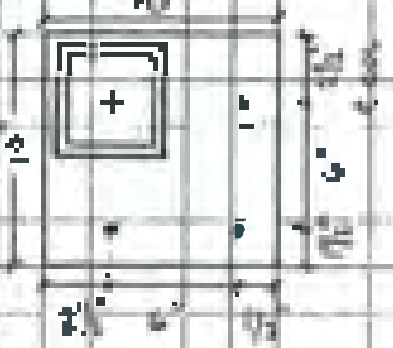
P = 3.76 k + 4.67 k = 8.43 k (FROM COLUMN C2)

F_y = 1,500 psi

E_s = 30,000 psi

(SAME AS A DIFFERENT GEOMETRY)

USE 10"x10"x 1/4" BASE PLATE



[redacted]

Steel Column Base Plate

Description: Base Plate A

General Information

Loads

Axial Load	[redacted]
[redacted]	[redacted]

Plate Dimensions

Plate Length	[redacted]
Plate Width	[redacted]
Plate Thickness	[redacted]

Support Pier Data

Pier Length	[redacted]
Pier Width	[redacted]

Steel Section [redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Strength Reduction

Concrete Fy	[redacted]
Base Plate Fy	[redacted]
Load Duration Factor	[redacted]

Section Bolt Data

Distance from Plate Edge	[redacted]
Bolt Count per Side	[redacted]
Tension Capacity	[redacted]
Bolt Area	[redacted]

Summary

[redacted]

Concrete Bearing Stress Bearing Stress OK

Actual Bearing Stress	[redacted]
Allow per ACI 318-08, Appendix D	[redacted]
Allow per AISC J8	[redacted]

Plate Bending Stress Reduction OK

Actual fb	[redacted]
Max Allow Plate fb	[redacted]

Anchor Bolt Area Bolt Tension OK

Actual Tension	[redacted]
Approach	[redacted]

Bolt Bearing Bolt Shear Connection

Bechtel/Parsch/Saboliini

Project: NWD Station #33
Project No.: 07302-001
Subject: CMU Wall Design
By: AJB Date: 03/19/07
Chkd: Sheet:
Rev: WS

Wall Design - W1

$H_{wall} = 22.5$ Ft
$H_{parapet} = 5$ Ft

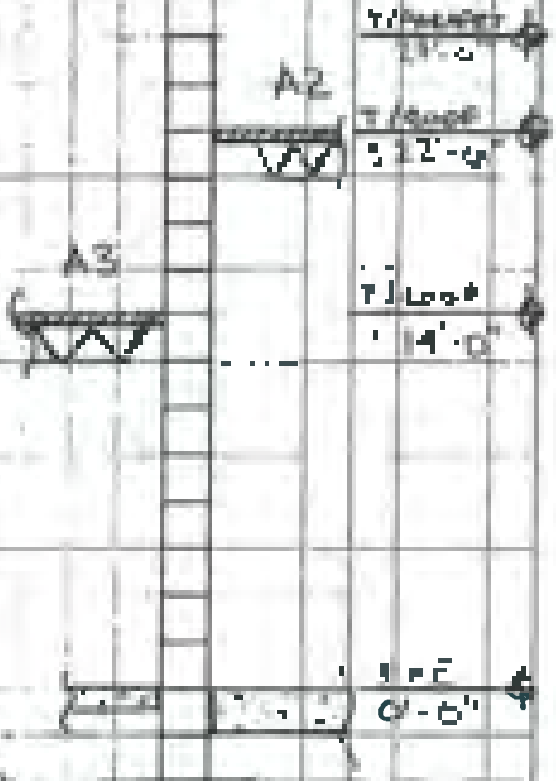
Tributary Area:

A2 = 35 Ft

A3 = 10.75 Ft

$W_{DL} = 200\#(35 + 10.75)$
$= 915$ PLF

$W_{LL} = 915$ PLF



Seismic Factor = 0.409
(See Lateral Loads for Walls)

(See Excalc For Gravity Design)

12" CMU Wall w/ #6 @ 24" o.c.

CMU Wall - W2

W_{CMU} = 3.33 psf

H_{CMU} = 5 ft

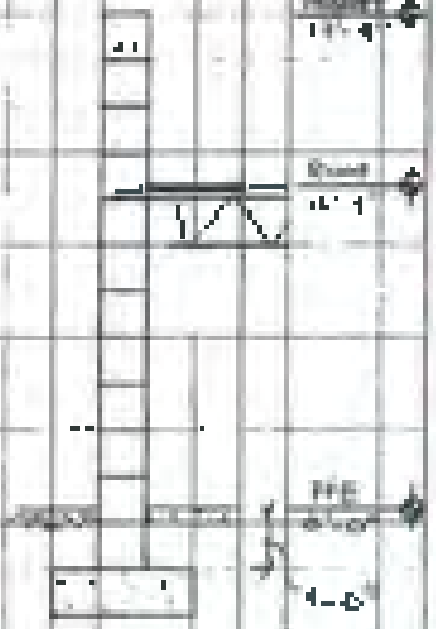
Loads:

W_{DL} = 20 psf x 3.33 ft = 200 plf

W_{LL} = 20 psf x 3.33 ft = 200 plf

(See Footing for Design)

3' CMU Wall = 85 k @ 24" oc



Dokken/Parrish/Sabatini

NLVFD Station #53
07502.01
CMU Wall Design
AJB
05/30/07

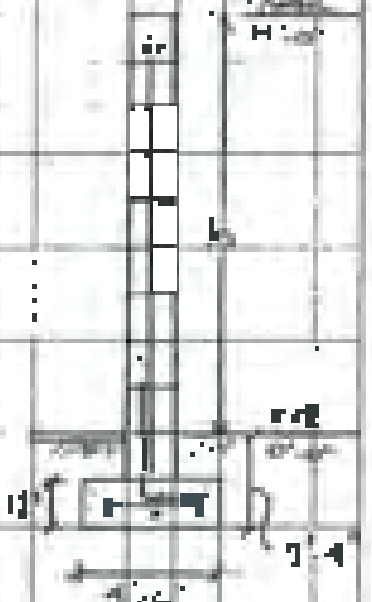
CMU Site Wall - W3

Soil Bearing Pressure = 2,000 psf
(1.2 F + 1.6 H = 3,200 psf)
Min. Code Depth & Width of Footing

P_a = 42 psf
P_p = 275 psf

Surcharge:
At Tank = 200 psf (Uniform Pressure)
at -ve = 20 psf (L)

f'_c = 1,500 psi
f'_m = 1,500 psi
F_y = 60,000 psi



- LATERAL LOADS:

* PER ASCE 7-05, Sec. 6.5.14

$F = q_z G C_f A_s$ (lb) [Eq. 6-27]

q_z = 18 psf
G = 0.85
C_f = 1.90 (Per Fig. 6-20)

Return Wall Reduction Factor

$\therefore P = q_z G C_f$ = 18 psf (0.85)(1.90)(0.95) = 12 psf

(SEE Enercalc for Design)

* USE 8" CMU Wall w/#5 @ 8" o.c. (Vert.) Fully Grouted - (Std. No. 9 Dur-O-Wall Truss @ 16" o.c. Horiz.)

[redacted]

Masonry Wall Design

Description CMU Wall - W1

Overview Information

Loads

Design Values

Load Combinations & Design Details Summary

Summary

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Masonry Wall Design

Page 1

General Information

Wall Height	10.33 ft	Seismic Factor	0.400	Fm	1,500.0 psi
Partial Height	4.33 ft	Calculated Axial Pu	800.00	Fs	24,000.0 psi
		Overturn Factor	1.148	Special Inspection	
Thickness	8 in	Wall Sh Mult	1.200	Grout @ Reinf Only	
Bond Beam	8			Normal Weight Block	
Partial Spacing	24 in			Equivalent Solid Thickness	6.625 in
Grade of Rebar	60 ksi	@ Center			

Loads

Uniform Load		Concentrated Axial Load		Area Load	30.000 psf
Dead Load	300.000 plf	Dead Load	1,600 lbs		
Live Load	200.000 plf	Live Load	3,600 lbs		
Load Eccentricity	4.500 in	Roof Load			
Roof Load					

Design Values

f'm	1,500.000 psi	Wall Area	0.688 sq ft	n=	20.000	f	4,000 psi
Bar Size	#5	Spacing of Cells	24.000 in	j	0.913	d	7.625 in
Area of Steel	0.300 sq in	Moment at Mid-Ht	3,718.000				

Max Allow Axial Load = 0.20 f'm (1-(h'/40t)^3) Area = 240.48 psi

Allow Masonry Bending Stress = 0.33 f'm = 495.00 psi

Allow Steel Bending Stress = 24,000.00 psi

Load Combination & Stress Details Summary

	Axial Load	Moment	Bending Stresses		Axial Compressive
Load Type	plf	ft-lb	Masonry psi	Steel psi	psi
D + L	7,400.0	3,718.0	4,254.0	167.5	13.89
D + L + Wind	8,120.0	4,078.4	3,884.4	1,838.4	15.24
D + L + Seismic	5,784.0	2,905.0	3,322.7	748.1	10.85
Designer Selected Load Combination					
D + L	7,400.0	3,718.0	4,254.0	167.5	13.89
D + L + Wind	8,120.0	4,078.4	3,884.4	1,838.4	15.24
D + L + Seismic	5,784.0	2,905.0	3,322.7	748.1	10.85

Summary

13.333 high wall with a 60ft parapet Normal Block at 8 OCm wall on 16 Mpa at 24 200mm OC at center

Max Applying Compressive Stress ..... 260.28 psi

Allowable ..... 495.00 OK

Max Axial Only Compressive Stress ..... 15.00 psi

Allowable ..... 240.00 OK

Max Steel Bending Stress ..... 1,838.40 psi

Allowable ..... 24,000.00 OK

[redacted]

[redacted]

[redacted]

CMU SITE WALL - W3

SOIL BEARING PRESSURE (SBP) = 2,000 PSF

* SBP = 1,100 PSF → INCREASED PER SOIL REPORT ALLOWABLE INCREASE PER DEPTH & WIDTH OF FOOTING.

P_A = 42 PSF

P_P = 245 PSF

- SURCHARGE:
  - AT TOE = 200 PSF (GENERAL P_{SO})
  - AT HEEL = 20 PSF (LL)

f'_c = 4,500 PSI
f_m = 1,500 PSI
F_y = 60,000 PSI

- LATERAL LOADS:

* ASCE 7-05, SECT. 6.5.14

$F = q_h G C_a A_s$ [Eq. 6-27]

B = 56.67 FT
h = h = 14 FT

B/h = 2.6

s/n = 1.0



Dekker/Perich/Sabatini

Project: HLVFD Station #53
Project No.: 99302-01
Subject: CMU Wall Design
By: AJE Date: 10/29/01
Checked: Date:
Page: 374

* Per Table 6.7.2D

For Case A & B: $C_f = 1.9$

For Case C:

Region 0-3	$C_f = 2.39$	$\Rightarrow$	1.911 CONTROLS
3-23	$C_f = 1.58$	$\Rightarrow$	1.26

* Per Note 1, for case C w/ $\frac{s}{h} \leq 0.8$, C_f shall be multiplied by the reduction factor [Reduction $(0.8 - s/h)$]

$[(1.3 - s/h) = 1.8 \quad 1.0 - 0.8]$

$q_n = 10.9$ psf (windward) $/ -12.1$ psf (leeward) (Eq. 6-5) Const. & Cladding

$G = 0.85$ (Sect. 6.5.8)

$P = 12.1 \text{ psf } (0.85)(1.91) = 19.69$ psf

(Use Envelope for Design)

— Shear Reinforcement:

$V = 19.90 \text{ psf} \times (36.67 \text{ ft} \times 19 \text{ ft}) = 9,087 \text{ lbs}$

$f_v = \frac{V}{bd} = \frac{9,087 \text{ lbs}}{(7.625 \times 428 \text{ in})} = 2.78$ psi

f_v (Inspection) $\leq f_m$ — Shear Reinforcement is adequate

$A_v \text{ (min)} = 0.0007 (7.625)(12'/4') = 0.064 \text{ in}^2$

PET.APP.001939

Better·Perich/Tahoelini

MAINTO STATION #53
07502-01
CMU WALL DESIGN
AAB 10/19/07
SJZ

$A_{(DUR-O-WALL)} = 0.049 \frac{in^2}{FACE} \times \frac{12"}{16" oc} = 0.0735 \frac{in^2}{ft}$

$A_{(BOND\ BEAMS)} = 0.61 in^2 \times \frac{12"}{48" oc} = 0.1525 \frac{in^2}{ft}$

$A_{TOTAL} = 0.204 \frac{in^2}{ft} > 0.064 \frac{in^2}{ft}$ OK

USE 8" CMU WALL w/ #5 @ 8" oc. (VERT.)
FULLY GROUTED AND HORIZONTAL REINT.
OF 3½" HEAVY DUR-O-WAL TRUSS @ 16" oc.
w/ 2 #5's @ 48" oc BOND BEAMS.

Cantilevered Retaining Wall Design

Description: CMU Wall - W3 (Generator Pad)

Criteria

Soil Data

Footing Strengths & Dimensions

Surcharge Loads

Design Summary

Stem Construction

Top Stem

Footing Design Results
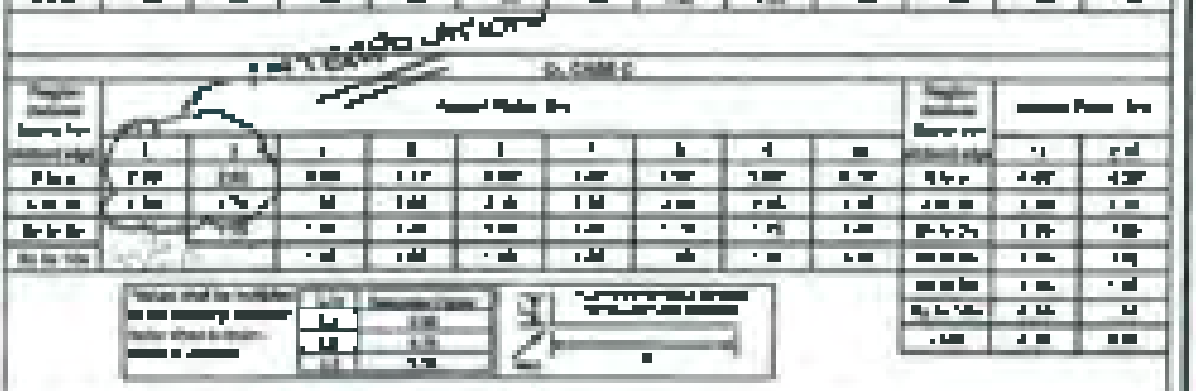
Description CMU Wall - W1 (Generator Pad)

Summary of Overturning & Resisting Forces & Moments

		Overturning			Resisting		
		Force lbs	Distance ft	Moment ft-lb	Force lbs	Distance ft	Moment ft-lb
Active Pressure	=	1,571.6	3.69	5,800.2			
Passive Pressure	=						
Surcharge Over Toe	=		1.41				
Adjacent Footing Load	=						
Added Lateral Load	=						
Load @ Stem Above Soil	=	378.3	6.33	2,395.4			
Soil Over Toe	=				1,067.1	3.44	3,671.2
Surcharge Over Heel	=				88.3	8.44	745.4
Adjacent Footing Load	=						
Added Const Load on Stem	=					6.00	
Soil Over Toe	=				384.1	0.94	361.4
Surcharge Over Toe	=				200.0	0.88	207.0
Stem Weight(s)	=				1,307.7	7.00	7,307.7
Earth @ Stem Transitions	=						
Footing Weight	=				975.0	5.00	4,875.0
Key Weight	=					7.83	
Vert Components	=				87.0	4.34	377.8
	Totals =	1,949.9 lbs		8,195.6 ft-lb			17,545.7 ft-lb

[illegible] – Method 2		All Heights
Figure 6-28	Force Coefficients, C_f	Solid Freestanding Walls & Solid Signs





Notes:

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]

Figure 6-3 (cont'd)	Net Design Wind Pressures	Walls & Roofs
Enclosed Buildings		

Net Design Wind Pressures, p_{net} (psf) [illegible]

Zone	Effective Wind Area sq ft	Basic Wind Speed V (mph)											
		85		90		100		105		110		120	
Roof Overhangs	1	[illegible]	7.1	-11.8	7.9	-14.9	8.7	-13.9	9.1	-15.1	9.5	-16.3	10.4	-18.8
	1	[illegible]	7.1	-20.7	7.9	-18.2	8.7	-17.1	9.1	-18.5	9.5	-19.9	10.4	-23.0
	1	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	1	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	2	[illegible]	7.1	-24.1	7.9	-24.1	8.7	-23.3	9.1	-25.3	9.5	-27.3	10.4	-31.6
	2	[illegible]	7.1	-24.1	7.9	-24.1	8.7	-23.3	9.1	-25.3	9.5	-27.3	10.4	-31.6
	2	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	3	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	3	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
Roof Overhangs	1	[illegible]	7.1	-11.8	7.9	-14.9	8.7	-13.9	9.1	-15.1	9.5	-16.3	10.4	-18.8
	1	[illegible]	7.1	-20.7	7.9	-18.2	8.7	-17.1	9.1	-18.5	9.5	-19.9	10.4	-23.0
	1	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	1	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	2	[illegible]	7.1	-24.1	7.9	-24.1	8.7	-23.3	9.1	-25.3	9.5	-27.3	10.4	-31.6
	2	[illegible]	7.1	-24.1	7.9	-24.1	8.7	-23.3	9.1	-25.3	9.5	-27.3	10.4	-31.6
	2	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	3	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	3	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
Roof Overhangs	1	[illegible]	7.1	-11.8	7.9	-14.9	8.7	-13.9	9.1	-15.1	9.5	-16.3	10.4	-18.8
	1	[illegible]	7.1	-20.7	7.9	-18.2	8.7	-17.1	9.1	-18.5	9.5	-19.9	10.4	-23.0
	1	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	1	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	2	[illegible]	7.1	-24.1	7.9	-24.1	8.7	-23.3	9.1	-25.3	9.5	-27.3	10.4	-31.6
	2	[illegible]	7.1	-24.1	7.9	-24.1	8.7	-23.3	9.1	-25.3	9.5	-27.3	10.4	-31.6
	2	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	3	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	3	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
Roof	4	[illegible]	7.1	-11.8	7.9	-14.9	8.7	-13.9	9.1	-15.1	9.5	-16.3	10.4	-18.8
	5	[illegible]	7.1	-20.7	7.9	-18.2	8.7	-17.1	9.1	-18.5	9.5	-19.9	10.4	-23.0
	4	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	5	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	4	[illegible]	7.1	-24.1	7.9	-24.1	8.7	-23.3	9.1	-25.3	9.5	-27.3	10.4	-31.6
	5	[illegible]	7.1	-24.1	7.9	-24.1	8.7	-23.3	9.1	-25.3	9.5	-27.3	10.4	-31.6
	4	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0
	5	[illegible]	7.1	-32.8	7.9	-32.8	8.7	-31.8	9.1	-34.5	9.5	-37.2	10.4	-43.0

Note: [illegible]

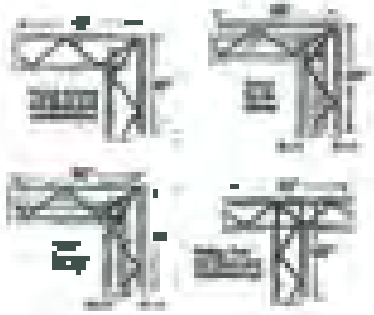
Bond beam reinforcement is required in all hollow concrete masonry walls.

Refer to the latest edition of DUR-O-WAL Truss Wire and Duplex reinforcing ladder and truss plan submissions for the Basic Wind Speed in Regional Gusts (ultimate limit state) in kilometres per hour for which the wire meets the requirements of the design standard for the appropriate terrain and importance level.

See DUR-O-WAL publications for more detailed information: "Reinforcing Masonry Walls with Joint Reinforcement, A Design Aid" Bulletin 83-7; "Building Reinforced Masonry Walls with Joint Reinforcement" Bulletin 83-12R and for information for the use of DUR-O-WAL to resist horizontal bending see "DUR-O-WAL Masonry Reinforcement in High-Rise, Shearing Wall Buildings" Bulletin 74-5.

Prefabricated Corners and Tees

A complete line of prefabricated corner and tee wire units are available in all design types and finishes. If a satisfactory or designated corner unit made or available other than by Dur-O-Wal, please specify.



Calculation Method

To supplement the amount of steel supplied by DUR-O-WAL, please use the following method.

Area of Steel in Bond Beam =

Bending

Example:

Area supplied by DUR-O-WAL

Bond beam reinforcement (when none is otherwise shown on plans)

Area of steel supplied by DUR-O-WAL

Bond beam reinforcement must meet the minimum requirements.

Warranty

Seller makes no warranty of any kind, express or implied, except that the goods sold under this agreement shall be of the warranted quality at sale and agrees to indemnify Buyer against all loss and liability resulting from the use of the goods, whether used singly or in conjunction with other goods. Seller neither assumes nor authorizes any person to assume for Seller any other liability in connection with the sale or use of the goods sold and there is no oral agreement or warranty collateral to or affecting this transaction.

DUR-O-WAL

Bekker/Perich/Sabatini

Project: MLVFD Station #53
Project No.: 03502-01
Subject: Stud Wall Design
By: LMS Date: 05/04/10
Chkd: VLF

Stud Wall - W1

- Joist Bearing Studs

$P_{DL} = 5\ psf$

$P_{DL} = \left(\frac{28'-9" + 33'-0"}{2}\right) \times 6'-0" \times 20\ psf = 3,585\ lbs$

$P_{LL} = 3,585\ lbs$

$H = 14'-7\frac{1}{2}"$ (175.5 in)

$P_{allow} = 3,300\ lbs/stud$ (Interpolated 55MA Tables)

USE (3) 600S162-43 @ Joist Bearing

$w/P_{allow} = 3 \times 3300 = 7,900\ lbs > 7,170\ lbs$ ∴ OK

- Field Studs:

