

MINOS NEAR DETECTOR STRONGBACK LAOD TEST

By Ingrid Fang

January 26, 2000

INTRIDUCTION

The Near Detector Stongback is designed to lift an 8000 pounds load with a single pick up point. The fixture weight is 5400 pounds. The load test plate is made of the scrapped near detector steel plate and 10 additional triangular or rectangular steel plates to obtain 125% lifted load. The load test plate weighs 10000 pounds.

The purpose of this load test is to verify the strongback is able to carry the steel and the scintillator detector plane. Both strongback and the plane will be raised from horizontal to vertical position. The pick up point is designed to prevent the strongback and plane assembly from tilting pass the 90 degree vertical position while suspended from the crane. The maximum angle that can be anticipated will be 87.8 degrees. Two pivot Hilman roller assemblies are also designed to provide a smooth transition from horizontal to vertical orientation.

Four clamping devices are designed to securely hold the plane to the strongback. Further, four additional safety clamping devices are designed to be mounted to the strongback in case the original clamping devices fail during the load test.

The following personnel will be required to perform this load test. They are:

1. Responsible Engineer/ Responsible to provide technical guidance during the load test.
2. Lift Coordinator/ Stationed on the floor. Responsible for coordinating efforts and providing instructions during the lift to other personnel. This person supervises the lift.
3. Crane Operator/ Stationed on the floor. Responsible to operate the crane under the direction of the Lift Coordinator.
4. Guide Line Operators/ Stationed on both sides of the strongback on the floor. Responsible for keeping the strongback straight while the strongback is being raised or lowered during the load test.

LOAD TEST

(1). PREPARATION PROCEDURES

1. Set the Near Strongback on the floor. The pickup point of the strongback should face north toward the Far Supporting Structure.
2. Install two new adjustable ear supporting plates as shown on Near Strongback Load Test drawing.
3. Install two roller pivot brackets as shown on Near Strongback Assembly drawing.
4. Install new lifting shim plate as shown on Near Strongback Load Test drawing.
5. Install 3" lifting plate as shown on Near Strongback Assembly drawing and *make sure this plate is in the extreme highest vertical position.*
6. Install swivel hoist rings on the 3" lifting plate and tighten swivel hoist ring to 800 ft-lbs.
7. Check torque at all bolted connections on the strongback.
8. Inspect welds at all welded connections on the strongback.
9. Set the load test plate on the top of the strongback as shown on Near Strongback Load Test drawing. Slide the bottom of the load test plate to fit under the two supporting lips until the lower edge of the test plate touches the two roller pivot brackets and two supporting lips.
10. Position two new bottom clamping safety plates to touch the face of the load test plate as shown on Near Strongback Load Test drawing. If the gap exists between the new clamping safety plate and the roller pivot bracket, use shim plates as required. Torque attached studs to 25 ft-lbs.
11. Position two new adjustable ear support plates to touch the bottom of the load test plate. Torque attached bolts to 150 ft-lbs.
12. Install two clamping devices on top of the load test plate as shown on Near Strongback Assembly drawing. Torque attached bolts to 150 ft-lbs.

13. Install two new top clamping safety angle weldments at the top of the strongback as shown on Near Strongback Load Test drawing.
14. Install safety rope on both sides of the new lifting lugs of the strongback.
15. Install plumb bob at the center of gravity of the strongback and load test plate assembly on the side of the strongback tube. Mark surface of the tube every half-inch with tape so the plumb bob will reference the lifting angle.
16. Install two Hilman roller attachments. Torque attached bolts to 70 ft-Lbs.
17. Attach the crane with crane scale to the swivel hoist ring to the strongback.

(2). LIFTING PROCEDURE

1. Sweep the floor to remove any debris in the path of the Hilman rollers.
2. Raise the strongback 1" off the floor and hold this position. Check the strongback for any unusual deflections or component failure.
3. Control the strongback rotation with two safety ropes if necessary. *Moving the strongback in east and west direction with the crane is forbidden due to the possibility of jamming the Hilman roller which will cause the top of the strongback to flip over in the direction of the crane movement.*
4. Slowly raise the strongback to approximately 45-degrees and hold this position. Check the strongback for any unusual deflections or component failure.
5. Continue to raise the strongback with the crane while observing the angle of the plumb bob with relationship to the tape reference marks. *After the plumb bob reaches the two-inch mark, lifting must not be stopped until strongback assembly is completely off the ground.* If lifting is stopped within this two-inch range, there is the possibility of the strongback being locked in an absolutely vertical position. If this happens, the crane can push the top of the strongback forward causing the strongback assembly to become unstable and fall in that direction. Please note that the strongback and load test assembly will naturally hang at a 2-degree backward angle.
6. Carefully hold the strongback in this position for 15 minutes. Check the strongback for any unusual deflections or component failure during this time period.

