LES - Bartow Facility Drum Storage Building Certification Report

December 1997

Prepared By

ViroGroup
Air • Water • Soil
TECHNOLOGY

ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone (803) 957-6270
FAX (803) 957-3845

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Department ... Environmental Protection
SOUTHWEST DISTRICT
BY

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ViroGroup
Technology for Today's Environment

ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-6270
FAX 803-957-3845

December 8, 1997

Denny Walton, Capital Projects Director
Laidlaw Environmental Services, Inc.
P.O. Box 11393
Columbia, SC 29211

Re: Drum Storage Building Quality Assurance Certification Report
ViroGroup Project No.12-32804.DO

Dear Mr. Walton:

ViroGroup, Inc. (ViroGroup) has been contracted by Laidlaw Environmental Services, Inc. to perform quality assurance services and RCRA certification for the above referenced project. The facility which consists of an enclosed drum storage building is designed to perform as secondary containment for storage of hazardous waste with primary containment consisting of storage drums. The design plans and specifications used for bidding and construction of the facility are dated December 5, 1996 and August 19, 1996 respectively. The plans were revised during construction to provide specific water stop details dated, May 21, 1997 and are presented in Appendix 1.

The construction of the structure was initiated in March 1997 and was completed in December 1997. During the construction ViroGroup made seven (7) site visits sporadically throughout the construction sequence to provide quality assurance inspections of in-progress and completed aspects of the facility structure. During these site visits ViroGroup project engineers observed the condition and methodology of completed and in progress work. LES contracted with Ardaman Associates (a local engineering materials testing company) either directly or through the general contractor (SEMCO) for quality control work during construction. LES also provided a construction manager on-site on a part time basis throughout the construction.

This report is separated into two main sections with the first section presenting ViroGroup's quality assurance documentation and certification that the facility was constructed in general accordance with project plans and specifications and the second section presenting the data ViroGroup has used in evaluating and providing a certification that the containment portion and other aspects of the structure meets the intent of RCRA regulations, specifically 40 CFR 264 Subpart I.

Section I
Quality Assurance Report

As indicated ViroGroup made seven visits to the facility during construction to document the procedures, methodologies and progress of construction. These visits were supplemented by data received from Ardaman and Associates with respect to soil, concrete, and reinforcing steel and data from the LES on-site construction manager with respect to other aspects of construction. During construction ViroGroup received the following shop drawing submittals and subsequently approved all final submittals:

1. Steel pre-engineered main structure - by Whirlwind - approved by Gene Amick, May 11, 1997
2. Electrical system installation - by RAYBRO - approved by John Evans, March 17, 1997
3. Foundation system - by SEMCO - approved by John W. Bale
4. Fire suppression system - by Wiginton Fire Sprinklers, Inc., - approved by John D. Miles, July 16, 1997

The attached as-built drawings have been prepared by the following representatives for each primary section of the construction and have been used in our evaluation as to whether the facility was constructed in general accordance with the project plans and specifications:

1. Foundation plan - John W. Bale - Appendix 2
2. Floor plan - John D. Miles - Appendix 2
3. Electrical plan - Horace Kirkland - Appendix 2
4. Fire suppression system - John D. Miles - Appendix 3
5. Structural Steel - John D. Nelson
6. Foam House - John D. Miles - Appendix 4

Based on the attached as-built plans (Appendices 2, 3, and 4), our periodic visits and data received from the LES construction manager and Ardaman Associates (Appendices 5 geotechnical report, 6 soils testing, 7 reinforcement inspections, 8 concrete testing, 9 concrete mix design) it is our professional opinion that the facility has been constructed in general accordance with the revised plans and specifications.

Section 2
RCRA Certification

As indicated ViroGroup has also been retained to provide professional certification of the RCRA aspect of the facility. As outlined in 40CFR 264 Subpart I "Use and Management of Containers" RCRA requires that storage facilities of drums containing hazardous waste must meet the following criteria:

1. A container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste.

2. At least weekly, the owner or operator must inspect areas where containers are stored, looking for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors.

3. Container storage areas must have a containment system that is designed and operated in accordance with the following,

   (a) A base must underly the containers which is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed;

   (b) The base must be sloped or the containment system must be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation, unless the containers are elevated or are otherwise protected from contact with accumulated liquids;

   (c) The containment system must have sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be considered in this determination;

   (d) Run-on into the containment system must be prevented unless the collection system has sufficient excess capacity in addition to that required in paragraph c above to contain any run-on which might enter the system; and

(e) Spilled or leaked waste and accumulated precipitation must be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system.

4. containers holding ignitable or reactive waste must be located at least 15 meters (50 feet) from the facility's property line.

5. Incompatible wastes, or incompatible wastes and materials (see Appendix V for examples), must not be placed in the same container, unless §264.17(b) is complied with.

6. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

ViroGroup has based our evaluation of the constructed facility with respect to RCRA guidelines on the above mentioned criteria. Several of the items are operational procedures and not related to construction of the facility. This report addresses only those items which are construction oriented as discussed in the following paragraphs.

Items 1, 2, 3e, 6 and part of item 5 are operational procedures and therefore are not addressed in this report. Methodologies for verifying items 3a, 3b, 3c, 3d, 4, and part of 5 are as follows:

3a. ViroGroup has used the following mechanisms for evaluating the integrity of the base of the structure:

1. Daily reports prepared by Ardaman Associates on inspections and observations they made on the following: foundation subgrade, floor slab subgrade, reinforcing steel, and concrete characteristics. Refer to appendix 6, 7 and 8 for daily reports on soils, concrete and reinforcing steel and Appendix 9 for concrete mix designs approved for the project. The geotechnical report outlining subsurface conditions and foundation design is included in appendix 5.

2. Hydrostatic testing of the completed cells performed and documented by the Laidlaw Environmental Services Construction Manager. Test results of the hydrostatic testing are presented in appendix 10.

3. Visual observations of the concrete for identifiable cracking.

3b. Visual observations were made to verify that the individual cells each sloped to a low spot to allow collection of spills. Refer to the attached as-built drawings (Appendix 2).

3c. Measurements were performed of each secondary containment cell after completion and the volume calculations are presented in appendix 11.

3d. The structure is constructed as a dock high facility which restricts all run -on.

5. The operational plan identifies internal methods of identifying individual waste streams. For physical separation once waste streams are identified, compatible and non compatible wastes can be separated because the facility is constructed with adjacent cells separated by an internal concrete dike (Appendix 1 and 2).

Based on our evaluations it is our professional opinion that the facility has been constructed in a manner which will allow it to function as intended in accordance with 40 CFR 264 Subpart I.

ViroGroup appreciates the opportunity to provide you with our professional services. Should you have any questions please call us.

Sincerely,
ViroGroup, Inc.

Sean Higgins
for John W. Bale, P.E.
Project Engineer

Reviewed by:

Charles S. Higgins, Jr., P.E.
Principal Engineer
FL # 0034452

JWB/lr

CERTIFICATION OF COMPLETION OF CONSTRUCTION

The hazardous waste container storage building for the Laidlaw Environmental Services of Bartow, Inc. facility located at 170 Bartow Municipal Airport, Bartow, Florida has been constructed in substantial accordance with the specific conditions of Construction Permit HC53-294150, as described in this certification report. Minor revisions are depicted in the attached As-Built Drawings. I certify that this document and the As-Built Drawings were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons or persons responsible for the construction of the building, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Laidlaw Environmental Services of Bartow, Inc.
Facility EPA I.D. Number

FLD 980729610
Facility

Charles S. Higgins, Jr., P.E.
Principal Engineer
FL# 0034452

Original Certification of December 8, 1997

CERTIFICATION OF COMPLETION OF CONSTRUCTION

The hazardous waste container storage building for the Laidlaw Environmental Services of Bartow, Inc. facility located at 170 Bartow Municipal Airport, Bartow, Florida has been constructed in substantial accordance with the specific conditions of Construction Permit HC53-294150, as described in this certification report. Minor revisions are depicted in the attached As-Built Drawings. I certify that this document and the As-Built Drawings were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons or persons responsible for the construction of the building, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

FLD 980 729 610

Facility EPA I.D. Number

Laidlaw Environmental Services of Bartow, Inc.

Facility

Charles S. Higgins, Jr., P.E.
Principal Engineer
FL# 0034452
12/9/97

LES - Bartow Facility
Drum Storage Building
Certification Report

Appendices

December 1997

Prepared By

ViroGroup
Air • Water • Soil
TECHNOLOGY

ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone (803) 957-6270
FAX (803) 957-3845

APPENDICES

1. Revised Construction Plans
2. Building Foundation/Electrical As-Builts
3. Pre-Engineered Metal Building As-Builts
4. Fire Suppression System As-Builts
5. Geotechnical Exploration, Foundation Analysis and Design
6. Quality Control Data and Report for Foundation Preparation
7. Quality Control for Reinforcing Steel Inspection
8. Concrete Test Results
9. Concrete Mix Designs and Submittals
10. Secondary Containment Hydostatic Test Results
11. Secondary Containment Volume Calculations

APPENDIX 1

Revised Construction Plans

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DRUM STORAGE BUILDING

PREPARED FOR

LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.

BARTOW, FLORIDA

SEPTEMBER 24, 1996

LIST OF DRAWINGS

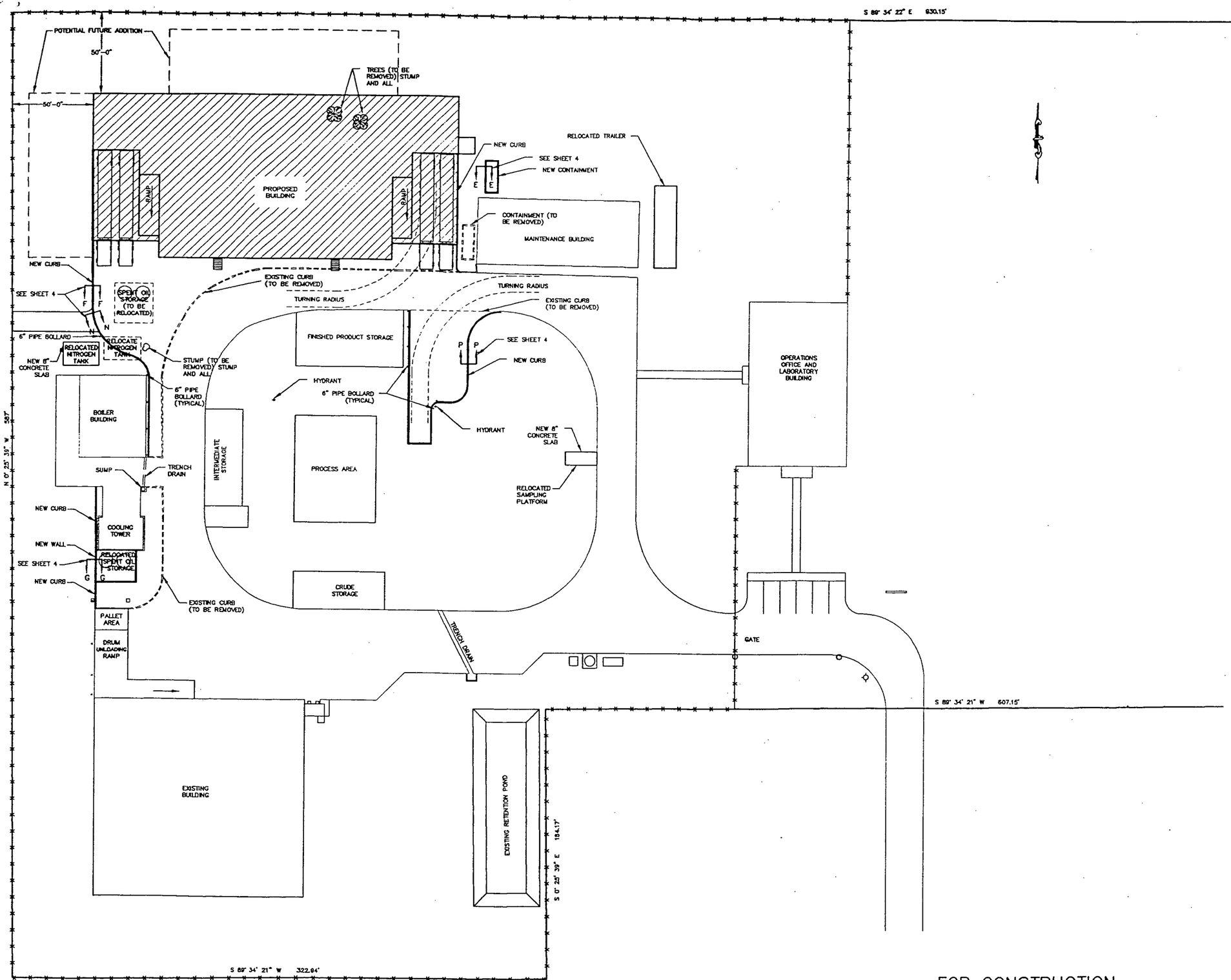
SHEET NO.	TITLE
1	COVER SHEET
2	SITE MAP
3	FLOOR PLAN
4	SECTIONS AND DETAILS
5	WASTE FLOW PLAN
6	SPRINKLER SYSTEM PLAN
7	PIPING SCHEMATIC
8	ROOF PLAN
9	DEMOLITION & RELOCATION PLAN
10	GRADING PLAN
11	ELEVATION VIEWS
S1	STRUCTURAL LAYOUT
S2	STRUCTURAL LAYOUT
E1	ELECTRICAL SYSTEM PLAN
E2	ELECTRICAL SYSTEM PLAN

prepared by

ViroGroup
Air • Water • Soil
TECHNOLOGY

ETE Division

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		



SCOPE OF WORK

1. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO CONSTRUCT THE NEW BUILDING IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS.
2. CONTRACTOR SHALL PERFORM ALL CONSTRUCTION IN ACCORDANCE WITH THE STANDARD BUILDING CODE 1991 EDITION.
3. CONTRACTOR SHALL PERFORM ALL CONSTRUCTION IN ACCORDANCE WITH THE STATE OF FLORIDA AND POLK COUNTY BUILDING CODES. CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS.
4. THE CONTRACTOR SHALL ACCOMPLISH ALL DEMOLITION AND DISPOSAL IN ACCORDANCE WITH THE STATE OF FLORIDA AND POLK COUNTY REGULATIONS. THIS SHALL BE DONE WITHOUT DISRUPTING THE OWNERS OPERATION IN THE SURROUNDING BUILDINGS. SHOULD THERE BE A REQUIREMENT TO INTERRUPT SERVICES TO THE OTHER FACILITIES THE OUTAGE SHALL BE SCHEDULED WITH THE OWNER 48 HRS IN ADVANCE.
5. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO DEMOLISH AND DISPOSE OF REQUIRED CONCRETE AND ASPHALT. ALL DEBRIS SHALL BELONG TO THE CONTRACTOR AND SHALL BE DISPOSED OF IN ACCORDANCE WITH STATE AND COUNTY REGULATIONS.
6. THE CONTRACTOR SHALL SCHEDULE AND CONDUCT THE WORK SO AS TO MINIMIZE DOWN TIME FOR THE OWNER. ALL WORK SHALL BE SCHEDULED WITH THE OWNER 2 WEEKS PRIOR TO STARTING WORK.
7. THE CONTRACTOR SHALL SUBMIT TO THE OWNER A DETAILED WORK PLAN SHOWING TASK SCHEDULING AND TIME FRAME FOR ALL TASKS. THIS PLAN SHALL BE APPROVED BY THE OWNER BEFORE STARTING WORK. THIS PLAN SHALL BE DEVELOPED BASED ON MINIMUM DOWN TIME FOR THE OWNER. THE PLAN SHALL BE UPDATED WEEKLY DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RELOCATING ALL ELECTRICAL, WATER, AND COMPRESSED AIR LINES SO AS TO PROVIDE SERVICES AS INDICATED ON DRAWINGS AND INCLUDED IN SPECIFICATIONS.
9. THE PRE-ENGINEER BUILDINGS SHALL BE CONSTRUCTED TO PROVIDE FOR 12 #/SF SNOW LOAD, 110 MPH WIND LOAD, AND A LIVE LOAD OF 20 #/SF. THE SEISMIC LOADING SHALL BE DESIGNED FOR AA OF .05% AND AV OF .05%. DRAWINGS, SPECIFICATIONS, AND CALCULATIONS SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL. ALL DRAWINGS, SPECIFICATIONS, AND CALCULATIONS SHALL BE SEALED BY AN ENGINEER REGISTERED IN THE STATE OF FLORIDA.
10. BUILDING SHALL BE BUTLER WIDESPAN OR APPROVED EQUAL. FRAME SHALL BE LRF TYPE #1 FOR MAIN BUILDING & LRSS TYPE #1 FOR WINGS. ROOF SHALL BE MR-24 24 GA., WALLS SHALL BE BUTLERIB II 26 GA. ALL FINISH SHALL BE EQUAL TO THOSE AS SPECIFIED BY BUTLER. COLORS WILL BE SELECTED BY THE OWNER.
11. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL THE POTABLE WATER SYSTEM TO INCLUDE, SAFETY SHOWERS, EYE WASHER.
12. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL THE POWER DISTRIBUTION SYSTEM AND LIGHTING SYSTEM.
13. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL THE COMPRESSED AIR SYSTEM. TAP EXISTING LINE ALONG CURB IN FRONT OF NEW BUILDING.
14. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL FIRE SUPPRESSION SYSTEM IN ACCORDANCE WITH NFPA REQUIREMENTS AND UL APPROVAL.

FOR CONSTRUCTION

ViroGroup, Inc.
Air•Water•Soil TECHNOLOGY
ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-8270
FAX 803-957-3845
Watts 1-800-786-0654

LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING SITE PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3002
APPROVED BY:	CEJ	PROJECT NO:	12-32803.D1
SCALE:	1"=60'	SHEET NO.	2 OF 11

CELL	DIMENSIONS FT.	VOLUME Cu.Ft.	CONTAINMENT GALLONS
CELL A	34.83x5x4.5x14.33x39.33x19.33	188.6	1,410.73
CELL B	28.5x19.33x32.26x14.33x3.75x5	154.68	1,157
CELL C	22x19.33x22x19.33	106.32	795.27
CELL D	28.5x19.33x28.5x19.33	137.73	1,030.27
CELL E	22x19.33x22x19.33	106.32	795.27
CELL F	28.5x5x3.75x14.33x32.26x19.33	154.68	1,157
CELL G	34.83x5x4.5x14.33x39.33x19.33	188.6	1,410.73
CELL H	35x27.34x35x27.34	239.23	1,789.44
CELL I	28.33x27.34x28.33x27.34	193.64	1,448.39
CELL J	23.5x27.75x23.5x27.75	163.03	1,219.46
CELL K	23.5x27.75x23.5x27.75	163.03	1,219.46
CELL L	15.67x15.95x2.67x2.67x2.67x8.29x15.67x26.92	103.65	775.3
CELL M	23.5x27.75x23.5x27.75	163.03	1,219.46
CELL N	23.5x27.75x23.5x27.75	163.03	1,219.46
CELL O	15.83x27.25x15.83x27.25	207.69	1,553.52
CELL P	35x27.34x35x27.34	239.23	1,789.44
CELL Q	28.33x27.34x28.33x27.34	193.64	1,448.39

REVISION 1

FOR CONSTRUCTION

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Watts 1-800-786-0654

LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

DRUM STORAGE BUILDING FLOOR PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	32853003
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	1"=20'	SHEET NO.	3 OF 11

NO.	REVISION	DATE	BY
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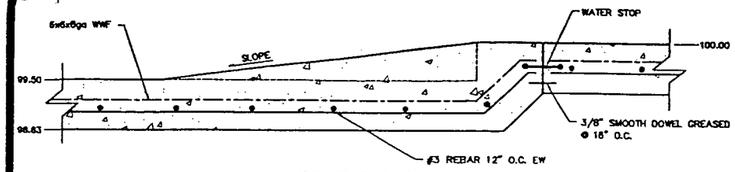
	WATER STOP REVISIONS		



SECTION L-L
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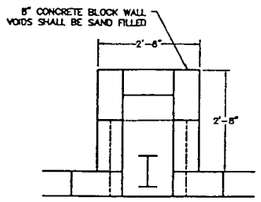
(SEE SHEET 3)



DETAIL A
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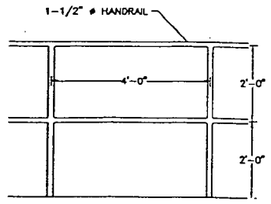
(SEE SHEET 3)



TYPICAL HANDRAIL DETAIL
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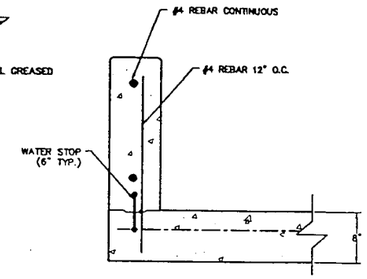
(SEE SHEET 3)



SECTION G-G & E-E
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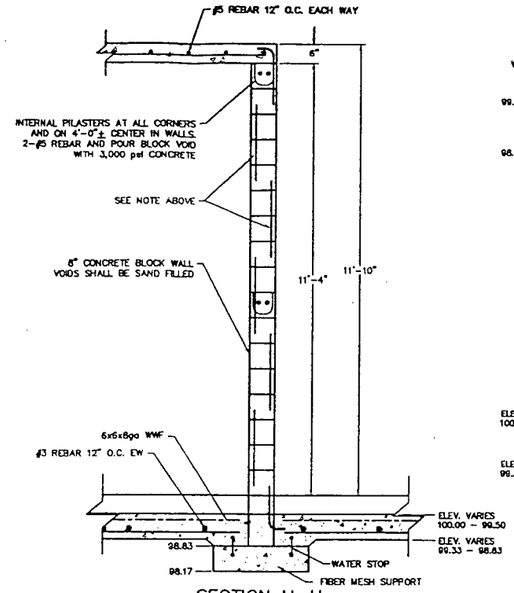

SECTION H-H
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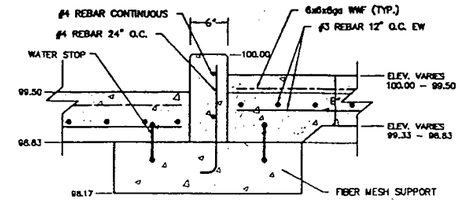
(SEE SHEET 3)



SECTION I-I
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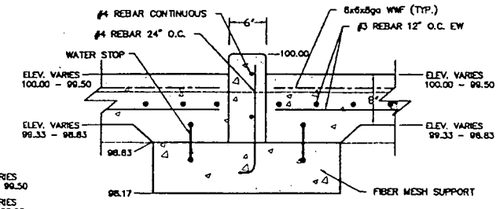

SECTION J-J
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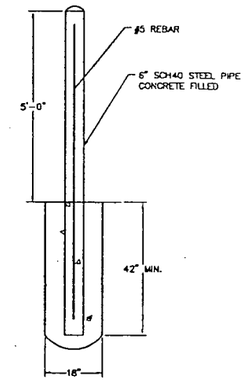

TYPICAL PIPE BOLLARD DETAIL
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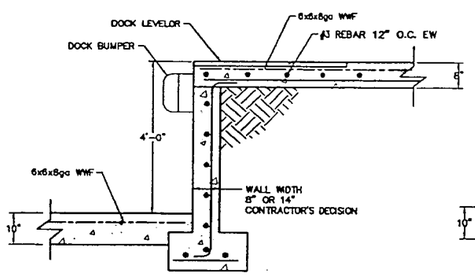
(SEE SHEET 3)



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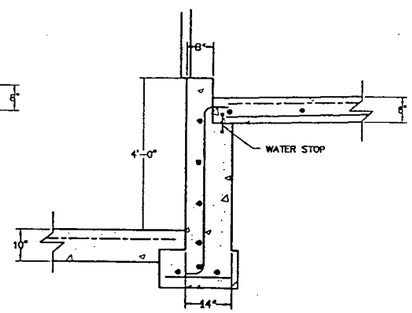

SECTION M-M
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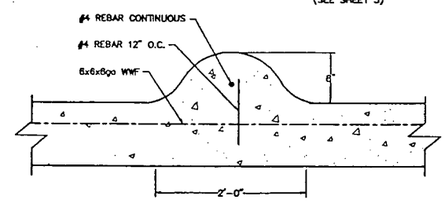
(SEE SHEET 3)



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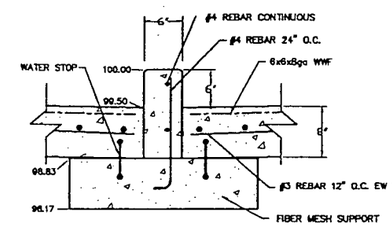

SECTION K-K
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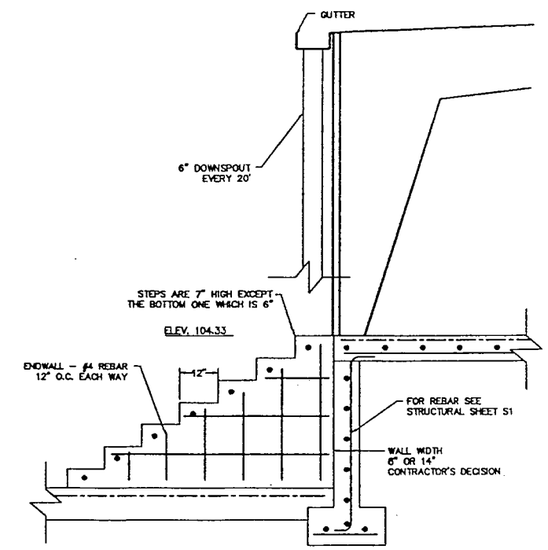

SECTION D-D
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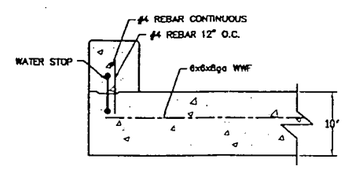
(SEE SHEET 3)



SECTION F-F & P-P
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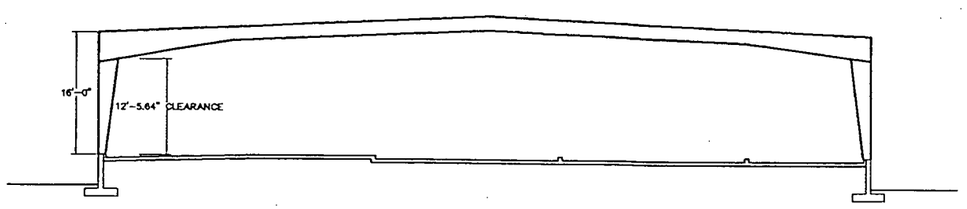
(SEE SHEET 2)



SECTION B-B
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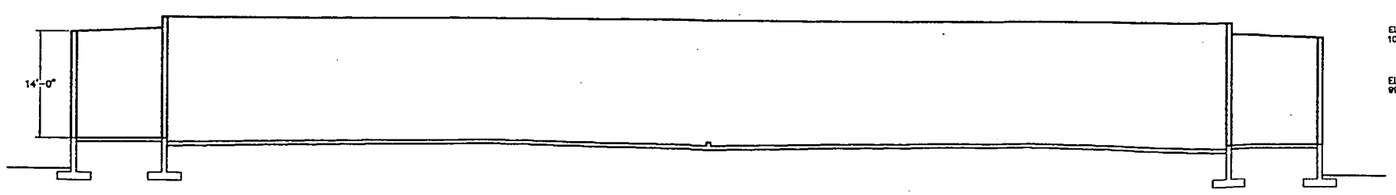
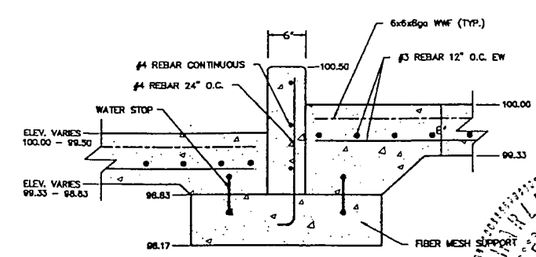


SECTION A-A
SCALE: 1" = 20'
(SEE SHEET 3)



SECTION C-C
SCALE: 1/2" = 1'
(SEE SHEET 3)

FOR CONSTRUCTION

ViroGroup
Air • Water • Soil
TECHNOLOGY
ViroGroup, Inc.
1445 Pleasant Church Road
Lexington, SC 29072
Phone 803-957-8270
FAX 803-957-3845
Wette 1-800-786-0654

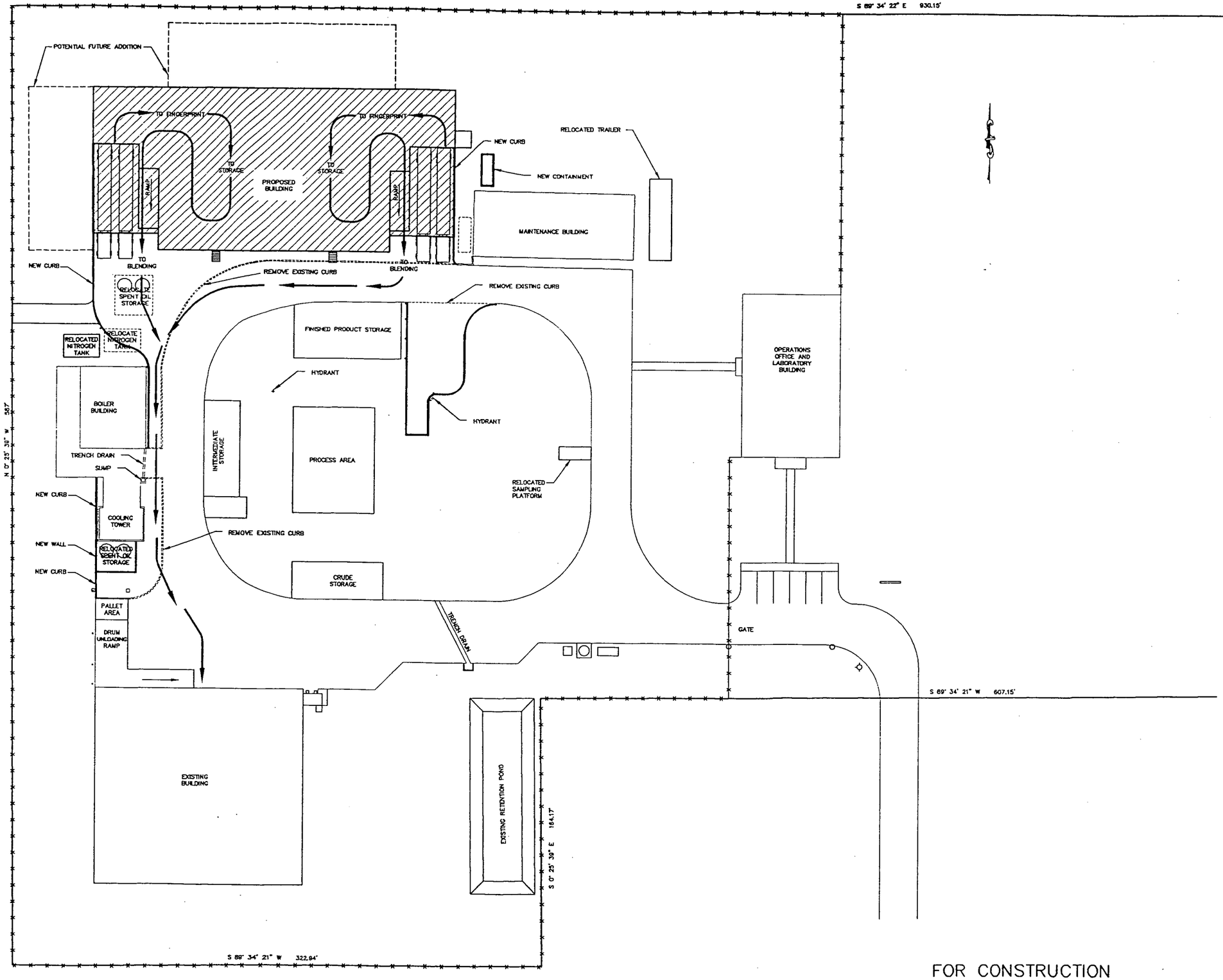
LAIDLAW
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING SECTIONS & DETAILS

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3004
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	AS SHOWN	SHEET NO.	4 OF 11

CHARLES E. JOHNSON
No. 32452
STATE OF FLORIDA
REGISTERED ENGINEER
MAY 97

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR WATER STOP REVISIONS	5/21/97	JKB



FOR CONSTRUCTION

ViroGroup Air•Water•Soil TECHNOLOGY

ViroGroup, Inc.
1443 Pleasant Church Road
Lexington, SC 29072
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FAX 803-957-3845
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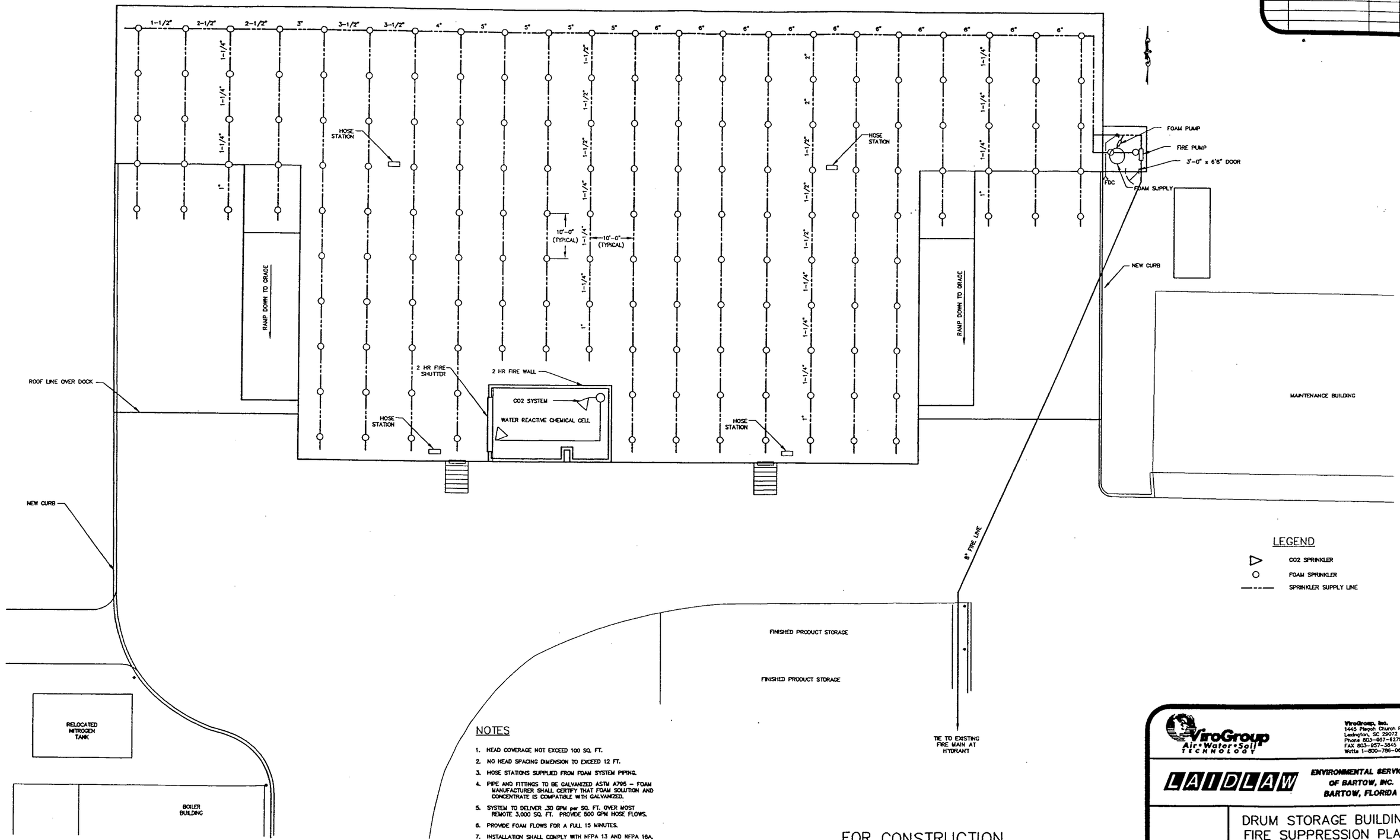
LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

DRUM STORAGE BUILDING WASTE FLOW PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3005
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	1"=60'	SHEET NO.	5 OF 11

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		



LEGEND

- ▷ CO2 SPRINKLER
- ○ FOAM SPRINKLER
- ---- SPRINKLER SUPPLY LINE

NOTES

1. HEAD COVERAGE NOT EXCEED 100 SQ. FT.
2. NO HEAD SPACING DIMENSION TO EXCEED 12 FT.
3. HOSE STATIONS SUPPLIED FROM FOAM SYSTEM PIPING.
4. PIPE AND FITTINGS TO BE GALVANIZED ASTM A795 – FOAM MANUFACTURER SHALL CERTIFY THAT FOAM SOLUTION AND CONCENTRATE IS COMPATIBLE WITH GALVANIZED.
5. SYSTEM TO DELIVER .30 GPM per SQ. FT. OVER MOST REMOTE 3,000 SQ. FT. PROVIDE 500 GPM HOSE FLOWS.
6. PROVIDE FOAM FLOWS FOR A FULL 15 MINUTES.
7. INSTALLATION SHALL COMPLY WITH NFPA 13 AND NFPA 16A.