$H = 14'-7\frac{1}{2}"$

$S = 16"\ o.c.$

Limiting Wall Height = 28'-9" (2 spans) > 14'-7½" ∴ OK

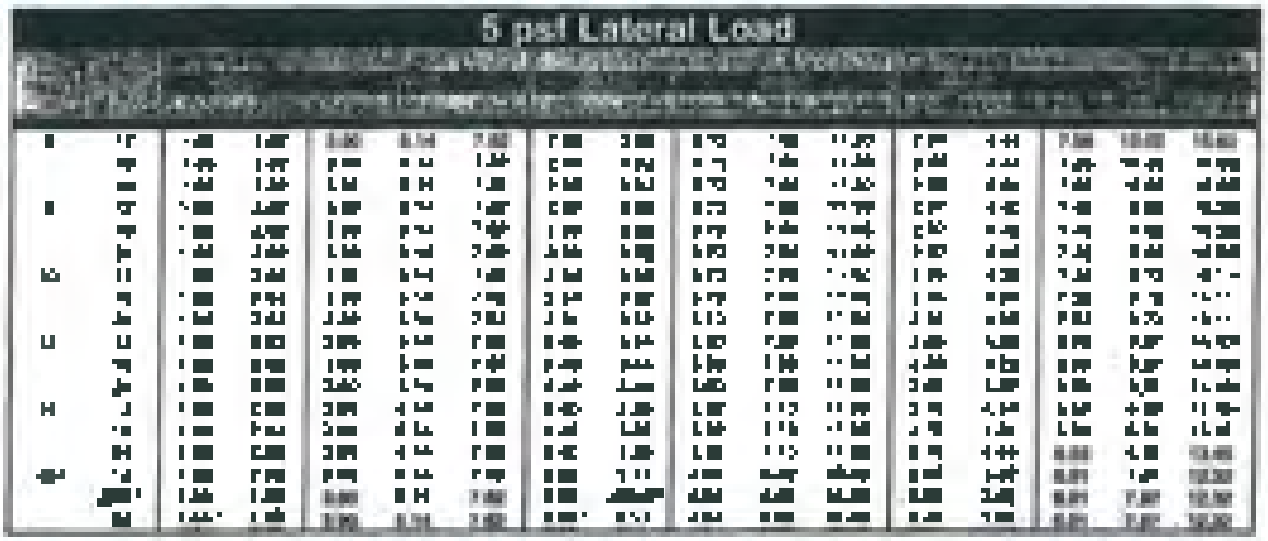
$P_{allow} = 3,300\ lbs$

$P = (29.875\ sf)(10\ psf)(14.625\ ft) = 1,513\ lbs < P_{allow}$ ∴ OK

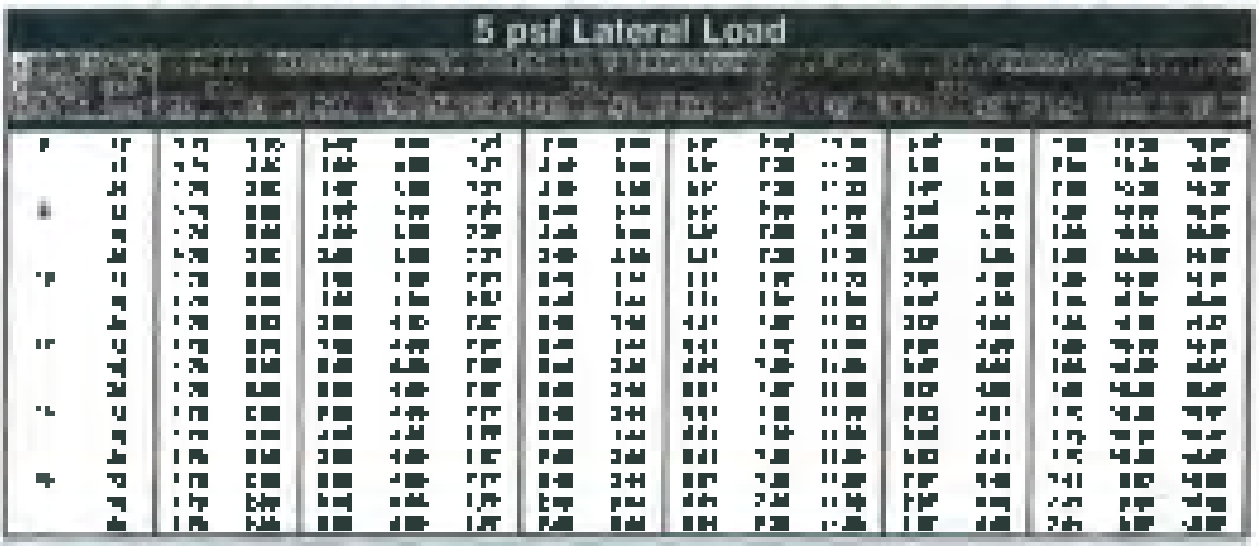
USE 600S162-43 @ 16" o.c. Stud Wall

Combined Axial and Lateral Load Tables

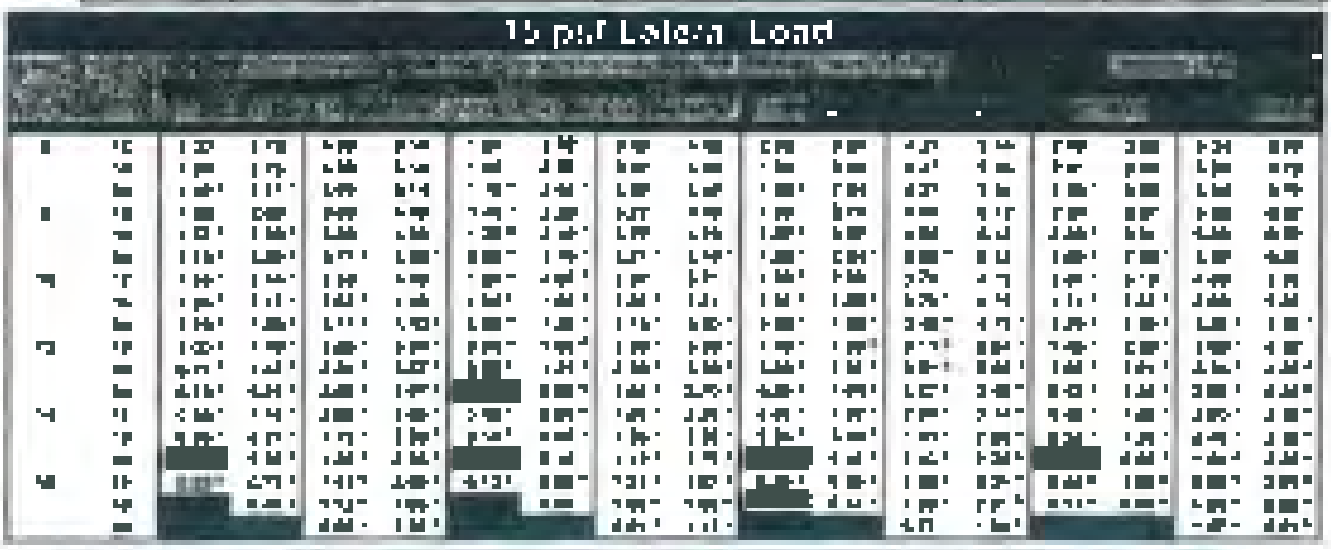
5 psf Lateral Load



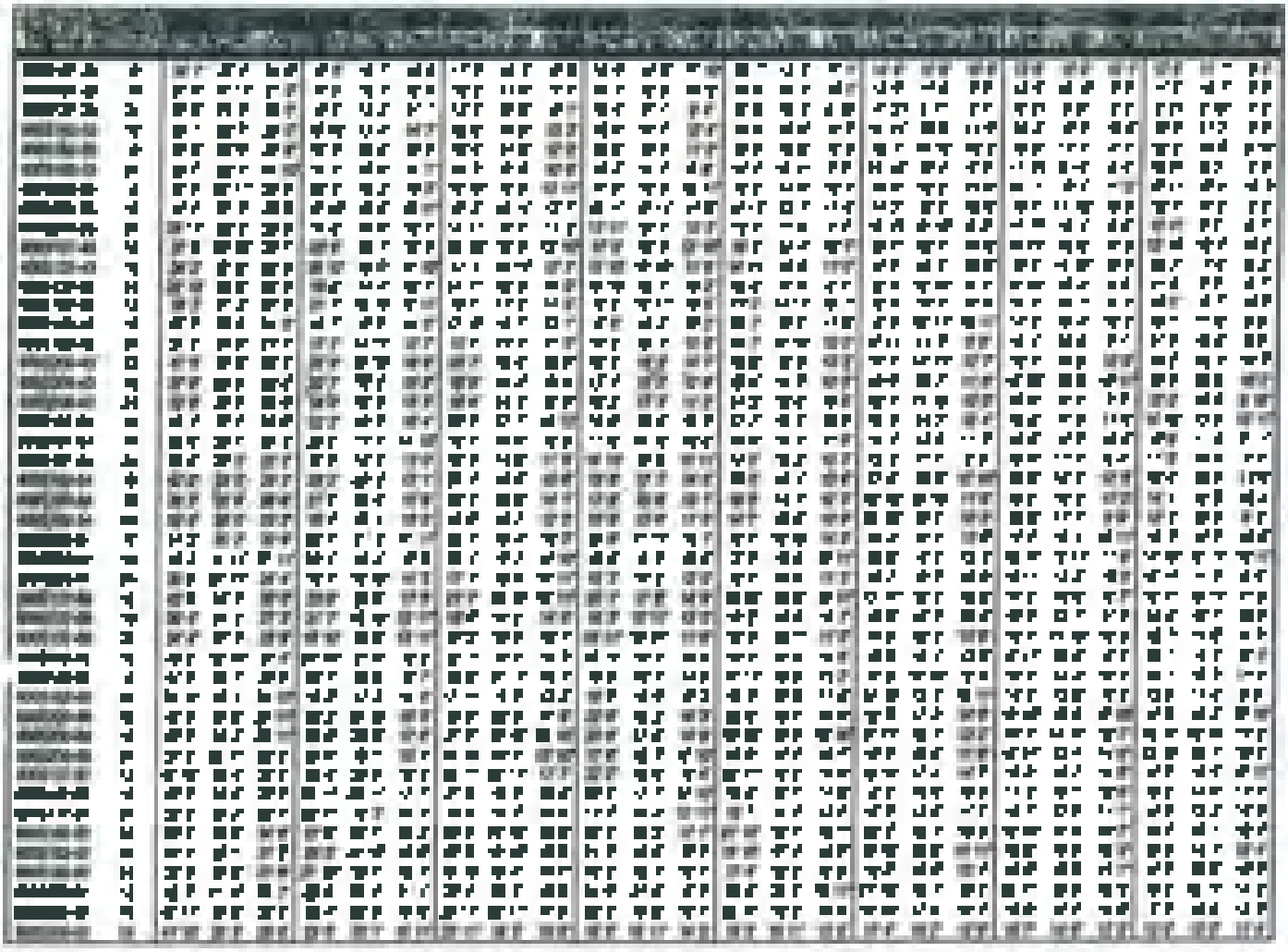
5 psf Lateral Load



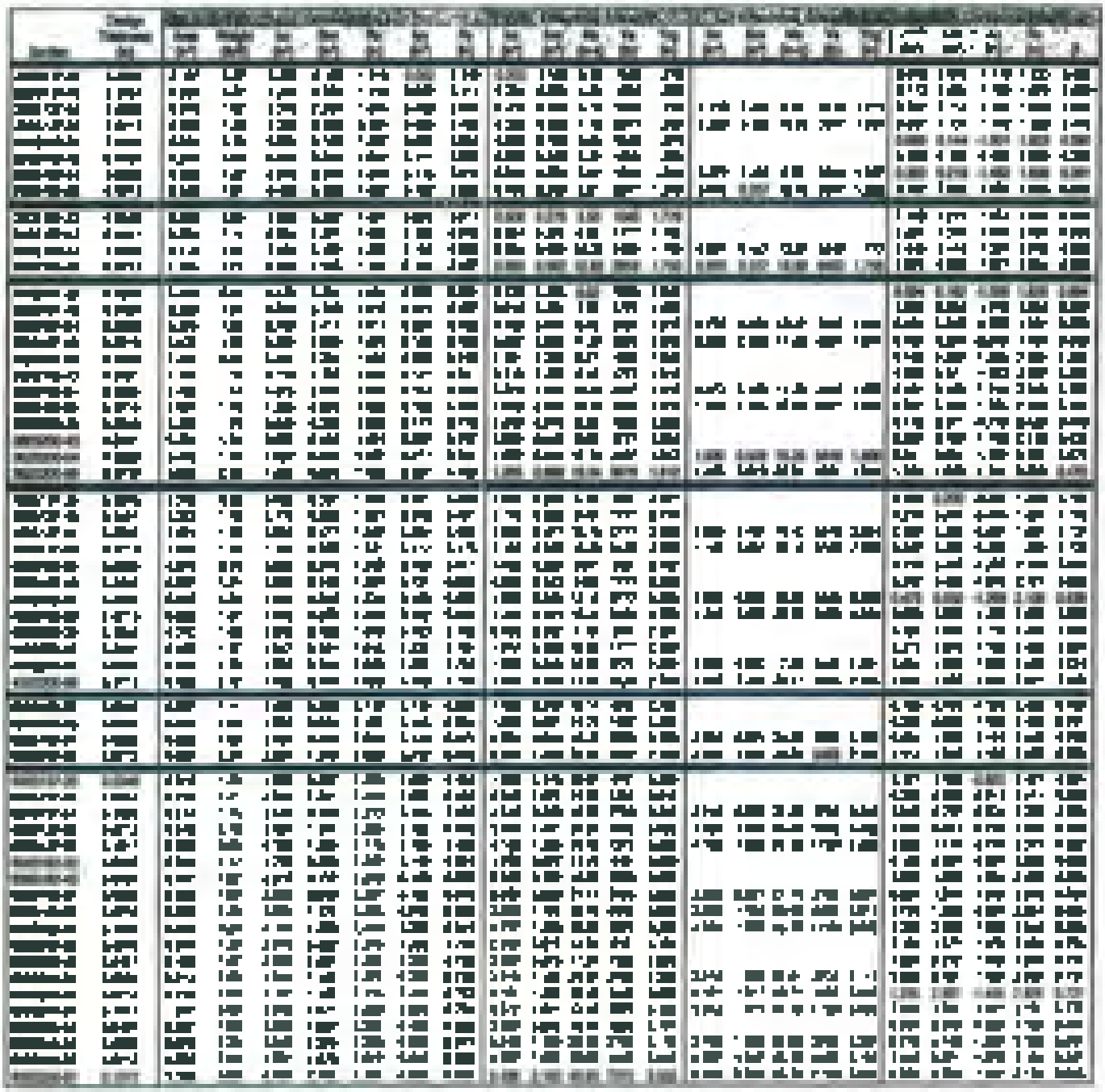
15 psf Lateral Load



Limiting Wall Heights — Curtain Wall



Structural (S) Stud Section Properties



STUD WALL - W2

- JOIST BEARING STUDS:

* FOR OUT-OF-PLANE LOADS CONSIDER COMPONENT & CLADDING WIND PRESSURES TO GOVERN PER ASCE 7-05 SECT. 6.4.2.2

$P_{net} = \lambda K_{zt} I p_{net30}$ [EQ. 6-2]

$\lambda = 1.21$ (FIG. 6-3, EXP. C)

$K_{zt} = 1.0$

$I = 1.5$

$p_{net30} = 12.1$ psf (FIG. 6-3)
to WORST PRESSURE @ WALL

$P_{net} = 1.21(1)(1.5)(12.1\text{ psf}) = 21.96$ psf

$P_{DL} = \left(\frac{25'-9'}{2}\right) \times 6\text{ psf} \times 20\text{ ft} = 1,725$ #

$P_{LL} =$ (1) $= 1,725$ #

$P_{TOTAL} = 3,450$ lb

$H = 19'-6''$

$P_{allow} = 2,600$ lbs/stud (FROM SSMA TABLES)

USE (2) 600S162-43 @ JOIST BEARING

$P_{allow} = 2 \times 2,600$ # $= 5,200$ lbs $> 3,450$ lbs

Dobler Perich Sabatini

Name: NLVFD Station #63
Project Number: 07502-01
Subject: Stud Wall Design
By: AJB Date: 10/30/07
Checked: Sheet:
Scale: VSS

- Field Studs:

H = 14.5 ft

S = 16" o.c.

Limiting Height = 17'-10" (7/40) > 14.5 ft ∴ OK

P = (14.395 ft)(40 psf)(16"oc / 12"/ft) = 767 lbs
(L + DL + LL)

P_allow = 2,600 lbs >> 767 # ∴ OK

∴ Check P_RAFTER:

w = 21.96 psf × 1 ft²/144 in² × 16"oc = 2.44 lb/in

M = (2.44 lb/in)(90 in)² / 2 = 9,882 lb-in

M_a = 16.68 k-in > M ∴ OK

- Check Deflection:

E = 6.716 x 10⁶ lb-in²

w = 2.44 lb/in

Δ = wL⁴ / 8EI = (2.44 lb/in)(90 in)⁴ / 8 × 6.716 x 10⁶ lb-in² = 0.298 in

Δ ≤ L/201 ∴ OK

V54

Figure 6-3 (cont'd)	Net Design Wind Pressures	Walls & Roofs
Enclosed Buildings		

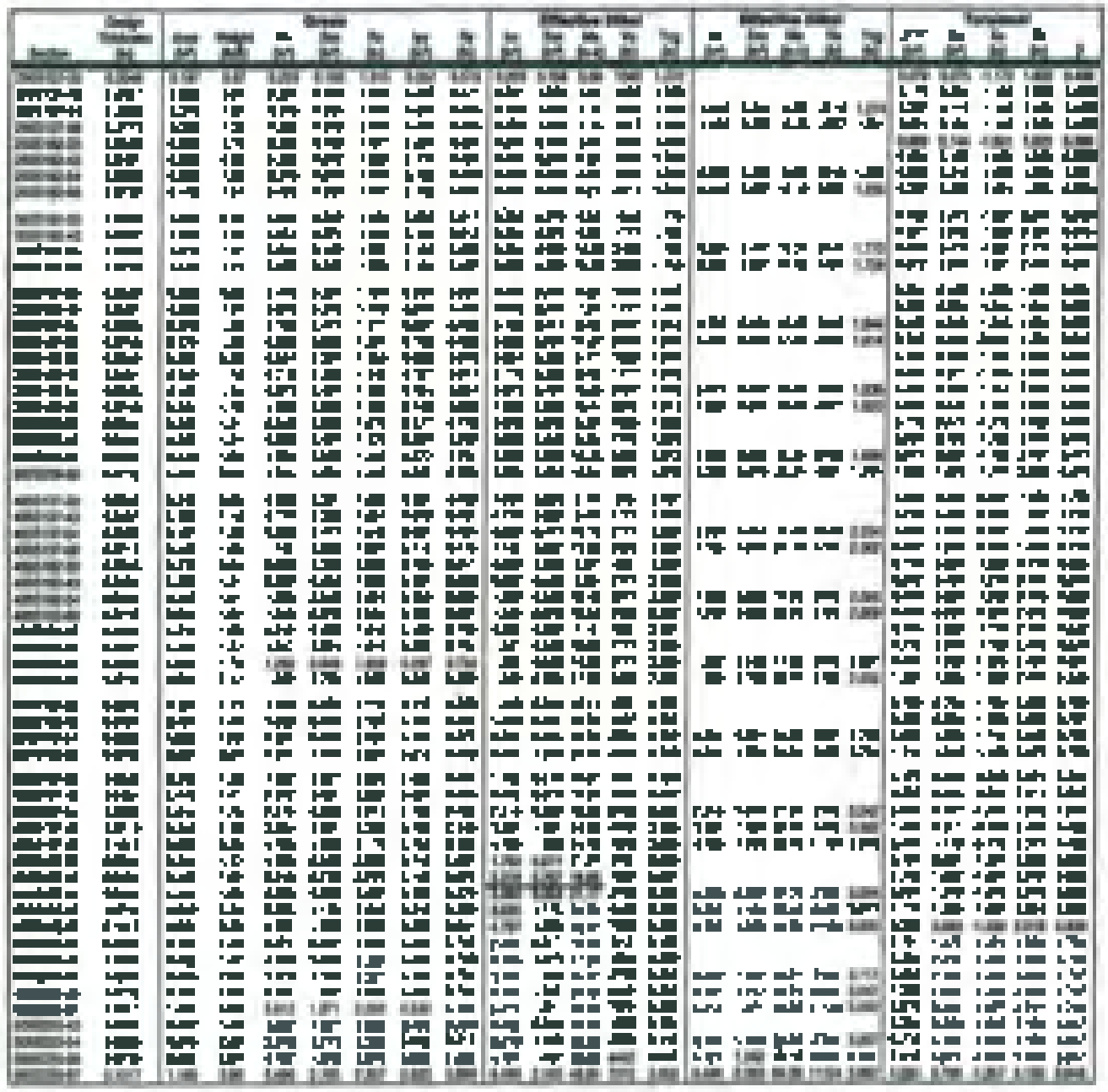
Net Design Wind Pressures, [illegible]

	Zone	Effective Wind Area sq ft	Basic wind Speed V (mph)											
			85		90		100		105		110		120	
[illegible]	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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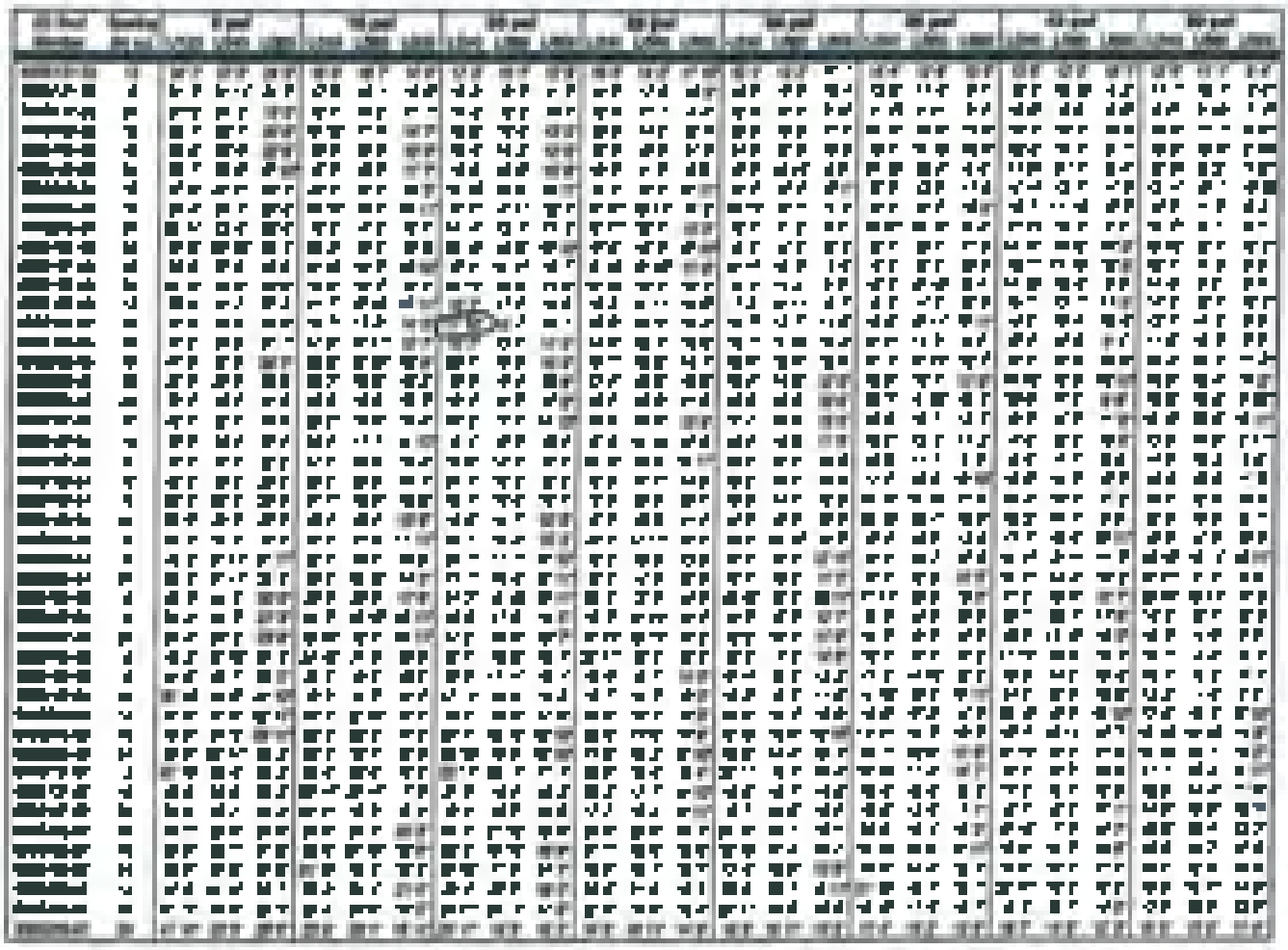
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Section Properties

Structural (S) Stud Section Properties



Limiting Wall Heights — Curtain Wall

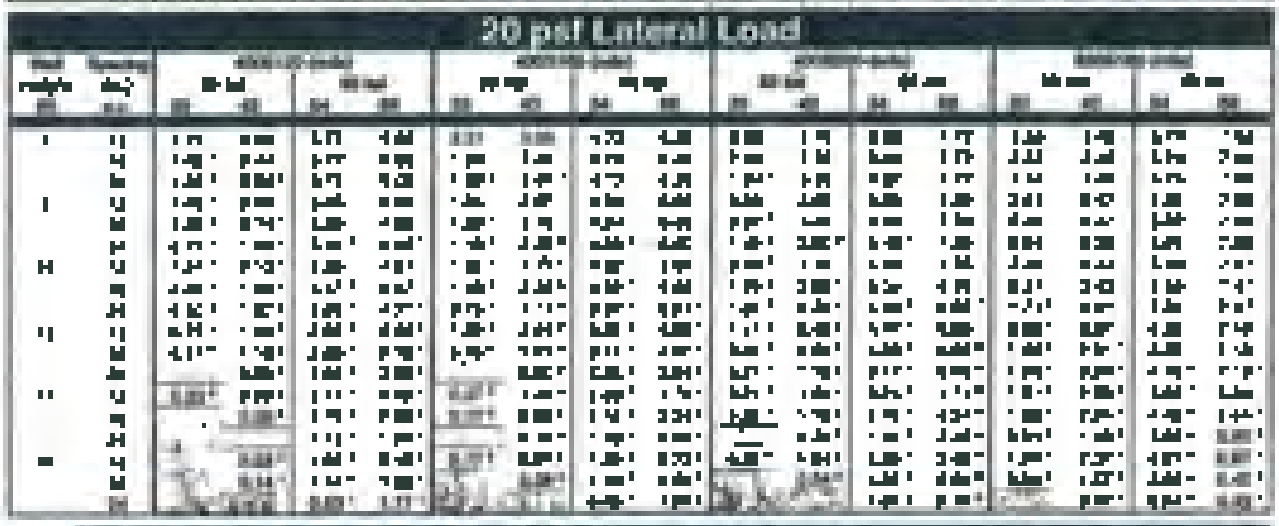


Combined Axial and Lateral Load Tables

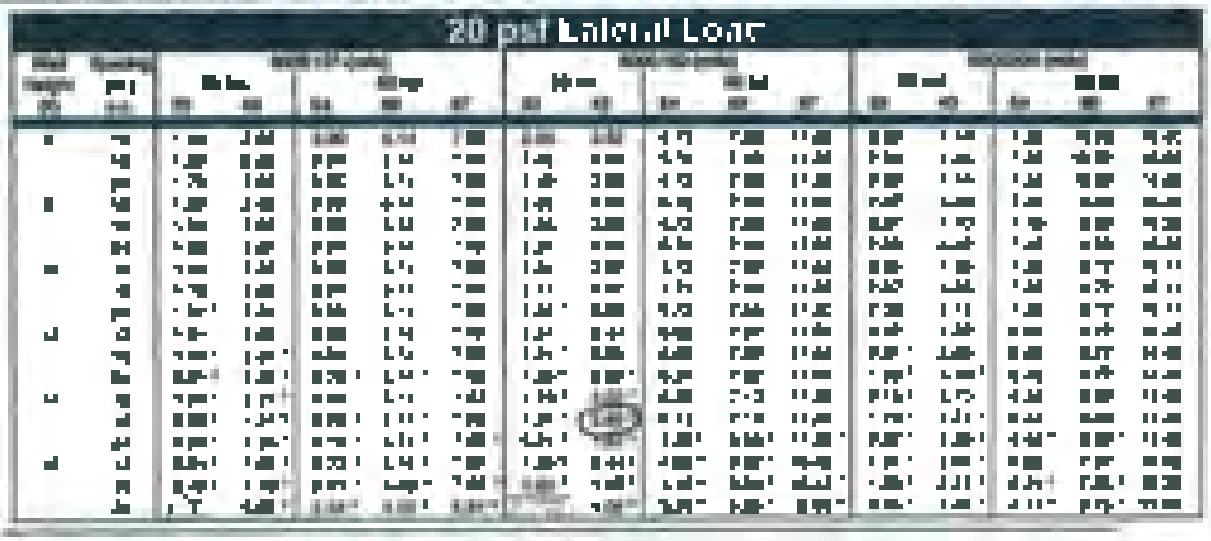
20 psf Lateral Load



20 psf Lateral Load



20 psf Lateral Load



Project: NAVFAC STATION 433
Job No.: 03502.01
Subject: STUD WALL DESIGN
By: AJB Date: 10/10/07
Checked:
Sheet: VM

STUD WALL - W3

- NON-BEARING STUDS

* PER ASCE 7-05 SECTION 13.3.1

$$F_p = \frac{0.4\, a_p\, S_{DS}\, W_p \left(1 + 2\frac{z}{h}\right)}{\left(\frac{R_p}{I_p}\right)}$$