7. After the time is up, get the responsible engineer's permission to begin lowering the strongback to its original floor position. Use the Hilman rollers again to lower the strongback to the floor. Load test is now complete.
8. If the strongback falls forward, allow the assembly to completely stop moving and stabilize before taking any corrective action. Slightly lifting the assembly, slowly back-up crane until the desired 2-degree backward tilt angle is regained. Repeat procedure 5, 6 and 7.

The following signatures on this sheet indicates that everyone has read and understands the near detector strongback load test procedure.

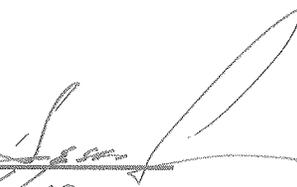
1. BoB Morrison, Lift Coordinator

Signature: 
Date: 02/04/00

2. Jim Kilmer, Guide Line Operator

Signature: 
Date: 2/4/00

3. Jesse Guerra, Guide Line Operator

Signature: 
Date: 2/4/00

4. Brine Lavoy, Crane Operator

Signature: 
Date: 2/4/00

4. Ingrid Fang, Responsible Engineer

Signature: 
Date: 2/4/00

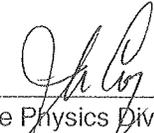
**OPERATION READINESS CLEARANCE FOR
LIFTING AND HANGING FOUR MINOS NEAR
DETECTOR PROTOTYPE PLANES ON TO
THE NEAR SUPPORT STRUCTURE**

Submitted By: MINOS Mechanical Engineer: Ingrid Fang

Date: February 23, 2000

REVIEWED AND APPROVED BY

DATE



Particle Physics Division Head

2/28/00

Comments/Exceptions:



Particle Physics Senior Safety Officer

28 Feb 2000

Comments/Exceptions:



Minos Safety Review Committee Chair

2/25/2000

Comments/Exceptions:



Minos Project Manager / Deputy Head

2/25/00

Comments/Exceptions:

Electronic approvals for this form are acceptable. Please forward your responses to all recipients. A signed paper form of this document will exist in the Minos ORC Sign off Book.

ingrid fang

From: keith schuh <schuh@fnal.gov>
To: ingrid fang <ingridf@fnal.gov>; John W. Cooper <jcooper@fnal.gov>
Cc: Jim Kilmer <kilmer@fnal.gov>; Tom Nicol <TNicol@fnal.gov>; T.J. Sarlina <sarlina@fnal.gov>; Mark Reichanadter <Reich@fnal.gov>; Robert Plunkett <plunk@fnal.gov>; Bob morrison <bmorrison@fnal.gov>
Sent: Friday, February 25, 2000 8:36 AM
Subject: Re: Revised Near Detector Plane Lifting and Hanging Procedure and JHA

John and Ingrid,

The Minos ES&H Mechanical Review Sub-Committee has reviewed the Lifting and Hanging procedures, and JHA for installation of the four plane prototype. We recommend that the ORC for lifting and hanging the planes be approved.

The lifting fixture has been previously approve and it has been load tested. The Sub-Committee would like to witness the first lift if we are around, so please send out an invitation to let us know when that will be.

2/25/00

Ingrid Fang

From: ingrid fang <ingridf@fnal.gov>
To: ingrid fang <ingridf@fnal.gov>; keith schuh <schuh@fnal.gov>; Jim Kilmer <kilmer@fnal.gov>; Tom Nicol <TNicol@fnal.gov>; T.J. Sarlina <sarlina@fnal.gov>; Mark Reichenadter <Reich@fnal.gov>
Cc: Robert Plunkett <plunk@fnal.gov>; Bob morrison <bmorrison@fnal.gov>
Sent: Wednesday, February 23, 2000 1:59 PM
Attach: Minos Near Detector Plane Lifting Procedure -.doc; Near Detector Plane Lifting and Hanging Hazard.doc; SIGN OFF SHEET.doc
Subject: Revised Near Detector Plane Lifting and Hanging Procedure and JHA

Dear Keith,

Thanks for your help with the JHA samples. I incorporated them to my Near Detector Plane Lifting and Hanging hazard analysis.

I also appreciate your help with the Near Detector Plane Lifting and Hanging Procedure. I also incorporated your changes in my revised procedure.

The following documents are attached without drawings for your review. They are

1. Near Detector Plan Lifting and Hanging Hazard Analysis.
2. Near Detector Plan Lifting and Hanging Procedure (revised).
3. ORC Sign off sheet.

Thanks again for your help.