FOR CONSTRUCTION

ViroGroup Air•Water•Soil TECHNOLOGY

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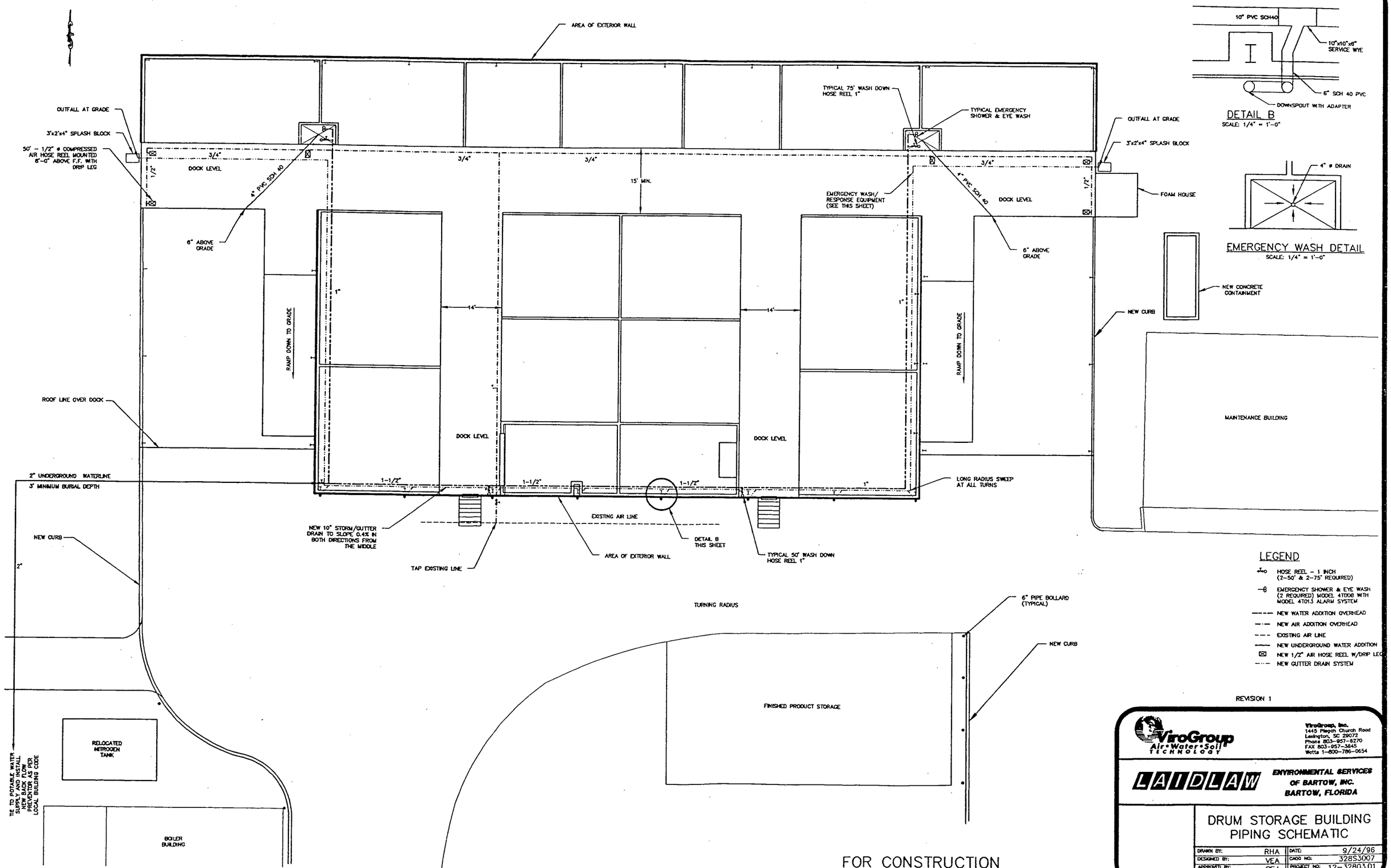
LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

DRUM STORAGE BUILDING FIRE SUPPRESSION PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3006
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	1"=20'	SHEET NO. 6	OF 11


AREA OF EXTERIOR WALL
OUTFALL AT GRADE
3"x2'x4" SPLASH BLOCK
50' - 1/2" ø COMPRESSED AIR HOSE REEL MOUNTED 8'-0" ABOVE F.F. WITH DRIP LEG
3/4"
1/2"
DOCK LEVEL
4" PVC SCH 40
6" ABOVE GRADE
15' MIN.
TYPICAL 75' WASH DOWN HOSE REEL 1"
TYPICAL EMERGENCY SHOWER & EYE WASH
EMERGENCY WASH/ RESPONSE EQUIPMENT (SEE THIS SHEET)
OUTFALL AT GRADE
3"x2'x4" SPLASH BLOCK
FOAM HOUSE
RAMP DOWN TO GRADE
1"
14"
ROOF LINE OVER DOCK
DOCK LEVEL
1-1/2"
2" UNDERGROUND WATERLINE
3' MINIMUM BURIAL DEPTH
NEW 10" STORM/GUTTER DRAIN TO SLOPE 0.4% IN BOTH DIRECTIONS FROM THE MIDDLE
TAP EXISTING LINE
EXISTING AIR LINE
AREA OF EXTERIOR WALL
DETAIL B THIS SHEET
TYPICAL 50' WASH DOWN HOSE REEL 1"
LONG RADIUS SWEEP AT ALL TURNS
NEW CURB
2"
TURNING RADIUS
6" PIPE BOLLARD (TYPICAL)
FINISHED PRODUCT STORAGE
RELOCATED NITROGEN TANK
TIE TO POTABLE WATER SUPPLY AND INSTALL NEW BACK FLOW PREVENTOR AS PER LOCAL BUILDING CODE
BOILER BUILDING
10" PVC SCH40
10"x10"x6" SERVICE WYE
6" SCH 40 PVC
DOWNSPOUT WITH ADAPTER
DETAIL B
SCALE: 1/4" = 1'-0"
4" ø DRAIN
EMERGENCY WASH DETAIL
SCALE: 1/4" = 1'-0"
NEW CONCRETE CONTAINMENT
MAINTENANCE BUILDING
LEGEND
HOSE REEL - 1 INCH (2-50' & 2-75' REQUIRED)
EMERGENCY SHOWER & EYE WASH (2 REQUIRED) MODEL 41008 WITH MODEL 41013 ALARM SYSTEM
NEW WATER ADDITION OVERHEAD
NEW AIR ADDITION OVERHEAD
EXISTING AIR LINE
NEW UNDERGROUND WATER ADDITION
NEW 1/2" AIR HOSE REEL W/DRIP LEG
NEW GUTTER DRAIN SYSTEM
REVISION 1
ViroGroup Air•Water•Soil TECHNOLOGY
ViroGroup, Inc.
1445 Piedmont Church Road
Lexington, SC 29072
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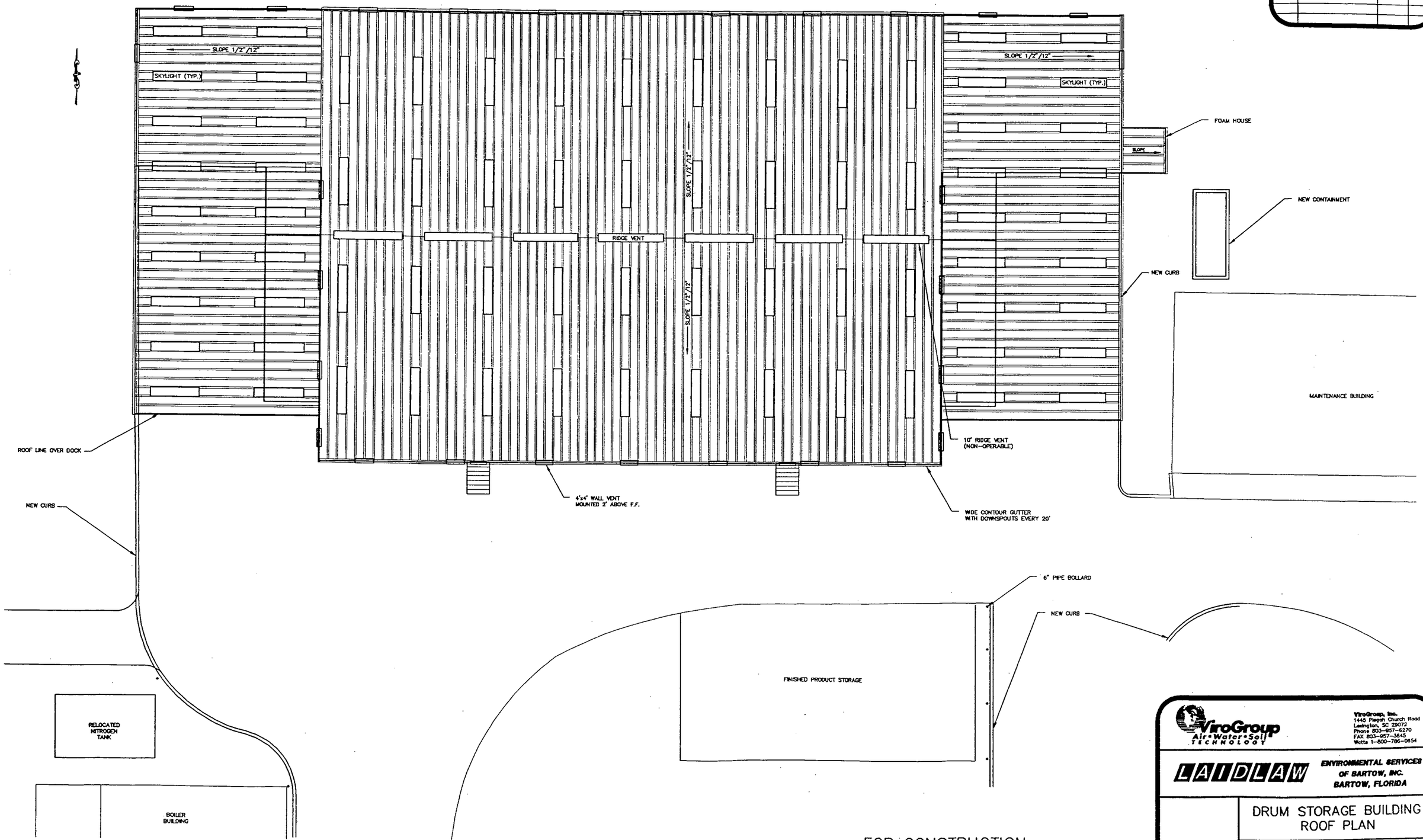
FAX 803-957-3845
Watts 1-800-786-0654
LAIDLAW
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA
DRUM STORAGE BUILDING
PIPING SCHEMATIC
DRAWN BY: RHA
DATE: 9/24/96
DESIGNED BY: VEA
CADD NO: 328S3007
APPROVED BY: CEJ
PROJECT NO: 12-32803.01
SCALE: 1"=20'
SHEET NO. 7 OF 11
FOR CONSTRUCTION

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		



FOR CONSTRUCTION

ViroGroup Air•Water•Soil TECHNOLOGY

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1443 Pleasant Church Road
Lexington, SC 29072
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FAX 803-957-3645
Wattz 1-800-786-0654

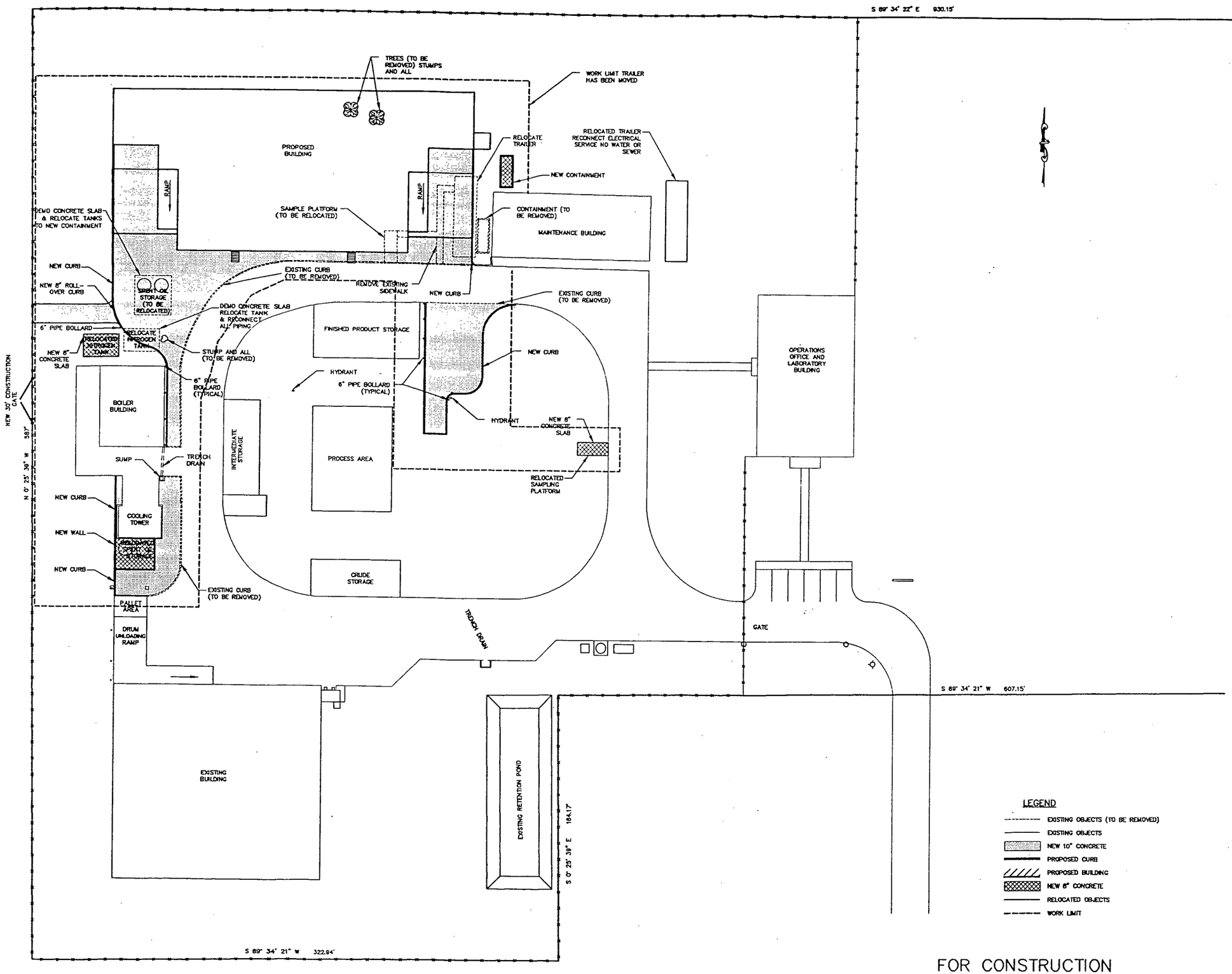
LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING ROOF PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3008
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	1"=20'	SHEET NO.	8 OF 11

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		



NOTES

1. TEMPORARY CURB SHALL BE INSTALLED AT ALL LOCATIONS WHERE EXISTING CURB IS BEING REMOVED. USE 6" REINFORCED WHEEL STOPS SEALED AT ALL END JOINTS AND VERTICLE SEAMS.
2. ALL COLD JOINTS SHALL HAVE INTERNAL SEALS AND BE CAULKED WITH HYDROCARBON RESISTANT MATERIAL.

LEGEND

- EXISTING OBJECTS (TO BE REMOVED)
- EXISTING OBJECTS
- NEW 10" CONCRETE
- PROPOSED CURB
- PROPOSED BUILDING
- NEW 6" CONCRETE
- RELOCATED OBJECTS
- WORK LIMIT

FOR CONSTRUCTION

ViroGroup Air•Water•Soil TECHNOLOGY

ViroGroup, Inc.
1445 Plaugh Church Road
Lexington, SC 29072
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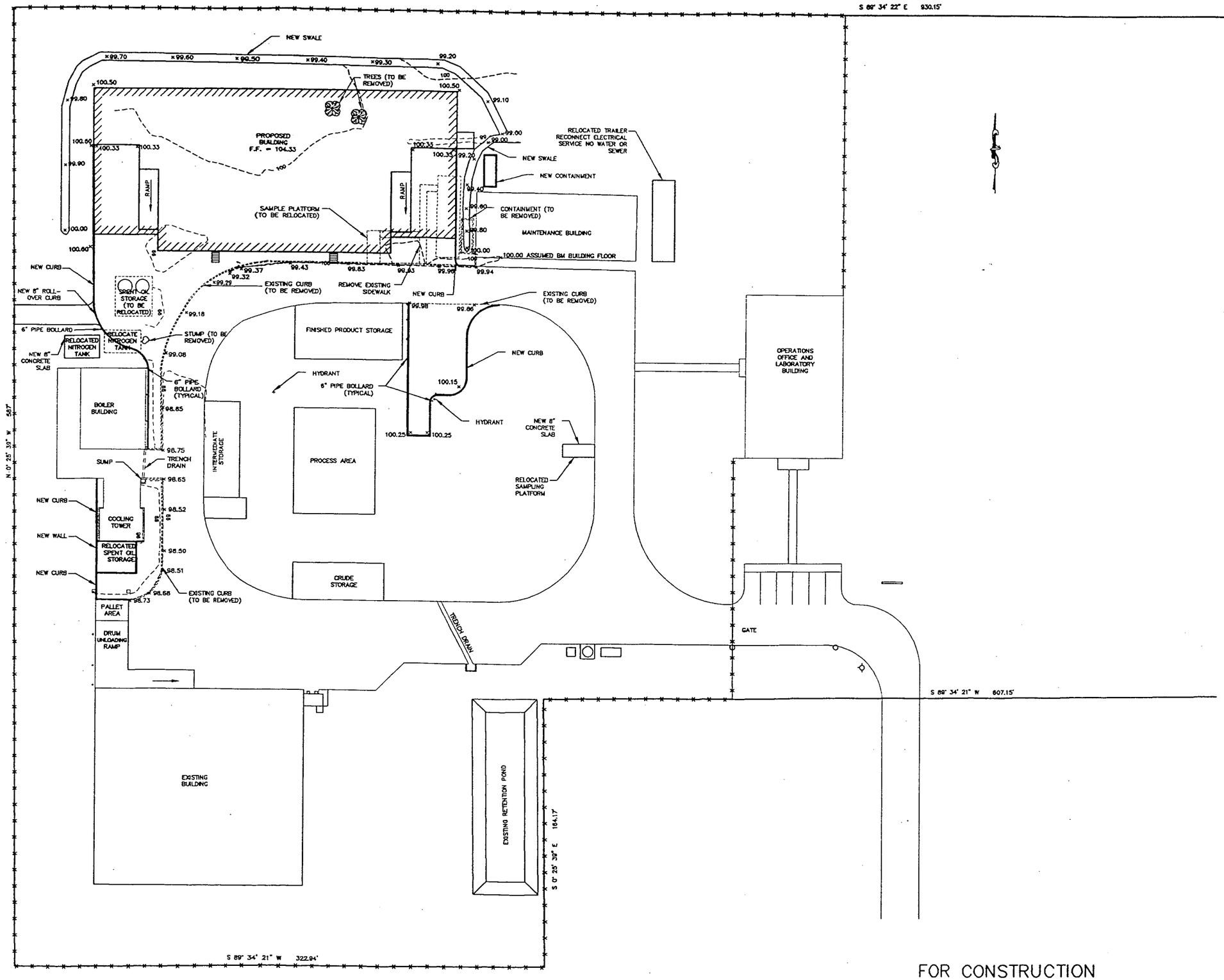
Watts 1-800-786-0654

LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

DRUM STORAGE BUILDING DEMOLITION & RELOCATION PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	32853009
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	1"=60'	SHEET NO.	9 OF 11

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	6/21/97	JKB
	WATER STOP REVISIONS		



NOTES

1. SLOPE NEW CONCRETE DRIVES TO EXISTING CONCRETE TIE AND SEAL COLD JOINT.

LEGEND

- NEW CONCRETE
- EXISTING STRUCTURES
- EXISTING STRUCTURES (TO BE REMOVED)
- NEW BUILDING
- ×99.94 EXISTING SPOT ELEVATIONS
- ×100.00 NEW SPOT ELEVATIONS

FOR CONSTRUCTION

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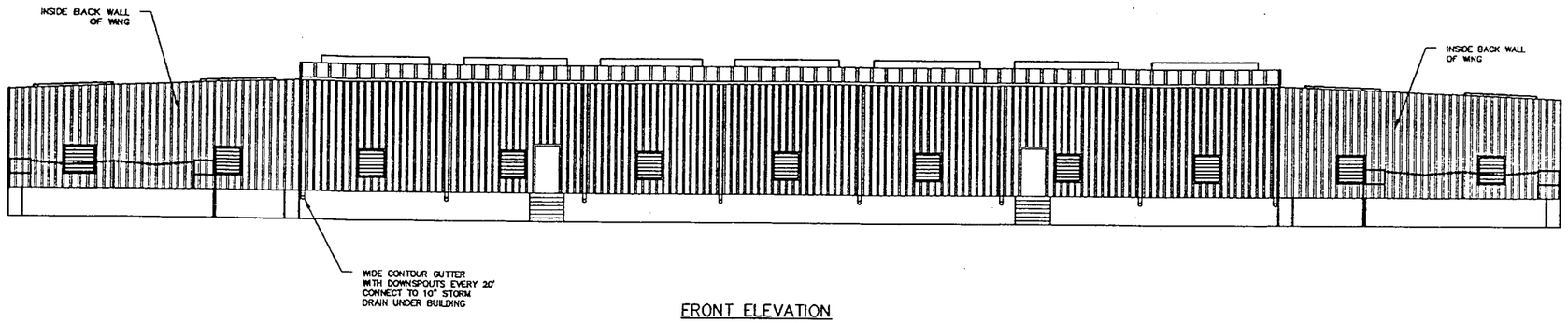
LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

DRUM STORAGE BUILDING GRADING PLAN

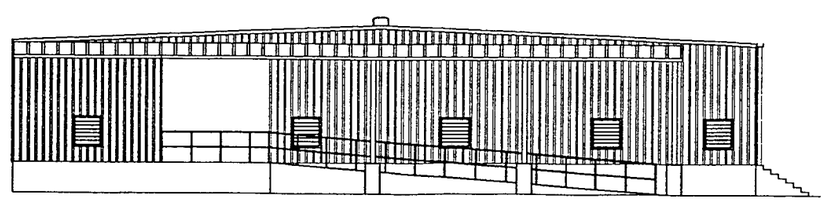
DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3010
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	1"=60'	SHEET NO.	10 OF 11

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		



FRONT ELEVATION

SCALE: 1" = 20'-0"



SIDE ELEVATION

SCALE: 1" = 20'-0"

FOR CONSTRUCTION

ViroGroup
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TECHNOLOGY

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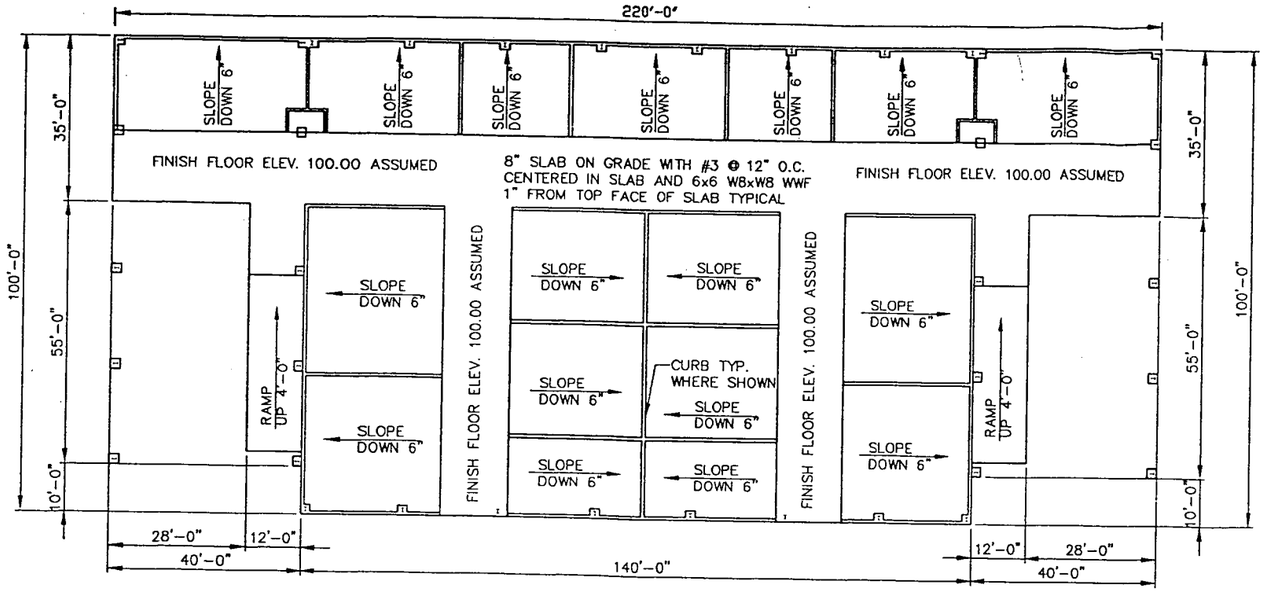
LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

DRUM STORAGE BUILDING
ELEVATION VIEWS

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	32BS3011
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	1"=20'	SHEET NO.	11 OF 11

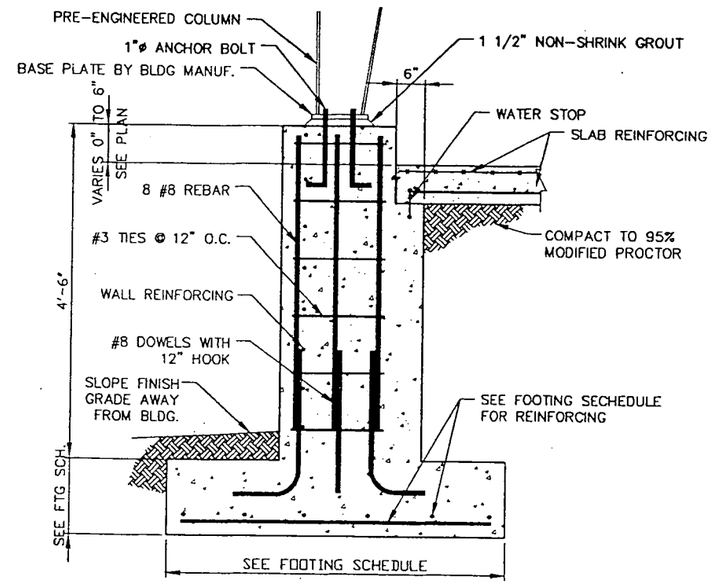
NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		



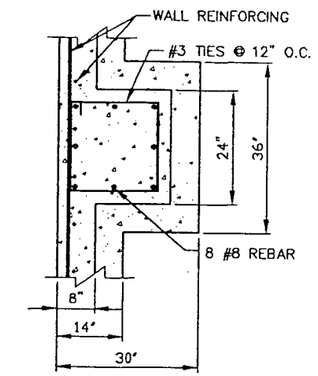
TOP OF PIER ELEVATION 100.00 (FINISH MAIN FLOOR ELEVATION) ALL CASES

FLOOR PLAN

SCALE: 1/32" = 1'-0"

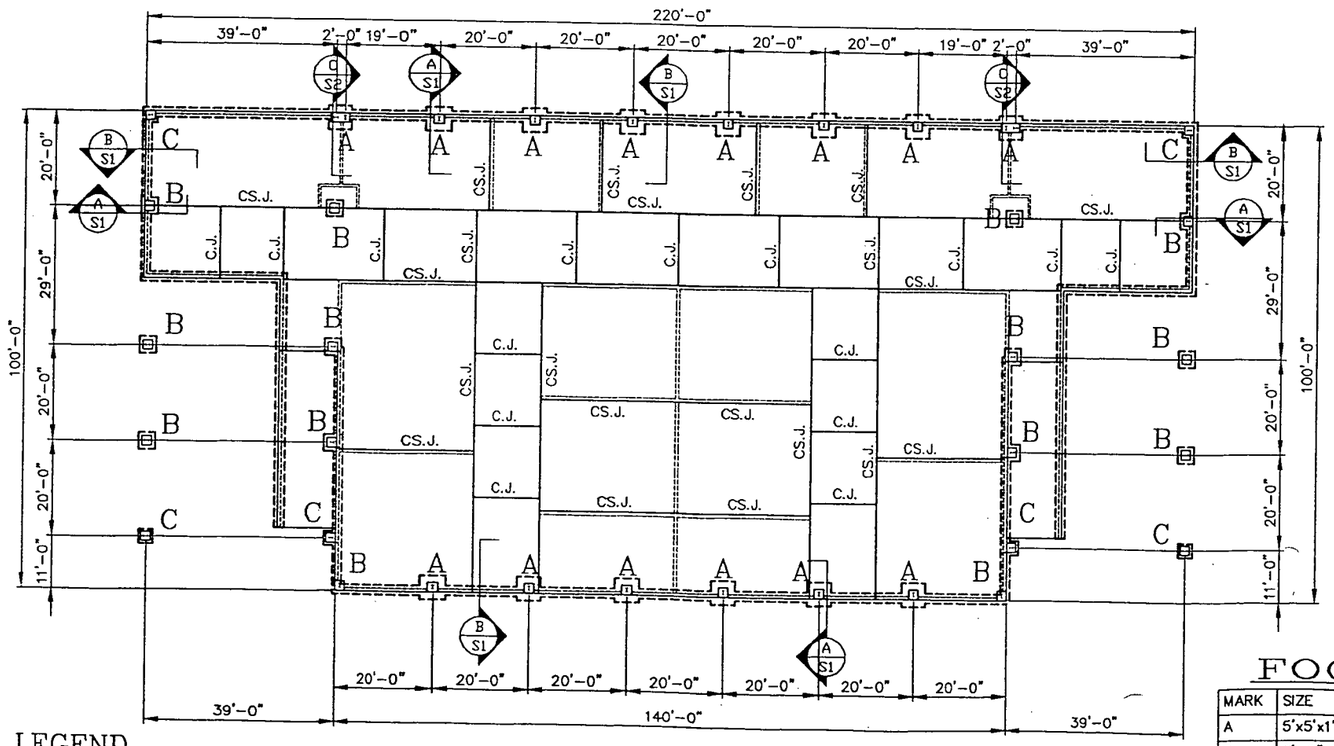


SECTION



TOP VIEW THROUGH PIER

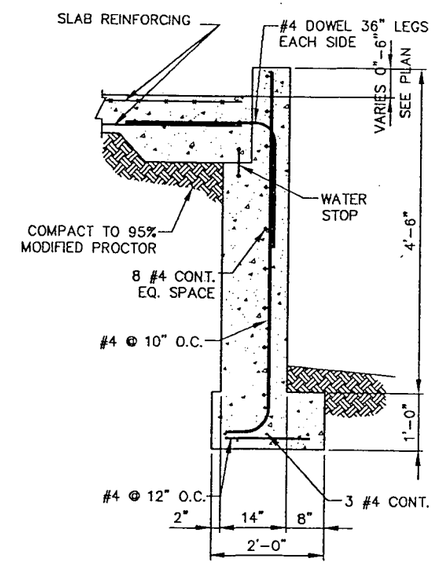
TYPCAL COLUMN FOOTING AND PIER



TOP OF FOOTING ELEVATION 95.50 (4'-6" BELOW FINISH FLOOR) ALL CASES

FOUNDATION PLAN

SCALE: 1/32" = 1'-0"

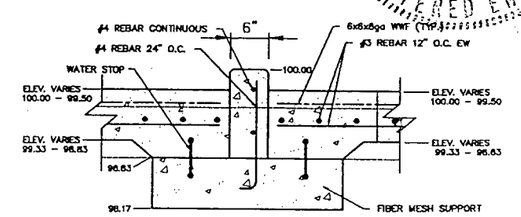


SECTION 'B'

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

SECTION 'A'

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



TYPICAL CURB DETAIL

SCALE: 1/2" = 1'-0"

LEGEND

C.J. CONTROL JOINT
CS. J. CONSTRUCTION JOINT

FOOTING SCHEDULE

MARK	SIZE	REINFORCING	REMARKS
A	5'x5'x1'-6"	6 #6 E.W.	TWO PIERS ON FTG.
B	3'-6"x3'-6"x1'-4"	4 #6 E.W.	
C	3'x3'x1'-4"	4 #6 E.W.	