WHERE:

$a_p = 1.0$
$R_p = 2.5$
$S_{DS} = 0.681$
$I_p = 1.5$
} PER TABLE 13.5-1

$\frac{z}{h} = \frac{13.33\,ft}{22\,ft} = 0.61$



$$F_p = \frac{0.4(1.0)(0.681)(15\,psf)}{\left(\frac{2.5}{1.5}\right)}\left(1 + 2(0.61)\right)$$

$F_p = 5.44\ psf$

⇒ USE WIND SINCE IT'S MORE CONSERVATIVE

$W_{wind} = 14.81\ psf \approx 15\ psf$

- LOADS:

$P_{DL} = 3\,ft(20\,psf)\left(\frac{4\,in}{12\,in/ft}\right) = 80\ lbs$
P_{LL}

$M = P_a = 160\ lbs \times \frac{3\,ft}{12.73\,ft} = 40\ lb\text{-}ft$

Redacted
Redacted
Redacted
Tel: Redacted
Fax: Redacted

Redacted

Redacted

Redacted

Single Span Beam Analysis

Description: Non Bearing Slid Wall - W3

General Information

Design Basis	Redacted	Moment of Inertia	Redacted
Left Cantilever	Redacted	Beam Material	Redacted
Right Cantilever	Redacted	Beam Width/Depth	Redacted

Uniform Loads

On Center Span...		On Left Cantilever...		On Right Cantilever...	
Redacted	Redacted	Redacted	Redacted	Redacted	Redacted

Moments

Magnitude	Redacted	Redacted	Redacted	Redacted
Location	Redacted	Redacted	Redacted	Redacted

Query Values

Center Location	Redacted	Left Edge	Redacted	Right Edge	Redacted
Moment	Redacted		Redacted		Redacted
Shear	Redacted		Redacted		Redacted
Deflection	Redacted		Redacted		Redacted

Summary

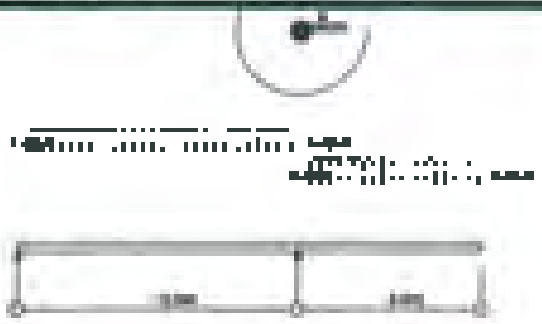
Reactions				Shears		Moments	
Max + @ Center	Redacted	at	Redacted	@ Left	Redacted	@ Left	Redacted
Max - @ Center	Redacted	at	Redacted	@ Right	Redacted	@ Right	Redacted
@ Left Edge	Redacted			Maximum	Redacted		
@ Right Edge	Redacted			Deflections			
Maximum =	Redacted			@ Center	Redacted	at	Redacted
				@ Left Edge	Redacted	at	Redacted
				@ Right Edge	Redacted	at	Redacted

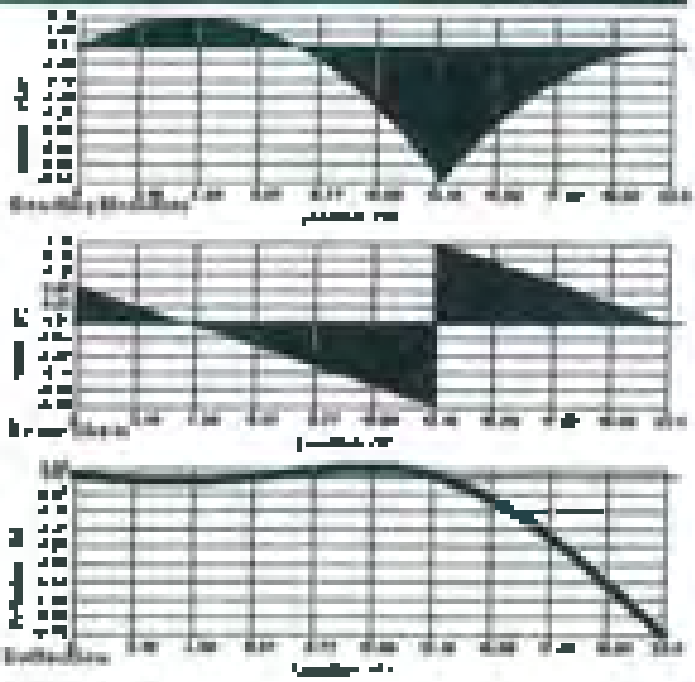
[redacted]

Single Span Beam Analysis

Description: Hor Bearing Seat Wall - W3

Block & Diagram





Dokken/Parfitt/Sabatini

Project Name: NWFD Station #53
Project Number: 07502-01
Subject: Stud Wall Design
By: AJB Date: 05/09/07
Checked: Date:
Sheet: WT

Stud Wall - W3

- Non Bearing Studs

$P_{WIND} = 19.8 \text{ psf} \leq 15 \text{ psf}$

$P_{DL} = (3 \text{ FT})(20 \text{ PSF})(15/12 \text{ FT}) = 80 \#$

$P_{LIVE} = 80 \#$

$P_{TOTAL} = 160 \text{ lbs}$

H: 22'-0"

Limiting Height = 19'-7" < 22'-0" ∴ N.G.

∴ Double Studs 6" below Roof Line

- Check Parapet & Roof Line:

$w = 15 \text{ psf}\,(16''/12'') + 20 \text{ psf}\,(1.67') = 53.3 \text{ plf}$

$M = \frac{20 \text{ plf}\,(8'-8'')^2}{7} = 232 \text{ lb-ft}$

$= 9.02 \text{ k-in}$

$M_a = 16.68 \text{ k-in/stud} \times 2 \text{ studs}$

$M_a = 33.36 \text{ k-in} > 9.02 \text{ k-in}$ OK

- Check Deflection:

$\Delta = \frac{w L^4}{8EI} = \frac{(1.67 \text{ plf})(104 \text{ in})^4}{8\,(6.9 \times 10^6 \text{ psi})} = 0.32 \text{ in} < \frac{l}{289}$ OK

PET.APP.001999

Reiter/Pennoni/Sabatini

[redacted]

Name: PLVFC Station #53
Number: 37502.01
Title: Stud Wall Design
By: AJB Date: 05/09/07
Check: [redacted]
Item: W4

Stud Wall - W4

- Non Bearing Studs

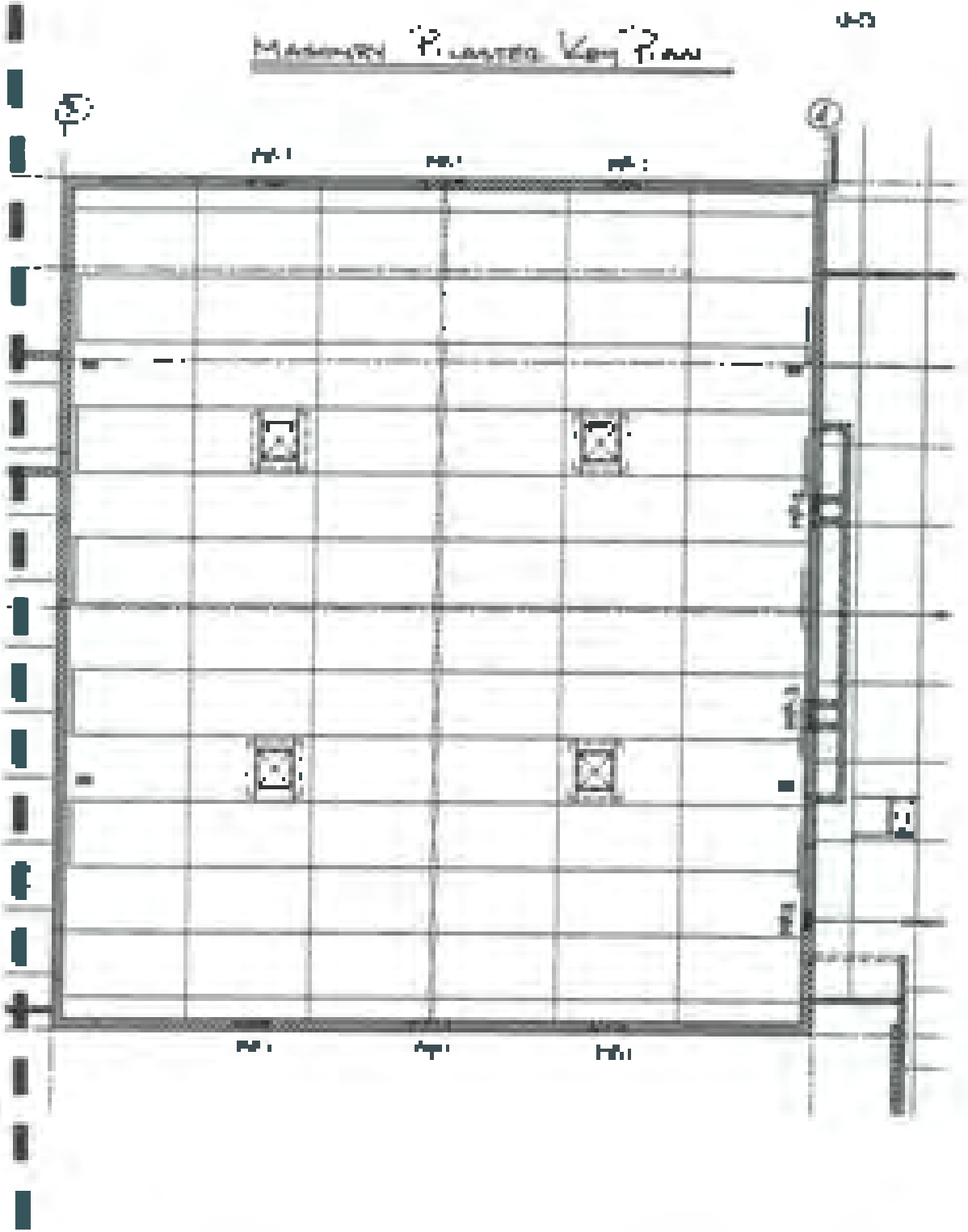
$P_{allow} = 14.5$ plf $\geq$ Σ plf

P = 160 lbs (Same as W3)

H = 19'-0"

Laterally Braced Height = 19'-3" > H ∴ OK

Use 600S162-43 @ 16" OC



MASONRY PILASTERS

MP-1 (APPARATUS BAY DOORS)

P_{DL} = 1330 plf × 13.33 ft = 17,729 lbs

P_{LL} = 600 plf × 13.33 ft = 800 lbs

* LOADS FROM HEADER DESIGN

(SEE ENGINEERING FOR DESIGN)

USE 32in (2-8) WIDE MASONRY PILASTER w/ #5 CENTERED IN EA. CELL (FULLY GROUTED)

MP-2

P_{DL} = 1,800 lbs
P_{LL} = 1,350 lbs
} FROM 24 REACTIONS

(SEE ENGINEERING FOR DESIGN)

USE 16in WIDE MASONRY PILASTER w/ #5 CENTERED IN EA CELL (FULLY GROUTED)

Dekker/Perich/Sabatini

Name: FLYER STATION #53
Name: 05501.01
Name: MASONRY PILASTERS
By: AJB Date: 05/30/07
Name: _____ Date: _____
Name: 1104

MP-3 (HOSE ALCOVE)

- REACTIONS FROM ML-3:

$P_{DL} = \frac{2,342 \text{ plf} \times 16 \text{ ft}}{2} = 18,736 \text{ lbs}$

$P_{LL} = \frac{800 \text{ plf} \times 16 \text{ ft}}{2} = 5,600 \text{ lbs}$

- REACTIONS FROM ML-4:

$P_{DL} = \frac{1,200 \text{ plf} \times 6 \text{ ft}}{2} = 3,600 \text{ lbs}$

$P_{LL} = \frac{700 \text{ plf} \times 6 \text{ ft}}{2} = 2,100 \text{ lbs}$

APPLIED LOADS TO PILASTER:

$P_{DL} = 18,736 + 3,600 = 22,336 \text{ lbs}$

$P_{LL} = 5,600 + 2,100 = 7,700 \text{ lbs}$

(SEE ENERCALC FOR DESIGN)

USE 32 in (2'-8") w/ DE MASONRY PILASTER w/ #5 CENTERED IN EA. CELL FULLY GROUTED)



Masonry Flush Wall Pilaster/Column

Description: MP-1

General Information

Applied Loads

Design Values

Load Combinations & Stress Ratios

Summary

Summary of Loads & Moments



[redacted]

Page [redacted]

Job # [redacted]

Date [redacted]

Sheet [redacted]

Masonry Flush Wall Pilaster/Column

Description MP-2

General Information

Wall Height	[redacted]	Beam Type	Normal Wt	Fm	[redacted]
f'm/f'cm	[redacted]	Bearing Plate Width	[redacted]	Es	[redacted]
Axial Load	[redacted]	Column Width	[redacted]	Em = Fm *	[redacted]
Pu/Mu Spacing	[redacted]		Appendix A Eq.	Special Inspection	
Pu/Mu Location	Center	Column Modulus	[redacted]	Solid Grouted	
				n	[redacted]
Reduction Factor	[redacted]	Load Duration Factor	[redacted]	r	[redacted]
Pressure Zone	[redacted]	Wall or Column?	[redacted]		

Applied Loads

Uniform Loads		Axial Loads	
Dead Load	[redacted]	Dead Load	[redacted]
Live Load	[redacted]	Live Load	[redacted]
Eccentricity	[redacted]	Eccentricity	[redacted]
Load Type	Axial	Load Type	Axial
Wind Load	[redacted]		

Design Values

Allow Stg. Stress	[redacted]	Pilaster Area	[redacted]		
Allow Axial Stress	[redacted]	Pilaster Depth	[redacted]		
Reduction Factor	[redacted]	Wall Weight	[redacted]		
		wp	[redacted]	[redacted]	[redacted]
Allow Masonry Bending	[redacted]		[redacted]	[redacted]	[redacted]
Max Allow Moment w/o Axial Load	[redacted]	Radius of Gyration		[redacted]	
Max Axial Load w/o Moment	[redacted]	Moment of Inertia		[redacted]	

Load Combinations & Design Checks

	Moment	Axial			
Top or Axial	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Bottom	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Short Axial & Top of Wall					
D + L + Wind	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
D + L + Seismic	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Resultant Bearing Loc	[redacted]		Axial Bearing Length		[redacted]

Summary

Pilaster Design OK

[redacted] high, [redacted] thick w/ [redacted] o.c. vertical reinforcing, Standard Inspection, Solid Grouted

Max Bending + Axial Comp Stress	[redacted]	psi
Allowable	[redacted]	OK
Max Axial Only Compressive Stress	[redacted]	psi
Allowable	[redacted]	OK
Max Steel Bending Stress	[redacted]	psi
Allowable	[redacted]	OK

Summary of Loads & Reactions

Uniform Dead Loads	[redacted] lbs	@ Top	@ Mid-Ht
Uniform Live Loads	[redacted] lbs	Uniform DL Moments	[redacted]
Wind Weight on Wall	[redacted] lbs	Uniform LL Moments	[redacted]
DL Reactions @ Wall Weight	[redacted] lbs	Axial Moments @ Mid-Ht	[redacted]
LL Reactions @ Wall Weight	[redacted] lbs	Seismic Moments @ Mid-Ht	[redacted]

[redacted]

[redacted]

[redacted]

ES REPORT™

ER-4943P

Reissued September 1, 2007

ICC-ES Evaluation Services, Inc. • 5360 Workman Mill Road, Whittier, California 90601 • www.icc-es.org

Filing Category: DRAWN—Steel

BEARING AND NONBEARING STEEL STUDS

STEEL STUD MANUFACTURERS ASSOCIATION
9 SOUTH WACKER DRIVE, SUITE 1400
CHICAGO, ILLINOIS 60606

ALLIED STUDCO
2333 NORTH 35TH AVENUE
PHOENIX, ARIZONA 85009

CEMCO
602 SOUTH DOVINA LANE
CITY OF INDUSTRY, CALIFORNIA 91744

CLARKDIETRICH BUILDING SYSTEMS LLC
9714 SAINT ANDREWS
PARAMOUNT, CALIFORNIA 90723

CONSOLIDATED FABRICATORS, INC.
4600 SOUTHBOUND DRIVE
COLUMBIA, SOUTH CAROLINA 29209

DIETRICH INDUSTRIES, INC.
900 GRANT STREET, SUITE 3000
PITTSBURGH, PENNSYLVANIA 15219

MARINO/WARE STEEL SYSTEMS
10940 SOUTH ALAMEDA
LA PUENTE, CALIFORNIA 91746

PACIFIC STEEL FRAMING SYSTEMS
9870 BALDWIN PLACE, UNIT A
EL MONTE, CALIFORNIA 91731

PLANET SHAN BUILDING MATERIALS, INC.
2740 WEST LONE CACTUS DRIVE
PHOENIX, ARIZONA 85027

SCAFCO CORPORATION
6210 EAST MAIN AVENUE
POST OFFICE BOX 11310
SPOKANE, WASHINGTON 99211-0310

STEEL DEVELOPMENT LLC
7440 WEST SAHARA
LAS VEGAS, NEVADA 89117

UNIMAST INCORPORATED
8600 NORTH SCOTT STREET
SCHILLER PARK, ILLINOIS 60176

UNITED METAL PRODUCTS, INC.
604 NORTH SHERMAN AVENUE
CORONA, CALIFORNIA 92882

WESTERN METAL LATH AND STEEL FRAMING SYSTEMS
4542 CHESAPEAKE DRIVE
RIVERSIDE, CALIFORNIA 92509

1.0 SUBJECT

Steel Framing and Nonframing Steel Studs, Joists and Tracks

2.0 DESCRIPTION

The design of the steel studs, joists and tracks described in this report complies with Section 2211 of the 1997 Uniform Building Code™ (UBC); Section 2209 of the 2000 International Building Code® (IBC); Section 2210.1 of the 2003 International Building Code® (IBC); and Section 2210.1 of the 2006 International Building Code®.

2.1 General

Punched, plain sheet and preformed steel wall framing members conforming to various details and with the steel thicknesses indicated in Table 1.

Section properties, material properties, steel yield strength, etc., are set forth on pages 8 through 11 and pages 3 through 6 of the accompanying Steel Stud Manufacturers Association catalogs, "Product Technical Information," dated 2001, and "Supplemental Product Technical Information," dated May 2007. Wall framing details and assemblies with bridging loads are noted on pages 36 through 41, and pages 4 and 7, of the accompanying catalogs.

2.2 Nonbearing Wall Framing:

Allowable nonbearing wall heights for interior nonloadbearing wall framing are noted on pages 12 and 13 of the accompanying catalog dated 2001. Allowable interior nonloadbearing wall heights, using cold-formed steel C-shaped studs of the sizes, gage and spacing noted on pages 14 and 15 of the accompanying catalog, are noted on pages 16 through 19 of the accompanying catalog.

2.3 Load-bearing Wall Studs:

Allowable stud sizes, gages and spacings for load-bearing wall framing are noted on pages 20 through 35 of the accompanying catalog. Allowable axial loads for wall studs, based on the lesser of the nominal strength and the strength reduced by the factor of safety or resistance factor, are noted on pages 20 through 35 of the accompanying catalog.

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[illegible] with Section 2.5 in the "Specification for the Design of Cold-formed Steel Structural Members," 1996 edition, and noted on pages 25 through 30 of the accompanying catalog dated "01."

2.4 Joists

Allowable joist span for various loads, joist spacings and span conditions are noted on pages 31 through 38 of the accompanying catalog dated [illegible]01.

2.5 Header Load Tables

Allowable spans for header combinations are noted on pages 39 and 40 of the accompanying catalog dated "01."

2.6 Ceiling Joists

Allowable ceiling span for 4 psf, 5 psf and 10 psf (191 kg/m², 239 kg/m² and 430 kg/m²) attic loading, L/240 and L/360 deflections, various spacings and span conditions are noted on pages 43 and 44 of the accompanying catalog dated "01."

2.7 Materials

2.7.1 Steel Members, Studs, joists and tracks are formed from steel having a minimum 50,000 psi (350 MPa) yield point [ASTM A653 SS Grade 33 or ASTM A1003 / A1003M Grade 33] for thicknesses of 0.043 inch (54 mils) [1.092 mm] through 0.118 inch (118 mils) [3.000 mm], and a minimum 50,000 psi (345 MPa) yield point [ASTM A 653 SS Grade 50 Class 1 or 2, or ASTM A 1003 SS Grade 50] for thicknesses of 0.0538 inch (54 mils)[1.366 mm] through 0.1180 inch [118 mils] [3.000]

2.7.2 Dynavar Sleeve. Dynavar sleeve conforms to ASTM C 28, with thicknesses of [illegible] inch [1.27 mm] and [illegible] inch [illegible] mm).

2.7.3 Steel Screws. [illegible] Type S, [illegible] Grade 2 steel screws conform to ASTM C 1002.

2.8 Fasteners and Details.

The catalogs entitled "Product Technical Information," dated [illegible]01 and "Supplemental Product Technical Information," dated May 2001, which are a part of this report, are available on the ICBO ES web site and on the ICBO ES publication report CD-ROM, under File #3643. Only the items described in Table 3 for the catalog dated [illegible]01 are part of this report. The entire catalog dated May 2001 is part of this report.

Structural properties for the adopted members of studs are noted on pages 4 through 11 of the catalog dated [illegible]01 and pages 3 through 9 of the catalog dated May 2001, and Section Properties for reflective characteristics of the aforementioned are

Allowable axial loads noted on pages 14 through 19 of the catalog dated [illegible]01 are based on the following considerations:

- The fabricated partition heights are based on flexure, deflection and shear interaction governed

- Allowable axial loads of table heights used are based on load bearing effective slenderness ratio [illegible] number 1 [illegible] specified in the [illegible] from table [illegible]

- Heights are based on web punchouts at a minimum distance of 1" [illegible] from the edge of bearing and the other web depth;

Pages 41 and 42 of the catalog dated 2001 are not recognized as part of this report.

2.9 Identification

Each stud is identified with the manufacturer's name, yield strength [illegible] ksi, ICBO ES Mark, thickness identification [illegible], and the ICBO ES report number embossed or stamped on the web of each section at a maximum of [illegible] feet [illegible] meters apart.

2.10 Evidence Submitted

Data in accordance with the ICBO ES Acceptance Criteria for Steel Studs, Joists and Tracks [AC90], dated January 2001.

3.0 Conditions

That the Steel Stud Manufacturers Association Steel Framing and Handbook, Steel Studs, Joists and Tracks described in this report comply with the 1997 Uniform Building Code™, the 2000 International Building Code®, the BOCA National Building Code® 1999 and the 1999 Standard Building Code, subject to the following conditions:

3.1 Studs, joists and tracks are installed in accordance with this report and the manufacturer's instructions.

3.2 Allowable heights and buildings comply with the values listed.

3.3 Load-bearing members must be fastened to the [illegible] [illegible] members as shown in the [illegible] [illegible] per [illegible] with the provisions of this [illegible] except as noted.

3.4 Calculations, plans and specifications verifying compliance with this report must be submitted to the building official for each project.

3.5 The studs are manufactured at the facilities listed in Table 1.

3.6 Steel material and specifications, including [illegible] thickness and finish, are noted in the accompanying tables. Studs are identified with the [illegible] labels noted in the accompanying tables.

This report is subject to re-examination in two years.

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]

[illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

(ICBO Evaluation Service, Inc. • 5360 Workman Mill Road, Whittier, California 90601 • www.icbo.org)

Filing Guideline: 09 04 01—Metal

BEARING AND NONBEARING SPRING STEEL JOISTS AND TRUSSES

STEEL JOIST MANUFACTURERS ASSOCIATION
3 LEVITT PARKWAY, Suite 1000
CHICAGO, ILLINOIS 60605

1.0 SUBJECT

Bearing and Nonbearing Steel Joists, Joists and Trusses
Reissued October 1, 2021

Add the following manufacturing locations:

Custom Steel, Inc.
5178 Highview Avenue
Jacksonville, Florida 32254

Denver, Inc.
4500 South Lucas Way Drive South
Seattle, Washington 98178

2.0 LIMITATIONS

No change

3.0 EVIDENCE SUBMITTED

No change

4.0 FINDINGS

That the changes noted herein comply with the 2021 Uniform Building Code™, the 2018 International Building Code®, and the 2018 International Residential Code®, subject to the following conditions:

4.1 through 4.3: No change.

4.4 Manufacturing Facilities: The steel joists are manufactured at the facilities listed in Table 2.

4.5 Packaging.

Unless specifically noted in this evaluation report supplement, the original report remains valid and unchanged.

This report supplement is issued solely to the product(s) listed in the original report and is subject to the terms and conditions set forth in the original report.