Ingrid Fang
FermiLab
630-840-8725
ingridf@fnal.gov

PPD Work Plan/Hazard Analysis

JOB NAME: Lifting and Hanging Four Minos Near Detector Prototype Planes on to the Near Support Structure

LOCATION: New Muon Lab

ESTIMATED START DATE: March 1, 2000

ESTIMATED JOB DURATION OR END DATE: May 1, 2000

WORK TO BE PERFORMED BY: MINOS Personnel

RESPONSIBLE ENGINEER: Ingrid Fang x 8725

TASK MANAGER: Bob Morrison x2851

DESCRIPTION OF WORK:

This job is to lift and hang four Minos Near Detector Prototype Planes on to the Near Support Structure. The plane will be mounted on the top of the Near Detector Strongback, which is designed to lift an 8000-pound load with a single pick up point. The strongback and plate assembly will be raised into a vertical orientation by the building crane onto the Near Support Structure. The details of this job are outlined under Minos Near Detector Plane Lifting and Hanging Procedure. An experienced crew of Minos personnel will conduct all lifting and hanging operation.

ASSOCIATED HAZARDS:

1. Mechanical Hazards: Lifting and hanging heavy objects as described under Minos Near Detector Plane Lifting and Hanging Procedure.
2. Work at Elevations: Personnel will be working from ladders.

PLANNED MITIGATION OF HAZARDS:

1. Experienced personnel will be conducting the operation as follows:

The task manager, **Bob Morrison**, will function as crew foreman and will act as lifting and hanging coordinator to the operation. He will assure that the Minos Near Detector Plane Lifting and Hanging Procedure is followed. Bob has previously participated in Minos Far Detector Plane Lifting and Hanging operation and is well versed in the task. In the absence of the task manager, the work will cease.

The responsible engineer, **Ingrid Fang**, will be present to supply technical guidance during the operation and to insure all prerequisites have been completed.

Brine Lavoy will function as the crane operator responsible for operating the crane under the direction of the lifting and hanging coordinator.

Mike Mascione and Jesse Guerra will function as the guideline operators responsible for performing all prerequisites outlined under 3.A. of Minos Near Detector Plane Lifting and Hanging Procedure. The guideline operators are also responsible for the following:

- a.** keeping the plane straight with the rails on the Near Support Structure while the plane is being raised and moved into position. While the plane is being lowered, each guideline operator watches his side of the plane, correcting the movement of the strongback assembly as directed by the lifting and hanging coordinator.
- b.** watching the location of the plane with respect to the Near Support Structure rail during the hanging operation.
- c.** Releasing the clamping device after the plane has been set on the Near Support Structure.
- d.** Installing or releasing the axial bolts at four corner of the plane.
- e.** Inspecting the plane to make sure it is secured to the Near Support Structure during plane installation.
- f.** Inspecting the plane to make sure it is disengaged from the Near Support Structure during plane removal.
- g.** Installing or releasing the C clamps on the top of the Near Detector Plane.

2. Personnel will wear hand protection and sturdy work boots for foot protection.
3. Personnel utilizing platform and man lifts will have lift training.
4. Personnel working at elevations above six feet will wear properly anchored safety harnesses.
5. Personnel are required to wear hard hats in the area of operations.
6. A pre-operational meeting will be held with the crewmembers on the first day to discuss the work to be performed. A similar meeting will be held prior to the start of work on each additional day that work covered under this permit is performed.

WORK PARTY (NAMES, TITLES IN THIS TASK):

1. Bob Morrison, Task Manager/ Lifting and Hanging Coordinator
2. Ingrid Fang, Responsible Engineer
3. Brine Lavoy, Crane Operator
4. Mike Mascione, Guideline Operator
5. Jesse Guerra, Guideline Operator

PREPARED BY: Ingrid Fang DATE: February 23, 2000

APPROVED BY: _____ DATE: _____

DETAILS ON NOTIFICATION / APPROVAL BY OTHER DIVISIONS

***MINOS
NEAR DETECTOR PLANE
LIFTING AND HANGING PROCEDURE***

BY INGRID FANG

REVISED VERSION

FEBRUARY 22, 2000

Approvals:

Minos Project Manager

Date

PPD Head

Date

1. PURPOSE

The purpose of this procedure is to present the method to be used to lift and to hang the Minos near detector prototype planes on to the near support structure.