FOR CONSTRUCTION

CHARLES S. RIGGS
CERTIFICATE OF AUTHORIZATION
No. 0004452
STATE OF FLORIDA
REGISTERED ENGINEER
MAR 29 '97

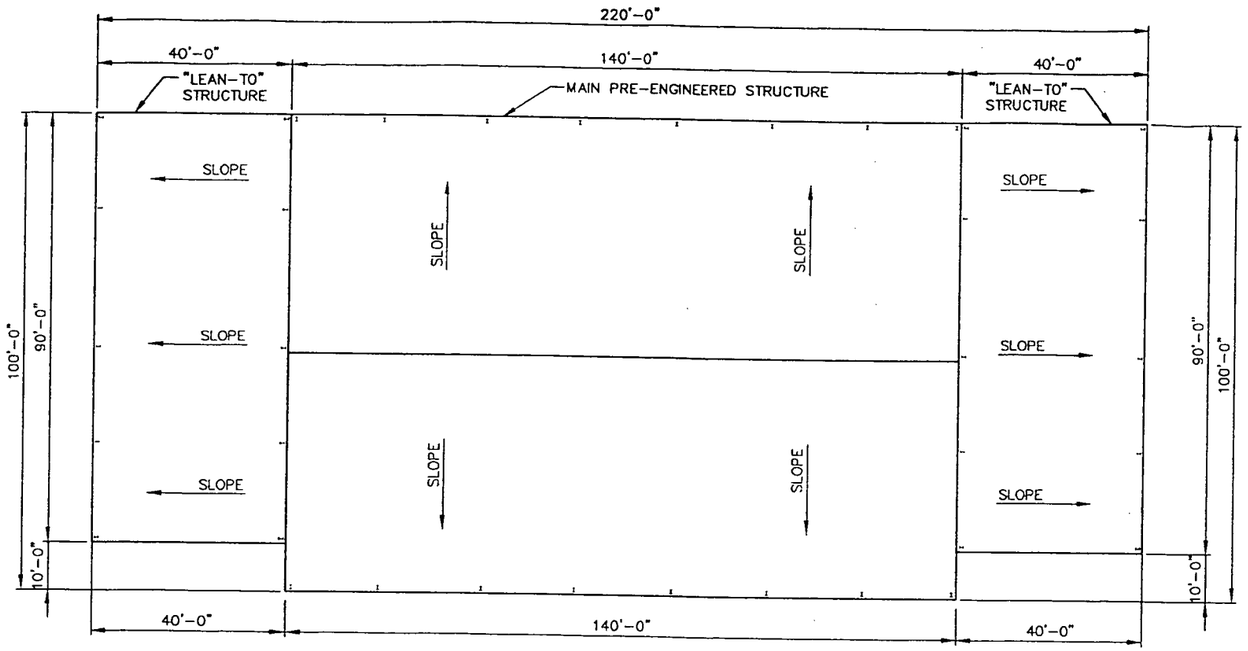
ViroGroup Air•Water•Soil TECHNOLOGY
ViroGroup, Inc.
1445 Pleasant Church Road
Lexington, SC 29072
Phone 803-957-5270
FAX 803-957-3845
Wattle 1-800-786-0654

LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

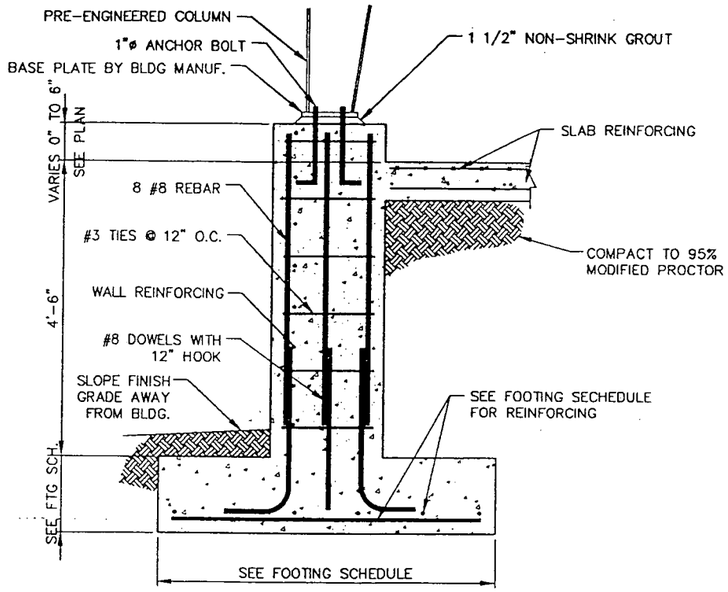
DRUM STORAGE BUILDING
STRUCTURAL LAYOUT

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	JVW	CADD NO:	328S3S01
APPROVED BY:	CEJ	PROJECT NO:	12-32803.D1
SCALE:	AS SHOWN	SHEET NO.	S1 OF S2

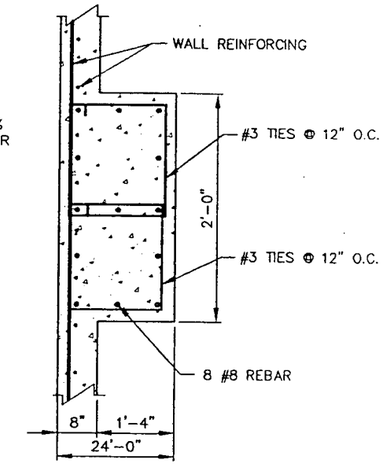
NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		



ROOF PLAN
SCALE: 1/32" = 1'-0"

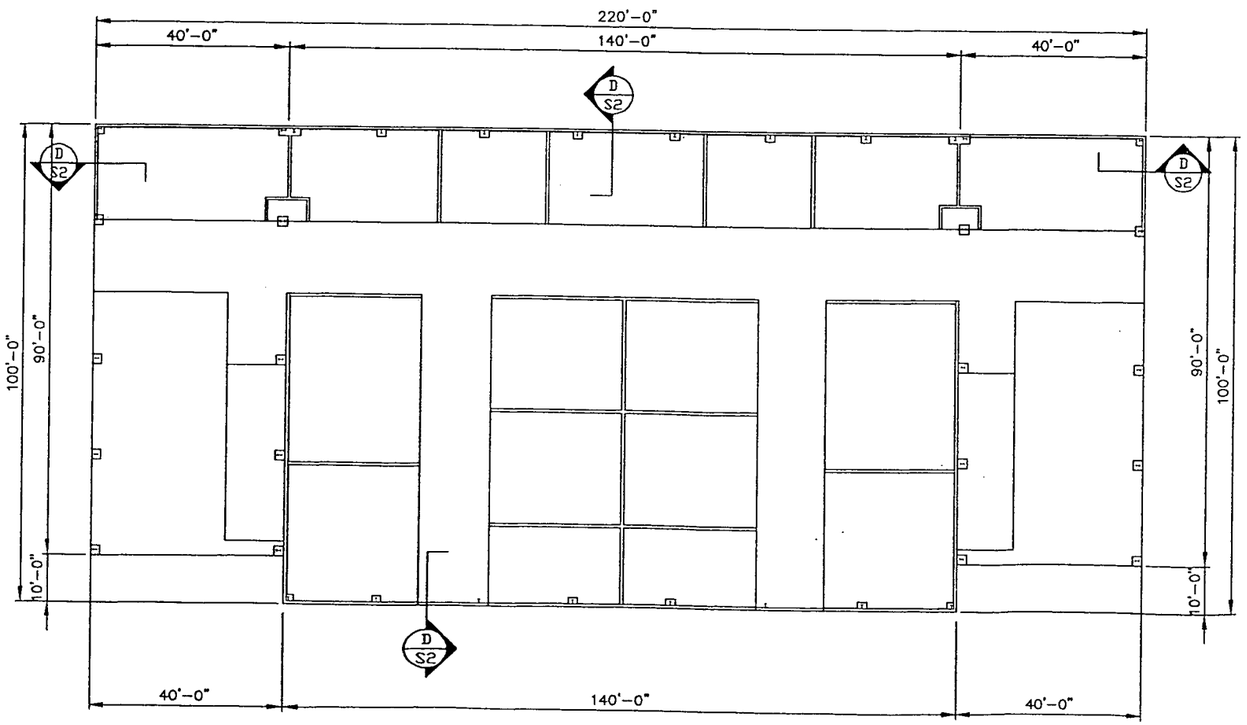


SECTION

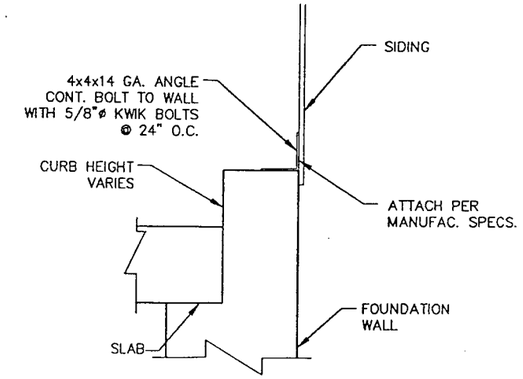


TOP VIEW THROUGH PIER (NOT APPLICABLE)

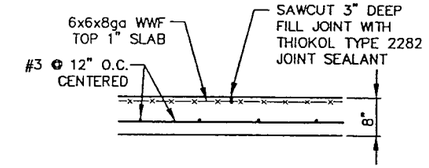
SECTION 'C'
SCALE: 3/8" = 1'-0"



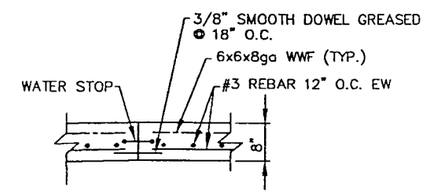
WALL SIDING LAYOUT
SCALE: 1/32" = 1'-0"



SECTION 'D'
SCALE: 3/4" = 1'-0"



TYPICAL CONTROL JOINT
SCALE: 3/8" = 1'-0"



CONSTRUCTION JOINT DETAIL AT SLAB TO SLAB
SCALE: 3/8"=1'-0"

GENERAL NOTES

1. ALL CONCRETE WORK PER ACI
2. ALL STEEL WORK PER AISC
3. ALL CONCRETE 4000 PSI @ 28 DAYS
4. ALL REBAR GRADE 60
5. ALL WWF ASTM A185
6. CUT ALL CONTROL JOINTS WITHIN EIGHT (8) HOUR OF CONCRETE POUR
7. WET CURE CONCRETE FOR 7 DAYS WITH SPRINKLERS AND BURLAP
8. COMPACT ALL FILL MATERIAL 95% MODIFIED PROCTOR
9. MINIMUM ALLOWABLE SOIL BEARING 2000 PSF
10. POUR FOOTINGS ON UNDISTURBED SOIL OR SUITABLE COMPACTED FILL MATERIALS
11. ALL STEEL ASTM A36
12. ALL BOLTS A325
13. SEAL ALL JOINTS IN CONCRETE WITH THIOKOL JOINT SEALANT TYPE 2282

FOR CONSTRUCTION

ViroGroup Air•Water•Soil TECHNOLOGY
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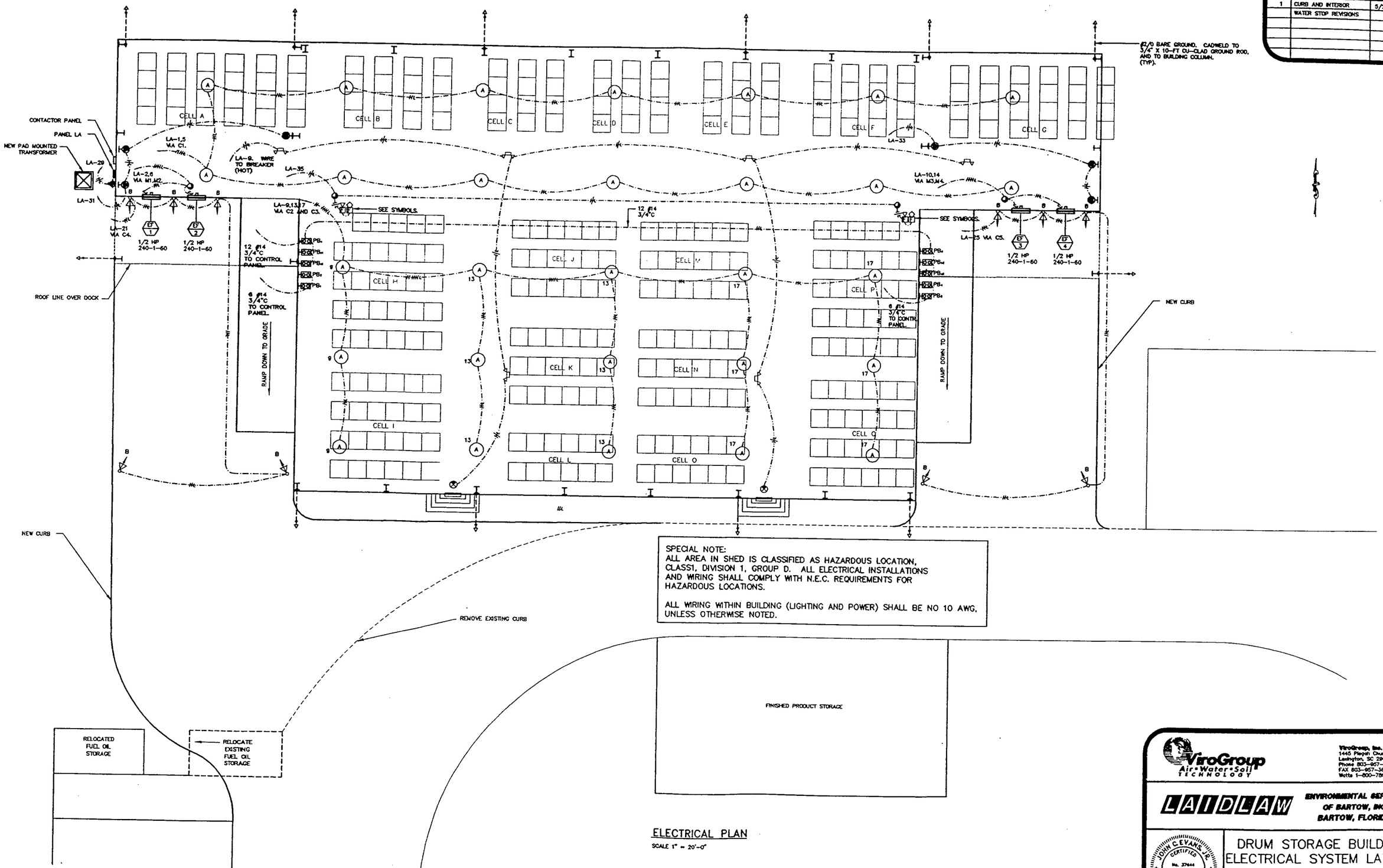
Watts 1-800-786-0654

LAIDLAW
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING
STRUCTURAL LAYOUT

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	JVW	CADD NO:	328S3S02
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	AS SHOWN	SHEET NO.	S2 OF S2

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		



SPECIAL NOTE:
ALL AREA IN SHED IS CLASSIFIED AS HAZARDOUS LOCATION, CLASS1, DIVISION 1, GROUP D. ALL ELECTRICAL INSTALLATIONS AND WIRING SHALL COMPLY WITH N.E.C. REQUIREMENTS FOR HAZARDOUS LOCATIONS.

ALL WIRING WITHIN BUILDING (LIGHTING AND POWER) SHALL BE NO 10 AWG, UNLESS OTHERWISE NOTED.

ELECTRICAL PLAN
SCALE 1" = 20'-0"

FOR CONSTRUCTION

ViroGroup Air•Water•Soil TECHNOLOGY
ViroGroup, Inc.
1445 Plaugh Church Road
Lexington, SC 29072
Phone 803-957-8270
FAX 803-957-3845
Watts 1-800-786-0654

LAIDLAW
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

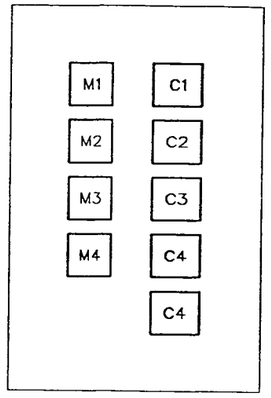
JOHN C. EVANS, JR. CERTIFIED No. 37644 STATE OF FLORIDA REGISTERED ENGINEER

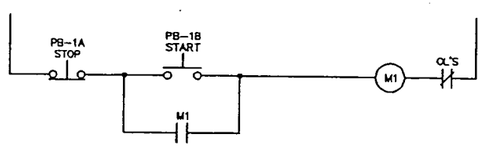
DRUM STORAGE BUILDING ELECTRICAL SYSTEM LAYOUT

DRAWN BY:	JCE	DATE:	8/22/96
DESIGNED BY:	JCE	CADD NO:	32853E01
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	1"=20'	SHEET NO.	E1 OF 2

CONTROL SYSTEMS EQUIPMENT:

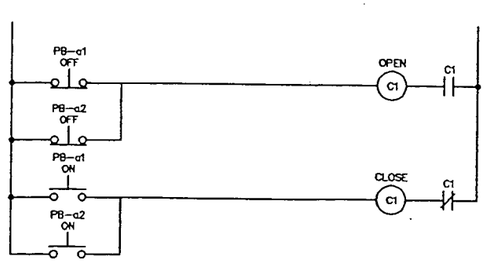
TYPE	DESCRIPTION
ENC	NEMA 4 ENCLOSED CABINET, 30-IN HIGH, 24-IN WIDE, 6-IN DEEP, WITH METAL BACK PANEL, HOFFMAN A-4 SERIES, OR EQUAL.
M1, M2 M3, M4	OPEN MOTOR STARTER, NEMA SIZE 0, 240-1-60, 1/2 HP WITH 120-VAC COIL AND HOLDING INTERLOCK. SQUARE D 8536/SB0, OR APPROVED EQUAL.
C1, C2 C3, C4 C5	MECHANICALLY HELD LIGHTING CONTACTOR, 30-AMP, 4-POLE, WITH 120-VAC COILS. SQUARE D 8903/LXQ, OR APPROVED EQUAL.
PB1, PB2 PB3, PB4	START-STOP PUSHBUTTON, SEALED, CLASS 1, DIVISION 1, GROUP D. SQUARE D 9001/BR214, OR APPROVED EQUAL.
PBa1, PBa2 PBb1, PBb2 PBc, PBd	ON-OFF PUSHBUTTON, SEALED, CLASS 1, DIVISION 1, GROUP D. SQUARE D 9001/BR214, OR APPROVED EQUAL.





CONTROL WIRING - FAN CIRCUIT

TYPICAL FOR EF-1, EF-2, EF-3, AND EF-4
NOT TO SCALE



LIGHTING CONTACTOR CONTROL WIRING

TYPICAL FOR C1, C2, AND C3.
SIMILAR FOR C4 AND C5, EXCEPT CONTROLLED BY ONE SET OF PB'S.
NOT TO SCALE

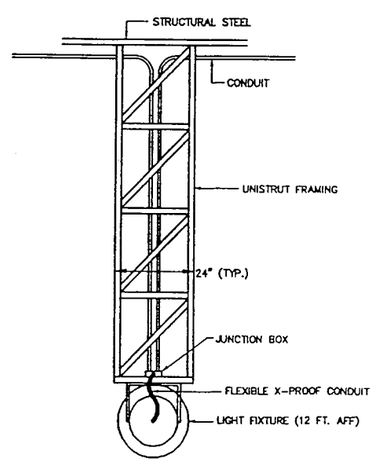
CONTACTOR	CIRCUITS CONTROLLED	PUSHBUTTON CONTROLLER
C1	LA-1, LA-5	PB-a1, PB-a2
C2	LA-9, LA-13	PB-b1, PB-b2
C3	LA-17	PB-b1, PB-b2
C4	LA-21	PB-c
C5	LA-25	PB-d

ELECTRICAL SYMBOLS

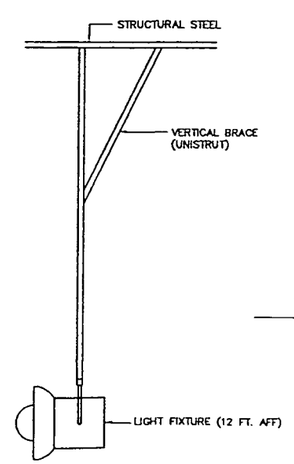
	H.I.D. FIXTURE, PENDANT MOUNT.
	SAME, EXCEPT WITH FLOODLIGHT TRUNNION BRACKET. SEE MOUNTING DETAIL.
	EXIT SIGN.
	EMERGENCY BATTERY LIGHT.
S_F	DISCONNECT SWITCH FOR FAN. MOUNT ADJACENT TO FAN. USE 20-AMP, 2-POLE EXPLOSION PROOF SWITCH, CROUSE HINDS, OR EQUAL.
	PUSHBUTTON FOR FAN STARTER OR LIGHTING CONTACTOR. SEE EQUIPMENT SCHEDULE. MOUNT ON COLUMN, 48-IN. ABOVE FIN. FLOOR.
	GFCI RECEPTACLE, 20A-120V-NEMA 5-20R. MOUNTING HEIGHT 48" AFF. PROVIDE TYPE FD BOX AND WEATHERPROOF COVER PLATE.
	EXPLOSION PROOF RECEPTACLE, 20A-120V. MOUNTING HEIGHT 48" AFF. CROUSE HINDS CPS-152-201, OR APPROVED EQUAL.
	EMERGENCY LIGHT TO FLASH WHEN EMERGENCY SHOWER IS OPERATED. PROVIDE 120V EXPLOSION PROOF CONNECTION TO LIGHT AS REQUIRED.
	EMERGENCY SIGNAL HORN FOR EMERGENCY SHOWER, SAME AS ABOVE.
J	WALL OR CEILING MOUNTED JUNCTION BOX.
	PANELBOARD.
LA-1, 3	BRANCH CIRCUIT WIRING RUN EXPOSED AT WALLS OR CEILING. SLASH MARKS INDICATE NUMBER OF #10 CONDUCTORS. WHERE MORE THAN TWO ARE REQUIRED, SHORT SLASH DENOTES HOT OR SWITCH LEG, LONG SLASH DENOTES NEUTRAL. "L" DENOTES GREEN GROUNDING WIRE. ARROW DENOTES HOME RUN, NUMERAL DENOTES CIRCUIT NUMBER.

FIXTURE SCHEDULE

TYPE	VOLTAGE	DESCRIPTION	LAMP
A	MULTI-TAP 240V	EXPLOSION PROOF FIXTURE WITH MULTI-TAP BALLAST (SET AT 240-VOLT) AND STANDARD REFLECTOR, CLASS 1 DIVISION 1 GROUP D. APPLETON AMBH SERIES, OR EQUAL OF CROUSE HINDS OR KILLARK. PROVIDE STEEL CHANNELS TO SUPPORT FIXTURE.	1/400W/MH "SUPER" 40K LUMENS
B	MULTI-TAP 240V	SAME AS TYPE A, EXCEPT WITH 30-DEGREE REFLECTOR. FIXTURE MOUNTING HEIGHT TO BE 12-FT. ABOVE FINISHED FLOOR.	1/400W/MH "SUPER" 40K LUMENS
C	120V	EMERGENCY BATTERY LIGHT, EXPLOSION PROOF, CLASS 1, DIVISION 1, GROUP D. DUAL-LITE XPB-75P SERIES WITH (2) EX-1CD LIGHT HEADS.	INCLUDED
D	120V	EXIT SIGN, EXPLOSION PROOF, CLASS 1, DIVISION 1, GROUP D. DUAL-LITE XPB-75P SERIES WITH (1) EX-1CD LIGHT HEAD AND EX-100 SIGN. FIXTURE MOUNTING HEIGHT TO BE 8 FT. ABOVE FINISHED FLOOR.	INCLUDED



FRONT VIEW



SIDE VIEW

TYPE B LIGHT FIXTURE MOUNTING DETAIL

NOT TO SCALE

GENERAL NOTES

A. VISIT SITE TO DETERMINE EXISTING CONDITIONS PRIOR TO SUBMITTING BID.

B. DO NOT SCALE THESE DRAWINGS. ROUGHING IN SHALL BE DONE FROM FIELD CONDITIONS AND DIMENSIONS ON ARCHITECTURAL DRAWINGS AND EQUIPMENT SHOP DRAWINGS.

C. ELECTRICAL CONTRACTOR SHALL DO ALL CUTTING AND PATCHING AS REQUIRED TO INSTALL HIS WORK. FINISH PATCHING AND PAINTING WILL BE DONE BY THE GENERAL CONTRACTOR.

D. PRIOR TO DIGGING ANY TRENCHES, NOTIFY ALL UTILITIES (ELECTRIC, GAS, TELEPHONE, WATER, AND SEWER) AND OBTAIN LOCATIONS OF UNDERGROUND UTILITIES.

E. ANY DAMAGES DONE TO UNDERGROUND UTILITIES OR PIPING BY THIS CONTRACTOR WILL BE REPAIRED BY THE OWNER OF THE LINE IN A SATISFACTORY MANNER. THIS CONTRACTOR WILL BEAR ALL COSTS FOR REPAIRS.

F. ALL WORK SHALL COMPLY WITH THE 1996 NATIONAL ELECTRICAL CODE AND ALL LOCAL CODES.

G. APPLY AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS WORK.

H. WIRING SHALL BE SOLID COPPER CONDUCTOR, SIZE NO. 10, UNLESS NOTED. WITH TYPE THHN-THWN-MTW, 90 C, 600V INSULATION. NO. 8 AND LARGER SHALL BE STRANDED COPPER CONDUCTOR WITH TYPE THHN-THWN, 75 C, 600V INSULATION. WIRING SHALL BE COLOR CODED TO MATCH EXISTING COLOR CODE.

I. ALL WIRING SHALL BE RUN IN GRC WITH THREADED FITTINGS.

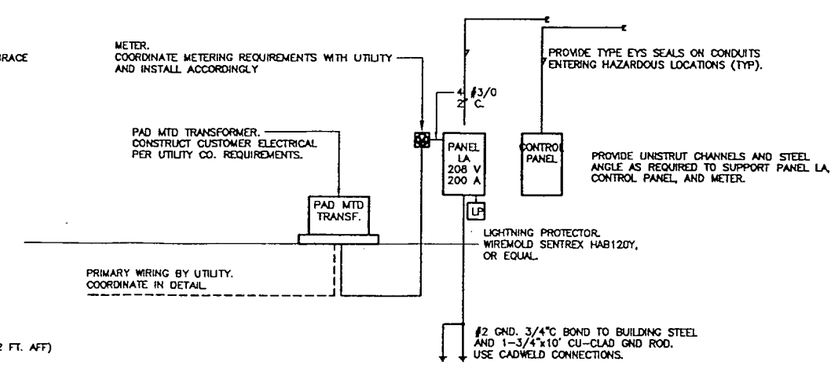
J. OUTLET BOXES IN SHED SHALL BE EXPLOSION PROOF.

K. SHED AREA IS CLASSIFIED AS A HAZARDOUS LOCATION, CLASS 1, DIVISION 1, GROUP D. ALL WORK IN SHED SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE FOR HAZARDOUS LOCATIONS. PROVIDE TYPE EYS SEALS WHERE RACEWAYS GO FROM HAZARDOUS LOCATION TO NON-HAZARDOUS LOCATIONS.

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		

PANEL "LA" SQUARE D TYPE NQOD, NEMA 3R CABINET, WITH GROUND BUS, 240/120 VOLT, 1 PHASE, 3 WIRE, 200 AMP, MAIN BREAKER (BOTTOM), 10K AIC RATED

KVA	LOAD	BKR	TYPE	NO	Ø	NO	TYPE	BKR	LOAD	KVA
3.5	LTG	20/2	QOB	1	A	2	QOB	20/2	FAN	0.7
				3	B	4				
3.5	LTG	20/2		5	C	6		20/2	FAN	0.7
				7	A	8				
3.5	LTG	20/2		9	B	10		20/2	FAN	0.7
				11	C	12				
3.5	LTG	20/2		13	A	14		20/2	FAN	0.7
				15	B	16				
3.5	LTG	20/2		17	C	18		20/2	SPARE	
				19	A	20				
2.5	LTG	20/2		21	B	22		20/2	SPARE	
				23	C	24				
2.5	LTG	20/2		25	A	26		SPC	SPACE	
				27	B	28				
	RECEPT	20/1		29	C	30				
	RECEPT	20/1		31	A	32				
	RECEPT	20/1		33	B	34		30/2	LIGHTNING PROTECTOR	
	LTG/FAN CONTROLS	15/1		35	C	36				



POWER RISER DIAGRAM
N.T.S.

FOR CONSTRUCTION

ViroGroup Air•Water•Soil TECHNOLOGY
ViroGroup, Inc.
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Lexington, SC 29072
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FAX 803-957-3845
Wetts 1-800-786-0654

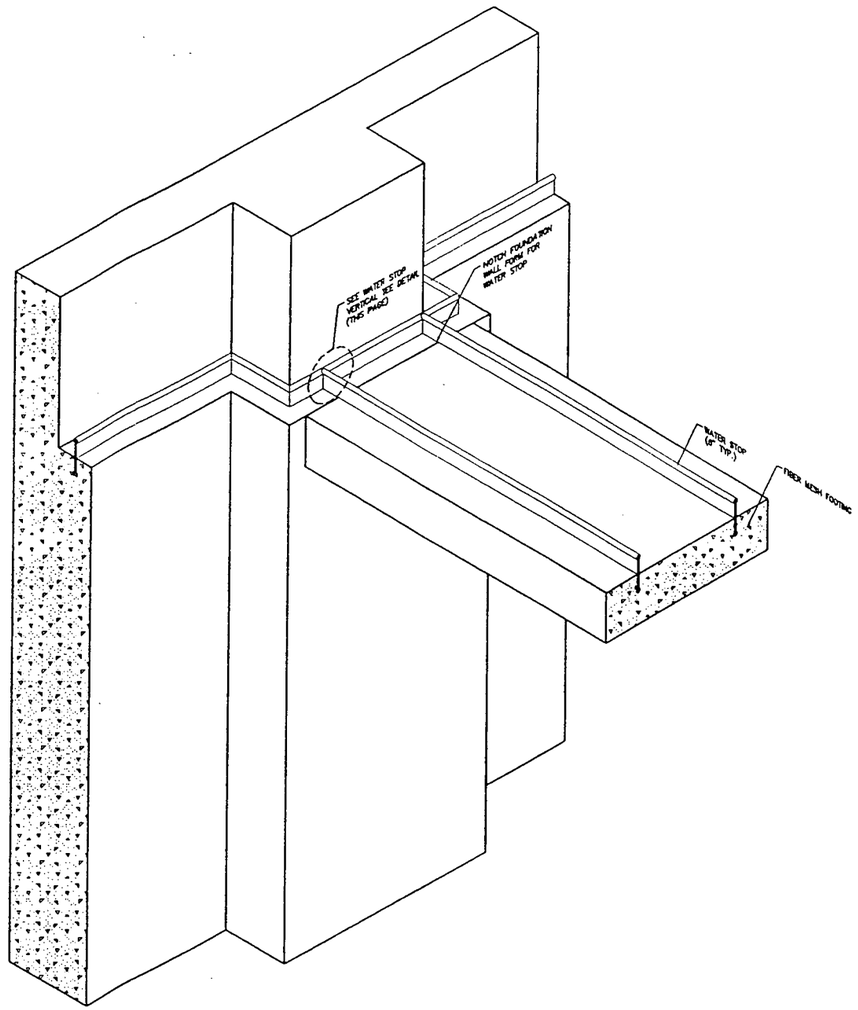
LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

JOHN C. EVANS, JR. CERTIFIED No. 37644 STATE OF FLORIDA REGISTERED ENGINEER

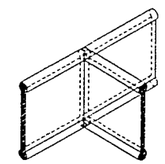
DRUM STORAGE BUILDING ELECTRICAL DETAILS

DRAWN BY:	JCE	DATE:	8/22/96
DESIGNED BY:	JCE	CADD NO:	328S3E02
APPROVED BY:	CEJ	PROJECT NO:	12-32803.01
SCALE:	NONE	SHEET NO.	E2 OF 2

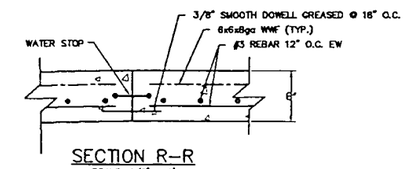
NO.	REVISION	DATE	BY



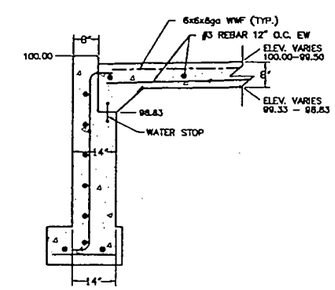
ISOMETRIC FOUNDATION WALL/INTERIOR SUPPORT DETAIL
SCALE: 1/2"=1'-0"



WATER STOP VERTICAL TEE DETAIL
SCALE: 1"=1'-0"



SECTION R-R
SCALE: 1/2" = 1'
(SEE SHEET 3)



SECTION Q-Q
SCALE: 1/4" = 1'
(SEE SHEET 3)

CHARLES S. HIGGINS JR.
CERTIFICATE OF AUTHORIZATION
STATE OF FLORIDA
REGISTERED ENGINEER
23 MAY 97

ViroGroup
Air•Water•Soil TECHNOLOGY

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1445 Pleasant Church Road
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Watts 1-800-786-0654

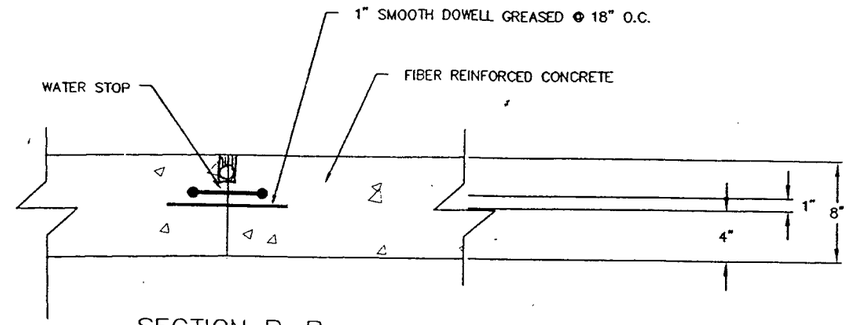
LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING
CHANGE ORDER #1

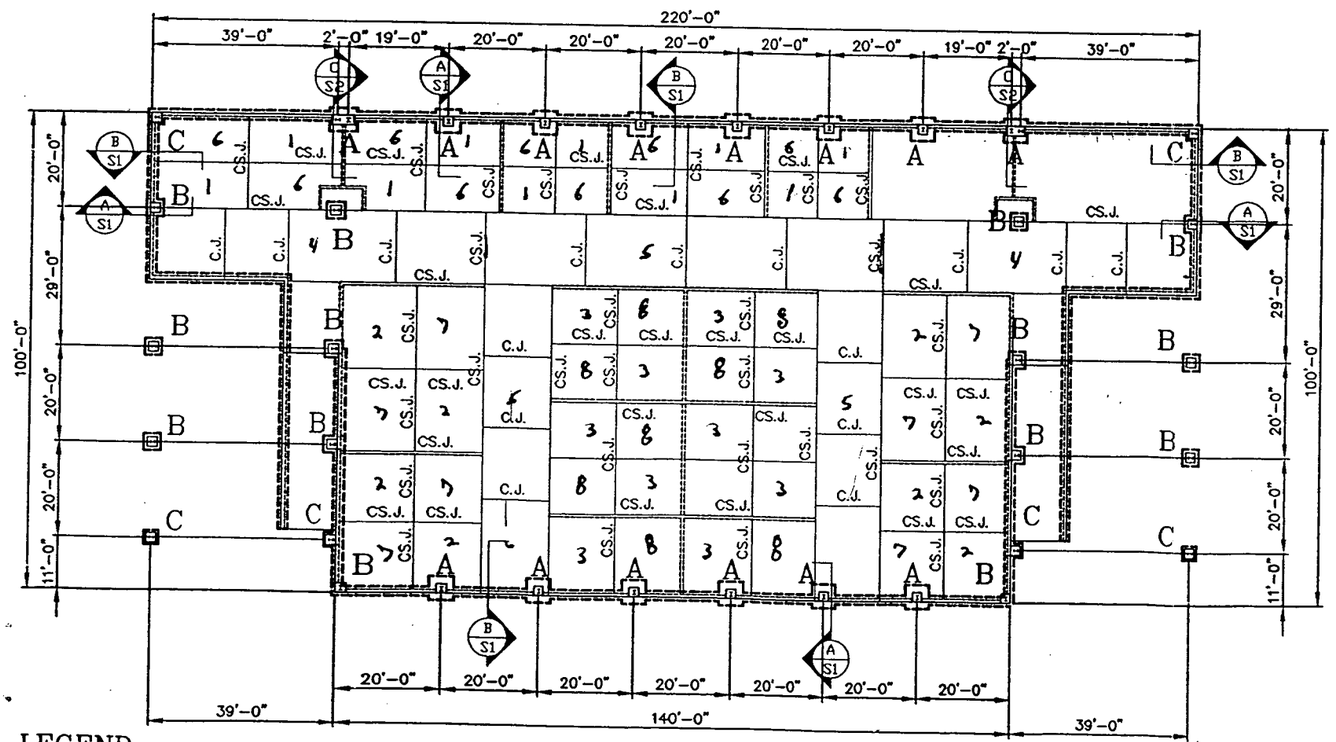
DRAWN BY:	JKB	DATE:	5/21/97
DESIGNED BY:	JWB	CADD NO:	3285ISO
APPROVED BY:		PROJECT NO:	12-32803.01
SCALE:	AS SHOWN	SHEET NO.	1 OF 1

NO.	REVISION	DATE	BY



SECTION R-R
SCALE: N.T.S.
(SEE SHEET 3)

DETAILS SHOWN ON DRAWING 4 OF 11, REVISION 1, 5/27/97, VIROGROUP PROJECT # 12-32803.D1, CADD # 32803004 REFERENCED AS SECTIONS C-C, O-O, M-M, H-H, J-J, K-K, L-L, I-I, & D-D SHOULD ALSO BE CONSIDERED REVISED, REFERENCE TO THE #3 REBAR 12" O.C. EACH WAY AND 6x6x8 WWF SHOULD BE DISREGARDED. ALSO DETAIL Q-Q ON VIROGROUP PROJECT # 12-32803.D1, CADD # 328BISO (SHEET 1 OF 1) IS REVISED AS STATED ABOVE AND DETAIL R-R IS REVISED AS SHOWN ABOVE. IN ADDITION, SECTION A, B, AND THE CURB DETAIL PRESENTED ON VIROGROUP CADD # 32803S01 (SHEET S1 OF S2) AND SECTION C AND THE TYPICAL CONTROL JOINT AND CONSTRUCTION JOINT ON CADD # 32803S02 (SHEET S2 OF S2) ARE REVISED AS MENTIONED ABOVE.