Add the following manufacturing facilities to Table 2:

Custom Steel Manufacturing, Inc.	5178 Highview Ave., Jacksonville, Minnesota
Denver, Inc.	4500 South Lucas Way Drive, Colorado
Denver, Inc.	10000 Lucas Way Drive South, Seattle, Washington

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STRUCTURAL CALCULATIONS

City Of North Las Vegas
Fire Station 53
North Las Vegas, NV

Lateral

[redacted]

Project: NLVFD Station #5
Job No.: 09502-01
Subject: LATERAL
By: AJB Date: 03/26/09
Checked: Date:
Sheet No.: 11

Seismic Coefficient Determination

2006 IBC & ASCE 7-05
Equivalent Lateral Force Procedure (9.5 $)

* Values obtained from the USGS Seismic Hazard Curves, Response Parameters and Design Parameters Software v5.0.5 (See Attached Data Sheets)

- Site Class D - 12 Zip Code = 89032

S_s = 75.4 %g
S_1 = 24.7 %g
F_a = 1.355
F_v = 2.101

$S_{MS} = F_a S_s = 1.355 \times 0.754 = 1.02$ (Eq. 9.4.1.2.4-1)

$S_{M1} = F_v S_1 = 2.101 \times 0.364 = 0.771$ (Eq. 9.4.1.2.4-2)

$S_{DS} = 2/3\ S_{MS} = 0.681$ (Eq. 9.4.1.2.5-1)

$S_{D1} = 2/3\ S_{M1} = 0.514$ (Eq. 9.4.1.2.5-2)

Occupancy Category = IV (1604.5)

Importance Factor, $I_E = 1.5$ (Table 11.5-1)

Seismic Design Category = D (Table 11.6-1)

Dekker/Perich/Sabatini

[redacted]

Project Name: NAVFO STATION #52
Project No.: 07501-01
Subject: LATERAL
By: ACB Date: 4/3/96
Checked: Date:
Sheet No.: L2

. SEISMIC SHEAR:

$$V = \frac{S_{D1} I_E W}{R} \quad \text{(Eq 12.8-2)}$$

$$V_{max} = \frac{S_{D1} I_E W}{T R} \quad \text{for } T \le T_L \quad \text{(Eq 12.8-3)}$$

$$V_{max} = \frac{S_{D1} T_L I_E W}{T^2 R} \quad \text{for } T > T_L \quad \text{(Eq 12.8-4)}$$

$$V_{min} = 0.01 W \quad \text{(Eq 12.8-5)}$$

* For $S_1 \ge 0.6g$

$$V_{min} = \frac{0.5 S_1 I_E W}{R} \quad \text{(Eq 12.8-6)}$$

$$T = T_a = C_t h_n^{x} \quad \text{(12.8.2, Eq 12.8-7)}$$

$T_L = 8$ (11.4.5, FIGURE 22-15)

$h_n = 22.5$ FT

$C_t = 0.02$ (ALL OTHER BUILDINGS) } TABLE 12.8-2

$x = 0.75$

$R = 5$ (SPECIAL REINFORCED CMU) (TABLE 12.2-1)

PET.APP.001974

Parker Parish Substation

[redacted]

Job: NWFD Station #53
No. 07502-01
Subject: LATERAL
By: A-JB Date: 03/26/07
Checked: Page:
Sheet: 43

$T_a = 0.02 (23.5)^{0.75} = 0.107$

$T < T_L$ ⇒ USE EQ. 12.8-3

$V = \frac{S_{D1}}{R} W = \frac{0.481(1.5)}{5} W = 0.201 W$ CONTROL

$V_{max} = \frac{S_{D1} I_E W}{T R} = \frac{(0.321)(1.5)}{(0.207)(5)} W = 0.795 W$

$V_{min} = \frac{0.5 S_1 I_E W}{R} = \frac{0.5(0.367)(1.5)}{5} W = 0.055 W$

Out-of-Plane Seismic Forces:

$F_p = 0.40 S_{DS} I W_p \geq 0.1 W_p$ (Eq. 12.11-1)

$= (0.40)(0.681)(1.5) W$

$F_p = 0.409 W$

Bakker/Perich/Kabulini

[redacted]

Name: NWFD Station #53
Job No.: 07502.01
Subject: LATERAL
By: AJB Date: 05/30/07
Check: Date:
Sheet: 4

Seismic Load Distribution

Roof Areas:

Area 1 = 8,022 sf
Area 2 = 5,168 sf
Area 3 = 1,107 sf

Total Area = 14,297 sf

Wall Areas:

Area 1 = 338 ft · (7'-9" + 7'-6") = 5,070 sf
Area 2 = 296 ft · (7'-9" + 5'-0") = 4,810 sf
Area 3 = 103 ft · (7'-9" + 3'-6") = 1,082 sf

Seismic Weight:

W_R = 14,297 sf × 20 psf = 285,940 #

Wall Weight:

W_W = (5,070 sf + 1,082 sf)(15 psf)
+ (4,810 sf)(99 psf)

W_W = 544,420 #

Total Weight:

W_T = 285,940 + 544,420 = 830,360 lbs

Dekker/Perich/Sabatini

[redacted]

Job No. United States #57
Job No. 07502.01
Subject LATERAL
By AJB Date 03/30/07
Chkd Date
Sht No. 65

TOTAL SEISMIC SHEAR:

$V = 0.104\ W$

$= 0.204\ (830k)$

$V = 169\ k$

From IBC 2006 - 1605.3.2

$V = \frac{169k}{1.4} = 121\ k$

SEISMIC SHEAR PER AREA:

$W_{A1} = (8,032\ sf \times 20\ psf) + (5,010\ sf \times 15\ psf)$

$= 236,490\ lbs$

$V_{A1} = \frac{0.204\ (236,490\ lbs)}{1.4} = 34,960\ lbs$

$W_{A2} = (5,168\ sf \times 20\ psf) + (4,810\ sf \times 94\ psf)$

$= 555,500\ lbs$

$V_{A2} = \frac{0.204\ (555,500\ lbs)}{1.4} = 80,948\ lbs$

$W_{A3} = (1,107\ sf \times 20\ psf) + (1,052\ sf \times 15\ psf)$

$= 38,390\ lbs$

$V_{A3} = \frac{0.204\ (38,390)}{1.4} = 5,591\ lbs$

Project Name = D7602-01 - MLVFD Station #3
Conterminous 48 States
2006 International Building Code
Zip Code = 88032
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.01 deg grid spacing

Period (sec)	Sa (g)	
0.2	0.556	Ss, Site Class B
1.0	0.173	S1, Site Class B

Period (sec)	Maximum Sa (g)	
0.2	0.670	Ss, Site Class B
1.0	0.171	S1, Site Class B

Period (sec)	Maximum Sa (g)	
0.2	0.540	Ss, Site Class B
1.0	0.172	S1, Site Class B

Conterminous 48 States
2006 International Building Code
Zip Code = 88032
Spectral Response Accelerations SMs and SM1
SMs = Fa Ss and SM1 = Fv S1
Site Class D - Fa = 1.355 ,Fv = 2.701

Period (sec)	Sa (g)	
0.2	0.754	SMs, Site Class D
1.0	0.357	SM1, Site Class D

Conterminous 48 States
2006 International Building Code
Zip Code = 88032
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D - Fa = 1.155 ,Fv = 2.101

Period Sa
(sec) (g)
0.2 0.503 50th, Site Class D
1.0 0.245 50th, Site Class D

Conterminous 48 States
2006 International Building Code
Zip Code = 89032
MCE Response Spectra for Site Class B
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)	Sa (inches)
0.000	0.273	0.000
0.083	0.557	0.021
0.200	0.557	0.736
0.314	0.557	0.536
0.400	0.437	0.683
0.500	0.350	0.854
0.600	0.293	1.025
0.700	0.250	1.195
0.800	0.219	1.366
0.900	0.194	1.537
1.000	0.175	1.708
1.100	0.159	1.879
1.200	0.146	2.050
1.300	0.134	2.220
1.400	0.125	2.391
1.500	0.117	2.562
1.600	0.109	2.733
1.700	0.103	2.903
1.800	0.097	3.074
1.900	0.092	3.245
2.000	0.087	3.416

Conterminous 48 States
2006 International Building Code
Zip Code = 89032
Site Modified Response Spectra for Site Class Site Class D
Sms = Fa Ss and Sm1 = Fv S1
Site Class D - Fa = 1.355 ,Fv = 2.101

Period (sec)	Sa (g)	Sv (inches)
0.000	0.302	0.050
0.097	0.754	0.070
0.200	0.754	0.295
0.487	0.754	1.747
0.500	0.735	1.794
0.600	0.617	2.153
0.700	0.525	2.502
0.800	0.459	2.871
0.900	0.408	3.250
1.000	0.367	3.638
1.100	0.334	3.941
1.200	0.306	4.308
1.300	0.283	4.695
1.400	0.262	5.024
1.500	0.245	5.383
1.600	0.230	5.748
1.700	0.216	6.100
1.800	0.204	6.459
1.900	0.193	6.818
2.000	0.184	7.177

Bohlin Perich Sabatini

[redacted]

Job: NCATC Standard #53
Job No: 07502.01
Subject: LATERAL
By: ALB Date: 03/30/07
Check: Date:
Sheet: L4

Wind Loads

- P_{ss} IBC 2006 = 109.11 ≤ ASCE 7-05 controls

Basic Wind Speed (3 sec Gust) = 90 mph (Fig. 6-1)
Exposure = C (Sec 6.5.6)
Roof Pitch = 0.25 : 12
Mean Roof Height, h = 28 ft

6.4 METHOD 1 - SIMPLIFIED PROCEDURE

6.4.2.1 - Main Wind-Force Resisting System

$$P_s = \lambda K_{zt} I_w P_{ss30} \quad \text{(Eq. 6-1)}$$

Where,
Height Adjustment Factor, $\lambda = 1.33$ (Fig. 6-2)
Topographic Factor, $K_{zt} = 1.0$ (6.5.7.2)
Importance Factor, $I_w = 1.15$ (Table 6-1)

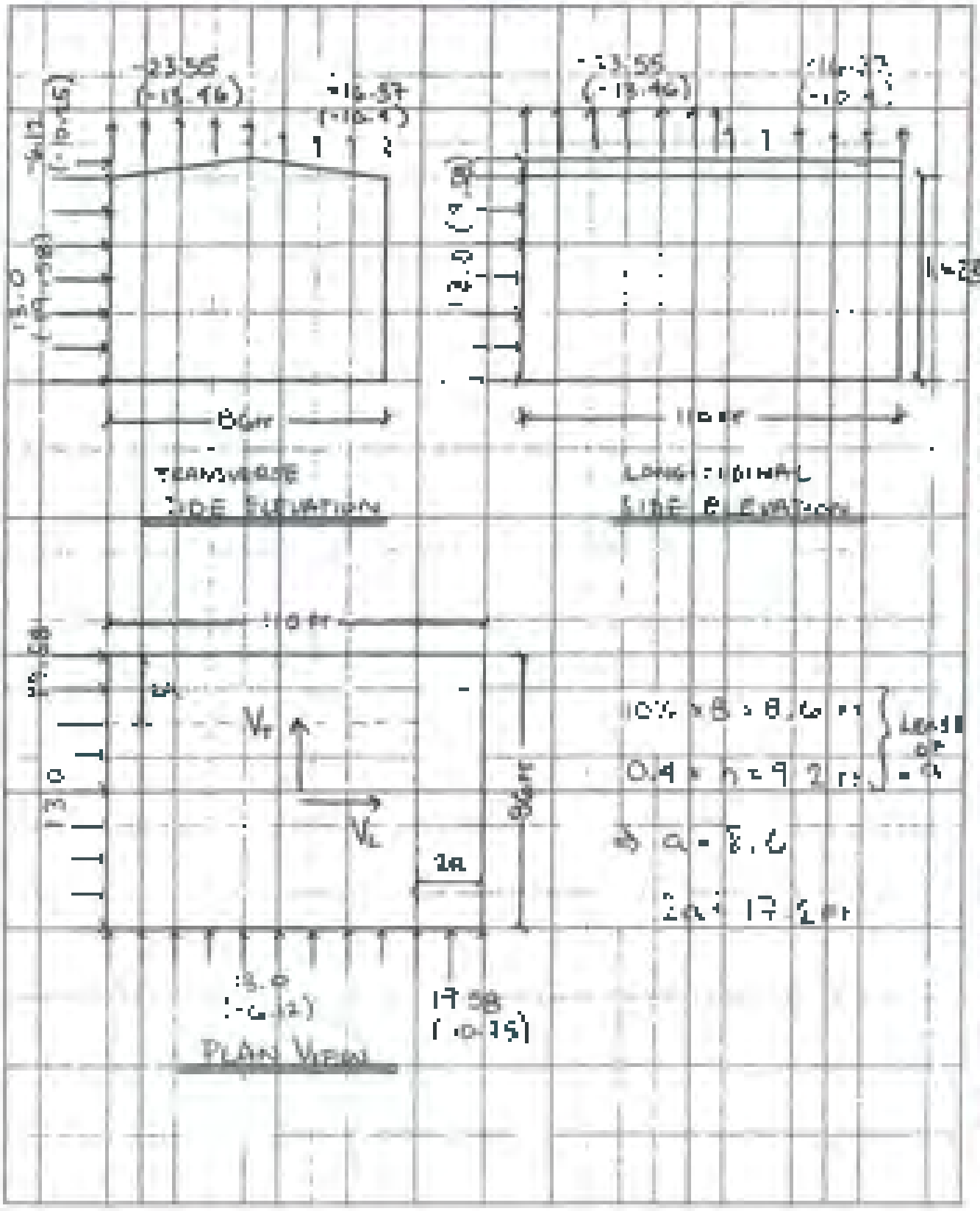
$$P_s = (1.33)(1.0)(1.15)\, P_{ss30} = 1.53\, P_{ss30}$$

P_{ss30} Fig. 6-2:

	Horiz. Pressures				Vert. Pressures				Overhangs	
	A	B	C	D	E	F	G	H	E_{oh}	G_{oh}
P_{ss30}	12.8	-6.7	8.5	-11.0	-15.4	-8.8	9.1	-6.8	-21.4	-16.9
P_s	19.58	-10.25	13.0	-16.83	-23.55	-13.46	13.92	-10.4	-32.74	-25.85

Becker/Perich/Sabatini

NAVFD Station #53
02502-01
Subject: LATERAL
By: AJB Date: 03/30/07
Checked: Date:
Sheet: 4 of



Bekker/Perich/Sabatini

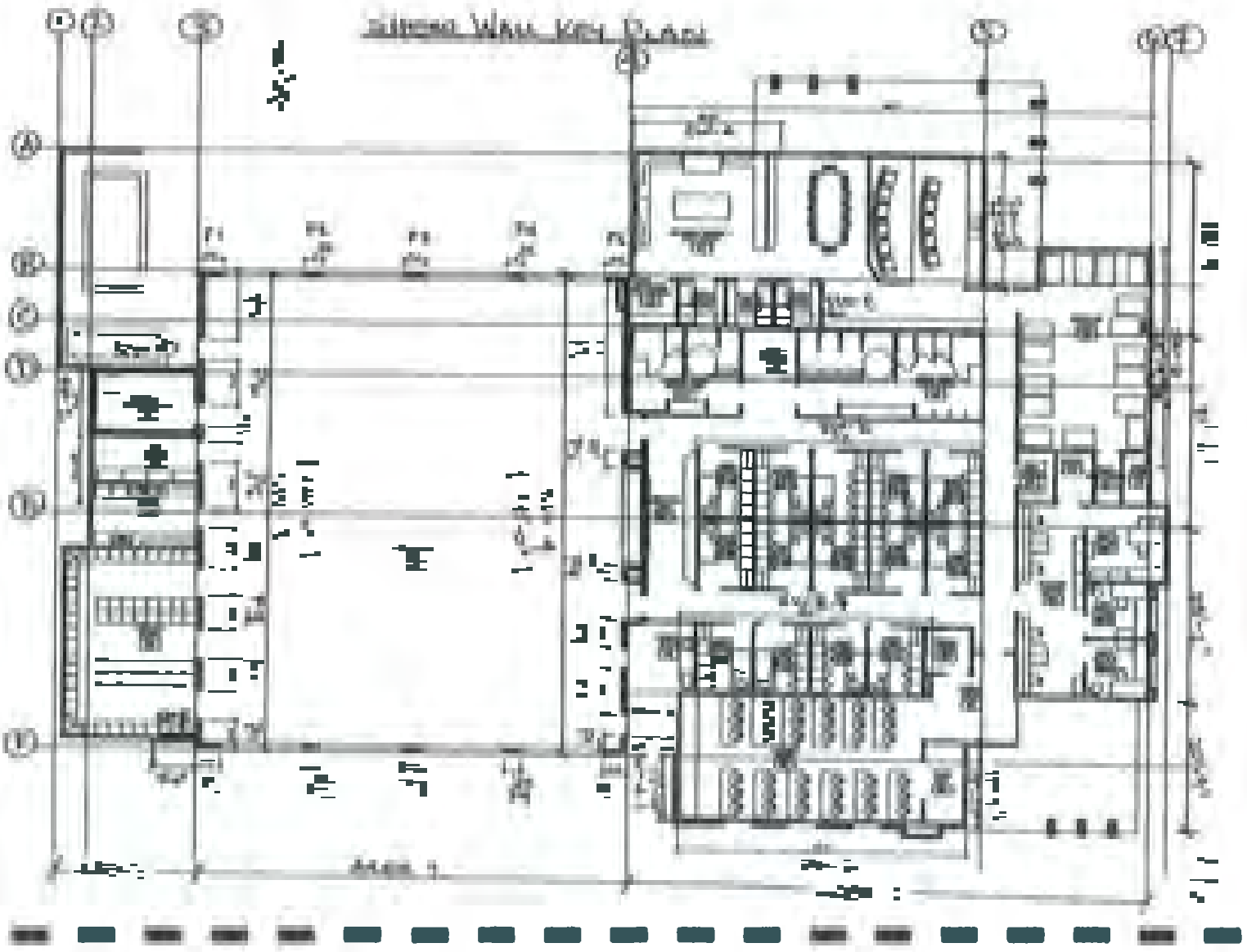
[redacted]

Name: NLVFD STATION #52
Project No.: 07502-01
Subject: LATERAL
By: AJB Date: 03/30/07
Checked: Date:
Sheet: 1/1

$V_T = (46.8\text{ FT} \times 23\text{ PSF})\,1.30 + (13.2\text{ FT} \times 23\text{ PSF})\,1.58$
$= 28.32\text{ K}$

$V_L = (92.8\text{ FT} \times 23\text{ FT})\,1.30 + (13.2\text{ FT} \times 23\text{ FT})\,1.58$
$= 35.99\text{ K}$

SEISMIC CONTROLS BOTH WAYS (121 K)



Bekker/Perich/Sabatini

Name: NUFD STATION #53
Project Number: 07502-01
Subject: LATERAL
By: AJB Date: 08/03/07
Checked: Date:
Sheet: L15

SHEAR WALL DESIGN - LIGHT GAGE STEEL

- IBC 2006: 2210.5 - LATERAL DESIGN PER AISI-LATERAL

- AISI LATERAL:

- C2 TYPE I SHEAR WALLS
  - SHALL BE FULLY SHEATHED w/ HOLD-DOWN ANCHORS @ EACH END OF WALL SEGMENT.
  - AVAILABLE STRENGTH SHALL BE DETERMINED USING THE SAFETY FACTOR Ω_v (2.5).
  - HEIGHT TO WIDTH ASPECT RATIO (H/W) OF A WALL PIER SHALL BE LIMITED TO A MAXIMUM OF 2:1.
  - WHERE AN ASPECT RATIO (H/W) GREATER THAN 2:1 IS ALLOWED, THE FUNDAMENTAL SHEAR STRENGTH SHALL BE MULTIPLIED BY 2 H/W, BUT IN NO CASE SHALL THE ASPECT RATIO EXCEED 4:1.

- C3 TYPE II (PERFORATED) SHEAR WALLS:
  - SHEATHING SEGMENTS SHALL BE LOCATED AT END AND OF A TYPE II SHEAR WALL.
  - NOMINAL SHEAR STRENGTH SHALL BE BASED UPON EDGE SCREW SPACING NOT LESS THAN 4 INCHES OC.
  - TYPE II SHEAR WALLS SHALL NOT HAVE OUT OF PLANE (PERPENDICULAR) OFFSETS.
  - COLLECTORS FOR SHEAR TRANSFER SHALL BE PROVIDED FOR THE FULL LENGTH OF WALL.
  - TYPE II SHEAR WALLS SHALL HAVE UNIFORM TOP OF WALL & BOTTOM OF WALL ELEVATIONS
  - WALL HEIGHT, h, SHALL NOT EXCEED 20 ft

Bekker/Petich/Sakakini

Name: NWFD Station #53
No.: 07502.01
Subject: LATERAL
By: AHB Date: 04/03/07
Chkd: _____
Sheet: 4

Shear Wall Design - Area 1

East-West Direction

Total Seismic Shear = 39,960 lbs

Roof Area = 8,022 sf

Seismic Load: $\frac{39,960 \text{ lbs}}{8,022 \text{ sf}} = 4.30 \text{ psf}$

Type I Shear Walls

Shear Wall SW-A

Tributary Area = .4 33'-6" = 824 sf

Length, L_{SW-A} = 23'-10" (23.83 ft)

Shear, v: $\frac{4.30 \text{ psf} \cdot 824 \text{ sf}}{23.83 \text{ ft}} = 148.7 \text{ plf} \approx 149 \text{ plf}$

A - Sheathing

15/32" APA RATED SHEATHING w/ 8d Screws @ 6" OC Along Panel Edges & 12" OC in Field

Nominal Shear Strength, R_n = 780 plf

Allowable Strength Value = $\frac{R_n}{\Omega} = \frac{780 \text{ plf}}{2.5}$

$312 \text{ plf} > 149 \text{ plf}$ ∴ OK

Parker/Pirnik/Schreiber

Project: NUVFD Station #53
Job No.: 03507-01
Subject: LATERAL
By: ALB Date: 09/08/07
Check: Date:
Sheet: 05

5-052 Wall Seq. A (cont.)

B - UPLIFT @ STEPPED END:

$T = C_s \frac{V h}{L_{eff}} = \frac{(4.30\ plf \times 824\ lf)(5/7)}{23.83\ ft}$

$T = 2,230$ lbs

RESISTING DEAD LOAD:

$W_{roof} = 20\ psf \times 14.33\ ft \times 23.83\ ft$
$= 6,830$ lbs

$W_{wall} = 15\ psf \times 15\ ft \times 23.83\ ft$
$= 5,362$ lbs

$W_{total} = 12,192$ lbs

$UPLIFT = T - 0.9 \frac{W_{total}}{2}$

$= 2,230 - 0.9 \left(\frac{12,192}{2}\right)$

$= -3,256$ lbs ∴ NO UPLIFT

∴ NO HOLD DOWNS REQ'D

C - ANCHORAGE FOR IN-PLANE SHEAR:

- PER IBC 2006 SECTION 1911
- TABLE 1911.2

Becker/Pertich/Sabatini

[redacted]

Job Name: NLVFD STATION #53
Job No.: 09507-01
Subject: LATERAL
Sheet: A-18 Date: 04/02/10
Client: [redacted]
Made by: GH Checked:

C. ANCHORAGE (cont.) C1-2

USE IRY ½" ϕ x 7" ANCHOR BOLTS

- MIN EMBED = 4" < ACTUAL - OK
- MIN EDGE DIST = 3" = ACTUAL - OK

T_{allow} = 950 lbs

V_{allow} = 1,250 lbs

ANCHOR SPACING = 4'-0" oc

V_s = WT (14' EP) = 596 lbs

T_s = 596 lbs

$$\left(\frac{V_s}{V_a}\right)^{5/3} + \left(\frac{T_s}{T_a}\right)^{5/3} \leq 1.0 \quad \text{(Eq. 19-1)}$$

$$\left(\frac{596}{1,250}\right)^{5/3} + \left(\frac{596}{950}\right)^{5/3} = 0.75 \leq 1.0 \quad \text{OK}$$

USE ½" ϕ x 7" ANCHOR BOLTS @ 4'-0" oc

Dekker/Perich/Sabatini

[redacted]

FIXED STATION #53
09502-01
LATERAL
A-B
04/02/97
L19

2) Compression Chord Force:

Ref AISC - C4: Concentrically Loaded Compression Members

T = C = 2,230 lbs

Use 2 - 60 x 5 Lbs 43 33 Back to Back

(See ASTM/CW Property Data Sheet)

$I_x = 3.586\ in^4$

$A_c = 0.689\ in^2$

$r = 2.282\ in$

$P_n = A_c F_n$ (Eq. C4-1)

$F_e = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2 (29 \times 10^3\ psi)}{\left(\frac{K = 1.0\ in \times 180\ in}{2.282\ in}\right)^2}$ (Eq. C4.1-1)

$F_e = 46,003\ psi$

$\lambda_c = \sqrt{\frac{F_y}{F_e}} = \sqrt{\frac{33\ ksi}{46\ ksi}} = .85 < 1.5$

$\Rightarrow F_n = \left(0.658^{\lambda_c^2}\right) F_y$ (Eq. C4-2)

$= \left(0.658^{(0.85)^2}\right) 33,000\ psi$

$F_n = 24,388\ psi$

- Σ. (cont.)

$P_h = 0.69\ in^2\ (24,350\ psi) = 6,803\ lbs$

$P_a = \frac{P_n}{\Omega} = \frac{16,703\ lbs}{1.8} = 4,335\ lbs$

$\Omega T = 2.5(2,732\ lbs) = 5,575\ lbs < P_a$: OK

USE 6005162-33 BACK-TO-BACK STUDS @ END OF SW-A

3. Where fully sheathed gypsum board is applied to the opposite side of the wall assembly, see Table C3.1-2 for sheathing grade Portland cement plaster and 7/8 inch (22 mm) stucco are considered fully sheathed for the purpose of determining shear strength and may be increased by 50%.
4. See Section C3.1 for requirements for sheathing applied to both sides of wall.
5. Shear wall height-to-width ratios shall not exceed those given in Table 4.3.4 but shall not exceed 2:1 for wood structural panel sheathing and 1-1/2:1 for all other sheathing materials unless otherwise provided.
6. Shear values permitted for use in seismic design where the seismic response modification factor, R, is taken equal to or less than 5. See Section C1.1.
7. For SI: 1" = 25.4 mm, 1 mm = 0.305 m, 1 lb = 4.45 N.

TABLE C3.1-3
NOMINAL SHEAR STRENGTH, (R_n), FOR WIND AND SEISMIC LOADS
FOR SHEAR WALLS FACED WITH GYPSUM BOARD[1,2,3,4]
(Pounds Per Foot)

Wall Construction	Min. Stud Size and Thickness	Description	Screw Spacing (in.)		Nominal Shear Strength (plf)
			Edge	Field	
½" gypsum board on one side of wall, studs max. 24" O/C	2×4	Gypsum board applied perpendicular to framing with edge blocking behind the horizontal joint and with joints staggered between the first row and the edges or applied vertically with all edges attached to framing members	2	7	260
			4	8	425
			4	12	365
			8	12	230

1. Nominal shear strengths shall be multiplied by the resistance factor (φ) to determine design strength or divided by the safety factor (Ω) to determine allowable shear strengths as set forth in Section C2.1.
2. See Section C3.1 for requirements for sheathing applied to both sides of wall.
3. Unblocked assemblies are permitted provided the nominal shear strength values above are reduced by 50%.
4. For SI: 1" = 25.4 mm, 1 lb/ft = 0.305 m, 1 lb = 4.45 N.