2. KEY PERSONNEL AND RESPONSIBILITIES

- **Responsible Engineer**
Required to be present to supply technical guidance during the lifting and hanging process and to insure all prerequisites have been completed.
- **Lifting and Hanging Coordinator**
Stationed on the floor on the south side of the near support structure. He is responsible for coordinating efforts and providing instructions during the lifting and hanging to the other personnel. This person supervises the lifting and hanging.
- **Crane operator**
Stationed on the floor on the south side. He is responsible for the operation of the crane under the direction of the Lifting and hanging Coordinator.
- **Guideline operators**
One guideline operator will be stationed on both north and south sides of the plane on the floor OUTSIDE the compression rails. They are responsible for the following:
 - a. Performing all prerequisites under 3.A.
 - b. Keeping the plane straight with the rails while the plane is being raised and moved into position. While the plane is being lowered, each guideline operator watches his side of the plane, correcting the movement of the strongback assembly as directed by the lifting and hanging coordinator.
 - c. Watching the location of the plane with respect to the near support structure rail during the hanging operation.
 - d. Releasing the clamping device after the plane has been set on the near support structure.
 - e. Installing or releasing the axial bolts at four corner of the plane.

- f. Inspecting the plane to make sure it is secured to the near support structure during plane installation.
- g. Inspecting the plane to make sure it is disengaged from the near support structure during plane removal.
- h. Installing and releasing the C clamps on the top of the near detector.

3. LIFTING PROCEDURE

A. PREREQUISITES

- The floor must be cleaned to remove any debris in the path of the Hilman rollers prior to setting the strongback down.
Initial: _____
- Check proper torque at all bolted connections on the strongback as shown on the drawings of 9213.300-ME-384094 and 9213.300-ME-384185.
Initial: _____
- Inspect the crane, slings, shackles, plate clamps, swivel hoist rings, C-clamps and come-a-longs according to DOE HOISTING AND RIGGING MANUAL-1090, current edition.
Initial: _____
- Use commercial plate clamps and building crane to position the steel plate on the top of the strongback. Attach 10,000 pounds capacity sling to one of the four the lugs provided on the strongback. Attach a swivel hoist ring into one of the two slots in the top of the plate. Attach the 5-ton capacity come-a-long between the swivel hoist ring and sling. Operate the come-a-long to slide the plate as required to fit under the two supporting lips. The lower edge of the plate must touch the two roller pivot brackets and two supporting lips.
Initial: _____
- Position two adjustable ear support plates to touch the bottom of the plate. Torque attached bolts to 150 ft-lbs.
Initial: _____
- Install two clamping devices on top of the plate as shown on drawing 9213.300-ME-384185. Torque attached bolts to 150 ft-lbs.

Initial: _____

- Install guide lines on both sides of the lifting lugs of the strongback.
Initial: _____
- Install plumb bob at the center of gravity of the strongback assembly on the side of the strongback tube. Mark surface of the tube every half-inch with tape so the plumb bob will reference the lifting angle. Please note that the use of the plumb bob is intended as a safety measure only.
Initial: _____
- Install two Hilman roller attachments to the top of the Hilman rollers. Torque attached bolts to 70 ft-lbs. Attach Hilman roller assembly to the strongback using roller pivot pin secure with hairpin cotter.
Initial: _____
- Attach the crane with crane scale to the swivel hoist ring to the strongback assembly.
Initial: _____
- Before the lift the responsible engineer will review this procedure with all of the participants in the lift.
Initial: _____

B. LIFING THE PLANE OFF THE FLOOR

- Begin to lift the strongback assembly while the rollers support the bottom portion of the strongback assembly.
- Control the strongback assembly rotation with two guidelines if necessary.
- **While the Hilman rollers are on the floor, moving the strongback assembly in east and west direction with the trolley is forbidden. This could jam the Hilman roller, which will result in the top of the strongback assembly flipping over in the direction of the crane movement.**
- Slowly raise the strongback assembly with the crane while observing the angle of the plumb bob with relationship to the tape reference marks. **After the plumb bob reaches the designated mark, lifting must not be stopped until strongback assembly is completely off the ground.** If lifting is stopped

within this range, there is the possibility of the strongback assembly being locked in an absolutely vertical position. If this happens, the crane can push the top of the strongback forward causing the strongback assembly to become unstable and fall in that direction. **Please note that the strongback assembly will naturally hang at a 2.2-degree backward angle.**

4. POSITIONING THE PLANE ON THE NEAR SUPPORT STRUCTURE

- Raise the hanging strongback assembly until the ears will clear the rails on the near support structure by 3-4 inches.
- Adjust the hanging strongback assembly so that it is square with the rail on the near support structure using the guidelines.
- Once the strongback assembly is in the desired position, slowly move the plane over the rails until the plane touches the near detector bookend. **Remember do not bang the bookend with the first plane. After the first plane has been hung, do not bang the previous plate while installing the next plate.**
- The first plane will be bolted against the near detector bookend. The remaining planes will be connected through axial bolts at the four corner of the plane. **Since the strongback assembly will naturally hang at a 2.2-degree backward angle, the top of the plane will have to be pulled plumb by moving the trolley east less than 5 ½ inches.** After the plane is against the bookend the guideline operators take up positions as the spotters.
- Adjust the strongback assembly in the north and south direction until the north spotter confirms that the 4" flat area on the ear is directly over the 4" rail.
- The plane is now in position to be lowered on the near support structure.