LEGEND
C.J. CONTROL JOINT
CS. J. CONSTRUCTION JOINT

TOP OF FOOTING ELEVATION 95.50 (4'-6" BELOW FINISH FLOOR) ALL CASES

FOUNDATION PLAN
SCALE: 1/32" = 1'-0"

As Builts

ViroGroup Air•Water•Soil TECHNOLOGY
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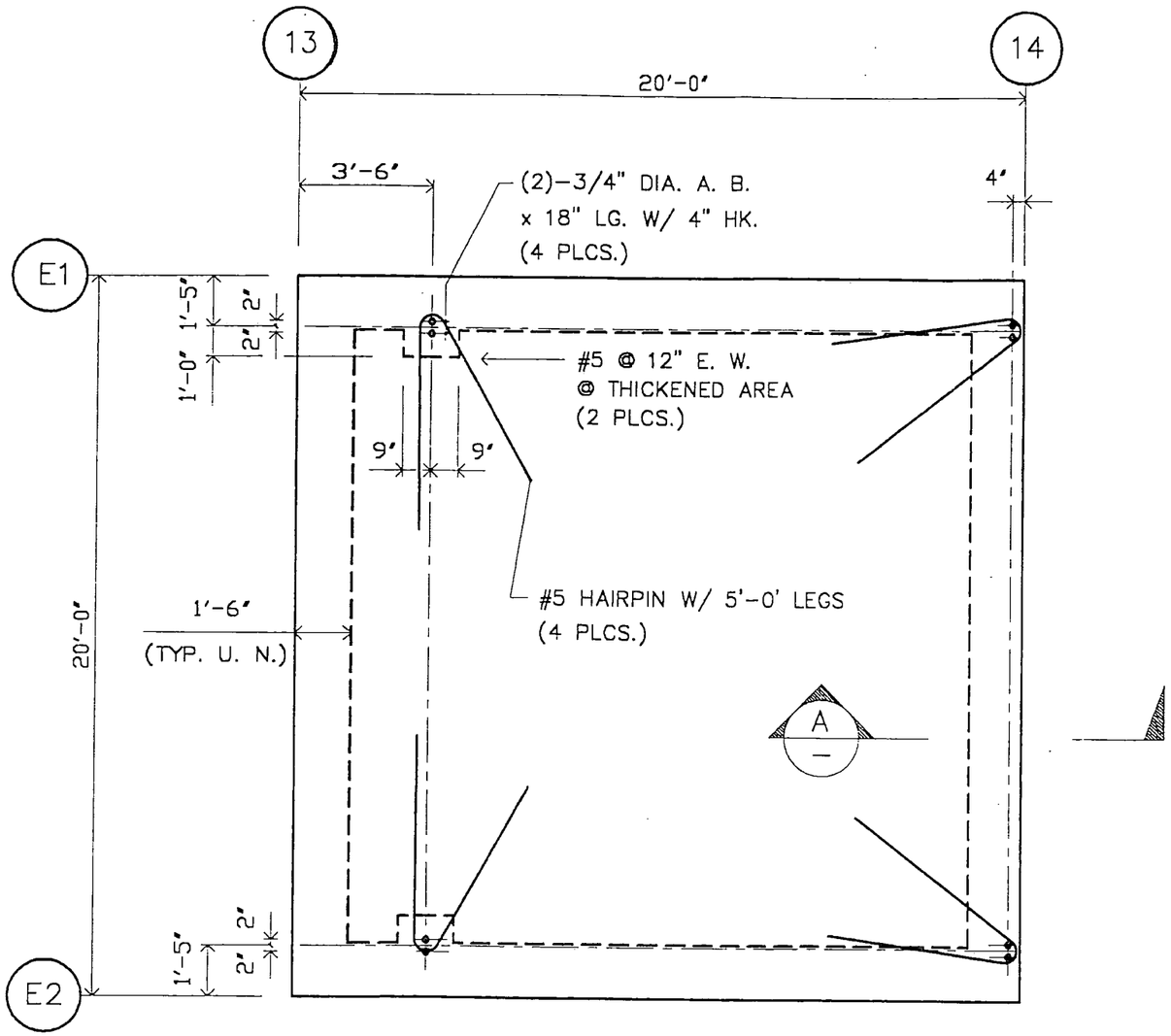
LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

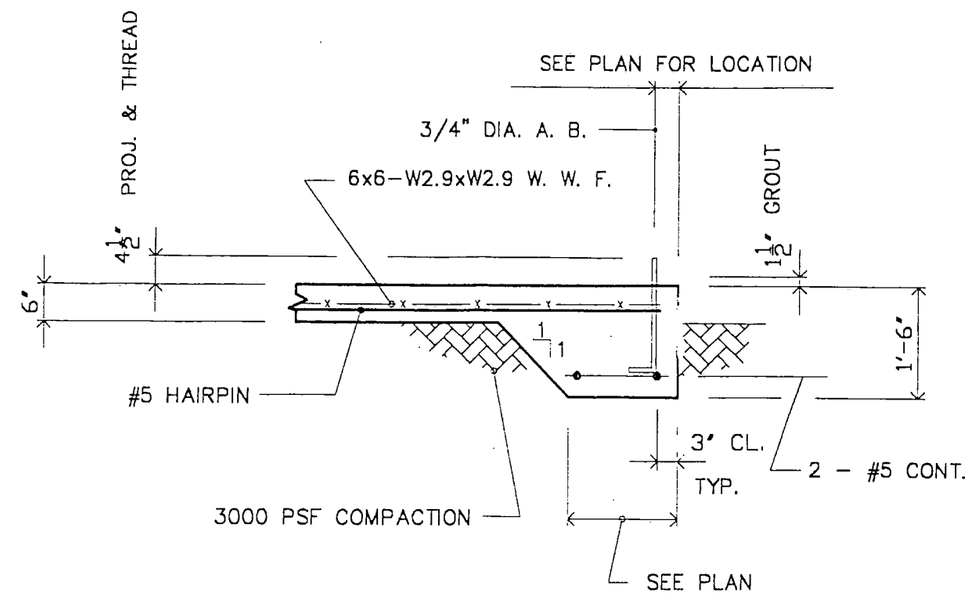
DRUM STORAGE BUILDING
OPTION #2

DRAWN BY:	DWB	DATE:	8/08/97
DESIGNED BY:	JVW	CADD NO:	328S3S01
APPROVED BY:	JWB	PROJECT NO:	12-32803.D1
SCALE:	AS SHOWN	SHEET NO.	1 OF 1



FOUNDATION PLAN

SCALE: 1/4"=1'-0"



SECTION A/—

SCALE: 1/2"=1'-0"

NOTE:

1. DESIGN CONFORMS WITH 1994 STANDARD BUILDING CODE SECTION 1606 100 MPH WIND LOADS.
2. FIELD COORDINATE LAYOUT W/ METAL BLDG. VENDOR DWGS.
3. CONCRETE 3000 PSI
4. REBAR 60,000 PSI
5. ANCHOR BOLTS A-36

10-6-97

LAIDLAW ENVIRONMENTAL SERVICES

BARTOW, FLORIDA

FOUNDATION PLAN AND SECTIONS

SHEET '1'

Mitchell A. Palm
10-6-97

1567059 (1)

DRUM STORAGE BUILDING

PREPARED FOR

LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.

BARTOW, FLORIDA

SEPTEMBER 24, 1996

LIST OF DRAWINGS

SHEET NO.	TITLE
1	COVER SHEET
2	SITE MAP
3	FLOOR PLAN
4	SECTIONS AND DETAILS
5	WASTE FLOW PLAN
6	SPRINKLER SYSTEM PLAN
7	PIPNG SCHEMATIC
8	ROOF PLAN
9	DEMOLITION & RELOCATION PLAN
10	GRADING PLAN
11	ELEVATION VIEWS
S1	STRUCTURAL LAYOUT
S2	STRUCTURAL LAYOUT
E1	ELECTRICAL SYSTEM PLAN
E2	ELECTRICAL SYSTEM PLAN

prepared by

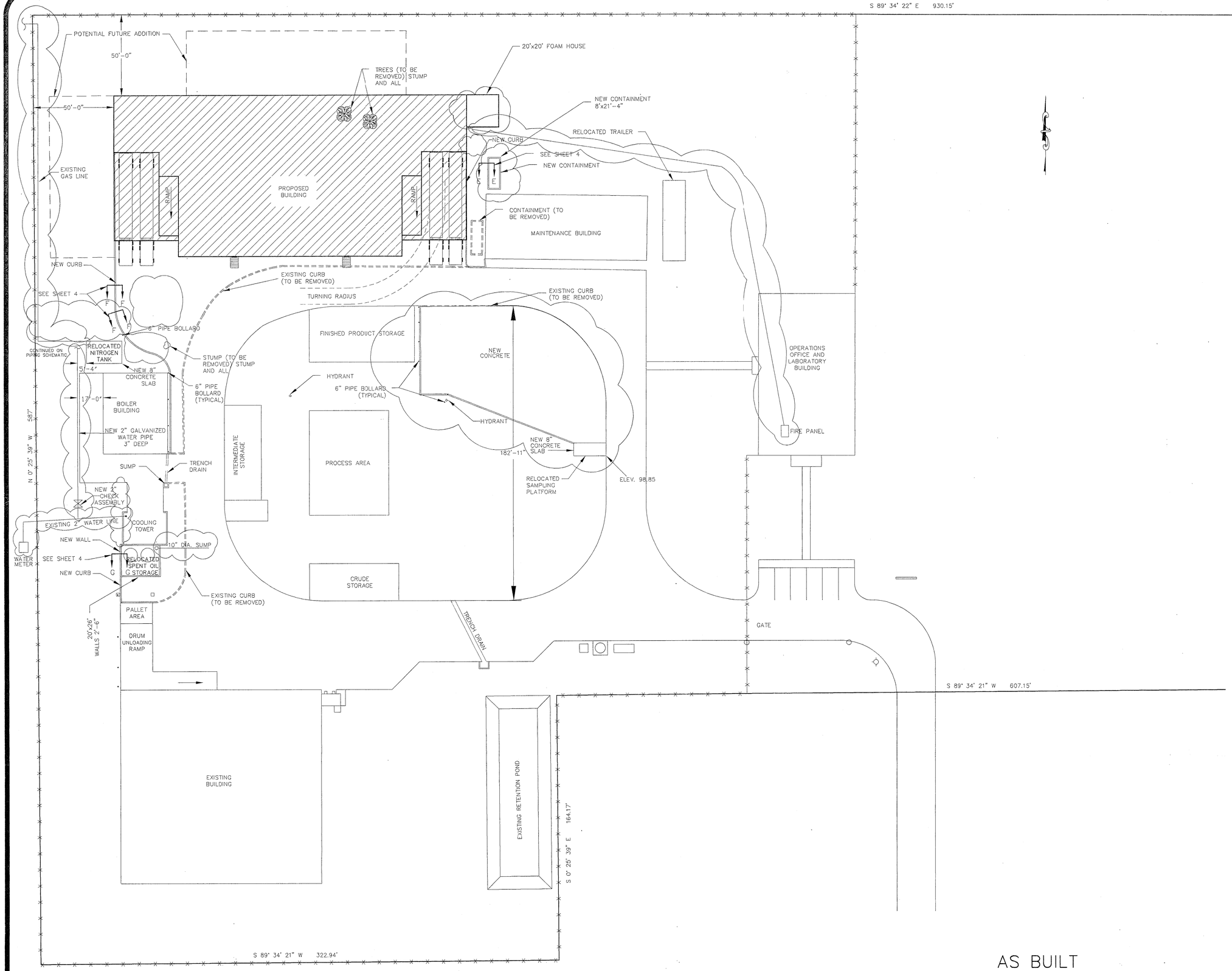
ViroGroup
Air • Water • Soil
TECHNOLOGY

ETE Division

RECEIVED
DEC 11 1997
D E P

328S3001

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
1	CONCRETE DRIVEWAYS	11/25/97	MSB
	CURBS,GAS LINES,WATER		
	LINES		



AS BUILT

SCOPE OF WORK

1. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO CONSTRUCT THE NEW BUILDING IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS.
2. CONTRACTOR SHALL PERFORM ALL CONSTRUCTION IN ACCORDANCE WITH THE STANDARD BUILDING CODE 1991 EDITION.
3. CONTRACTOR SHALL PERFORM ALL CONSTRUCTION IN ACCORDANCE WITH THE STATE OF FLORIDA AND POLK COUNTY BUILDING CODES. CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS.
4. THE CONTRACTOR SHALL ACCOMPLISH ALL DEMOLITION AND DISPOSAL IN ACCORDANCE WITH THE STATE OF FLORIDA AND POLK COUNTY REGULATIONS. THIS SHALL BE DONE WITHOUT DISRUPTING THE OWNERS OPERATION IN THE SURROUNDING BUILDINGS. SHOULD THERE BE A REQUIREMENT TO INTERRUPT SERVICES TO THE OTHER FACILITIES THE OUTAGE SHALL BE SCHEDULED WITH THE OWNER 48 HRS IN ADVANCE.
5. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO DEMOLISH AND DISPOSE OF REQUIRED CONCRETE AND ASPHALT. ALL DEBRIS SHALL BELONG TO THE CONTRACTOR AND SHALL BE DISPOSED OF IN ACCORDANCE WITH STATE AND COUNTY REGULATIONS.
6. THE CONTRACTOR SHALL SCHEDULE AND CONDUCT THE WORK SO AS TO MINIMIZE DOWN TIME FOR THE OWNER. ALL WORK SHALL BE SCHEDULED WITH THE OWNER 2 WEEKS PRIOR TO STARTING WORK.
7. THE CONTRACTOR SHALL SUBMIT TO THE OWNER A DETAILED WORK PLAN SHOWNIG TASK SCHEDULING AND TIME FRAME FOR ALL TASKS. THIS PLAN SHALL BE APPROVED BY THE OWNER BEFORE STARTING WORK. THIS PLAN SHALL BE DEVELOPED BASED ON MINIMUM DOWN TIME FOR THE OWNER. THE PLAN SHALL BE UPDATED WEEKLY DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RELOCATING ALL ELECTRICAL, WATER, AND COMPRESSED AIR LINES SO AS TO PROVIDE SERVICES AS INDICATED ON DRAWINGS AND INCLUDED IN SPECIFICATIONS.
9. THE PRE-ENGINEER BUILDINGS SHALL BE CONSTRUCTED TO PROVIDE FOR 12 #/SF SNOW LOAD, 110 MPH WIND LOAD, AND A LIVE LOAD OF 20 #/SF. THE SEISMIC LOADING SHALL BE DESIGNED FOR AA OF .05% AND AV OF .05%. DRAWINGS, SPECIFICATIONS, AND CALCULATIONS SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL. ALL DRAWINGS, SPECIFICATIONS, AND CALCULATIONS SHALL BE SEALED BY AN ENGINEER REGISTERED IN THE STATE OF FLORIDA.
10. BUILDING SHALL BE BUTLER WIDESPAN OR APPROVED EQUAL. FRAME SHALL BE LRF TYPE #1 FOR MAIN BUILDING & LRSS TYPE #1 FOR WINGS, ROOF SHALL BE MR-24 24 GA., WALLS SHALL BE BUTLERIB II 26 GA. ALL FINISH SHALL BE EQUAL TO THOSE AS SPECIFIED BY BUTLER. COLORS WILL BE SELECTED BY THE OWNER.
11. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL THE POTABLE WATER SYSTEM TO INCLUDE, SAFETY SHOWERS, EYE WASHER.
12. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL THE POWER DISTRIBUTION SYSTEM AND LIGHTING SYSTEM.
13. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL THE COMPRESSED AIR SYSTEM. TAP EXISTING LINE ALONG CURB IN FRONT OF NEW BUILDING.
14. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO INSTALL FIRE SUPPRESSION SYSTEM IN ACCORDANCE WITH NFPA REQUIREMENTS AND UL APPROVAL.

ViroGroup Air•Water•Soil TECHNOLOGY

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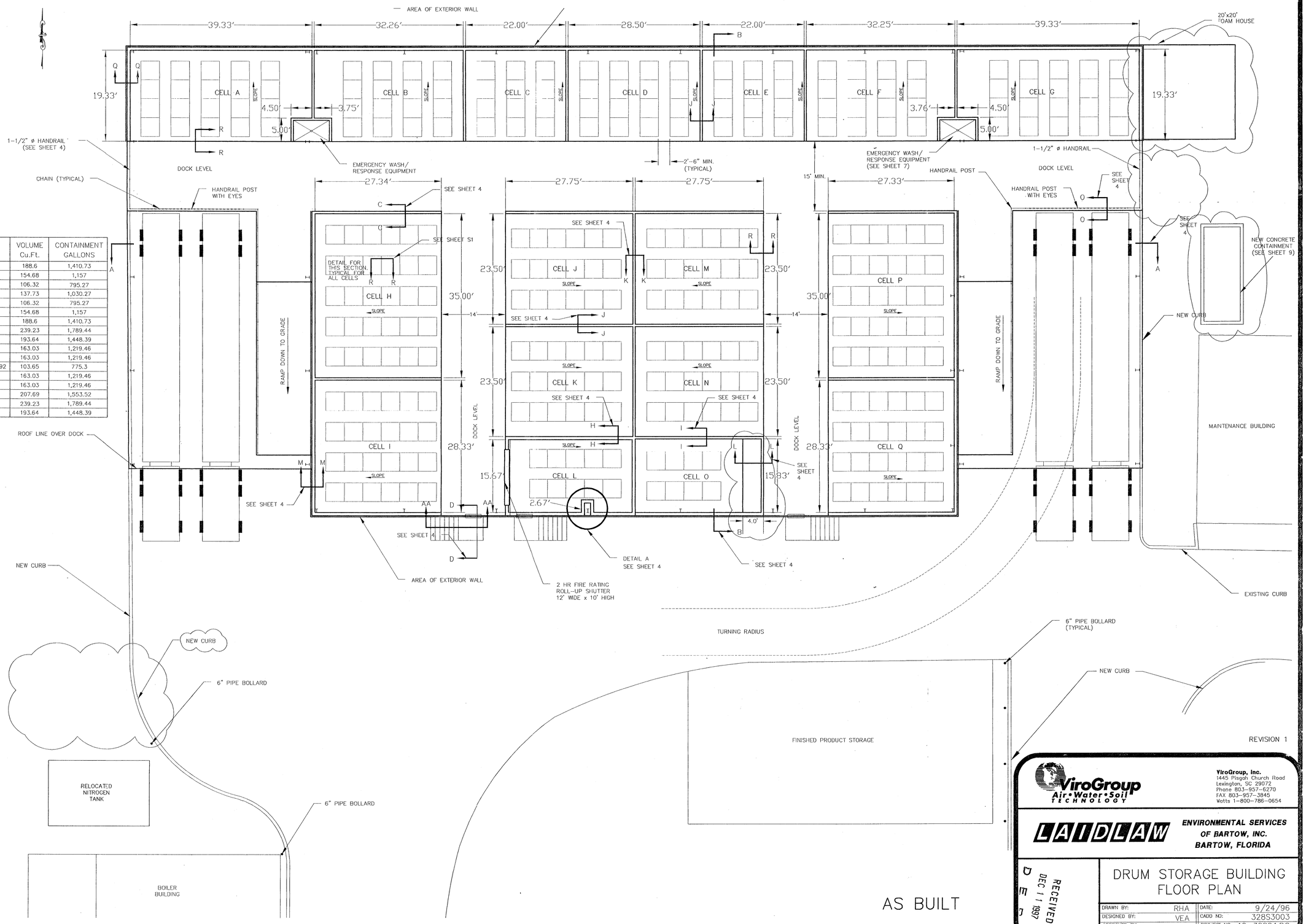
LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

RECEIVED DEC 11 1997

DRUM STORAGE BUILDING SITE PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3002
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	1"=60'	SHEET NO.	2 OF 11



CELL	DIMENSIONS	VOLUME Cu.Ft.	CONTAINMENT GALLONS
CELL A	34.83x5x4.5x14.33x39.33x19.33	188.6	1,410.73
CELL B	28.5x19.33x32.26x14.33x3.75x5	154.68	1,157
CELL C	22x19.33x22x19.33	106.32	795.27
CELL D	28.5x19.33x28.5x19.33	137.73	1,030.27
CELL E	22x19.33x22x19.33	106.32	795.27
CELL F	28.5x5x3.75x14.33x32.26x19.33	154.68	1,157
CELL G	34.83x5x4.5x14.33x39.33x19.33	188.6	1,410.73
CELL H	35x27.34x35x27.34	239.23	1,789.44
CELL I	28.33x27.34x28.33x27.34	193.64	1,448.39
CELL J	23.5x27.75x23.5x27.75	163.03	1,219.46
CELL K	23.5x27.75x23.5x27.75	163.03	1,219.46
CELL L	15.67x15.96x2.67x2.67x2.67x8.29x15.67x26.92	103.65	775.3
CELL M	23.5x27.75x23.5x27.75	163.03	1,219.46
CELL N	23.5x27.75x23.5x27.75	163.03	1,219.46
CELL O	15.83x27.25x15.83x27.25	207.69	1,553.52
CELL P	35x27.34x35x27.34	239.23	1,789.44
CELL Q	28.33x27.34x28.33x27.34	193.64	1,448.39

REVISION 1

ViroGroup Air•Water•Soil TECHNOLOGY

ViroGroup, Inc.
1445 Pisgah Church Road
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Phone 803-957-6270
FAX 803-957-3845
Watts 1-800-786-0654

LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC. BARTOW, FLORIDA

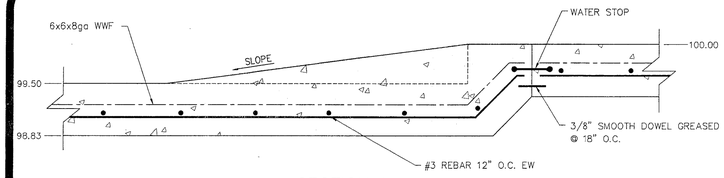
RECEIVED DEC 11 1997 DEP

DRUM STORAGE BUILDING FLOOR PLAN

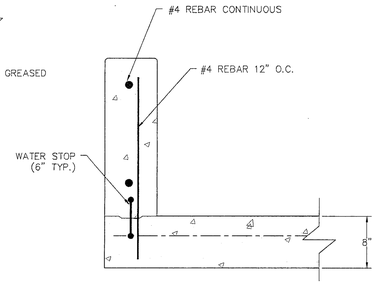
DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3003
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	1"=20'	SHEET NO.	3 OF 11

AS BUILT

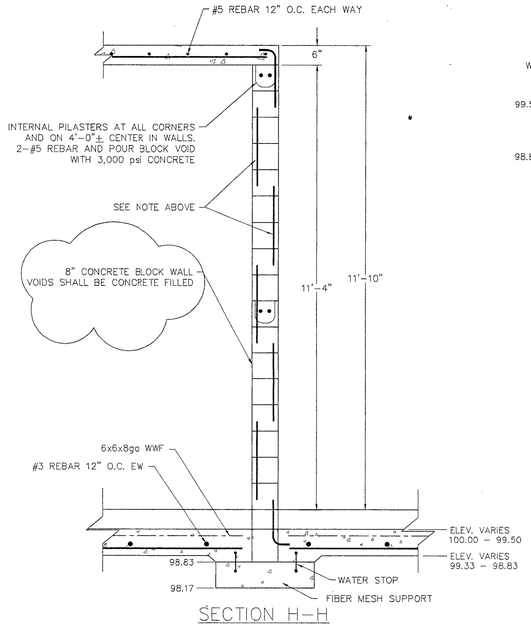
NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
·	WATER STOP REVISIONS		
2	EDITED TEXT	11/25/97	MSB



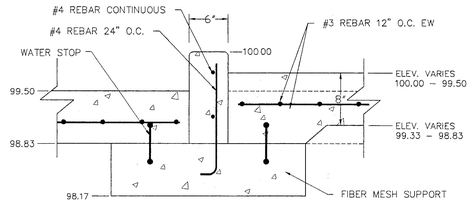
SECTION L–L
SCALE: 1/2" = 1'
(SEE SHEET 3)



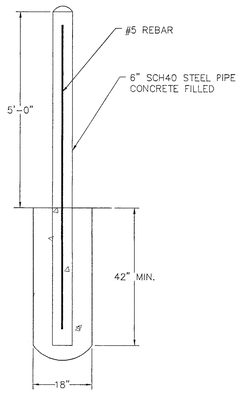
SECTION G–G & E–E
SCALE: 1/2" = 1'
(SEE SHEET 2)



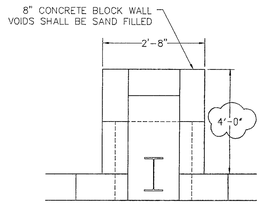
SECTION H–H
SCALE: 1/4" = 1'
(SEE SHEET 3)



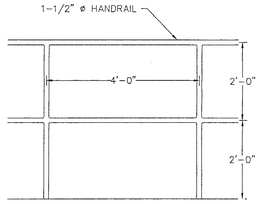
SECTION I–I
SCALE: 1/2" = 1'
(SEE SHEET 3)



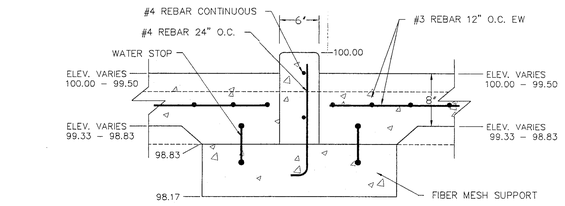
TYPICAL PIPE BOLLARD DETAIL
SCALE: 1/4" = 1'
(SEE SHEET 3)



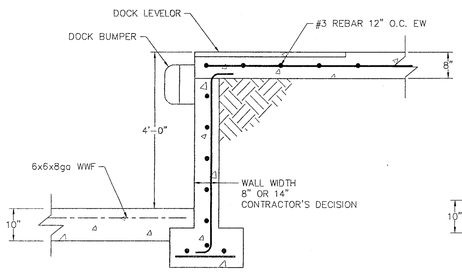
DETAIL A
SCALE: 1/4" = 1'
(SEE SHEET 3)



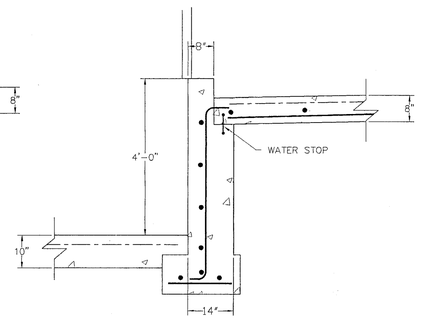
TYPICAL HANDRAIL DETAIL
SCALE: 1/4" = 1'
(SEE SHEET 3)



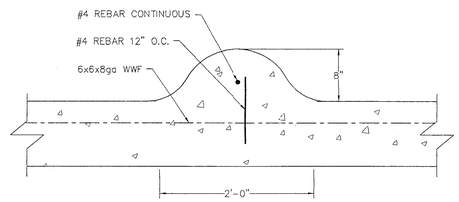
SECTION J–J
SCALE: 1/2" = 1'
(SEE SHEET 3)



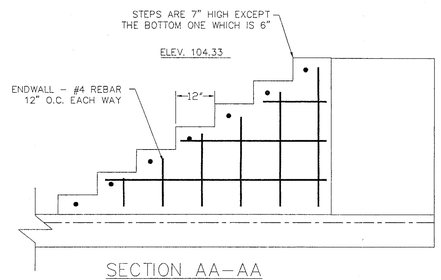
SECTION O–O
SCALE: 1/4" = 1'
(SEE SHEET 3)



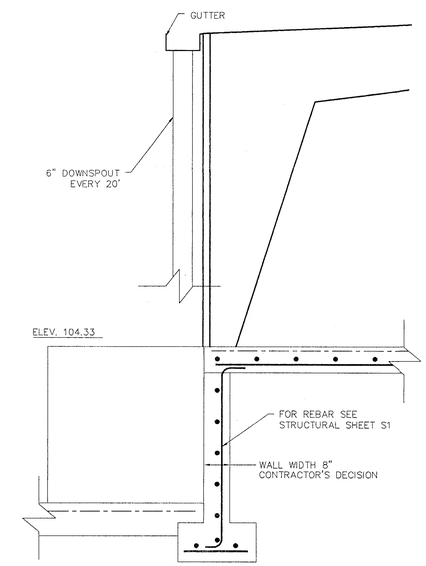
SECTION M–M
SCALE: 1/4" = 1'
(SEE SHEET 3)



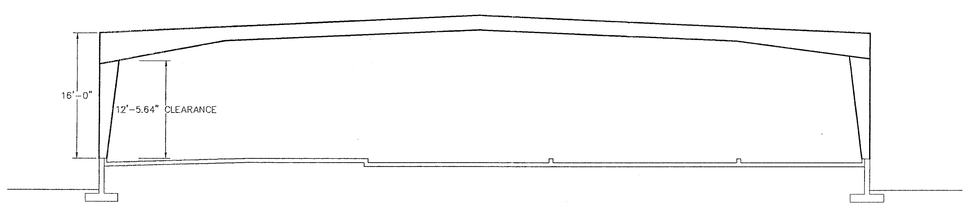
SECTION N–N
SCALE: 1/2" = 1'
(SEE SHEET 2)



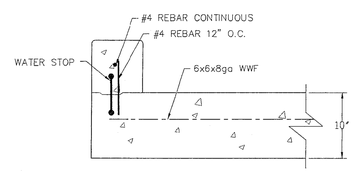
SECTION AA–AA
N.T.S.
(SEE SHEET 3)



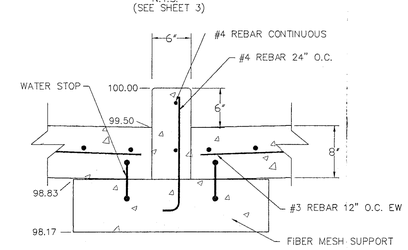
SECTION D–D
SCALE: 1/4" = 1'
(SEE SHEET 3)



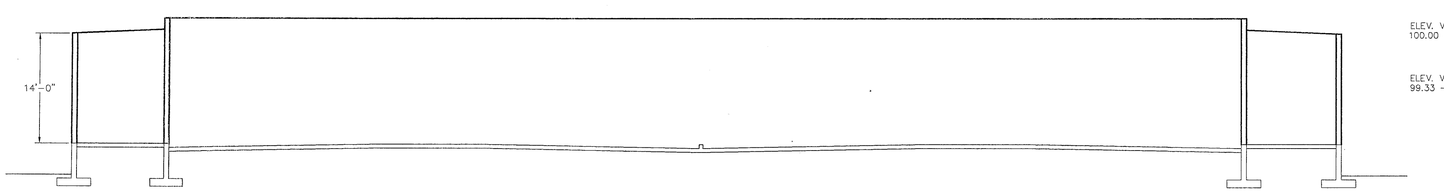
SECTION B–B
SCALE: 1" = 20'
(SEE SHEET 3)



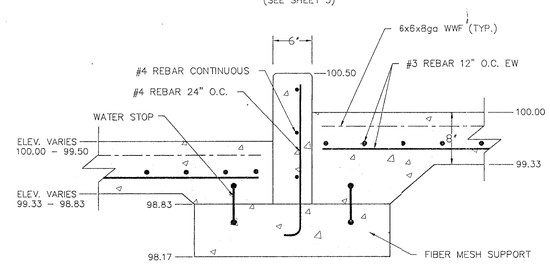
SECTION F–F & P–P
SCALE: 1/2" = 1'
(SEE SHEET 2)



SECTION K–K
SCALE: 1/2" = 1'
(SEE SHEET 3)



SECTION A–A
SCALE: 1" = 20'
(SEE SHEET 3)



SECTION C–C
SCALE: 1/2" = 1'
(SEE SHEET 3)

AS BUILT

RECEIVED DEC 17 1998

ViroGroup Air•Water•Soil TECHNOLOGY
ViroGroup, Inc.
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FAX 803-957-3845
Watts 1-800-786-0854

