Case No. _____

In the

Supreme Court

of the

State of Nevada

Electronically Filed
Jul 15 2020 10:50 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 3

Docket 81459 Document 2020-25969

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CHRONOLOGICAL INDEX - APPENDIX OF EXHIBITS

Exhibit:	Volume:	Bates: PET.APP.	Date:	Description:
1	3	000278 – 000491	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 17	002847 – 002848 002849 – 002850	08/06/2019 09/06/2019	Exhibit A – Clerk of the Court's Notice of Hearing 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

DPS

STRUCTURAL CALCULATIONS

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

November 2, 2007

Arthur Perich Saboliar [illegible]

Project Name	[illegible]
Project Number	[illegible]
Subject	Roof Dead and Live Loads
By	[illegible] Date: [illegible]
Checked	Date:
Sheet	[illegible] of

GRAVITY DESIGN LOAD SUMMARY — ROOF LOADS

ITEM	DESCRIPTION	DECK DESIGN	JOIST DESIGN	GIRDER DESIGN	SEISMIC DESIGN
ROOF	1.5" 22ga Type B	[illegible] psf	2.0 psf	2.0 psf	2.0 psf
INSULATION		[illegible] psf	2.0 psf	2.0 psf	2.0 psf
ROOFING		[illegible] psf	6.0 psf	6.0 psf	6.0 psf
FIREPROOFING		[illegible] psf	psf	psf	psf
		[illegible] psf	psf	psf	psf
		[illegible] psf	psf	psf	psf
JOISTS			[illegible] psf	2.0 psf	2.0 psf
MEP			[illegible] psf	4.0 psf	4.0 psf
CEILING			[illegible] psf	2.0 psf	2.0 psf
			[illegible] psf	psf	psf
			[illegible] psf	psf	psf
GIRDER				[illegible] psf	psf
				[illegible] psf	psf
PARTITIONS					[illegible] psf
					[illegible] psf

	DECK DESIGN	JOIST DESIGN	GIRDER DESIGN	SEISMIC DESIGN
DEAD LOAD TOTALS	10.0 psf	18.0 psf	18.0 psf	18.0 psf
ACTUAL DEAD LOADS USED	[illegible] psf	[illegible] psf	[illegible] psf	[illegible] psf

	MINIMUM	SNOW	[illegible]
LIVE LOADS	20.0 psf	[illegible] psf	[illegible] psf

STRUCTURAL CALCULATIONS

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

Gravity Framing – Horizontal

Dekker/Perich/Sabatini

Project Name: NLVFD Station #53
Project Number: 07502-01
Subject: Roof Deck Design
By: AJB Date: 03/26/02
Checked: Date:
Sheet: HS

Roof Deck Design

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

Joist Spacing @ 6'-0" oc

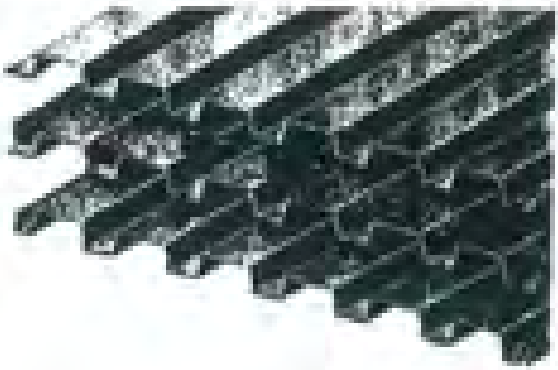
USE Vulcraft SB-22 ga Type Roof Deck

w/ 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 Span Length 40'-0"
Extra Charge for Lengths Under 8'-0"
Factory Mutual Approved (No. 0C2A1, A2A, 0C1A3, A4A and 5T1A4, A4A)
ICBO Approved (No. 3415)



SECTION PROPERTIES

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

ACOUSTICAL INFORMATION

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

[illegible]

Type B deck (Type BI) deck provides excellent structural load carrying capacity and ease of steel stiffener and fire resistive design eliminates the need for dam roof panels.

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

Acoustical deck (Type BA, BIA) is particularly suitable in structures such as auditoriums, schools, and museums where sound control is desirable. Acoustic perforations are located in the vertical webs where the load carrying properties are negligibly affected (see chart, p.3).

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

Beams are best installed and may require adaptation.

VERTICAL LOADS PER TYPE 1.5B

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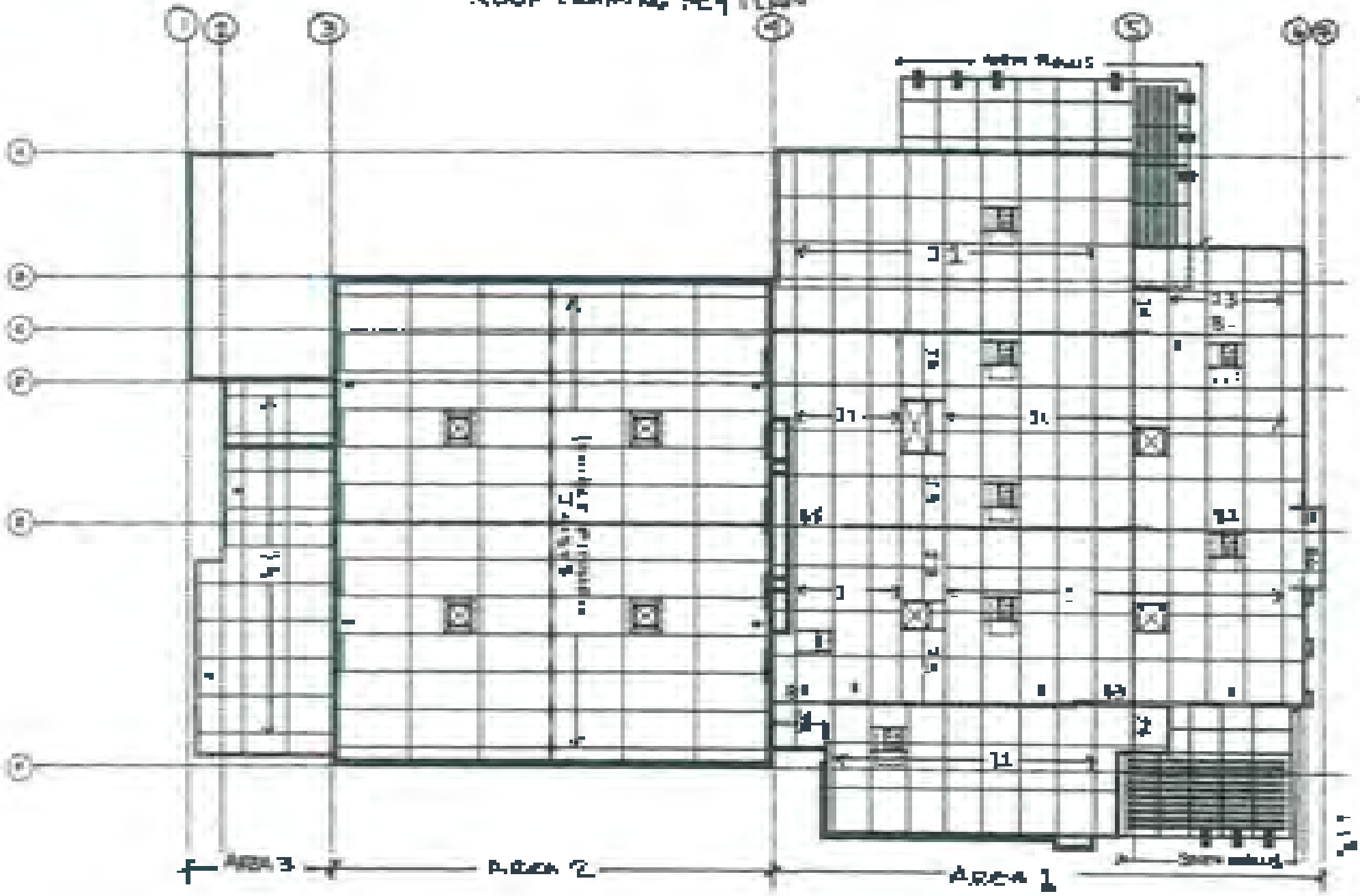
[illegible]

Roof Framing Key Plan



Dekker/Perich/Sabatini

NLVFD STATION #53
07502-01
ROOF FRAMING
A-1B 02/20/07
144

ROOF JOISTS - AREA 1

- JOISTS - J1

SPAN, L = 31'-0"

JOIST SPACING = 6'-0" OC

W_{DL} = 20 PSF × 6 FT = 120 PLF
W_{LL} = 120 PLF

W_{TL} = 240 PLF

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

ALLOW. TOTAL LOAD = 256 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 4K3 STEEL JOISTS @ 6'-0" OC

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

Dekker/Perich/Sabatini

NLVFD Station #53
07502-01
Roof Framing
AMB 03/20/07
HS

- Joists - J3

Span, L = 13'-9" ≈ 14'-0"

Joist Spacing = 6'-0" oc.

w_{DL} = 120 plf
w_{LL} = 120 plf

w_{TL} = 240 plf

USE 10K1 steel joists @ 6'-0" oc

Allow. Total Load = 412 plf > 240 plf
Allow. Live Load = 189 plf > 120 plf } OK

- Joists - J4

Span, L = 7'-5" ≈ 8'-0"

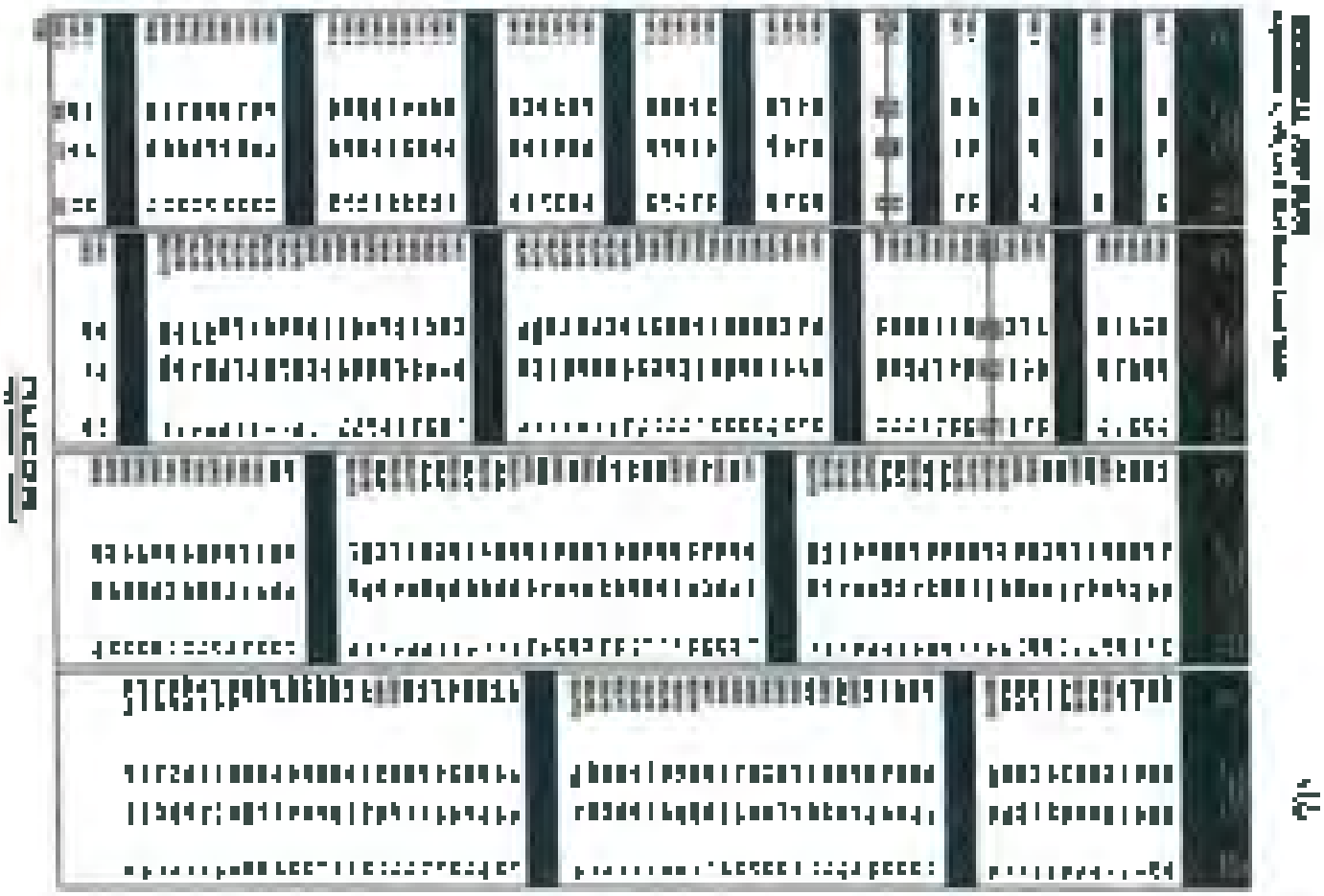
Joist Spacing = 6'-0" oc

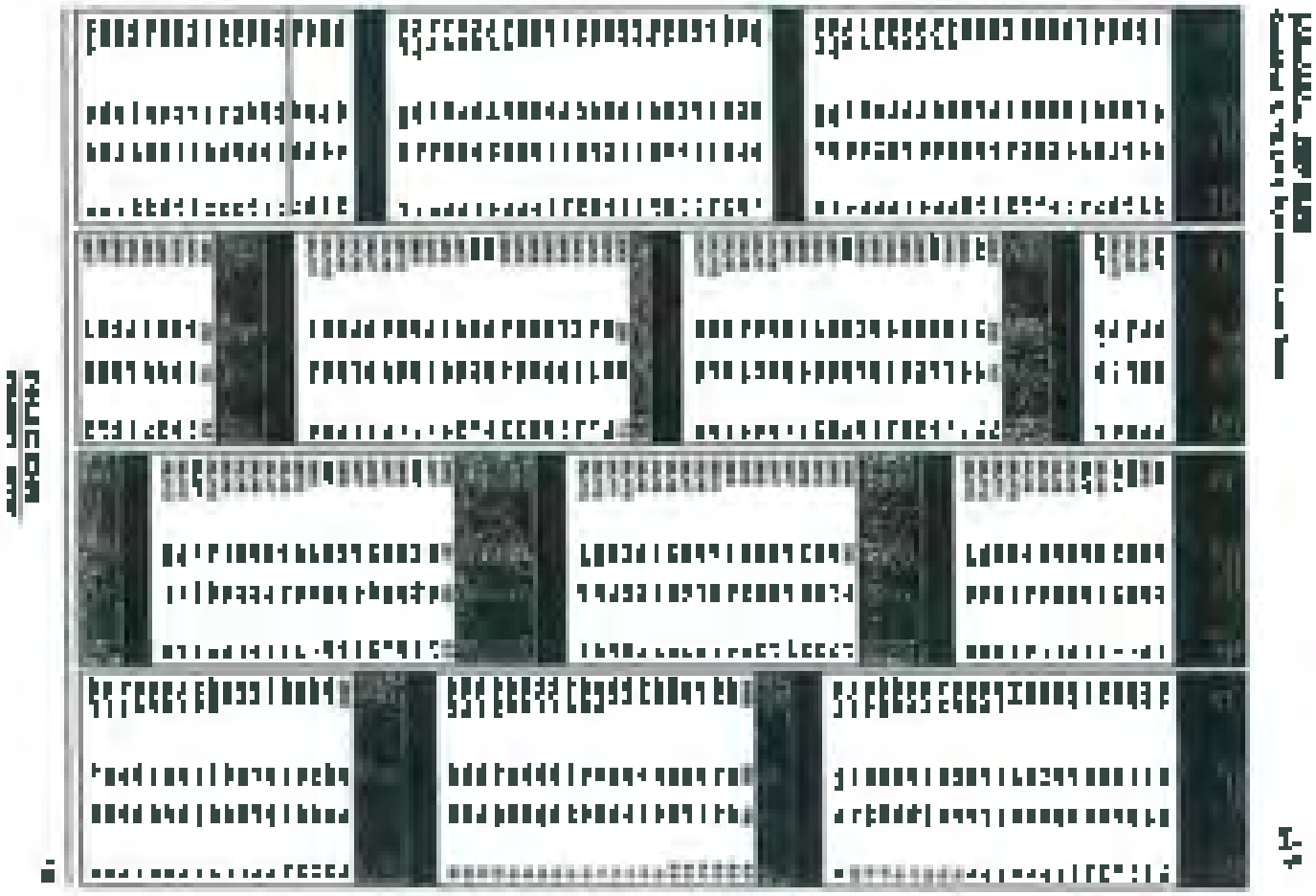
w_{DL} = 120 plf
w_{LL} = 120 plf

w_{TL} = 240 plf

USE 2.5K3 joist substitutes @ 6'-0" oc

Allow. Total Load = 408 plf > 240 plf
Allow. Live Load = 193 plf > 120 plf } OK





2.5K SERIES

2.5K SERIES are joist hold-downs which are intended for use in wide joist spans (10ft or less) where open web steel cable are impractical. They are commonly specified to span over hallways and short spans in stacked bays.

NOTE: 2.5K SERIES NOT U.L. APPROVED

FABRICATION

- Depth: 2.5 in
- Maximum Length: 10 ft
- Minimum Length: 3 ft
- Contact your local Vulcraft sales for shipping or packing data information.

2.5K SERIES SIMPLE SPAN LOAD TABLE

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

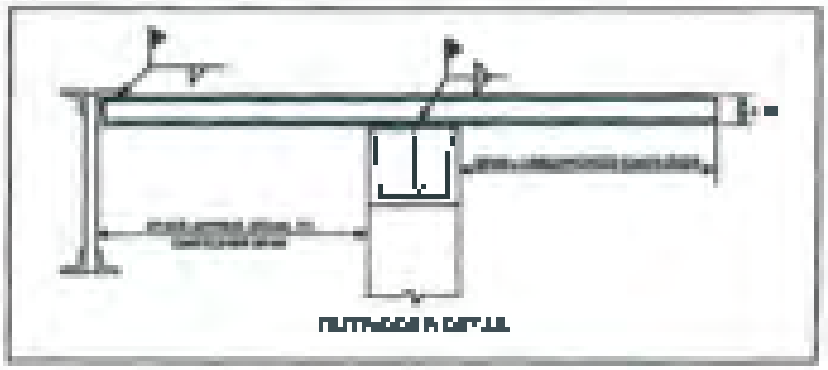
[illegible]

LOAD TABLE SPECIFICATIONS

Joist substitutes are fabricated from material conforming to the SJI specifications. F_y = 50 ksi, F_u = 70 ksi. Full lateral support to the compression flange is assumed to be provided by deck or joist.

ERECTION STABILITY

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



NOTE: 2.5K SERIES NOT U.L. APPROVED

LOAD TABLE FOR LOOSE OUTRIGGERS

Outrigger Type	[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]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Dekker/Perich/Sabatini

Project: NLVFD Station #53
Project No.: 07502-001
Subject: Roof Framing
By: AJB Date: 08/15/07
Checked: ____ Date: ____
Sheet: M1

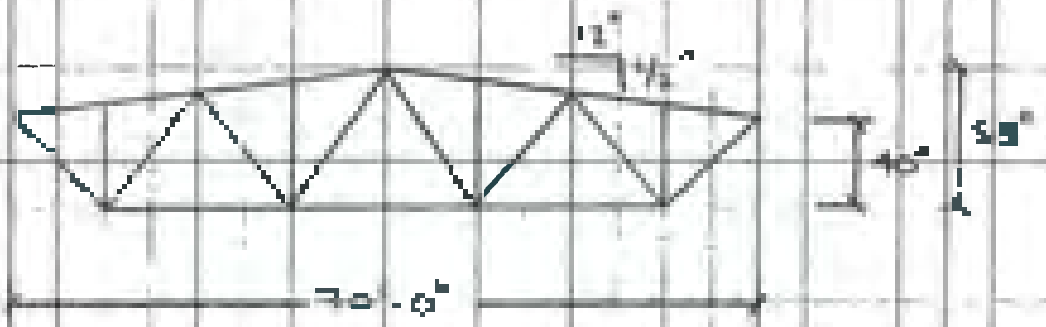
Roof Joist - Area 2

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 Undersloping

40" TST TL Allow Load = 288 PLF > 240 PLF ∴ OK
LL Allow Load = 66 PLF > 120 PLF ∴ OK

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

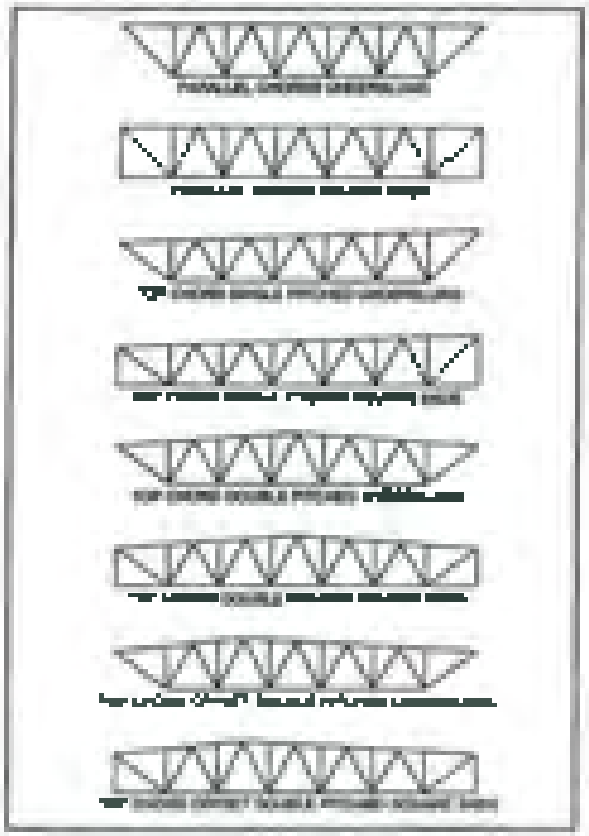
LH & DLH SERIES LONGSPAN STEEL JOISTS

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 tilted, double pitched joists, where the depth should be given at the ridge. A part of the designation also states the approximate number of the joist design load over the design live load (PLL given in psf).

All pitched joists will be cambered in addition to the pitch unless specified otherwise.



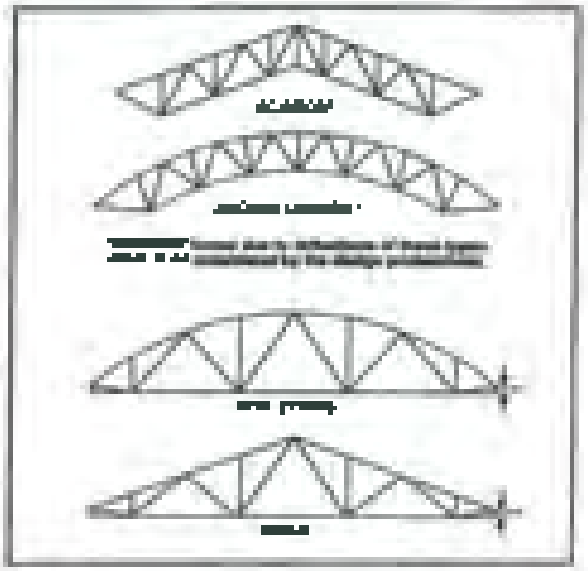
CAMBER

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

Standard Types: The camber ratio in the table will be followed and the joists under the design professional specifications, unless otherwise on the structural drawings.

NON-STANDARD TYPES

The following joists can also be detailed by Vulcraft, however, this particular equipment on longspan manufacturing capacity adjustment may apply or be CONTACTED FOR ANY LIMITATIONS on DEPTH OR LENGTH.



**Contact Vulcraft for minimum depth at ends.

CAMBER FOR STANDARD TYPES

LH SERIES joists shall have camber as 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]	[illegible]

[illegible]

Hitchcock/Powell/Sabatini

Name: NLVFD Station #53
Project No.: 07502-01
Subject: Roof Framing
By: AJB Date: 03/20/07
Checked: Date:
Sheet: H12

Roof Joists - Area 3 - Joists J5

Span, L = 21'-2" ≈ 22 ft

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

W_{DL} = 120 plf
W_{LL} = 120 plf

W_{TL} = 240 plf

USE 14K3 steel joists @ 6'-0" o.c.

Allow. Total Load = 293 plf > 240 plf ✓ OK
Allow. Live Load = 189 plf > 120 plf ✓

Parker/Peters/Schmidt

[redacted]

Project: NAVFD Station #58
Project Number: 07502-01
Subject: Roof Framing
By: AJB Date: 02/20/07
Checked: HJS

- Beam - B1

Span, L = 27'-3"

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

Loads:

W_{DL} = 20 psf × 22.375 ft = 448 plf

W_{LL} = 448 plf

W_{TL} = 896 plf

Unbraced Length = 6'-0" (30% spacing max)

(See Enercalc for Design)

USE W16x26 Beam

- Beam - B2

Span, L = 27'-3"

Tributary Area = $\frac{30'-0" + 27'-9"}{2}$ = 30.875 ft

Loads:

W_{DL} = 20 psf × 30.875 ft = 618 plf

W_{LL} = 618 plf

W_{TL} = 1,236 plf

(See Enercalc for Design)

USE W18x35 Beam

Miller-Turick-Schellin

Project Name: NLVFD Station #53
Job No./Number: 03502-01
Subject: Roof Framing
By: A.R. Date: 03/10/97
Checked: HW

- Beam - B3

Span, L = 13'-4"

Tributary Area = $\frac{20'-11" + 28'-2"}{2}$ = 24.5 sf

Loads:

W_{DL} = 20 psf × 24.5 sf = 490 plf

W_{LL} = = 492 plf

W_{TL} = 980 plf

(See Enercalc for Design)

W12x14 Beam

- Beam - B4

Span, L = 8'-8"

Tributary Area = $\frac{3'-0" + 28'-2"}{2}$ = 15.58 sf

Loads:

W_{DL} = 20 psf × 5.58 sf = 312 plf

W_{LL} = = 312 plf

W_{TL} = 624 plf

(See Enercalc for Design)

USE W8x10 Beam

Dekker/Perich/Sabatini

NLVFD STATION #53
07502-01
ROOF FRAMING
A.S.B. Date 03/20/07
Checked Date
By MB

- 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

Dekker/Perich/Sabatini

Project: NUFO Station #53
Project No.: 04502-01
Subject: ROOF FRAMING
By: A-1R Date: 08/10/07
Checked: Date:
Page: H6 of

T-BEAM B6

SPAN = 9'-1"

LOADS:

W_{DL} = 20 PSF × 6 FT = 120 PLF

W_{LL} = " " " = 120 PLF

W_{TL} = 240 PLF

(SEE ENERCALC FOR DESIGN)

USE HSS6×4×1/8 BEAM

[illegible]
[illegible]
[illegible]
Tel. [illegible]
Fax [illegible]

Title [illegible]
Project [illegible]
Description
Subject

Job # [illegible]
Date [illegible]

Steel Beam Design

Page 1

Description: Roof Framing Beam - B1

General Information

Steel Section: [illegible]

Center Span	[illegible]	Fy	[illegible]	[illegible]
Left Cant.	[illegible]	Fu	[illegible]	[illegible]
Right Cant.	[illegible]			
Lateral Unbraced Length	[illegible]			

Distributed Loads

Dx	[illegible]						[illegible]
Dy	[illegible]						[illegible]
Dz							[illegible]
Start Location							[illegible]
End Location							[illegible]

Summary

Beam OK

	Actual	Allowable		
Moment	[illegible]	[illegible]	Max Deflection	[illegible]
% Bending Stress	[illegible]	[illegible]	Length/Total Defl	[illegible]
Shear	[illegible]	[illegible]	Length/Live Load Defl	[illegible]
% Shear Stress	[illegible]	[illegible]		

Forces & Stresses Summary

	Moment	CL Class	LL All Spans	LL All Spans	LL All Spans	LL All Spans	[illegible]
Max Mz	[illegible]	[illegible]	[illegible]				[illegible]
Min Mz							[illegible]
Max Mz @ Left							[illegible]
Max Mz @ Right							[illegible]
Shear @ Left	[illegible]	[illegible]	[illegible]				[illegible]
Shear @ Right	[illegible]	[illegible]	[illegible]				[illegible]
Center Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Left Cant. Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Right Cant. Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Overall Defl @	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Reactions @ Left	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
Reactions @ Right	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]

[illegible]

[illegible]
[illegible] Suite 100
Las Vegas, NV [illegible]
Tel. 702-[illegible]
Fax. 702-[illegible]

[illegible]

[illegible]

Steel Beam Design

Description: Roof Framing Beam - B1

Section Properties: W10X30

Depth	[illegible] in	Weight	[illegible]
Web Thick	[illegible] in	Ix	[illegible] in4
Width	[illegible] in	Sx	[illegible] in3
Flange Thick	[illegible] in	Zx	[illegible] in3
Area	[illegible] in2	Iy	[illegible] in4
rx	[illegible] in	Sy	[illegible] in3
		Zy	[illegible] in3
Values for LRFD Design		Ry	[illegible] in
J	[illegible] in4	Cw	[illegible] in6
Cw	[illegible] in6	rT	[illegible] in
		h	[illegible] in

Golden Panda Enterprise
Las Vegas, NV 89118
Tel: 702-436-1888
Fax: 702-436-1889

Steel Beam Design

Description: Roof Framing Beam - B2

Summary

Forces & Stress Summary

[illegible]
[illegible] Bermuda, Suite 140
Las Vegas, NV 89119
Tel. 702-436-1999
Fax [illegible]

[illegible]

H20

[illegible]

Steel Beam Design

[illegible] Roof Framing Beam - B3

Section Properties W14X26

Depth	[illegible] in	Weight	[illegible] lb/ft
Web Thick	[illegible] in	I_x	[illegible] in^4
Width	[illegible] in	r_x	[illegible] in
Flange Thick	[illegible] in	S_x	[illegible] in^3
Area	[illegible] in^2	Z_x	[illegible] in^3
r_y	[illegible] in	I_y	[illegible] in^4
[illegible]		r_y	[illegible] in
J	[illegible] in^4	S_y	[illegible] in^3
C_w	[illegible] in^6	Z_y	[illegible] in^3
		h	[illegible] in

Las Vegas, NV
Fax

Date
Designer
Checked
Revision

Job #
Date

Sheet

Steel Beam Design

Page

Description Roof Framing Beam - B3

General Information

Beam Designed : Yes LRFD

Span Length		Shear Capacity	Beam Weight	
Left Cant		Moment Capacity	Beam Deflection	
Right Cant				
Left Unbraced Length				

Unbraced Lengths

Top							
Bot							
Top							
Bot							
Start Location							
End Location							

Summary

Beam OK

Moment		
Shear		

Forces & Stress Summary

Max Moment						
Max Shear						
Max Left Cant Moment						
Max Right Cant Moment						
Max Left Cant Shear						
Max Right Cant Shear						
Cantilever Deflection						
Left Cant Defl						
Right Cant Defl						
Deflection Ratio						
Max Left Cant Rotation						
Max Right Cant Rotation						

[illegible]
[illegible]
Las Vegas, NV [illegible]
FA [illegible]
Fax [illegible]

File [illegible]
Designer [illegible]
Description:

Job # [illegible]
Date [illegible]

Header 1423

[illegible]

Steel Beam Design

Page 3

Description: Roof Framing Beam - B3

Section Properties [illegible]

Depth	[illegible] in	Weight	[illegible] lbs
Web Thick.	[illegible] in	Ix	[illegible] in4
Width	[illegible] in	Sx	[illegible] in3
Flange Thick.	[illegible] in	Zx	[illegible] in3
Area	[illegible] in2	Iy	[illegible] in4
rx	[illegible] in	Sy	[illegible] in3
Values for LRFD Design		Zy	[illegible] in3
J	[illegible] in4	Cw	[illegible] in6
Cw	[illegible] in6	rT	[illegible] in
		ho	[illegible] in

[redacted]

Title [redacted]
Engineer [redacted]
Description
Date [redacted]

Sheet [redacted]

Steel Beam Design

Page 1

Description: Roof Framing Beam - B4

General Information

Steel Section : W8X15

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

Distributed Loads

	B1	B2	B3	B4	B5	B6	B7	
Dx	[redacted]							[redacted]
Dy	[redacted]							[redacted]
Lr								[redacted]
Start Location								[redacted]
End Location								[redacted]

Summary

Beam OK

	Actual	Allowable		
Moment	[redacted]	[redacted]	Max. Deflection	[redacted]
Shear	[redacted]	[redacted]	Length/DL Defl	[redacted]
			Length/(DL+LL Defl)	[redacted]

Force & Stress Summary

	Moment	Vx Shear	Vy	Vy/Ø	Vz	Vz/Ø
Max. Vy	[redacted]	[redacted]	[redacted]			[redacted]
Max. Vz						[redacted]
Max. Vy @ Left						[redacted]
Max. Vy @ Right						[redacted]
Shear @ Left	[redacted]	[redacted]	[redacted]			[redacted]
Shear @ Right	[redacted]	[redacted]	[redacted]			[redacted]
Center Defl	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Left Cant Defl	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Right Cant Defl	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Cantl Defl @	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Reaction @ Left	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]
Reaction @ Right	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]

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

[illegible]

[illegible]

Steel Beam Design

[illegible]