5. UNLOADING THE PLANE ONTO THE NEAR SUPPORT STRUCTURE

- Cautiously lower the strongback assembly. The lifting and hanging coordinator watches the scale and controls the unloading sequence.
- Check the position of the strongback assembly.

- Continue to lower the strongback assembly until the scale reads just about 5400lbs. **At this load reading the strongback is completely unloaded of the weight of the plane.**
- Clamp the plane to the near bookend using C clamps. Unloading the plane onto the near support structure is complete.

6. SECURING THE PLANE

- Guideline Operators shall position ladders as required to bolt the plane to the top of the near detector bookend at two upper corners. Torque attached bolts to 100 ft-lbs.
- Guideline Operators shall install the axial bolts at two lower corners of the plane. Torque attached bolts to 100 ft-lbs.
- **Guideline Operators shall inspect the plane and make sure it is secured on the near support structure.**

7. RELEASING THE STRONGBACK FROM THE PLANE

- Guideline Operators shall release the C clamps on the top of the near detector bookend.
- Guideline Operators shall loosen the 1 1/8" clamping bolts of the clamping devices on both sides of the strongback assembly while the plane bears its own weight on the rails of the near support structure. **The short helical compression spring will release the clamping plate as shown on drawing of 9213.300-ME-384185. The clamping plate will drop to clear the plane. Please keep hands and feet clear of the plate while loosening the bolts.**
- Lower the strongback about 3 inches to disengage the plane off the two bottom supporting lips.
- **Inspect the strongback and make sure it is no longer coupled to the plane.**
- Slowly move the strongback to the west away from the hanging plane. **Stop if any movement of the plane is noticed.**

- Continue to move the strongback until it is in the area where it can be lowered to the floor.

8. LOWERING THE STRONGBACK WITH NO PLANE ON IT

- The floor must be cleaned to remove any debris in the path of the Hilman rollers prior to setting the strongback down.
- Adjust the hanging strongback rotation using the guidelines if necessary.
- Lower the strongback until the Hilman rollers touch the floor. **Please note that the pick up point is designed to prevent the strongback from tilting past the 90 degree vertical position while suspended from the crane. The maximum angle that can be anticipated will be 85.5 degrees.**
- After the Hilman rollers have contacted the ground, lower the strongback into its starting position using the crane.