TABLE C3.1-3
NOMINAL SHEAR STRENGTH (R_n), FOR SEISMIC LOADS FOR SHEAR WALLS [4,5]
(Pounds Per Foot)

Assembly Description	Min. Stud Size and Thickness (in.)	Fastening Spacing at Panel Edges (in.)				Designation Thickness of Sheathing (in.)	Required Sheathing Blocked
		6	4	3	2		
15/32" Structural 1 sheathing (4-ply), one side	2×3	490	660			33 or 43	B
	3×3	880	1330	1775	2180	43 or 54	B
7/16" OSB, one side	2×3	700	935	-	-	33	B
	2×3	825	1235	1545	2060	43 or 54	B
	3×3	940	1410	1760	2350	54	B
	3×3	1230	1845	2310	3080	68	BD
0.019" steel sheet, one side	3×3	350		-	-	33 (min.)	B
0.027" steel sheet, one side	4×3	-	1350	1685	2170	33 (min.)	B

1. Nominal shear strength shall be multiplied by the resistance factor (φ) to determine design strength or divided by the safety factor (Ω) to determine allowable shear strengths as set forth in Section C2.1.
2. Screws at the ends of the panel shall be installed 2" inches (305 mm) O.C. unless otherwise shown.
3. Shear wall height-to-width ratios (h/w) greater than 2:1, but not exceeding 3:1, are permitted provided the nominal shear strength are multiplied by 2w/h. See Section C3.1
4. See Section C3.1 for requirements for sheathing applied to both sides of wall.

SECTION 1913
CONCRETE

1913.1 General. Concrete in excess of 2 inches (51 mm) deep shall be proportioned in accordance with one of the methods in Section 1913.2 or 1913.3. Concrete shall conform to the requirements of this chapter and applicable standards.

1913.2 Prescription mix and materials. Concrete proportions shall be selected that allow suitable placement procedures using the delivery equipment selected and shall result in a hardened concrete having the strength required by the design and the durability required by the environment to which it will be exposed.

1913.3 Aggregates. Coarse aggregates and sand shall conform to ASTM C 33 except as modified by Section 1913.3.1.

1913.3.1 Lightweight aggregates. Lightweight aggregates and lightweight concrete shall comply with the provisions of Sections 1913.3.1.1 through 1913.3.1.3.

1913.3.1.1 Slag. The maximum quantity of expanded slag that may be used in lightweight aggregate concrete shall be limited to that for which adequate evidence is submitted to show that the finished concrete will not disintegrate due to the presence of unstable slag.

1913.3.1.2 Clinkering. Where No. 3 or smaller bars are used, there shall be a minimum clearance between parallel reinforcement bars of 1½ times the bar diameter. Where bars larger than No. 3 are provided, there shall be a minimum clearance between parallel bars equal to one diameter of the bars used. Where four or more bars are provided, the vertical spacing of the bars shall be not less than the spacing required in the direction in which the bars have the least clearance.

Exception: Subject to the approval of the building official, required clearances shall be reduced where it is demonstrated by procedures or tests that adequate placement of the bars and the design will be achieved.

1913.3.1.3 Uniformity. Lightweight aggregates shall be uniform in quality and composition.

1913.4 Preconstruction tests. When required by the building official, a test panel shall be shot, cured, cored or sawed and tested prior to commencement of the project. The sample panel shall be representative of the proposed and in-place job conditions as closely as possible. The panel thickness and reinforcing shall represent the most and least congested areas specified by the structural design. It shall be shot at the same angle using the same nozzle and with the same nozzle and shooting distance that will be used on the project. The aggregates used in preconstruction testing shall be the same aggregates used in the work requiring such testing, unless substitute aggregates are approved by the building official.

1913.5 Rebound. Any rebound or accumulated loose aggregate shall be removed from the surface to be covered prior to placing the initial or any succeeding layers of concrete. Rebound shall not be used as aggregate.

1913.6 Joints. Except where permitted herein, pneumatically placed concrete shall be applied in such a manner that it will be free of sand pockets and will be uniformly dense and homogeneous throughout. Unless otherwise shown on the approved construction documents, square joints are permitted. Before placing additional material, adjacent to

TABLE 1913.3
MAXIMUM ALLOWABLE STRESSES FOR PRESTRESSED CONCRETE (pounds per square inch)

Type of Prestressing Steel	Minimum Specified Strength	Stress Type	Symbol	Maximum Concrete Prestress Used					
				f'_{ci} = 3,000		f'_{ci} = 4,000		f'_{ci} = 5,000	
				Tension	Shear	Tension	Shear	Tension	Shear
Wire	240 ksi	Initial	f_{pi}	400	400	600	600	750	750
Wire	240 ksi	Effective	f_{pe}	300	1,200	300	1,200	300	1,200
Strand	250 ksi	Initial	f_{pi}	400 1,000	1,200 1,400	600 1,000	1,200 1,400	750 1,000	1,200 1,400
Strand	270 ksi	Initial	f_{pi}	400 1,000	1,200 1,400	600 1,000	1,200 1,400	750 1,000	1,200 1,400
Strand	250 ksi	Effective	f_{pe}	300 1,000	1,200 1,400	300 1,000	1,200 1,400	300 1,000	1,200 1,400
Strand	270 ksi	Effective	f_{pe}	300 1,000	1,200 1,400	300 1,000	1,200 1,400	300 1,000	1,200 1,400
Bar	150 ksi	Initial	f_{pi}	400	1,200	600	1,200	750	1,200
Bar	150 ksi	Effective	f_{pe}	300	1,200	300	1,200	300	1,200
Bar	160 ksi	Initial	f_{pi}	400	1,200	600	1,200	750	1,200
Bar	160 ksi	Effective	f_{pe}	300	1,200	300	1,200	300	1,200
Bar	235 ksi	Initial	f_{pi}	400	1,200	600	1,200	750	1,200
Bar	235 ksi	Effective	f_{pe}	300	1,200	300	1,200	300	1,200

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.9 kPa, 1 ksi = 1,000 psi = 6.9 MPa.

PET.APP.001992

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2001 North American Specification w/2004 Supplement ASD
04/16, 400SHF

[2] 6 THSHF 400S162-54 (54): 400S162-54 [2] Back-to-Back

INPUT PROPERTIES:

Web Height =	6.000	in	Steel Thickness =	0.0566	in
Top Flange =	1.625	in	Inside Corner Radius =	0.1700	in
Bottom Flange =	1.625	in	Yield Stress, Fy =	33.0	ksi
Stiffening Lip =	0.500	in	Fy With Cold-Work, Fya =	33.0	ksi

OUTPUT PROPERTIES:

Effective Section Properties, Strong Axis

Inverse Axis from Top Fiber (Yeg)	3.0347	in
Moment of Inertia for Deflection (Ied)	3.3856	in^4
Section Modulus (Sxc)	1.1348	in^3
Allowable Bending Moment (Ma)	1901.26	ft-Lb

Gross Section Properties of Full Section, Strong Axis

Neutral Axis from Top Fiber (Yog)	3.0000	in
Moment of Inertia (Ixg)	3.0450	in^4
Gross Sectional Area (Ag)	0.9998	in^2
Radius of Gyration (Rx)	2.3019	in

Section Properties, Weak Axis

Gross Moment of Inertia (Iyg)	0.3458	in^4
Radius of Gyration (Ry)	0.7193	in

Other Section Property Data

Member Weight per Foot of Length	3.3431	lbf
Maximum Shear Force in Web (Unpunched)	1278	lb
Fyc for use in Interaction Equation C5-7	7266	lb

Lateral Buckling Properties for Flexure

Moment of Inertia of Compression Portion (yc)	0.1149	in^4

Allowable Web Crippling Loads (lb) Total for [2] Members

	1.00in Brg (Interior)		2.00in Brg (End)	
	Cond 1	Cond 3	Cond 2	Cond 4
[2] Back-to-Back	774	386	1075	538

SHEAR WALL SW-C

TRIBUTARY AREA = 2442 SF

LENGTH, L_{SW-C} = 58'-0"

SHEAR, V = 1.30 PSF × 2,442 SF = 10,501 lbs

UNIT SHEAR, $v = \frac{V}{L_{SW-C}} = \frac{10,501 \text{ lbs}}{58 \text{ FT}} = 181 \text{ PLF}$

A - SHEATHING:

15/32" APA RATED SHEATHING w/ #8 SCREWS @ 6" O.C. ALONG PANEL EDGES AND AT 12" O.C. IN FIELD

$v_{ALLOW} = \frac{R_A}{L} = \frac{780}{2.5} = 312 \text{ PLF} > 181 \text{ PLF}$ OK

B - UPLIFT @ SHEAR WALL ENDS:

$T = C = \frac{Vh}{L_{SW}} = \frac{(10,501 \text{ lbs})(15 \text{ FT})}{58 \text{ FT}} = 2,715 \text{ lbs}$

RESISTING DEAD LOAD:

W_{ROOF} = 20 PSF × 29.875 FT × 58 FT = 34,655 lbs

W_{WALL} = 10 PSF × 15 FT × 58 FT = 8,700 lbs

W_{TOTAL} = 34,655 + 8700 = 43,355 lbs

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[redacted]

NWTC STATION #53
07502-0
LATERAL
AJB 04/03/07
L23

B - UPLIFT (CONT.) SW-C

$UPLIFT = T - 0.9\frac{W_{TOTAL}}{2} = 2,716 - 0.9\frac{43,355}{2}$

$= -16,794$ lbs ∴ No UPLIFT

∴ No Hold Downs Req'd

C - ANCHORAGE FOR IN-PLANE SHEAR:

USE 1/2" ø x 7" ANCHOR BOLTS

$T_{allow} = 950$ lbs
$V_{allow} = 1,250$ lbs

SPACING @ 4'-0"

$T_d = 4(181\ plf) = 724$ lbs
$V_s = 724$ lbs

$\left(\frac{724}{1250}\right)^{5/3} + \left(\frac{724}{950}\right)^{5/3} = 1.0$ ∴ OK

USE 1/2" ø x 7" ANCHOR BOLTS @ 4'-0" oc.

D - COMPRESSION CHORD FORCE

$\Omega T = \Omega C = (2.5)\ 2,716$ lbs $= 6,790$ lbs
(SEE SW-A FOR (2)600S162-33 CALCULATIONS)

$P_a = 9,335$ lbs $>$ 6,790 lbs ∴ OK

USE 2-600S162-33 BACK TO BACK STUDS @ ENDS

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NLVFD Station #57
075021-01
LATERAL
A-LE 04/03/07
E-24

SHEAR WALL SW-E

TRIBUTARY AREA = 2547 SF

LENGTH, L_{SW-E} = 47'-0"

SHEAR, V = 4.30 PSF × 2547 SF = 10,952 lbs

UNIT SHEAR, $U = \frac{10,952 \text{ lbs}}{47 \text{ ft}} = 233$ PLF

A - SHEATHING

15/32" APA RATED SHEATHING W/ 8D SCREWS AT 6" OC ALONG PANEL EDGES AND AT 12" OC IN FIELD.

$U_{ALLOW} = \frac{780 \text{ PLF}}{2.5} = 312 \text{ PLF} > 233 \text{ PLF} \therefore$ OK

B - UPLIFT @ SHEARWALL ENDS

$T = C = \frac{Vh}{L_{SW}} = \frac{(10,952 \text{ lbs})(15 \text{ ft})}{47 \text{ ft}} = 3,495$ lbs

RESISTING DEAD LOAD

$W_{ROOF} = 20 \text{ PSF} \times 29.5 \text{ ft} \times 47 \text{ ft} = 27,805$ lbs
$W_{WALLS} = 10 \text{ PSF} \times 15 \text{ ft} \times 47 \text{ ft} = 7,050$ lbs
$W_{TOTAL} = 27,805 + 7,050 = 34,855$ lbs

$UPLIFT = 3,495 \text{ lbs} - 0.9\left(\frac{34,855}{2}\right) = -12,190$ lbs
NO UPLIFT

NO HOLD DOWN REQ'D

Dewberry Perlich Saboteini

[redacted]

Project: MW-10 SPACING #53
Job No.: 09502-01
Subject: LATERAL
By: AJB Date: 04/09/07
Chkd: Date:
Sheet: 675

(C) - ANCHORAGE FOR IN-PLANE SHEAR:

USE 7/8" ϕ x 7½" ANCHOR BOLTS

T_{allow} = 1,500 lbs
V_{allow} = 2,750 lbs

SPACING @ 9'-0" o.c.

T_s = A_T (233 plf) = 932 lbs
V_s = " = 932 lbs

$\left(\frac{932}{2,750}\right)^{5/3} + \left(\frac{932}{1500}\right)^{5/3} = 0.62 \leq 1.0$ ∴ OK

USE 7/8" ϕ x 7½" ANCHOR BOLTS @ 9'-0" o.c.

D - COMPRESSION CHORD FORCE:

ΩT = 2.5 (3,495 lbs) = 8,736 lbs

(SEE SHEET P1 FOR COMPRESSION CHORD CALCULATIONS)

P_n = 9,335 lbs > 8,736 lbs ∴ OK

USE (2) 600S 162-33 BACK-TO-BACK STUDS

SHEAR WALL SW-E.7

TRIBUTARY AREA = 1,796 SF

LENGTH, $L_{SW.E.7}$ = 41'-4" (41.33 FT)

SHEAR, V = 430 PLF × 1,796 SF = 7,508 lbs

UNIT SHEAR, $U = \frac{7,508 \text{ lbs}}{41.33 \text{ ft}} = 182 \text{ PLF}$

A - SHEATHING:

15/32" APA RATED SHEATHING w/ 8d SCREWS @ 6" OC ALONG PANEL EDGES AND @ 12" OC IN FIELD.

$U_{allow} = \frac{730}{2.5} = 512 \text{ PLF} > 182 \text{ PLF}$ ∴ OK

B - UPLIFT @ SHEAR WALL END:

$T = C = \frac{V h}{L_{SW}} = \frac{(7,508 \text{ lbs})(15 \text{ ft})}{41.33 \text{ ft}} = 2,725 \text{ lbs}$

RESISTING DEAD LOAD:

$W_{ROOF} = 20 \text{ PSF} \times 24.5 \text{ ft} \times 41.33 \text{ ft} = 20,252 \#$

$W_{WALL} = 10 \text{ PSF} \times 15 \text{ ft} \times 41.33 \text{ ft} = 6,200 \#$

$W_{TOTAL} = 20,252 + 6,200 = 26,452 \text{ lbs}$

$\text{UPLIFT} = 2,725 - 0.9 \frac{26,452}{2} = -9,198 \text{ lbs}$

∴ NO UPLIFT

NO HOLD DOWNS REQ'D

Bakker/Petrich/Sabatini

Project: NUVFO STATION #53
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[redacted]

C - ANCHORAGE FOR IN-PLANE SHEAR

USE 1 OR 1 ½" Ø x 7" ANCHOR BOLTS

T_{allow} = 950 lbs
V_{allow} = 1,250 lbs

SPACING @ 4'-0" oc

T_s = 4ft (182 plf) = 728 lbs
V_s = " = 728 lbs

$\left(\frac{728}{1250}\right)^{5/3} + \left(\frac{728}{950}\right)^{5/3} = 1.0$ ∴ OK

USE ½" Ø x 7" ANCHOR BOLTS @ 4'-0" oc

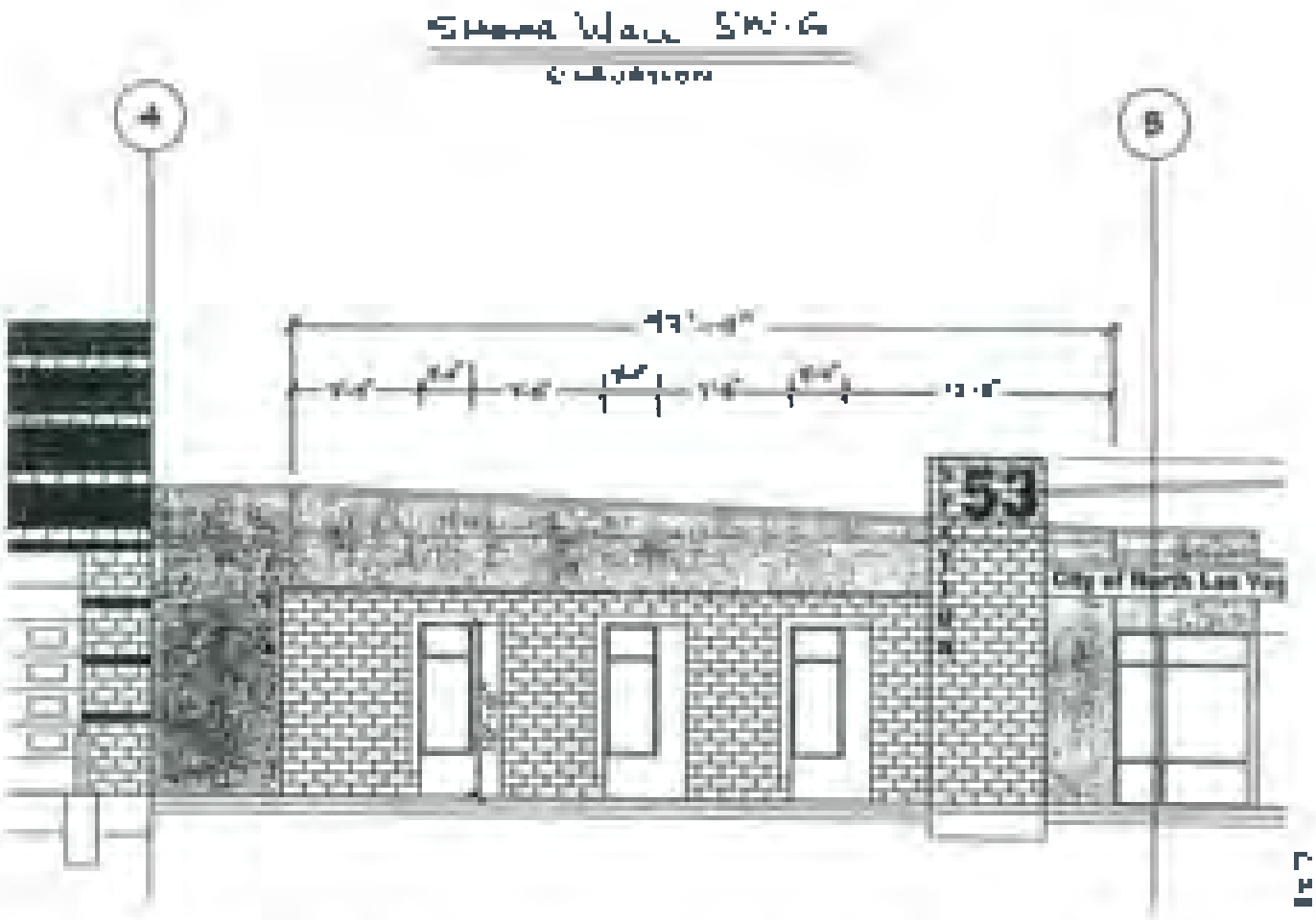
D - COMPRESSION CHORD FORCE:

$T = 2.5(2,725 \text{ lbs}) = 6,813$ lbs

(SEE SW-A FOR COMPRESSION CHORD FORCES.)

P_a = 11,335 lbs > 6,813 lbs ∴ OK

USE (2) 6005162-33 BACK-TO-BACK STUDS


Street Wall Sign
Elevation
4
5
53
City of North Las Veg

Dokker/Perich/Sahatjian

[redacted]

Project Name: LUFD STATION #53
Project No.: 09502-01
Subject: LATERAL
By: AJB Date: 04/25/07
Checked: Date:
Sheet: L2.1

- TYPE II SHEAR WALL

- SHEAR WALL SW-G

Tributary Area: 10.375 · 47.33 = 491 SF

% of Full Height Sheathing = $\frac{3'-4" + 3'-8" + 3'-8" + 15-8"}{47'-9"}$ = 20.81 ≥ 8.1%

Max. Opening Height / Story Height = $\frac{10'-0"}{15'-0"}$ = 0.67

From AISI Table C3.7-1:

C_c = 0.83

V = 4.30 PSF · 491 SF = 2,111 lbs

$v = \frac{V}{C_c \Sigma L_i} = \frac{2,111 \text{ lbs}}{(0.83)(38.9')}$ = 66 PLF

- SHEATHING:

15/32" APA RATED SHEATHING w/ #8 SCREWS @ 6" oc ALONG ALL PANEL EDGES AND @ 12" oc IN FIELD.

$V_{allow} = \frac{780 \text{ PLF}}{2.5}$ = 312 PLF > 66 PLF ∴ OK

PET.APP.002001

SHEAR WALL SW-G (CONT.)

K = UPLIFT @ SHEAR WALL END:

$$T = \frac{Vh}{C_a \Sigma L} = \frac{(2,111 \text{ lbs})(15 \text{ ft})}{(0.85)(38-33 \text{ ft})} = 995 \text{ lbs}$$

∴ USE S/HDBS HOLD DOWNS w/ 7/8" ϕ ANCHORS

w/ T_{allow} = 8,580 lbs ≥ 995 lbs ∴ OK

L - ANCHORAGE FOR IN-PLANE SHEAR:

USE 1 EA 1/2" ϕ x 7" ANCHOR BOLTS

T_{allow} = 950 lbs
V_{allow} = 1,250 lbs

T_a = 4 ft x 66 plf = 264 lbs
V_a = = 264 lbs

$$\left(\frac{264}{1,250}\right)^{5/3} + \left(\frac{264}{950}\right)^{5/3} = 0.19 < 1.0 \therefore \text{OK}$$

USE 1/2" ϕ x 7" @ 4'-0" oc ANCHOR BOLTS

Rutter·Torrich·Tabatini

Name: NJFD Station #53
Number: D7502-01
Type: LATERAL
Initials: MB Date: 04/06/07
Check: Sheet:
Job: 634

[redacted]

(2) - COMPRESSION CHORD FORCE:

$\Omega T = 2.5 (995\ lbs) = 2,488\ lbs$

(SEE SHEET 4 FOR COMPRESSION CHORD CALCS.)

$P_a = 9,335\ lbs > 2,488\ lbs$ ∴ OK

USE (2) 6005162-33 BACT-TO-BACK STUDS

SIMPSON Strong-Tie









PET.APP.002004

Becker/Parish/Zabelini

[redacted]

Name NUFO STATION 453
Job 07502.01
Subject LATERAL
By AJB Date 08/09/07
Checked
Sheet L33

NORTH - SOUTH DIRECTION

TOTAL SEISMIC SHEAR = 34,460 lbs

ROOF AREA = 8,022 sf

SEISMIC LOAD = $\frac{34,460 \text{ lbs}}{8,022 \text{ sf}}$ = 4.30 psf

TYPE I SHEAR WALLS

SHEAR WALL SW-4.1

TRIBUTARY AREA = 353 sf

LENGTH, $L_{SW-4.1}$ = 13'-10" (13.83 ft)

SHEAR, $v = \frac{4.30 \text{ psf} \times 353 \text{ sf}}{13.83 \text{ ft}}$ = 110 plf

4 - SHEATHING

15/32" APA RATED SHEATHING w/ 8d SCREWS AT 6" oc ALONG PANEL EDGES AND AT 12" oc IN FIELD.

NOMINAL SHEAR STRENGTH, R_n = 780 plf

AVAILABLE STRENGTH $v_{allow} = \frac{R_n}{\Omega} = \frac{780}{2.5}$

v = 312 plf > 110 plf ∴ OK

Bekker-Perich/Sabatini

[redacted]

Job: NAVFD STATION #53
Job No.: 07502-01
Subject: LATERAL
By: AJB Date: 01/09/07
Chkd: Sh
Sht: 4 of 34

SHEAR WALL SW-9.1 (CONT.)

B - UPLIFT @ SHEARWALL ENDS:

$T = C = \frac{Vh}{L_{SW}} = \frac{(4{,}130\ plf \times 8.5\ ft)(15\ ft)}{13.83\ ft}$

$T = 1{,}696\ lbs$

RESISTING DEAD LOAD:

$W_{WOOD} = 20\ psf \times 6\ ft \times 17.92\ ft = 2{,}090\ lbs$

$W_{WALL} = 15\ psf \times 15\ ft \times 17.92\ ft = 3{,}920\ lbs$

$W_{TOTAL} = 2{,}090 + 3{,}920 = 6{,}010\ lbs$

$UPLIFT = T - 0.9\left(\frac{W_{TOTAL}}{2}\right) < 1{,}696 - 0.9\left(\frac{6{,}010}{2}\right)$

$= -1{,}059\ lbs$ ∴ NO UPLIFT

∴ NO HOLD DOWNS REQ'D

C - ANCHORAGE FOR IN-PLANE SHEAR

USE ½" ϕ x 7" ANCHOR BOLTS

$T_{allow} = 950\ lbs$

$V_{allow} = 1{,}250\ lbs$

ANCHOR SPACING @ 4'-0" o.c.