Roof Framing Beam - B4

Section Properties W8X10

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

Steel Beam Design

Page 1

Description: Steel Framing Beam - 65

General Information

Distributed Loads

Summary

Beam OK

Force & Stress Summary

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

Title [illegible]
Date [illegible]
Description

Job [illegible]
Date [illegible]

[illegible]

Steel Beam Design

Description: Roof Framing Beam R5

Section Properties: W12X14

Depth	[illegible]	Weight	[illegible]
Web Thick	[illegible]	Ix	[illegible]
Width	[illegible]	Sx	[illegible]
Flange Thick	[illegible]	Iy	[illegible]
Area	[illegible]	Sy	[illegible]
rx	[illegible]	Zx	[illegible]
Values for LRFD Design		Zy	[illegible]
J	[illegible]	Cw	[illegible]
Cw	[illegible]	Tc	[illegible]
		Ix	[illegible]

Las Vegas, NV

Steel Beam Design

Page 1

Description Roof Framing Beam - B9

General Information

Distributed Loads

Summary

Force & Stress Summary

Section Properties

Carlson Partners Associates
8680 Burnside, Suite 100
Las Vegas, NV 89149
Tel. 702-436-4261
Fax. 702-436-1980

Title: [illegible]
Project: [illegible]
Description:

Job # [illegible]
Date: [illegible]

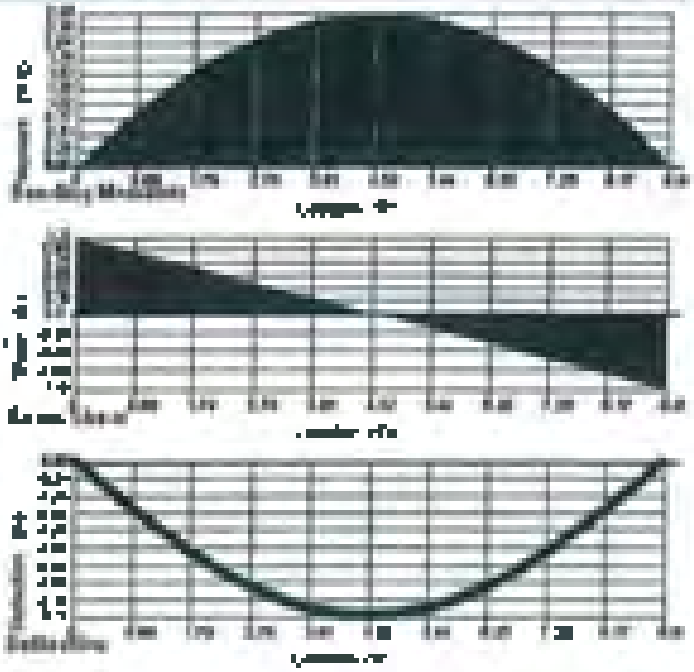
Sheet: H3F

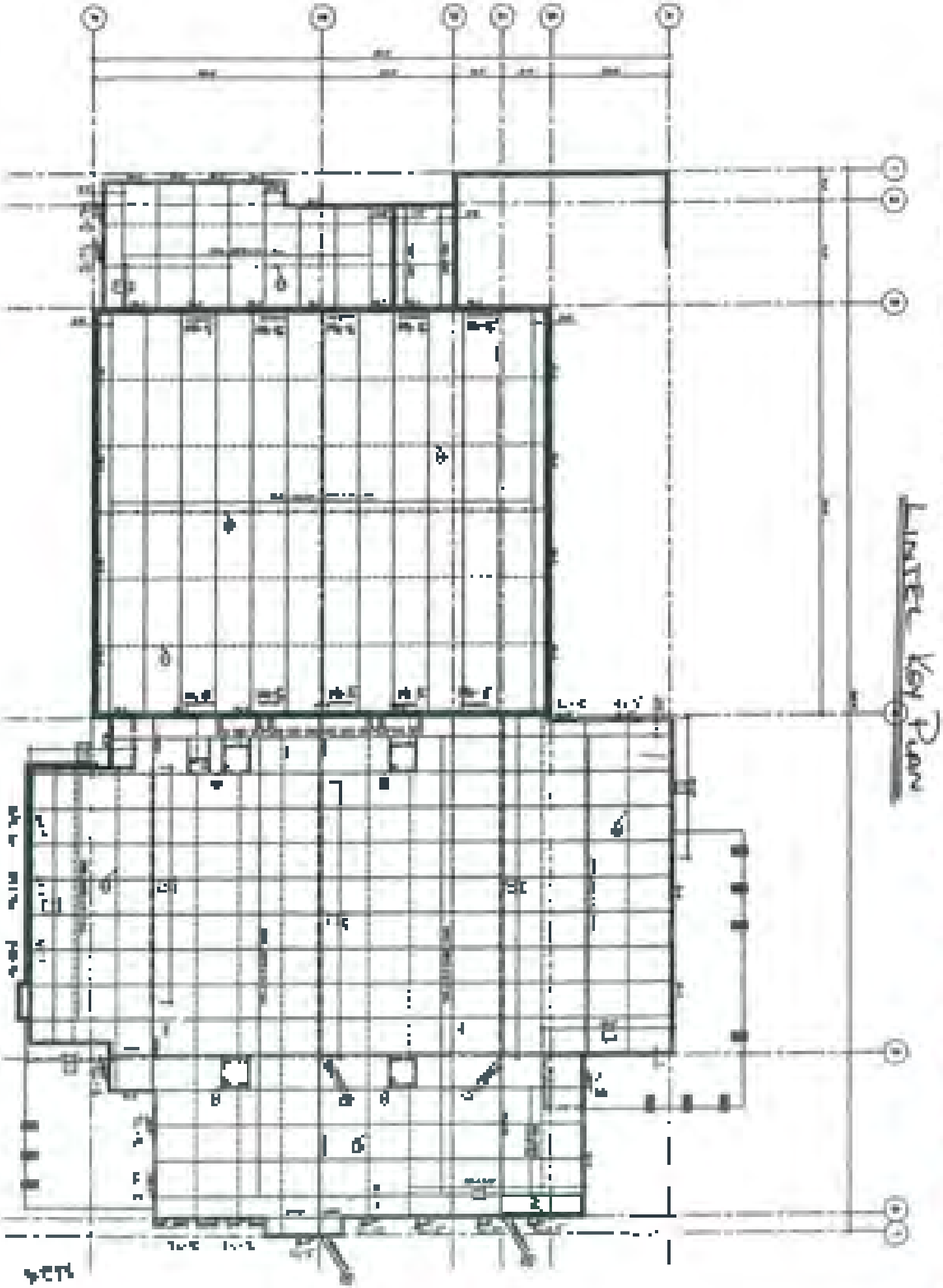
Steel Beam Design

Page 1

Description: Roof Framing Beam - B6

Shape & Diagram

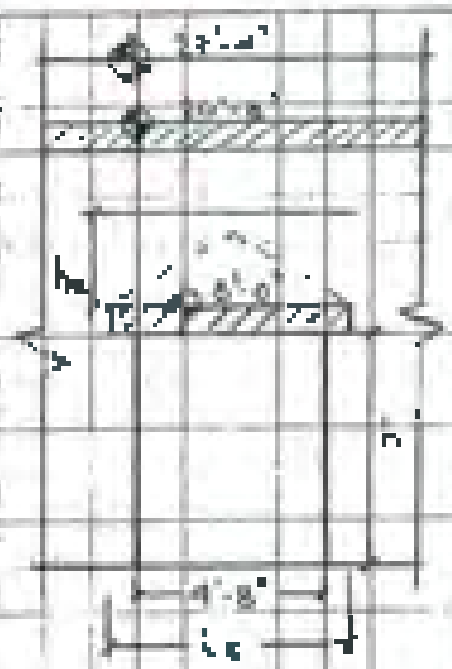




Dekker/Perich/Sabatini

Project Name: NEFD STATION #53
Project No.: 07502-01
Subject: MASONRY LINTELS
By: AJB Date: 05/21/07
Checked: Date:
Sheet: HS0

MASONRY LINTEL M1-1



Span = 4'-8"

L_c = 5'-4"

- Check for Arching

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

$2(3'-8") = 8'-0" + 12'-8" > h_c$

∴ Arching Occurs

- Loads:

W_{beam} + 88 plf
W_{lintel} = 58 plf
W_{wall} (3 ft × 81 psf) = 270 plf
W_{roof} = (5 ft × 20 psf) = 700 plf

W_{total} = 1,146 plf

- Flexural

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

$\Rightarrow M = \frac{f'_m}{6} b_w jk d^2$

$jk = \frac{6M}{f'_m b_w d^2} = \frac{6(3,124\ lb\text{-}ft)(12\ in/ft)}{(1,500\ psi)(11.25\ in)^2(6\ in)} = 0.34$

Dekker/Perich/Sabatini

[redacted]

Project: NLVFD Station #53
Job No.: 07502-01
Subject: MASONRY LINTELS
By: AJB Date: 02/01/07
Client:
Sheet: HSI

(ML-1 cont)

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

$k\left(1 - \frac{k}{3}\right) = 0.395$

$k = 0.40$

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

$j = 1 - 0.133 = 0.867$

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

$A_s = 0.30$

USE 2 - #6's w/ $A_s = 0.88 \text{ in}^2 > 0.30 \text{ in}^2$ ∴ OK

- Check Shear:

$V = w\left(\frac{l}{2} - \frac{d}{2}\right) = 1.46 \text{ psf}\left(\frac{9'\ 12''}{2} - \frac{6 \text{ in}}{2(12)}\right)$

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

$f_v = \frac{V}{b_w d} = \frac{2{,}195 \text{ lbs}}{(11.625 \text{ in})(6 \text{ in})} = 31.5 \text{ psi}$

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

∴ No Shear Reinf. Req'd ∴ OK

Dekker/Perich/Sabatini

Project: NIYPO STATION ASS
Project No.: 07502-01
Subject: MASONRY LINTELS
By: AJB Date: 05/10/07
Checked: _____ Date: _____
Sheet: H32

MASONRY LINTEL M1-2

$t_c = 12'' : 4''$

$L_x = 14' \ 0''$

- CHECK FOR ARCHING

$h_a = \frac{L_x}{2} + 8' = 7' \ 8''$

$20'-8'' - 15'-4'' = 5'-4'' < h_a$

$\therefore$ ARCHING DOES NOT OCCUR

- LOADS:

$w_{BRICKSTAT} = 88$ PLF
$w_{WATER} = 176$ PLF
$w_{MASONRY\ WALL\ (1')} = 972$ PLF
$w_{ROOF} = 60$ PLF
$w_{TOTAL} = 1,296$ PLF

- FLEXURAL:

$$M = \frac{wL^2}{8} = \frac{0.196\ \text{klf}\ (13.833\ \text{ft})^2}{8} = 28.786\ \text{k-ft}$$

$$jk = \frac{6M}{f_m bd^2} = \frac{6\ (28.786\ \text{k-ft})(12''/\text{ft})}{(1500\ \text{psi})(1.625\ \text{in})(14\ \text{in})^2}$$

$jk = 0.606$

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

Dekker/Perich/Sabatini

[redacted]

NLVFD Station #53
09502-01
MASONRY LINTELS
A-18 05/01/07
103

(ML 2 cont)

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

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

$A_s = 1.43 \text{ in}^2$

⇒ TRY A DEEPER BEAM

24" deep Beam
d = 22 in

loads:

w_{beam} Beam = 88 plf
w_{lintel} = 264 plf
w_{wall} (8 psf × 11.5 in) = 918 plf
w_{roof} (30 psf × 3 ft) = 120 plf
w_{total} = 1,390 plf

→ Total load

$M = \frac{wL^2}{8} = \frac{(1.390 \text{ plf})(15.33 \text{ ft})^2}{8} = 30.873 \text{ k-ft}$

$jk = \frac{f_s M}{f'_c b d^2} = \frac{6(30.873 \text{ k-ft})(12''/ft)}{(5000 \text{ psi})(11.625 \text{ in})(22 \text{ in})^2}$

$jk = 0.263$

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

Dekker/Perini/Sabatini

Project: NAVAL Station B53
Job No.: 29502.01
Subject: MASONRY LINTELS
By: AJB Date: 05/01/07
Checked: Date:
Sheet: HSW

(M-2 cont.)

$j = 1 - \frac{k}{3} = 1 - \frac{0.291}{3} = 0.903$

$A_s\,(\text{reqd}) = \frac{M}{F_s\, j\, d} = \frac{30{,}873\ \text{in-rr}\ (12\ \text{in/ft})}{(24{,}000\ \text{psi})(0.903)(22\ \text{in})}$

$A_s\,(\text{reqd}) = 0.78\ \text{in}^2$

USE 2 - #6's w/ $A_s = 0.88\ \text{in}^2 > 0.78$ in

- Check Shear:

$V = w\left(\frac{l}{2} - \frac{d}{2}\right) = 1{,}390\ \text{plf}\left(\frac{13.83\ \text{rr}}{2} - \frac{22\ \text{in}}{2\,(12\ \text{in/ft})}\right)$

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

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

$F_v = \sqrt{1500} = 39\ \text{psi} > 31.2\ \text{psi}$ ∴ OK

∴ No Shear Reinf. req'd

PET.APP.000315

Ketter/Reich/Schalini

[redacted]

Project: NLVFD Station #53
Job No.: 03502-01
Subject: MASONRY LINTELS
By: AJB Date: 05/01/07
Chkd: Date:
Rev: KGS

MASONRY LINTEL M2-2

L = 16'-0"

L_e = 16'-8"

- Check True Arching:

$m_c = \frac{L_e}{2} + 8" = 9'-0"$

$29'-8" - 14'-0" = 6'-8" < 9'-0"$

∴ Arching Does Not Occur

- Loads:

$w_{masonry\ wall}$ = 88 plf

w_{lintel} = 528 plf

w_{wall} (8 psf × 12.67 ft) = 1,026 plf

w_{roof} (40 psf × 35 ft) = 1,400 plf

w_{total} = 3,042 plf

Flexure:

$M = \frac{wL^2}{8} = \frac{(3{,}042\ plf)(16\ ft)^2}{8} = 97{,}344\ lb\text{-}ft$

$J_R = \frac{6M}{f'_m bd^2} = \frac{6(97{,}344\ lb\text{-}ft)(12\ in/ft)}{(1500\ psi)(11.625\ in)(48\ in)^2}$

J_R = 0.190

Dekker/Perich/Sabatini

NAVFO Station #53
07302-01
MASONRY & NILES
A-1B 05/01/07
1436

(K, 3 cont)

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

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

$\therefore k = 0.204$

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

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

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

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

- Check Shear:

$V = w\left(\frac{l}{2} - \frac{d}{2}\right) = 3.042 \text{ klf}\left(\frac{20 \text{ ft}}{2} - \frac{46 \text{ in}}{2(12)}\right)$

$V = 18,506 \text{ lbs}$

$f_v = \frac{V}{b_w d} = \frac{18,506 \text{ lbs}}{(12 \text{ in})(46 \text{ in})} = 34.6 \text{ psi}$

$F_v = 39 \text{ psi} > f_v$ ∴ OK

∴ No Shear Reinf. Req'd

Dekker/Perich/Sabatini

[redacted]

Project: DUNED STATION #53
Project No.: 07507-01
Subject: MASONRY LINTELS
By: AJB Date: 05/01/07
Checked: Date:
Sheet: H37

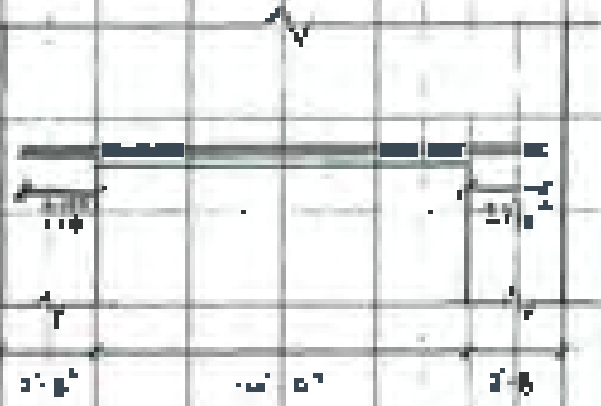
(M.L. 3 ref)

- DEVELOPMENT LENGTH:

$l_d = 0.0245\, d_b F_s$

$= 0.0245\,(0.5\ldots)(24{,}000\,psi)$

$l_d = 28.5$ in



Dekker/Perich/Sabatini

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

MASONRY LINTEL ML-4

L = 6'-0"

L_c = 6'-8"

- Check for Arching:

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

$6'-8" + 8" - 8" = 12'-0" > 4'-0"$

∴ Arching Occurs

Loads:

W_Band Beam	= 85 plf
W_Lintel	= 89 plf
W_Wall = (8) psf × 4'	= 32 plf
W_Roof = (150 psf)	= 1,400 plf
W_Total =	1,900 plf

- Flexural:

$M = \frac{wL^2}{8} = \frac{1900\ plf\ (6\ ft)^2}{8} = 8,550\ lb\text{-}ft$

$J_R = \frac{6M}{f_m b_w d^2} = \frac{6\ (8,550\ lb\text{-}ft)(12\ in/ft)}{(1,500\ psi)(11.625\ in)(14\ in)^2}$

$J_R = 0.150$

Dekker/Perich/Sabatini

[redacted]

Project: NLFD STATION #53
Project No.: 09502-01
Subject: MASONRY LINTELS
By: AJB Date: 05/01/09
Checked: Date:
Sheet: M09

(MAX CONT.)

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

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

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

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

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

- Check Shear:

$V = w\left(\frac{l_1}{2} - \frac{d}{2}\right) = 1{,}000 \text{ plf}\left(\frac{8 \text{ ft}}{2} - \frac{14 \text{ in}}{2(12 \text{ in/ft})}\right)$

$V = 4{,}592 \text{ lbs}$

$v = \frac{V}{b_w d} = \frac{4592 \text{ lbs}}{(1.5 \text{ in})(14 \text{ in})} = 28 \text{ psi}$

$v_c = \sqrt{1500} = 39 \text{ psi} > 28 \text{ psi}$ ∴ OK

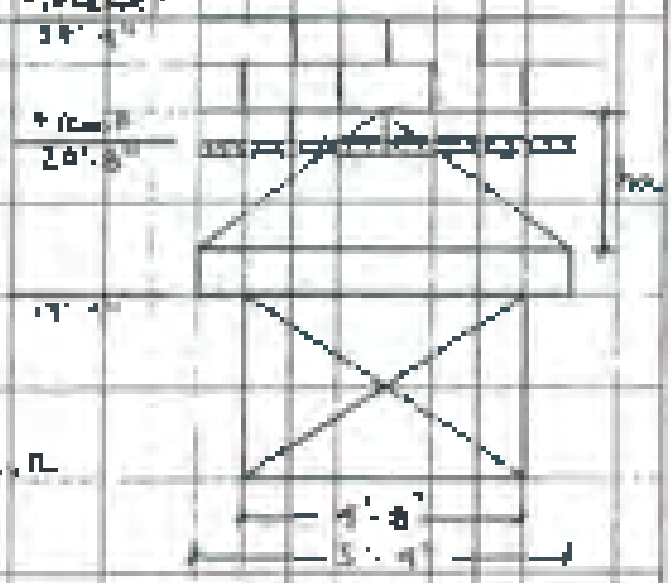
No Shear Reinf Reqd

Peter Perich Associates

[redacted]

Project: NUVFD Section #53
Job No.: 07502 - 01
Subject: MASONRY LINTELS
By: A.L.G. Date: 08/27/07
Client:
Sheet: [illegible]

MASONRY LINTEL M1-5



Span = 4'-8"

L_{eff} = 5'-4"

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

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

* Arching Does NOT occur

Loads:

L_{wall} = 1760 PLF
W_{wall} = 94 psf x 8 ft = 752 PLF
Bond Beam & Rock = 88 PLF

W_{DL} = 20 psf x 34 ft = 680 PLF
W_{LL} = 20 PSF x 34 ft = 680 PLF

W_{TOTAL} = 3,376 PLF

Flexural:

$M = \frac{wL^2}{8} = \frac{(3376)(4.67)^2}{8} = 6,919$ lb-ft (80,952 in-lb)

$jk = \frac{6M}{f_c b_w d^2} = \frac{6(80,952 \text{ lb-in})}{(1500 \text{ psi})(7.625 \text{ in})(8 \text{ in})^2} = 0.142$

Petkiewicz/Sabatini

[redacted]

Name: NLVFD Station #53
Job No.: 07502-01
Subject: MASONRY LINTELS
By: AIB Date: 6/27/07
Checked: Date:
Page: HW
(M-5 cont)

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

$K = 0.149$

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

$A_s\ (\text{req'd}) = \frac{M}{f_s \cdot d} = \frac{80,752\ \text{lb-in}}{(24\,000\ \text{psi})(0.95)(14\ \text{in})}$

$= 0.253\ \text{in}^2$

USE 2 - #6's w/ $A_s = 0.88\ \text{in}^2 > 0.253\ \text{in}^2$ ∴ ok

- Check Shear

$V = w\left(\frac{l}{2} - \frac{d}{2}\right) = 2376\ \text{plf}\left(\frac{9.67\ \text{ft}}{2} - \frac{1.167\ \text{ft}}{2}\right)$

$= 9,162\ \text{lbs}$

$f_v = \frac{V}{b \cdot d} = \frac{9162\ \text{lbs}}{(1.625\ \text{in})(19\ \text{in})} = 25.57\ \text{psi}$

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

∴ No Shear Reinf. req'd

Dekins/Petrich/Sabatini

NLVFD STATION #53
07505.01
MASONRY LINTELS
ALB 08/28/02
NWB

MASONRY LINTEL ML-6

8" CMU WALL

SPAN = 4'-8"

L_e = 5'-4"

$R_A = \frac{5'\cdot 4'}{2} + 8' \times 5'\cdot 4'$

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

DEAD

LINTEL = 58 PLF
WALL = 61 PSF × 3.33' = 205 PLF

w_{TOTAL} = 261 PLF

FLEXURAL

$M = \frac{wL^2}{8} = \frac{(261\ plf)(4.67\ ft)^2}{8} = 712\ lb\cdot ft$ (8538 lb·in)

$jk = \frac{6M}{f'm\ bn\ d^2} = \frac{6(8538\ lb\cdot in)}{(1500\ psi)(3.625\ in)(6\ in)^2} = 0.124$

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

$k = 0.1296$

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

Dekker/Perich/Sabatini

Project Name: NLVFD STATION #53
Project Number: 07502-01
Subject: MASONRY LINTELS
By: AB Date: 09/28/07
Checked: Date:
Sheet: 1 of 3
(Min. 6 sq.in.)

$A_s = \frac{M}{f_s \cdot j \cdot d} = \frac{8,538 \text{ lb-in}}{(24,000 \text{ psi})(0.859)(6 \text{ in})}$

$= 0.062 \text{ in}^2$

USE 2 - #5's w/ $A_s = 0.41 \text{ in}^2 > 0.062 \text{ in}^2$ ∴ OK

* 3.4 INSPECTION NO. SHOW REINFORCEMENT PROD

Dekker/Perich/Sabatini

Project Name: NLVFD Station #53
Project Number: 07507-01
Subject: Steel Headers
By: AJB Date: 05/03/07
Checked: Date:
Date: HHF

Steel Header S1-1

L = 3'-4" Load Bearing Header

$w_{DL} = (20\ psf \times 20'\text{-}8'/2) + 20\ plf = 227\ plf$
$w_{LL} = 20\ psf \times 20'\text{-}8'/2 = 207\ plf$
$w_{TOTAL} = 414\ plf$

USE 2-600S162-43 Boxed Header

w/ $w_{MAXIMUM} = 1357\ plf > 414\ plf$ ∴ OK

(SEE ATTACHED SSMA HEADER LOAD TABLE)

Header Support

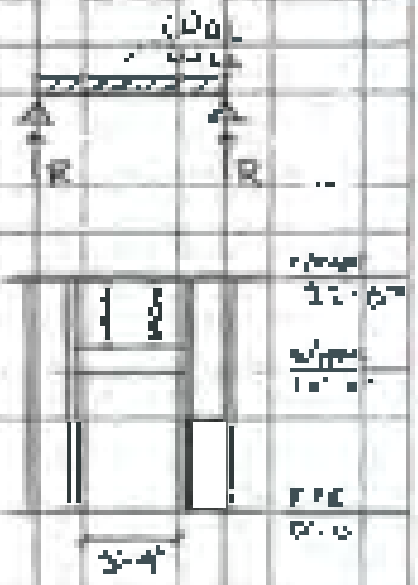
Jack Studs:

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

$R_{DL} = 378\ lbs$

$R_{LL} = 345\ lbs$

$H = 10'\text{-}0"$



USE 1-600S162-43 Stud

$I_{eff} = 2.316\ in^4$
$S_{eff} = 0.963\ in^3$
$r = 2.276\ in$
$A_e = 0.487\ in^2$

Kutter/Zwick/Sarabini

Project: HLTO Stanton #53
Project Number: 07502-01
Subject: Steel Headers
By: AJB Date: 05/03/04
Checked: Date:
Scale: NTS

S1.1. (cont.)

$$F_e = \frac{\pi^2 E}{\left(KL/r\right)^2} = \frac{\pi^2 (29{,}000\ ksi)}{\left(\frac{(1.0)(1.0\ in)(12\ in/ft)}{2.276\ in}\right)^2} = 18.9\ ksi$$

$$\lambda_c = \sqrt{\frac{F_y}{F_e}} = \sqrt{\frac{33\ ksi}{18.9\ ksi}} = 0.544$$

$$F_n = (0.658^{\lambda_c^2})F_y = (0.658^{(0.544)^2})33\ ksi$$
$$= 28.86\ ksi$$

$$P_n = A_c F_n = 0.344\ in^2 (28.86\ ksi) = 9{,}928\ lbs$$

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

$P = 723\ lbs < P_a$ ∴ OK

- Full Height Studs:

$$P_{wind} = \left[\left(\frac{3.33\ psf}{2}\right) + \left(\frac{1.33\ psf}{2}\right)\right](14.0\ psf) = 34.5\ plf$$

$$M = \frac{wL^2}{8} = \frac{(34.5\ plf)(22\ ft)^2}{8} = 2.087\ lb\text{-}ft$$
$$= 25\ k\text{-}in$$

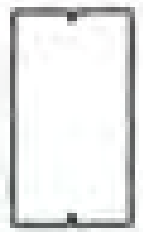
USE 2 - 600S162-43 FULL HEIGHT STUDS

$$\phi M_n = (2)\,16.68\ k\text{-}in = 33.36\ k\text{-}in$$ ∴ OK

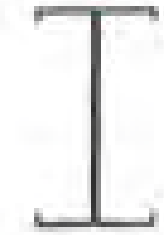
Header Load Tables

Header Load Table Notes

1. Deflection limit is L/360
2. Allowable loads have not been modified for single or semi-uniform loading
3. Headers are made from two "boxed" or back to back members
4. Allowable moment, shear and web crippling are based on twice the capacity of a single member. The moment of inertia is based on twice the value of the single member
5. Bearing length for web crippling is 1.5" minimum
6. Values are for unpunched members
7. Headers are assumed adequately braced for bending
8. Allowable loads are for simply supported headers with uniform bending loads only



Boxed Header



Back-to-Back Header

Header Allowable Uniform Loads (lb/ft)

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

"#" - web crippling required in wall support

Structural (S) Stud Section Properties

Dekker/Perich/Sabatini

[redacted]

Project: SJVFD Station #53
Job No.: 07502-01
Subject: Steel Headers
By: ALB Date: 5/09/09
Checked: Date:
Sheet: HF

Steel Header S1-2

L = 7'-6" (Load Bearing)

$W_{DL} = \left(\frac{27'-10'}{2} \times 20\ PSF\right) + 20\ PLF = 298\ PLF$

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

$W_{total} = 576\ PLF$

(See Excalc Sheet T-4 Design)

USE HSS 5-3/8" Header

- Jack Studs

$R_{DL} = 1150\ lbs$
$R_{LL} = 1040\ lbs.$ } from Excalc

H = 10'-0"

USE 2 ea. 1-6005162-43 Stud

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

From S1-1 Calculations

$P_a = 5,516\ lbs > P$ ∴ OK

Bethlehem/Parich/Salutini

[redacted]

Project: NLVFD Station #53
Project number: D7502-01
Subject: Steel Headers
By: AJB Date: 05/09/07
Checked: Date:
Sheet: H39

FULL HEIGHT STUDS:

$P_{WIND} = \left(\frac{9.5ft}{2} + \frac{13.5ft}{2}\right)(10.81 psf) = 65.4 plf$

$M = \frac{wL^2}{8} = \frac{(65.4 plf)(23ft)^2}{8} = 3,956 lb\cdot ft$

$= 47.5 k\cdot in$

USE (3) 600S162-43 FULL HEIGHT STUDS

$M_n = (3)\,16.68 k\cdot in = 50.04 k\cdot in > 47.5$

$\therefore$ OK

Steel Beam Design

Description: Heacock - SL-3

General Information

Steel Section : [illegible]

Distributed Loads

Summary

Factor & Detail Summary

Section Properties

Dekker/Perich/Sabatini

Project: NUFO Station #53
Project No.: 0302.01
Subject: Steel Headers
By: AJB Date: 02/09/07
Checked: Date:
Sheet: 1 of

STEEL HEADER SL-3

L = 11'-2" (LONG BEARING)

$W_{DL} = \left(\frac{28'-9"}{2} \times 20 \text{ PSF}\right) + 20 \text{ PLF} = 308 \text{ PLF}$

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

$W_{TOTAL} = 596 \text{ PLF}$

(SEE ENERCALC FOR DESIGN)

USE HSS6x4x3/16 HEADER

∴ JACK STUDS:

$R_{DL} = 1,800 \text{ lbs}$
$R_{LL} = 1,620 \text{ lbs}$ } FROM ENERCALC

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

$H = 10'-0"$

FROM SL-1 CALCULATIONS (1) 600S162-43

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

∴ USE 2 - 600S162-43 STUD

(2 FOR BEARING)

Dekker/Perich/Sabatini

Project Name: NLVFD STATION #5
Project Number: 07502-01
Subject: STEEL HEADERS
By: AMB Date: 05/04/07
Checked: Date:
Sheet: WS2

- FULL HEIGHT STUDS: (S-3 CONT)

$W_{HEAD} = \frac{11'\,1''}{2} \times 14.81 = 82.7$ PLF

$W_{STUDS} = \frac{1.3'\,2\times4}{2} \times 14.81 = 9.8$ PLF

$M_L = 3.94$ K-FT $\times$ 12"/FT $= 44.88$ K-IN

↳ SEE SIMPLE BEAM ANALYSIS

USE (3) GOOSE 162-43 FULL HEIGHT STUDS

$M_L = (3)\,16.68$ K-IN $= 50$ K-IN > 44.88

∴ OK

Dunham/Parkes/Schaefer
[illegible], Suite 106
Las Vegas, NV 89119
Tel [illegible]
Fax [illegible]

H53

Steel Beam Design

Page 1

Opinion/Report Headers - DL-3

General Information

Steel Section : [illegible]

Comp Beam	[illegible]	Fy	[illegible]
Cpr Cbxx	[illegible]	Fy	[illegible]
Angle Cpm	[illegible]		
Lb Unbraced Length	[illegible]		

Distributed Loads

DL	[illegible]						[illegible]
LL	[illegible]						[illegible]
[illegible]							[illegible]
Start Location							[illegible]
End Location							[illegible]

Summary

Beam DH

Using [illegible] section, Sxxx = [illegible], Fy = [illegible]
End Span = Pinned-Pinned, Lx = [illegible], LDF = [illegible]

	Actual	Allowable		
Moment	[illegible]	[illegible]	Max Deflection	[illegible]
Fb Resource Factor	[illegible]	[illegible]	Length/L Defl	[illegible]
Fb / Ft	[illegible]		Length/Cantilevered Defl	[illegible]
Shear	[illegible]	[illegible]		
Fv Shear Stress	[illegible]	[illegible]		
Fv / Ft	[illegible]			

Forces & Stress Summary

	Moment	Cb	Fb	Rx	Ry	Stress
[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]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

Section Properties

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Volume for LRFD Design		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible] Burnside, Suite 140
Lake Oswego, OR 97035
Tel. 503-636-1000
Fax. 503-636-1000

Title
Client
Description

Date
Code [illegible]

Sample

1454

[illegible]

Single Span Beam Analysis

Page [illegible]

Description: Full Height Stud - SL-3

General Information

Center span	22.00 ft	Uniform loading	0.00 plf
Left Cantilever	0	Beam Material	29,000 psi
Right Cantilever	0	Beam Unit Wgt	490 pcf

Uniform Loads

On Center Span...		On Left Cantilever...		On Right Cantilever...	
# 1	0.310 plf	# 1	0	# 1	0

Trapezoidal Loads

Magnitude @ Left	0.000 plf	0	0	0
Magnitude @ Right	0.000 plf	0	0	0
Dist. Fr Left Side	14.000 ft	0	0	0
Dist. Fr Right Side	22.000 ft	0	0	0

Query Values

Center Location	0.000 ft	Left Cant	0.000 ft	Right Cant	0.000 ft
Moment	0.00 lb-ft		0.00 lb-ft		0.00 lb-ft
Shear	0.00 lb		0.00 lb		0.00 lb
Deflection	0.00000 in		0.00000 in		0.00000 in