9. MOUNTING A HANGING PLANE TO THE STRONGBACK

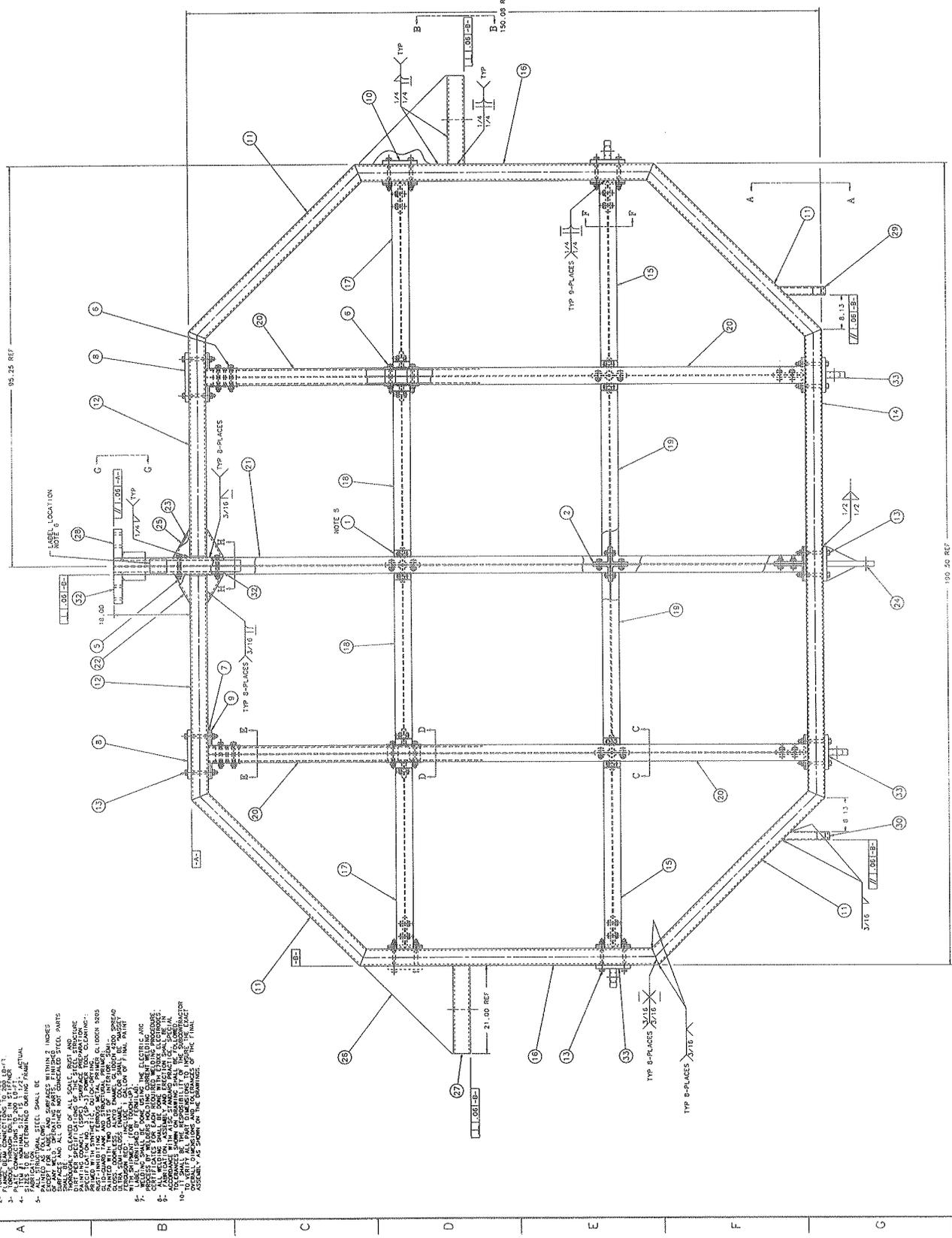
- Bring the strongback up near to the plane using Procedures NO.3 and NO.4.
- Slowly move the strongback into contact with the plane. **Do not bang into the plane.**
- After the bottom of the strongback contacts the plane, slowly move the trolley to the east until the strongback is flat on the plane surface.
- Slowly lower the strongback vertically until the two supporting lips pass the bottom of the plane.
- Slowly raise the strongback vertically until the plane fits under the two supporting lips.
- **Continue to raise the strongback with the crane until the plane touches the two roller pivot brackets and two supporting lips.**
- Position two adjustable ear support plates to touch the bottom of the plane. Torque attached bolts to 150 ft-lbs.

- Install two clamping devices on top of the plane as shown on drawing 9213.300-ME-384185. Torque attached bolts to 150 ft-lbs.
- Inspect the strongback and make sure all clamps are engaged as shown on the drawing 9213.300-ME-384185.
- Remove the four axial bolts from the plane at the top and bottom corners. **Inspect the plane and make sure it is no longer coupled to the next plane.**
- Raise the strongback assembly off the near support structure 3”~4” above the rails. **The lifting and hanging coordinator shall check the crane scale to insure the load of 13400-pound is not exceeded.** This indicates that one or more axial bolts are still engaged with the adjacent plane or the near bookend. **Check all of the clamps on the strongback and make sure they stay engaged all the time.**
- Move the strongback assembly to the west out of the area of the near support structure. Guideline operators keep the strongback assembly square with the near support structure during the move.

10. LOWERING THE STRONGBACK WITH A PLANE ON IT

- The floor must be cleaned to remove any debris in the path of the Hilman rollers prior to setting the strongback down.
- Adjust the hanging strongback assembly rotation using the guidelines.
- Lower the strongback until the Hilman rollers touch the floor. **Please note that the pick up pint is designed to prevent the strongback and plane assembly from tilting past the 90 degree vertical position while suspended from the crane. The maximum angle that can be anticipated will be 87.8 degrees.**
- **After the Hilman rollers have contacted the ground, lower the strongback into its starting position using the crane.**