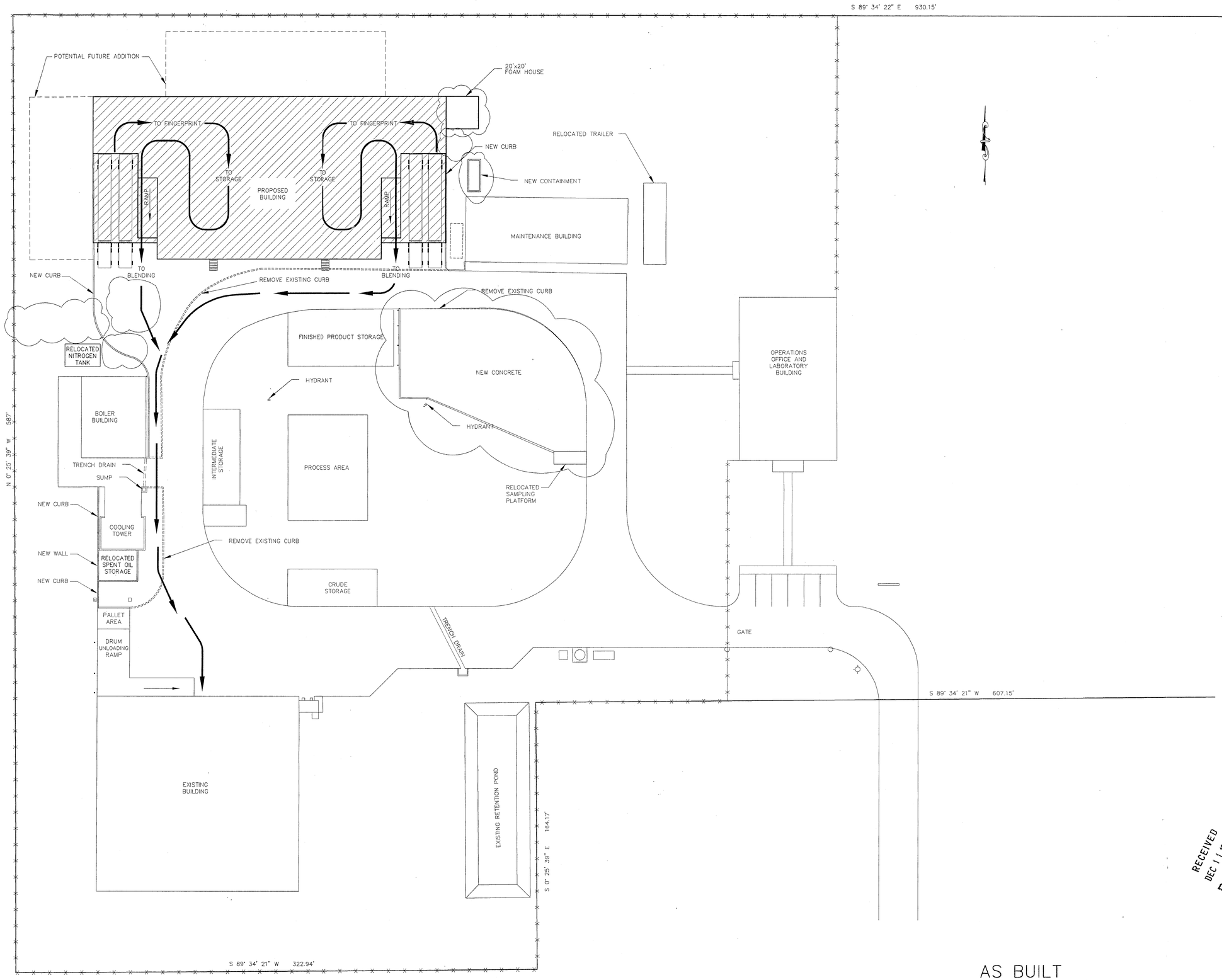
LAIDLAW
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING SECTIONS & DETAILS

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3004
APPROVED BY:	CEJ	PROJECT NO:	12-32803.D1
SCALE:	AS SHOWN	SHEET NO.	4 OF 11

(5)

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
2	DRIVEWAYS AND	11/25/97	MSB
	FOAM HOUSE		



AS BUILT

RECEIVED DEC 11 1997

ViroGroup Air•Water•Soil TECHNOLOGY

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FAX 803-957-3845
Watts 1-800-786-0654

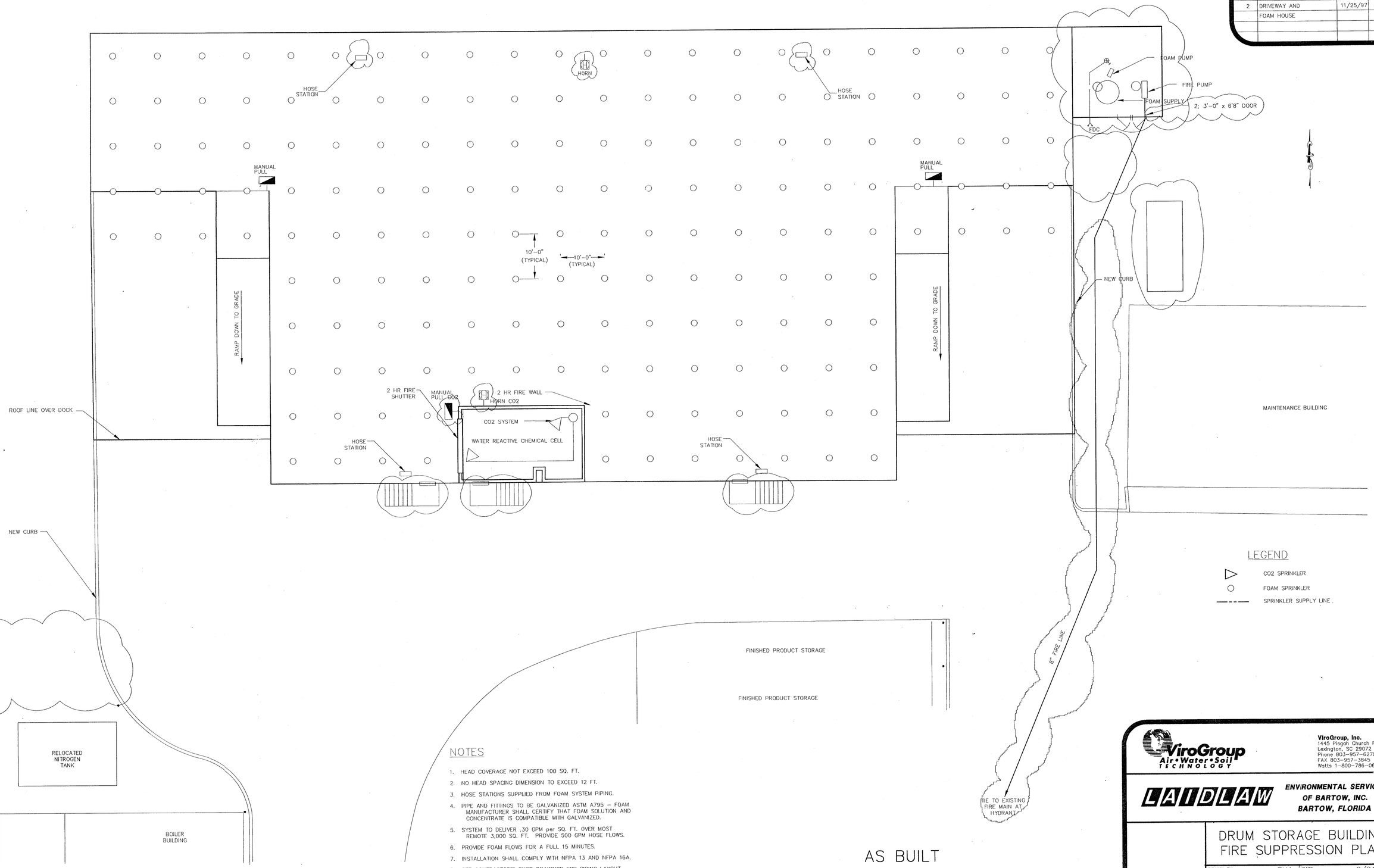
LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING WASTE FLOW PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3005
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	1"=60'	SHEET NO. 5	OF 11

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKO
	WATER STOP REVISIONS		
2	DRIVEWAY AND	11/25/97	MSB
	FOAM HOUSE		



NOTES

1. HEAD COVERAGE NOT EXCEED 100 SQ. FT.
2. NO HEAD SPACING DIMENSION TO EXCEED 12 FT.
3. HOSE STATIONS SUPPLIED FROM FOAM SYSTEM PIPING.
4. PIPE AND FITTINGS TO BE GALVANIZED ASTM A795 – FOAM MANUFACTURER SHALL CERTIFY THAT FOAM SOLUTION AND CONCENTRATE IS COMPATIBLE WITH GALVANIZED.
5. SYSTEM TO DELIVER .30 GPM per SQ. FT. OVER MOST REMOTE 3,000 SQ. FT. PROVIDE 500 GPM HOSE FLOWS.
6. PROVIDE FOAM FLOWS FOR A FULL 15 MINUTES.
7. INSTALLATION SHALL COMPLY WITH NFPA 13 AND NFPA 16A.
8. SEE CONTRACTOR'S SHOP DRAWINGS FOR PIPING LAYOUT.

AS BUILT

ViroGroup Air•Water•Soil TECHNOLOGY

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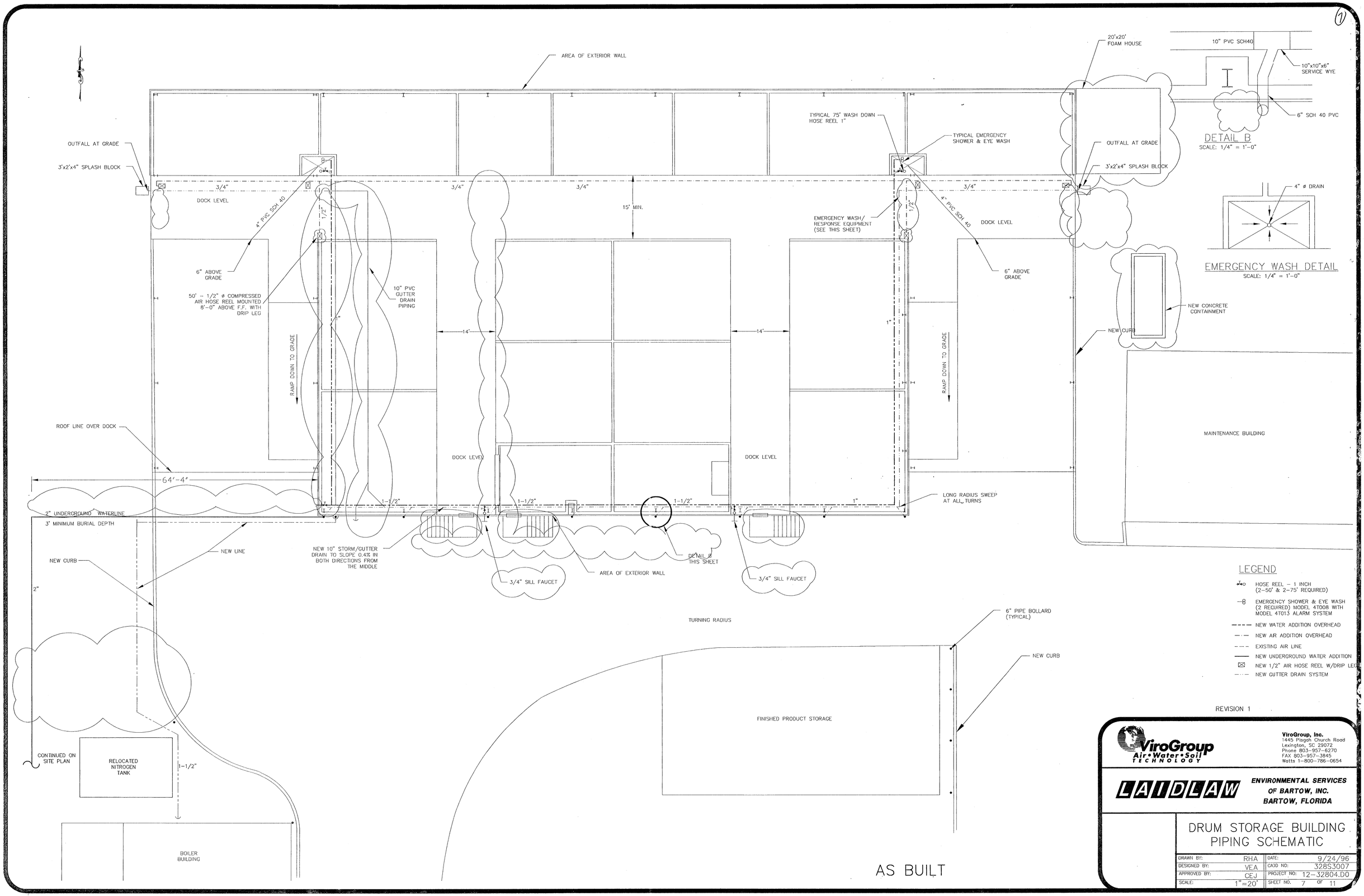
Watts 1-800-786-0654

LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

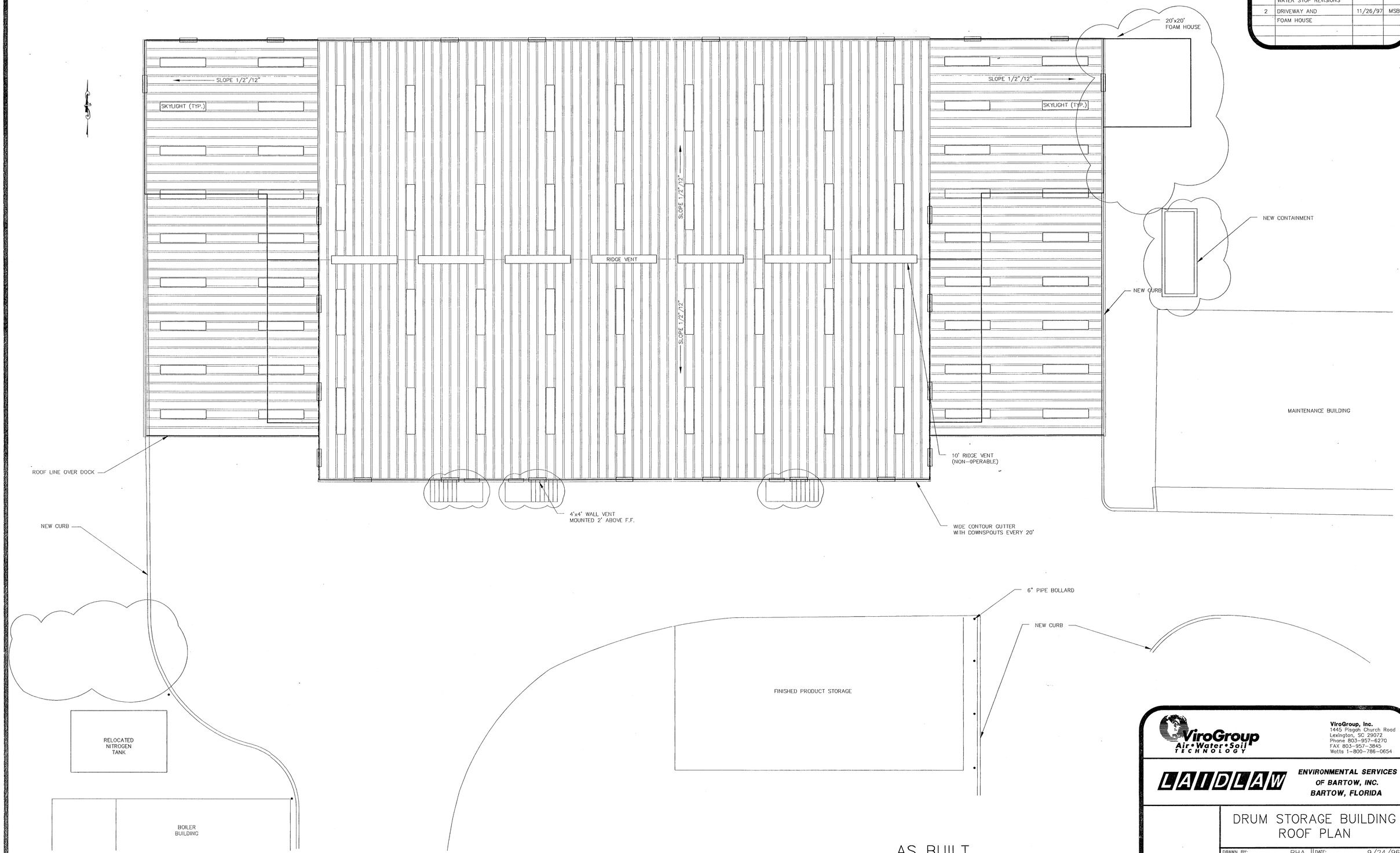
DRUM STORAGE BUILDING FIRE SUPPRESSION PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3006
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	1"=20'	SHEET NO.	6 OF 11


AREA OF EXTERIOR WALL
20'x20' FOAM HOUSE
10" PVC SCH40
10"x10"x6" SERVICE WYE
6" SCH 40 PVC
DETAIL B
SCALE: 1/4" = 1'-0"
OUTFALL AT GRADE
3'x2'x4" SPLASH BLOCK
TYPICAL 75' WASH DOWN HOSE REEL 1"
TYPICAL EMERGENCY SHOWER & EYE WASH
OUTFALL AT GRADE
3'x2'x4" SPLASH BLOCK
4" ø DRAIN
EMERGENCY WASH DETAIL
SCALE: 1/4" = 1'-0"
3/4"
DOCK LEVEL
4" PVC SCH 40
15' MIN.
EMERGENCY WASH/ RESPONSE EQUIPMENT (SEE THIS SHEET)
DOCK LEVEL
6" ABOVE GRADE
50' - 1/2" ø COMPRESSED AIR HOSE REEL MOUNTED 8'-0" ABOVE F.F. WITH DRIP LEG
10" PVC GUTTER DRAIN PIPING
14'
RAMP DOWN TO GRADE
NEW CONCRETE CONTAINMENT
NEW CURB
ROOF LINE OVER DOCK
DOCK LEVEL
MAINTENANCE BUILDING
64'-4"
1-1/2"
1"
LONG RADIUS SWEEP AT ALL TURNS
2" UNDERGROUND WATERLINE
3' MINIMUM BURIAL DEPTH
NEW LINE
NEW CURB
NEW 10" STORM/GUTTER DRAIN TO SLOPE 0.4% IN BOTH DIRECTIONS FROM THE MIDDLE
DETAIL B THIS SHEET
AREA OF EXTERIOR WALL
3/4" SILL FAUCET
3/4" SILL FAUCET
2"
TURNING RADIUS
6" PIPE BOLLARD (TYPICAL)
NEW CURB
FINISHED PRODUCT STORAGE
CONTINUED ON SITE PLAN
RELOCATED NITROGEN TANK
BOILER BUILDING
LEGEND
HOSE REEL - 1 INCH (2-50' & 2-75' REQUIRED)
EMERGENCY SHOWER & EYE WASH (2 REQUIRED) MODEL 4T008 WITH MODEL 4T013 ALARM SYSTEM
NEW WATER ADDITION OVERHEAD
NEW AIR ADDITION OVERHEAD
EXISTING AIR LINE
NEW UNDERGROUND WATER ADDITION
NEW 1/2" AIR HOSE REEL W/DRIP LEG
NEW GUTTER DRAIN SYSTEM
REVISION 1
ViroGroup Air•Water•Soil TECHNOLOGY
ViroGroup, Inc.
1445 Piggah Church Road
Lexington, SC 29072
Phone 803-957-6270
FAX 803-957-3845
Watts 1-800-786-0654
LAIDLAW
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA
DRUM STORAGE BUILDING PIPING SCHEMATIC
DRAWN BY: RHA
DATE: 9/24/96
DESIGNED BY: VEA
CADD NO: 328S3007
APPROVED BY: CEJ
PROJECT NO: 12-32804.00
SCALE: 1"=20'
SHEET NO. 7 OF 11
AS BUILT

(8)

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
2	DRIVEWAY AND	11/26/97	MSB
	FOAM HOUSE		



AS BUILT

ViroGroup
Air • Water • Soil
TECHNOLOGY

ViroGroup, Inc.
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Phone 803-957-6270
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LAIDLAW

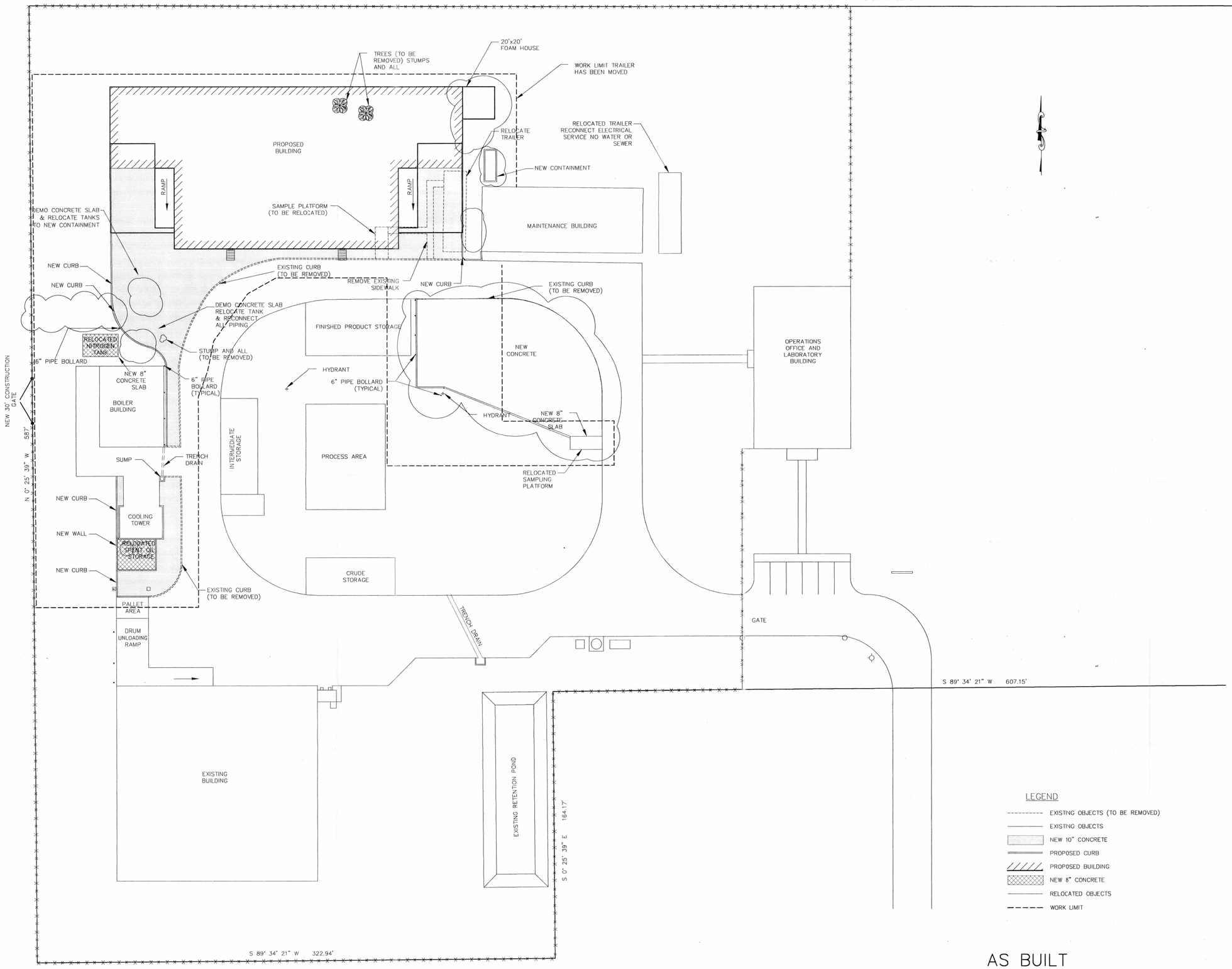
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING ROOF PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3008
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	1"=20'	SHEET NO. 8	OF 11

(9)

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
2	DRIVEWAYS AND	11/26/97	MSB
	FOAM HOUSE		



NOTES

1. TEMPORARY CURB SHALL BE INSTALLED AT ALL LOCATIONS WHERE EXISTING CURB IS BEING REMOVED. USE 6" REINFORCED WHEEL STOPS SEALED AT ALL END JOINTS AND VERTICLE SEAMS.
2. ALL COLD JOINTS SHALL HAVE INTERNAL SEALS AND BE CAULKED WITH HYDROCARBON RESISTANT MATERIAL.

LEGEND

- EXISTING OBJECTS (TO BE REMOVED)
- EXISTING OBJECTS
- NEW 10" CONCRETE
- PROPOSED CURB
- PROPOSED BUILDING
- NEW 8" CONCRETE
- RELOCATED OBJECTS
- WORK LIMIT

AS BUILT

ViroGroup Air•Water•Soil TECHNOLOGY

ViroGroup, Inc.
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Phone 803-957-6270
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LAIDLAW

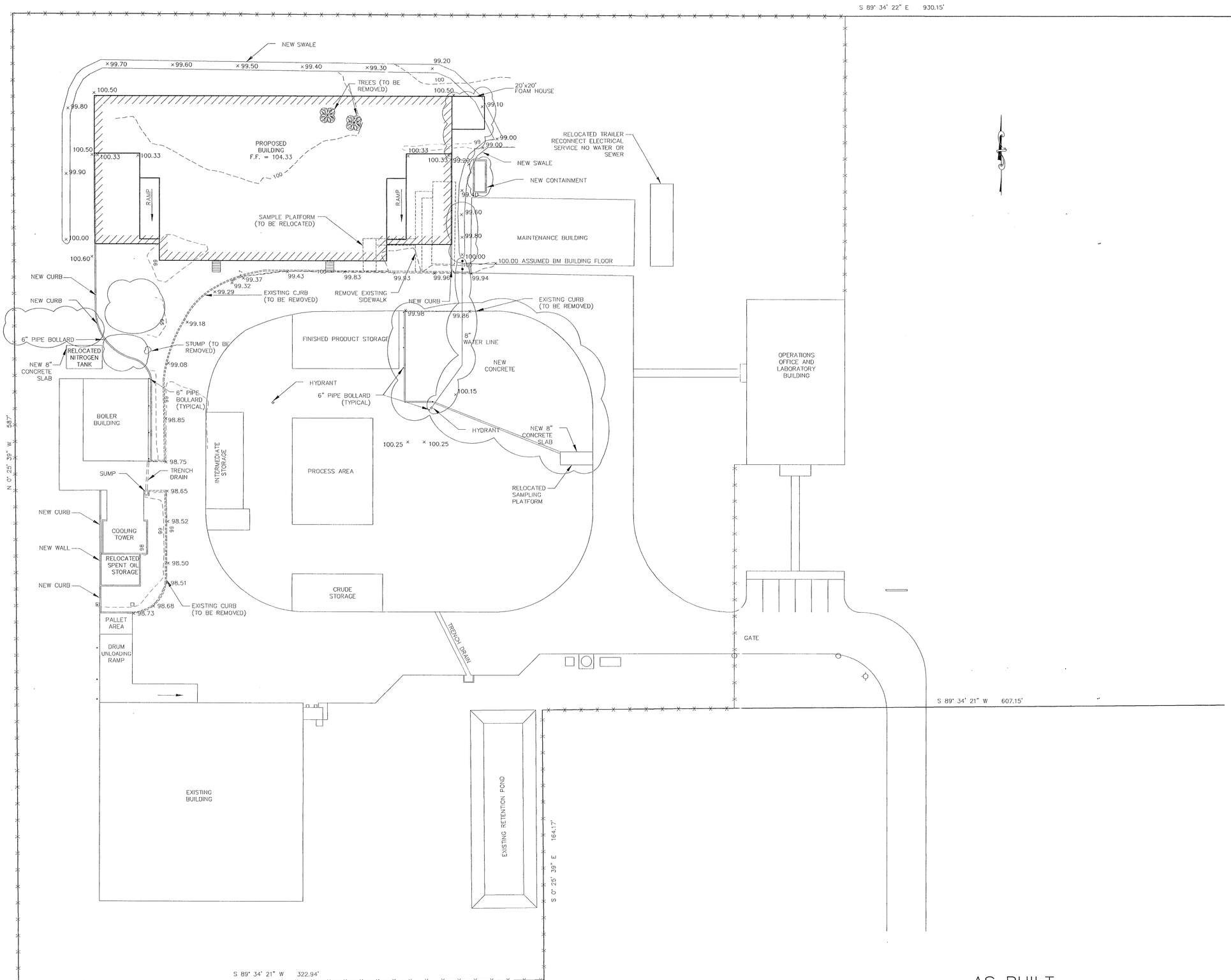
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING
DEMOLITION & RELOCATION PLAN

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3009
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	1"=60'	SHEET NO.	9 OF 11

(10)

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
2	DRIVEWAYS AND	11/26/97	MSB
	FOAM HOUSE		



NOTES

1. SLOPE NEW CONCRETE DRIVES TO EXISTING CONCRETE TIE AND SEAL COLD JOINT.

LEGEND

- NEW CONCRETE
- EXISTING STRUCTURES
- EXISTING STRUCTURES (TO BE REMOVED)
- NEW BUILDING
- ×99.94 EXISTING SPOT ELEVATIONS
- ×100.00 NEW SPOT ELEVATIONS

AS BUILT

ViroGroup Air•Water•Soil TECHNOLOGY

ViroGroup, Inc.
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Phone 803-957-6270
FAX 803-957-3845
Watts 1-800-786-0654

LAIDLAW

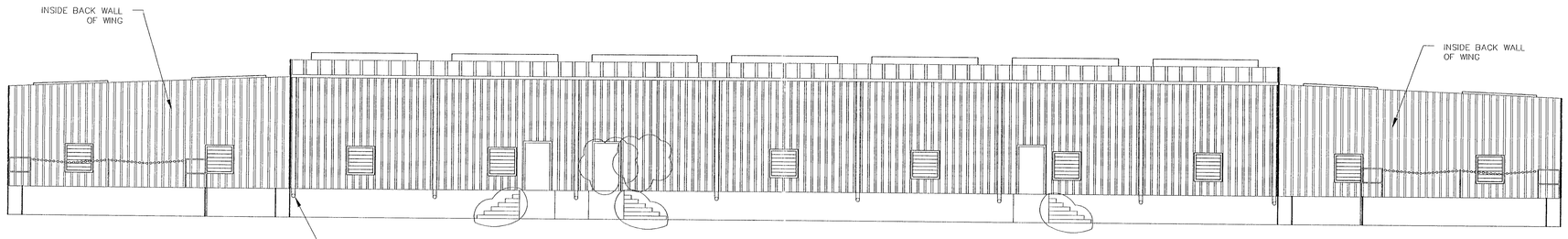
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING GRADING PLAN

DRAWN BY:	RHA	DATE	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3010
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	1"=60'	SHEET NO.	10 OF 11

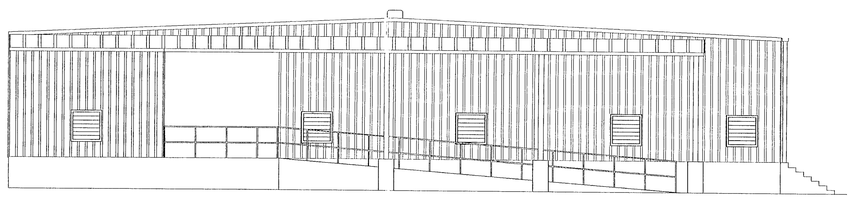
(11)

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
2	VENT DELETED	11/26/97	MSB



FRONT ELEVATION

SCALE: 1" = 20' 0"



SIDE ELEVATION

SCALE: 1" = 20'-0"

AS BUILT

ViroGroup
Air • Water • Soil
TECHNOLOGY

ViroGroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072
Phone 803-957-6270
FAX 803-957-3845
Watts 1-800-786-0654

LAIDLAW

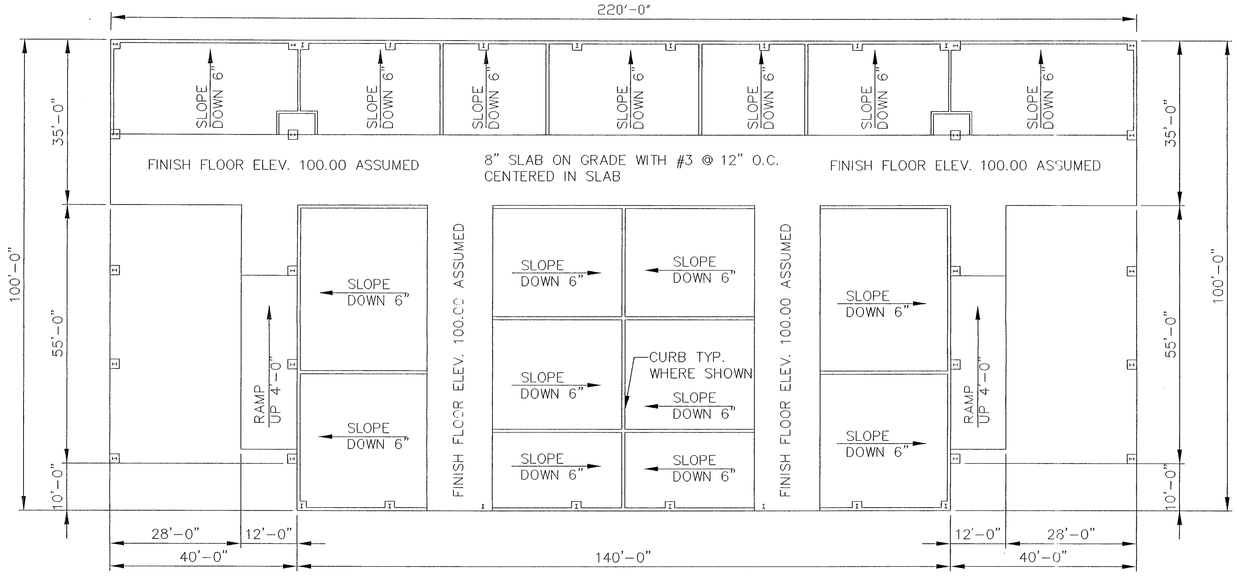
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING
ELEVATION VIEWS

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	VEA	CADD NO:	328S3011
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	1"=20'	SHEET NO.	11 OF 11

(12)

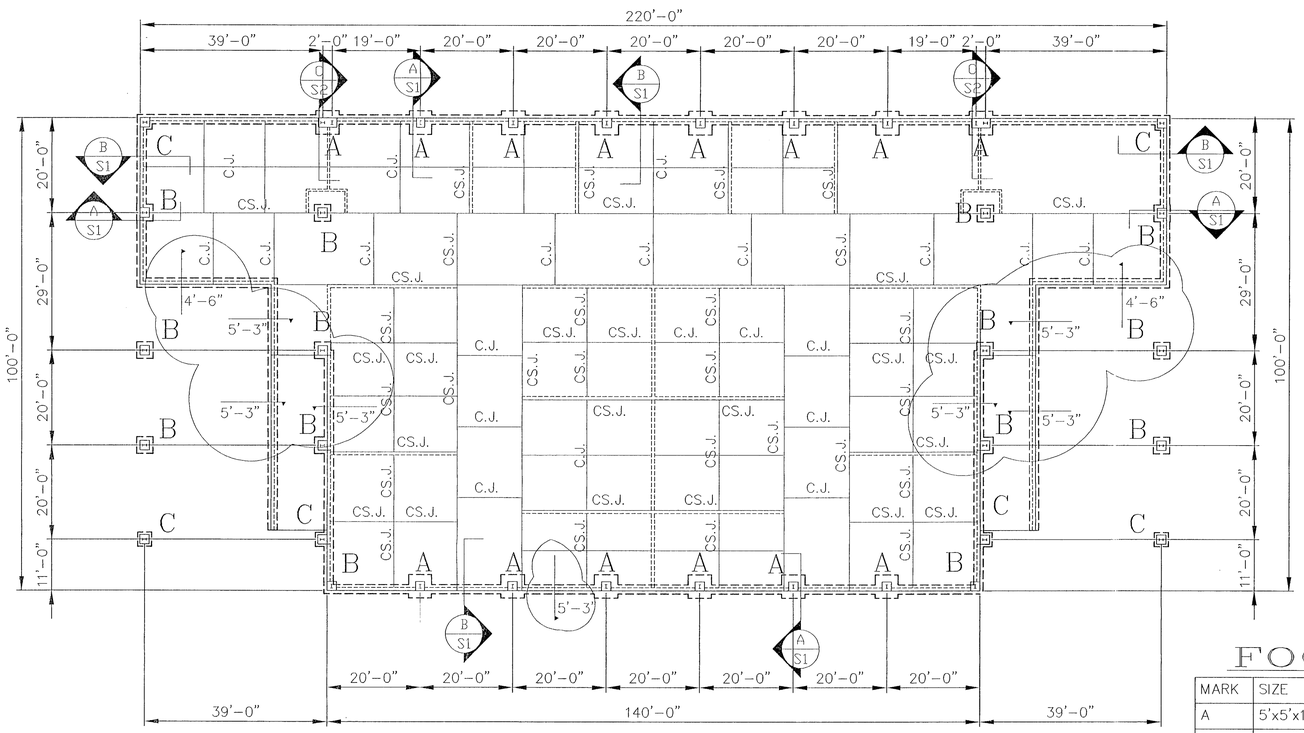
NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISONS		
2	CONTROL JOINTS	8/1/97	JWB
3	TEXT	11/26/97	MSB



TOP OF PIER ELEVATION 100.00 (FINISH MAIN FLOOR ELEVATION) ALL CASES

FLOOR PLAN

SCALE: 1/32" = 1'-0"



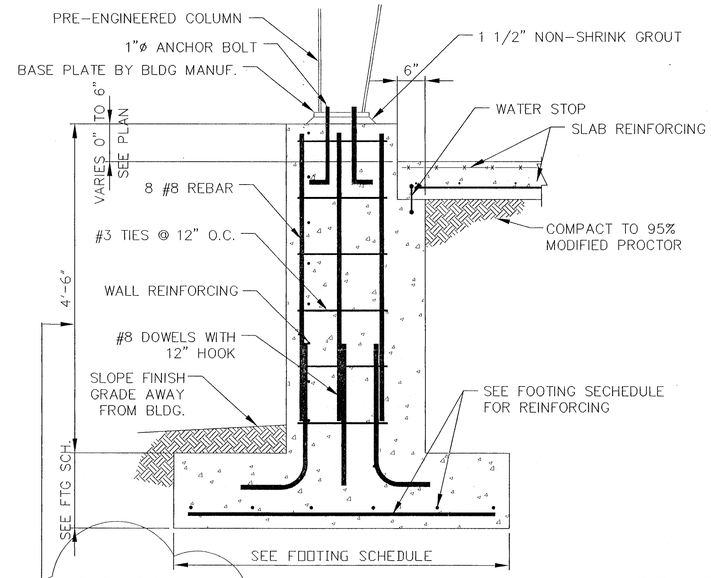
TOP OF FOOTING ELEVATION 95.50 (4'-6" BELOW FINISH FLOOR) ALL CASES

FOUNDATION PLAN

SCALE: 1/32" = 1'-0"

LEGEND

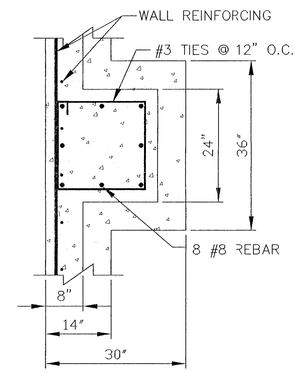
C.J. CONTROL JOINT
CS. J. CONSTRUCTION JOINT
SEE DETAIL 'R-R' OF DWG S2 FOR C.J. AND C.J.S.