Summary

Reactions				Moments		Deflections		Reactions	
Max + @ Center	0.31 lb	at	11.00 ft	@ Left	0.00 lb-ft			@ Left	0.31 lb
Max - @ Center	0.00 lb	at	22.00 ft	@ Right	0.00 lb-ft			@ Right	0.00 lb
				Max Abs	0.00 lb-ft				
@ Left Cant	0.00 lb								
@ Right Cant	0.00 lb			@ Center	-0.0000 in	at	11.00 ft		
Max Abs	0.31 lb			@ Left Cant	0.000 in	at	0.00 ft		
				@ Right Cant	0.000 in	at	0.00 ft		

[redacted]

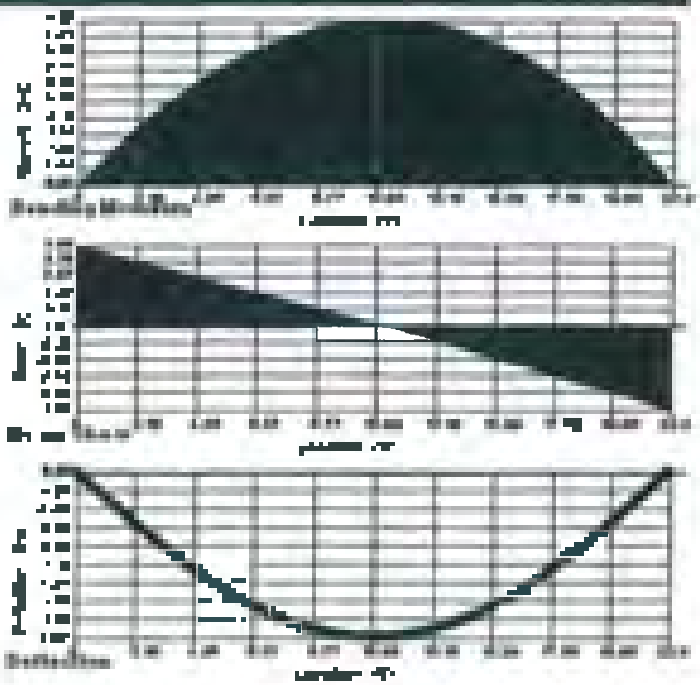
Title
Job #
Date
Description
Scale
Page

Single Span Beam Analysis

Page

Description

Sketch & Diagram



Ackler·Perich·Sabatini

Project: MUFO Station #53
Job No.: 07502-01
Subject: Steel Headers
By: AJB Date: 05/09/07
Checked: Date:
Page: HSS

Steel Header SL-4

L = 16'-0" (Load Bearing)

$W_{DL} = \left(\frac{28'-7''}{2} \times 20\ psf\right) + 20\ plf = 308\ plf$

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

$W_{TOTAL} = 596\ plf$

(See Energenic Sheet for D

USE HSS9x3x1/4 Header

- Jack Studs:

$R_{DL} = 2{,}610$ lbs
$R_{LL} = 2{,}300$ lbs } From Energenic

$P = 4{,}910$ lbs

H = 10'-0"

From SL-1 Calculations: 5002-62-93

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

USE (2) 6005-62-93 Jack Studs

(2 for bearing)

Delter Jerich Tahlaei

[redacted]

NYFD Station #53
07502-01
Type: Reactors
AGB 03/08/09
HST

- Full Height Studs: (SL-4 DIM)

$w_{studs} = \frac{16\,ft}{2} \times 14.81\,psf = 118\,pf$

$w_{studs} = \frac{1.33\,ft}{2} \times 14.81\,psf = 9.8\,pf$

(See Enercalc Beam Analysis)

$M = 5.09\,k\text{-}ft \times 12\,in/ft = 60.84\,k\text{-}in$

$S = 4(0.767\,in^3) = 3.068\,in^3$
→ 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

SE 9-6005 60.43 Full Height Studs

Steel Beam Design

Headers - SL-4

Optional Information

Steel Section : [illegible]

Span	[illegible]	Pinned-Pinned	Fy	[illegible]
Left Cant	[illegible]	[illegible]	Elastic Modulus	[illegible]
Right Cant	[illegible]			
Unbraced Length	[illegible]			

Distributed Loads

	#1	#2	#3	#4	#5	#6	#7
DL	[illegible]						[illegible]
SL	[illegible]						
Start Location							
End Location							

Summary

Beam OK

[illegible]

Moment	[illegible]	[illegible]	Total Deflection	[illegible]
% Bending Stress	[illegible]	[illegible]	Live/Total Defl	[illegible]
Ratio	[illegible]		Live/Total +LL Defl	[illegible]
Shear	[illegible]	[illegible]		
% Shear Stress	[illegible]	[illegible]		
Ratio	[illegible]			

Force & Stress Summary

	Unfactored	DL Factor	LL (@ Center)	LL (@ Center)	LL (@ Cantilever)	LL (@ Cantilever)
Max +V	[illegible]	[illegible]	[illegible]			[illegible]
Max -V						[illegible]
Max +M @ Left						[illegible]
Max +M @ Right						[illegible]
Shear @ Left	[illegible]	[illegible]	[illegible]			[illegible]
Shear @ Right	[illegible]	[illegible]	[illegible]			[illegible]
Center Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Left Cant Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Right Cant Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cantilever Defl @	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Reactions @ Left	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
Reactions @ Right	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

Fb calc'd per Eq. [illegible]

Section Properties

Depth	[illegible]	Weight	[illegible]
Web Thick	[illegible]	Ix	[illegible]
Width	[illegible]	Sx	[illegible]
Flange Thick	[illegible]	Iy	[illegible]
Area	[illegible]	Sy	[illegible]
Ix	[illegible]	Rxp	[illegible]
Values for LRFD Design:		Ryp	[illegible]
J	[illegible]	Zx	[illegible]
Cw	[illegible]	Zy	[illegible]

[illegible]
[illegible]
Las Vegas, [illegible]
Fax [illegible]

Title [illegible]
Engineer [illegible]
Description
Notes

Job # [illegible]
Date [illegible]

#57

Single Span Beam Analysis

Page [illegible]

Description: Full Height Stud - [illegible]

General Information

Center Span	[illegible]	Material of Member	[illegible]
Left Cantilever	[illegible]	Uniform Modulus	[illegible]
Right Cantilever	[illegible]	Moment End Fixity	[illegible]

Uniform Loads

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

Trapezoidal Loads

Magnitude @ Left	[illegible]	[illegible]	[illegible]	[illegible]
Magnitude @ Right	[illegible]	[illegible]	[illegible]	[illegible]
Dist. To Left Edge	[illegible]	[illegible]	[illegible]	[illegible]
Dist. To Right Edge	[illegible]	[illegible]	[illegible]	[illegible]

Query Values

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

Summary

Reactions:				Moments		Deflections	
Force @ Center	[illegible]	at	[illegible]	@ Left	[illegible]	@ Left	[illegible]
Force @ Center	[illegible]	at	[illegible]	@ Right	[illegible]	@ Right	[illegible]
@ Left Cant.	[illegible]			Maximum	[illegible]		
@ Right Cant.	[illegible]			Deflections:			
Maximum =	[illegible]			@ Center	[illegible]	at	[illegible]
				@ Left Cant.	[illegible]	at	[illegible]
				@ Right Cant.	[illegible]	at	[illegible]

Dokken/Zerich/Sabatini

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_{roof} = (3m x 30 psf) + 10 psf = 80 plf
W_{wall} = (3m x 20 psf) = 60 plf

W_{total} = 140 plf

(See SSMA Header Load Table)

USE (2) 600S162-43 Back to Back Header

W_{allow} = 347 plf > 140 plf ∴ Ok

- Jack Studs:

$R_{roof} = \frac{(80 plf)(7.5 ft)}{2} = 300\#$

$R_{lin} = \frac{(60 plf)(7.5 ft)}{2} = 225\#$

525 lbs

H = 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

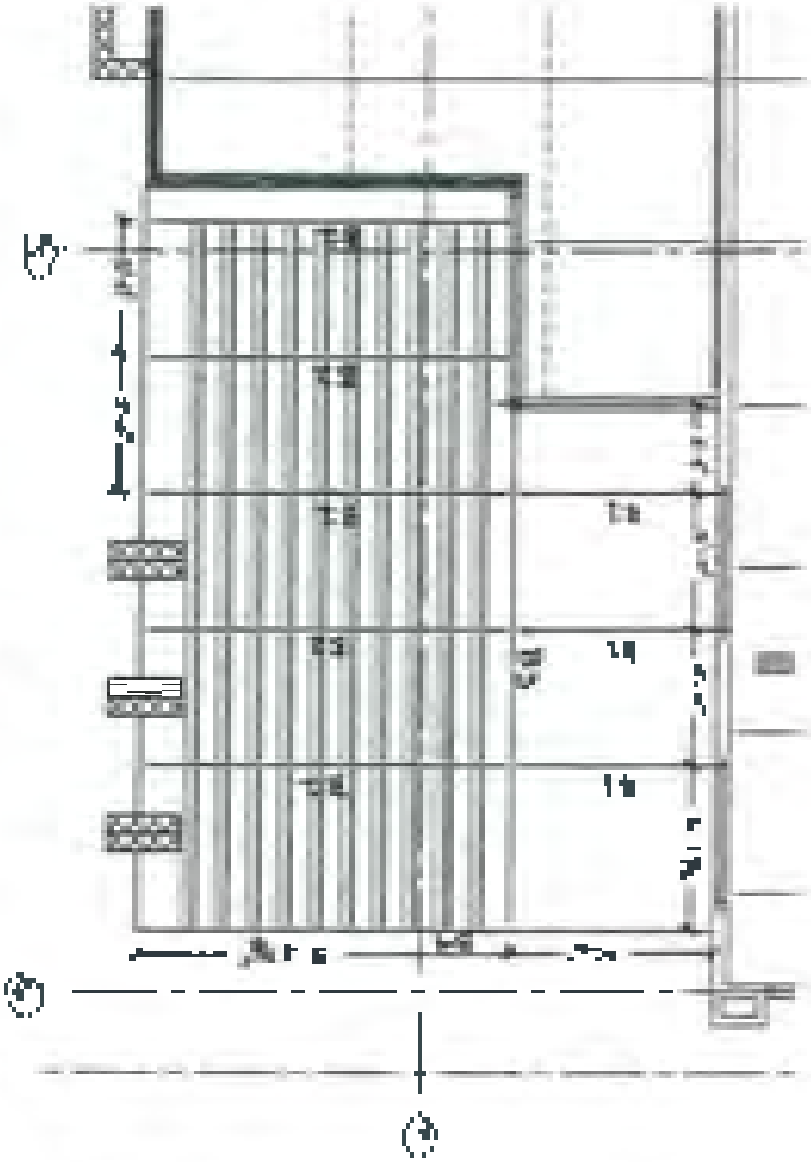
Dekker/Perich/Sabatini

Name: NLVFD Station #53
Job No.: 07502.01
Subject: Steel Lintels
By: AJB Date: 05/09/07
Chk'd: Rev:

FULL HEIGHT STUDS: (SL 5 CONT.)

SAME AS SL:2

USE (3) 600S162-43 FULL HEIGHT STUDS



Dekker/Perich/Sabatini

[redacted]

Project: NUVEO STATION #53
Project No.: 07502.01
Subject: TRELLIS FRAMING
By: GLB Date: 06/01/07
Sheet: [illegible]
Page: RL3

SOUTH TRELLIS

- BEAM B1:

LOADS:

$w_{DL} = 5\,psf \times 5.5\,sqft = 28\,plf$

$w_{LL} = 20\,psf \times 5.5\,sqft = 111\,plf$

$L = 9'\text{-}6"$

(SEE ENERCALC FOR DESIGN)

USE HSS5x3x3/16

- BEAM B2

$w_{DL} = 5\,psf \times 5.5\,sqft = 28\,plf$

$w_{LL} = 20\,psf \times 5.5\,sqft = 111\,plf$

$L = 13'\text{-}8\frac{1}{2}"$

(SEE ENERCALC FOR DESIGN)

USE HSS5x3x3/16

Dekker/Perich/Sabatini

Project: NLVFD STATION #53
Project No.: 01502-01
Subject: CANOPY FRAMING
By: AJB Date: 06/07/07
Checked: Date:
Sheet: 1 of

- Beam B3

P_{DL} = 140 lbs (B1) + 250 lbs (B2) = 390 lbs

P_{LL} = 240 lbs (B1) + 960 lbs (B2) = 1,170 lbs

L = 19'

L_H = 6' - 1/8"

(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
P_{LL} = 1,510 lbs
} from B3 reactions

L = 2' - 3"

L_H = 3' - 9"

(SEE ENVELOPE FOR DESIGN)

USE HSS 10 x 3 x 3/16

Construction Consultant
4000 Bonneville, Suite 100
Las Vegas, NV 89104
Tel. 702-474-9400
Fax. 702-474-1993

Steel Beam Design

Page 1

Description: South Trellis - B7

General Information

Steel Section : HSS8X3X3/16

Center Span	[illegible]	Fy	[illegible]	[illegible]
Left Cant.	[illegible]			
Right Cant.	[illegible]			
Left Unbraced Length	[illegible]			

Distributed Loads

	[illegible]						
	[illegible]						
Start Location							
End Location							

Summary

Section OK

Using HSS8X3X3/16 section, Span = [illegible], Fy = [illegible]

	Actual	Allowable		
Moment	[illegible]	[illegible]	Max. Deflection	[illegible]
% Bending Stress	[illegible]	[illegible]	Length/360 Ratio	[illegible]
Fb / Fb	[illegible]		Length/Defl. Ratio	[illegible]
Shear	[illegible]	[illegible]		
% Shear Stress	[illegible]	[illegible]		
Fv / Fv	[illegible]			

Forces & Stress Summary

	Moment	Shear	Deflection			
Max. M +	[illegible]	[illegible]	[illegible]			
Max. M -						
Max. M @ Left						
Max. M @ Right						
Shear @ Left	[illegible]	[illegible]	[illegible]			
Shear @ Right	[illegible]	[illegible]	[illegible]			
Center Defl.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Left Cant. Defl.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Right Cant. Defl.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cantilever Defl.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Reaction @ Left	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
Reaction @ Right	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

Fb calcd per Eq. [illegible] = [illegible]

Section Properties HSS8X3X3/16

Depth	[illegible] in	Weight	[illegible] lbs
Avg. Thick	[illegible] in	Ix	[illegible] in^4
Width	[illegible] in	Sx	[illegible] in^3
Avg. Thick	[illegible] in	Rx	[illegible] in
Area	[illegible] in^2	Iy	[illegible] in^4
Zx	[illegible] in^3	Sy	[illegible] in^3
		Ry	[illegible] in
Values for J & C Design		Zy	[illegible] in^3
J	[illegible] in^4	Ix	[illegible] in^4
Cw	[illegible] in^6	Zy	[illegible] in^3

Steel Beam Design

Description: South Trellis - AC

General Information

Steel Section : [illegible]

Center Span	[illegible]
Left Cant	[illegible]
Right Cant	[illegible]
Unbraced Length	[illegible]

Distributed Loads

	[illegible]						
	[illegible]						
	[illegible]						

Summary

Beam OK

Loading: [illegible] section, Span = [illegible], Fy = [illegible]

End Fixity = Pinned-Pinned, Lr = [illegible], LCF = [illegible]

	Actual	Allowable		
Moment	[illegible]	[illegible]	[illegible]	[illegible]
% Bending Stress	[illegible]	[illegible]	[illegible]	[illegible]
Ratio	[illegible]		[illegible]	[illegible]
Shear	[illegible]	[illegible]		
% Shear Stress	[illegible]	[illegible]		
Ratio	[illegible]			

Force & Moment Summary

[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]	[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]	[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]

Section Properties: [illegible]

Depth	[illegible]	Weight	[illegible]
Web Thick	[illegible]	Area	[illegible]
Width	[illegible]	Iy	[illegible]
Flange Thick	[illegible]	Sy	[illegible]
Area	[illegible]	Zy	[illegible]
Ix	[illegible]	Ry	[illegible]
Values for LRFD Design		Ry/Ry	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Steel Beam Design

South Trestle - B3

General Information

Point Loads

Summary

Force & Stress Summary

Section Properties

Consulting Structural Engineer
[illegible] Bermuda, Suite 100
Las Vegas, NV 89118
Tel: 702-[illegible]
Fax: 702-[illegible]

Title: [illegible]
Diagram: [illegible]
Description:

Subject:

Job #: [illegible]
Date: [illegible]

HGT

Steel Beam Design

Page: 1

Description South Trellis

General Information

Input Section : [illegible]

Center Span	[illegible]	Fy	[illegible]	
Left Cant.	[illegible]			
Right Cant.	[illegible]			
Lb : Unbraced Length	[illegible]			

Distributed Loads

	#1	#2	#3	#4	#5	#6	#7
X	[illegible]						
W1	[illegible]						
W2							
Start Location							
End Location							

Point Loads

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

Summary

Beam OK

Using: [illegible]

Bad Policy: [illegible]

	Actual	Allowed		
Moment	[illegible]	[illegible]	Max Deflection	[illegible]
% Governing Moment	[illegible]	[illegible]	Length/Allow. Defl	[illegible]
Fb / Fb	[illegible]		Length/Overall Defl	[illegible]
Shear	[illegible]	[illegible]		
% Shear Stress	[illegible]	[illegible]		
Fv / Fv	[illegible]			

Force & Stress Summary

	Maximum	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max. M +	[illegible]	[illegible]	[illegible]			
Max. M -						
Max. M @ Left						
Max. M @ Right						
Shear @ Left	[illegible]	[illegible]	[illegible]			
Shear @ Right	[illegible]	[illegible]	[illegible]			
Center Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Left Cant Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Right Cant Defl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cantilever Defl @	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Reaction @ Left	[illegible]	[illegible]	[illegible]	[illegible]		
Reaction @ Rt	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]
[illegible]
[illegible]
Tel. [illegible]
Fax [illegible]

Title : [illegible]
Project No. [illegible]
Description [illegible]

Job # [illegible]
Date [illegible]

Assign [illegible]

[illegible]

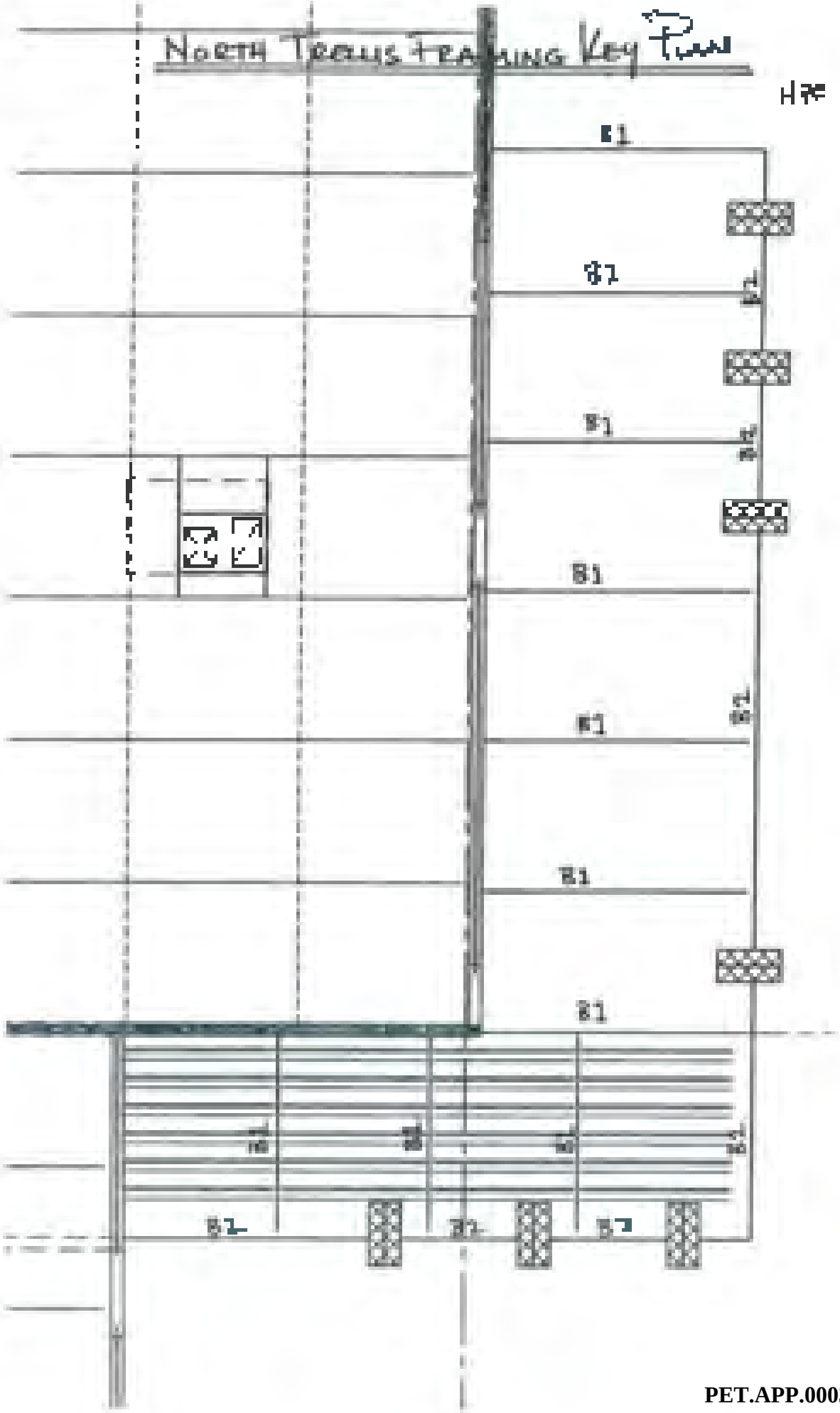
Steel Beam Design

Page 1

Description South Trellis - B4

Section Properties [illegible]

Depth	[illegible] in	Weight	[illegible]
Web Thick	[illegible]	[illegible]	[illegible]
Width	[illegible]	[illegible]	[illegible]
Flange Thick	[illegible]	[illegible]	[illegible]
Area	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Values for LRFD Design		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]


North Trails Training Key Plan
H7
B1
B2
B1
B2
B1
B2
B1
B1
B1
B2
B2
B2
B2
B2
B2
B2

Becker/Parish/Sabatini

[redacted]

Project: NAVFO STATION #53
Project No.: 09501.01
Subject: TRELLIS FRAMING
By: ALB Date: 06/01/07
Checked: Date:
Sheet: H71

NORTH TRELLIS

- BEAM B1:

$W_{DL} = 5\ psf \times 7.25\ ft = 36.25\ plf$
$W_{LL} = 20\ psf \times 7.25\ ft = 145\ plf$

$L = 11'\ 9''$

(See Enercalc For Design)

USE HSS 5x3x3/16

- BEAM B2:

$P_{DL} = 260\ lbs$
$P_{LL} = 850\ lbs$
} FROM B1 REACTIONS

$L = 18\ ft$

$L_b = 9'\ 9''$

(See Enercalc For Design)

USE HSS10x3x3/16

[illegible]
[illegible]
[illegible]
Tel. [illegible]
Fax. [illegible]

Job # [illegible]
Date [illegible]

Subject

Page 1

Steel Beam Design

Description North Trellis B1

General Information

Steel Section : [illegible]

Span [illegible]
Left Cant. [illegible]
Right Cant. [illegible]
Unsupported Length [illegible]

Fy [illegible]
Total Deflection Factor [illegible]
Equivalent Moment [illegible]

Distributed Loads

Dx	[illegible]						
L	[illegible]						
W							
Right Cantilever							
Left Cantilever							

Summary

Beam OK

Using the [illegible] section, Mmax = [illegible], Fy = [illegible]
Load Type = Pinned-Pinned, L = [illegible], LDF = [illegible]

	Actual	Allowable		
Moment	[illegible]	[illegible]	Max. Deflection	[illegible]
Bending Stress	[illegible]	[illegible]	Length/L, Cant	[illegible]
Ratio	[illegible]		Length/L, Cant. (Lim)	[illegible]
Shear	[illegible]	[illegible]		
Shear Stress	[illegible]	[illegible]		
Ratio	[illegible]			

Force & Stress Summary

Note: These columns are Cases + Unit Load placed as noted

	Moment	Dx Dist.	Lx @ Center	Lx=L/2 @ Center	Lx @ Center	Lx=L/2 @ Center
Shear @ Left	[illegible]	[illegible]	[illegible]			[illegible]
Shear @ Right	[illegible]	[illegible]	[illegible]			[illegible]
Center Def.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Left Cant. Def.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Right Cant. Def.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cantilever Def. @	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Reaction @ Left	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
Reaction @ Right	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

Fb calc'd per Fb, [illegible], FC,Lt = Sc

Section Properties

[illegible]

Depth	[illegible]	Weight	[illegible]
Web Thick	[illegible]	Ix	[illegible]
Width	[illegible]	Sx	[illegible]
Flange Thick	[illegible]	Iy	[illegible]
Area	[illegible]	Sy	[illegible]
Rx	[illegible]	Rx/Ry	[illegible]
Values for LRFD Design		Ry/Rx	[illegible]
Z	[illegible]	Zx	[illegible]
Cw	[illegible]	Zy	[illegible]

Consultants/Associates
Las Vegas, NV
Tel
Fax

Title
Date
Job #
Designer
Description
Scale

Steel Beam Design

Page 1

Description North Trellis - 6'

General Information

Steel Section :

Span			
Left Cant			
Right Cant			
Unbraced Length			

Point Loads

Dead Load							
Live Load							
Short Term							
Location							

Summary

Using section, Span = , Fy = ksi
End Fixity = , Unbraced Length = , LDF =

	Actual	Allowable		
Moment				
% Bending Stress				
Shear				
% Shear Stress				

Force & Stress Summary

	Moment	Shear	Cb	Fb	Fv	Ft	Fc
Span M							
Span M							
Span M Left							
Span M Right							
Shear @ Left							
Shear @ Right							
Cantilever Left							
Left Cant End							
Right Cant End							
Cantilever Right							
Deflection @ Left							
Deflection @ Right							

Section Properties

Depth		Weight	
Web Thick			
Flange			
Flange Thick			
Area			
Ix			
Values for LRFD Design			
Zx			
Sx			

STRUCTURAL CALCULATIONS

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

Gravity Design – Vertical

Vertical Framing Key Plan
CMU - W1
CMU - W1
CMU - W3

Dekker/Perich/Sabatini

Project Name: NIVED STATION #53
Project Number: 07502.01
Subject: COLUMN DESIGN
By: ALB Date: 09/20/07
Checked: Date:
Page: 20

COLUMN DESIGN - COLUMN C1

LOADS:

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

LENGTH = 15'-0"

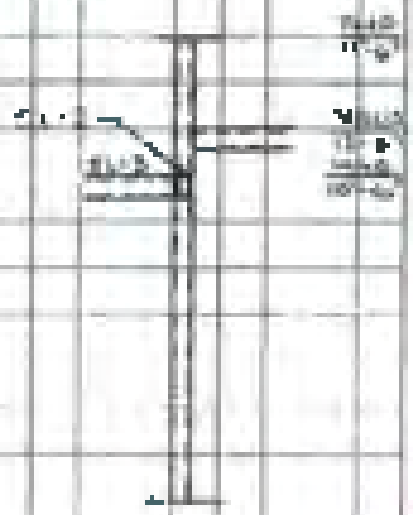
(SEE ENERCALC DESIGN)

USE HSS4x4x1/4 COLUMN

CANOPY - C2

SL-2 REACTIONS:

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



SL-3 REACTIONS:

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

CANOPY BEAM REACTIONS:

$P_{DL} = 810$ lbs
$P_{LL} = 2,010$ lbs

(SEE ENERCALC FOR DESIGN)

USE HSS4x4x1/4 COLUMN

Decker·Perich/Sabatini

Name: NWPO Station #53
Number: 03502-01
Subject: Column Design
By: AJB Date: 06/01/03
Checked: VS

CMU Column C3

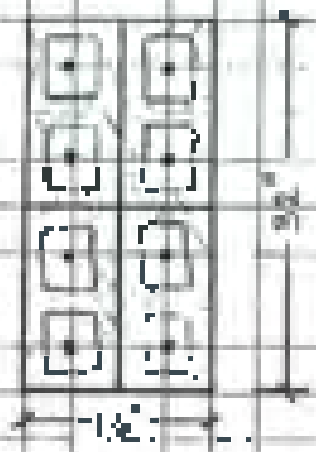
Loads:

$P_{DL} = 500$ lbs
$P_{LL} = 1,300$ lbs } From North Tower B2

Wind = 20 psf

(See Enercalc for Design)

USE 6" x 32" CMU Column w/ #5's & Ea Cell



[illegible]
[illegible] Suite 100
Las Vegas, NV [illegible]
Tel: [illegible]
Fax: [illegible]

[illegible]

Steel Column

Page 1

Description: Interior Column - C1

General Information

Case Ref: AISC 9th, AISC, 14th LRFD, 2005 IBC, 2006 NFPA [illegible]

Steel Section	[illegible]	Fy	[illegible] ksi	Axial Efficiency	Residual
		Compact Section	1.000	[illegible]	Approximate
Column Height	[illegible]	Beam Moment	[illegible]		
End Fixity	Pin-Pin	[illegible]	[illegible]	[illegible]	[illegible]
Use 8 Wheel Face Loads Conditional		[illegible]	[illegible]	[illegible]	[illegible]

Loading

Axial Load:

Dead Load	[illegible]	[illegible]	[illegible]
Live Load	[illegible]	[illegible]	[illegible]
Super Imposed Load	[illegible]		

Summary

Column Design OK

Section: [illegible], Height = [illegible], Axial Load: Dx = [illegible] Lx = [illegible] Ky = [illegible], Ex = [illegible]

Unbraced Length: Lx = [illegible], Ly = [illegible]

Compression Strength Factor	Dead	Live	DL + LL	[illegible]
AISC Allowable Kl/r	[illegible]	[illegible]	[illegible]	[illegible]
AISC Allowable Kl/r	[illegible]	[illegible]	[illegible]	[illegible]
AISC Average Kl/r				

[illegible]

[illegible]

Summary

Allowable & Actual Stresses	Dead	Live	DL + LL	DL + Wind
[illegible]	[illegible] ksi	[illegible] ksi	[illegible] ksi	[illegible] ksi
[illegible]	[illegible] ksi	[illegible] ksi	[illegible] ksi	[illegible] ksi
[illegible]	[illegible] ksi	[illegible] ksi	[illegible] ksi	[illegible] ksi
[illegible]	[illegible] ksi	[illegible] ksi	[illegible] ksi	[illegible] ksi
[illegible]	[illegible] ksi	[illegible] ksi	[illegible] ksi	[illegible] ksi
[illegible]	[illegible] ksi	[illegible] ksi	[illegible] ksi	[illegible] ksi

Analysis Values

[illegible]	[illegible] psi	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] psi	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] psi	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] psi	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Consulting Structural Engineers
[illegible]
Las Vegas, NV [illegible]
Tel. [illegible]
Fax. [illegible]

Title: [illegible]
Project: [illegible]
Subscriber:

Job # [illegible]
Date: [illegible]

Steel Column

Description: Interior Column - C1

Section Properties HSS4X4X3/16

Depth	[illegible] in	Weight	[illegible] plf	Values for LRFD Design	
Web thick.	[illegible] in	ro	[illegible] in	J	[illegible] in4
Width	[illegible] in	rp	[illegible] in	Cw	[illegible] in6
Flange Thick	[illegible] in	Sxp	[illegible] in3	Zx	[illegible] in3
Area	[illegible] in2	Syp	[illegible] in3	Zy	[illegible] in3
Ix	[illegible] in4	Rxp	[illegible] in		[illegible]
		Ryp	[illegible] in		

Section Type = HSS-Square

Sketch & Diagram

Steel Column

General Information

Loads

Summary

Stresses

Analysis Values

[illegible]
[illegible]
Las Vegas, [illegible]
Tel. [illegible]
Fax [illegible]

Title: [illegible]
Engineer: [illegible]
Description:
Scale: [illegible]
Date: [illegible]
Sheet: [illegible]

Description: Hanger Column - C2

Section Properties: HSS4X4X1/4

Depth	[illegible] in	Weight	[illegible]	Values for LRFD Design	
Web Thick	[illegible] in	Ix	[illegible]	J	[illegible]
Width	[illegible] in	Iy	[illegible]	Cw	[illegible]
Flange Thick	[illegible] in	Sx	[illegible]	Zx	[illegible]
Area	[illegible]	Sy	[illegible]	Zy	[illegible]
rg	[illegible] in	Rx	[illegible]		[illegible]
		Ry	[illegible]		

Section Type = HSS-Square

Sketch & Diagram

[illegible]

Masonry Column Design

Description [illegible]

General Information

Column Height	[illegible]	Fm	[illegible]	Seismic Factor	[illegible]
Width	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Depth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Column Area	[illegible]			[illegible]	[illegible]
Pedestal Size	[illegible]			[illegible]	
Bar Count Each Face	[illegible]				
[illegible]	[illegible]				
Pedestal Depth	[illegible]				

Applied Loads

Vertical Load		Lateral Load	
Dead Load	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Load Type	[illegible]
Load Type	[illegible]	[illegible]	[illegible]

Design Highlights

Allowable Base Pressure	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]			[illegible]	
[illegible]	[illegible]	[illegible]		[illegible]	
Max Allow Vertical with Axial Load	[illegible]				
Max Allow Axial Load with Moment	[illegible]				

Load Combinations & Stress Details Summary

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Top of Shaft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Base Stress & Top of Shaft					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Summary

Column Design OK

[illegible] Width = [illegible] Depth = [illegible] Using [illegible]

Max Bending + Axial Comp. Stress	[illegible]	psi
Allowable	[illegible]	OK
Max. Axial Only Compressive Stress	[illegible]	psi
Allowable	[illegible]	OK
Max Shear Bending Stress	[illegible]	psi
Allowable	[illegible]	OK

[redacted]

[redacted]

Masonry Column Design

[redacted]

Summary of Loads & Reactions

Vertical Loads...