REV	DESCRIPTION	DATE
A	INITIAL DESIGN AND CONSTRUCTION OF THE V.I.C. M. SUPPORT	10-1-55

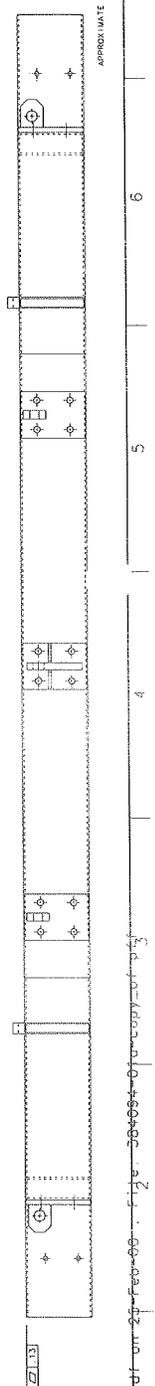


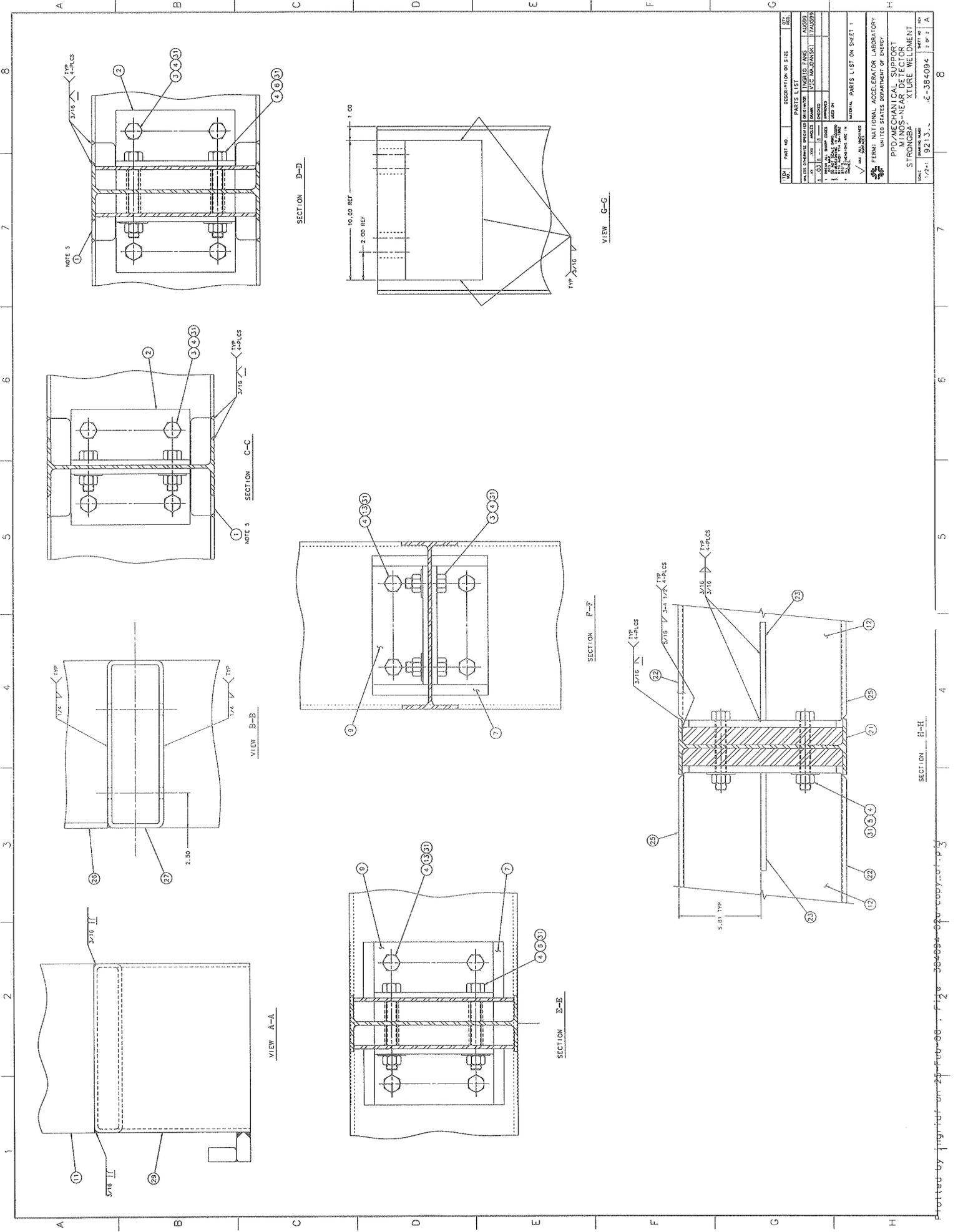
REV	DESCRIPTION	DATE
A	INITIAL DESIGN AND CONSTRUCTION OF THE V.I.C. M. SUPPORT	10-1-55