5'-3" AT SOUTH STEM WALL AND B & C FOUNDATIONS ON EAST AND WEST END AT STEMWEALL TO TOP OF RAMP.(SEE RED LETTER NOTES BELOW AT "FOUNDATION PLAN")

SECTION

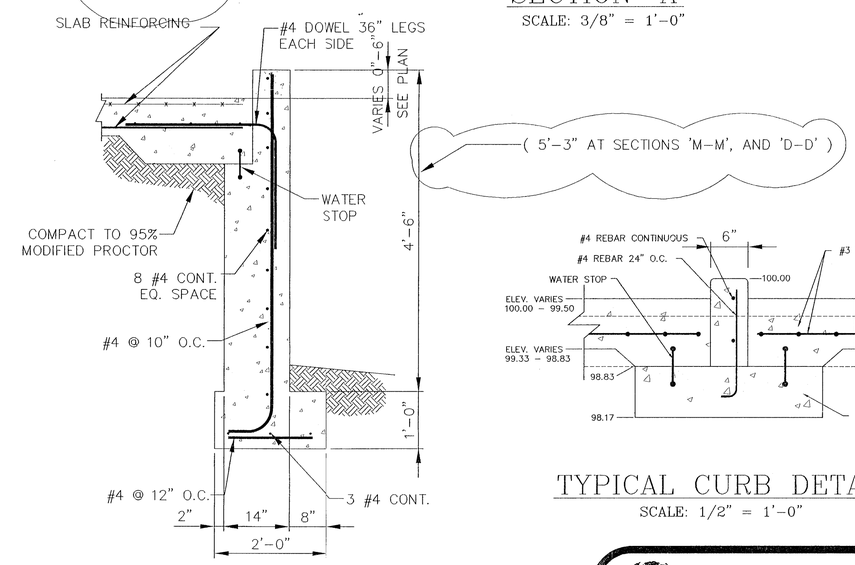
TYPICAL COLUMN FOOTING AND PIER



TOP VIEW THROUGH PIER

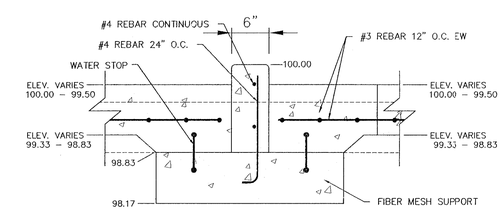
SECTION 'A'

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



SECTION 'B'

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



TYPICAL CURB DETAIL

SCALE: 1/2" = 1'-0"

FOOTING SCHEDULE

MARK	SIZE	REINFORCING	REMARKS
A	5'x5'x1'-6"	6 #6 E.W.	TWO PIERS ON FTG.
B	3'-6"x3'-6"x1'-4"	4 #6 E.W.	
C	3'x3'x1'-4"	4 #6 E.W.	

AS BUILT

ViroGroup Air•Water•Soil TECHNOLOGY

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Watts 1-800-786-0654

LAIDLAW

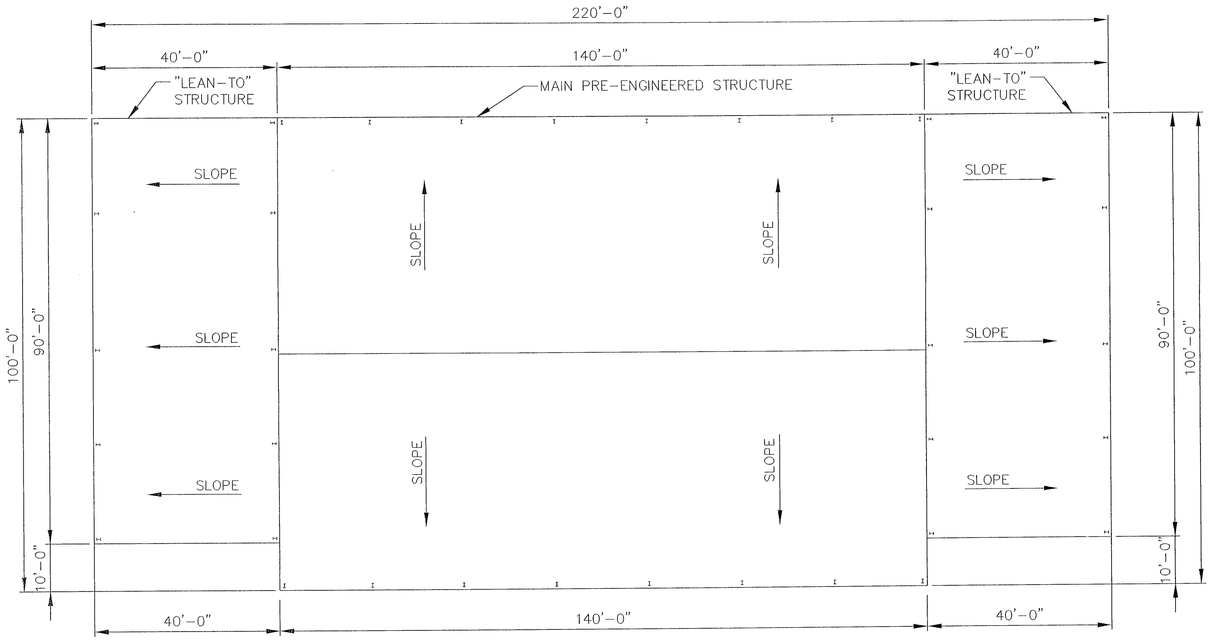
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING
STRUCTURAL LAYOUT

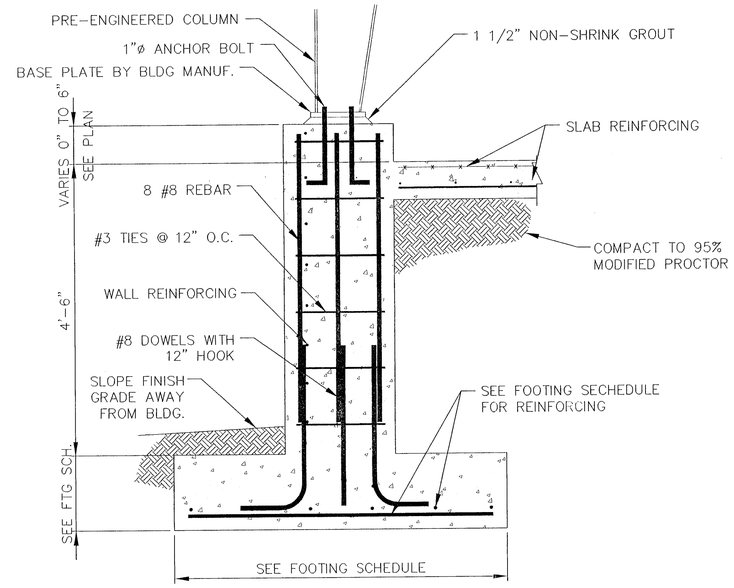
DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	JVW	CADD NO:	32833S01
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	AS SHOWN	SHEET NO.	S1 OF 2

(13)

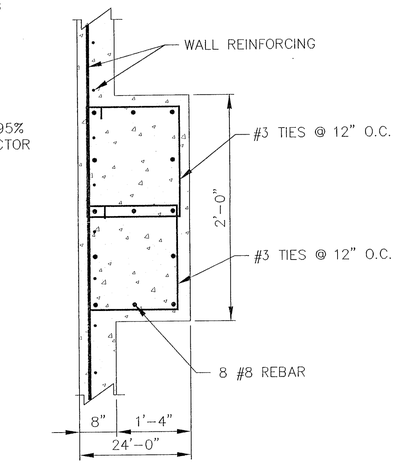
NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
2	ADDED WATERSTOP AND	11/26/97	MSB
	EDITED TEXT		



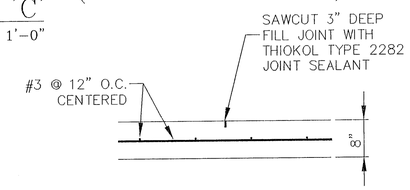
ROOF PLAN
SCALE: 1/32" = 1'-0"



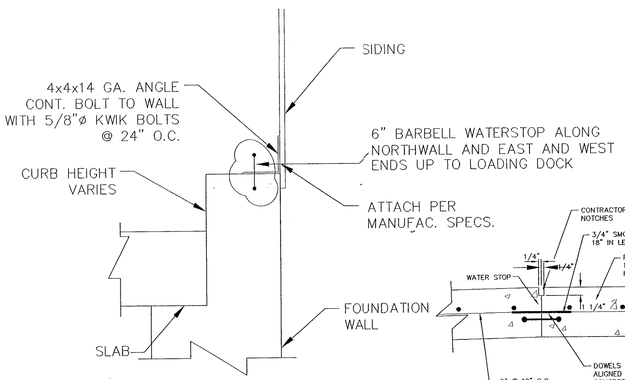
SECTION
SCALE: 3/8" = 1'-0"



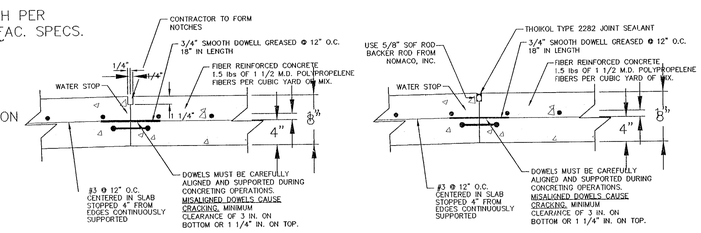
TOP VIEW THROUGH PIER (NOT APPLICABLE)
SCALE: 3/8" = 1'-0"



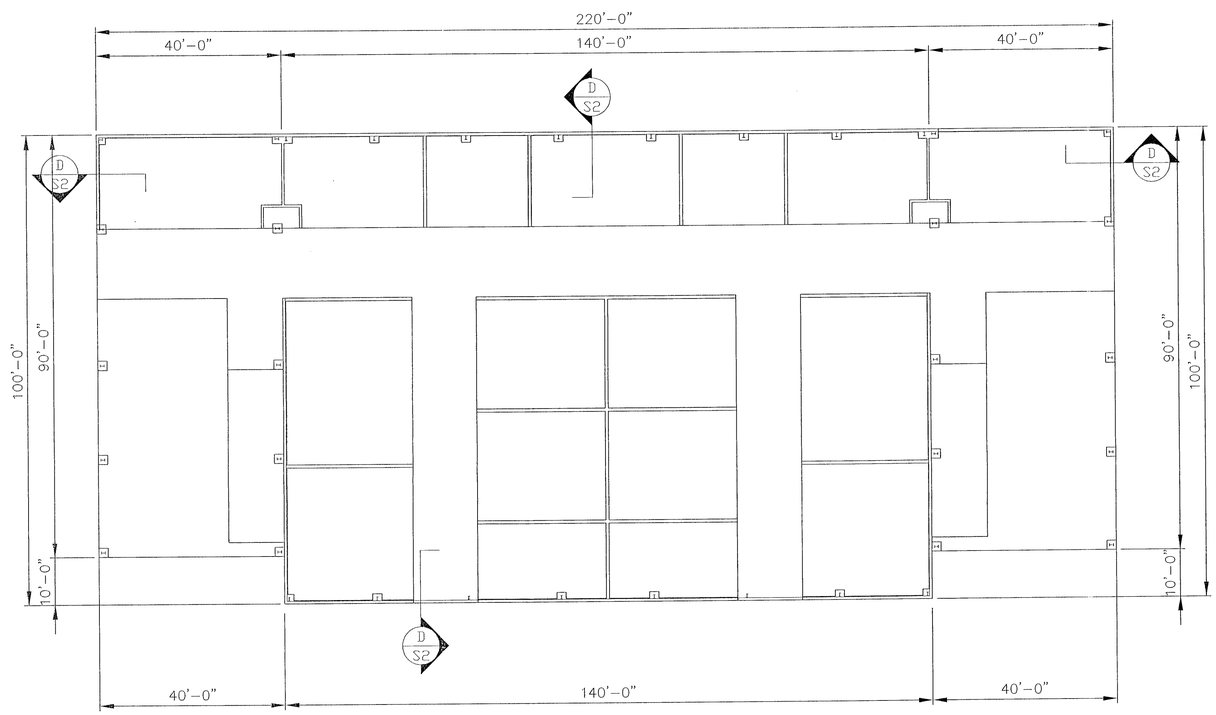
TYPICAL CONTROL JOINT
SCALE: 3/8" = 1'-0"



SECTION 'D'
SCALE: 3/4" = 1'-0"



CONSTRUCTION JOINT DETAIL AT SLAB TO SLAB SECTION 'R-R'
N.T.S.



WALL SIDING LAYOUT
SCALE: 1/32" = 1'-0"

GENERAL NOTES
1. ALL CONCRETE WORK PER ACI
2. ALL STEEL WORK PER AISC
3. ALL CONCRETE 4000 PSI @ 28 DAYS W/ 1-1/2" M.D. FIBERMESH 1-1/2#/C.Y. W/ SUPERPLASTIZIER
4. ALL REBAR GRADE 60
5. ALL WWF ASTM A185
6. CUT ALL CONTROL JOINTS WITHIN EIGHT (8) HOUR OF CONCRETE POUR
7. WET CURE CONCRETE WITH AQUA CURE CURING COMPOUND
8. COMPACT ALL FILL MATERIAL 95% MODIFIED PROCTOR
9. MINIMUM ALLOWABLE SOIL BEARING 2000 PSF
10. POUR FOOTINGS ON UNDISTURBED SOIL OR SUITABLE COMPACTED FILL MATERIAL
11. ALL STEEL ASTM A36
12. ALL BOLTS A325
13. SEAL ALL JOINTS IN CONCRETE WITH THIOKOL JOINT SEALANT TYPE 2282

AS BUILT

ViroGroup Air•Water•Soil TECHNOLOGY

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LAIDLAW

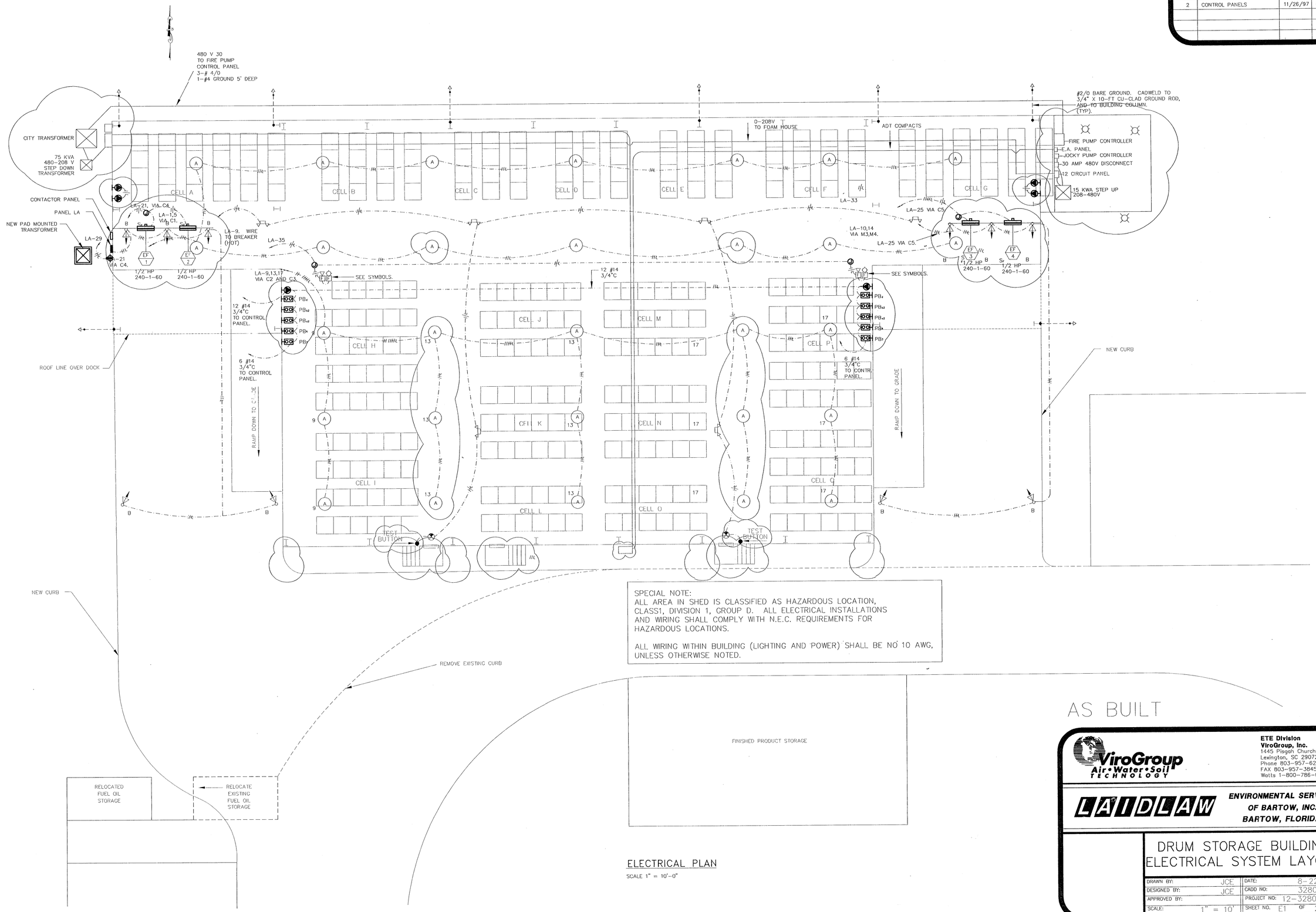
ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING
STRUCTURAL LAYOUT

DRAWN BY:	RHA	DATE:	9/24/96
DESIGNED BY:	JVW	CADD NO:	328S3S02
APPROVED BY:	CEJ	PROJECT NO:	12-32804.DO
SCALE:	AS SHOWN	SHEET NO.	S2 OF 2

(19)

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
2	CONTROL PANELS	11/26/97	MSB



SPECIAL NOTE:
ALL AREA IN SHED IS CLASSIFIED AS HAZARDOUS LOCATION, CLASS1, DIVISION 1, GROUP D. ALL ELECTRICAL INSTALLATIONS AND WIRING SHALL COMPLY WITH N.E.C. REQUIREMENTS FOR HAZARDOUS LOCATIONS.

ALL WIRING WITHIN BUILDING (LIGHTING AND POWER) SHALL BE NO 10 AWG, UNLESS OTHERWISE NOTED.

AS BUILT

ELECTRICAL PLAN

SCALE 1" = 10'-0"

ViroGroup
Air•Water•Soil
TECHNOLOGY

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Watts 1-800-786-0654

LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

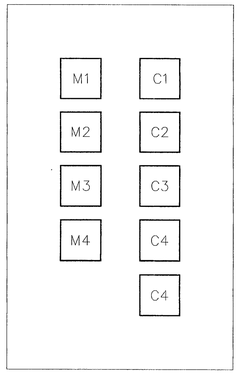
DRUM STORAGE BUILDING ELECTRICAL SYSTEM LAYOUT

DRAWN BY:	JCE	DATE:	8-22-96
DESIGNED BY:	JCE	CADD NO:	32803E01
APPROVED BY:		PROJECT NO:	12-32804.DO
SCALE:	1" = 10'	SHEET NO.	E1 OF 2

NO.	REVISION	DATE	BY
1	CURB AND INTERIOR	5/21/97	JKB
	WATER STOP REVISIONS		
2	DETAIL DELETED	11/26/97	MSB

CONTROL SYSTEMS EQUIPMENT:

TYPE	DESCRIPTION
ENC	NEMA 4 ENCLOSED CABINET, 30-IN HIGH, 24-IN WIDE, 6-IN DEEP, WITH METAL BACK PANEL, HOFFMAN A-4 SERIES, OR EQUAL.
M1, M2 M3, M4	OPEN MOTOR STARTER, NEMA SIZE 0, 240-1-60, 1/2 HP WITH 120-VAC COIL AND HOLDING INTERLOCK. SQUARE D 8536/SBO, OR APPROVED EQUAL.
C1, C2 C3, C4 C5	MECHANICALLY HELD LIGHTING CONTACTOR, 30-AMP, 4-POLE, WITH 120-VAC COILS. SQUARE D 8903/LXO, OR APPROVED EQUAL.
PB1, PB2 PB3, PB4	START-STOP PUSHBUTTON, SEALED, CLASS 1, DIVISION 1, GROUP D. SQUARE D 9001/BR214, OR APPROVED EQUAL.
PBa1, PBa2 PBb1, PBb2 PBc, PBd	ON-OFF PUSHBUTTON, SEALED, CLASS 1, DIVISION 1, GROUP D. SQUARE D 9001/BR214, OR APPROVED EQUAL.



ELECTRICAL SYMBOLS

	H.I.D. FIXTURE, PENDANT MOUNT.
	SAME, EXCEPT WITH FLOODLIGHT TRUNNION BRACKET. SEE MOUNTING DETAIL.
	EXIT SIGN.
	EMERGENCY BATTERY LIGHT.
Sr	DISCONNECT SWITCH FOR FAN. MOUNT ADJACENT TO FAN. USE 20-AMP, 2-POLE EXPLOSION PROOF SWITCH, CROUSE HINDS, OR EQUAL.
	PUSHBUTTON FOR FAN STARTER OR LIGHTING CONTACTOR. SEE EQUIPMENT SCHEDULE. MOUNT ON COLUMN, 48-IN. ABOVE FIN. FLOOR.
	GFCI RECEPTACLE, 20A-120V-NEMA 5-20R. MOUNTING HEIGHT 48" AFF. PROVIDE TYPE FD BOX AND WEATHERPROOF COVER PLATE.
	EXPLOSION PROOF RECEPTACLE, 20A-120V. MOUNTING HEIGHT 48" AFF. CROUSE HINDS CPS-152-201, OR APPROVED EQUAL.
	EMERGENCY LIGHT TO FLASH WHEN EMERGENCY SHOWER IS OPERATED. PROVIDE 120V EXPLOSION PROOF CONNECTION TO LIGHT AS REQUIRED.
	EMERGENCY SIGNAL HORN FOR EMERGENCY SHOWER, SAME AS ABOVE.
I-J J	WALL OR CEILING MOUNTED JUNCTION BOX.
	PANELBOARD.
LA-1, 3	BRANCH CIRCUIT WIRING RUN EXPOSED AT WALLS OR CEILING. SLASH MARKS INDICATE NUMBER OF #10 CONDUCTORS. WHERE MORE THAN TWO ARE REQUIRED, SHORT SLASH DENOTES HOT OR SWITCH LEG, LONG SLASH DENOTES NEUTRAL, "L" DENOTES GREEN GROUNDING WIRE. ARROW DENOTES HOME RUN, NUMERAL DENOTES CIRCUIT NUMBER.

GENERAL NOTES

A. VISIT SITE TO DETERMINE EXISTING CONDITIONS PRIOR TO SUBMITTING BID.

B. DO NOT SCALE THESE DRAWINGS. ROUGHING IN SHALL BE DONE FROM FIELD CONDITIONS AND DIMENSIONS ON ARCHITECTURAL DRAWINGS AND EQUIPMENT SHOP DRAWINGS.

C. ELECTRICAL CONTRACTOR SHALL DO ALL CUTTING AND PATCHING AS REQUIRED TO INSTALL HIS WORK. FINISH PATCHING AND PAINTING WILL BE DONE BY THE GENERAL CONTRACTOR.

D. PRIOR TO DIGGING ANY TRENCHES, NOTIFY ALL UTILITIES (ELECTRIC, GAS, TELEPHONE, WATER, AND SEWER) AND OBTAIN LOCATIONS OF UNDERGROUND UTILITIES.

E. ANY DAMAGES DONE TO UNDERGROUND UTILITIES OR PIPING BY THIS CONTRACTOR WILL BE REPAIRED BY THE OWNER OF THE LINE IN A SATISFACTORY MANNER. THIS CONTRACTOR WILL BEAR ALL COSTS FOR REPAIRS.

F. ALL WORK SHALL COMPLY WITH THE 1996 NATIONAL ELECTRICAL CODE AND ALL LOCAL CODES.

G. APPLY AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS WORK.

H. WIRING SHALL BE SOLID COPPER CONDUCTOR, SIZE NO. 10, UNLESS NOTED, WITH TYPE THHN-THWN-MTW, 90 C, 900V INSULATION. NO. 8 AND LARGER SHALL BE STRANDED COPPER CONDUCTOR WITH TYPE THHN-THWN, 75 C, 600V INSULATION. WIRING SHALL BE COLOR CODED TO MATCH EXISTING COLOR CODE.

I. ALL WIRING SHALL BE RUN IN GRC WITH THREADED FITTINGS.

J. OUTLET BOXES IN SHED SHALL BE EXPLOSION PROOF.

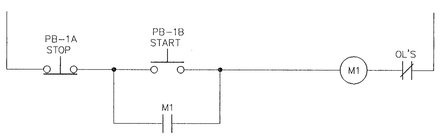
K. SHED AREA IS CLASSIFIED AS A HAZARDOUS LOCATION, CLASS 1, DIVISION 1, GROUP D. ALL WORK IN SHED SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE FOR HAZARDOUS LOCATIONS. PROVIDE TYPE EYS SEALS WHERE RACEWAYS GO FROM HAZARDOUS LOCATION TO NON-HAZARDOUS LOCATIONS.

PANEL "LA" SQUARE D TYPE NQOD, NEMA 3R CABINET, WITH GROUND BUS, 240/120 VOLT, 1 PHASE, 3 WIRE, 200 AMP, MAIN BREAKER (BOTTOM), 10K AIC RATED

KVA	LOAD	BKR	TYPE	NO	Ø	NO	TYPE	BKR	LOAD	KVA
3.5	LTG	20/2	QOB	1	A	2	QOB	20/2	FAN	0.7
				3	B	4				
3.5	LTG	20/2		5	C	6		20/2	FAN	0.7
				7	A	8				
3.5	LTG	20/2		9	B	10		20/2	FAN	0.7
				11	C	12				
3.5	LTG	20/2		13	A	14		20/2	FAN	0.7
				15	B	16				
3.5	LTG	20/2		17	C	18		20/2	SPARE	
				19	A	20				
2.5	LTG	20/2		21	B	22		20/2	SPARE	
				23	C	24				
2.5	LTG	20/2		25	A	26		SPC	SPACE	
				27	B	28				
	RECEPT	20/1		29	C	30				
	RECEPT	20/1		31	A	32				
	RECEPT	20/1		33	B	34		30/2	LIGHTNING PROTECTOR	
	LTG/FAN CONTROLS	15/1		35	C	36				

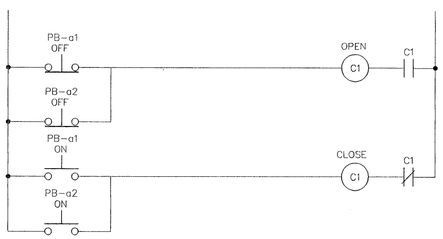
FIXTURE SCHEDULE

TYPE	VOLTAGE	DESCRIPTION	LAMP
A	MULTI-TAP 240V	EXPLOSION PROOF FIXTURE WITH MULTI-TAP BALLAST (SET AT 240-VOLT) AND STANDARD REFLECTOR, CLASS 1 DIVISION 1 GROUP D. APPLETON AMBH SERIES, OR EQUAL OF CROUSE HINDS OR KILLARK. PROVIDE STEEL CHANNELS TO SUPPORT FIXTURE.	1/400W/MH "SUPER" 40K LUMENS
B	MULTI-TAP 240V	SAME AS TYPE A, EXCEPT WITH 30-DEGREE REFLECTOR. FIXTURE MOUNTING HEIGHT TO BE 12-FT. ABOVE FINISHED FLOOR.	1/400W/MH "SUPER" 40K LUMENS
C	120V	EMERGENCY BATTERY LIGHT, EXPLOSION PROOF, CLASS 1, DIVISION 1, GROUP D. DUAL-LITE XPB-75P SERIES WITH (2) EX-1CD LIGHT HEADS.	INCLUDED
D	120V	EXIT SIGN, EXPLOSION PROOF, CLASS 1, DIVISION 1, GROUP D. DUAL-LITE XPB-75P SERIES WITH (1) EX-1CD LIGHT HEAD AND EX-100 SIGN. FIXTURE MOUNTING HEIGHT ~~TO BE 8 FT.~~ ABOVE FINISHED FLOOR.	INCLUDED



CONTROL WIRING – FAN CIRCUIT

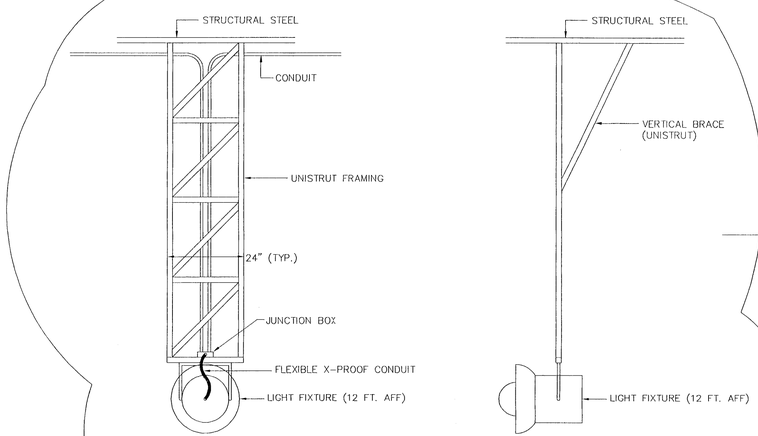
TYPICAL FOR EF-1, EF-2, EF-3, AND EF-4
NOT TO SCALE



LIGHTING CONTACTOR CONTROL WIRING

TYPICAL FOR C1, C2, AND C3.
SIMILAR FOR C4 AND C5, EXCEPT CONTROLLED BY ONE SET OF PB'S.
NOT TO SCALE

CONTACTOR	CIRCUITS CONTROLLED	PUSHBUTTON CONTROLLER
C1	LA-1, LA-5	PB-a1, PB-a2
C2	LA-9, LA-13	PB-b1, PB-b2
C3	LA-17	PB-b1, PB-b2
C4	LA-21	PB-c
C5	LA-25	PB-d



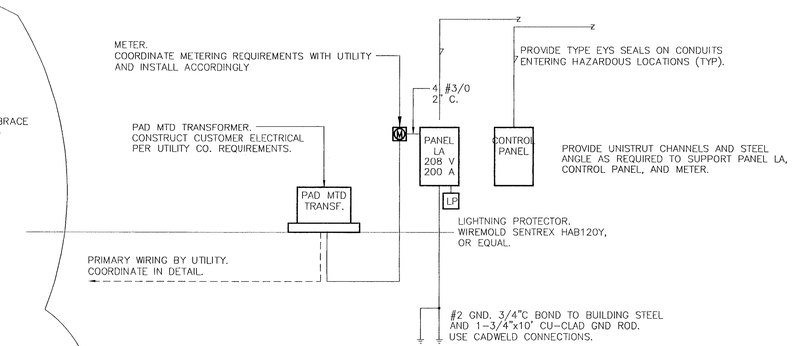
FRONT VIEW

SIDE VIEW

TYPE B LIGHT FIXTURE MOUNTING DETAIL

NOT TO SCALE

DELETED



POWER RISER DIAGRAM

N.T.S.

AS BUILT

ViroGroup Air•Water•Soil TECHNOLOGY

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LAIDLAW

ENVIRONMENTAL SERVICES OF BARTOW, INC.
BARTOW, FLORIDA

DRUM STORAGE BUILDING ELECTRICAL DETAILS

DRAWN BY:	JCE	DATE:	8/22/96
DESIGNED BY:	JCE	CADD NO:	32803E02
APPROVED BY:		PROJECT NO:	12-32804.DO
SCALE:	NONE	SHEET NO.	E2 OF 2

APPENDIX 3

Pre-Engineered Metal Building As-Builts

GENERAL NOTES

1. Design and/or fabrication shall be in accordance with Whirlwind's standard practices and interpretation of the following codes:
   Ninth Edition AISC Steel Construction Manual ASD, 1986 AISI Cold-Formed Steel Design Manual, 1996 AWS D1.1 Structural Welding Code-Steel and any other code listed within the Design Information.