[redacted]

Lateral Loads...

[redacted]

Combined Reactions:

[redacted]

Dekker/Perich/Sabatini

[redacted]

Project: MBFD Station #53
Job No.: 07501-01
Subject: Base Plates
By: AJB Date: 06/01/07
Chkd: Date:
Rev: VD

- **Base Plate A**

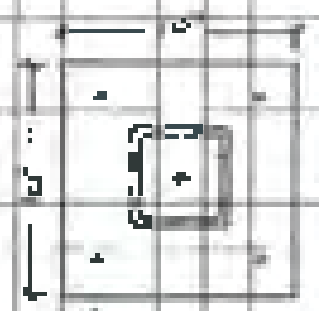
Axial Loads

$P = 8.9 + 8.42 = 17.32\,k$ (from Column C3)

$F_c = 4{,}500$ psi
$F_y = 36{,}000$ psi

(See Engecalc for Design)

Use 8"x10"x¾" Base Plate



Base Plate A

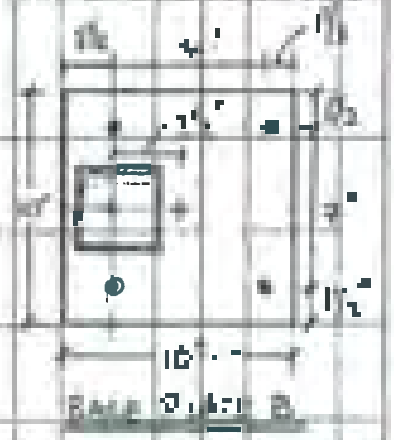
- **Base Plate B**

$P = 17.32\,k$ (same as BP.A)

$F_c = 4{,}500$ psi
$F_y = 36{,}000$ psi

(Same as A different Geometry)

Use 8"x10"x¾" Base Plate



Base Plate B

Dekker/Perich/Sabatini

[redacted]

Project: HUMB S ATION # 53
Project No.: 07502-01
Subject: BASE PLATES
By: [illegible] Date: [illegible]
Checked: [illegible] Date: [illegible]
Sheet: [illegible]

BASE PLATE C

AXIAL LOADS:

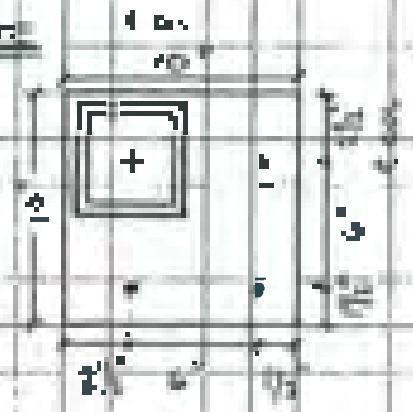
$P = 3.764 + 4.67 = 8.43$ K (SEE CALCULATION C2)

$f'_c = 4{,}500$ psi

$E_c = 36{,}000$ psi

(SAME AS A DIFFERENT GEOMETRY)

USE 10"x10" x ¼" BASE PLATE



[illegible]
[illegible]
[illegible]
Tel. [illegible]
Fax. [illegible]

[illegible]

Steel Column Base Plate

Description: Base Plate A

General Information

Loads

[illegible]

Plate Dimensions

[illegible]

Support Pier Size

[illegible]

Steel Section

[illegible]

Allowable Stresses

[illegible]

Anchor Bolt Data

[illegible]

Summary

[illegible]

Concrete Bearing Stress

[illegible]

Plate Bending Stress

[illegible]

Anchor Bolt Tension

[illegible]

Bettler/Perich/Salvatini

[redacted]

Project: NLVFD Station #33
Project No.: 07302.001
Subject: CMU Wall Design
By: ALB Date: 03/19/07
Sheet: Of:
Ref: WB

Wall Design - W1

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

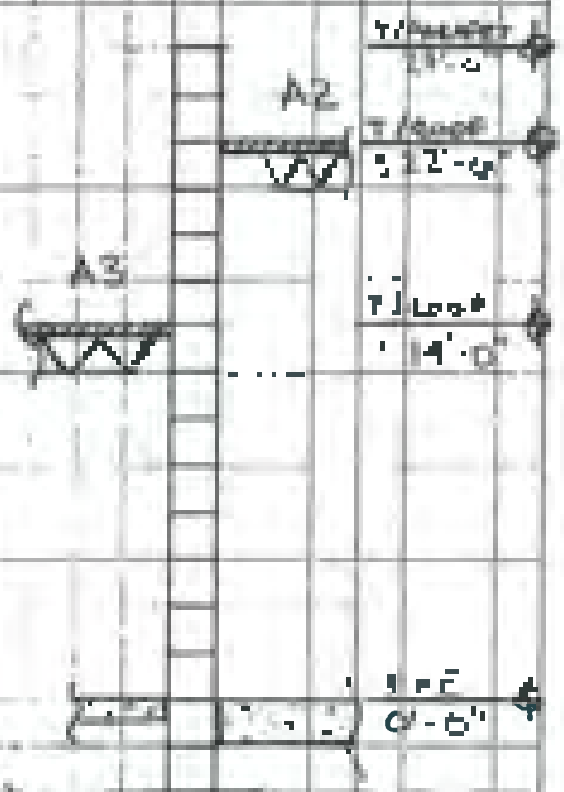
Tributary Area:

A2 = 35 ft

A3 = 10.75 ft

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

$W_{LL} = 915$ PLF



Seismic Factor = 0.409
(See Lateral Loads for Walls)

(See Enercalc for Gravity Design)

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

Dekker/Perich/Sabatini

Project: NIFD_Station #53
Project No.: 07502.01
Subject: CMU Wall Design
By: AJB Date: 03/30/07
Checked: Date:
Sheet: VM

CMU Wall - W2

$h_{unsp} = 8.33\,ft$

$H_{unsp} = 5\,ft$

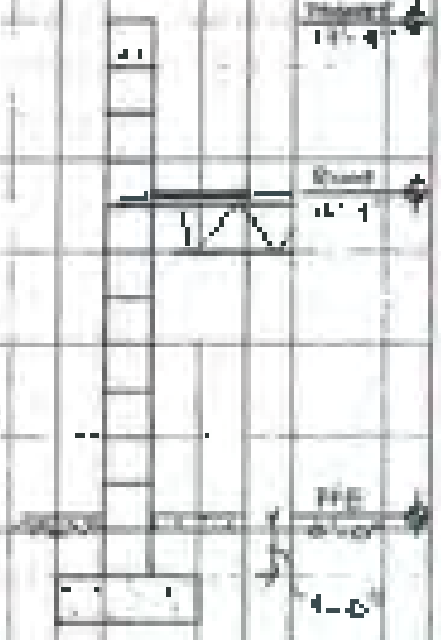
Loads:

$W_{DL} = 20\,psf \times 8.33\,ft = 200\,plf$

$W_{LL} = 20\,psf \times 8.33\,ft = 200\,plf$

(See Engineering Form Design)

8" CMU Wall w/ #5 @ 24" oc



Dekker/Perich/Sabatini

[redacted]

Project: NLVFD Station #53
Project No.: 07502.01
Subject: CMU Wall Design
By: AJB Date: 05/30/07
Checked: Date:
Sheet: 105 of

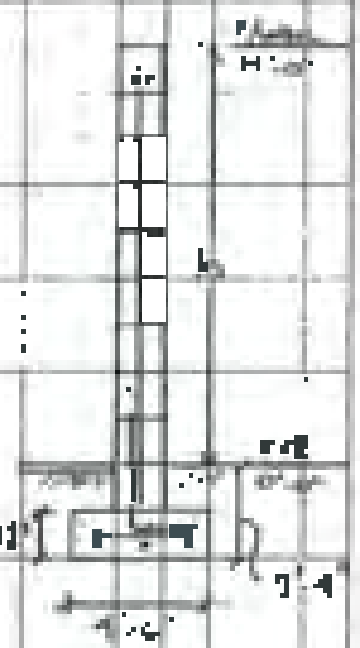
CMU Site Wall - W3

Soil Bearing Pressure = 2,000 psf
(5.2 ft × 100 pcf unfinished = 520 psf)
(Per Soils Report Allow. Increase Per Depth & Width of Footing)

P_a = 42 psf
P_p = 275 psf

Surcharge:
Ac Tank = 200 psf (Surcharge Pressure)
of Veh. = 20 psf (L.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

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

q_h = 18 psf
G = 0.85
C_f = 1.40 (Per Fig. 6-20)

Return Wall Reduces Force

$\Rightarrow P = q_h G C_f$ = 18 psf (0.85)(1.40)(0.95) = 19 psf

(SEE Engineering For Design)

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

Las Vegas, NV 89118

Masonry Wall Design

Description CMU Wall - W1

Overhead Information

Wall Height	[illegible]	Seismic Factor	[illegible]	Fm	[illegible] psi
Parapet Height	[illegible]	Cost of Bar [illegible]	[illegible]	Fs	[illegible] psi
		Dynamic Factor	1.00	Special Inspection	
Thickness	[illegible]	Wall [illegible]	[illegible]	Grout @ Rebar Only	
Wall Bars	[illegible]			Normal Weight Block	
Rebar Spacing	[illegible]			Equivalent	
Cover to Rebar	[illegible] @ Center			Solid Thickness	[illegible]

Loads

Uniform Loads		Concentrated Roof Load		Wind Load	[illegible] psf
Dead Load	[illegible]	Dead Load	[illegible]		
Live Load	[illegible]	Live Load	[illegible]		
Load Eccentricity	[illegible]	Wall Load			
Roof Load					

Design Values

f	[illegible] psi	Rebar Area	[illegible]	n	[illegible]		[illegible]
[illegible]	[illegible]	Rebar d Dynamic	[illegible]	r	[illegible]	[illegible]	[illegible]
Wall Weight	[illegible] psf	Moment of Inertia	[illegible]				

[illegible] Bending Moment [illegible] [illegible] psi

Load Combinations & Stress Details Summary

	Applied	Axial Load	Bending Moment Max	Bending Moment Allowable	Axial Compressive
Top of Wall	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bottom Bars & Top of Wall					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Summary

[illegible] 6.00ft parapet, Normal Block, [illegible] wall w/ #5 bars at 24.00in c. at center

Max Bending Compressive Stress	[illegible]	Ok
Allowable	[illegible]	Ok
Max Axial Only Compressive Stress	[illegible]	psi
Allowable	[illegible]	Ok
Max Shear Bending Stress	[illegible]	psi
Allowable	[illegible]	Ok

[illegible]
[illegible] Suite [illegible]
Las Vegas, NV [illegible]
Tel. [illegible]
Fax. [illegible]

[illegible]
Designer [illegible]
Calculations [illegible]
Date [illegible]

Checked [illegible]

Masonry Wall Design

Page [illegible]

Description [illegible]

Final Loads & Moments

Wall Weight [illegible]	[illegible]	[illegible]	[illegible]
Roof Load Reaction @ Top of Wall	[illegible]		
Floor Load Reaction @ Mid Ht	[illegible]	Total Dead Load	[illegible]
		Total Live Load	[illegible]
Max Load Moment @ Top of Wall	[illegible]		
Max Load Moment @ Mid Ht	[illegible]		
Maximum Value Allowable for Applied Axial Load =		[illegible]	
Maximum Value Allowable Load for Applied Moment =		[illegible]	

Masonry Wall Design

Page 1

General Information

Loads

Design Values

Load Combination & Stress Details Summary

Summary

[illegible]
[illegible]
Los Angeles, [illegible]
Tel. [illegible]
Fax. [illegible]

[illegible]

[illegible]

Temporary Wall Design

Page [illegible]

Description: CMU Wall - W2

[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]	[illegible]	[illegible]			

Dekker/Perich/Sabatini

Project Name: NLVFD Station #58
Project Number: 09502-01
Subject: CMU Wall Design
By: AJB Date: 10/27/01
Checked: Date:
Sheet: of

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 = 100 psf (General Pad)
  At heel = 20 psf (LL)

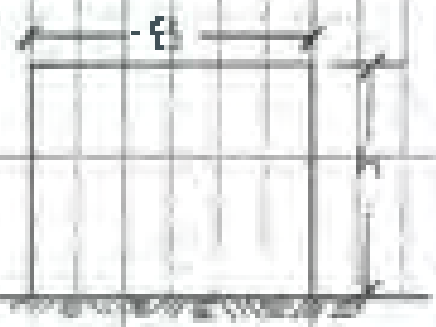
f'_c = 4,500 psi
f'_m = 1,500 psi
f_y = 60,000 psi

- Lateral Loads:

* ASCE 7-05, Sect. 6.5.14

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

B = 36.67 ft
h = 14 ft



B/h = 2.6

$\frac{s}{h}$ = 1.0

Dekker/Perich/Sabatini

Project: HLVFD Station #53
Project No.: 99302-01
Subject: CMU Wall Design
By: AHE Date: 10/29/99
Checked: Date:
Page: 1/4

* PER TABLE 6-20

FOR CASE A & B: $C_f = 1.9$

FOR CASE C:

			Reduction (0.8 - S/h)	
Region 0-3	$C_f = 2.39$	→	$\boxed{1.911}$	CONTROLS
3-23	$C_f = 1.58$	→	1.26	

* PER NOTE 1. FOR CASE C w/ S/h = 0.8, C_f SHALL BE MULTIPLIED BY THE REDUCTION FACTOR [(1.3 - S/h) = 1.3 - 0.8]

q_n = 10.9 psf WINDWARD, −12.1 psf LEEWARD (FIG. 6-5) CONF. & GLAZING

G = 0.85 (SECT. 6.5.8)

P = 12.1 psf (0.85)(1.91) = 19.69 psf

(USE ENVELOPE FOR DESIGN)

— SHEAR REINFORCEMENT:

V = 19.90 psf × (36.69 ft × 19 ft) = 9,087#

$f_v = \frac{V}{bd} = \frac{9{,}087 \text{ lbs}}{(7.625 \times 128 \text{ in})} = 2.78$ psi

ON INSPECTION THE SHEAR REINFORCEMENT IS ADEQUATE

A_n (min) = 0.0007 (7.625)(12"/ft) = 0.066 in²/ft

Netter-Perich/Tabatini

MUTD STATION #53
07502-01
CMU WALL DESIGN
AHB 10/19/07
1/22

$A_{(DUR\text{-}O\text{-}WAL)} = 0.069 \frac{in^2}{FT} \times \frac{12''}{16'' oc} = 0.05175 \frac{in^2}{FT}$

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

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

USE 8" CMU WALL w/ #5 @ 8" oc. (VERT) FULLY GROUTED AND HORIZONTAL REINF. OF 3/16" HEAVY DUR-O-WAL TRUSS @ 16" oc. w/ 2 #5's @ 48" oc BOND BEAMS.

[redacted]

Cantilevered Retaining Wall Design

Page 1

Description: CMU Wall - W3 (Generator Pad)

Criteria

Soil Data

Footing Strengths & Dimensions

Surcharge Loads

Design Summary

Stem Construction

Footing Design Results

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

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

Code Ref: [illegible]

Cantilevered Retaining Wall Design

Description CMRF Wall - W3 (Generator Pad)

Summary of Overturning & Resisting Forces & Moments

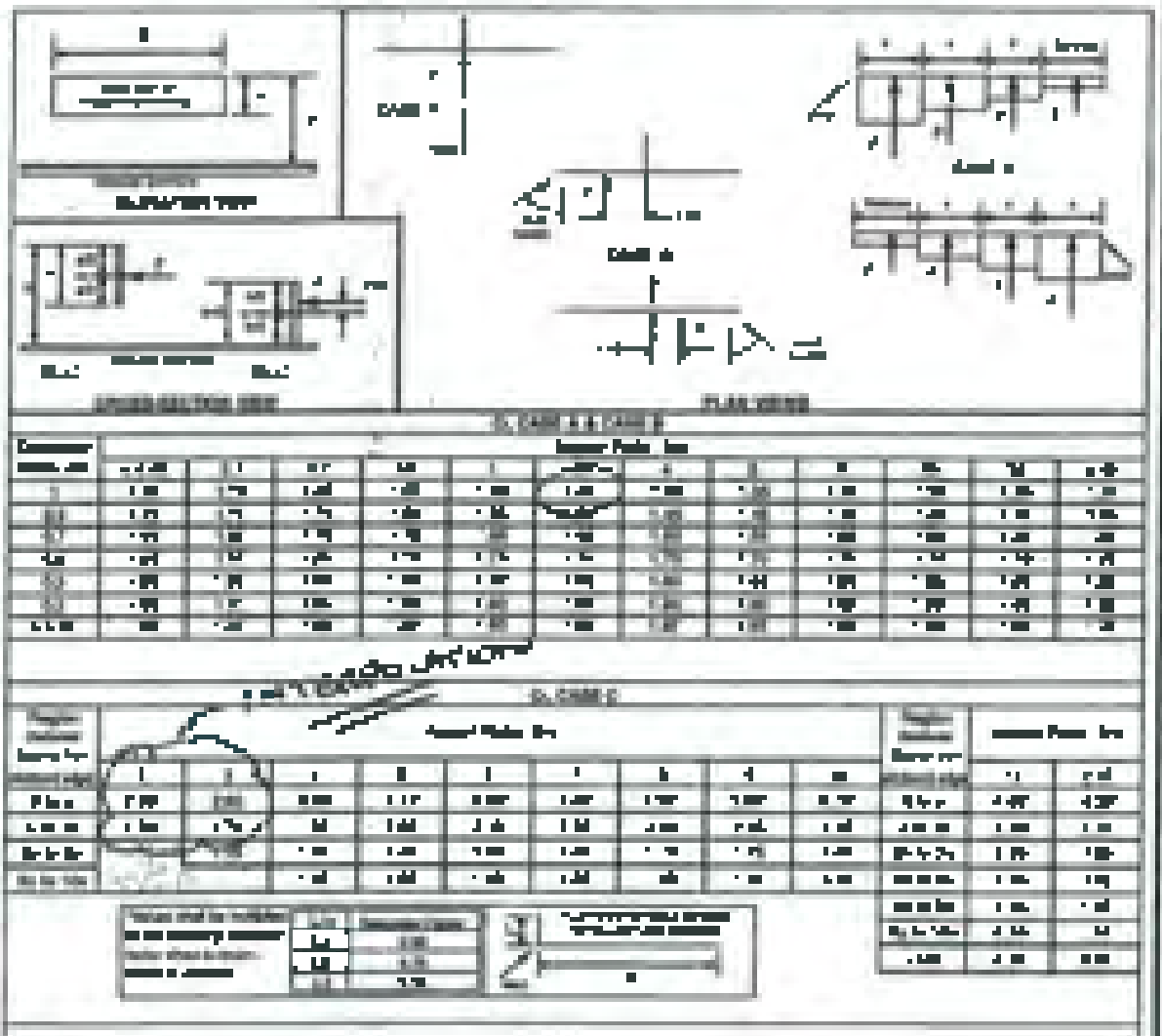
Item		Force lb	Overturning Distance ft	Moment ft-lb
[illegible]	=	[illegible]	[illegible]	[illegible]
Free Active Pressure	=			
Surcharge Over Toe	=		[illegible]	
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above Soil	=	[illegible]	[illegible]	[illegible]
Deferred load	=			
Total	=	[illegible]	[illegible]	[illegible]

Overturning/Overturning Ratio = [illegible]

Vertical Loads used for Soil Pressure = [illegible] lb

Vertical component of active pressure used for soil pressure

Item		Force lb	Resisting Distance ft	Moment ft-lb
Soil Over Toe	=	[illegible]	[illegible]	[illegible]
Reduced Soil Over Heel	=			
Surcharge Over Heel	=	[illegible]	[illegible]	[illegible]
Adjacent Footing Load	=			
Added Vertical Load @ Stem	=		[illegible]	
Soil Over Toe	=	[illegible]	[illegible]	[illegible]
Surcharge Over Toe	=	[illegible]	[illegible]	[illegible]
Stem Weight(s)	=	[illegible]	[illegible]	[illegible]
Earth @ Stem Transitions	=			
Footing Weight	=	[illegible]	[illegible]	[illegible]
Key Weight	=		[illegible]	
Wall Component	=	[illegible]	[illegible]	[illegible]
Total	=	[illegible] lb	[illegible] ft	[illegible]



Net Design Wind Pressures, [illegible]

	Zones	Effective Area (sq ft)	Basic Wind Speed V (mph)											
			85		90		100		105		110		120	
Roof Slope 7 degrees	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Roof Slope 7 to 45 degrees	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3	[illegible]	[illegible]	[illegible]	-34.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Roof Slope 45 degrees	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1	[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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Note: [illegible]

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

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

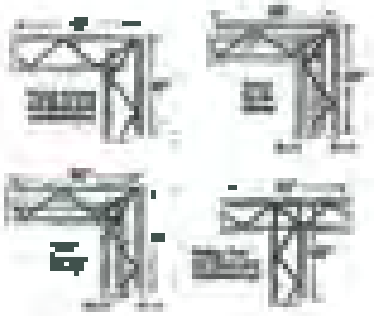
[illegible]

[illegible]

See DUR-O-WAL publications for more detailed information: "Reinforcing Masonry Walls with Joint Reinforcement, A Design Aid" Bulletin 65-7; "Building Reinforced Masonry Walls with Joint Reinforcement" Bulletin 65-12R and for information for the use of DUR-O-WAL in masonry horizontal bonding see "DUR-O-WAL Masonry Reinforcement in High-Rise, Bearing Wall Buildings" Bulletin 74-5.

Prefabricated Corners and Tees

A complete line of prefabricated corner and tee units are available in all design types and finishes. A mechanical or designed corner can be made or custom other using Trimrod or Double Spotlight type.



Calculation Method

By supplying the amount of steel supplied by DUR-O-WAL, have you the following formula:

Area of Steel × [illegible] = [illegible]

Example:

The area supplied by [illegible]

[illegible]

This is less than that required [illegible]

[illegible]

[illegible]

Warranty

Seller makes no warranty of any kind, express or implied, except that the goods will conform to the specifications and be of the standard quality of seller and buyer assumes all risk and liability resulting from the use of the goods, whether used singly or in combination 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.

[illegible]

DUR-O-WAL [illegible]

Dekker/Perich/Sabatini

Project: MLVFD Station #53
Project No.: 07502-01
Subject: Stud Wall Design
By: LMB Date: 05/04/07
Checked: VDF

Stud Wall - W1

- Joist Bearing Studs

$P_w = 5\ psf$

$P_{DL} = \left(\frac{28'-9" + 31'-0}{2}\right) \times 6'-0" \times 10\ psf = 3,585\ lbs$ (tributary)

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

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

$P_{allow} = 3,300\ lbs/stud$ (Interpolate SSMA Table)

USE (3) 600S162-43 @ Joist Bearing

$w/P_{allow} = 3 \times 3300 = 9,900\ lbs > 7,170\ lbs$: OK

- Field Studs:

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

$S = 16"\ oc$

Limiting Wall Height $= 28'-9"\ (\frac{3}{600}) > 14'-7\frac{1}{2}"$: OK

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

$P = (29.875\ in)(10\ psf)(16/12\ in) = 1,593\ lbs < P_a$: OK

USE 600S162-43 @ 16" oc Stud Wall

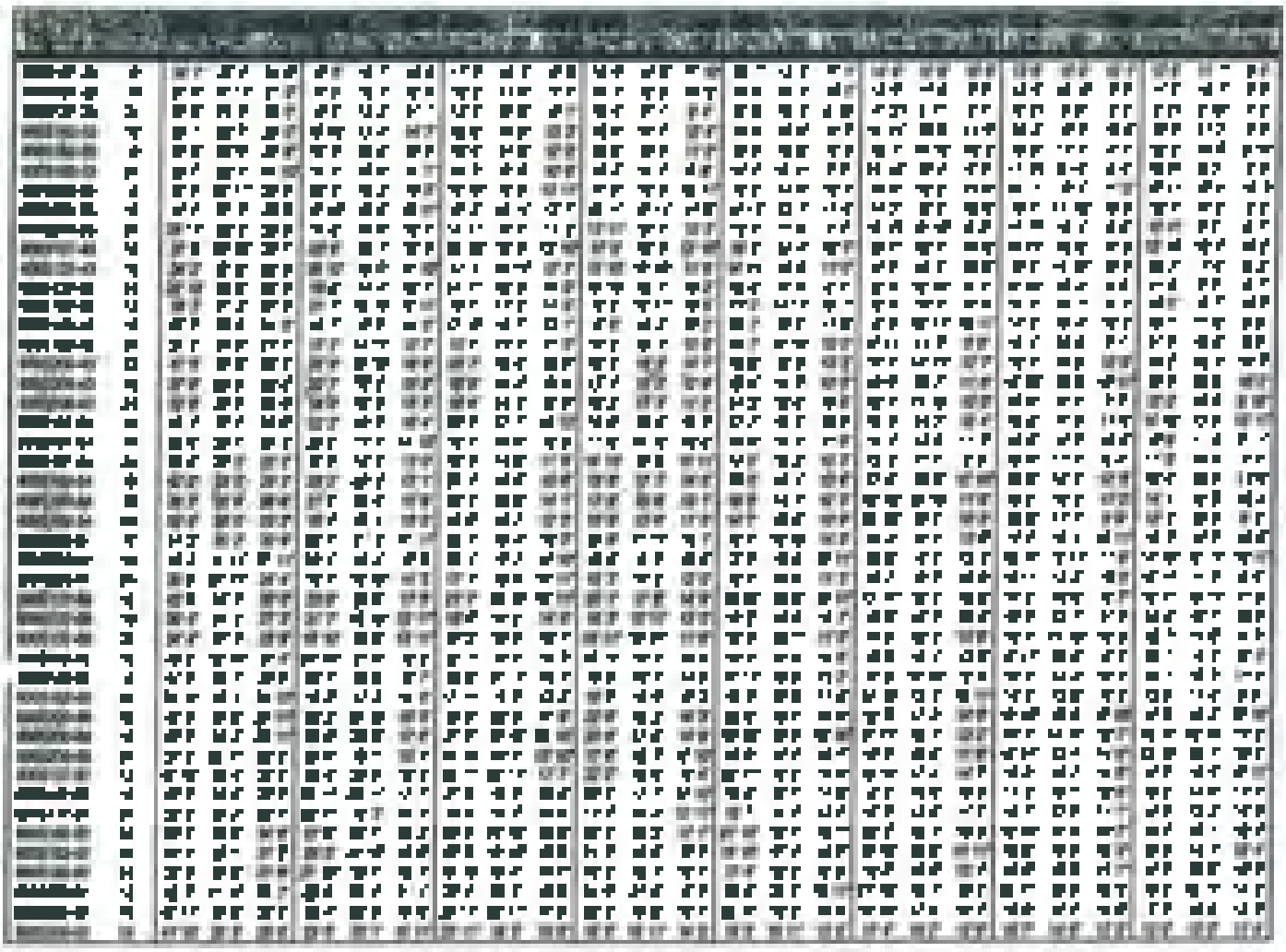
Combined Axial and Lateral Load Tables

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)

↳ NEGATIVE PRESSURE @ WALL

$P_{NET} = 1.21(1.0)(1.5)(12.1\ psf) = \underline{21.96\ PSF}$

$P_{DL} = \left(\frac{28'-9'}{2}\right) \times 6\ PSF \times 20\ PSF = 1,725\ \#$

$P_{LL} =$ " $= \underline{1,725\ \#}$

$P_{TOTAL} = 3,450\ \#$

$H = 14'-6''$

$P_{ALLOW} = 2,600\ lbs/STUD$ (FROM SSMA TABLES)

USE $\underline{(2)\ 600S162-43}$ @ JOIST BEARING

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

Becker/Parich/Sabatini

Project: NLVFD Station #63
Project No.: 078502-01
Subject: Stud Wall Design
By: AJB Date: 10/30/07
Checked: Sheet:
For: V33

- Field Studs:

H = 14.5 ft
S = 16" o.c.