REV	DESCRIPTION	DATE
32	MC-384099 PLATE-OUTSIDE SMALL WELDMENT	4
31	MC-384197 WELDMENT, L.H.	1
30	MC-384163-2 WELDMENT SUPPORTING LIP L.H.	1
29	MC-384163-1 WELDMENT SUPPORTING LIP R.H.	1
28	MC-384156 WELDMENT, R.H.	1
27	MC-384135 TONGUE-CLAMPING DEVICE	2
26	MC-384134 CASSET PLATE-CLAMPING DEVICE UPPER	2
25	MC-384133 CASSET PLATE-CLAMPING DEVICE LOWER	2
24	MC-384130 LIFTING LUG WELDMENT	1
23	MC-384129 CASSET PLATE-UPPER AND LOWER	4
22	MC-384116 WELDMENT WELDMENT CENTER	1
21	MC-384114 BEAM-HORIZONTAL CENTER VERTICAL	2
20	MC-384113 BEAM-HORIZONTAL CENTER UPPER	2
19	MC-384112 BEAM-HORIZONTAL CENTER LOWER	2
18	MC-384111 TUBE-SLIDE	2
17	MC-384110 BEAM-HORIZONTAL LOWER	1
16	MC-384109 TUBE-480TOM	2
15	MC-384108 TUBE-480TOM	2
14	MC-384107 TUBE-480TOM	2
13	MC-384106 TUBE-480TOM	2
12	MC-384105 TUBE-OUTSIDE SMALL	4
11	MC-384104 ANGLE-BRACKET	2
10	MC-384103 PLATE-OUTSIDE LARGE	2
9	MC-384102 PLATE-SPACER	2
8	MC-384101 PLATE-SPACER	2
7	MC-384100 PLATE-OUTSIDE SMALL	4
6	MC-384099 ANGLE-BRACKET	2
5	MC-384098 ANGLE-BRACKET	2
4	MC-384097 PLATE	2
3	MC-384096 PLATE	2
2	MC-384095 PLATE	2
1	MC-384094 PLATE	2

NOTES:

- 1- OWNER'S DRAWING SHALL BE IN FORCE.
- 2- DIMENSIONS TO UNLESS OTHERWISE NOTED.
- 3- FINISH SHALL BE AS SHOWN ON THE DRAWING.
- 4- ALL DIMENSIONS ARE TO UNLESS OTHERWISE NOTED.
- 5- PARTS TO BE DETERMINED DURING FABRICATION.
- 6- ALL DIMENSIONS SHALL BE IN INCHES.
- 7- ALL DIMENSIONS SHALL BE TO UNLESS OTHERWISE NOTED.
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- 32- ALL DIMENSIONS SHALL BE TO UNLESS OTHERWISE NOTED.





ITEM	PART NO.	DESCRIPTION OR SIZE	QTY.
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3	000	WELDED FANS	1
4	000	WELDED FANS	1
5	000	WELDED FANS	1
6	000	WELDED FANS	1
7	000	WELDED FANS	1
8	000	WELDED FANS	1
9	000	WELDED FANS	1
10	000	WELDED FANS	1
11	000	WELDED FANS	1
12	000	WELDED FANS	1
13	000	WELDED FANS	1
14	000	WELDED FANS	1
15	000	WELDED FANS	1
16	000	WELDED FANS	1
17	000	WELDED FANS	1
18	000	WELDED FANS	1
19	000	WELDED FANS	1
20	000	WELDED FANS	1
21	000	WELDED FANS	1
22	000	WELDED FANS	1
23	000	WELDED FANS	1
24	000	WELDED FANS	1
25	000	WELDED FANS	1

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- 1 - The first picture shows the lift coordinator give the final instruction to the Guideline operator.
- 2 - The second picture shows the first portion of the lift. The strongback assembly is supported by the crane and the two Hilman rollers.
- 3 - The third picture shows the strongback assembly is being lifted in a 45° position. We stopped and checked for any obvious signs of deflection. Nothing was found.
- 4 - The fourth picture shows the strongback assembly is initially being lifted off the floor and is supported by the crane entirely.
- 5 - The fifth picture shows that Jim Kilmer is checking the backward angle on the strongback assembly while it is supported by the crane. The angle is about 2° as designed.

6- The sixth picture shows that two safety clamps on the top which were welded to the strongback to prevent the plane from falling off the strongback in case the two original clamping devices failed. as you can see from the gap between the plane and the ear, the two original clamping devices performed flawlessly.

7- This is the picture showing the crane scale. The scale indicates the total weight of the strongback and the test load. The actual weight will be 25% less.

8- This is the picture showing how the two clamping devices worked.

9. - This is the picture showing the strongback assembly being lowered down to the floor. Because of the 2° backward angle, it is not necessary to pull the bottom of the plane to get the strongback assembly fall back into the position to be lowered.

10 - This is the final picture showing the crane is doing the strongback assembly to the floor.