2. Materials

	ASTM Designation	Minimum Yield
Hot Rolled Mill Shapes	A36	FY=36 KSI
Steel Plate/Flat Bar	A572 or A529	FY=50 KSI
Structural Steel Sheets	A570	FY=50 KSI
Cold-Formed Light Gauge Shapes	A570	FY=55 KSI
Cable Bracing	A475	Extra High Strength
Rod Bracing	A36	FY=36 KSI
Roof and Wall Sheeting	A792	FY=50, 80 KSI
Machine Bolts	A307	
High Strength Bolts	A325	
Anchor Bolts (by others)	A36	FY=36 KSI

3. Finish
   Whirlwind's standard Red-Oxide shop primer meets the end performance requirements of Federal Specification TT-P-636D and is intended for short term field protection from the elements. Whirlwind is not responsible for any deterioration of the shop primer paint as a result of improperly applied point and/or coatings.

4. All Bolts are ½" x 0'-1¼" A307 Except:
   A). Endwall rafter splice – ⅝" x 0'-1½" A325-N
   B). Endwall column to rafter connection – ⅝" x 0'-1½" A325
   C). Main frame connections – SEE CROSS SECTION

5. A325 Bolt Tightening Requirements
   All high strength bolts are A325 unless specifically noted otherwise. All structural A325 bolts with heavy hex nuts for the Rigid Frame are to be installed using the turn-of-nut method specified in the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" in the AISC Manual. All bolted connections unless noted are designed as bearing type connections with bolt threads not excluded from the shear plane.

6. Closure Strips Furnished For Roof Application
   INSIDE – under roof panels at eave
   OUTSIDE – between endwall panels and rake trim and at the high side eave trim

7. Erection Note:
   All bracing shown and provided by Whirlwind for this building is required and shall be installed by the erector as a permanent part of the structure. ("Code of Standard Practice for Steel Buildings and Bridges" in the AISC Manual; Section 7.9)

8. Shortages
   Any claims or shortages by buyer must be made to Whirlwind within seven (7) working days after delivery, or such claims will be considered to have been waived by the customer and disallowed.

9. Misfits
   Claims for correction of alleged misfits will be disallowed unless Whirlwind shall have received prior notice thereof and allowed reasonable inspection of such misfits. Ordinary inaccuracies of shop work shall not be construed as misfits. No part of the building may be returned or charges assessed for alleged misfits without prior approval from Whirlwind.

WHIRLWIND

STEEL BUILDINGS

DRAWING PACKAGE FOR

CUSTOMER: SEMCO CONSTRUCTION

JOB NUMBER: 970090

OWNER: LAIDLAW ENVIRONMENTAL SERVICES

JOBSITE: BARTOW, FL

DRAWING SCHEDULE

DRAWING NUMBER	ISSUE	DATE	DESCRIPTION
C-ONE	A	02.26.97	COVER
E-ONE	A	02.26.97	ROOF FRAMING PLAN
E-2	A	02.26.97	FRAMING ELEVATIONS
E-3	A	02.26.97	FRAMING ELEVATIONS
D-ONE	A	02.26.97	GIRT/PURLIN LAPS
P-ONE	A	02.26.97	FRAME X-SECTION
P-2	A	02.26.97	FRAME X-SECTION
P-3	A	02.26.97	FRAME X-SECTION
F-ONE	A	02.26.97	ANCHOR BOLT PLAN
S & T-ONE	–	–	SHEETING/TRIM ELEV.
S & T-2	–	–	SHEETING/TRIM ELEV.

RESPONSIBILITIES

1. The Contractor obtains and pays for all building permits, licenses, public assessments, paving or utility pro rata, utility connections, occupancy fees and other fees required by any governmental authority or utility in connection with the work provided for in the Contract Documents. The Contractor provides at his expense all plans and specifications required to obtain a building permit. It is the Contractor's responsibility to ensure that all plans and specifications comply with the applicable requirements of any governing building authorities.

2. The End Customer is responsible for identifying all applicable building codes, zoning codes, or other regulations applicable to the Construction Project, including the metal building system.

   It is the responsibility of the Contractor to interpret all aspects of the End Customer's specifications and incorporate the appropriate specifications, design criteria, and design loads into the Order Documents submitted to Whirlwind.

   It is the responsibility of Whirlwind, through Whirlwind's Engineer, to design the metal building system to meet the specifications including the design criteria and design loads incorporated by the Contractor into the Order Documents. Whirlwind is not responsible for making an independent determination of any local codes or any other requirements not part of the Order Documents.

   Whirlwind is responsible only for the structural design of the metal building system it provides. Whirlwind or Whirlwind's Engineer is not the Design Professional or Engineer of Record for the Construction Project. Whirlwind is not responsible for the design of any components or materials not provided by it or their interface and connection with the metal building system unless such design responsibility is specifically required by the Order Documents.

3. Whirlwind Steel Buildings' standard specifications apply unless stipulated otherwise in the Contract Documents. Whirlwind design, fabrication, quality criteria, standards, practice, methods and tolerances shall govern the work any other interpretations to the contrary not withstanding. It is understood by both parties that the Contractor is responsible for clarifications of inclusions or exclusions from the Architectural plans and/or specifications.

4. In case of discrepancies between Whirlwind's structural steel plans and plans for other trades, Whirlwind's shall govern ("Code of Standard Practice for Steel Buildings and Bridges" in the AISC Manual; Section 3.3)

5. Approval of Whirlwind drawings and/or calculations indicate that Whirlwind has correctly interpreted the contract requirements. This approval constitutes the Contractor acceptance of the Whirlwind design, concepts, assumptions and loadings ("Code of Standard Practice for Steel Buildings and Bridges" in the AISC Manual; Section 4.2)

6. Once the Contractor has signed Whirlwind's Approval Package and the project is released for fabrication, changes shall be billed to the Contractor including material, engineering and other cost. An additional fee may be charged if the project must be moved from fabrication and the shipping schedule.

7. The Contractor is responsible for overall project coordination. All interface, compatibility and design considerations concerning any materials not furnished by Whirlwind and Whirlwind's steel system are to be considered and coordinated by the Contractor. Specific design criteria concerning this interface between materials must be furnished before release for fabrication or Whirlwind's assumptions will govern.

8. The Contractor is responsible for the setting of anchor bolts and erection of steel in accordance with Whirlwind's "For Construction" drawings only.

9. Temporary supports, such as guys, braces, falsework, cribbing or other elements required for the erection operation shall be determined and furnished by the erector ("Code of Standard Practice for Steel Buildings and Bridges" in the AISC Manual; Section 7.9).

10. Normal erection operations include the correction of minor misfits by moderate amounts of reaming, chipping, welding or cutting and the drawing of elements into line through use of drift pins. Errors which require major changes in the member configuration are to be reported immediately to Whirlwind by the Contractor to enable whoever is responsible either to correct the error or to approve the most efficient and economic method of correction to be used by others ("Code of Standard Practice for Steel Buildings and Bridges" in the AISC Manual; Section 7.12).

11. Neither the fabricator nor the Contractor will cut, drill or otherwise alter their work, or the work of other trades to accommodate other trades unless such work is clearly specified in the contract documents. Whenever such work is specified the Contractor is responsible for furnishing complete information as to materials, size, location and number of alterations prior to preparation of shop drawings ("Code of Standard Practice for Steel Building and Bridges" in the AISC Manual; Section 7.13).

12. Whirlwind does not investigate the influence of the metal building system on existing buildings or structures. The End Customer assures that such buildings and structures are adequate to resist snow drifts, wind loads, or other conditions as a result of the presence of the metal building system.

SUBMITTAL
☐ APPROVED
☒ APPROVED AS NOTED
☐ NOT APPROVED - RESUBMIT
DATE
March, 1997

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
No Exceptions Taken ☐
Note Markings ☒ Resubmit ☐
Contractor's responsibility for product functions and with the design concept and contract dr... comments shall not be construed as relieving the Supplier/Subcontractor from complying with the plans and specifications, nor from the Supplier/Subcontractor from any error in dimensions, for satisfying and complying with all dimensions and quantities, and of assembly and erection techniques or performing the work in a safe manner.
By: 3/4/97

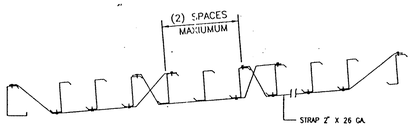
As Built's

CUSTOMER	
SEMCO CONSTRUCTION	
JOB NO.: 970090	DWG. NO.: C-ONE

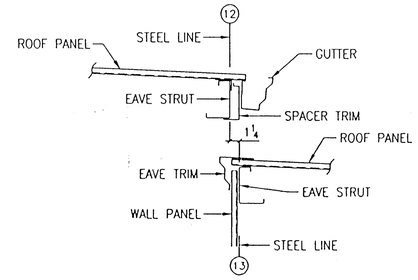
WARNING!

SKYLIGHTS MUST NOT BE USED FOR FOOT TRAFFIC NOR SHOULD THEY SUPPORT THE UNDISTRIBUTED WEIGHT OF ANY INDIVIDUAL. ROOFING LADDERS OR 1" X 12" PLANKS MUST BE USED DURING INSTALLATION, MAINTENANCE OR REPAIR PROCEDURES.

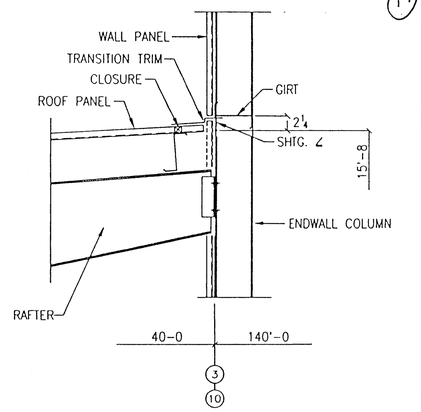
WHIRLWIND STEEL BUILDINGS AND ITS ENGINEERS ARE NOT RESPONSIBLE FOR ANY INJURY RESULTING FROM THE SKYLIGHTS FAILING FROM IMPROPER USE.



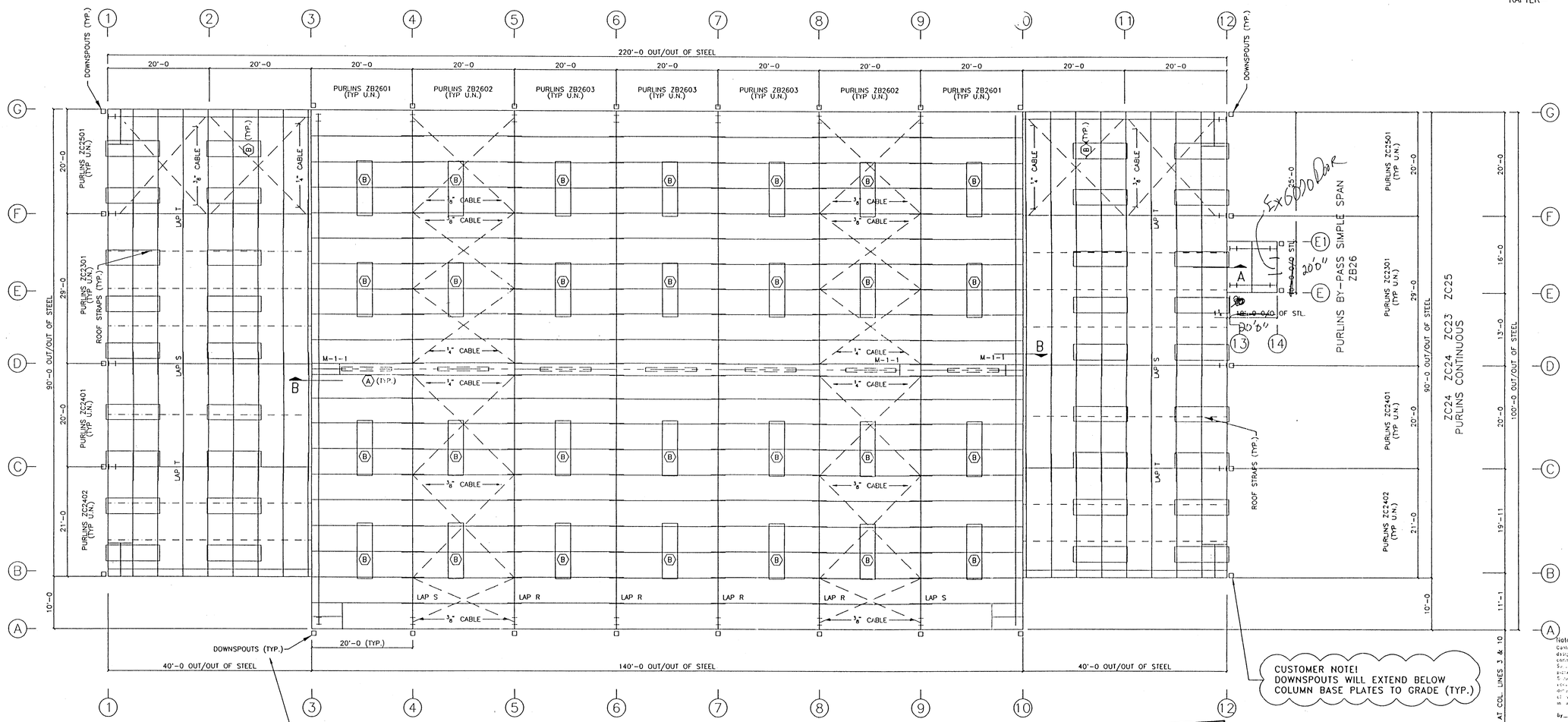
PURLIN STRAP DETAIL WITH 6 OR MORE PURLINS



SECTION "A"



SECTION "B"



ROOF FRAMING PLAN

CUSTOMER NOTE!
WHIRLWIND WILL FURNISH DOWNSPOUTS AT WHIRLWIND STANDARD SPACING

100mph
~~110 mph~~
Sheet 2 of 11
Note #9

PURLINS CONTINUOUS
ZB26 ZB26 ZB26 ZB26 ZB26 ZB26 ZB26

*PLEASE LOCATE

CUSTOMER NOTE!
DOWNSPOUTS WILL EXTEND BELOW COLUMN BASE PLATES TO GRADE (TYP.)

SUBMITTAL
☐ APPROVED
☒ APPROVED AS NOTED
☐ NOT APPROVED - RESUBMIT
VIROGROUP DATE
Mar 11, 1997

SUBMITTAL
☐ APPROVED
☐ APPROVED AS NOTED
☐ NOT APPROVED - RESUBMIT
VIROGROUP DATE

Need Engineer Seal

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
☒ Exceptions Taken ☐ Resubmit ☐
Note Markings
By: Date: 3/3/97

STEEL DESIGN ONLY
NO OTHER CODE REQUIREMENTS ARE INCLUDED

As Built's
2/26/97

REFERENCE: LAIDLAW ENVIRONMENTAL SERVICES

DESIGN INFORMATION					
BUILDING CODE:	1991 SBC	WIND LOAD:	[redacted]	SEISMIC HAZARD EXPOSURE:	I
DEAD LOAD:	METAL BLDG ONLY	WIND IMPORTANCE:	1.00	PEAK VEL-REL ACCEL (Av):<0.05	
COLLATERAL LOAD:	3.0 PSF	WIND EXPOSURE:	N/A	PEAK ACCELERATION (Aa): <0.05	
SPRINKLER LOAD:	3.0 PSF	WIND COND.:PARTIALLY ENCLOSED		SEISMIC PERFORMANCE CAT:	A
ROOF LIVE LOAD:	20.0 PSF			SOIL PROFILE:	2.0
FRAME LIVE LOAD:	12.0 PSF	DIRECTION:		LATERAL	LONGITUDINAL
ROOF SNOW LOAD:	0.0 PSF	STRUCTURAL SYSTEM:	ORDINARY MOMENT		BRACED FRAME
SNOW IMPORTANCE:	N/A	RESPONSE MODIFICATION (R):	4.5		4.0
SNOW EXPOSURE:	N/A	DEFLECTION AMPLIFICATION (Cd):	4.0		4.5
SNOW THERMAL:	N/A	ANALYSIS:	EQUIVALENT LATERAL FORCE PROCEDURE		

SHEETING AND TRIM		
24 GA ROOF - SUPER SPAN - 20 YR COLOR		
24 GA WALLS - PROFILE & COLOR TO BE SELECTED		
24 GA TRIM - 20 YR COLOR		
INCLUDE GUTTER & DOWNSPOUTS		
UL 580, CLASS 90 ROOF; CONSTRUCTION No 167		
MK	QTY	SKYLIGHTS - WHITE
B	72	UL 580, CLASS 90 3 x 10'-7" SUPER SPAN (TYP)
MK	QTY	VENTILATORS
A	7	9" x 10' RIDGE, 26 GA, ADJUSTABLE

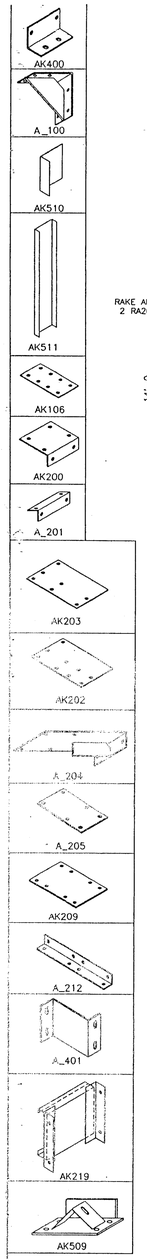
WALKDOORS AND WINDOWS			
MK.	QTY.	FINISH	DESCRIPTION
D	2	WHITE	4070 (M) WALK DOOR
E*	ONE	WHITE	3070 (M) WALK DOOR

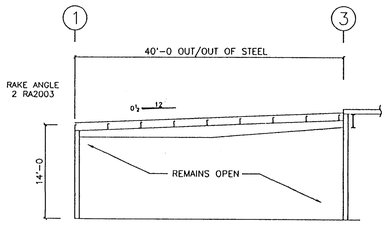
FRAMED OPENINGS				
MK.	QTY.	WIDTH	HEIGHT	OPENING FOR:
C	28	4'-0	4'-0	WALL VENTS BY OTHERS

REV	DATE	DESCRIPTION	BY	CHKD.
A	2/26/97	FOR APPROVAL	SD	JH

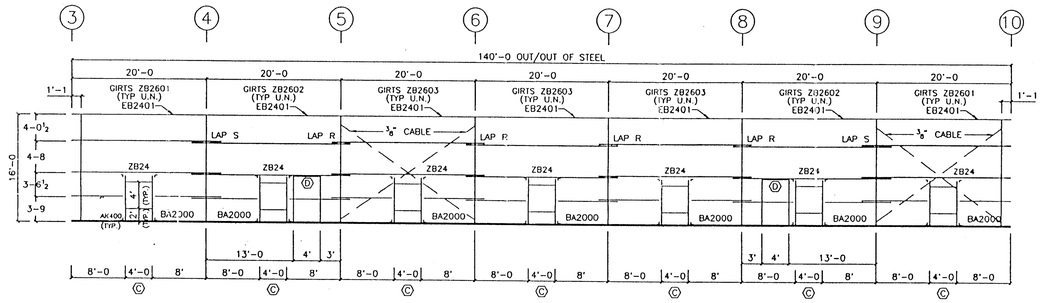
WHIRLWIND STEEL BUILDINGS
8234 HANSEN HOUSTON, TEXAS 77075-1089
(713) 946-7140

DESCRIPTION	ROOF FRAMING PLAN						
SIZE	VARIES	WELDED RIGID FRAME/LEAN-TO/SINGLE SLOPE					
CUSTOMER	SEMCO CONSTRUCTION	0.5:12 ROOF SLOPE					
LOCATION	BARTOW, FL	JOBSITE	BARTOW, FL				
DRAWN BY	CHECKED BY	DATE	SCALE	CAD NO.	JOB NO.	DWG. NO.	ISSUE
SD	JH	2/26/97	NONE	970090A	970090	E-ONE	A

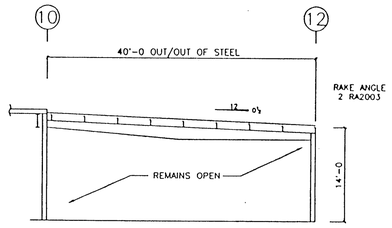




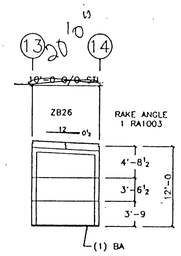
END FRAMING ELEVATION
COLUMN LINE B



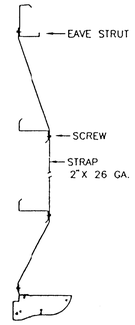
SIDE FRAMING ELEVATION
COLUMN LINE A
GIRTS CONTINUOUS
ZB26 ZB26 ZB26 ZB26 ZB26 ZB26 ZB26 (TYP. U.N.)



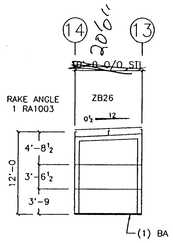
END FRAMING ELEVATION
COLUMN LINE B



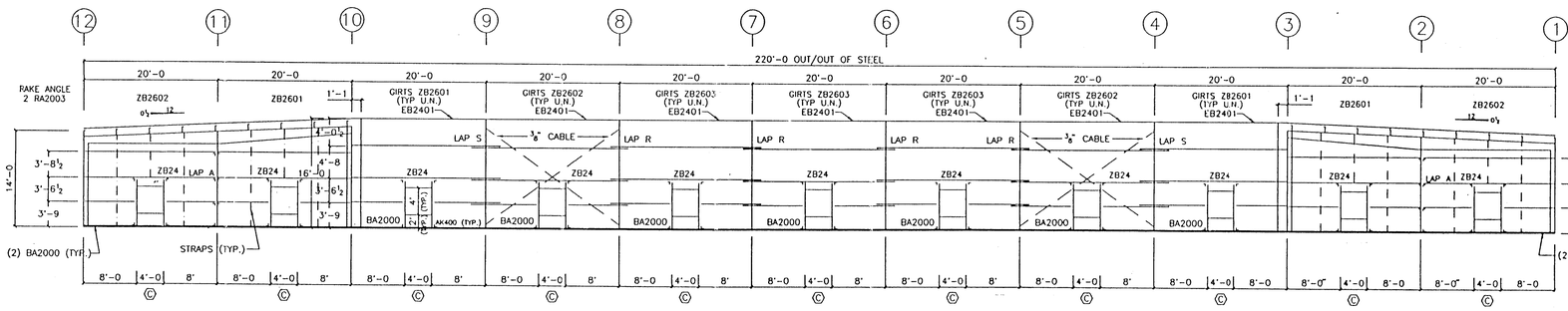
END FRAMING ELEVATION
COLUMN LINE E
GIRTS SIMPLE SPAN FLUSH
ZB26



TYPICAL SIDEWALL STRAP



END FRAMING ELEVATION
COLUMN LINE E1
GIRTS SIMPLE SPAN FLUSH
ZB26



END FRAMING ELEVATION
COLUMN LINE G
GIRTS SIMPLE SPAN FLUSH
ZB26 ZB26 (TYP. U.N.)

SIDE FRAMING ELEVATION
COLUMN LINE G
GIRTS CONTINUOUS
ZB26 ZB26 ZB26 ZB26 ZB26 ZB26 ZB26 (TYP. U.N.)

END FRAMING ELEVATION
COLUMN LINE G
GIRTS SIMPLE SPAN FLUSH
ZB26 ZB26 (TYP. U.N.)

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
No Exceptions Taken
Note Markings:
Contractor's responsibility for general arrangement, dimensions, design criteria and quantities, fabrication of components, shop and erection drawings, fabrication and erection of structure, and coordination with other trades.
Review of this drawing does not constitute approval of deviations from contract requirements unless specifically noted and accepted. Review of drawing does not constitute approval of quantities and dimensions. Not responsible for selecting fabrication techniques or procedures or for performing the work in a safe manner.
By ____ Date 3/3/92

STEEL DESIGN ONLY
NO OTHER CODE REQUIREMENTS
ARE INCLUDED

2/26/97

As Built

REFERENCE: LAIDLAW ENVIRONMENTAL SERVICES

REFERENCE NOTES

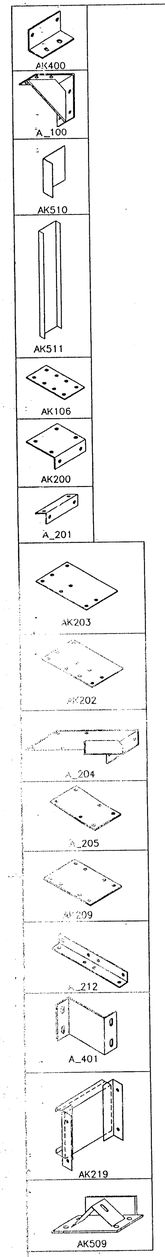
1. CABLES, RODS AND ANGLES ARE MARKED BY THEIR LENGTH IN FEET AND INCHES.
2. FIELD CUT OR LAP ANGLES AS REQUIRED TO FIT.
3. ENDWALL GIRTS AND EAVE STRUTS DO NOT LAP.
4. OUTSIDE FLANGES OF GIRTS TURN UP UNLESS NOTED.
5. FIELD LOCATE WINDOWS AND WALK DOORS.
6. FIELD CUT AND SELF TAP GIRTS AT WALK DOORS.
7. GIRT CLIPS ARE AK200 UNLESS NOTED.
8. USE 1/2" DIAMETER BUTTON HEAD BOLTS AT FACE OF FRAMED OPENING.
9. SEE DWG. CD-1 FOR ENDWALL DETAILS.
10. FIELD BOLT BASE CLIPS TO ENDWALL COLUMNS & CORNER COLUMNS USE (2) 5/8" X 1-3/4" A-325 BOLTS IF (2) AK400'S ARE REQUIRED.
11. USE (2) 5/8" X 1-1/2" A-325 BOLTS IF (1) AK400 IS REQUIRED.
12. FIELD SLOT GIRTS FOR BRACE RODS OR CABLES.
13. FIELD BOLT AK400 CLIPS TO F.O. JAMBS WITH (2) 1/2" X 1-1/4" A-325 BOLTS.
14. FIELD CUT SHEETS FOR ALL OPENINGS.
15. FLANGE BRACES ARE MARKED BY THEIR LENGTH IN FEET, INCHES, & EIGHTHS.

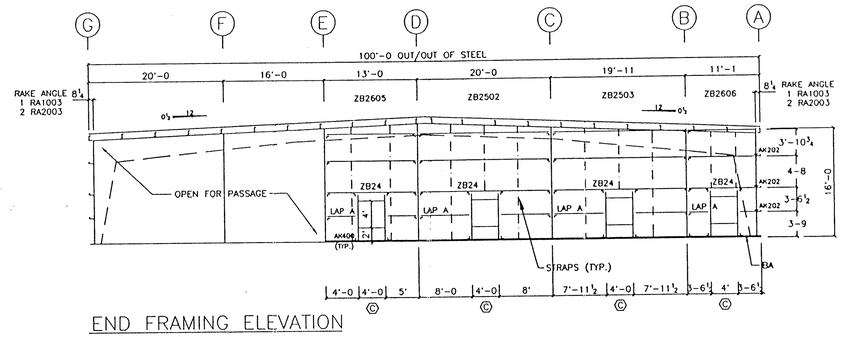
REV	DATE	DESCRIPTION	BY	CHKD.
A	2/26/97	FOR APPROVAL	SD	JH

WHIRLWIND STEEL BUILDINGS
8234 HANSEN HOUSTON, TEXAS 77075-1089
(713) 946-7140

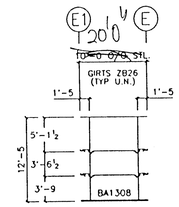
DESCRIPTION	ELEVATION FRAMING PLAN
SIZE	VARIES — WELDED RIGID FRAME/LEAN-TO/SINGLE SLOPE
CUSTOMER	SEMCO CONSTRUCTION — 0.5:12 ROOF SLOPE
LOCATION	BARTOW, FL — JOBSITE BARTOW, FL

DRAWN BY	CHECKED BY	DATE	SCALE	CAD NO	JOB NO.	DWG. NO.	ISSUE
SD	JH	2/26/97	NONE	970090A	970090	E-2	A

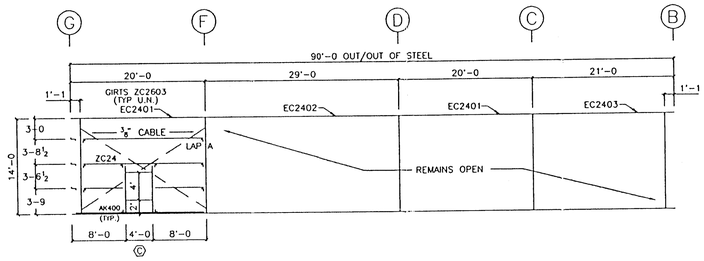




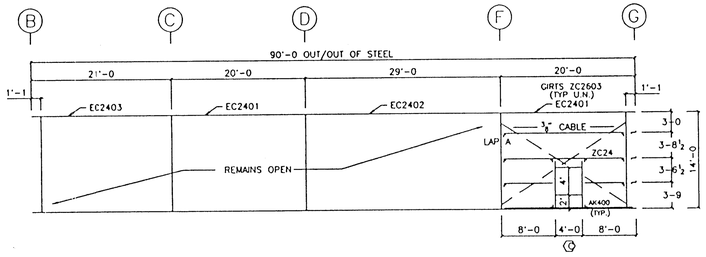
END FRAMING ELEVATION
COLUMN LINE 3
GIRTS SIMPLE SPAN FLUSH
ZB26 ZB25 ZB25 ZB26 (TYP. U.N.)



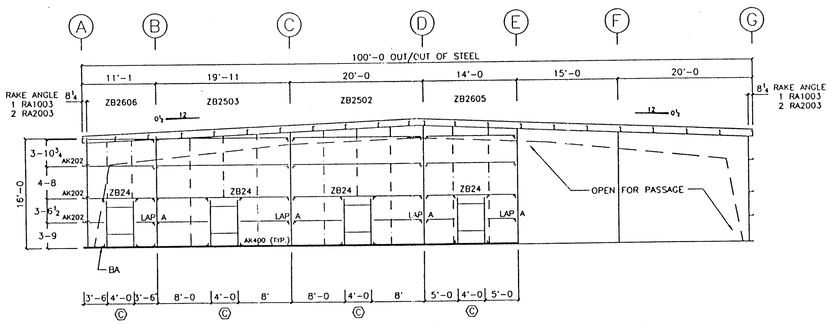
SIDE FRAMING ELEVATION
COLUMN LINE 13
GIRTS BY-PASS SIMPLE SPAN
ZB26



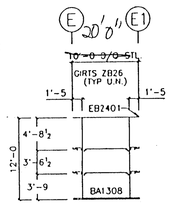
SIDE FRAMING ELEVATION
COLUMN LINE 1
GIRTS SIMPLE SPAN FLUSH
ZC26



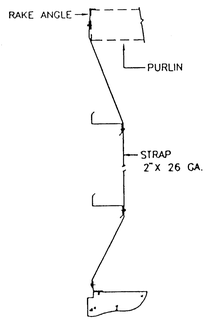
SIDE FRAMING ELEVATION
COLUMN LINE 12
GIRTS SIMPLE SPAN FLUSH
ZC26



END FRAMING ELEVATION
COLUMN LINE 10
GIRTS SIMPLE SPAN FLUSH
ZB26 ZB25 ZB25 ZB26



SIDE FRAMING ELEVATION
COLUMN LINE 14
GIRTS BY-PASS SIMPLE SPAN
ZB26



TYPICAL ENDWALL STRAP

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
No Exceptions Taken ☐
Note Markings ☒
Resubmit ☐
Contractor's responsibility for general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the contractor of compliance with contract plans and specifications nor authorizing deviations from the contract requirements. The contractor remains responsible for details and accuracy, for coordinating and overlapping all quantities and dimensions, for selecting fabrication processes and for techniques of assembly and safety precautions and programs in connection with the performance of the work.
Date 3/3/97

STEEL DESIGN ONLY
NO OTHER CODE REQUIREMENTS
ARE INCLUDED

As Built's

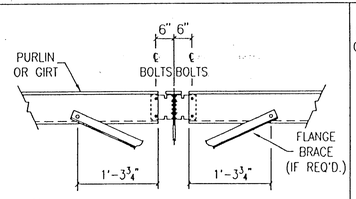
2/26/97

REFERENCE: LAIDLAW ENVIRONMENTAL SERVICES

REV	DATE	DESCRIPTION	BY	CHKD.
A	2/26/97	FOR APPROVAL	SD	JH

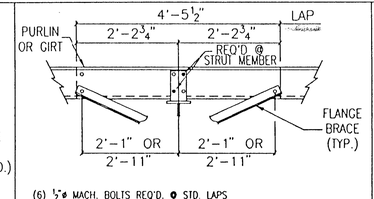
WHIRLWIND STEEL BUILDINGS
8234 HANSEN HOUSTON, TEXAS 77075-1089
(713) 946-7140

DESCRIPTION	END WALL ELEVATION						
SIZE	VARIES	WELDED RIGID FRAME/LEAN-TO/SINGLE SLOPE					
CUSTOMER	SEMCO CONSTRUCTION	0.5:12 ROOF SLOPE					
LOCATION	BARTOW, FL	JOBSITE	BARTOW, FL				
DRAWN BY	CHECKED BY	DATE	SCALE	CAD NO.	JOB NO.	DWG. NO.	ISSUE
SD	JH	2/ /97	NONE	970090A	970090	E-3	A



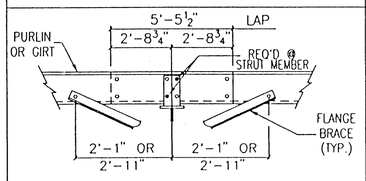
½"ø MACH. BOLTS REQ'D. @ MEMBERS

SIMPLE SPAN FLUSH COND.
FLUSH CONDITION LAP (A)



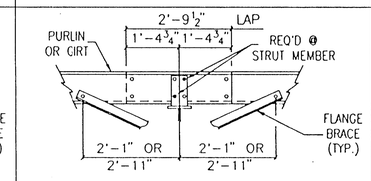
(6) ½"ø MACH. BOLTS REQ'D. @ STD. LAPS
(8) ½"ø MACH. BOLTS REQ'D. @ STRUT MEMBER
(A STRUT MEMBER IS A PURLIN OR GIRT @ BRACING POINTS. THEY CONTINUE ACROSS LENGTH OF BLDG.)

NOMINAL 4'-5½" LAP (S)



(6) ½"ø MACH. BOLTS REQ'D. @ STD. LAPS
(8) ½"ø MACH. BOLTS REQ'D. @ STRUT MEMBER
(A STRUT MEMBER IS A PURLIN OR GIRT @ BRACING POINTS. THEY CONTINUE ACROSS LENGTH OF BLDG.)

NOMINAL 5'-5½" LAP (T)

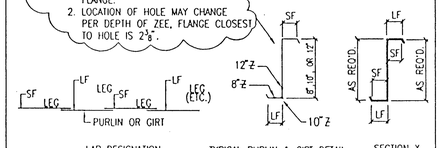


(6) ½"ø MACH. BOLTS REQ'D. @ STD. LAPS
(8) ½"ø MACH. BOLTS REQ'D. @ STRUT MEMBER
(A STRUT MEMBER IS A PURLIN OR GIRT @ BRACING POINTS. THEY CONTINUE ACROSS LENGTH OF BLDG.)

NOMINAL 2'-9½" LAP (R)

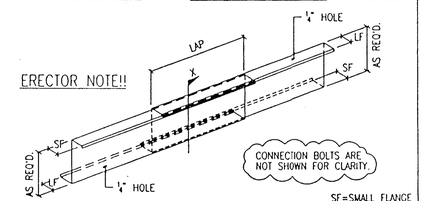
20

NOTES:
1. ¼"ø HOLE AT 1'-6"± FROM END OF MEMBER TO DESIGNATE 2⅜" FLANGE.
2. LOCATION OF HOLE MAY CHANGE PER DEPTH OF ZEE, FLANGE CLOSEST TO HOLE IS 2⅜".