Limiting Height = 17'-10" (5/6) > 14.5 ft ∴ ok

P = (14.395 ft)(40 psf)(16" o.c. / 12 in/ft) = 767 lbs
↳ DL + LL

P_{allow} = 2,600 lbs >> 767 # ∴ ok

∴ Check Parapet:

$w = 2.196 \text{ psf} \times \frac{1 \text{ ft}^2}{144 \text{ in}^2} \times 16" \text{ o.c.} = 2.44 \text{ lb/in}$

$M = \frac{(2.44 \text{ lb/in})(90 \text{ in})^2}{2} = 9,882 \text{ lb-in}$

M_a = 16.68 k-in > M ∴ ok

- Check Deflection:

$EI = 6.716 \times 10^7 \text{ lb-in}^2$

$w = 2.44 \text{ lb/in}$

$\Delta = \frac{wl^4}{8EI} = \frac{(2.44 \text{ lb/in})(90 \text{ in})^4}{8 \times 6.716 \times 10^7 \text{ lb-in}^2} = 0.298 \text{ in}$

$\Delta \leq \frac{l}{201}$ ∴ ok

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

Net Design Wind Pressures, Zone (psf) [illegible]

	Zone	Effective Area (sq ft)	Basic Wind Speed V (mph)											
			85		90		100		105		110		120	
Walls & Parapets	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Roof Overhangs	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Roof	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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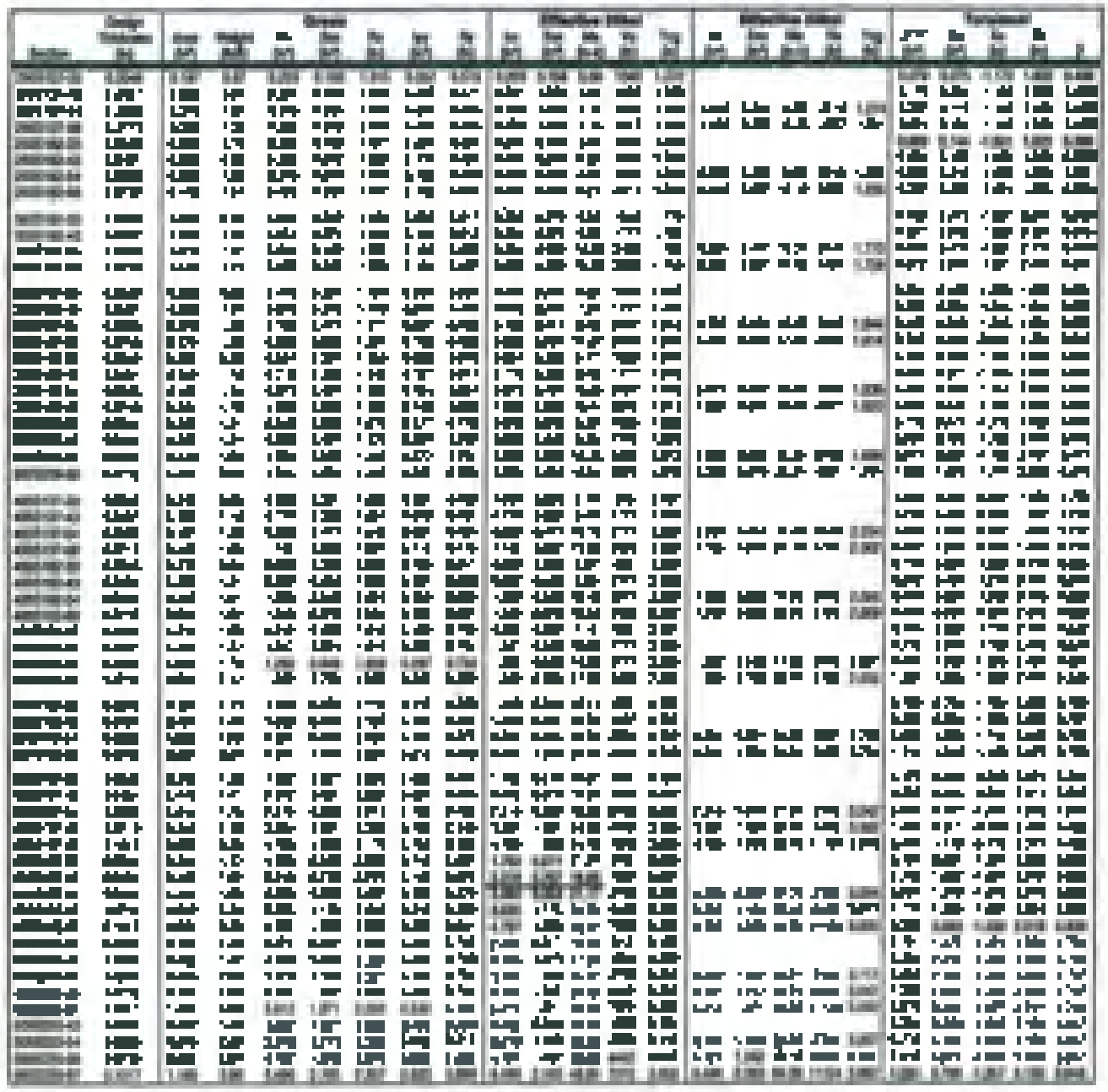
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

v3r

Structural (S) Stud Section Properties



[illegible]

Limiting Wall Heights — Curtain Wall

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

[illegible]

[illegible]

Combined Axial and Lateral Load Tables

20 psf Lateral Load

20 psf Lateral Load

20 psf Lateral Load

STUD WALL - W3

- NON-BEARING STUDS

* PER ASCE 7-05 SECTION 13.3.1

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

WHERE:

$a_p = 1.0$, $R_p = 2.5$ } PER TABLE 13.5

$S_{DS} = 0.681$

$I_p = 1.5$

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

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

$F_p = 5.44\ psf$

⇒ USE WIND SINCE IT'S MORE CONSERVATIVE

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

- LOADS:

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

$P_{LL} = 80\ lbs$

- $M = Pa = 160\ lbs \times \frac{3\,in}{12\,in/ft} = 40\ lb\text{-}ft$

Los Vegas, NV 89119
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Single Span Beam Analysis

Non Bearing Stud Wall - W3

General Information

Center Span	15 00 ft	Moment of Inertia	7.14 in4
Left Cantilever	0 ft	Elastic Modulus	29,000 ksi
Right Cantilever	0.00 ft	Beam Fixed/Fixity	Pin Pin

Uniform Loads

On Center Span...		On Left Cantilever...		On Right Cantilever...	
0 1	0.000 kif	0 1	0 kif	0 1	0.000 kif

Moments

Magnitude	0.00 in-k	0 in-k	0 in-k	0 in-k
Location	13.500 ft	0 ft	0 ft	0 ft

Query Values

Center Location	0.000 ft	Left Cant	0.000 ft	Right Cant	0.000 ft
Moment	-0.00 in-k		0.00 in-k		-0.00 in-k
Shear	-0.000 k		0.000 k		-0.000 k
Deflection	0.00000 in		0.00000 in		0.00000 in

Summary

Maximums				Shears		Reactions	
Max + @ Center	0.00 in-k	at	0.00 ft	@ Left	0.00 k	@ Left	0.00 k
Max - @ Center	-0.00 in-k	at	13.50 ft	@ Right	0.00 k	@ Right	0.00 k
@ Left Cant	0.00 in-k			Maximum	0.00 k		
@ Right Cant	-0.00 in-k			Deflections			
				@ Center	0.000 in	at	11.00 ft
Maximum =	0.00 in-k			@ Left Cant	0.000 in	at	0.00 ft
				@ Right Cant	0.000 in	at	20.00 ft

[illegible]
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Las Vegas, NV [illegible]
Tel [illegible]
Fax [illegible]

Title [illegible]
Engr [illegible]
Description

Date [illegible]

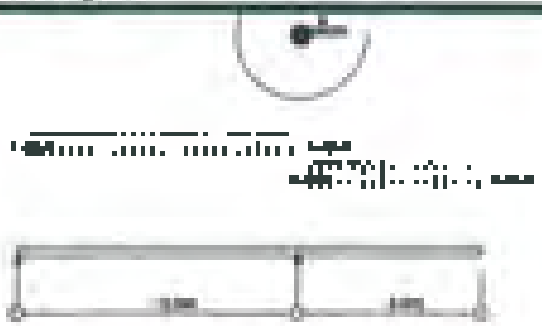
Sheet [illegible]

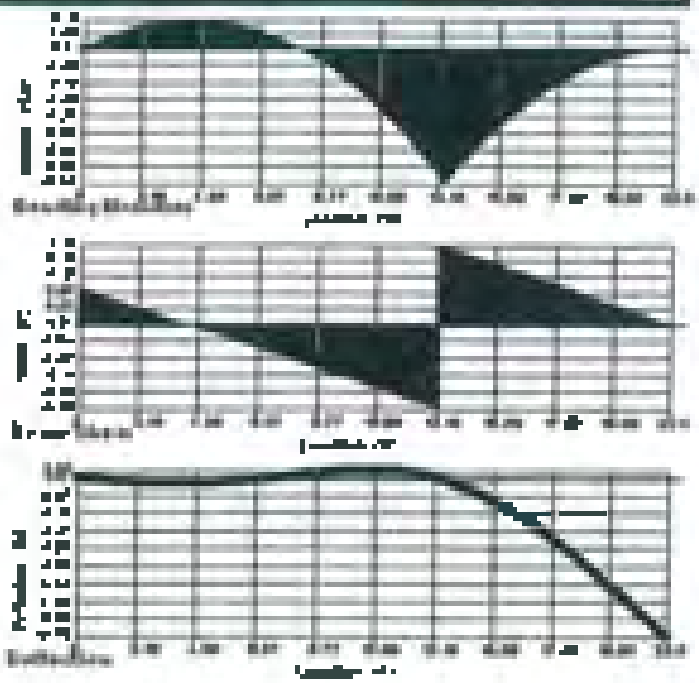
Single Span Beam Analysis

Page 1

Description: Non Bearing Sand Wall - [illegible]

Sketch & Diagram





Hekker/Parick/Sabatini

[redacted]

Project: 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

$P_{WIND} = 19.81$ psf ≈ 15 psf

$P_{DL} = (3\ ft)(20\ psf)(15/12\ in) = 80\ \#$

$P_{LIVE} = 80\ \#$

$P_{TOTAL} = 160$ lbs

H = 22'-0"

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

∴ Double Studs 6" below Roof Line

- Check Parapet & Roof Line:

$w = 15\ psf\ (12''/12\ in) + 20\ plf\ (1.67\ ft)$

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

$= 9.02\ k\text{-}in$

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

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

- Check Deflection:

$\Delta = \frac{wl^4}{8EI} = \frac{(1.67\ ft/in)(104\ in)^4}{8(\underbrace{6.9\ lb \times 10^6\ lb/in^2}_{\text{stud}})} = 0.36\ in \Rightarrow \frac{l}{289} \therefore$ OK

Baker/Pomeroy/Sabatini

Project: NLVFC Station #53
Job No.: 375021.01
Subject: Stud Wall Design
By: AMB Date: 05/09/01
Chk'd: Date:
Sheet: W4

Stud Wall - W4

- Non Bearing Studs

$P_{wind} = 14.51$ psf $\pm$ 15 psf

$P = 60$ lbs (Same as W3)

$H = 19'-0"$

Limiting Height = 19'-9" > H ∴ OK

Use 600S162-43 @ 16" oc

Dekker/Perich/Sabatini

PROJ. NUVFD STATION #53
PROJ. NO. 07502.01
SUBJ. MASONRY PILASTERS
BY A-CB DATE 11/30/07
CHKD. _____ DATE _____
SHT. V-4

MASONRY PILASTERS

MP-1 (APPARATUS BAY DOORS)

$P_{DL} = 1330$ PLF $\times$ 13.33 FT = 17,729 lbs

$P_{LL} = 600$ PLF $\times$ 13.33 FT = 800 lbs

* LOADS FROM HEADER DESIGN

(SEE ENGINEERING DESIGN)

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

MP-2

$P_{DL} = 1,900$ lbs
$P_{LL} = 1,350$ lbs } FROM 34 REACTIONS

(SEE ENGINEERING DESIGN)

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

Becker/Perich/Sabatini

[redacted]

Project: FLOYD STATION #53
Project No.: 02501.01
Subject: MASONRY PILASTERS
By: A.B. Date: 05/30/07
Page: 1 of 4

MP-3 (HOSE ALCOVE)

- REACTIONS FROM ML-3:

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

$P_{LL} = \frac{900 \text{ plf} \cdot 16 \text{ ft}}{2} = 5,600 \text{ lbs}$

- REACTIONS FROM ML-4:

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

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

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") x 8" MASONRY PILASTER w/ #5 CENTERED IN EA. CELL (FULLY GROUTED)

Dunham/Francis/Bakewell
[illegible]
Los Angeles, [illegible]
Tel: [illegible]
Fax: [illegible]

Title: [illegible]
Project: [illegible]
Subject:
Date: [illegible]
Sheet: [illegible]

Masonry Flush Wall Pilaster/Column

Page: [illegible]

Description: MP-1

General Information

Wall Height	[illegible]	Beam Type	[illegible]	Fm	[illegible] psi
Pilaster Spacing	[illegible]	Beam Flange Width	[illegible]	Fy	[illegible] ksi
Pilaster Width	[illegible]	Column Width	[illegible]	[illegible]	[illegible]
Pilaster Spacing	[illegible]		[illegible]	Special Inspection	
Pilaster Location	Center	Concrete Strength (psi)	[illegible]	Bolted Connection	
				[illegible]	[illegible]
Masonry Factor	[illegible]	Lateral Consolidation Factor	[illegible]	[illegible]	[illegible]
Seismic Zone	[illegible]	[illegible]	[illegible]		

Applied Loads

Uniform Loads		Girder Load	
Dead Load	[illegible] psf	Dead Load	[illegible] lbs
Live Load	[illegible] psf	Live Load	[illegible] lbs
Height	[illegible] ft	Eccentricity	[illegible] in
Wall Type	Floor	Girder Type	Beam
Wind Load	[illegible] psf		

Design Values

Allow Brg. Stress	[illegible] psi	Pilaster Area	[illegible] in2
Allow Bend Stress	[illegible] psi	Pilaster Depth	[illegible] in
Reduction Factor	[illegible]	Area Moment	[illegible] in4
Allow Masonry Bending	[illegible] psi	[illegible]	[illegible]
Bearing Length Required	[illegible]	Modulus of Elasticity	[illegible] psi
Max. Bend Load with Minimum	[illegible] lbs	Moment of Inertia	[illegible] in4

Load Combinations & Stress Checks

	Magnitude	Axial			
Top of wall	[illegible]	[illegible]			
DL + LL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max. Bend & Top of wall					
DL + LL + Wind	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DL + LL + Seismic	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Assumed Bearing Area	[illegible]		Footing Bearing Length		[illegible]

Summary

Pilaster Design OK

[illegible] DL[illegible] high [illegible] 2 Dim thick wall [illegible] @ [illegible] OOW [illegible] C [illegible] Dowel, Special Inspection, Good Soil[illegible]

Max. Bending + Axial Comp. Stress	[illegible]	psi
Allowable	[illegible]	psi
Max. Axial Only (Compressive) Stress	[illegible]	psi
Allowable	[illegible]	psi
Max. Bend Bending Stress	[illegible]	psi
Allowable	[illegible]	psi

Summary of Loads & Moments

Girder + Uniform Dead Loads	[illegible] lbs			Shear	Moment
Girder + Uniform Live Loads	[illegible] lbs	Girder DL Increment		[illegible]	[illegible]
Axial Dropped @ wall height	[illegible] lbs	Girder LL Increment		[illegible]	[illegible]
Dx Moment @ wall height	[illegible]	Total Moment @ Wall			[illegible]
Dy Moment @ wall height	[illegible]	Footing Moment @ Wall			[illegible]

Dustin Porter Enterprises
[illegible] Suite 104
Las Vegas, NV [illegible]
Tel [illegible]
Fax 702-436-1899

Date [illegible]
Project [illegible]
Description
Sheet

Job [illegible]
Date [illegible]

Page 1

Masonry Flush Wall Pilaster/Column

Description MP-2

General Information

Wall Height	[illegible] ft	Mortar Type	Normal (M)	Fm	[illegible] psi
Thickness	[illegible] in	Grouting Prism Width	[illegible] in	Fg	[illegible] psi
Pilaster Size	[illegible]	Column Width	[illegible] in	Cm = Fm / [illegible]	[illegible]
Pilaster Spacing	[illegible] in		Assume [illegible] Block	Special Inspection	
Pilaster Location	Center	Column Width Limit	[illegible] in	Solid Grouted	
				n	[illegible] psi
Seismic Zone	[illegible]	Legal Pilaster Center	[illegible]	r	[illegible]
Seismic Zone	2	Wind or Seismic	[illegible]		

Applied Loads

Uniform Loads		Axial Loads	
Dead Load	[illegible] plf	Dead Load	[illegible] lbs
Live Load	[illegible] plf	Live Load	[illegible] lbs
Eccentricity	[illegible] in	Eccentricity	[illegible] in
Wind Type	Field	Axial Type	Field
Wind Load	[illegible] psf		

Design Values

Allow Brg. Stress	[illegible] psi	Pilaster Area	[illegible] in²
Allow Axial Stress	[illegible] psi	Pilaster Depth	[illegible] in
Reduction Factor	[illegible]	Wall Weight	[illegible] psf
Allow Masonry Bending	[illegible] psi	Up	[illegible]
Max Allowable Moment w/o Axial Load	[illegible] in-kip	Radius of Gyration	[illegible] in
Max Axial Load w/o Moment	[illegible] kip	Moment of Inertia	[illegible] in⁴

Load Combinations & Stress Checks

	Moment	Axial			Axial Stress
Top of Wall	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DL + LL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wind Load & Top of Wall					
DL + LL + Wind	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DL + LL + Seismic	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Resultant Bending Line	[illegible] in		Point Bearing Length		[illegible] in

Summary

Pilaster Design OK

15 [illegible] high, 12 [illegible] thick w/ [illegible] @ [illegible] O.C. at center. Special Inspection, Solid Grouted

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

Summary of Loads & Moments

Girder + Uniform Dead Loads	[illegible] lbs		@ Top	@ Mid-Ht
Girder + Uniform Live Loads	[illegible] lbs	Girder DL Moments	[illegible]	[illegible] lb-ft
Wall weight @ mid height	[illegible] lbs	Girder LL Moments	[illegible]	[illegible] lb-ft
DL Moment @ mid-height	[illegible] lb-ft	Wind Moment @ mid-ht		[illegible] lb-ft
LL Moment @ mid-height	[illegible] lb-ft	Seismic Moment @ mid-ht		[illegible] lb-ft

[illegible]
[illegible], Suite 100
Las Vegas, NV 89118
Tel. [illegible]
Fax. [illegible]

Title [illegible]
Project [illegible]
Description
Made

Job # [illegible]
Date [illegible]

Page 1

Masonry Flush Wall Pilaster/Column

Description MP-3

General Information

Wall Height	[illegible] ft	Block Type	[illegible]	Fm	[illegible] psi
Thickness	[illegible] in	Reinforcing Place Width	[illegible] in	Fy	[illegible] ksi
Pilaster Width	[illegible]	Column Width	[illegible] in	[illegible]	[illegible]
Pilaster Reinforcing	[illegible] in		Spacing [illegible]	Reinforcing Arrangement	
Pilaster Location	Center	Column Width Used	[illegible] in	Bar Size Used	[illegible]
					[illegible] ksi
Seismic Region	[illegible]	Load Combination Factor	[illegible]		[illegible]
Seismic Zone	[illegible]	[illegible]	[illegible]		

Applied Loads

Uniform Loads		Point Loads	
Dead Load	[illegible] plf	Dead Load	[illegible] lbs
Live Load	[illegible] plf	Live Load	[illegible] lbs
Wind Load	[illegible] in	Eccentricity	[illegible] in
Load Type	[illegible]	Load Type	[illegible]
Wind Load	[illegible] psf		

Design Values

Allow. Bldg. Drift	[illegible] psi	Pilaster Area	[illegible] in2
Allow. Axial Stress	[illegible] psi	Pilaster Length	[illegible] in
Reduction Factor	[illegible]	Axial Strength	[illegible] psi
Axial Compressive Strength	[illegible] psi	[illegible]	[illegible]
Max. Allow. Moment w/o Axial Load	[illegible] in-lb	Radius of Gyration	[illegible] in
Max. Allow. Axial Load w/o Moment	[illegible] lbs	Moment of Inertia	[illegible] in4

Load Combinations & Stress Details

	Factor	Load			
Dead Load	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Live Load	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wind Load	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dl + Ll - Wind	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dl + Ll + Wind	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Accumulated Bearing Area [illegible] in2 — Avg. Effective Length [illegible] ft

Summary

Pilaster Design OK

10.00ft high, 12.00in thick wall [illegible] @ 8.00in c. [illegible] pilaster. Special inspection, [illegible]

Max. Bending + Axial Comp. Stress	[illegible] psi OK
Allowable	[illegible] psi OK
Max. Axial Only Compressive Stress	[illegible] psi
Allowable	[illegible] psi OK
Max. Shear Bearing Stress	[illegible] psi
Allowable	31,620.00 OK

Summary of Loads & Moments

Group = Uniform Dead Loads	[illegible] lbs		@ TOW	@ MID-HT
Group = Uniform Live Loads	[illegible] lbs	Group DL Moments	[illegible]	[illegible] lb-ft
Total Weight @ Mid-Height	[illegible] lbs	Group LL Moments	[illegible]	[illegible] lb-ft
DL Moments @ Mid-Height	[illegible] lb-ft	Total Moment @ Mid-Ht		[illegible] lb-ft
LL Moments @ Mid-Height	[illegible] lb-ft	Total DL Moment @ Mid-Ht		[illegible] lb-ft

ES REPORT™

ER-4943P

Revised September 1, 200[illegible]

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

Filing Category: DESIGN—Steel

DRAWING AND NONBEARING STEEL STUDS

STEEL STUD MANUFACTURERS ASSOCIATION
[illegible] SOUTH MICHIGAN AVENUE, SUITE [illegible]
CHICAGO, ILLINOIS [illegible]

ALLIED STUCCO
[illegible] NORTH 27TH AVENUE
PHOENIX, ARIZONA [illegible]

CEMCO
[illegible] SOUTH CORONA LANE
CITY OF INDUSTRY, CALIFORNIA [illegible]

CONSOLIDATED FASTENER CORP.
[illegible] AVENUE
PARAMOUNT, CALIFORNIA [illegible]

CONSOLIDATED INTERNAL, INC.
[illegible] DRIVE
COLUMBIA, SOUTH CAROLINA [illegible]

DEBAN SHAPE MASTER
[illegible] EAST [illegible]
SOUTH EL MONTE, CALIFORNIA [illegible]

DIETRICH INDUSTRIES, INC.
[illegible] PRESTON, SUITE [illegible]
PITTSBURGH, PENNSYLVANIA [illegible]

FAMOSA PAIL & STEEL STIFFENER
[illegible] SOUTH [illegible]
LA PUENTE, CALIFORNIA [illegible]

FORMER STEEL FRAMING STIFFENER
[illegible] SALEM-CALLAHAN HIGHWAY
SALEM, OREGON [illegible]

GRAND RAPIDS BUILDING MATERIALS, INC.
[illegible] WEST LONG CANYON DRIVE
PHOENIX, ARIZONA [illegible]

MARVCO CORPORATION
[illegible] EAST MAIN AVENUE
POST OFFICE BOX [illegible]
SPOKANE, WASHINGTON [illegible]

STEEL DEVELOPMENT LLC
[illegible] WEST BONANZA
LAS VEGAS, NEVADA [illegible]

UNIBOAT INCORPORATED
[illegible] NORTH SCOTT STREET
SCHILLER PARK, ILLINOIS [illegible]

UNITED METAL PRODUCTS, INC.
[illegible] NORTH SHERMAN AVENUE
CORONA, CALIFORNIA [illegible]

WESTERN METAL LATH AND STEEL FRAMING OF [illegible]
[illegible] GENERAL DRIVE
RIVERSIDE, CALIFORNIA [illegible]

1.0 SUBJECT

Drawing and nonbearing steel studs, joists and tracks.

2.0 DESCRIPTION

The design of the steel studs, joists and tracks described in this report complies with Section 221.1 of the 1997 Uniform Building Code™ (UBC); Section 2209 of the 2000 International Building Code® (IBC); Section 2209.1 of the 2000 Uniform Building Code™ (UBC); and Section 2209.1 of the 1999 Standard Building Code.

2.1 Scope

Punched steel stud and unpunched track are known as [illegible] in various depths and are made of the steel thicknesses indicated in Table 1.

Section properties, section properties, steel yield strength, etc., are set forth on pages 8 through 11 and pages 2 through 6 of the accompanying Steel Stud Manufacturers Association catalogs, "Product Technical Information," dated 1/01, and "Supplemental Product Technical Information," dated May 2001. Web crippling details and specifications with crippling loads are found on pages 36 through 41, and pages 4 and 5, of the accompanying catalogs.

2.2 Nonbearing Wall Heights

Allowable nonbearing wall heights for interior nonbearing wall assemblies are noted on pages 12 and 13 of the accompanying catalog dated 1/01. Allowable interior nonbearing wall heights, using the section properties of the stud, are noted on page 14 of the catalog. Allowable nonbearing wall heights for curtain walls are noted on pages 14 through 19 of the accompanying catalog.

2.3 Load-Bearing Wall Studs

Allowable stud sizes combined with gauge lists for various heights and stud spacings, based on deflection limiting at maximum of [illegible] mm (1/240 span) in order to avoid shaking in both axes for bearing stability, with the design

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Corresponding with Section C3.1 in the "Specification for the Design of Cold-Formed Steel Structural Members," 1996 edition, are noted on pages 30 through 33 of the accompanying catalog dated 1/01.

2.4 Joists

Allowable joist spans for vertical loads, joist spacings and span conditions are noted on pages 31 through 38 of the accompanying catalog dated 1/01.

2.5 Allowable Load Tables

Allowable spans for header combinations are noted on pages 31 and 34 of the accompanying catalog dated 1/01.

2.6 Ceiling Joist

Allowable ceiling spans for 4 psf, 5 psf and 10 psf (191 N/m², 239 N/m² and 479 N/m²) joist loading, L/240 and L/360 deflections, various spacings and span conditions are noted on pages 42 and 43 of the accompanying catalog dated 1/01.

2.7 Materials

2.7.1 Steel Members: Studs, joists and tracks are formed from steel having a minimum 50,000 psi (345 MPa) yield point (ASTM A653 Grade 33 or ASTM A792 Grade 33) for thicknesses of 0.0179 inch (0.45 mm) and thicker, and a minimum 33,000 psi (345 MPa) yield point (ASTM A653 Grade 33) for thicknesses of 0.0538 inch (0.4 mm) and thicker; through 0.1180 inch (1.9 mm) (3 mm).

2.7.2 Deflection Track: Deflection track conforms to ASTM C 955, with thicknesses of 1/2 inch (12.7 mm) and 1 inch (25.4 mm).

2.7.3 Steel Screws: No. 8 Type S, S-12 self-drilling CSK or PAN head screws conform to ASTM C 1002.

2.8 Frames and Details

The catalogs entitled "Product Technical Information," dated 1/01, 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 specialty report CD-ROM, under File 0843. Only the items described in Table 3 for the catalog dated 1/01 are part of this report. The entire catalog dated May 2001 is part of this report.

Structural properties for the adjustable connection of studs are noted on pages 4 through 11 of the catalog dated 1/01, and pages 2 through 5 of the catalog dated May 2001, and included in Procedure 1 for deflection determination as the allowable moment limit.

Allowable axial loads noted on pages 14 through 19 of the catalog dated 1/01 are based on the following considerations:

- The tabulated partition heights are based on flexure, deflection and shear strength governing.
- Allowable axial loads (LRFD) based on flexure, deflection and shear strength governing the tabulated partition heights are based on the provisions for cold-forming allowable compression loads (LRFD) contained in "Cold-Formed Steel Design Manual" (Table 3-18) (Weight from table 6-1).
- Heights are based on load combinations of a minimum deflection of L/240 from the weight of building and the above wind loads.

Pages 41 and 42 of the catalog dated 1/01 are not recognized as part of this report.

2.9 Identification

Each stud is identified with the manufacturer's name, steel strength (33 ksi), 33 ksi (228 MPa), thickness, manufacturer's designation, and the ICBO ES report number (evaluation or validation) on the web of each member at a maximum of 48 inches (1219 mm) on center.

3.0 INSTALLATION INSTRUCTIONS

Installation details, and fire rating, engineering calculations, wind and seismic connection load tables and approved product technical information, in accordance with the ICBO ES Acceptance Criteria for Steel Studs, Joists and Frames (AC046), dated January 2001.

4.0 FINDINGS

That the Steel Stud Manufacturers Association Framing and Hardware Steel Studs, Joists and Frames 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:

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

4.2 Allowable heights and buildings comply with the attachments noted.

4.3 Unbalanced installations must substantiate all load bearing members are delivered to the jobsite shall be at least 75 percent of the attachments weight in storage.

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

4.5 The studs are manufactured in the facilities listed in Table 1.

4.6 Stud manufacturer and installers, including from allowable heights and loads, are noted in the accompanying tables. Studs are installed with the wind bracing before noted in the accompanying catalog.

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

TABLE 1 – [illegible]

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

[illegible]

TABLE 2 – [illegible]

Company	Manufacturing Facility
[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]	[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]	[illegible]
[illegible]	[illegible]

ES REPORT™ SUPPLEMENT 1

Revised September 1, 2004

ICC-ES Evaluation Services, Inc. • 5360 Workman Mill Road, Whittier, California 90601 • (562) 699-0543 • www.icc-es.org

Filing Category: 09 04 00—Metal

DRAWING AND NONBEARING STEEL STUDS, JOISTS AND TRACKS

STEEL STUD MANUFACTURERS ASSOCIATION
9 SOUTH WACKER DRIVE, SUITE 1500
CHICAGO, ILLINOIS 60606

1.0 SUBJECT

Drawing and Nonbearing Steel Studs, Joists and Tracks
Revised October • 2002 1

Add the following two additional lines:

Custom Stud, Inc.
5175 Highview Avenue
Louisville, Kentucky 40241

Dragon Inc
10001 South Lower King Rd N. South
Seattle, Washington 98178

2.0 DESCRIPTION

No change

3.0 EVIDENCE SUBMITTED

No change

4.0 FINDINGS

Then the changes noted herein comply with the 1997 Uniform Building Code™, the 2003 International Building Code®, and the 2003 International Residential Code®, subject to the following conditions:

4.1 through 4.3: No change

4.4 Manufacture Location: The studs are manufactured in the facilities noted in Table 2.

4.5 No change.

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

This report supplement corresponds only with the evaluation report noted September 1, 2004.

Add the following manufacturing facilities to Table 2:

Custom Stud Manufacturing, Inc	5175 Highview Ave., Louisville, Kentucky
Dragon Inc	4041 South Ave., Riverside, California
Dragon Inc	10001 South Lower King Rd N. South, Seattle, Washington

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STRUCTURAL CALCULATIONS

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

Lateral

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

SEISMIC COEFFICIENT DETERMINATION

- 2006 IBC + ASCE 7-05
  EQUIVALENT LATERAL FORCE PROCEDURE (9.5 S)

- 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.P CODE = 89032

$S_S = 75.4\%$
$S_1 = 36.7\%$
$F_a = 1.355$
$F_v = 2.101$

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

$S_{M1} = F_v S_1 = 2.101 \cdot 0.367 = 0.771$ (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/Gabaldini

Project Name: NAVFO STATION
Project No.: 07501-01
Subject: LATERAL
By: ACB Date: 4/3/96
Page No.: L7

SEISMIC SHEAR:

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

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

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

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

* For $S_1 \ge 0.6g$

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

$T = T_a = C_t h_n^x$ (12.8.3, 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)

Baker Parish Schubert

NUFO STATION #53
07502.01
LATERAL
A.J.B. 03/26/07
43

$T_a = 0.02(22.5)^{0.75} = 0.207$

$T < T_L \Rightarrow$ USE EQ. 12.8-3

$V = \frac{S_{DS} I_e W}{R} = \frac{0.681(1.5)}{5} W = \underline{\underline{0.204 W}}$ CONTROL

$V_{max} = \frac{S_{D1} I_e W}{T R} = \frac{(0.594)(1.5)}{(0.207)(5)} W = 0.795 W$

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

OUT-OF-PLANE SEISMIC FORCES:

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

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

$F_p = 0.409 W$

Dokken/Perich/Kabalini

NUFD STATION #53
07502.01
LATERAL
A-18
DS | SO | E
64

Seismic Load Determination

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 lf · (7'-9" + 7'-6") = 5,070 sf
Area 2 = 296 lf · (7'-9" + 5'-0") = 4,810 sf
Area 3 = 103 lf · (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)(9 psf)

W_W = 544,420 #

Total Weight:

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

Dekker/Perich/Sabatini

[redacted]

Project: NIVEO STATION #53
Job No.: 07502.01
Subject: LATERAL
By: AJB Date: 03/30/07
Sheet: 65

TOTAL SEISMIC SHEAR:

$V = 0.204\ W$

$= 0.204\ (830k)$

$V = 169\ k$

From IBC 2006 - 1605.3.2

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

SEISMIC SHEAR PER AREA

$W_{A1} = (8,032\ sf \times 20psf) + (5,070\ sf \times 15psf)$
$= 236,490\ lbs$

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

$W_{A2} = (5,168\ sf \times 20psf) + (4,810\ sf \times 94psf)$
$= 555,500\ lbs$

$V_{A2} = \frac{0.204\ (555,500\ lbs)}{1.4} = 80,949\ lbs$

$W_{A3} = (1,107\ sf \times 20\ psf) + (1,052\ sf \times 15\ psf)$
$= 38,390\ lbs$

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

Project Name = D7602-01 - MLVFD Station #3
Conterminous 48 States
2006 International Building Code
Zip Code = 89032
Spectral Response Acceleration: Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on = 0.01 deg grid spacing

Period (sec)	Centroid Sa (g)	
0.2	0.558	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)	Minimum 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 = 89032
Spectral Response Acceleration: SMs and SM1
SMs = FaSs and SM1 = FvS1
Site Class D - Fa = 1.355 ,Fv = 2.101

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 = 89032
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D - Fa = 1.355 ,Fv = 2.101

Period (sec)	Sa (g)
0.2	0.503 SDs, Site Class D
1.0	0.245 SD1, 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	0.278
0.314	0.557	0.538
0.400	0.437	0.663
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 = FaSs and SM1 = FvS1
Site Class D - Fa = 1.355 ,Fv = 2.101

Period (sec)	Sa (g)	Sd (inches)
0.000	0.302	0.000
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	2.542
0.800	0.459	2.971
0.900	0.408	3.290
1.000	0.367	3.588
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	5.741
1.700	0.216	6.100
1.800	0.204	6.459
1.900	0.193	6.818
2.000	0.184	7.177

Dekker/Perich/Sabatini

[redacted]

Project: NLVFD Station #53
Job No.: 07502.01
Subject: LATERAL
By: DLB Date: 03/30/07
Checked: L4

Wind Loads

- Per IBC 2006 - 1609.1.1 & ASCE 7-05 Chapter 6

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 = 23 ft

6.4 Method 1 - Simplified Procedure

6.4.2.1 - Main Wind-Force Resisting System

$$p_s = \lambda K_{zt} I_w p_{s30} \quad \text{(Eq. 6-1)}$$

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)

$$p_s = (1.33)(1.0)(1.15)\, p_{s30} = 1.53\, p_{s30}$$

p_{s30} Fig. 6-2:

	Horiz. Pressures				Vert. Pressures				Overhangs	
	A	B	C	D	E	F	G	H	G_{on}	G_{op}
p_{s30}	12.8	-6.7	8.5	-4.0	-15.4	-8.8	-0.9	-6.8	-21.4	-16.9
p_s	19.58	-10.25	13.0	6.1	-23.55	-13.46	-1.37	-10.4	-32.7	-25.85