$V_3 = 4\ ft \times 110\ plf = 440\ plf$

$T_3 = 4\ ft \times 110\ plf = 440\ plf$

C - ANCHORAGE, SW-9.1 (CONT.)

$$\left(\frac{V_e}{V_a}\right)^{5/3} + \left(\frac{T_e}{T_a}\right)^{5/3} \leq 1.0 \quad \text{(Eq. 19-1)}$$

$$\left(\frac{440}{1,250}\right)^{5/3} + \left(\frac{140}{950}\right)^{5/3} = 0.15 < 1.0 \therefore \text{OK}$$

USE ½" ϕ ANCHOR BOLTS @ 4'-0" OC

D - COMPRESSION CHORD FORCE:

$\Omega T = 2.5(1,646 \text{ lbs}) = 4,115 \text{ lbs}$

(SEE SW-A FOR (2)6005162-33 CALCULATIONS)

$P_a = 9,335 \text{ lbs} \geq 4,115 \text{ lbs} : \text{OK}$

USE (2) 6005162-33 BACK-TO-BACK STUDS @ 16" OC

Dekker/Perich/Sabatini

[redacted]

Project: Silver Station #53
Project No.: 07502.01
Subject: LATERAL
By: AJB Date: 04/09/07
Check: Date:
Sheet No.: 636

Shear Wall : SW-4.9

Tributary Area = 1,835 SF

Length, $L_{SW-4.9}$ = 13'-11" (13.92 FT)

Shear, V = 420 PLF x 1,835 SF = 7,891 lbs

Unit Shear, $U = \frac{V}{L} = \frac{7,891 \text{ lbs}}{13.92 \text{ FT}} = 567$ PLF

1) - Sheathing:

Both Sides - 15/32" APA Rated Sheathing w/ 8 screws at 6" on Along Panel Edges and at 12" on In Field.

$U_{allow} = \frac{780 \text{ PLF} + 780 \text{ PLF}}{2.5} = 624 \text{ PLF} > 567 \text{ PLF}$ OK

2) - Uplift & Shear Wall Ends:

$T = C = \frac{Vh}{L_{SW}} = \frac{(7,891 \text{ lbs})(13 \text{ FT})}{13.92 \text{ FT}}$

$T = 8,503$ lbs

Resisting Dead Load:

$W_{ROOF} = 20 \text{ PSF} \times 60 \text{ FT} \times 13.5 \text{ FT} = 1,620$ lbs

$W_{WALL} = 15 \text{ PSF} \times 8 \text{ FT} \times 13.92 \text{ FT} = 1,332$ lbs

$W_{TOTAL} = 1,620 + 2,132 = 7,802$ lbs

Dekker/Perich/Sabatini

[redacted]

NUVFD STATION #53
07502-01
LATERAL
AB 04/09/07
CSZ

SW - 4.9 - UPLIFT (CONT.)

$$\text{UPLIFT} = T - 0.9\frac{\text{WDTAL}}{2}$$

$$= 8,503 \text{ lbs} - 0.9\left(\frac{4,892}{2}\right)$$

$$\therefore \text{UPLIFT} = 6,342 \text{ lbs}$$

∴ USE S/HDB5 HOLD DOWN W/ 5/8" Ø ANCHOR

$\phi T_{allow} = 8,580$ lbs >> 6,342 lbs ∴ OK

5 - ANCHORAGE FOR IN-PLANE SHEAR

USE 5/8" Ø x 7" ANCHOR BOLTS

$T_{allow} = 1,500$ lbs
$V_{allow} = 2,750$ lbs

ANCHOR SPACING AT 16" (1.33 FT)

$T_a = 1.33 \text{ FT} \times 567 \text{ PLF} = 754$ lbs
$V_s = 754$ lbs

$$\left(\frac{V_s}{V_{allow}}\right)^{5/3} + \left(\frac{T_a}{T_{allow}}\right)^{5/3} \le 1.0 \quad (\text{Eq. 19-1})$$

$$\left(\frac{754}{2,750}\right)^{5/3} + \left(\frac{754}{1,500}\right)^{5/3} = 0.43 < 1.0 \therefore \text{OK}$$

USE 5/8" Ø ANCHOR BOLTS @ 16" O.C.

PET.APP.002009

Boeing/Rocketdyne

NLP Design #53
D7502-01
LATERAL
AJB 04/09/97
LSW

3) - COMPRESSION CHORD FORCE

UT = 25 > 8,503 lbs > 21,258 lbs

USE (4) 600S162-43 STUDS

(SEE AISI/WIN/CW PROPERTY DATA SHEET)

I_x = 4 x 2.3158 in⁴ = 9.26 in⁴

A_c = 4 x 0.4969 in² = 1.99 in²

r = 2.28 in

$P_n = A_e F_n$ (Eq C4-1)

$F_e = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2 (29 \times 10^6 \text{ psi})}{\left(\frac{1.0 \times 180 \text{ in}}{2.28 \text{ in}}\right)^2}$ = 45,912 psi

$\lambda_c = \sqrt{\frac{F_y}{F_e}} = \sqrt{\frac{33}{16}}$ = 0.85 > 1.5 ∴ ok

$F_n = (0.658^{\lambda_c^2}) F_y = (0.658^{0.85^2})$ 33,000 psi

= 24,388 psi

P_n = 1.99 in² x 24,388 psi = 43,655 lbs

$P_a = \frac{P_n}{\Omega} = \frac{43,655 \text{ lbs}}{1.8}$ = 24,253 lbs > 21,258 lbs

∴ ok

USE (4) 600S162-43 STUDS @ EACH SW END

www.clarkwestern.com

2001 North American Specification w/2004 Supplement AISI
DATE: 7/31/2007

SECTION DESIGNATION: 600S162-43 Single

INPUT PROPERTIES:

Web Height =	6.000 in	Steel Thickness =	0.0451 in
Top Flange =	1.625 in	Inside Corner Radius =	0.0713 in
Bottom Flange =	1.625 in	Yield Stress, Fy =	33 ksi
Stiffening Lip =	0.500 in	Fy with Cold-Work, Fya =	38.1 ksi
Punchout Width =	1.500 in	Punchout Length =	4.000 in

OUTPUT PROPERTIES:

Effective Section Properties, Bending Axis

Neutral Axis from Top Fiber (Yeg)	3.0074	in
Moment of Inertia for Deflection (Ix)	3.3158	in^4
Section Modulus (Sx)	0.7873	in^3
Allowable Bending Moment (Ma)	1999.91	Ft-Lb

Gross Section Properties at Full Section, Strong Axis

Neutral Axis from Top Fiber (Yog)	3.0000	in
Moment of Inertia (Ixo)	3.3158	in^4
Gross Cross-Sectional Area (A)	0.4480	in^2
Radius of Gyration (Rx)	2.7164	in

Section Properties, Weak Axis

Gross Neutral Axis (Xog) from Web Face	0.4139	in
Gross Moment of Inertia (Iyo)	0.1484	in^4
Radius of Gyration (Ry)	0.5782	in
Effective Section Modulus (Sfy)	0.1080	in^3
Effective Neutral Axis (Xeg) from Web Face	0.4798	in
Allowable Moment (May)	177.85	Ft-Lb

Other Section Property Data

Hat Area at Punchout	0.3782	in^2
Member Weight per Foot of Length	1.5306	lbf
Allowable Shear Force in Web (Unpunched)	1416	lb
Allowable Shear Force in Web (Punched)	1340	lb
Data for Axis in Interaction Equation (Ca)	4864	lb

Torsional Properties

Dist. from Shear Center to Neutral Axis (Xo)	-1.0809	in
St. Venant Torsion Constant (J x 1000)	0.3030	in^4
Warping Constant (Cw)	1.0823	in^6
Radius of Gyration (Ro)	2.5648	in
Torsional Flexural Constant (Beta)	0.9763	

Adjustable Web Crippling Loads (lb)

	1.00in END BEND		3.50in INT BEND	
	Cond 1	Cond 2	Cond 3	Cond 4
Single Member	268	195	Fail	Fail
Reduction Rc	0.825 + 0.050 wh/t <= 1.0		0.888 + 0.050 wh/t <= 1.0	

Note: Rc applies only Cond 1 and 2

Dokken/Pavick/Takahiki

NLVFD Station #53
23502.01
LATERAL
AJB
04/09/07
LAB

Shear Wall SW-5

Tributary Area = 2,189 SF

Length, L_{SW5} = 22 FT

Shear, V = 4.30 PLF × 2,189 SF = 9,413 lbs

Unit Shear, $U = \frac{V}{L} = \frac{9,413 \text{ lbs}}{22 \text{ FT}} = 428 \text{ PLF}$

A - Sheathing:

Both Sides - 15/32" APA Rated Sheathing w/ 8" screws @ 6" o/c along panel edges and @ 12" o/c in field.

$V_{allow} = \frac{R_A}{\Omega} = \frac{1(980 \text{ PLF})}{2.5} = 624 \text{ PLF} > 428 \text{ PLF}$ ∴ OK

B - Uplift @ Shear Wall Ends:

$T = C \cdot \frac{Vh}{L_{SW}} = \frac{(9,413 \text{ lb})(15 \text{ FT})}{22 \text{ FT}} = 6,418 \text{ lbs}$

Resisting Dead Load:

W_{ROOF} = 20 PSF × 6 FT × 22 FT = 2640 lbs
W_{WALL} = 15 PSF × 15 FT × 22 FT = 4,950 lbs
W_{TOTAL} = 2640 lbs + 4950 lbs = 7,590 #

$UPLIFT = T - 0.9\left(\frac{W_{TOTAL}}{2}\right) = 6,418 - 0.9\left(\frac{7590}{2}\right)$
$= 3,003 \text{ lbs}$

SHEAR WALL SW-5 (CONT.)

USE S/HDB8 HOLD DOWN W/ 7/8" ø ANCHORS

W/ T_{allow} = 8,580 lbs > 3,003 lbs UPLIFT ∴ OK

C - ANCHORAGE FOR IN-PLANE SHEAR

USE 5/8" ø x 7" ANCHOR BOLTS

T_{allow} = 1,500 lbs
V_{allow} = 2,750 lbs

ANCHOR SPACING @ 16" o.c. (1.33 ft)

T_s = 1.33 ft x 428 plf = 569 lbs
V_s = " " = 569 lbs

$\left(\frac{569}{2,750}\right)^{5/3} + \left(\frac{569}{1,500}\right)^{5/3} = 0.27 < 1.0$ ∴ OK

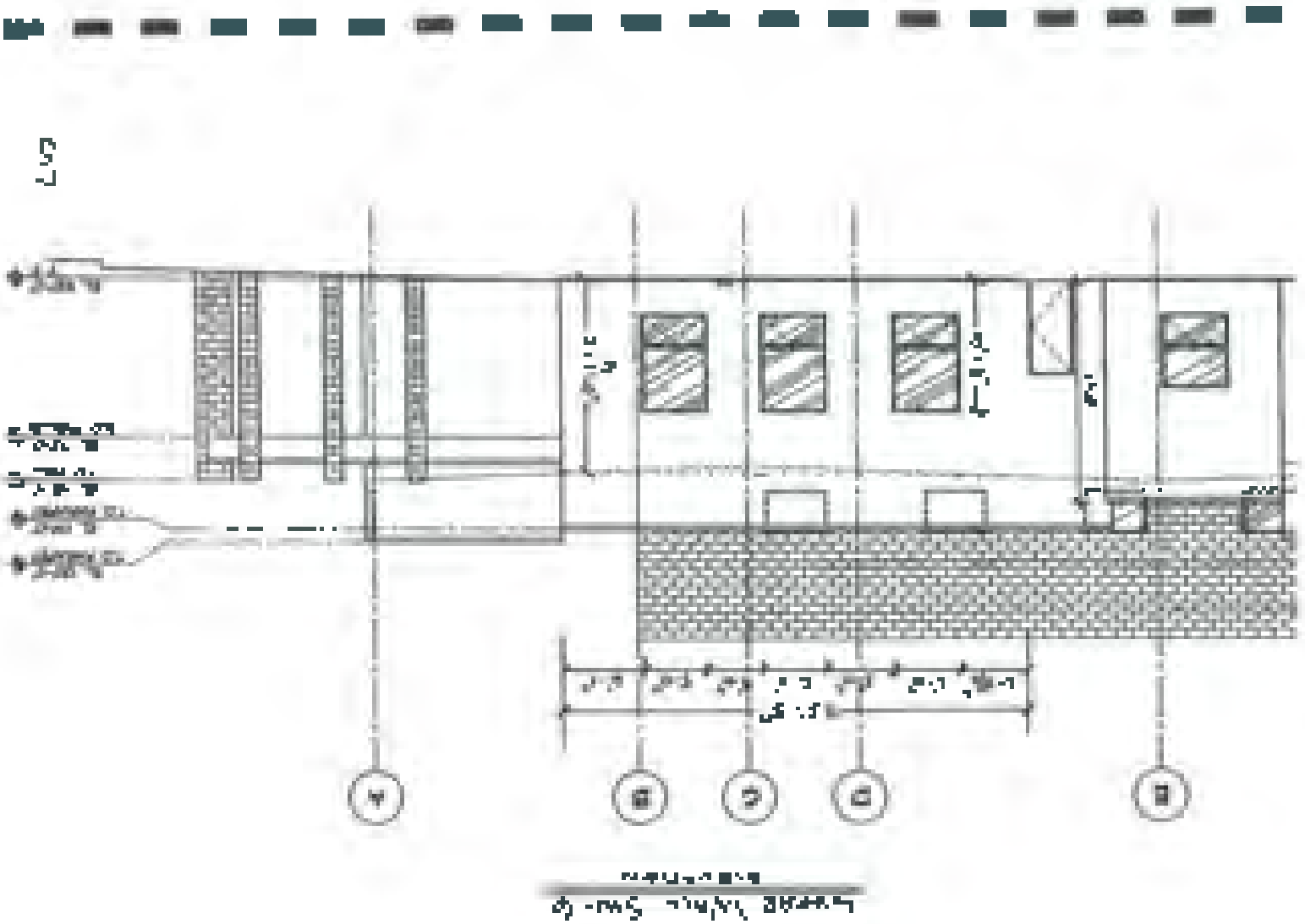
USE 5/8" ø x 7" ANCHOR BOLTS @ 16" o.c.

D - COMPRESSION CHORD FORCE:

$\Sigma LT = 2.5(6,418 \text{ lbs}) = 16,045 \text{ lbs}$

(SEE SW-4A FOR COMPRESSION CHORD CALCS)
P_a = 21,253 lbs > 16,045 lbs ∴ OK

USE (4)6003/6Z + 4 STUDS @ EA. SW END.



Becker/Perich/Sabatini

[redacted]

Project: NLVFD Station #53
Job No.: 07501-01
Subject: LATERAL
By: AJB Date: 04/09/07
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Sheet: L43 of

TYPE II SHEAR WALL

SHEAR WALL SW-6

TRIBUTARY AREA = 1,005 SF

% FULL-HEIGHT SHEATHING = $\frac{5'-3\frac{1}{2}" + 6'-0" + 9'-0" + 6'-1"}{35'-3"} = 0.575$

MAX. OPENING HEIGHT / TOTAL HEIGHT = $\frac{10'-2"}{15'-0"} = 0.68$

FROM AISI TABLE C2.2-1:

$C_a = 0.76$

$V = 4.30 \text{ PLF} \times 600 \text{ SF} = 2,580 \text{ lbs}$

$U = \frac{V}{C_a \Sigma L_i} = \frac{2,580 \text{ lbs}}{0.76(20.375')} = 166 \text{ PLF}$

A - SHEATHING:

15/32" APA RATED SHEATHING w/ #8 SCREWS AT 6" o.c. ALONG PANEL EDGES AND AT 12" o.c. IN FIELD.

* PER NOTE 3 ON TABLE C2.1-3 - SHEAR WALL ASPECT RATIO GREATER THAN 2:1 ARE PERMITTED AS LONG AS Δ_{allow} IS MULTIPLIED BY 2w/h, BUT NOT EXCEED 4:1.

EXCEPT WHERE SW = 6 : 7 SHEATHING (CONT.)

$2\ w/_{ft} = 2\left(4^{ft}/_{5ft}\right) = 0.533$

$R_n = 0.533\,(980\ plf) = 416\ plf$

$U_{allow} = \frac{416\ plf}{2.5} = 166\ plf$ ∴ OK

B - UPLIFT @ SHEAR WALL ENDS:

$T = \frac{Vh}{C_a \sum L_i} = \frac{(2,580\ lbs)(15\ ft)}{3.76\,(20.335\ ft)} = 2,500\ lbs$

USE S/HDBS HOLD DOWN W/ 7/8" ø ANCHORS

W/ $T_{allow} = 8,580\ lbs > 2,500\ lbs$ ∴ OK

C - ANCHORAGE FOR IN-PLANE SHEAR:

USE DRY 1/2" ø x 7" ANCHOR BOLTS

$T_{allow} = 950\ lbs$

$V_{allow} = 1,250\ lbs$

SPACING @ 4'-0" oc

$T_{@\ 4\ ft} = 4\ ft \times 166\ p.l.f = 664\ lbs$

$V_{@\ 4\ ft} = 664\ lbs$

SHEAR WALL SW-6.1 - ANCHORAGE (CONT.)

$$\left(\frac{6,649\ lbs}{11,250\ lbs}\right)^{1/2} + \left(\frac{6,649\ lbs}{9,500\ lbs}\right)^{5/3} = 0.90 > 1.0 \therefore OK$$

USE 1/2" ϕ x 7" @ 4'-0" oc ANCHOR BOLTS

D - COMPRESSION CHORD FORCE:

$\Omega T = 2.5(2,500\ lbs) = 6,250\ lbs$

(SEE SW-A FOR COMPRESSION CHORD CALCS.)

$P_a = 9,335\ lbs > 6,250\ lbs \therefore OK$

USE (2) 600S162-33 BACK-TO-BACK STUDS @ SW-6.1

5
4

[redacted]

North - South Direction

Total Seismic Shear = 80,944 lbs

Shear Along Grids (3) + (4):

$$V_{3-4} = \frac{80,944 \text{ lbs}}{2} + 40,472 \text{ lbs}$$

h = 20.67 ft (248 in)

$$M = Vh = (40,472 \text{ lbs})(20.67 \text{ ft})$$

$$= 836,556 \text{ lb-ft} \quad (10,038,710 \text{ lb-in})$$

Roof Loads:

DL = 20 psf

LL = 20 psf

40 psf

P = 40 psf × 35 ft × 78 ft = 109 K

- Check if Wall is Cracked

$$f_a = \frac{P}{A} = \frac{109,200 \text{ lbs}}{(11.625 \text{ in})(936 \text{ in})} = 10.01 \text{ psi}$$

$$S = \frac{bd^2}{6} = \frac{11.625 \text{ in}(936 \text{ in})^2}{6} = 1,668,510 \text{ in}^3$$

$$f_b = \frac{M}{S} = \frac{10,038,710 \text{ lb-in}}{1,668,510 \text{ in}^3} = 6.02 \text{ psi}$$

Baker/Petrolite Solutions

[redacted]

Project No. SLVED Station #53
Project Name 07501 01
Subject LATERAL
By AJB Date 07/24/07
Checked By [redacted] Page
Sheet No. 6 of [redacted]

$$\frac{P}{A} + \frac{M}{S} = 16.04 \text{ psi} < 0.60 F_y$$



$\ell = 9.44$ m $\sigma_r = 1065$ psi

∴ Wall is Un-Cracked

Allowable Stresses:

$$F_v = (1.33)(0.33\sqrt{f'_m}) = 1.33(0.33\sqrt{1,500 \text{ psi}}) = 68 \text{ psi}$$

$$F_s = 1.33 F_s = 1.33(24,000 \text{ psi}) = 31,920 \text{ psi}$$

$$f_v = \frac{V}{bd} = \frac{40,972 \text{ lbs.}}{(11.625 \text{ in})(92 \text{ in})} = 38.45 \text{ psi}$$

$$\frac{M}{Vd} = \frac{1,003,710 \text{ lb-in}}{(40,972 \text{ lbs})(92 \text{ in})} = 0.027 < 1.0$$

$$\Rightarrow F_v = \left(\frac{1}{3}\right)\left[4 - \left(\frac{M}{Vd}\right)\right]\sqrt{f'_m} = \frac{1}{3}\left[4 - 0.027\right]\sqrt{1500}$$

$F_v = 51.29$ psi $>> f_v$ ∴ OK

PET.APP.002020

Bakker/Pench/Sabatini

[redacted]

Project: NLNEO STATION #53
Proj. No.: 07502-01
Subject: LATERAL
By: AJB Date: 07/24/07
Checked: Date:
Sheet: L44

- MINIMUM REINF. REQUIRED:

* PER BERMS I. & U.

$A_{s(min)} = 0.0007 (1.625 in)(12 in/ft) = 0.0137 in^2/ft$

USE #4 @ 12" HEDGE DUTY DUR-O-WALL TRUSS @ 16" OC AND 2-#5 @ BOND BEAMS PER DETAIL S1/S202 HORIZONTAL REINFORCEMENT.

BOND BEAMS: 2-#5 = 0.62 in²

DUR-O-WALL: 0.066 in²/ft × (12 in / 16" oc) = 0.0495 in²/ft

$A_{min-2} = 2.11 + 0.0495 = 2.49 in^2/ft > 0.0137 in^2/ft$

∴ OK

VERT. REINF:

$A_v = \#6 @ 24" oc = 0.44 in^2 \times \frac{12"/ft}{24 in} = 0.22 in^2/ft$

VERT. REINF REQ'D: $(0.002 \times A_g) + A_{vh}$

$= 0.239 + 0.093 in^2/ft$

$= 0.182 in^2/ft < 0.22 in^2/ft$

∴ OK

Bekker/Petrick/Sabatini

Project: NLVFD Station #53
Job No.: 03502.01
Subject: LATERAL
By: AJB Date: 07/21/03
Check: Sheet: 15

- OUT OF PLANE DESIGN:

$M = \frac{wl^2}{8} = \frac{20\ psf\ (10.67\ ft)^2}{8} = 1,048\ ft\text{-}lb = 12,818\ lb\text{-}in$

$A_s = \frac{M}{f_s j d} = \frac{12,818\ lb\text{-}in}{(31,720\ psi)(0.9)(5.8\ in)} = 0.0748\ in^2 < 0.22\ in^2$ (4 GAGE @ 24" o.c.)

∴ 1-#6 @ 24" o.c. IS ADEQUATE

- COMPRESSIVE STRESS:

$r = \frac{t}{\sqrt{12}} = \frac{11.63}{\sqrt{12}} = 3.36\ in$

$\frac{h}{r} = \frac{298\ in}{3.36\ in} = 88.8 < 99$

$\Rightarrow F_a = \frac{1}{4} F'_m \left[1 - \left(\frac{h}{140 r}\right)^2\right]$ (Eq. 2-2)

$= \frac{1}{4}(1500)\left[1 - \left(\frac{298}{140(3.36)}\right)^2\right]$

$F_a = 271\ psi$

Dekker/Perich/Sabatini

Project Name: NLVFD STATION #53
Project Number: 09502-01
Subject: LATERAL
By: AJB Date: 04/24/07
Check by: Date:
Sheet: 4 of

- Tens. : Plane Stresses:

$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1.0$

$\frac{10.64}{271} + \frac{0.60}{658} = 0.032 < 1.0 \therefore$ OK

- Bur. Dr. Plane Stresses:

$f_{cp} = \frac{2M}{k_{cd}}$

$k_{cd} = \frac{f_c}{E_m} = \frac{2,500 \text{ psi}}{1,000(33)(145)^{1.5}\sqrt{2,500}} = \frac{29,000 \text{ psi}}{3,320 \text{ psi}} = 11.48$

$\rho_t = \frac{A_s}{bd} = \frac{0.94 \text{ in}^2}{(12 \text{ in})(8.81 \text{ in})} = 0.0063$

$\rho_{bal} = 0.1353$

$k = \sqrt{2\rho_t n + (\rho_t n)^2} - \rho_t n = 0.1522$

$j = 1 - \frac{k}{3} = 0.8459$

$f_b = \frac{2(12.8 \text{ k-in})}{(0.8459)(0.1522)(12 \text{ in})(8.81 \text{ in})^2} = 181.72 \text{ psi}$

$\frac{f_a}{F_a} + \frac{f_b}{F_b} = \frac{0.04}{271} + \frac{181.72}{658} = 0.813 < 1.0$

$\therefore$ OK

Reinforcement is Adequate

Shearwall "B & F" - Plate Design

Plan	A	L	M_A	A_s	M_C	M_B/A_s	V_1	Name	Size	Str	Str Plate

Keller Pecub Zabelini

[redacted]

NLVFD Stations #23
07501.0
LATERAL
A-18 — 09/23/07
LEO

∴ East - West Direction

Total Seismic Shear = 80,994 lbs

Base Shear on each Wall = 40,472 lbs

Shear Walls B & F

- Piers 1 & 5:

$V_u = 12,700 \text{ lbs} \times 1.5 = 19,050 \text{ lbs}$ (IBC 1604.5)

L = 4'-0"

A - Shear Stress:

$f_v = \frac{V}{bd} = \frac{19,050 \text{ lbs}}{(14.625 \text{ in})(93.2 \text{ in})} = 37.93 \text{ psi}$

B - Allowable Shear Stress:

$\frac{M}{Vd} - \frac{H}{2} = \frac{25.67 \text{ ft} (12''/\text{ft})}{93.2 \text{ in}} = 3.31 > 1.0$

$F_v = 1.5\sqrt{1,500 \text{ psi}} = 58 \text{ psi} > f_v$ ∴ OK

C - Min. Area of Reinforcement:

$A_v = \frac{V}{F_s d} = \frac{19,050 \text{ lbs} (12''/\text{ft})}{(1.33 \times 24,000 \text{ psi})(93.2 \text{ in})} = 0.164 \text{ in}^2/\text{ft}$

USE 2-#5 @ 48" o.c. STG @ 0-0-w @ 32" o.c.