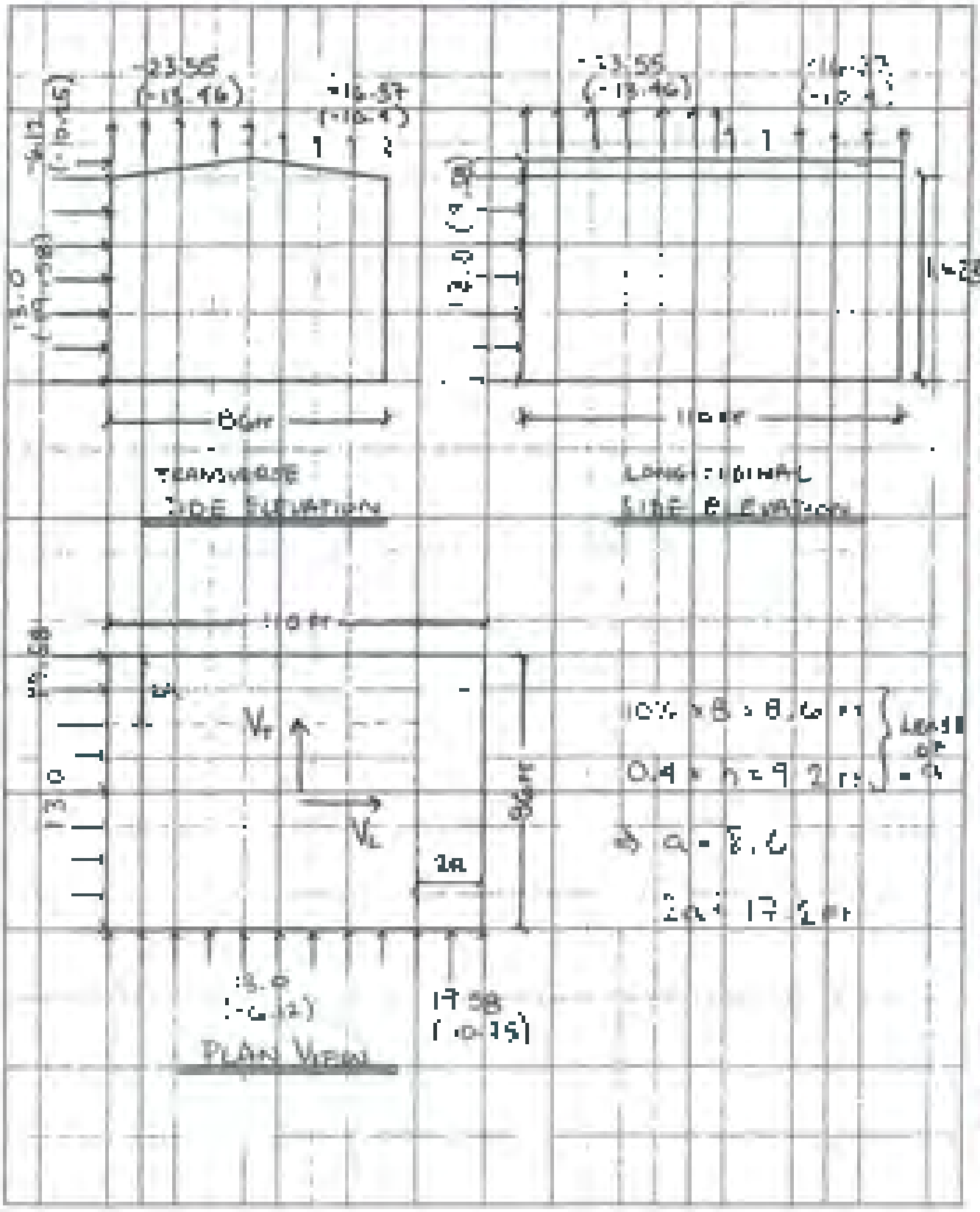
Dekker/Perich/Sabatini

NWFD Station #53

07502-01

LATERAL

AJB 03/30/07



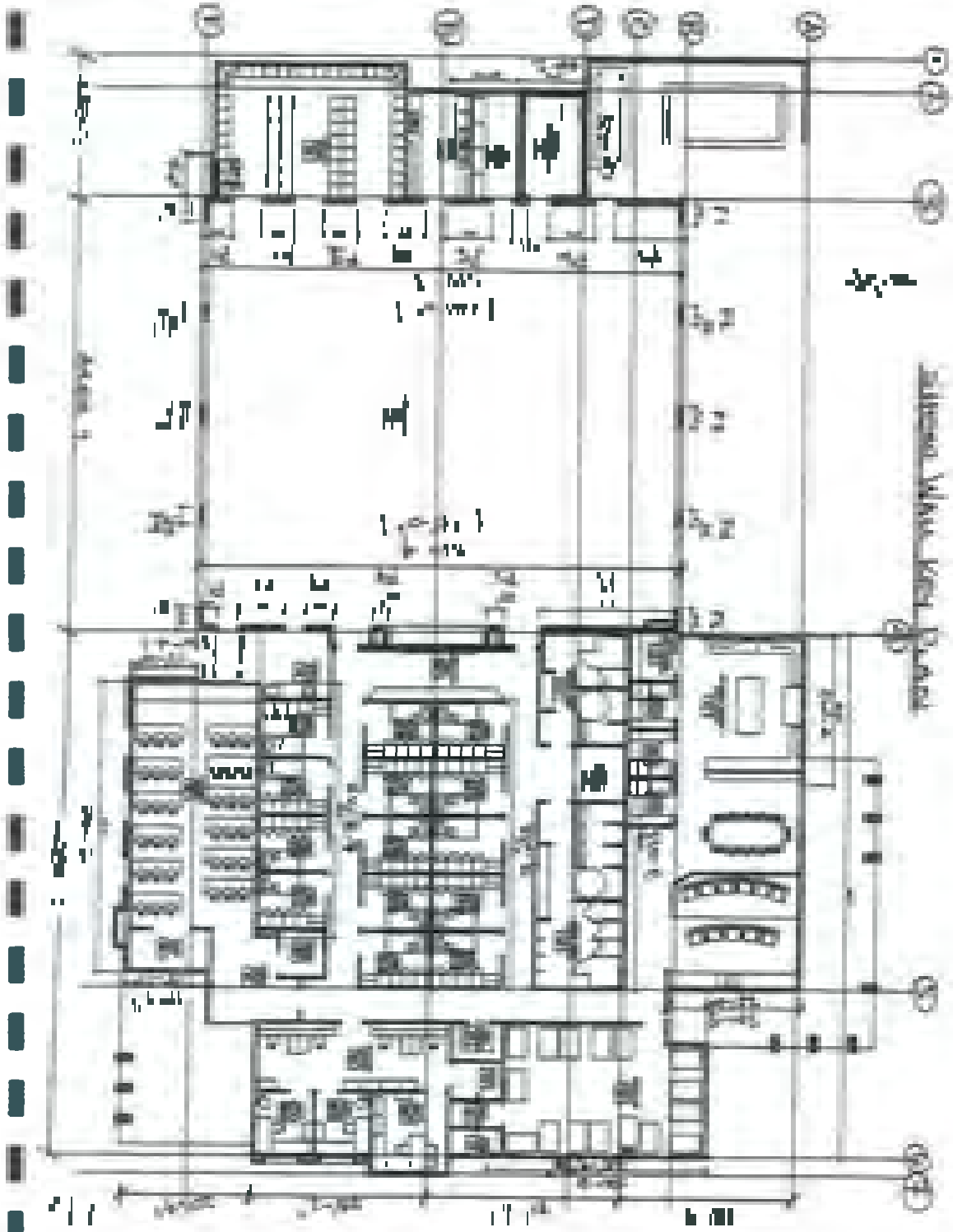
Bekker/Perich/Sabatini

Project Name: NLVFD STATION #53
Project Number: 07502-01
Subject: LATERAL
By: AMB Date: 03/30/07
Checked: Date:
Sheet: 5A

$V_T = (46.8\,pf \times 23\,pf)\,13.0 + (19.2\,pf \times 23\,pf)\,1.58$
$= 28.32\,K$

$V_L = (92.8\,pf \times 23\,pf)\,13.0 + (19.2\,pf \times 23\,pf)\,1.58$
$= 35.99\,K$

SEISMIC CONTROLS BOTH WAYS (121 K)



Bekker/Perich/Sabatini

[redacted]

Project Name: NUVFD STATION #53
Project Number: 07502-01
Subject: LATERAL
By: AJB Date: 04/03/07
Checked: Date:
Page: U3

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/ NO OPENINGS
  - ANCHORS @ EACH END OF WALL SEGMENT.
  - AVAILABLE STRENGTH SHALL BE DETERMINED USING THE SAFETY FACTOR Ω (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 AVAILABLE SHEAR STRENGTH SHALL BE MULTIPLIED BY 2 W/H, BUT IN NO CASE SHALL THE ASPECT RATIO EXCEED 4:1.

• C3 TYPE II (PERFORATED) SHEAR WALLS:
  - SHEATHING SEGMENTS SHALL BE LOCATED AT EAC. END 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 (HORIZONTAL) OFFSETS.
  - COLLECTORS FOR SHEAR TRANSFER SHALL BE PROVIDED TO 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

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SHEAR WALL DESIGN - AREA 1

EAST-WEST DIRECTION

TOTAL SEISMIC SHEAR = 39,460 lbs

ROOF AREA = 8,022 SF

SEISMIC LOAD: $\frac{39,460 \text{ lbs}}{8,022 \text{ SF}}$ = 4.90 PSF

TYPE I SHEAR WALLS

SHEAR WALL SW-A

TRIBUTARY AREA = .4 33 ft x 54.5 ft = 824 SF

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

SHEAR, v: $\frac{4.90 \text{ PSF} \cdot 824 \text{ SF}}{23.83 \text{ ft}}$ = 148.7 PLF

≅ 149 PLF

A - SHEATHING

15/32" APA RATED SHEATHING WITH 8 SPACING @ 6" OC ALONG PANEL EDGES AND @ 12" OC IN FIELD

NOMINAL SHEAR STRENGTH, R_n = 780 PLF

ALLOWABLE STRENGTH VALUE = $\frac{R_n}{\Omega}$ = $\frac{780 \text{ PLF}}{2.5}$

S_{allow} = 312 PLF > 149 PLF ∴ OK

Metker/Pirnt/Sabatini

[redacted]

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5-CS2 WALL SEQ. A (CONT.)

B - UPLIFT @ STRONGWALL END:

$T = C = \frac{Vh}{L_{eff}} = \frac{(4.30\ kip \times 8.24\ ft)(5/1)}{23.83\ ft}$

$T = 2,230$ lbs

RESISTING DEAD LOAD:

$W_{ROOF} = 20\ psf \times 19.33\ ft \times 23.83\ ft$
$= 6,880$ 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

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C. ANCHORAGE (CONT.) C1-2

USE TRY 1/2" 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 = 491 (19" BP) = 596 lbs

T_s = 596 lbs

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

$$\left(\frac{596}{1,250}\right)^{5/3} + \left(\frac{596}{950}\right)^{5/3} = 0.75 < 1.0 \therefore \underline{OK}$$

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

2 Compression Chord Force:

Ref AISC - C4: Concentrically Loaded Compression Members

$T = C = 2,230$ lbs

Use 2 - 600S162-33 (43) Back to Back

(See ASTM/CW Property Data Sheet)

$I_x = 3.586 \text{ in}^4$

$A_e = 0.689 \text{ in}^2$

$r = 2.282$ in

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

$F_e = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2 (29 \times 10^6 \text{ psi})}{\left(\frac{1 \times 180 \text{ in}}{2.282 \text{ in}}\right)^2}$ (Eq. C4.1-1)

$F_e = 46,003$ psi

$\lambda_c = \sqrt{\frac{F_y}{F_e}} = \sqrt{\frac{33 \text{ ksi}}{46 \text{ ksi}}} = 0.85 < 1.5$

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

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

$F_n = 24,388$ psi

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- D. (CONT.)

$P_n = 0.689\ in^2\ (24,388\ psi) = 6,803\ lbs$

$P_a = \frac{P_n}{\Omega} = \frac{16,703\ lbs}{1.8} = 9,335\ lbs$

$\Omega T = 2.5(2,232\ lbs) = 5,575\ lbs < P_a$ ∴ OK

USE 6005167-33 BACK-TO-BACK STUDS @ END OF SW-A

3. [illegible]
4. See Section C2.1 for requirements for sheathing applied to both sides of wall.
5. Shear wall height-to-width ratios (h/w) greater than 2.1, but not exceeding 4.1, are permitted provided the nominal shear strength is multiplied by 2w/h. See Section C2.1.
6. Shear values permitted for use in seismic design where the seismic response modification factor, R, is taken equal to or less than 5. Refer to Section C1.1.
7. For SI: 1" = 25.4 mm, 1 mph = 0.305 m/s, 1 lb = 4.45 N.

TABLE C2.1-2
NOMINAL SHEAR STRENGTH (PLF) FOR WIND AND SEISMIC LOADS
FOR SHEAR WALLS FACED WITH GYPSUM BOARD[1,2,3,4]
(Pounds Per Foot)

Wall Construction	Max. Aspect Ratio (h/w)	Sheathing	Screw Spacing		Nominal Shear Strength (Lb/ft)
			Edge	Field	
1½" grooved gypsum board on one side of wall studs max. 24" o/c	2:1	Gypsum board applied perpendicular to framing with strap 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	395
			8	12	330

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 C2.3.
2. See Section C2.1 for requirements for sheathing applied to both sides of wall.
3. Unbalanced assemblies are permitted provided the nominal shear strength values shown are reduced by 0.75.
4. For SI: 1" = 25.4 mm, 1 mph = 0.305 m/s, 1 lb = 4.45 N.

TABLE C2.1-3
NOMINAL SHEAR STRENGTH (PLF) FOR SEISMIC LOADS FOR SHEAR WALLS[1,2,3]
(Pounds Per Foot)

Assembly Description	Max. Aspect Ratio (h/w)	Allowable Sheathing Shear Panel (Edge Fastener Spacing)				Designation Thickness of Stud and Track (mils)	Required Sheathing Screw Size
		6	4	3	2		
15/32" Structural 1 sheathing (4-ply), one side	2:1[4]	740	990			33 or 43	8
	3:1	880	1330	1775	2180	43 or 54	8
7/16" OSB, one side	2:1[4]	700	935	-	-	33	8
	2:1[4]	425	1235	1545	2060	43 or 54	8
	3:1	840	1410	1760	2330	54	8
	4:1	1230	1848	2310	3080	68	10
0.018" metal sheet, one side	3:1	395		-	-	33 (min.)	8
0.027" metal sheet, one side	4:1	-	1300	1625	2170	33 (min.)	8

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 strength as set forth in Section C2.3.
2. Spacing of the fasteners shall be maintained 12 inches (305 mm) o.c. unless otherwise noted.
3. Shear wall height-to-width ratios (h/w) greater than 2:1, but not exceeding 4:1, are permitted provided the nominal shear strength is multiplied by 2w/h. See Section C2.3.
4. See Section C2.1 for requirements for sheathing applied to both sides of wall.

SECTION 1913
SHOTCRETE

1913.1 General. Shotcrete is mortar or concrete that is pneumatically projected at high velocity onto a surface. Except as modified in this section, shotcrete shall conform to the requirements of this chapter for plain or reinforced concrete.

1913.2 Proportions and materials. Shotcrete proportions shall be selected that allow suitable placement procedures using the delivery equipment selected and shall result in finished in-place hardened shotcrete meeting the strength requirements of this code.

1913.3 Aggregates. Coarse aggregate, if used, shall not exceed ½ inch (19.1 mm).

1913.4 Reinforcement. Reinforcement used in shotcrete construction shall comply with the provisions of Sections 1913.4.1 through 1913.4.4.

1913.4.1 Size. The maximum size of reinforcing wire shall be No. 3 bars unless it is demonstrated by preconstruction tests that adequate consolidation of larger bars will be achieved.

1913.4.2 Clearance. When No. 3 or smaller bars are used, there shall be a minimum clearance between parallel reinforcing bars of 2½ inches (64 mm). When bars larger than No. 3 are provided, there shall be a minimum clearance between parallel bars equal to six diameters of the bars used. When two layers of steel are provided, the vertical stirrups for support shall have a minimum spacing equal to 12 bar diameters and the remaining vertical steel shall have a minimum spacing of six bar diameters.

Exception. Subject to the approval of the building official, required clearances shall be reduced where it is demonstrated by preconstruction tests that adequate consolidation of the bars will in the design will be achieved.

1913.4.3 Splices. Lap splices of reinforcing bars shall only have the same number of lap splices in any cross-sectional area of 3 inches (51 mm) between bars. The use of contact lap splices is permitted but length of the reinforcing is permitted unless approved by the building official, based on satisfactory preconstruction tests that show that adequate consolidation of the bars will be achieved, and provided that the splice is located in the plane through the center of the spaced bars perpendicular to the surface of the shotcrete.

1913.4.4 Spirally tied columns. Shotcrete shall not be applied to spirally tied columns.

1913.5 Preconstruction tests. When required by the building official, a test panel shall be shot, cured, cored, or sawed, tested and tested prior to commencement of the project. The sample panel shall be representative of the project and members job conditions as closely as possible. The panel the nozzle and reinforcing shall represent the final and more congested area specified in the structural design. It shall be shot at the same angle using the same equipment and with the same consistency and design that will be used on the project. The aggregate used in preconstruction testing shall be the same aggregate used in the work requiring such testing, and the proportions approved by the building official.

1913.6 Rebound. Any rebounded or accumulated loose aggregate shall be removed from the surface to be covered prior to placing the initial or any succeeding layers of shotcrete. Rebound shall not be used as aggregate.

1913.7 Joints. Except where permitted herein, permanent work joints shall not be allowed in shotcrete. Joints shall be made with square edges perpendicular to the surface. For structural concrete joints will be made in accordance with the construction joints shown on the approved construction documents, unless joints are permitted. Before placing additional material, adjacent to

Table 1913.3
MAXIMUM SURFACE LOAD ON PERMANENT ANCHOR (pounds)

[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]	[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]	[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]

For SI: [illegible]

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2001 North American Specification w/2004 Supplement AISI
04/18/2006

BETTER ORIGINAL FORM: 600H150-33 (3) Back-to-Back

INPUT PROPERTIES:

Web Height =	6.000	in	Steel Thickness =	0.0346	in
Top Flange =	1.625	in	Inside Corner Radius =	0.0700	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

Neutral Axis from Top Fiber (Ycg)	3.0347	in
Moment of Inertia for Deflection (Ixd)	3.3866	in^4
Section Modulus (Sxc)	1.1346	in^3
Allowable Bending Moment (Mn)	1901.26	Ft-Lb

Gross Section Properties of Full Section, Strong Axis

Neutral Axis from Top Fiber (Ycg)	3.0000	in
Moment of Inertia (Ixx)	3.6858	in^4
Gross Sectional Area (A)	0.6668	in^2
Radius of Gyration (Rx)	2.2619	in

Section Properties, Weak Axis

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

Gross Section Property Data

Member Weight per Foot of Length	2.3131	lb/ft
Maximum Shear Force in Web (Unpunched)	1278	lb
Fsv for use in Interaction Equation C3-2	7266	lb

Lateral Buckling Properties for Flexure

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

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

	1.00in (EHO Brace)		2.00in (W1 Brace)	
	Cond 1	Cond 3	Cond 2	Cond 4
(2) Back-to-Back	774	386	1075	963

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 AT 6" O.C. ALONG PANEL EDGES AND AT 12" O.C. IN FIELD.

$v_{allow} = \frac{R_n}{\Omega} = \frac{780}{2.5} = 312 \text{ plf} > 181 \text{ plf}$ OK

B - UPLIFT @ SHEAR WALL ENDS:

$T = C = \frac{Vh}{L_{SW}} = \frac{(10,501 \text{ lbs})(15 \text{ ft})}{58 \text{ ft}} = 2,716 \text{ lbs}$

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

Decker/Perich/Sabatini

[redacted]

Project: NJTC STATION #53
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B - UPLIFT (CONT.) SW-C

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

$$= -16,794 \text{ lbs} \quad \therefore \text{ No UPLIFT}$$

$\therefore$ NO HOLD DOWNS REQ'D

C - ANCHORAGE FOR IN-PLANE SHEAR:

USE 1/2" ϕ x 7" ANCHOR BOLTS

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

SPACING @ 4'-0"

$T_s = 4ft\,(181\ plf) = 724$ lbs
$V_s = \ldots = 724$ lbs

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

USE 1/2" ϕ 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 $\therefore$ OK

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

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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, $v = \frac{10{,}952 \text{ lbs}}{47 \text{ ft}} = 233$ PLF

A - SHEATHING

7/32" APA RATED SHEATHING W/ #8 SCREWS AT 6" OC ALONG PANEL EDGES AND AT 12" OC IN FIELD.

$v_{allow} = \frac{780 \text{ PLF}}{2.5} = 312 \text{ PLF} > 233 \text{ PLF} \therefore$ 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 PSF × 29.5 ft (λr) × 47 ft = 27,805 lbs
W_{WALL} = 10 PSF × 15 ft × 47 ft = 7,050 lbs
W_{TOTAL} = 27,805 + 7,050 = 34,855 lbs

UPLIFT = 3,495 lbs − 0.9(34,855) = −12,190 lbs
No UPLIFT

No HOLD DOWN REQ'D

Dekkers/Perlich/Sabatini

[redacted]

Project: NUVO Studio #53
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C - ANCHORAGE FOR IN-PLANE SHEAR:

USE DRY 7/8" ϕ × 7½" ANCHOR BOLTS

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

SPACING @ 4'-0" o.c.

$T_s = A_T \cdot (233 \text{ psf}) = 932$ lbs
$V_s = \quad " \quad = 932$ lbs

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

USE 7/8" ϕ × 7½" ANCHOR BOLTS @ 4'-0" o.c.

D - COMPRESSION CHORD FORCE:

$\Omega T = 2.5(3,495 \text{ lbs}) = 8,736$ lbs

(SEE SUPRA FOR COMPRESSION CHORD CALCULATIONS)

$P_a = 9,335$ lbs $> 8,736$ lbs ∴ OK

USE (2) 600S162-33 BACK-TO-BACK STUDS

Shear Wall SW-E.7

Tributary Area = 1,746 SF

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

Shear, V = 430 PLF × 1,746 SF = 7,508 lbs

Unit Shear, $v = \frac{7,508 \text{ lbs}}{41.33 \text{ ft}} = 182$ PLF

A - Sheathing:

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

$v_{allow} = \frac{780}{2.5} = 312$ PLF > 182 PLF ∴ OK

B - Uplift @ Shear Wall End:

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

Resisting Dead Load:

W_{roof} = 20 PSF × 24.5 ft × 41.33 ft = 20,252 #
W_{wall} = 10 PSF × 15 ft × 41.33 ft = 6,200 #
W_{total} = 20,252 + 6,200 = 26,452 lbs

Uplift = 2,725 − 0.9 $\frac{26,452}{2}$ = −9,178 lbs
∴ No Uplift

No Hold Downs Req'd

Bekker/Petersen/Sabatini

[redacted]

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Chkd: Date:
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C - ANCHORAGE FOR IN-PLANE SHEAR

USE 1 ~~1~~ 1/2" ϕ x 7" ANCHOR BOLTS

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

SPACING = 4'-0" oc

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

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

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

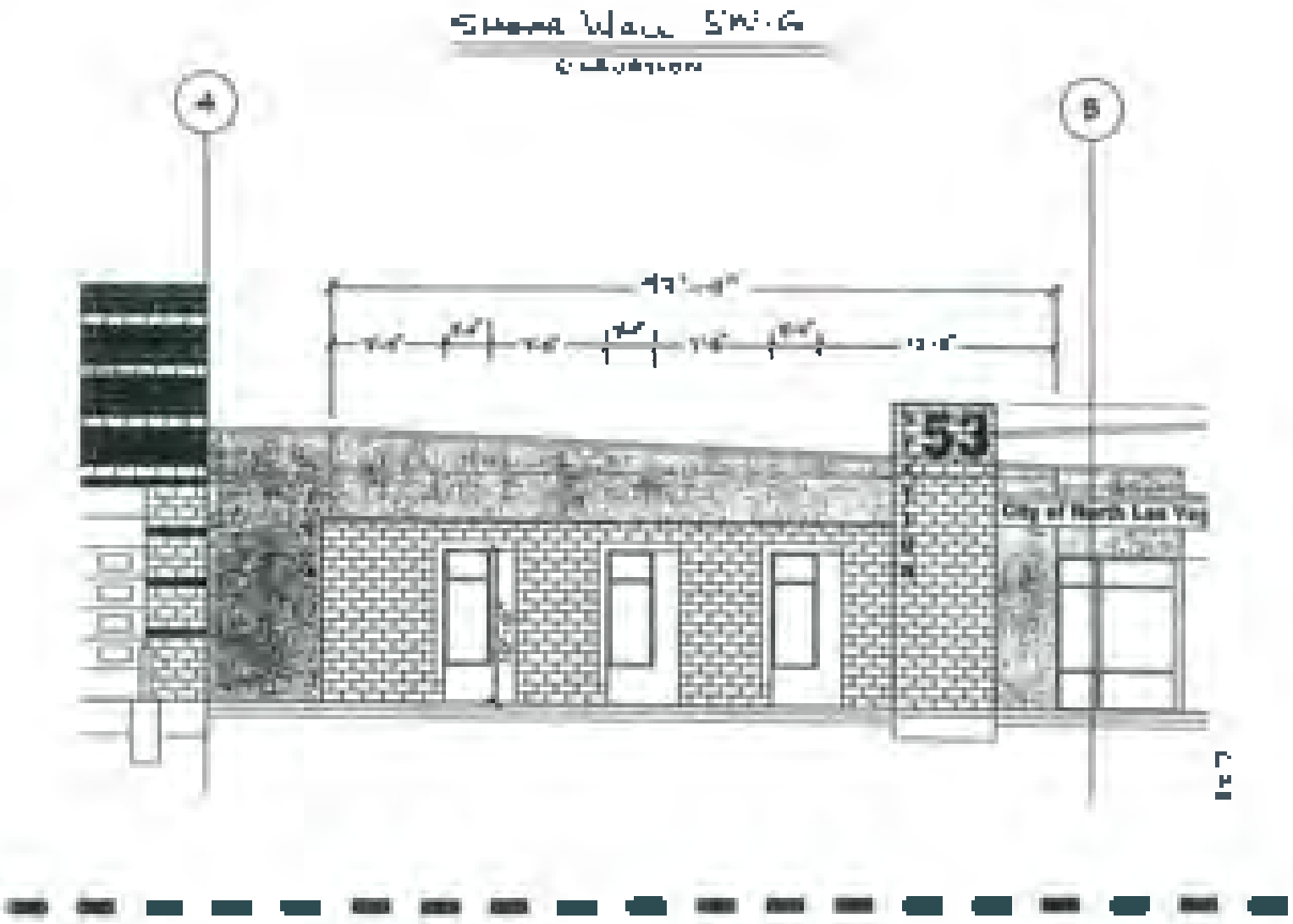
D - COMPRESSION CHORD FORCE:

$\Omega T = 2.5(2,725\ lbs) = 6,813$ lbs

(SEE SW-A FOR COMPRESSION CHORD FORCES.)

$P_a = 9,335$ lbs > 6,813 lbs ∴ ok

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


53
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[redacted]

Project: NUFD STATION #53
Project No.: 07502-01
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By: AIB Date: 09/05/07
Checked: Date:
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- TYPE II SHEAR WALL
- SHEAR WALL SW-G

TRIBUTARY AREA: 10.375 + 47.33 = 491 SF

% OF FULL HEIGHT SHEATHING = $\frac{3'-4" + 7'-8" + 3'-8" + 15'-8"}{47'-4"}$

= 0.81 ≥ 65%

$\frac{\text{MIN. OPENING HEIGHT}}{\text{FOR-AR HEIGHT}} = \frac{10'-0"}{15'-0"} = 0.67$

FROM AISI TABLE C2.2-1:

$C_a = 0.83$

V = 430 PSF × 491 SF = 2,111 lbs

$v = \frac{V}{C_a \Sigma L_i} = \frac{2{,}111 \text{ lbs}}{(0.83)(38'-9")} = 66$ PLF

- SHEATHING:

15/32" APA PANEL 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

SHEAR WALL SW-G (CONT.)

K = UPLIFT @ SHEAR WALL END:

$$T = \frac{Vh}{C_d \Sigma L} = \frac{(2,111 \text{ lbs})(15 \text{ ft})}{(0.83)(38-33 \text{ ft})} = 995 \text{ lbs}$$

∴ USE S/HDB5 HOLD DOWNS w/ 7/8" ϕ ANCHORS

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

10 - ANCHORAGE FOR IN-PLANE SHEAR:

USE 1/2" ϕ x 7" ANCHOR BOLTS

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

T_s = 4 ft × 66 plf = 264 lbs
V_s = 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

Dekker·Perich·Sabatini

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(2) - COMPRESSION CHORD FORCE:

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

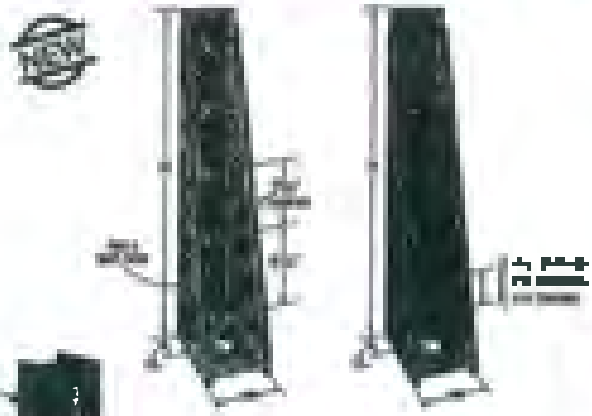
(SEE SHEET 4 FOR COMPRESSION CHORD CALCS.)

$P_a = 9,335 \text{ lbs} > 2,488 \text{ lbs} \therefore$ OK

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

S/HDS & S/HDB

SIMPSON Strong-Tie



Dekker/Perich/Sabatini

Project: NWFD Station 453
Job No.: 07502-01
Subject: LATERAL
By: AJB Date: 08/09/07
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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

Dekker/Perrick/Sabatini

NAVFD STATION #53
07502-01
LATERAL
AIB 01/09/01
L34

SHEAR WALL SW-9.1 (CONT.)

B - UPLIFT @ SHEARWALL ENDS:

$T = C = \frac{Vh}{L_{SW}} = \frac{(430\,PLF \times 853\,LF)(15\,FT)}{13.83\,FT}$

$T = 1,696$ lbs

RESISTING DEAD LOAD:

$W_{WOOD} = 20\,PSF \times 6\,FT \times 17.42\,FT = 2,090$ #

$W_{WALL} = 15\,PSF \times 15\,FT \times 17.42\,FT = 3,920$ #

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

$UPLIFT = T - 0.9\left(\frac{W_{TOTAL}}{2}\right) < 1,695 - 0.9\left(\frac{6,010}{2}\right)$

$= -1,059$ # ∴ NO UPLIFT

∴ NO HOLD DOWNS REQ'D

C - ANCHORAGE FOR IN-PLANE SHEAR

USE 1/2" Φ × 7" ANCHOR BOLTS

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

ANCHOR SPACING @ 4'-0" OC

$V_S = 4\,FT \times 110\,PLF = 440\,PLF$
$T_S = 4\,FT \times 110\,PLF = 440\,PLF$

Dokter/Perich/Salustri

NLVFD STATION #53
03502.01
LATERAL
A-1B 09/09/09
L35

C - ANCHORAGE, SW-4.1 (CONT.)

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

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

USE 1/2" ϕ ANCHOR BOLTS @ 4'-0" OC

D - COMPRESSION CHORD FORCE:

$\Omega_2 T = 2.5(1,646 \text{ lbs}) = 4,115 \text{ lbs}$

(SEE SW-A FOR (2)G005162-33 CALCULATIONS)

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

USE (2) G005162-33 BACK-TO-BACK STUD CLIPS

Dekker/Perich/Sabatini

[redacted]

BLVD STATION #53
07502.01
LATERAL
4.18 05/09/07
636

SHEAR WALL : SW-4.9

TRIBUTARY AREA = 1,835 SF

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

SHEAR, V = 4.30 PSF 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" OC ALONG PANEL EDGES AND AT 12" OC 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 :

$T = C = \frac{Vh}{L_{SW}} = \frac{(7,891 \text{ lbs})(15 \text{ ft})}{13.92 \text{ ft}}$

T = 8,503 lbs

RESISTING DEAD LOAD :

W_{ROOF} = 20 PSF x 60 FT x 13.5 FT = 1,620 lbs

W_{WALL} = 15 PSF x 15 FT x 13.92 FT = 2,132 lbs

W_{TOTAL} = 1,620 + 2,132 = 3,802 lbs

Bekker/Parich/Sabatini

[redacted]

NLVFD STATION #53
07507-01
LATERAL
AB 04/09/07
CST

SW = 4.9 - UPLIFT (CONT.)

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

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

UPLIFT = 6,342 lbs

∴ USE S/HDB5 HOLD DOWN w/ 3/8" ø ANCHORS

w/ T_{allow} = 8,580 lbs >> 6,342 lbs ∴ OK

S - ANCHORAGE FOR IN-PLANE SHEAR

USE 1/2 IRV 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 ft x 567 plf = 754 lbs
V_a = " " = 754 lbs

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

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

USE 5/8" ø ANCHOR BOLTS @ 16" O.C.

D - COMPRESSION CHORD FORCE

$\Omega T = 2.5 \times 8{,}503 \text{ lbs} = 21{,}258 \text{ lbs}$

USE ~~(4)~~ (4) 600S162-43 STUDS

(SEE AISI WIN/CW PROPERTY DATA SHEET)

$I_x = 4 \times 2.3158 \text{ in}^4 = 9.26 \text{ in}^4$

$A_c = 4 \times 0.4969 \text{ in}^2 = 1.79 \text{ in}^2$

$r = 2.28 \text{ in}$

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

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

$\lambda_c = \sqrt{\dfrac{F_y}{F_e}} = \sqrt{\dfrac{33}{46}} = 0.85 > 1.5$ ∴ OK

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

$= 24{,}388 \text{ psi}$

$P_n = 1.79 \text{ in}^2 \times 24{,}388 \text{ psi} = 43{,}655 \text{ lbs}$

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

∴ OK

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

www.clarkwestern.com

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

JUNCTION DESIGNATION: 800S162-43 Single

INPUT PROPERTIES:

Web Height =	8.000	in	Base Thickness =	0.0451	in
Top Flange =	1.625	in	Inside Corner Radius =	0.0713	in
Bottom Flange =	1.625	in	Yield Stress, Fy =	33.0	ksi
Stiffening Lip =	0.500	in	Fy With Cold-Work, Fya =	38.3	ksi
Punchout Width =	1.500	in	Punchout Length =	4.000	in

OUTPUT PROPERTIES:

Effective Section Properties, Bending Axis

Neutral Axis from Top Fiber (Ycg)	3.6074	in
Moment of Inertia for Deflection (Ix)	3.3158	in^4
Section Modulus (Sx)	0.7573	in^3
Allowable Bending Moment (Ma)	1999.91	Ft-Lb

Gross Section Properties of Full Section, Strong Axis

Neutral Axis from Top Fiber (Ycg)	3.5000	in
Moment of Inertia (Ix)	3.3158	in^4
Gross Cross Sectional Area (A)	0.6498	in^2
Radius of Gyration (Rx)	2.2764	in

Section Properties, Weak Axis

Gross Neutral Axis (Xcg) From Web Face	0.4158	in
Gross Moment of Inertia (Iy)	0.1464	in^4
Radius of Gyration (Ry)	0.5762	in
Effective Section Modulus (Sfy)	0.1080	in^3
Effective Neutral Axis (Xcg) from Web Face	0.6790	in
Allowable Moment (May)	177.85	Ft-Lb

Other Section Property Data

Net Area at Punchout	0.3767	in^2
Member Weight per Foot of Length	1.5306	lbs
Allowable Shear Force in Web (Unpunched)	1416	lb
Allowable Shear Force in Web (Punched)	1340	lb
Tau for use in Interaction Equation C6.2	4864	lb

Torsional Properties

Dist. from Shear Center to Neutral Axis (Xo)	-1.0806	in
St. Venant Torsion Constant (J x 1000)	0.3030	in^4
Warping Constant (Cw)	1.0873	in^6
Radius of Gyration (Ro)	2.5646	in
Torsional Flexural Constant (Beta)	0.8763	

Adjustable Web Crippling Loads (lb)

	1.00in END BEARING		3.50in INT BEARING	
	Cond 1	Cond 2	Cond 3	Cond 4
Single Member	268	195	745	745
Reduction, Rc	0.825 + 0.063(h/t) <= 1.0		0.888 + 0.063(h/t) <= 1.0	

Note: Rc applies only Cond 1 and 2

Dekker/Perich/Sabatini

Project Name: NLVFD Station #53
Project No.: 07502-01
Subject: LATERAL
By: AJB Date: 09/09/07
Checked: Date:
Sheet: L18

Shear Wall SW-5

Tributary Area = 2,189 SF

Length, L_{SW5} = 22 FT

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

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

A - Sheathing:

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

$v_{allow} = \frac{R_n}{\Omega} = \frac{1(180 \text{ PLF})}{2.5} = 624 \text{ PLF} > 428 \text{ PLF}$ ∴ OK

B - Uplift @ Shear Wall Ends:

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

$UPLIFT = T - 0.9\left(\frac{W_{TOTAL}}{2}\right) = 6,418 - 0.9\left(\frac{7,590}{2}\right)$
$= 3,003$ lbs

Dekker/Perich/Sabatini

[redacted]

NLVFD STATION #53
07501-0
LATERAL
ALB 04/09/07
GHT

SHEAR WALL SW-5 (CONT.)

USE S/HDB5 HOLD DOWN w/ 5/8" 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

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

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

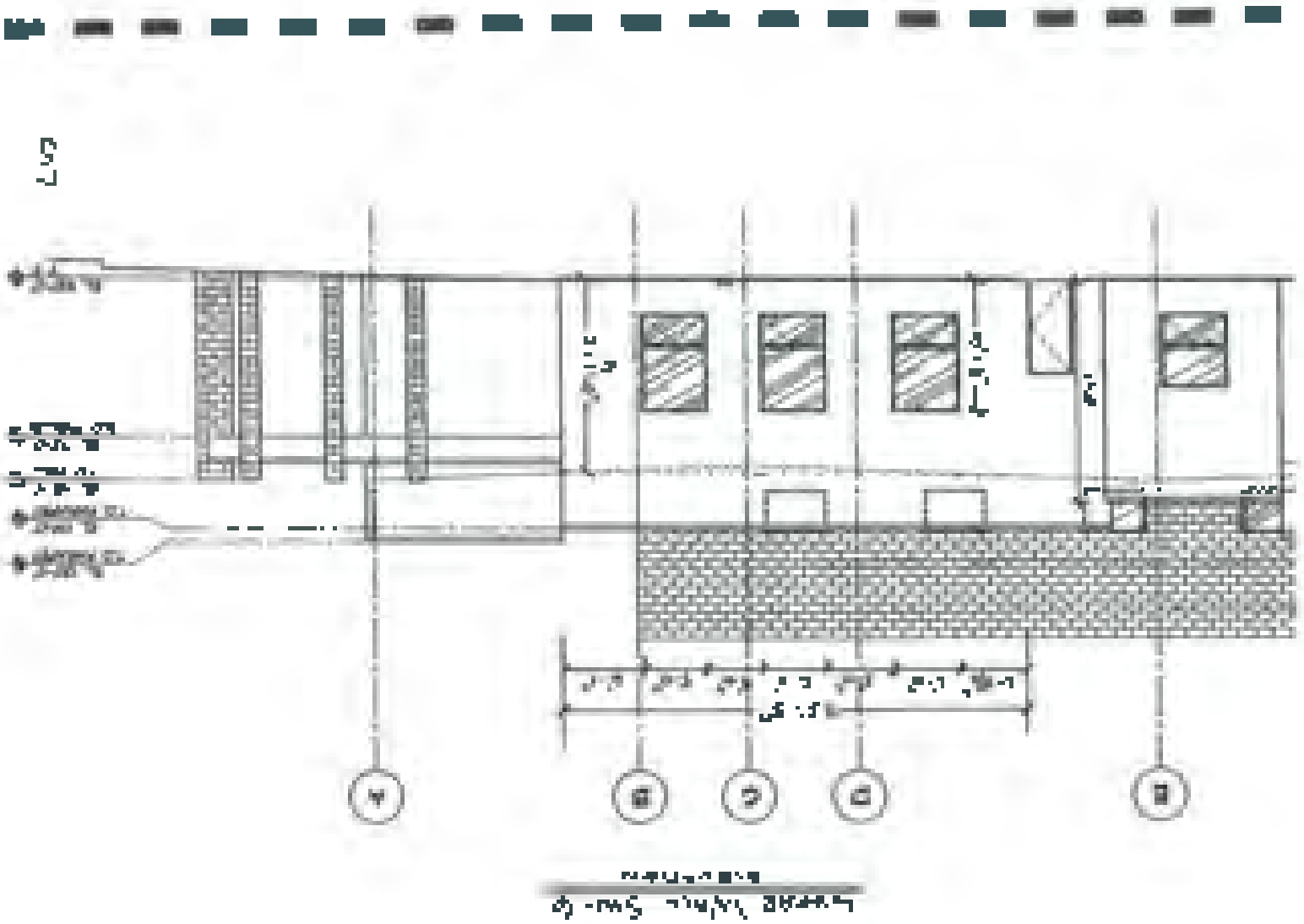
D - COMPRESSION CHORD FORCE:

$\Omega T = 2.5(6,448 \text{ lbs}) = 16,045$ lbs

(SEE SW-49 FOR COMPRESSION CHORD CALCS)
P_a = 21,253 lbs > 16,045 lbs ∴ OK

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

PET.APP.000450



Bekker/Perick/Salutini

Project: NEXTEL Station #53
Job No.: 07501-01
Subject: LATERAL
By: AJB Date: 04/09/07
Client:
Sheet: 143

- TYPE II SHEAR WALL

SHEAR WALL SW-6

TRIBUTARY AREA = 1,000 SF

% FULL-HEIGHT SHEATHING =
$\frac{5'-3\frac{1}{2}" + 6'-0" + 4'-0" + 6'-1"}{35'-3"} = 0.575$

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

FROM ASI TABLE C2.2-1:

$C_a = 0.76$

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

$v = \frac{V}{C_a \Sigma L_i} = \frac{2,580 \text{ lbs}}{0.76(20.375 \text{ ft})} = 166 \text{ plf}$

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 v_{allow} IS MULTIPLIED BY 2"/h, BUT NOT EXCEED 4:1.

Dutter/Perrich/Sabatini

[redacted]

NLVFD STATION #53
93502-01
LATERAL
AHB 04/09/07
GW

Shear Wall SW-6 : Sheathing (cont)

2 w/h = 2 (4 ft / 5 ft) = 0.533

R_n = 0.533 (980 plf) = 416 plf

v_{allow} = 416 plf / 2.5 = 166 plf ∴ OK

B - Uplift @ Shear Wall Ends :

$T = \frac{Vh}{C_a \Sigma L_i} = \frac{(2,580 \text{ lbs})(15 \text{ ft})}{3.76 (20.375 \text{ ft})} = 2,500 \text{ lbs}$

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 IRT 1/2" ø x 7" Anchor Bolts

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

Spacing @ 4'-0" oc

T_{sp} 4 ft x 166 p.f = 664 lbs
V_{sp} = 664 lbs

Dekker/Perich/Sabatini

[redacted]

NUFO Section #53
07502-01
LATERAL
BB 01/09/07
LRS

SHEAR WALL SW-6 - ANCHORAGE (CONT.)

$$\left(\frac{664\ lbs}{1250\ lbs}\right)^{5/3} + \left(\frac{664\ lbs}{950\ lbs}\right)^{5/3} = 0.90 > 1.0 = \underline{OK}$$

USE 1/2" ϕ x 7" @ 4'-0" o.c. ANCHOR BOLTS

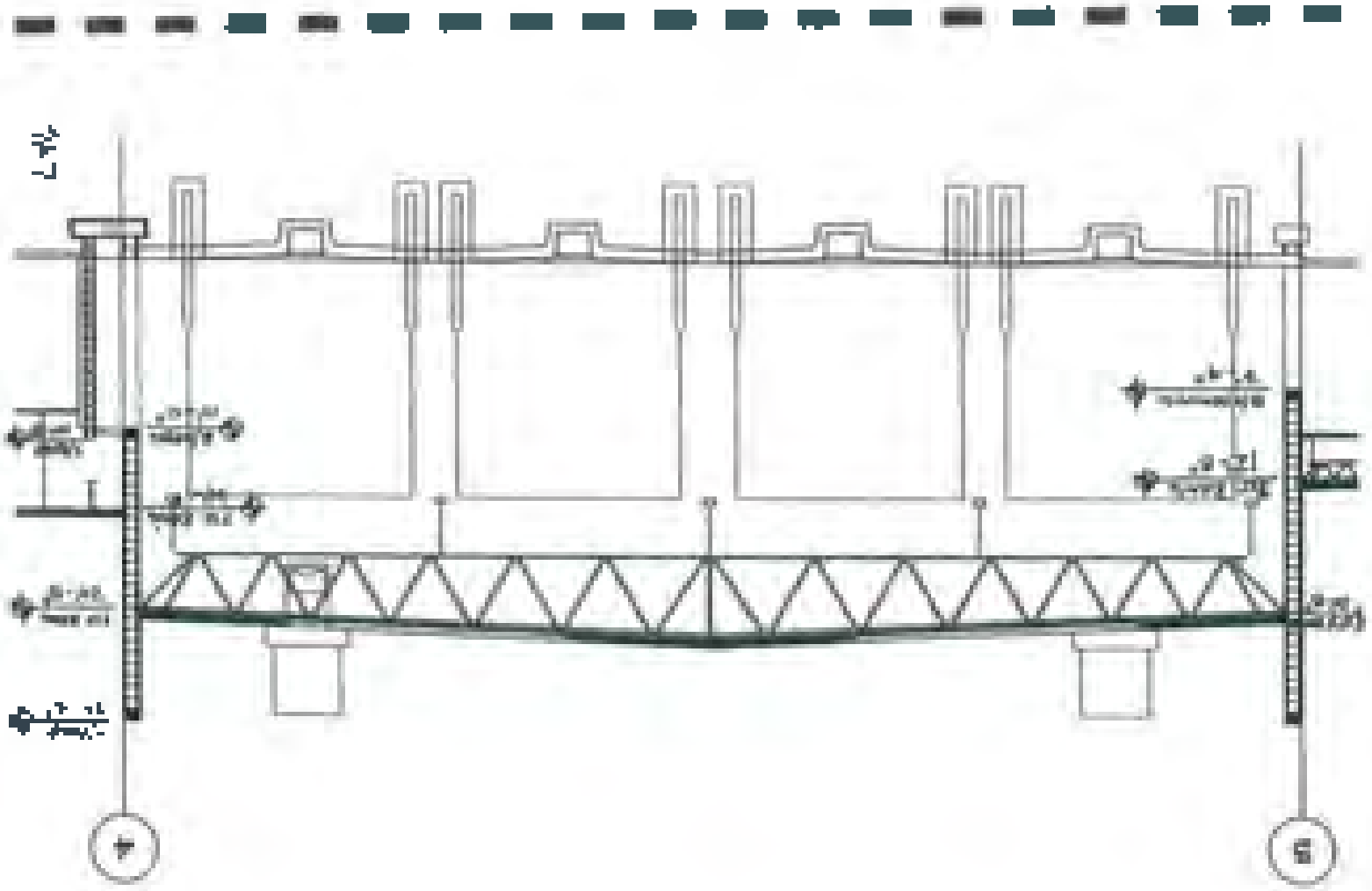
D - COMPRESSION CHORD FORCE:

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

(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 EDS.



Project: NUVFD Station #53
Job No.: 09502-01
Subject: LATERAL
By: AJB Date: 09/21/07
Checked: Date:
Sheet: L42

North - South Direction

Total Seismic Shear = 80,944 lbs

Shear Along Grids (3) + (4):

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

$h = 20.67 \text{ ft}$ (248 in)

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

$= 836,556 \text{ lb-ft}$ (1,003,710 in-in)

Roof Loads:

DL = 20 psf
LL = 20 psf
40 psf

$P = 40 \text{ psf} \times 35 \text{ ft} \times 78 \text{ ft} = 109 \text{ K}$

- Check if Wall is Cracked

$f_a = \frac{P}{A} = \frac{109,200 \text{ lbs}}{(11.625 \text{ in})(936 \text{ in})} = 10.09 \text{ psi}$

$S = \frac{bd^2}{6} = \frac{11.625 \text{ in}(936 \text{ in})^2}{6} = 1,668,540 \text{ in}^3$

$f_b = \frac{M}{S} = \frac{1,003,710 \text{ in-in}}{1,668,540 \text{ in}^3} = 0.60 \text{ psi}$

Baker/Petrich/Schalchlin

Project: NEVED Stations #53
Project Number: 07501 01
Subject: LATERAL
By: AJB Date: 07/24/07
Checked: Page
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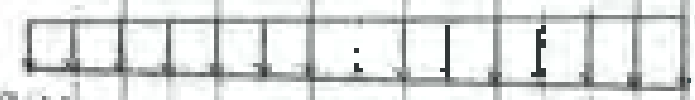
$\frac{P}{A} + \frac{M}{S} = 1.0 \text{ psi} + 0160 \text{ psi}$



$f_c = 9.44$ psi $\qquad f_t = 1068$ psi

∴ Wall is UN-CRACKED

Allowable Stresses:

$F_a = (1.33)(0.33 f'_m) = 1.33(0.33 \cdot 1500 \text{ psi})$
$= 658$ psi

$F_s = 1.33 F_s = 1.33(24{,}000 \text{ psi})$
$= 31{,}920$ psi

$f_v = \frac{V}{bd} = \frac{40{,}972 \text{ lbs}}{(11.625 \text{ in})(9.28 \text{ in})} = 3.45$ psi

$\frac{M}{Vd} = \frac{1{,}003{,}710 \text{ lb-in}}{(40{,}972 \text{ lbs})(9.28 \text{ in})} = 0.027 \ll 1.0$

$\Rightarrow F_v = \left(\frac{1}{3}\right)\left[4 - \left(\frac{M}{Vd}\right)\right]\sqrt{f'_m} = \frac{1}{3}\left[4 - 0.027\right]\sqrt{1500}$

$F_v = 51.29$ psi $\gg f_v$ ∴ OK

Dekker/Perich/Sabatini

[redacted]

Project: NLVFD STATION #53
Proj. No.: 07502-01
Subject: LATERAL
By: AJB Date: 07/24/07
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Sheet: L44

- MINIMUM REINF. REQUIRED:

* PER BERMS 1.4.6

$A_m(min) = 0.0007(1,625 in)(12 in/ft) = 0.097 in^2/ft$

USE 5/16" HEDUN DUR-O WALL TRUSS @ 16" OC AND 2-#5 BOND BEAMS PER DETAIL B1/S202 HORIZONTAL REINFORCEMENT.

BOND BEAMS: 2-#5 = 0.62 in²

DUR-O-WALL: $0.066 in^2/truss \times \left(\frac{12 in}{16" oc}\right) = 0.0495 in^2/ft$

$A_{m-2} = 2.44 + 0.0495 = 2.49 in^2/ft > 0.097 in^2/ft$ ∴ OK

VERTICAL REINF.:

$A_v = \#6 @ 24" oc = 0.44 in^2 \times \frac{12 in/ft}{24 in} = 0.22 in^2/ft$

VERT. REINF REQ'D = $(0.002 \times A_e) - A_m$

$= 0.279 - 0.097 in^2/ft$

$= 0.182 in^2/ft < 0.22 in^2/ft$

∴ OK

Bekker/Perich/Salatini

Project: NIVFD Station #53
Project Number: 03502.01
Subject: LATERAL
By: A.B. Date: 07/29/07
Location:
Sheet: 250

- OUT-OF-PLANE DESIGN:

$$M = \frac{wl^2}{8} = \frac{20\,psf\,(10.67\,ft)^2}{8} = 1{,}068\,ft\text{-}lb = 12{,}818\,lb\text{-}in$$

$$A_s = \frac{M}{f_s j d} = \frac{12{,}818\,lb\text{-}in}{(31{,}720\,psi)(0.9)(5.8\,in)}$$

$$A_s = 0.0768\,in^2 < 0.22\,in^2$$ (SEE SECTION)

∴ 1-#6 @ 24" o.c. IS ADEQUATE

- COMPRESSIVE STRESS:

$$r = \frac{t}{\sqrt{12}} = \frac{1.625}{\sqrt{12}} = 3.36\,in$$

$$\frac{h}{r} = \frac{298\,in}{3.36\,in} = 88.8 < 99$$

$$\Rightarrow F_a = \frac{1}{4} F'_m \left[1 - \left(\frac{h}{140r}\right)^2\right] \quad \text{(Eq. 2-2)}$$

$$= \frac{1}{4}(1500)\left[1 - \left(\frac{298}{140(3.36)}\right)^2\right]$$

$$F_a = 271\,psi$$

Dekker/Perich/Sabatini

[redacted]

Project Name: NLVFD STATION #53
Project Number: 09502-01
Subject: LATERAL
By: AJB Date: 04/24/07
Checked By: Date:
Sheet: 6.61

- Long. Plane Stresses:

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1.0$$

$$\frac{10.64}{271} + \frac{0.60}{658} = 0.038 < 1.0 \therefore \underline{OK}$$

- Out of Plane Stresses:

$$f_b = \frac{2M}{bkd}$$

$$M = \frac{f_b}{F_m} = \frac{29,000 \text{ in-lb}}{700(12)(8.5)} = \frac{29,000 \text{ in-lb}}{.350 \text{ in}} = 21.48$$

$$\rho = \frac{A_s}{bd} = \frac{0.04 \text{ in}^2}{(12 \text{ in})(8.5 \text{ in})} = 0.0003$$

$\rho n = 0.1353$

$$k = \sqrt{2\rho n + (\rho n)^2} - \rho n = 0.4022$$

$$j = 1 - \frac{k}{3} = 0.8659$$

$$f_b = \frac{2(12.8 \text{ in-lb})}{(0.8659)(0.4022)(12)(8.5)^2} = 181.72 \text{ psi}$$

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} = \frac{0.04}{271} + \frac{181.72}{658} = 0.313 < 1.0$$

$\therefore \underline{OK}$

REINFORCEMENT IS ADEQUATE

Shearwall "B & F" - Plate Design

Axis 1

Plate	h	L	h/L	Δ	K	K/K	Vi	Force	Stiff	Mr	Mr/Mo
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
					Σ=	[illegible]	[illegible]	[illegible]			

V= [illegible] Total Shear Force at Top of Plate

H= [illegible] Total Height of Wall (ft)

Wr= [illegible] Total weight (kips)

I= [illegible] Additional Moment (ft)

$$\Delta_i = \Delta(\%)_i + 3(\%)_i$$

$$K_i = \frac{1}{\Delta_i}$$

$$K\% = \frac{K_i}{\Sigma K \times 100}$$

$$V_i = V \times K\%$$

Reiter·Pecub·Sabatini

[redacted]

NUVED STADIUM #73
03501-0
LATERAL
A-18 09/23/07
163

∴ East - West Direction

Total Seismic Shear = 80,994 lbs

Base Shear on each Wall = 40,472 "

Shear Walls B & F

- Piers 1 & 5:

V_u = 12,700 lbs × 1.5 = 19,050 lbs (IBC 2106.5.1)

L = 4'-0"

A - Shear Stress:

$$f_v = \frac{V}{bd} = \frac{19{,}050 \text{ lbs}}{(11.625 \text{ in})(43.2 \text{ in})} = 37.93 \text{ psi}$$

B - Allowable Shear Stress:

$$\frac{M}{Vd} = \frac{H}{d} = \frac{25.67 \text{ ft}\,(12''/\text{ft})}{43.2 \text{ in}} = 5.94 > 1.0$$

$$F_v = 1.5\sqrt{1{,}500 \text{ psi}} = 58 \text{ psi} > f_v \quad \underline{\text{OK}}$$

C - Min. Area of Reinforcement:

$$A_v = \frac{V}{F_s d} = \frac{19{,}050 \text{ lbs}\,(12''/\text{ft})}{(1.33 \times 24{,}000 \text{ psi})(43.2 \text{ in})} = 0.166 \text{ in}^2/\text{ft}$$

USE 2-#5's @ 48" on 1st 9 & 2-#4's @ 32" o.c.

$A_s = 0.169 \text{ in}^2/\text{ft} > 0.166 \text{ in}^2/\text{ft}$ ∴ OK

Dekker/Perich/Sabatini

[redacted]

S.F.F.D. Station #52
07502-01
LATERAL
By AJB Date 01/23/07
Sheet
Of 234

- PIERS 2 & 4.

$V_2 = 3,840 \text{ lbs} \times 1.5 = 5,760 \text{ lbs}$

$L = 20.67 \text{ ft}$

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:

$$\frac{M}{Vd} = \frac{H}{d} = \frac{(20.67 \text{ ft})(12 \text{ in})}{28.84 \text{ in}} = 8.6 > 1.0$$

$F_v = 58 \text{ psi} > 17.18 \text{ psi} \therefore$ OK

C - MIN. AREA OF REINFORCEMENT:

$$A_v = \frac{V}{F_s d} = \frac{(5,760 \text{ lbs} \times 12 \text{ in})}{(1.33 \times 24000 \text{ psi})(28.84 \text{ in})}$$

$A_v = 0.075 \text{ in}^2/\text{ft}$

USE 2-#5's @ 48" oc & STOP 3.0 in @ 32" oc.

$A_{sx} = 0.169 \text{ in}^2/\text{ft} > 0.075 \text{ in}^2/\text{ft} \therefore$ OK

Becker·Perich/Sabatini

[redacted]

Project: NLVFD Station #53
Job Number: 07502-01
Subject: LATERAL
By: AJB Date: 04/23/08
Checked: Date:
Sheet: 166

- For B:

$V_u = 7{,}390 \text{ lbs} \times 1.5 = 11{,}085 \text{ lbs}$

$L = 3.33 \text{ ft}$

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:

$$\frac{M}{Vd} = \frac{M}{d} = \frac{20.67 \text{ ft}\,(12''/\text{in})}{35.96 \text{ in}} = 6.90 > 1.0$$

$F_v = 58 \text{ psi} > 26.5 \text{ psi}$ ∴ Ok

C - Min. Area of Reinforcement:

$$A_v = \frac{V}{F_y d} = \frac{11{,}085 \text{ lbs} \times 12''/\text{ft}}{(1.33 \times 29{,}000 \text{ psi})(35.96 \text{ in})} = 0.116 \text{ in}^2/\text{ft}$$

USE 2-#5's @ 18" oc = 3'0 ±9 D.O.W @ 32' oc

$A_{s3} = 0.169 \text{ in}^2/\text{ft} > 0.116 \text{ in}^2/\text{ft}$ ∴ Ok

Dekker/Perich/Sabatini

[redacted]

Project: NUPO Storage #53
Job No.: 0450 2-01
Subject: LATERAL
By: AGB Date: 09/29/97
Sheet No.: L64

OVERTURNING AT EACH PIER

- PIERS 1 & 5:

$T \cdot C = \frac{(12{,}700 \text{ lbs})}{\text{alt}}(20.67 \text{ ft}) = 65{,}623 \text{ lbs}$

RESISTING LOADS:

Roof: 20 psf × 3 ft (out to ½) = 60 plf

Wall: 133 psf × 13.33 ft = 1,773 plf

(12'-4" - 1'-1") (Wall - door opening)

$R_a = \left(\frac{4 \text{ ft}}{2} + \frac{13'-4"}{2}\right)(1{,}773 \text{ plf}) \times 0.90 = 13{,}835 \text{ lbs}$

Net Uplift = −65,623 lbs + 13,835 lbs

Uplift = −51,792 lbs

USE TRY 4-#6's @ 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 THAN HALF THE WALL DEAD LOAD ABOVE THE DOOR OPENINGS.

Dalleer/Parish/Sabaliot

Project Name: NLVFD STATION #53
Project No.: 09502-01
Subject: LATERAL
By: ASB Date: 01/24/07
Sheet: 257

- PIERS 2 & 4:

$T = C = \frac{3,840 \text{ lbs } (20.67 \text{ ft})}{2.67 \text{ ft}} = 29,728 \text{ lbs}$

RESISTING LOADS:

ROOF: 20 psf x 3 ft = 60 plf
WALL: 133 psf x 13.83 ft = 1,773 plf

$R_{DL} = \left(\frac{2.67 \text{ ft}}{2} + \frac{13.83 \text{ ft}}{2}\right)(1,833 \text{ plf}) \times 0.90 = 13,206 \text{ lbs}$

(WALL / ROOF DEAD LOADING)

NET UPLIFT = -29,728 lbs + 13,206 lbs = -16,522 #

USE THRU 2 - #6 @ EA. END OF PIER

$f_t = \frac{P}{A} = \frac{16,522 \#}{0.88 \text{ in}^2} = 18,775 \text{ psi}$

$F_t = 0.6 (60,000 \text{ psi}) = 36,000 \text{ psi} > f_t$: OK

Baker/Perry/Robertson

[redacted]

Project: NLVFD Station #53
Project No.: 07502-01
Subject: LATERAL
By: AHB Date: 04/29/07
Chkd: Sheet:
Ref: LSR

— PIER 3:

$T = C = \frac{(7,390 \text{ lbs})(20.67 \text{ ft})}{3.33 \text{ ft}} = 45,871 \text{ lbs}$

RESISTING LOADS:

ROOF: 60 plf
WALL: 1,723 plf

$R_{DL} = \left(\frac{3.33 \text{ ft}}{2} + \frac{13'-4''}{2}\right)(1,838 \text{ plf}) \times 0.90 = 13,750 \text{ lbs}$

NET UPLIFT = −45,871 lbs + 13,750 lbs

UPLIFT = −32,121 lbs

USE 4 - #6's @ EA END OF PIER

$f_t = \frac{32,121 \text{ lbs}}{1.77 \text{ in}^2} = 18,148 \text{ psi}$

$F_t = 36,000 \text{ psi} > f_t \therefore$ OK

Reiter, Perich/Sabatini

[redacted]

NLV PD Station #53
03502.01
LATERAL
AJB 09/24/07
CSA

Shear Wall Design - Area 3

- North-South Direction

Seismic Base Shear = 5,591 lbs

- Shear Wall SW-2

$V = \frac{5,591 \text{ lbs}}{2} = 2,796 \text{ lbs}$

$M = Vh = 2,796 \text{ lbs} \times 12.5 \text{ ft} = 34,950 \text{ lb-ft}$

$\frac{M}{Vd} = \frac{34,950 \text{ lb-ft } (12 \text{ in/ft})}{(2,796 \text{ lbs})(132 \text{ in})} = 1.14 > 1.0$

$\Rightarrow f_{cr} = 1.5\sqrt{f'_m} = 1.5\sqrt{1,500 \text{ psi}} = 58 \text{ psi}$

$F_b = 1.33(0.33 f'_m) = 658 \text{ psi}$

$F_s = 1.33(24,000 \text{ psi}) = 31,920 \text{ psi}$

- Flexural Design:

Use #5 @ 48 in o.c. 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
075002-01
LATERAL
AMB 04/24/04
LGP

$j = 1 - \frac{k}{3} = 0.9584$

$f_b = \frac{2M}{j k b_w d^2} = \frac{2(34,950 \text{ lb-ft})(12 \text{ in/ft})}{(0.9584)(0.1248)(7.625 \text{ in})(32 \text{ in})^2}$

$f_b = 528 \text{ psi} \quad << F_b \quad \therefore$ Ok

$f_s = \frac{M}{j d A_s} = \frac{(34,950 \text{ lb-ft})(12 \text{ in/ft})}{(0.9584)(32 \text{ in})(0.31 \text{ in}^2)}$

$f_s = 10,694 \text{ psi} \quad << F_s \quad \therefore$ Ok

MIN. AREA OF SHEAR REINFORCEMENT:

$A_v = 0.0007(B)(12) = 0.0672 \text{ in}^2/\text{ft}$

USE 2-#5 @ 48" oc AT BOND BEAMS AND STD. No. 9 BWG 0-WIRE TIES @ 16" oc

$A_s = 0.036 \text{ in}^2/\text{ft} + 0.0615 \text{ in}^2/\text{ft} = 0.0975 \text{ in}^2/\text{ft}$

$A_s > A_v \quad \therefore$ Ok

Dekker/Perich/Sabatini

NLVFD Station #53
03501-01
LATERAL
By ALB 01/31/03
Chkd
Sheet LG

- East - West Direction.....

Shear Wall SW-D

$V = 2,796$ lbs

$M = 2,796 \text{ lbs} \times 12.5 \text{ ft} = 34,950$ lb-ft

$\frac{M}{Vd} = \frac{34,950 \text{ lb-ft}(12 \text{ in})}{(2,796 \text{ lbs})(104 \text{ in})} = 0.935 < 1.0$

$\Rightarrow F_v = \frac{1}{2}\left(4 - \frac{M}{Vd}\right)\sqrt{f'_m} \leq \left(120 - \frac{45M}{Vd}\right)$

$= \frac{1}{2}(4 - 0.935)\sqrt{1500 \text{ psi}} \leq (120 - 45(0.935))$

$= 63.23 \text{ psi} < 86.98 \text{ psi}$ ∴ ok

$F_v = 63.23$ psi

$F_b = 658$ psi

$F_t = 31,920$ psi

Dekker/Perich/Sabatini

[redacted]

Project: Wood Studios #63
Job No.: 07502.01
Subject: LATERAL
By: AJB Date: 04/24/07
Checked: Date:
Sheet: L62

- FLEXURAL DESIGN:

USE

DRY 1 - #5 @ END OF WALL

$$\rho = \frac{A_s}{b_w d} = \frac{0.31\ in^2}{(7.625\ in)(204\ in)} = 0.000199$$

$$\rho n = (0.000199)(19) = 0.00578$$

$$K = \sqrt{2\rho n + (\rho n)^2} - \rho n = 0.102$$

$$j = 1 - \frac{K}{3} = 0.966$$

$$f_c = \frac{2M}{j K b_w d^2} = \frac{2(34,950\ lb\cdot ft)(12\ in/ft)}{(0.966)(0.102)(7.625)(204)^2}$$

$f_c = 26.83$ psi $<< F_c$ ∴ OK

$$f_s = \frac{M}{j d A_s} = \frac{34,950\ lb\cdot ft\ (12\ in/ft)}{(0.966)(204)(0.31\ in^2)}$$

$f_s = 6,865$ psi $<< F_s$ ∴ OK

MIN. AREA OF LINEAR REINFORCEMENT:

$A_s = 0.0672\ in^2/ft$

USE 2 - #5 @ 18" OC @ BOND BEAMS AND STD. NO. 4 DUR-O-WALL TRUSSES @ 16" OC

$A_s = 0.0975\ in^2/ft > A_s$ ∴ OK

Dekker/Perich/Sabatini

[redacted]

Project Name: NAVFD Station #53
Project No.: 07502-01
Client: LATBRAC
By: AJB Date: 04/30/07
Checked: Date:
Sheet: 663

Shear Wall SW-F

L = 7.0' (84 in)

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. along perimeter edges and @ 12" o.c. in field.