$A_s = 0.169 \text{ in}^2/\text{ft} > 0.164 \text{ in}^2/\text{ft}$ ∴ OK

Dokken/Perich/Saboloni

[redacted]

Job: N. UFO Station #52
Job #: 07502-01
Subject: LATERAL
By: AJB Date: 01/23/07
Check: [redacted]
Sheet: 4 of [redacted]

- PIERS 2 & 4:

V_u = 3,840 lbs x 1.5 = 5,760 lbs

L = 2.67 ft

A - SHEAR STRESS:

$f_v = \frac{V}{bd} = \frac{5,760 \text{ lbs}}{(1.625 \text{ in})(28.84 \text{ in})} = 17.18 \text{ psi}$

B - ALLOWABLE SHEAR STRESS:

$\frac{M}{Vd} = \frac{H}{d} = \frac{(20.67 \text{ ft})(12 \text{ in})}{28.84 \text{ in}} = 8.6 > 1.0$

F_v = 58 psi > 17.18 psi ∴ OK

C - MIN AREA OF REINFORCEMENT:

$A_v = \frac{V}{F_s d} = \frac{(5,760 \text{ lbs} \times (12 \text{ in/ft}))}{(1.33 \times 24,000 \text{ psi} \times (28.84 \text{ in}))}$

A_v = 0.073 in²/ft

USE 2-#5 @ 48" oc + STD @ 5.0 ft @ 32" oc.

A_v = 0.169 in²/ft > 0.095 in²/ft ∴ OK

Becker·Perich/Sabatini

[redacted]

Project: NLVFD Station #53
Project Number: 07502-01
Subject: LATERAL
By: AJB Date: 04/23/08
Check: Date:
Sheet: L66

∴ FOR B:

V_u = 7,390 lbs × 1.5 = 11,085 lbs

L = 3.33 ft

A - SHEAR STRESS:

$$f_v = \frac{V}{bd} = \frac{11,085 \text{ lbs}}{(11.625 \text{ in})(35.96 \text{ in})} = 26.5 \text{ psi}$$

B - ALLOWABLE SHEAR STRESS:

$$\frac{M}{Vd} \rightarrow \frac{M}{d} = \frac{20.67 \text{ ft} \left(12 \frac{\text{in}}{\text{ft}}\right)}{35.96 \text{ in}} = 6.90 > 1.0$$

$F_v = 58 \text{ psi} > 26.5 \text{ psi}$ ∴ OK

C - MIN. AREA OF REINFORCEMENT:

$$A_v = \frac{V}{f_s d} = \frac{11,085 \text{ lbs} \times 12 \frac{\text{in}}{\text{ft}}}{(.33)(29,000 \text{ psi})(35.96 \text{ in})} = 0.116 \frac{\text{in}^2}{\text{ft}}$$

USE 2-#5 @ 18" OC = 3(0.11) = 0.33 in²

$A_s = 0.169 \text{ in}^2/\text{ft} > 0.116 \text{ in}^2/\text{ft}$ ∴ OK

Dekker/Perich/Sabatini

Project Name: NUMED Storage #53
Project Number: 0450.2-01
Subject: LATERAL
By: AJB Date: 04/29/97
Sheet No.: 6 of 66

OVERTURNING AT EACH PIER

- PIERS 1 & 5:

$T \cdot C = \frac{(12{,}700 \text{ lbs})(20.67 \text{ ft})}{4 \text{ ft}} = 65{,}623 \text{ lbs}$

RESISTING LOADS:

P_{ROOF}: 20 PSF × 3 FT = 60 PLF

WALL: 133 PSF × 13.33 ft = 1,773 PLF

$R_R = \left(\frac{4 \text{ FT}}{2} + \frac{13.33 - 4}{2}\right)(1{,}773 \text{ PLF}) \times 0.90 = 13{,}835 \text{ lbs}$

NET UPLIFT = 65,623 lbs − 13,835 lbs

UPLIFT = 51,792 lbs

USE 1RH 4-#6 @ EA END OF PIER

$f_t = \frac{P}{A} = \frac{51{,}792}{1.77 \text{ in}^2} = 29{,}261 \text{ psi}$

$F_t = 0.6(60{,}000 \text{ psi}) = 36{,}000 \text{ psi} > f_t$:OK

* WEIGHT OF INTERSECTING WALL & END ASSUMED AS LESS CRITICAL THEN HALF THE WALL DEAD LOAD ABOVE THE DOOR OPENINGS.

Architect/Permit/Subplan

Project Name: NLVFD STATION #53
Project No.: 07502-01
Subject: LATERAL
By: AEB Date: 01/24/07
Sheet No.: 257

- P.ERS 2 : 4 :

$$T = C = \frac{3,840 \text{ lbs} \left(20.67 \text{ ft}\right)}{2.67 \text{ ft}} = 29,728 \text{ lbs}$$

RESISTING LOADS:

ROOF: 20 PSF x 3 FT = 60 PLF
WALL: 133 PCF x 13.83 FT = 1,773 PLF

$$R_{DL} = \left(\frac{2.67 \text{ ft}}{2} + \frac{18 \text{ in}}{2}\right)\left(1,833 \text{ PLF}\right) \times 0.90 = 13,206 \text{ lbs}$$

(½ WALL + ROOF OVERHANG) (WALL + ROOF) (0.9)

NET UPLIFT = -29,728 lbs + 13,206 lbs = -16,522 #

USE STRAP 2 - #6 @ EA. END OF P.ERS

$$F_t = \frac{P}{A} = \frac{16,522 \#}{0.88 \text{ in}^2} = 18,795 \text{ psi}$$

$F_t = 0.6 \left(60,000 \text{ psi}\right) = 36,000 \text{ psi}$ ∴ $f_t < F_t$ OK

- PIER 3:

$$T = C = \frac{(7{,}390\ \text{lbs})(20.67\ \text{ft})}{3.33\ \text{ft}} = 45{,}871\ \text{lbs}$$

RESISTING LOADS:

Roof: 40.0 PLF
Walls: 1,273 PLF

$$R_{DL} = \left(\frac{3.33\ \text{ft}}{2} + \frac{13'\text{-}4''}{2}\right)(1{,}038\ \text{PLF}) \times 0.90 = 13{,}750\ \text{lbs}$$

NET UPLIFT = -45,871 lbs + 13,750 lbs

UPLIFT = -32,121 lbs

USE 4 - #6's @ EA END OF PIER

$$f_t = \frac{32{,}121\ \text{lbs}}{1.77\ \text{in}^2} = 18{,}148\ \text{psi}$$

F_t = 36,000 psi > f_t ∴ OK

Shear Wall Design - Area 3

- North - South Direction

Seismic Base Shear = 5,591 lbs

Shear Wall SW-2

$V = \frac{5,591 \text{ lbs}}{2} = 2,796 \text{ lbs}$

$M = Vh = 2,796 \text{ lbs} \times 12.5 \text{ ft} = 34,950 \text{ lb-ft}$

$\frac{M}{Vd} = \frac{34,950 \text{ lb-ft} (12 \text{ in/ft})}{(2,796 \text{ lbs})(132 \text{ in})} = 1.14 > 1.0$

$\Rightarrow f_v = 1.5\sqrt{f'_m} = 1.5\sqrt{1,500 \text{ psi}} = 58 \text{ psi}$

$F_b = 1.33 (0.33 f'_m) = 658 \text{ psi}$

$F_s = 1.33 (24,000 \text{ psi}) = 31,920 \text{ psi}$

- Flexural Design:

Use: Det 1 - #5 @ 8ins OF Wall

$\rho = \frac{A_s}{b_w d} = \frac{0.31 \text{ in}^2}{(7.625 \text{ in})(132 \text{ in})} = 0.000308$

$\rho_n = 0.0003 (29) = 0.0089$

$K = \sqrt{2\rho_n + (\rho_n)^2} - \rho_n = 0.1248$

Dekker/Perich/Sabatini

NLVFD STATION #53
07502-01
LATERAL
AMB 04/24/07
LGH

$j = 1 - \frac{k}{3} = 0.9584$

$f_b = \frac{2M}{j\,k\,b_w\,d^2} = \frac{2(34{,}950\ \text{lb-ft})(12\ \text{in/ft})}{(0.9584)(0.1248)(9.625\ \text{in})(32\ \text{in})^2}$

$f_b = 528\ \text{psi} \quad < F_b \quad \therefore$ OK

$f_s = \frac{M}{j\,d\,A_s} = \frac{(34{,}950\ \text{lb-ft})(12\ \text{in/ft})}{(0.9584)(32\ \text{in})(0.31\ \text{in}^2)}$

$f_s = 16{,}694\ \text{psi} \quad < F_s \quad \therefore$ OK

MIN. AREA OF SHEAR REINFORCEMENT:

$A_v = 0.0007(8)(12) = 0.0672\ \text{in}^2/\text{ft}$

USE 2-#5 @ 48" oc AT BOND BEAMS AND STD. No. 9 BAR U-SHAPED TIES @ 16" oc

$A_s = 0.036\ \text{in}^2/\text{ft} + 0.0415\ \text{in}^2/\text{ft} = 0.0775\ \text{in}^2/\text{ft}$

$A_s > A_v \quad \therefore$ OK

- East - West Direction.....

SHEAR Wall SW: D

$V = 2,796$ lbs

$M = 2,796$ lbs $\times$ 12.5 ft $= 34,950$ lb-ft

$\frac{M}{Vd} = \frac{34,950 \text{ lb-ft} (12 \text{ in})}{(2,796 \text{ lbs})(10.4 \text{ in})} = 0.735 < 1.0$

$\therefore v_{uc} = \frac{1}{2}\left(f_A - \frac{M}{Vd}\right)\sqrt{f'_m} \leq \left(12.0 - \frac{15M}{Vd}\right)$

$= \frac{1}{2}\left(9 - 0.735\right)\sqrt{1,500 \text{ psi}} \leq \left(120 - 15(0.735)\right)$

$= 63.23$ psi $<$ 86.98 psi $\therefore$ Ok

$v_u = 68.23$ psi

$v_b = 658$ psi

$v_n = 31,920$ psi

Dekker/Perich/Sabatini

Project: Wood Structures
Job No.: 07502.01
Subject: LATERAL
Sheet No.: 4-06 of 24
Calculated by: [redacted] Date: [redacted]
Checked by: LKE Date:

- FLEXURAL DESIGN:

USE 1-#5 @ END OF WALL

$$\rho = \frac{A_s}{b_w d} = \frac{0.31\ in^2}{(11.25\ in)(20\ in)} = 0.00139$$

$$\rho n = (0.00139)(19) = 0.00578$$

$$K = \sqrt{2\rho n + (\rho n)^2} - \rho n = 0.102$$

$$j = 1 - \frac{K}{3} = 0.966$$

$$f_c = \frac{2M}{j K b_w d^2} = \frac{2(34.950\ k\text{-}ft)(12\ in/ft)}{(0.966)(0.102)(11.25\ in)(20\ in)^2}$$

$f_c = 26.83\ psi$ < F_c ∴ OK

$$f_s = \frac{M}{j d A_s} = \frac{34.950\ k\text{-}ft\ (12\ in/ft)}{(0.966)(20\ in)(0.31\ in^2)}$$

$f_s = 6.865\ psi$ < F_s ∴ OK

- MIN. AREA OF SHEAR REINFORCEMENT:

$A_v = 0.0432\ in^2/ft$

USE 2-#5 @ 8" OC @ BOND BEAMS AND STD. NO. 4 DUR-O-WALL TRUSSES @ 16" OC

$A_s = 0.0975\ in^2/ft$ > A_v ∴ OK

PET.APP.002034

Dahlen Porter / Sabatini

[redacted]

Name: NAVFD Station #52
Proj. no.: 07502-01
Title: LATERAL
By: AJB Date: 04/30/07
Check: Date:
Sht. no.: 6&3 of

Shear Wall Sum

L = 7.0' (East)

V = 2,796 lbs

$v = \frac{V}{L} = \frac{2,796 \text{ lbs}}{7 \text{ ft}} = 399 \text{ plf}$

A - Sheathing:

Both Sides - 15/32" APA Rated Sheathing w/ 8 screws @ 6" o.c. at Panel Edges and at 12" o.c. in Field.

$v_{allow} = \frac{R_n}{\Omega} = \frac{2,930 \text{ lbs}}{2.5} = 624 \text{ plf} > 399 \text{ plf}$ OK

B - Uplift @ Shear Wall Ends:

$T = C = \frac{Vh}{L} = \frac{(2,796 \text{ lbs})(12.5 \text{ ft})}{7 \text{ ft}}$

T = 4,993 lbs

Resisting Dead Load:

$W_{roof} = 20 \text{ psf} \times 3 \text{ ft} \times 7 \text{ ft} = 420 \text{ lbs}$

$W_{wall} = 15 \text{ psf} \times 12.5 \text{ ft} \times 7 \text{ ft} = 1,313 \text{ lbs}$

$W_{total} = 420 + 1,313 = 1733 \text{ lbs}$

Dekker/Perich/Sabatini

Project: NAVFD STATION #53
Project No.: 03501-01
Subject: LATERAL
By: AJB Date: 04/30/03
Check: Date:
Sheet: LOAD

UPLIFT = T - 0.9 (Weight/2) = 4,993 - 0.9 (1,733/2)

UPLIFT = 4,214 lbs

USE 5/4000 psi Hilti Dawn w/ 1/2" ø Anchors

T allow = 8,580 lbs >> 4,214 lbs ∴ OK

C - Anchorage For In-Plane Shear:

USE 2EA 1/2" ø x 7" Anchor Bolts @ 16" o.c.

T allow = 1,500 lbs
V allow = 2,750 lbs

T_a = 1.33T = 399 psf = 531 psf
V_a = 1.33V = 309 psf = 53 psf

(580 lbs / 2,750 lbs)^5/3 + (531 lbs / 1,500 lbs)^5/3 = 0.342 < 1.0

∴ OK

USE 3/4" ø x 7" Anchor Bolts @ 16" o.c.

D - Compression Chord Force:

ΩT = 2.5 (4,993 lbs) = 12,483 lbs

(See SW-49 for Compression Chord Calculations)

P_a = 24,253 lbs > 12,483 lbs ∴ OK

USE (4) 6003K3 - 33 BACK-TO-BACK STUDS

PET.APP.002036

Baker/Parsons Submittal

[redacted]

Name: NLVPD Station #53
Project No.: 07502-01
Type: LATERAL
By: AJB Date: 04/25/07
Check: Date:
Sheet: L03

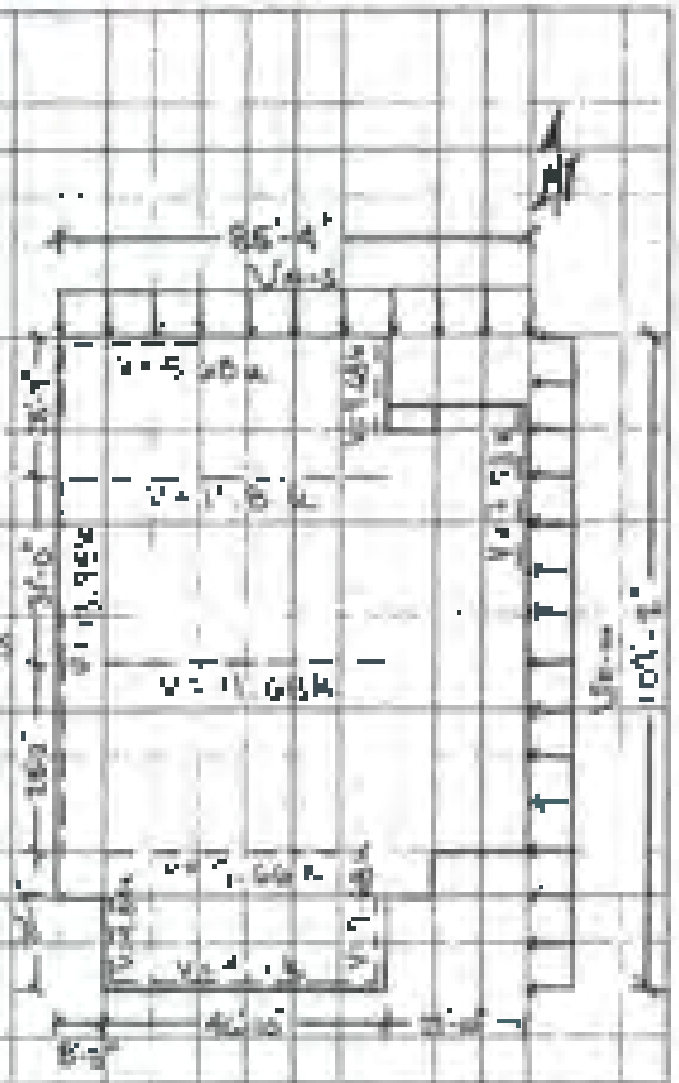
Roof Diaphragm

Area 1:

V = 34,460 lbs

ASCE 7-05: 12.3.2.1 -
Horizontal Irregularities:
- Reentrant Corner
- Diaphragm Discontinuity

12.3.3.4: Increase in forces due to irregularities for Category D Design Forces shall be increased 25% for connections of diaphragm to vertical elements. Collectors and their connections also.


85'-4"
V = 0.5 kips
V = 1.7 kips
V = 11.6 kips
V = 1.6 kips
V = 1.6 kips
V = 1

Dekker/Perich/Sabatini

Name: NLVFD STATION #53
Number: 07502-01
Subject: LATERAL
By: AJB Date: 04/25/07
Check: Date:
Sheet: 1 of 6

USE TRY 1.5B - 22 GA METAL DECK ~ 5/8" ϕ DOUBLE HEADED STUDS (3 PER PATTERN) ~ 8" OVER SCHEDULE, @ SIDE LAP FASTENERS PER SPAN (@ 12" oc)

$\phi M_{allow} = 330 \text{ k-ft} > M_{actual} (130 \text{ k-ft})$ ∴ OK

- CHECK DEFLECTION:

$$G' = \frac{K_n}{3.78 + \frac{0.2\,D_n}{SPAN} + 3\,K_n \cdot SPAN}$$

$$G' = \frac{}{3.78 + \frac{0.3\,(0.72)}{6ft} + 3\,(0.230)\,6ft}$$

$G' = 14.14 \text{ k/in}$

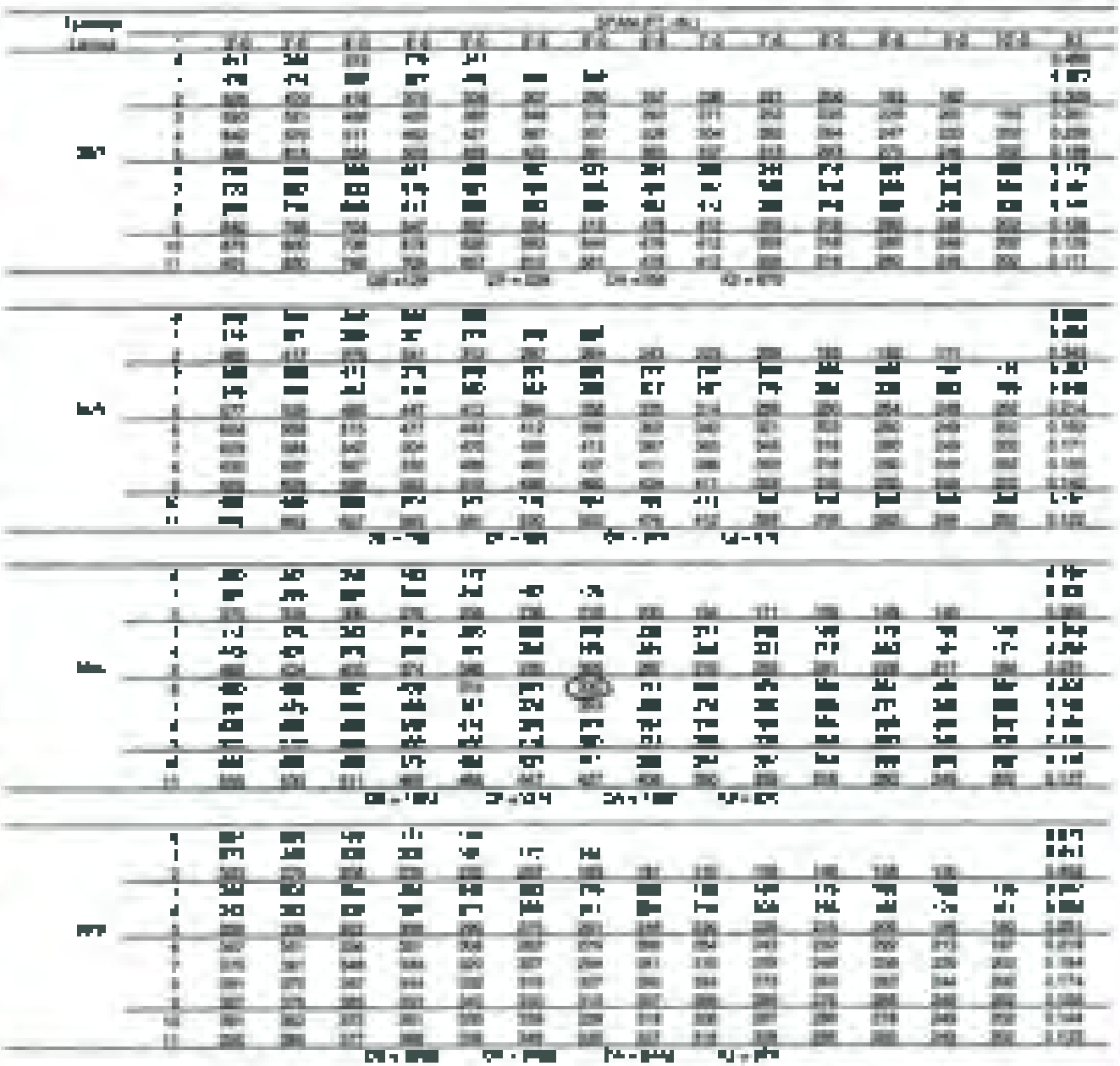
$$\Delta_L = \frac{\omega L^2}{8BG'} = \frac{(0.36 \text{ k/ft})(109.9 \text{ ft})^3}{8\,(8.33 \text{ in})(14.14 \text{ k/in})}$$

$\Delta_L = 0.17 \text{ in.} < \frac{L}{240}$ ∴ OK

1.5 (B, F, A) 22 ALLOWABLE DIAPHRAGM SHEAR STRENGTH (PLF)

SUPPORT FASTENERS: 5/8" puddle welds[1]

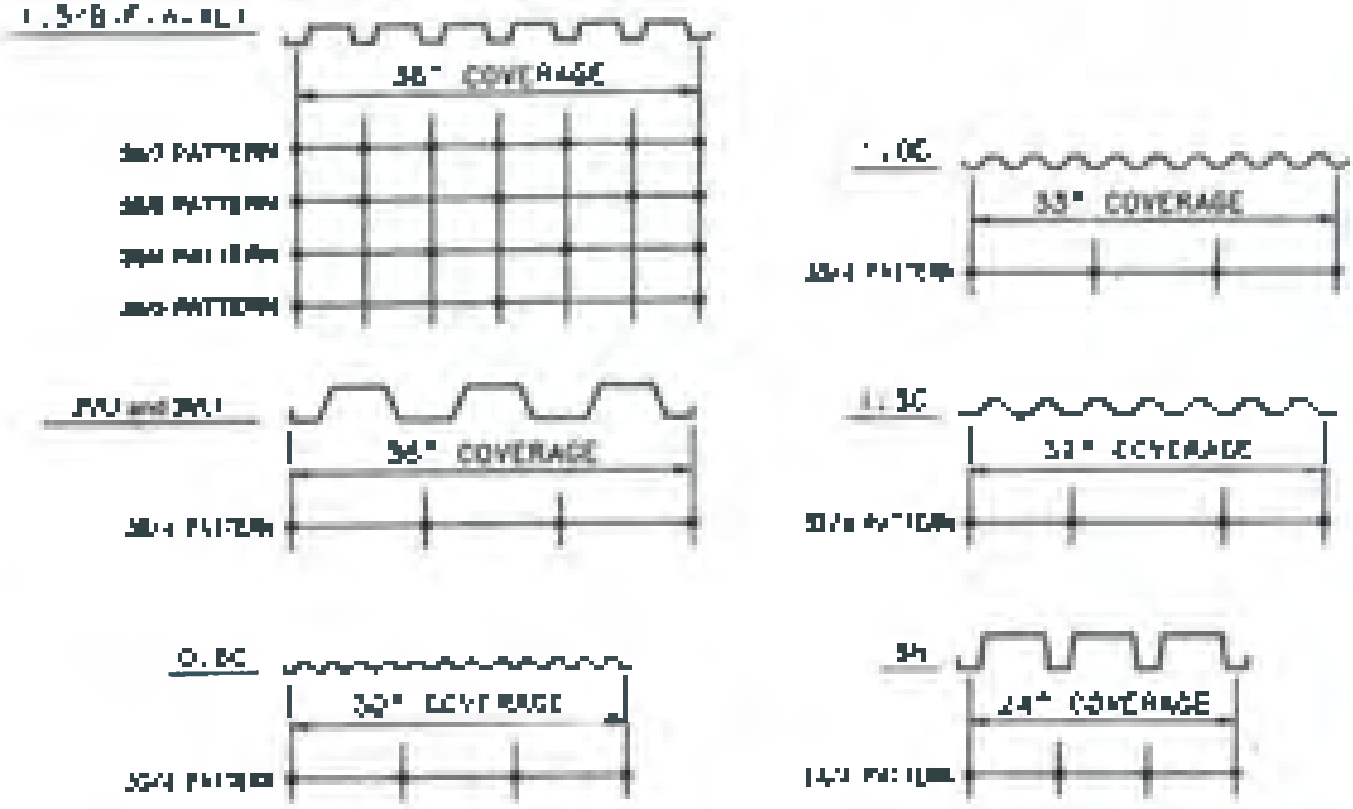
SIDELAP FASTENERS: #10 TEK screws



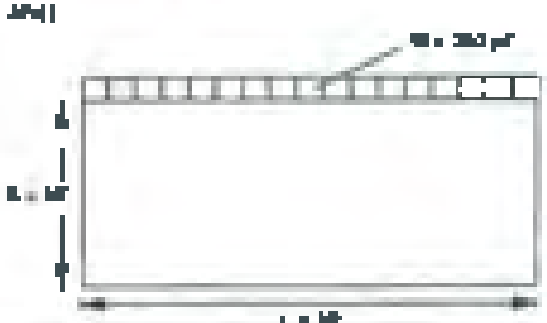
[1] In standard weight concrete
[2] Tabulated values are permissible
[3] Shear values are for 1 sheet wide

$$q = \frac{V}{\frac{2b}{G_t t} + \frac{d}{t_1 G_1}}$$

TYPICAL FASTENER LAYOUT



DIAPHRAGM SHEAR STRENGTH AND STIFFNESS DESIGN EXAMPLE



Dekker/Perich/Sabatini

[redacted]

NLFD STATION #53
03-072-01
CALCULATIONS
BY AGB DATE 04/04/07
CHK'D BY LBG SHEET

AREA 2:

V = 80,999 lbs.