$v_{allow} = \frac{R_n}{\Omega} = \frac{2,980 \text{ lbs}}{2.5} = 624 \text{ plf} > 399 \text{ plf}$ 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:

$W_{roof} = 20 \text{ psf} \times 3 \text{ ft} \times 7 \text{ ft} = 420 \text{ lbs}$

$W_{wall} = 15 \text{ psf} \times 12.5 \text{ ft} \times 7 \text{ ft} = 1,313 \text{ lbs}$

$W_{total} = 420 + 1,313 = 1,733 \text{ lbs}$

Dekker/Perich/Sabatini

Project: NAVFD STATION #53
Project No.: 03501.01
Subject: LATERAL
By: AUB Date: 04/30/03
Chkd: Date:
Sheet: LS4

UPLIFT = T - 0.9 (WTOTAL / 2) = 4,993 - 0.9 (1,333 / 2)

UPLIFT = 4,214 lbs

USE S/HDB5 HEAD DAMPER W/ 5/8" ø ANCHORS

Tallow = 8,580 lbs >> 4,214 lbs ∴ OK

C - ANCHORAGE FOR INT. PONY SHEAR:

USE 2EA 5/8" ø x 7" ANCHOR BOLTS @ 16" o.c.

Tallow = 1,500 lbs
Vallow = 2,750 lbs

Ta = 1.33π = 399 plf = 531 plf
Vs = 1.33π = 399 plf = 531 plf

$$\left(\frac{531\ lbs}{2,750\ lbs}\right)^{5/3} + \left(\frac{531\ lbs}{1,500\ lbs}\right)^{5/3} = 0.342 < 1.0$$

∴ OK

USE 5/8" 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)

Pa = 24,253 lbs > 12,483 lbs ∴ OK

USE (4) 600S162-33 BACK-TO-BACK STUDS

Dekker/Perich/Sabatini

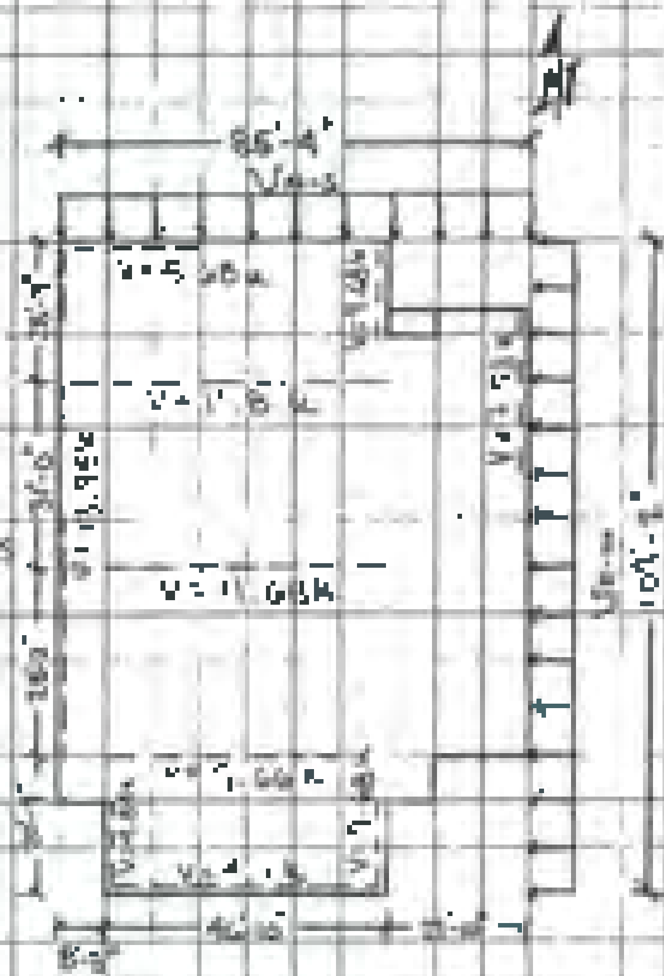
[redacted]

Project Name: NLVFD Station #53
Project Number: 07507-01
Subject: LATERAL
By: A.B.   Date: 04/25/07
Checked: Date:
Sheet: L.03

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.

$V_{max} = \frac{34,460 \text{ lbs}}{85.33 \text{ ft}} \times 1.25 = 505$ PLF

$V_{max} = \frac{34,460 \text{ lbs}}{107.17 \text{ ft}} \times 1.25 = 395$ PLF

North - South:

$V_{max} = 13.95k \Rightarrow v = \frac{13.95k}{109.12 \text{ ft}} = 128$ PLF

East - West:

$V_{max} = 11.8 k \Rightarrow v = \frac{11.8k}{85.33 \text{ ft}} = 138$ PLF Controls

PET.APP.000474

Dekker/Perich/Sabatini

Project Name: NLVFD Station #53
Project No.: 07502-01
Subject: LATERAL
By: AB Date: 04/25/07
Check: Date:
Sheet: 1.26

USE TRY 1.5B - 22 GA METAL DECK w/ 5/8" ϕ DUDLY WELDS (5/6 PATTERN) - #10 SMS SCREWS, @ SIDE LAP FASTENERS BETL SPAN (@ 12" oc)

$V_{allowable} = 330 \text{ plf} > V_{actual} (130 \text{ plf})$ ∴ OK

- CHECK DEFLECTION:

$$G' = \frac{K_a}{3.78 + \frac{0.3\, D_B}{SPAN} + 3 K_a \times SPAN}$$

$$G' = \frac{B \times G}{3.78 + \frac{0.3(.072)}{6 \text{ in}} + 3(.230) \times 6 \text{ in}}$$

$G' = 14.14 \text{ k/in}$

$$\Delta_t = \frac{wL^2}{8BG'} = \frac{(0.136 \text{ klf})(109.9 \text{ ft})^2}{8(86.33 \text{ in})(14.14 \text{ k/in})}$$

$\Delta_t = 0.17 \text{ in.} < \frac{L}{240}$ ∴ OK

1.5 (B, F, AJ) 22 ALLOWABLE DIAPHRAGM SHEAR STRENGTH (PLF)

SUPPORT FASTENERS: 3/8" puddle welds[1]

SIDELAP FASTENERS: #10 TEK screws

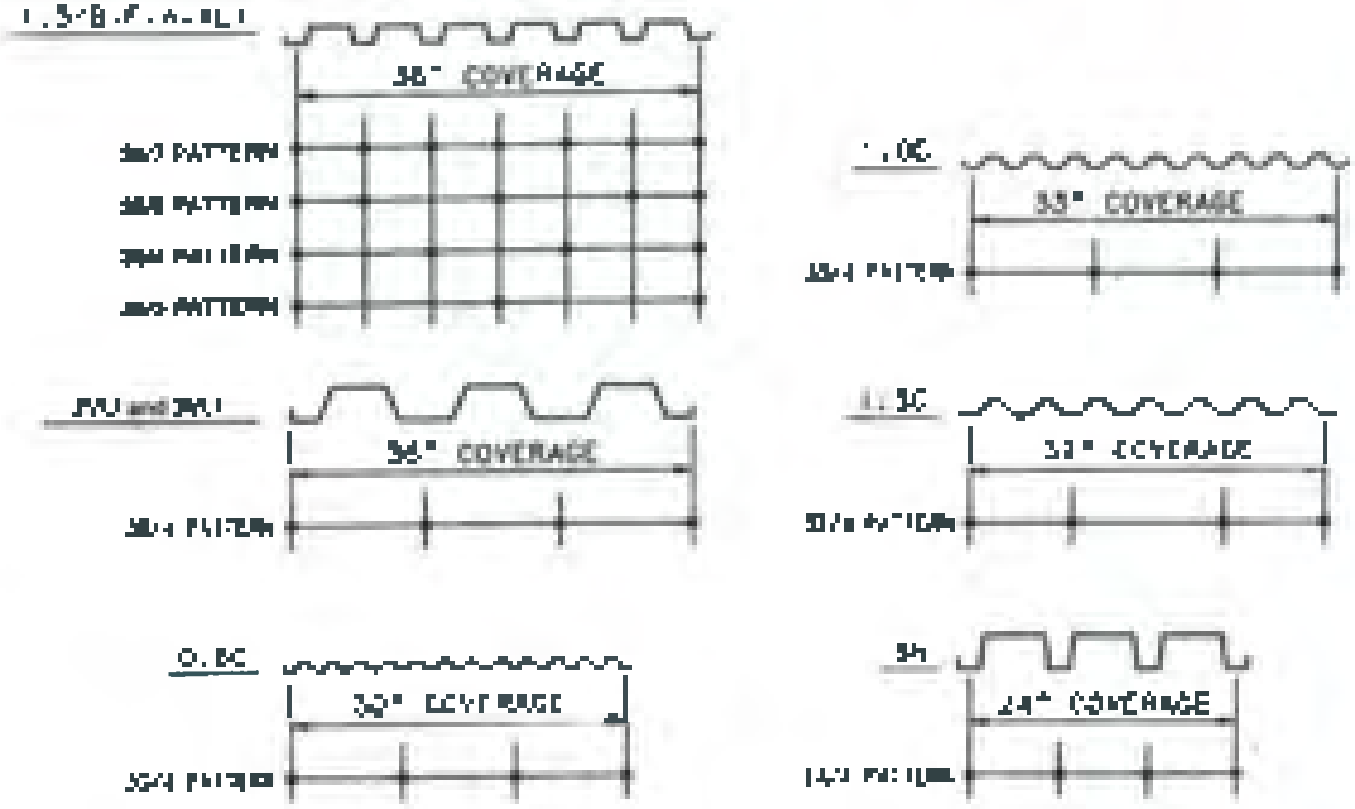
Gage	Span (ft-in)														
20															
18															
16															
14															

[1] Number of puddle welds is 36/span
[2] Gage - 1.5" deep deck
[3] Allowable shear strength is 0.7 times

$$\Delta = \frac{v}{\left(\frac{4Pb^3}{Ebt} + \frac{Pb}{Gt}\right)} \text{ Equation}$$

Where: v = [illegible]; P = [illegible]; b = [illegible]; E = [illegible]; t = [illegible]; G = [illegible]

TYPICAL FASTENER LAYOUT



DIAPHRAGM SHEAR STRENGTH AND STIFFNESS DESIGN EXAMPLE

For roof plan shown, calculate the deflection of diaphragm at ℄ panel joint

Joist spacing = 5'-0"
Deck: 1.5B 22 [illegible] in 10'-0" panels
[illegible] conditions
Fasteners: Support - 5/8" diameter
[illegible] puddle welds
Sidelap - 1 [illegible] TEK

From strength tables K_1 = [illegible]

$$G = \frac{K_2}{3.78 + \frac{0.30 K_2}{\text{Span}} + 3K_1\,\text{Span}} = \frac{[illegible]}{3.78 + \frac{0.30[illegible]}{5} + 3[illegible]} = [illegible]$$

$$\frac{\Delta_{\text{panel}}}{L} = \frac{wL^3}{8GBD} = \frac{0.250[illegible]^3}{8[illegible]} = [illegible]$$

Strength Check

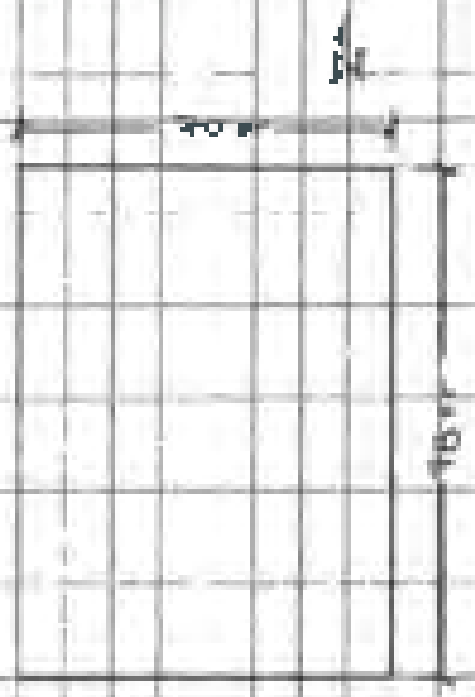
$$R = wL/2 = \frac{350[illegible]}{2} = 7500\text{ lbs} \qquad \theta = \frac{7500}{48} = [illegible]$$

Dekker/Perich/Sabatini

[redacted]

NLVFD STATION #53
095072-01
LATERAL
A-CB 04/24/07
L69

AREA 2:



V = 80,999 lbs.

$\frac{V}{2}$ = 40,472 lbs

- NORTH-SOUTH DIRECTION

$v = \frac{40,472 \text{ lbs}}{78 \text{ FT}} = 519 \text{ PLF}$

- EAST-WEST DIRECTION:

$v = \frac{40,472 \text{ lbs}}{70 \text{ FT}} = 578 \text{ PLF}$

USE ~~TRY~~ 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.)

$v_{allowable}$ = 669 PLF > v_{actual} (578 PLF) : OK

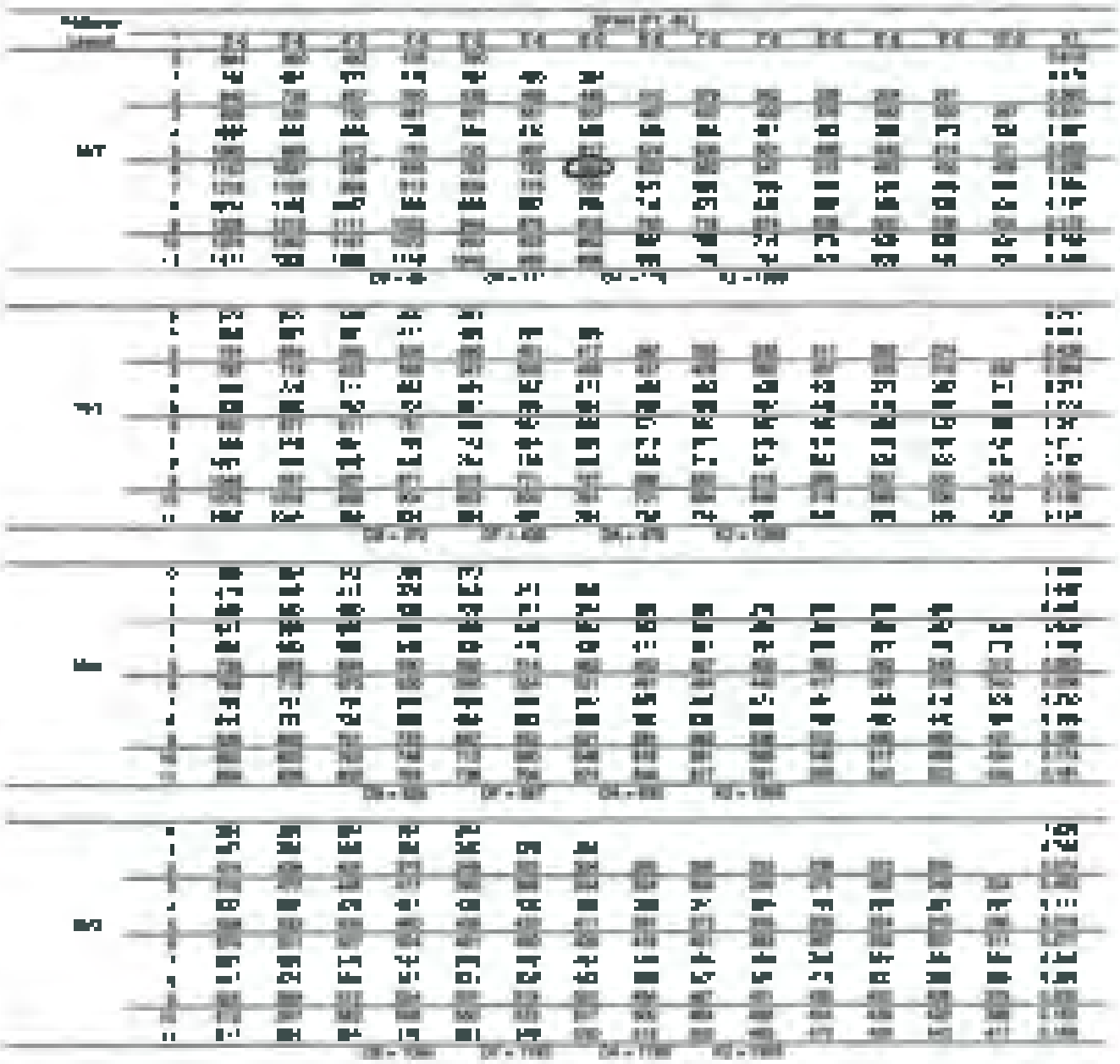
- CHECK DEFLECTION:

$G' = \frac{1.398}{3.78 + \frac{0.3(63)}{6 \text{ IN}} + 3(0.226) \times 6 \text{ FT}} = 127.11$

$\Delta_c = \frac{(0.578 \text{ KLF})(78 \text{ FT})^4}{8(70 \text{ FT})(127.11)} = 0.0494 \text{ INCH} < \frac{l}{240}$

: OK

1.5 φ, P, Aj 18 ALLOWABLE DIAPHRAGM SHEAR STRENGTH (PLF)
SUPPORT FASTENERS: 5/8" puddle welds[1]
SIDELAP FASTENERS: #10 TEK screws



Dekker/Perich/Sabatini

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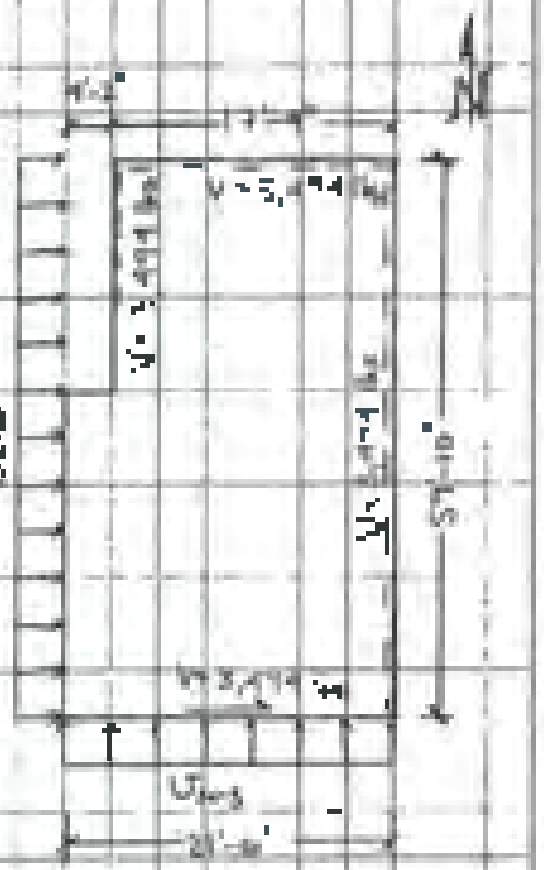
Project: NEWED STADIUM #53
Project No.: 07502-01
Subject: LATERAL
By: AJB Date: 04/25/07
Checked: Date:
Sheet: L71

AREA 3

V = 5,591 lbs

PER 3.3.4 INCREASE IN FORCES DUE TO IRREGULARITIES FOR CAT. D, INCREASE FORCE BY 25% AND DIAPHRAGM CONNECTIONS TO VERTICAL MEMBERS AND FOR COLLECTORS & THEIR CONNECTIONS

V = 5,591 × 1.25 = 6,989 lbs



- NORTH - SOUTH DIRECTION:

$\frac{V}{2} = \frac{6,989 \text{ lbs}}{2} = 3,494 \text{ lbs}$

$V_{uns} = \frac{3,494 \text{ lbs}}{57.83 \text{ ft}} = 60 \text{ plf}$

- EAST - WEST DIRECTION:

$V_{uns} = \frac{3,494 \text{ lbs}}{21.5 \text{ ft}} = 163 \text{ plf}$ CONTROLS

USE 1.5B-22 GA METAL DECK w/ 5/8" PUDDLE WELDS (36/4 PATTERN) w/ #10 TEK SCREWS TO SIDE LAP FASTENERS PER SPAN (2.7 ft)

$V_{allow} = 330$ PLF > V_{actual} (163 PLF) ∴ OK

Weber Jerich Sokolowski

NLUFD STATION #53
03552-01
LATERAL
ATB 04/26/07
LRF

- Check Deflection:

$$G' = \frac{870}{3.98 + \frac{0.3(1.032)}{6\,in} + 3(0.205) \times 6\,ft}$$

$$G = 14.25\ k/in$$

$$\Delta_t = \frac{wl^4}{8BG} = \frac{(0.03\ k/in)(59.87\ in)^4}{8(21.6\ in)(14.25\ k/in)}$$

$$\Delta_t = 0.238\ in < l/240 = 0.24$$

Oehlmann/Perich/Robotini

Project: NLVPD Station 153
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

$w_u = 305$ PLF (controls ~ North-South direction)

$M = \frac{w L^2}{8} = \frac{305 \text{ PLF} (85.33 \text{ ft})^2}{8} = 459{,}626$ in-ft

$T = C = \frac{M}{b} = \frac{459{,}626 \text{ lb-ft}}{129.17 \text{ in}} = 4{,}210$ lbs

USE ~~1~~ 4 L5 × 3 × 1/4 CHORD MEMBER - BEARING

$A = 1.94 \text{ in}^2$

$F_y = 36$ ksi

$F_t = 0.6 F_y = 0.6(36 \text{ ksi}) = 21.6$ ksi

$f_t = \frac{P}{A} = \frac{4{,}210 \text{ lbs}}{1.94 \text{ in}^2} = 2{,}170$ psi $<< F_t$ ∴ OK

CHECK L3 × 3 × 1/4 - NON-BEARING

$A = 1.44 \text{ in}^2$

$f_t = \frac{4{,}210 \text{ lbs}}{1.44 \text{ in}^2} = 2{,}924$ psi $<< F_t$ ∴ OK

USE L5 × 3 × 1/4 @ BEARING WALLS
L3 × 3 × 1/4 @ NON-BEARING WALLS

Dekker/Perich/Sabatini

[redacted]

Project: VLFD Station #53
Job No.: 07202-01
Subject: LATERAL
By: AJB Date: 04/25/07
Sheet: 1.30

DIAPHRAGM CHORD DESIGN - AREA 2

$V_2 = 80{,}999$ lbs

$w = \frac{80{,}999 \text{ lbs}}{78 \text{ ft}} = 1{,}038$ plf

$M = \frac{wl^2}{8} = \frac{(1038 \text{ plf})(78 \text{ ft})^2}{8} = 788{,}379$ lb-ft

$T = C = \frac{M}{b} = \frac{788{,}379 \text{ lb-ft}}{70 \text{ ft}} = 11.27$ k

USE 2 - #5 @ BOND BEAM

$f_t = \frac{P}{A} = \frac{11.27 \text{ k}}{0.61 \text{ in}^2} = 18.48$ ksi
(2 - #5)

$F_t = (0.6) F_y = 0.6(60 \text{ ksi}) = 36$ ksi > 18.5 ksi
∴ OK

∴ 2 - #5 @ BOND BEAM IS ADEQUATE FOR LOADS IN ALL DIRECTIONS IN AREA 2

Jackson/Perick/Sabatini

Project: NWPD Station #53
Job No.: 67502-01
Subject: LATERAL
By: AJB Date: 09/26/97
Sheet: L35

Diaphragm Chord Design - Area 2

* From Area 3 Diaphragm:

$w = 103$ plf (Controls in East West Direction)

$$M = \frac{wl^2}{8} = \frac{(103\ plf)(29.11\ ft)^2}{8} = 73{,}033\ lb\text{-}ft$$

$$T = C = \frac{M}{b} = \frac{73{,}033\ lb\text{-}ft}{21.5\ ft} = 3{,}397\ lbs$$

* Same As Area 1 Chord

USE L5x3x1/4 @ Bearing Walls
L3x3x1/4 @ Non-Bearing Walls

Dekker/Perich/Sabatini

Project: Bayfed Section #53
Project No.: 07502-01
Subject: LATERAL
By: AJB Date: 04/26/07
Sheet: No.
Job: L76 Of

DIAPHRAGM CHORD SPLICE DESIGN

IBC 2204.1 - CONNECTIONS

V_{max} = 40,422 lbs (AREA 2)

- CHECK WELD:

P = (1 in)(4)(0.928)

P = 40.8 k > 40.5 k ∴ OK

(SEE DETAIL C3/S301)

Dekker/Perich/Sabatini

Project: NLVFD Station #53
Project No.: 02502.01
Subject: LATERAL
By: AJB Date: 09/26/01
Checked: Date:
Sheet: L-7

COLLECTOR FORCE DESIGN - AREA 1

SW-C3

$V = 11{,}800$ lbs

$v_{avg} = \frac{11{,}800 \text{ lbs}}{85.33 \text{ ft}} = 138$ plf

$v_{max} = \frac{11{,}800 \text{ lbs}}{38 \text{ ft}} = 103$ plf

NET UNIT SHEAR

MAXIMUM COLLECTOR FORCE 3,771 lbs

USE SIMPSON MSTC40 STRAP TIE w/ T = 4,600 lbs

Dekker/Perich/Sabatini

Project: NLVFD Station #53
Project No.: 07502-01
Subject: LATERAL
By: AJB Date: 09/28/07
Sheet: Of:
Sub: 1.24 Of:

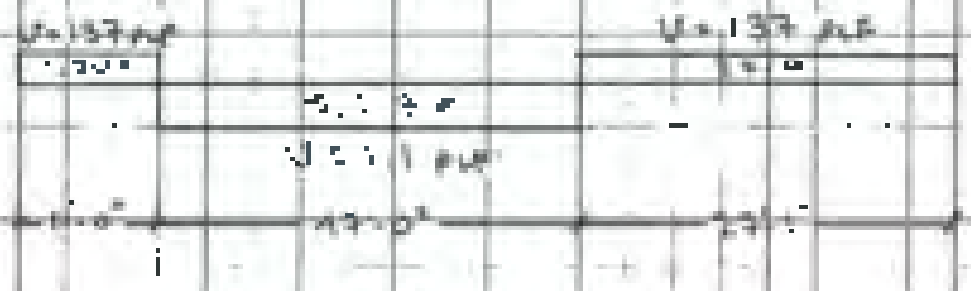
[redacted]

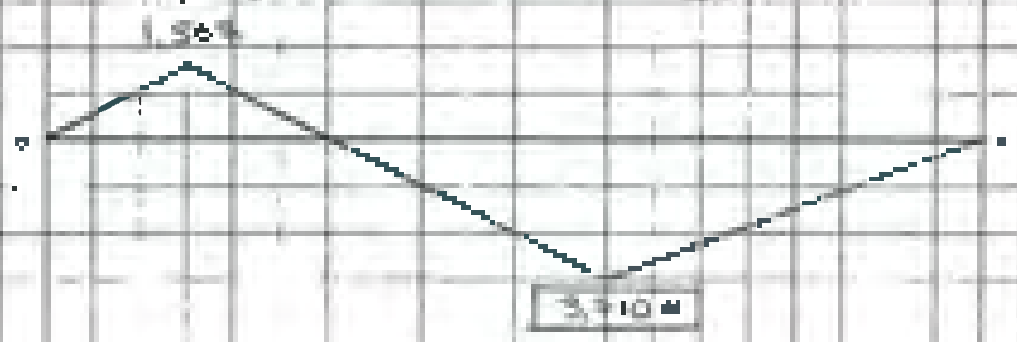
Diaphragm Value SW-E:

V = 11,680 lbs

$V_{roof} = \frac{11,680 \text{ lbs}}{85.33 \text{ ft}} = 137 \text{ plf}$

$V_{walls} = \frac{11,680 \text{ lbs}}{47 \text{ ft}} = 248 \text{ plf}$





Net Unit Shear

Maximum Collector Force 3,910 lbs

USE SIMPSON MST48D STRAP TIE w/ T=4,600 lbs

Dekker/Perich/Sabatini

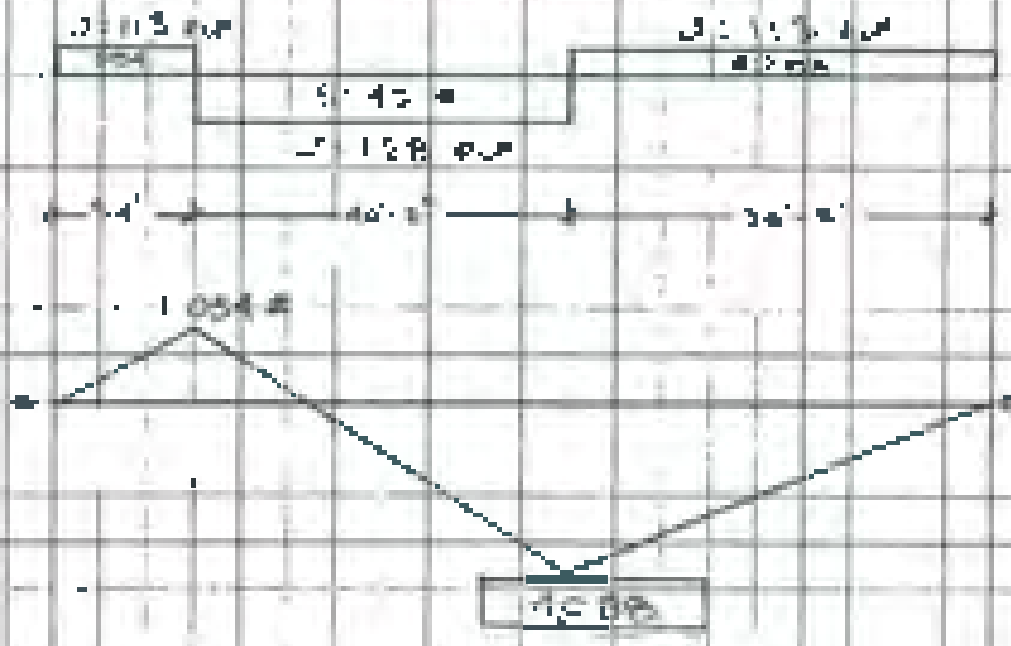
Project Name: NLVFD Station #53
Project No.: 07502-01
Subject: LATERAL
By: AJB Date: 11/13/07
Sheet No.:
Page: 279

Simpson Lower Sw. E.7

$V = 9,660$ lbs

$v_{roof} = \frac{9,660 \text{ lbs}}{85.33 \text{ ft}} = 113$ plf

$v_{wall} = \frac{9,660 \text{ lbs}}{40.0 \text{ ft}} = 241$ plf



Net Unit Shear

Maximum Collector Force 4,088 lbs

USE Simpson MSTC40 Strap Tie w/ T = 4,600 lbs

SIMPSON Strong-Tie

Dettori/Periah/Sabatini

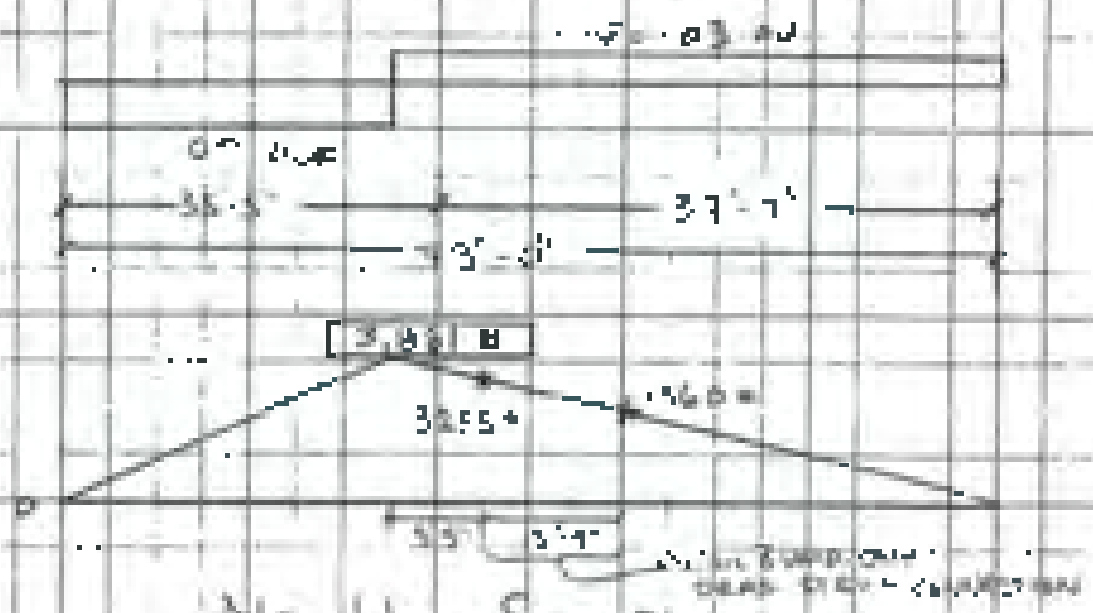
Project Name: NUVEO STADION #53
Project Number: 03502-01
Client: LATERAL
By: AHB Date: 04/30/07
Checked: Date:
Sheet: 1.81

SHEAR WALL SW-6:

$V = 7,530$ lbs

$v_{south} = \frac{7,530 \text{ lbs}}{73.4'} = 103$ PLF

$v_{north} = \frac{7,530 \text{ lbs}}{35.5'} = 212$ PLF



NET UNIT SHEAR

MAXIMUM CONCRETE FORCE 3,821 lb

* DECK SUPPORT ANGLE IS ADEQUATE FOR FORCE TRANSFER

L3x3x1/4 NON BEARING ANGLE
(SEE DIAPHRAGM CHORD DESIGN)

Patterson·Dental·Supply

Project Name: NIVEO Station #53
Project Number: 07501 - 01
Subject: Connection @ Wall Bump-Out
By: 4 B Date: 07/26/07
Checked: Date:
Sheet: 1.02

Shlg. Connection @ Wall Bump-Out

- USE Simpson S/DSC Drag Strut Connector @ Both Ends Wall Bump-Out

$W_{|T} = 4,025$ lbs

(See Simpson Data Sheet)