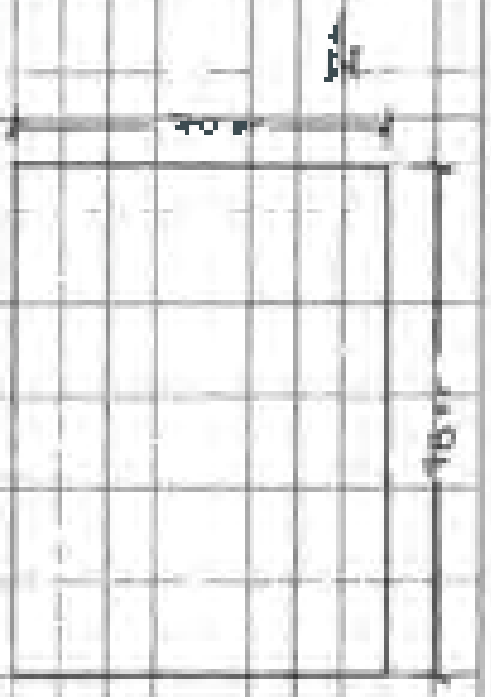
$\frac{V}{2}$ = 40,472 lbs

- NORTH-SOUTH DIRECTION:

$U = \frac{40,472 \text{ lbs}}{78 \text{ FT}} = 518 \text{ PLF}$

- EAST-WEST DIRECTION:

$U = \frac{40,472 \text{ lbs}}{70 \text{ FT}} = 578 \text{ PLF}$



USE 1.5B-18 GA METAL DECK w/ 5/8" ø PUDDLE WELDS (36/7 PATTERN) w/ #10 TEK SCREWS @ SIDE LAP FASTENERS PER SPAN (@ 12" oc.)

$U_{allow} = 619 \text{ PLF} > U_{actual} (578 \text{ PLF})$ ∴ OK

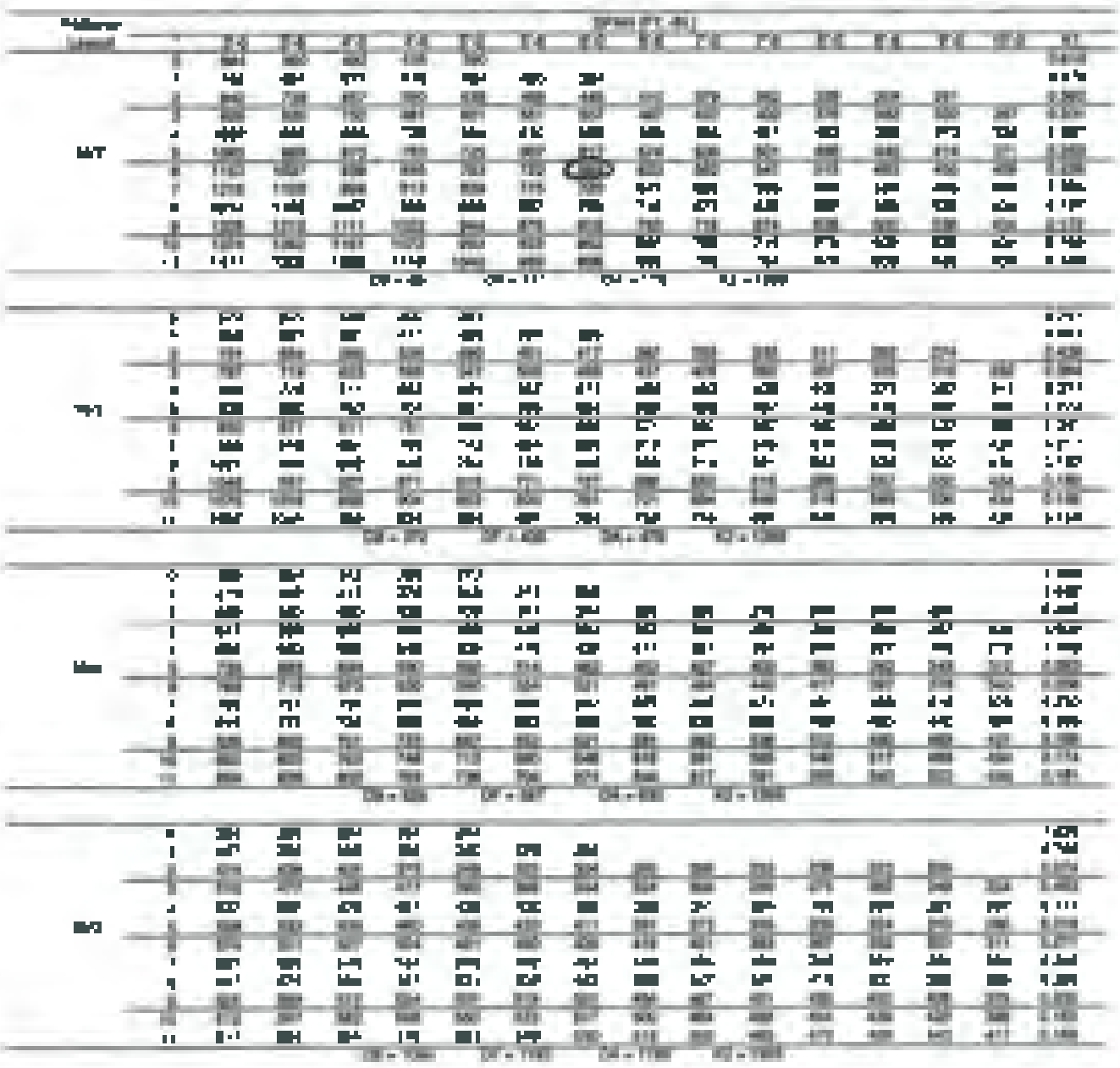
- CHECK DEFLECTION:

$G' = \frac{1.39B}{3.78 + \frac{0.3(6B)}{6 \text{ FT}} + 3(0.224) \times 6 \text{ FT}} = 127.11$

$\Delta L = \frac{(0.578 \text{ K/F})(78 \text{ FT})^3}{8(70 \text{ FT})(127.11)} = 0.0494 \text{ INCH} < L/240$

∴ OK

1.5 pcf, P, Aj 18 ALLOWABLE DIAPHRAGM SHEAR STRENGTH (PLF)
SUPPORT FASTENERS: 5/8" puddle welds[1]
SIDELAP FASTENERS: #10 TEK screws



[1] [illegible]
[2] [illegible]



Dekker/Perich/Sabatini

NEED STREET #53
07502-01
LATERAL
A-1B
04/25/07
L71

AREA 3:

V = 5,591 lbs

PER 3.3.4 INCREASE IN FORCES DUE TO DISCONTINUITIES FOR CAT. D, INCREASE FORCES BY 25% FOR DIAPHRAGM CONNECTIONS TO VERTICAL MEMBERS AND FOR COLLECTORS & THEIR CONNECTIONS

V = 5,591 × 1.25 = 6,989 lbs

- NORTH - SOUTH DIRECTION:

$\frac{V}{2} = \frac{6,989 \text{ lbs}}{2} = 3,495 \text{ lbs}$

$v_{max} = \frac{3,495 \text{ lbs}}{57.83 \text{ ft}} = 58 \text{ plf}$

- EAST - WEST DIRECTION:

$v_{max} = \frac{3,494 \text{ lbs}}{21 \text{ ft}} = 163 \text{ plf}$ CONTROLS

USE 1.5 B-22 GA METAL DECK w/ 5/8" PUDDLE WELDS (36/4 PATTERN) w/ #10 TEK SCREWS @ SIDE LAP FASTENERS PER SPAN (@ 7' o.c.)

$v_{allow} = 330 \text{ plf} > v_{actual} (163 \text{ plf})$: OK

Miller Zerlich Gabellini

NLFD Station #53
03552-01
Layout
By ACE 04/25/07
Checked
Sheet
Job ACE

- Check Deflection:

$$G = \frac{870}{3.98 + \frac{0.3(1.032)}{G_m} + 3(0.205) \text{ AT } G_{FT}}$$

$$G = 14.25 \text{ k/in}$$

$$\Delta_E = \frac{w l^2}{8 E G} = \frac{(10.43 \text{ k/in})(59.83 \text{ in})^2}{8(21{,}000 \text{ ksi})(14.25 \text{ k/in})}$$

$$\Delta_E = 0.259 \text{ in} < L/240 \quad \therefore \text{OK}$$

Rutherford/Perich/Kabatini

[redacted]

Project Name: NLVFD Station 53
Project Number: 97502-01
Subject: LATERAL
By: AJB Date: 01/25/07
Checked: Date:
Sheet: L13

Diaphragm Chord Design - Area 1

- From Area 1 Diaphragm

w_c = 305 plf (controls - North-South Direction)

$$M = \frac{w L^2}{8} = \frac{305 \text{ plf} (85.33 \text{ ft})^2}{8} = 459,626 \text{ lb-ft}$$

$$T = C = \frac{M}{b} = \frac{459,626 \text{ lb-ft}}{129.17 \text{ in}} = 4,210 \text{ lbs}$$

USE ~~1~~ 4 L5 x 3 x 1/4 CHORD MEMBER - BEARING

$A = 1.94 \text{ in}^2$

$F_y = 36 \text{ ksi}$

$F_t = 0.6 F_y = 0.6(36 \text{ ksi}) = 21.6 \text{ ksi}$

$$f_t = \frac{P}{A} = \frac{4,210 \text{ lbs}}{1.94 \text{ in}^2} = 2,170 \text{ psi} < F_t \quad \therefore \text{OK}$$

CHECK L3 x 3 x 1/4 - NON-BEARING

$A = 1.44 \text{ in}^2$

$$f_t = \frac{4,210 \text{ lbs}}{1.44 \text{ in}^2} = 2,924 \text{ psi} < F_t \quad \therefore \text{OK}$$

USE L5 x 3 x 1/4 @ BEARING WALLS
L3 x 3 x 1/4 @ NON-BEARING WALLS

Dekker/Perich/Sabatini

[redacted]

Project: WLPD Station #53
Job No.: D3202-01
Subject: LATERAL
By: AJB Date: 04/25/07
Check: Date:
Sheet: 1.36 of

Diaphragm Chord Design - Area 2

$V_2 = 80,999$ lbs

$w = \frac{80,999 \text{ lbs}}{78 \text{ ft}} = 1,038$ plf

$M = \frac{wL^2}{8} = \frac{(1038 \text{ plf})(78 \text{ ft})^2}{8} = 789,379$ lb-ft

$T = C = \frac{M}{b} = \frac{789 \text{ k-ft}}{70 \text{ ft}} = 11.27$ k

USE 2 - #5 @ Bond Beam

$f_t = \frac{P}{A} = \frac{11.27 \text{ k}}{0.61 \text{ in}^2} = 18.48$ ksi

$F_t = (0.6) F_y = 0.6(60 \text{ ksi}) = 24 \text{ ksi} > 18.5$ ksi

∴ OK

∴ 2 - #5 @ Bond Beam is adequate for loads in all directions in Area 2

Job: NWPD Station #53
Job No.: 07502-01
Sheet: LATERAL
By: AJS Date: 04/26/17
Check: Scale:
Ref: L35

Diaphragm Chord Design - Area 2

* From Area 3 Diaphragm

$w = 163$ plf (Controls in East West Direction)

$$M = \frac{wL^2}{8} = \frac{(163\text{ plf})(70.11\text{ ft})^2}{8} = 73,033\text{ lb-ft}$$

$$T = C = \frac{M}{b} = \frac{73,033\text{ lb-ft}}{21.5\text{ ft}} = 3,394\text{ lbs}$$

* Same As Area 1 Chord

USE L5x3x1/4 @ Bearing Walls
L3x3x1/4 @ Non-Bearing Walls

Dekker/Perich/Sabatini

Project: Raised Section #53
Project No.: 03502-01
Client: LATERAL
By: AJB Date: 04/26/05
Check: Date:
Sheet: L26

Diaphragm Chord Splice Design

IBC 2204.1 - Connections

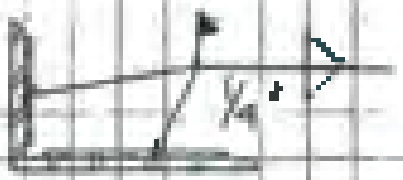
$V_{max.} = 40,472$ lbs (Area 2)

- Check weld:

$P = (k_{in})(4)(0.928)$

$P = 40.8k > 40.5k$ ∴ OK

(See Detail C3/S301)



Dokker/Parish/Sakakini

[redacted]

Project: NLVFD Station #53
Proj. No.: 03502.01
Subject: LATERAL
By: AJS Date: 04/26/01
Checked: Date:
Sheet: L#2

Collector Force Design - Area 1

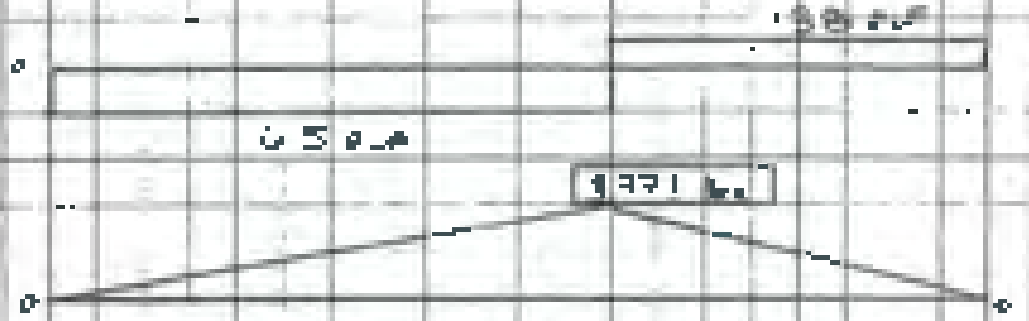
SW-C2



V = 11,800 lbs

$v_{diaph} = \frac{11,800 \text{ lbs}}{85.33 \text{ ft}} = 138 \text{ plf}$

$v_{wall} = \frac{11,800 \text{ lbs}}{28 \text{ ft}} = 103 \text{ plf}$



Net Unit Shear

Maximum Collector Force = 1331 lbs

USE SIMPSON MSTC40 STRAP TIE w/ T = 4,600 lbs

Dokker/Parish/Sabatini

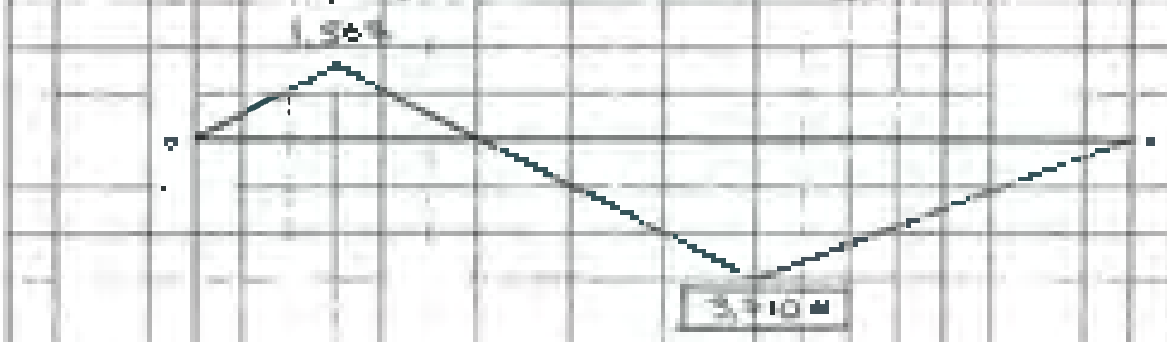
Name NLVFD Station #53
Number 07502-01
Type LATERAL
Sheet A-1B Date 09/24/07
Name _____ By _____
Scale 1/2" = 1'-0" Job _____

Lateral Loads SW-E:

V = 11,680 lbs

V_{roof} = 11,680 lbs / 85.33 ft = 137 plf

V_{wall} = 11,680 lbs / 47 ft = 248 plf



Net Unit Shear

Maximum Collector Force 3,910 lbs

USE SIMPSON MST48 STRAP TIE w/ T=4,200 lbs

Bekker/Perich/Sabatini

Project: NLVFD Station #53
Project No.: 07502-01
Subject: CALCULATIONS
By: AJB Date: 11/14/07
Check by: No.
Sheet: 279

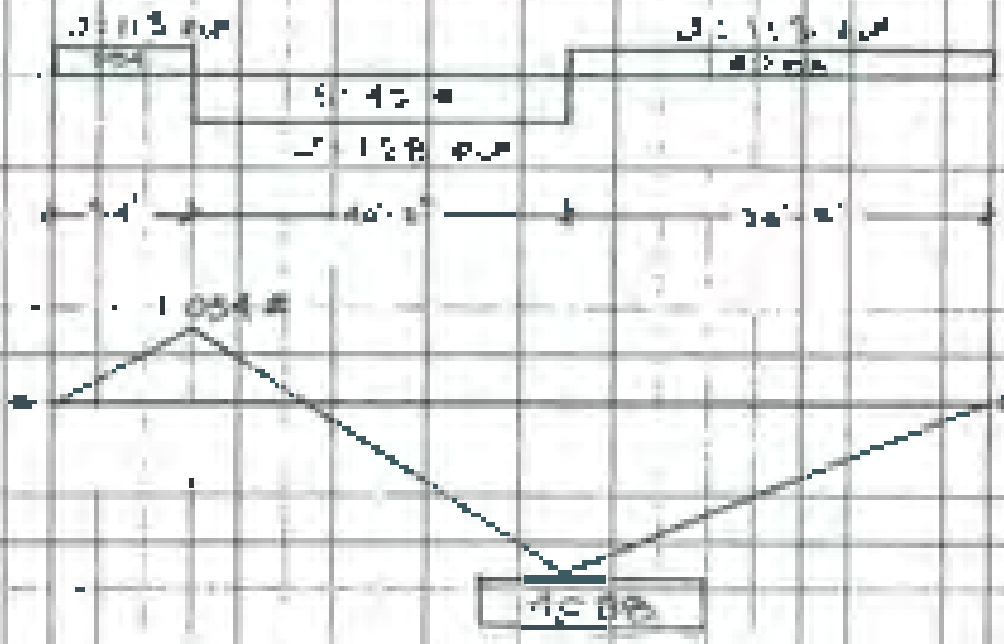
[redacted]

Shear Wall Sw. E.7

V = 1,660 lbs

$v_{floor} = \frac{1,660 \text{ lbs}}{85.33 \text{ ft}} = 19.5 \text{ plf}$

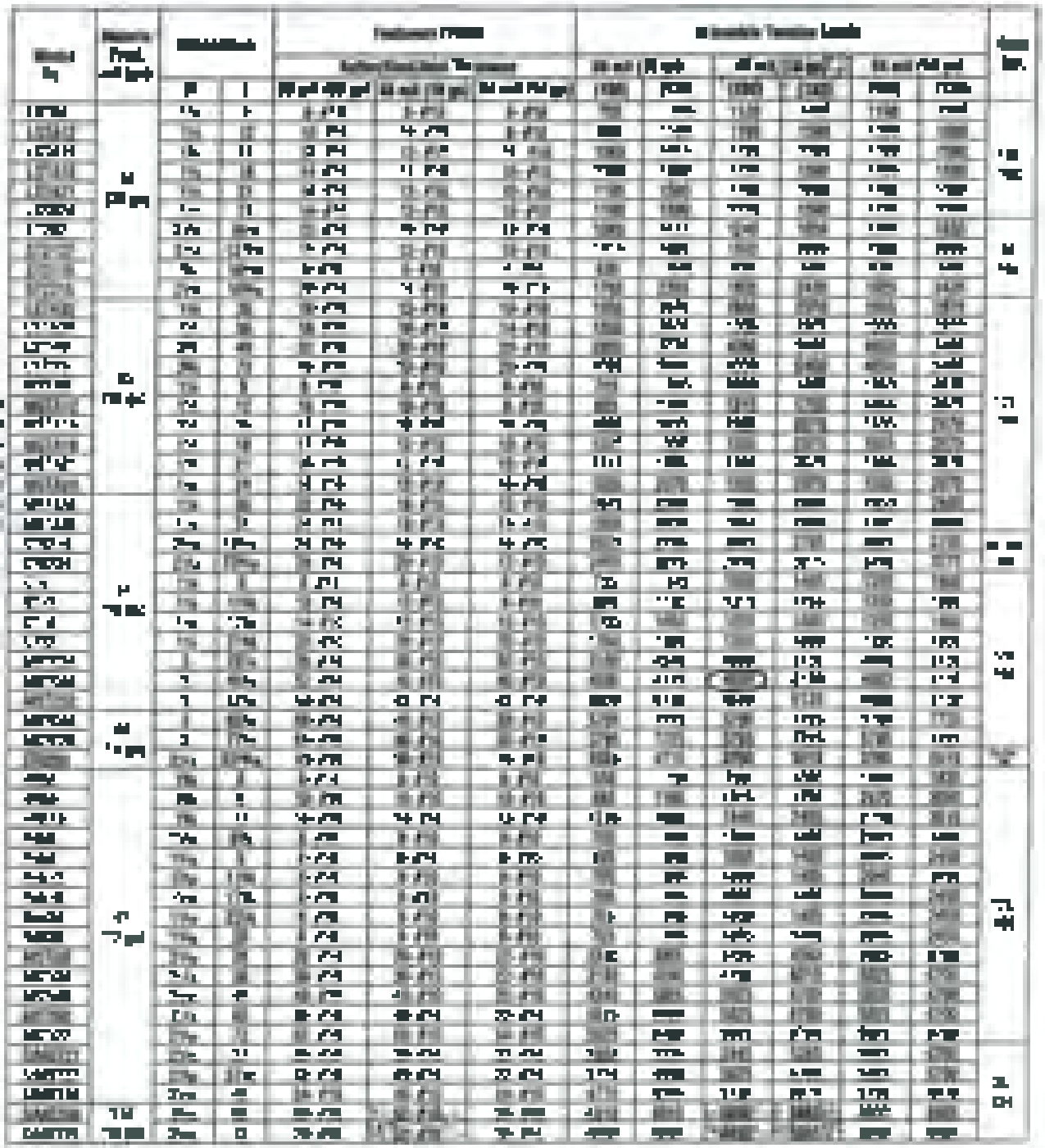
$v_{wall} = \frac{1,660 \text{ lbs}}{40.7 \text{ ft}} = 39.1 \text{ plf}$



Net Unit Shear

Maximum Collector Force 4,088 lbs

USE Simpson MSTC40 strap tie w/T = 9,600 lbs



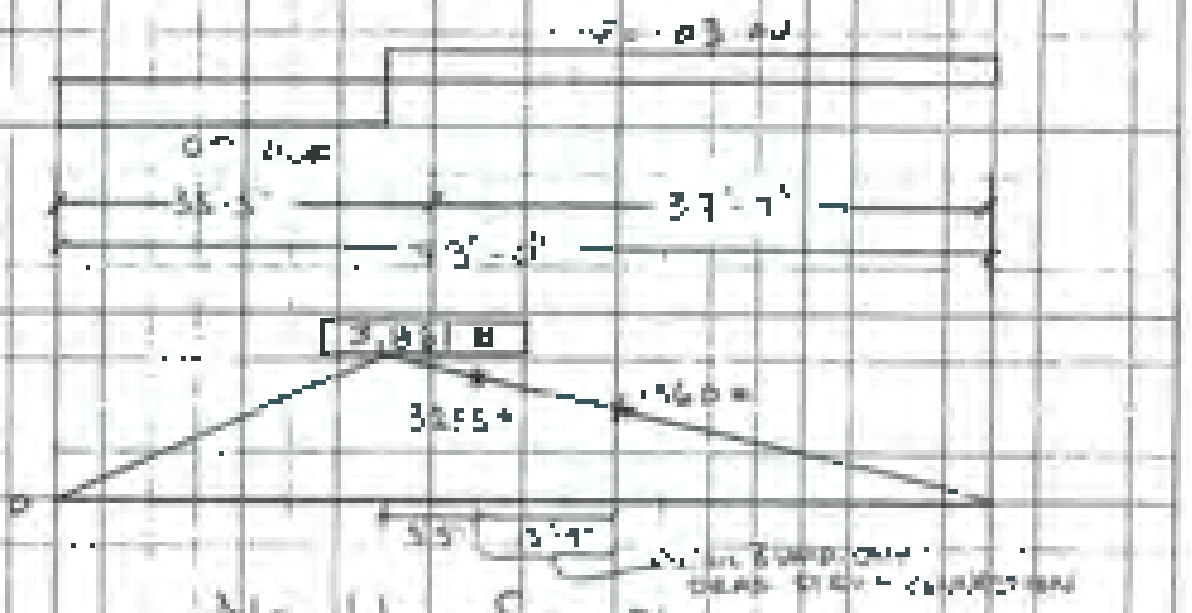
Project Name: NUVO SEASON #53
Project Number: 07502-01
Subject: LATERAL
By: AMB Date: 04/30/07
Checked: Date:
Page: 1.81

SHEAR WALL SW-6:

V = 7,530 lbs

$v_{max} = \frac{7,530 \text{ lbs}}{73'-4"} = 103 \text{ plf}$

$v_{min} = \frac{7,530 \text{ lbs}}{35'-5"} = 212 \text{ plf}$



NET UNIT SHEAR

MAXIMUM CHORD FORCE 3.82 k

* DECK SUPPORT ANGLE IS ADEQUATE FOR FORCE TRANSFER

L3x3x1/4 NON-BEARING ANGLE
(SEE DIAPHRAGM CHORD DESIGN)