LAP DESIGNATION — TYPICAL PURLIN & GIRT DETAIL — SECTION X

ERECTOR NOTE!!



TYPICAL PURLIN & GIRT LAP

SF=SMALL FLANGE
LF=LARGE FLANGE

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
No Exceptions Taken ☐
Resubmit ☐
Note Markings ☒
Contractor's approval is for general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the Supplier / Subcontractor from compliance with the project plans and specifications. The Supplier / Subcontractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly and for performing his work in a safe manner.
By [signature] Date 3/3/97

HI-TENSILE PIECE MARKS

Z B J 4 01

01-99
Job Unique Piece Mark
1. Piece Length
2. Auxiliary Holes

2-7
Material Specification
1. ASTM Designation
2. Decimal Thickness

ASTM A570 55KSI		ASTM 653 Class 1 50 KSI	
2=0.094	12GA	7=0.096	
3=0.085	13GA		
4=0.069	14GA	9=0.071	
5=0.062	15GA		
6=0.054	16GA	1=0.056	

Nominal Out of Flange to Out of Flange Dimension

Zee	Cee	Eave Strut
2=2⅛x2⅜	2=2½x2½	2=2½x5½
3=3⅛x3⅜	3=3½x3½	
4=3⅝x3⅞	4=4 x 4	

Section Depth
A=6" D=12"
B=8" E=14"
C=10" F=4"

Section Shape
Z=Zee
C=Cee
E=Eave Strut L
G=Eave Strut

STEEL DESIGN ONLY
NO OTHER CODE REQUIREMENTS ARE INCLUDED

John A. Nelson 2/26/97

As Built's

REFERENCE: LAIDLAW ENVIRONMENTAL SERVICES

REV	DATE	DESCRIPTION	BY	CHKD.
A	2/26/97	FOR APPROVAL	SD	JH

WHIRLWIND STEEL BUILDINGS
8234 HANSEN HOUSTON, TEXAS 77075-1089
(713) 946-7140

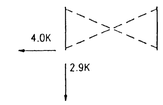
DESCRIPTION	GIRT LAP DETAILS
SIZE	VARIES — WELDED RIGID FRAME/LEAN-TO/SINGLE SLOPE
CUSTOMER	SEMCO CONSTRUCTION — 0.5:12 ROOF SLOPE
LOCATION	BARTOW, FL — JOBSITE BARTOW, FL

DRAWN BY	CHECKED BY	DATE	SCALE	CAD NO.	JOB NO.	DWG. NO.	ISSUE
SD	JH	2/26/97	NONE	970090A	970090	D-ONE	A

SPLICE BOLT TABLE		
SPLICE	NO.	SIZE
A	14	3/4"ø x 0-2 1/2"
B	8	3/4"ø x 0-2 1/2"
C	8	3/4"ø x 0-2 1/2"

REACTION MEMBERS		DEAD LOAD	COLL LOAD	LIVE LOAD	SNOW LOAD	WIND LEFT1	WIND LEFT2	WIND RIGHT1	WIND RIGHT2	WIND LONG.	SEIS LOAD
LEFT COL.	HOR	4.1	3.8	15.0	0.0	-33.4	-12.1	0.0	0.0	-28.3	0.0
LEFT COL.	VER	3.8	3.0	12.0	0.0	-28.2	-9.1	0.0	0.0	-27.5	0.0
RIGT COL.	HOR	-4.1	-3.8	-15.0	0.0	28.5	7.2	0.0	0.0	28.7	0.0
RIGT COL.	VER	3.8	3.0	12.0	0.0	-24.3	-4.6	0.0	0.0	-23.9	0.0

THE REACTIONS ARE STATED IN KIPS (1 KIP = 1000 POUNDS).



REACTIONS AT WALL X-BRACING

AT COLUMN LINES A & G

THE REACTIONS SHOWN MUST ACT ON THE FRAME IN THE DIRECTION SHOWN TO MAINTAIN STABILITY. THE REACTION ON THE ANCHOR BOLT OR FOUNDATION WILL BE IN THE OPPOSITE DIRECTION TO THAT INDICATED BY THE TABLE.

POSITIVE REACTIONS ARE IN THE SAME DIRECTION AS THE DIAGRAM ARROWS. NEGATIVE DIRECTIONS ARE IN THE OPPOSITE DIRECTION TO THE ARROWS.

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"SEIS" IS SEISMIC LOAD.

WARNING!

SKYLIGHTS MUST NOT BE USED FOR FOOT TRAFFIC NOR SHOULD THEY SUPPORT THE UNDISTRIBUTED WEIGHT OF ANY INDIVIDUAL. ROOFING LADDERS OR 1" X 12" PLANKS MUST BE USED DURING INSTALLATION, MAINTENANCE OR REPAIR PROCEDURES.

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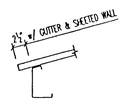
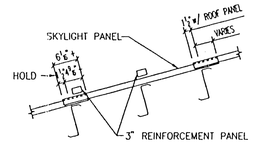
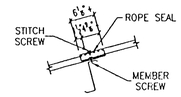


SECTION @ PANEL END



DETAIL @ SUPER SPAN UL 580, CLASS 90 SKYLIGHT PANEL



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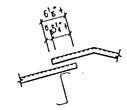

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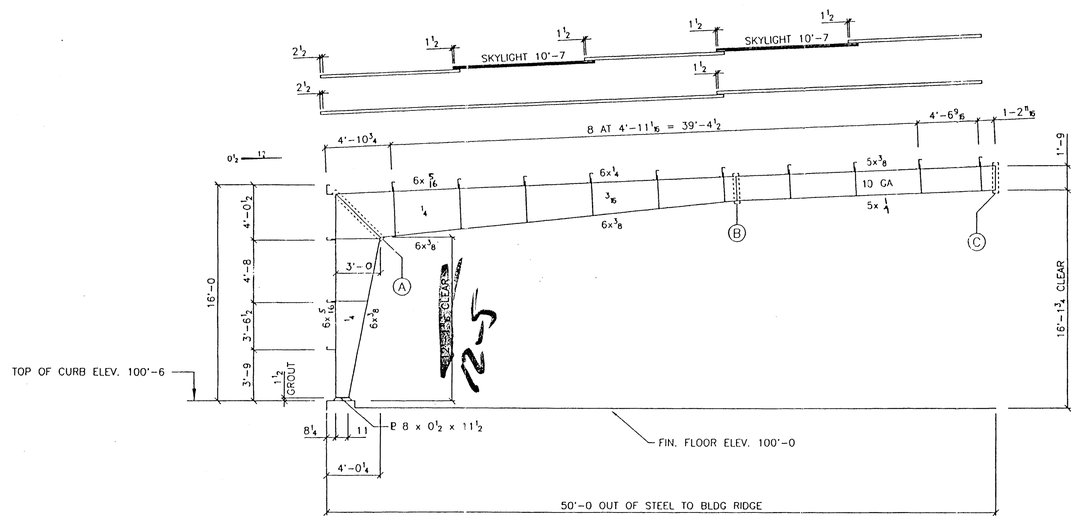


FRAME CROSS SECTION

COLUMN LINES 3 – 10

TURN-OF-NUT TIGHTENING

CONNECTIONS FOR RIGID FRAMES MUST BE PROPERLY PRE-TENSIONED. THE SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS DATED NOVEMBER 13, 1985 (FUTURE REFERENCE TO THIS SECTION IS TO BE CALLED THE CODE) RECOGNIZES FOUR METHODS TO PROPERLY TIGHTEN THE BOLTS – 1) "TURN-OF-NUT", 2) CALIBRATED WRENCH, 3) ALTERNATE DESIGN BOLTS AND 4) DIRECT TENSION INDICATOR. ALL OF THESE METHODS REQUIRE SPECIAL BOLTS AND/OR EQUIPMENT TO INSTALL, EXCEPT THE TURN-OF-NUT METHOD. THIS IS WHY WHIRLWIND SPECIFIES THIS METHOD FOR BOLT INSTALLATION.

ACCORDING TO PARAGRAPH 7(c) OF THE CODE, WASHERS ARE NOT REQUIRED TO BE INSTALLED.

EXCERPTS FROM THE CODE FOR INSTALLATION COME FROM PARAGRAPH 8(d): "BOLTS SHALL BE INSTALLED IN ALL HOLES OF THE CONNECTION AND BROUGHT TO A SNUG-TIGHT CONDITION. SNUG-TIGHT IS DEFINED AS THE TIGHTNESS THAT EXIST WHEN THE PLIES OF THE JOINT ARE IN FIRM CONTACT. THIS MAY BE ATTAINED BY A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF A MAN USING AN ORDINARY SPUD WRENCH. SNUG TIGHTENING SHALL PROGRESS SYSTEMATICALLY FROM THE MOST RIGID PART OF THE CONNECTION TO THE FREE EDGES, AND THEN THE BOLTS OF THE CONNECTION SHALL BE RETIGHTENED IN A SIMILAR SYSTEMATIC MANNER AS NECESSARY UNTIL ALL BOLTS ARE SIMULTANEOUSLY SNUG TIGHT AND THE CONNECTION IS FULLY COMPACTED. FOLLOWING THIS INITIAL OPERATION, ALL BOLTS IN THE CONNECTION SHALL BE TIGHTENED FURTHER BY THE APPLICABLE AMOUNT OF ROTATION SPECIFIED IN TABLE 5..."

TABLE 5. NUT ROTATION FROM SNUG-TIGHT CONDITION.

BOLT LENGTH (FROM UNDER SIDE OF HEAD TO END OF BOLT)	
UP TO AND INCLUDING 4 DIAMETERS	1/3 TURN
OVER 4 DIAMETERS, BUT NOT EXCEEDING 8 DIAMETERS	1/2 TURN
OVER 8 DIAMETERS, BUT NOT EXCEEDING 12 DIAMETERS	2/3 TURN

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
No Exceptions Taken ☐
Note Markings ☑ Resubmit ☐
Contractor's review is for general conformance with the design concept and contract documents. Contractor shall verify dimensions, quantities, fabrication processes and techniques of construction, coordination of his work with that of all other trades, and satisfaction of all requirements of the contract documents. Contractor is responsible for all dimensions and quantities to be confirmed and correlated at the job site, for information that pertains only to safety precautions and programs in connection with the work, and for coordination of work of all trades.
By Date 3/3/97

SUBMITTAL
☐ APPROVED
☒ APPROVED AS NOTED
☐ NOT APPROVED - RESUBMIT
Gene Arnold
MRDGROUP DATE
Mar 11, 1997

STEEL DESIGN ONLY
NO OTHER CODE REQUIREMENTS
ARE INCLUDED

As Builts

2/26/97

REFERENCE: LAIDLAW ENVIRONMENTAL SERVICES

REV	DATE	DESCRIPTION	BY	CHKD.
A	2/26/97	FOR APPROVAL	SD	JH

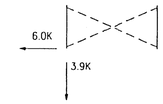
WHIRLWIND STEEL BUILDINGS
8234 HANSEN HOUSTON, TEXAS 77075-1089
(713) 946-7140

DESCRIPTION	FRAME CROSS SECTION
SIZE	VARIES — WELDED RIGID FRAME/LEAN-TO/SINGLE SLOPE
CUSTOMER	SEMCO CONSTRUCTION — 0.5:12 ROOF SLOPE
LOCATION	BARTOW, FL — JOBSITE BARTOW, FL

DRAWN BY	CHECKED BY	DATE	SCALE	CAD NO.	JOB NO.	DWG NO.	ISSUE
SD	JH	2/ /97	NONE	970090A	970090	P-ONE	A

SPLICE BOLT TABLE		
SPLICE	NO.	SIZE
A	6	$\frac{5}{8}$"ø x 0-1$\frac{1}{2}$"

REACTION MEMBERS		DEAD LOAD	COLL LOAD	LIVE LOAD	SNOW LOAD	WIND LEFT1	WIND LEFT2	WIND RIGHT1	WIND RIGHT2	WIND LONG.	SEIS LOAD
EXT. COL.	HOR	0.0	0.0	0.0	0.0	0.5	-2.4	3.1	0.2	3.5	0.0
EXT. COL.	VER	1.6	1.5	5.9	0.0	-14.6	-5.1	-11.6	-1.6	-14.7	0.0



REACTIONS AT WALL X-BRACING

COLUMN LINES 1 & 12

THE REACTIONS ARE STATED IN KIPS (1 KIP = 1000 POUNDS).

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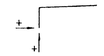

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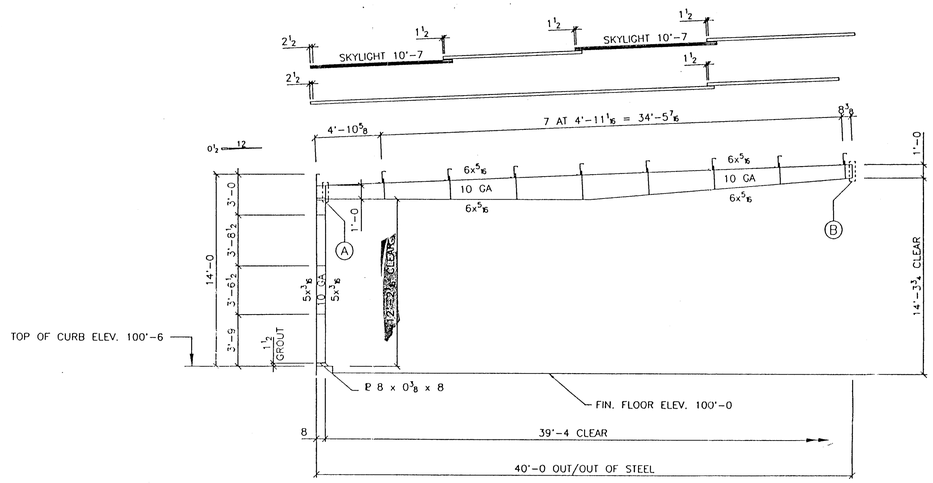

FRAME CROSS SECTION

COLUMN LINES B - G

TURN-OF-NUT TIGHTENING

CONNECTIONS FOR RIGID FRAMES MUST BE PROPERLY PRE-TENSIONED. THE SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS DATED NOVEMBER 13, 1985 (FUTURE REFERENCE TO THIS SECTION IS TO BE CALLED THE CODE) RECOGNIZES FOUR METHODS TO PROPERLY TIGHTEN THE BOLTS -1) "TURN-OF-NUT", 2) CALIBRATED WRENCH, 3) ALTERNATE DESIGN BOLTS AND 4) DIRECT TENSION INDICATOR. ALL OF THESE METHODS REQUIRE SPECIAL BOLTS AND/OR EQUIPMENT TO INSTALL, EXCEPT THE TURN-OF-NUT METHOD. THIS IS WHY WHIRLWIND SPECIFIES THIS METHOD FOR BOLT INSTALLATION.

ACCORDING TO PARAGRAPH 7(c) OF THE CODE, WASHERS ARE NOT REQUIRED TO BE INSTALLED.

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TABLE 5. NUT ROTATION FROM SNUG-TIGHT CONDITION.

BOLT LENGTH (FROM UNDER SIDE OF HEAD TO END OF BOLT)

UP TO AND INCLUDING 4 DIAMETERS ..... 1/3 TURN

OVER 4 DIAMETERS, BUT NOT EXCEEDING 8 DIAMETERS ..... 1/2 TURN

OVER 8 DIAMETERS, BUT NOT EXCEEDING 12 DIAMETERS ..... 2/3 TURN

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
Note Markings ☒ Exceptions Taken ☐
Contractor's responsibility for general construction means, methods, techniques, sequences and procedures, for coordinating the work, for performing the work in a safe manner.
By [signature] Date 3/3/97

STEEL DESIGN ONLY
NO OTHER CODE REQUIREMENTS
ARE INCLUDED

As Builts

2/26/97

REFERENCE: LAIDLAW ENVIRONMENTAL SERVICES

REV	DATE	DESCRIPTION	BY	CHKD.
A	2/26/97	FOR APPROVAL	SD	JH

WHIRLWIND STEEL BUILDINGS
8234 HANSEN HOUSTON, TEXAS 77075-1089
(713) 946-7140

DESCRIPTION	FRAME CROSS SECTION
SIZE	40' X 90' X 14' E.H. LEAN-TO
CUSTOMER	SEMCO CONSTRUCTION 0.5:12 ROOF SLOPE
LOCATION	BARTOW, FL JOBSITE BARTOW, FL

DRAWN BY	CHECKED BY	DATE	SCALE	CAD NO.	JOB NO.	DWG. NO.	ISSUE
SD	JH	2/26/97	NONE	970090B	970090	P-2	A

SPLICE BOLT TABLE		
SPLICE	NO.	SIZE
A	6	$\frac{3}{4}$"ø x 0-2$\frac{1}{2}$"
B	8	$\frac{3}{4}$"ø x 0-2$\frac{1}{2}$"
C	6	$\frac{3}{4}$"ø x 0-2$\frac{1}{2}$"

REACTION MEMBERS		DEAD LOAD	COLL LOAD	LIVE LOAD	SNOW LOAD	WIND LEFT1	WIND LEFT2	WIND RIGHT1	WIND RIGHT2	WIND LONG.	SEIS LOAD
LEFT COL.	HOR	0.0	0.0	0.1	0.0	−2.2	−2.6	2.2	1.7	1.1	0.0
LEFT COL.	VER	0.3	0.2	1.0	0.0	−4.0	−3.4	1.7	2.2	−1.2	0.0
RIGT COL.	HOR	0.0	0.0	−0.1	0.0	−2.0	−1.6	2.2	2.7	−1.1	0.0
RIGT COL.	VER	0.3	0.2	1.0	0.0	1.4	1.9	−4.1	−3.6	−1.2	0.0

THE REACTIONS ARE STATED IN KIPS (1 KIP = 1000 POUNDS).

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TURN-OF-NUT TIGHTENING

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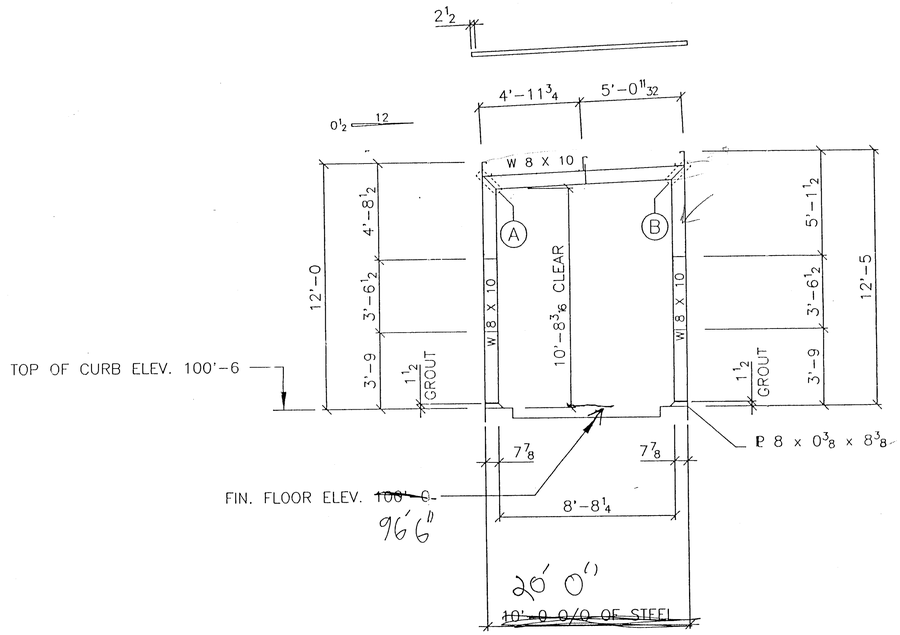


FRAME CROSS SECTION

COLUMN LINES E – F

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
No Exceptions Taken ☐
Note Markings ☒ Revise as Noted ☐
Contractor's responsibility for general compliance with the design concept and contract requirements. Review of Supplier's or Contractor's shop drawings or plans and specifications does not relieve the Supplier / Subcontractor from complying with the Project requirements. Contractor remains responsible for the accuracy, for coordinating the fabrication details and of materials and fabrication processes, for techniques of assembly and for satisfactory performance of his work.
By _____ Date 3/3/97

STEEL DESIGN ONLY
NO OTHER CODE REQUIREMENTS
ARE INCLUDED

As Built's

REFERENCE: LAIDLAW ENVIRONMENTAL SERVICES

REV	DATE	DESCRIPTION	BY	CHKD.
A	2/26/97	FOR APPROVAL	SD	JH

WHIRLWIND STEEL BUILDINGS
8234 HANSEN HOUSTON, TEXAS 77075-1089
(713) 946-7140

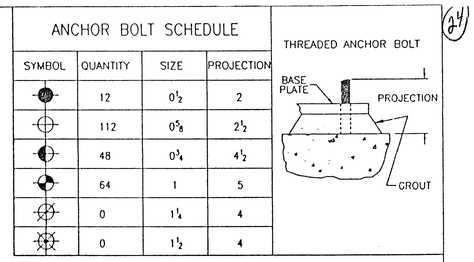
DESCRIPTION	FRAME CROSS SECTION
SIZE	10' X 10' X 12' E.H. SINGLE SLOPE
CUSTOMER	SEMCO CONSTRUCTION 0.5:12 ROOF SLOPE
LOCATION	BARTOW, FL JOBSITE BARTOW, FL

DRAWN BY	CHECKED BY	DATE	SCALE	CAD NO.	JOB NO.	DWG. NO.	ISSUE
SD	JH	2/ /97	NONE	970090D	970090	P-3	A

ANCHOR BOLT SCHEDULE

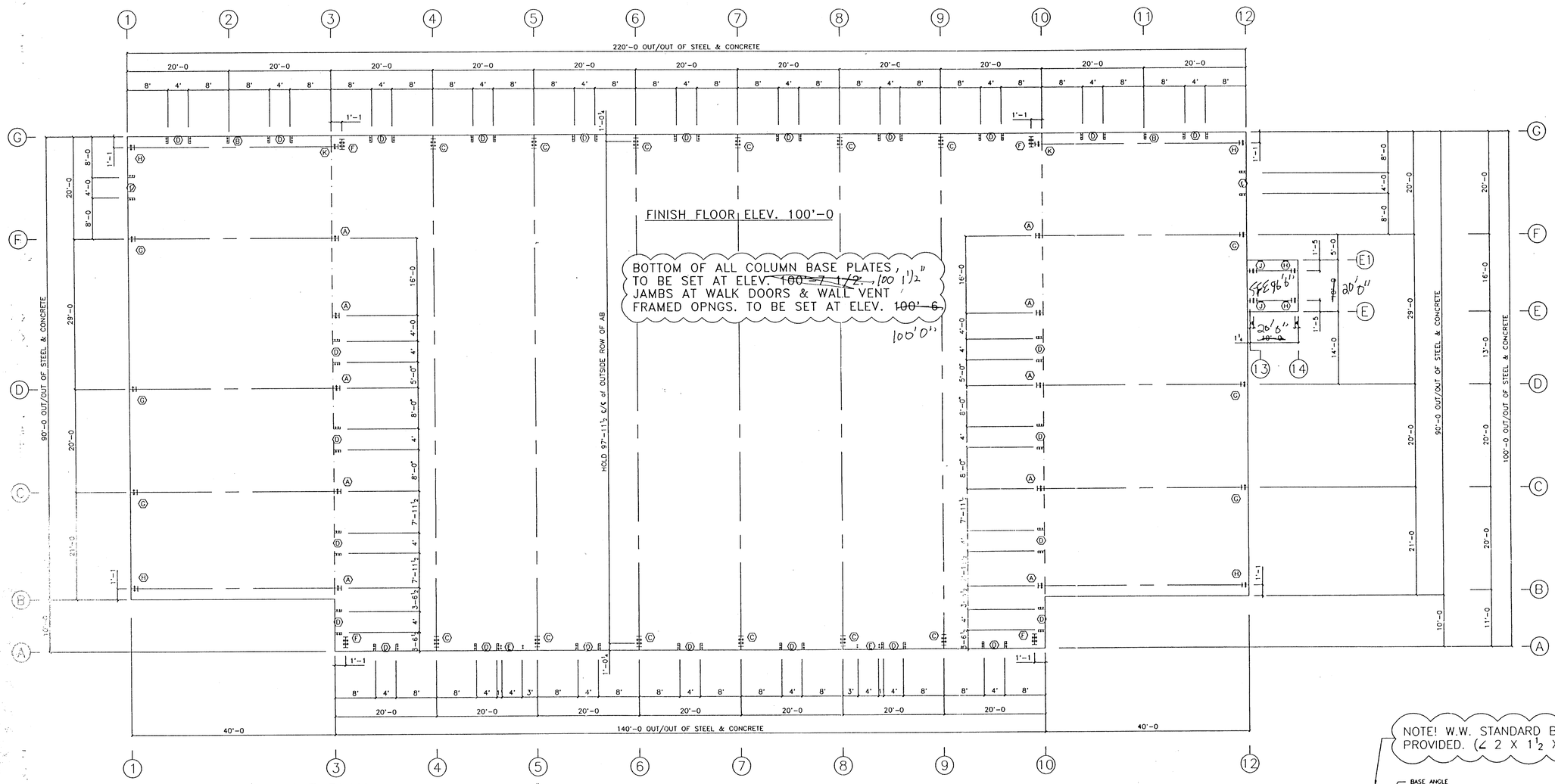
SYMBOL	QUANTITY	SIZE	PROJECTION
	12	$0\frac{1}{2}$	2
	112	$0\frac{5}{8}$	$2\frac{1}{2}$
	48	$0\frac{3}{4}$	$4\frac{1}{2}$
	64	1	5
	0	$1\frac{1}{4}$	4
	0	$1\frac{1}{2}$	4

THREADED ANCHOR BOLT



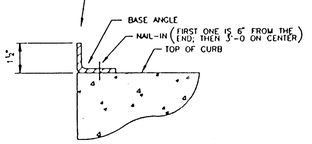
REFERENCE NOTES

1. ALL ANCHOR BOLTS (BY OTHERS) TO HAVE NUTS AND FLAT WASHERS.
2. WHIRLWIND IS RESPONSIBLE FOR THE DESIGN OF THE ANCHOR BOLT TO PERMIT THE TRANSFER OF FORCES BETWEEN THE BASE PLATE AND THE ANCHOR BOLT IN SHEAR, BEARING AND TENSION. BUT IS NOT RESPONSIBLE FOR THE TRANSFER OF ANCHOR BOLT FORCES TO THE CONCRETE OR THE ADEQUACY OF THE ANCHOR BOLT IN RELATION TO THE CONCRETE ("1986 LOW RISE BUILDING SYSTEMS MANUAL", SECTION A10).



ANCHOR BOLT PLAN

NOTE! W.W. STANDARD BASE ANGLE PROVIDED. (∠ 2 X 1½ X 14GA)



NO SHEETING RECESS
(BASE ANGLE ONLY)

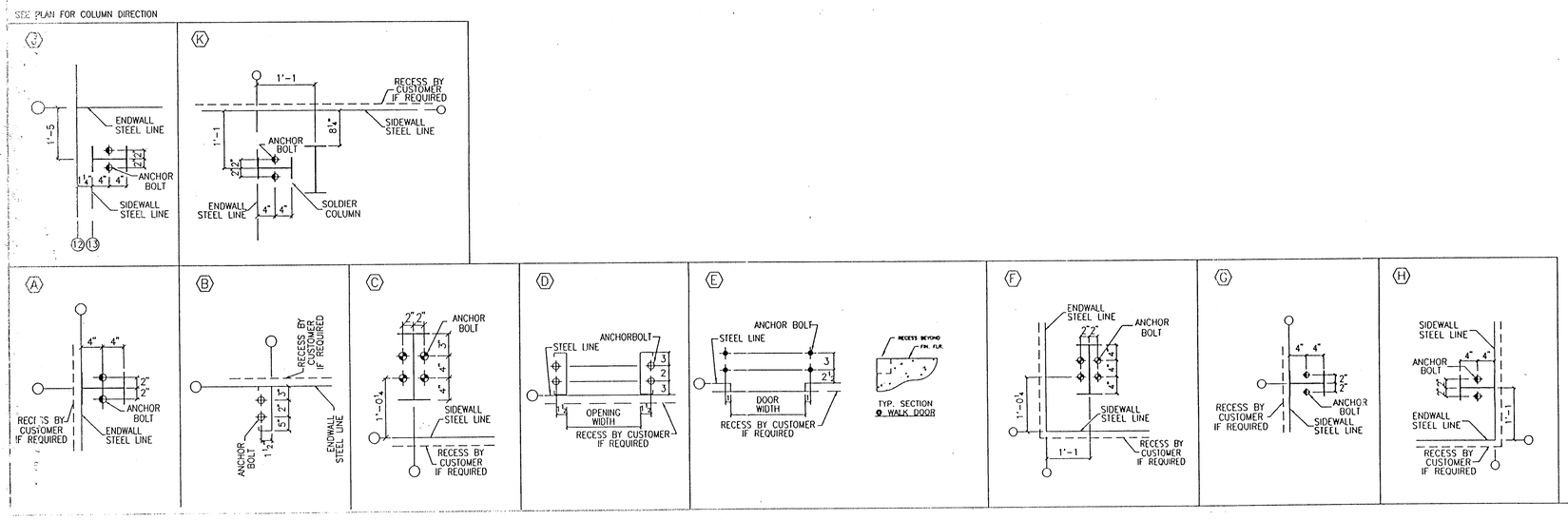
SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
Exceptions Taken ☐
Resubmit ☐
Note Markings: ☒
Contractor's review is for general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the Supplier / Subcontractor from compliance with ...
Date 3/3/97

STEEL DESIGN ONLY
NO OTHER CODE REQUIREMENTS ARE INCLUDED

2/24/97

As Builts

SEE PLAN FOR COLUMN DIRECTION



REFERENCE: LAIDLAW ENVIRONMENTAL SERVICES

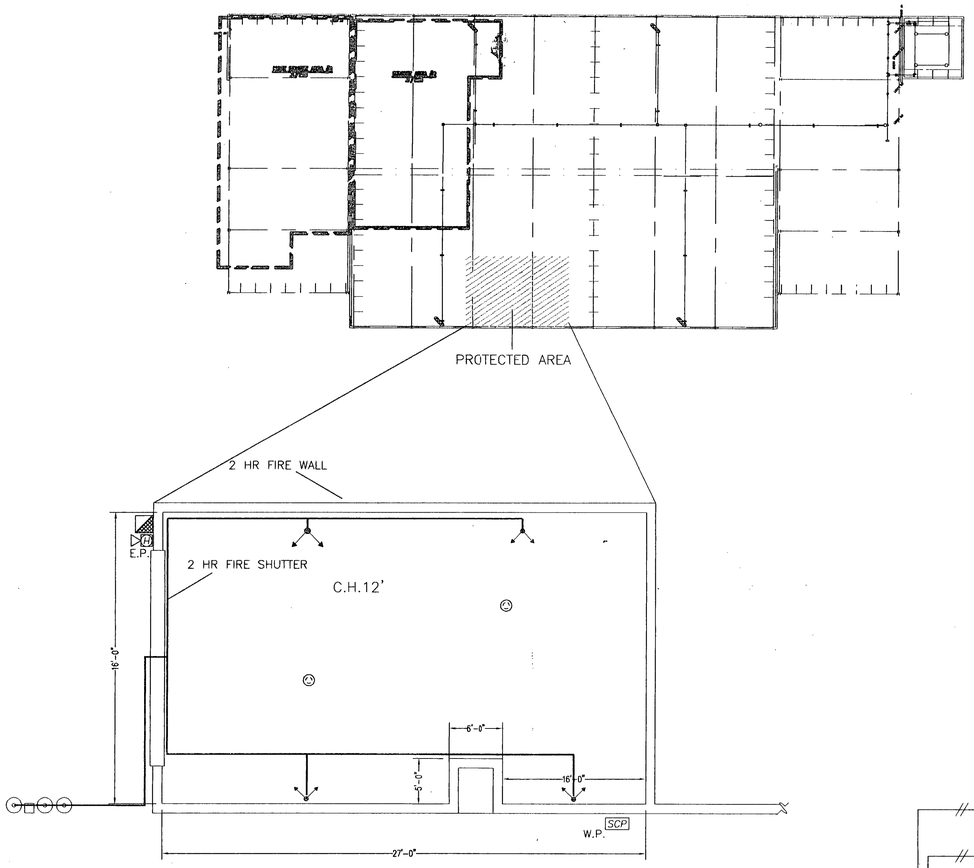
REV	DATE	DESCRIPTION	BY	CHKD.
A	2/26/97	FOR APPROVAL	SD	JH

WHIRLWIND STEEL BUILDINGS
8234 HANSEN HOUSTON, TEXAS 77075-1089
(713) 946-7140

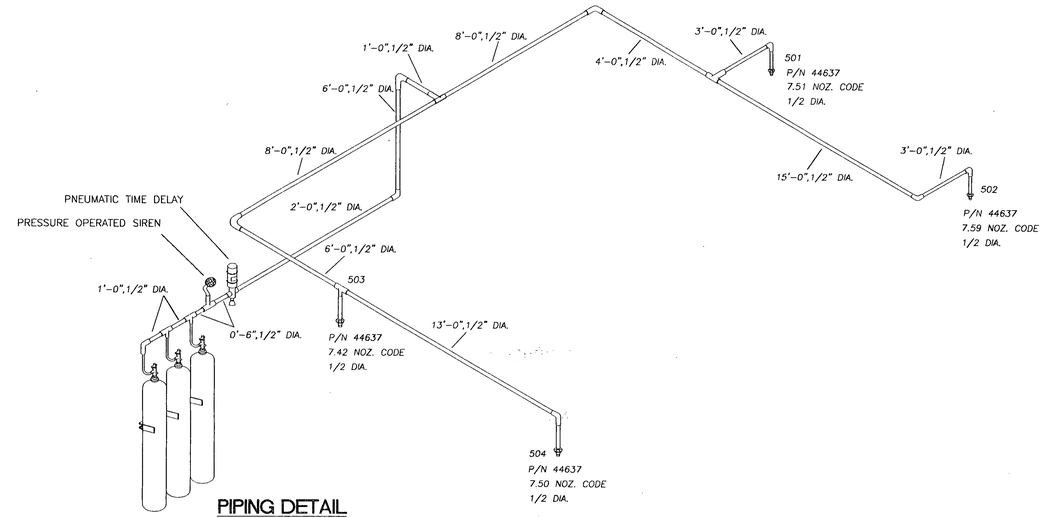
DESCRIPTION	ANCHOR BOLT LAYOUT					
SIZE	VARIES	WELDED RIGID FRAME/LEAN-TO/SINGLE SLOPE				
CUSTOMER	SEMCO CONSTRUCTION	0.5:12 ROOF SLOPE				
LOCATION	BARTOW, FL	JOBSITE	BARTOW, FL			
DRAWN BY SD	CHECKED BY JH	DATE 2/ /97	SCALE NONE	CAD NO. 970090A	JOB NO. 970090	DWG. NO. F-ONE	ISSUE A

APPENDIX 4

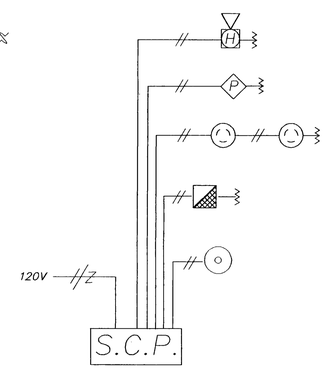
Fire Suppression Systems As-Builts



PROTECTED AREA
NOT TO SCALE

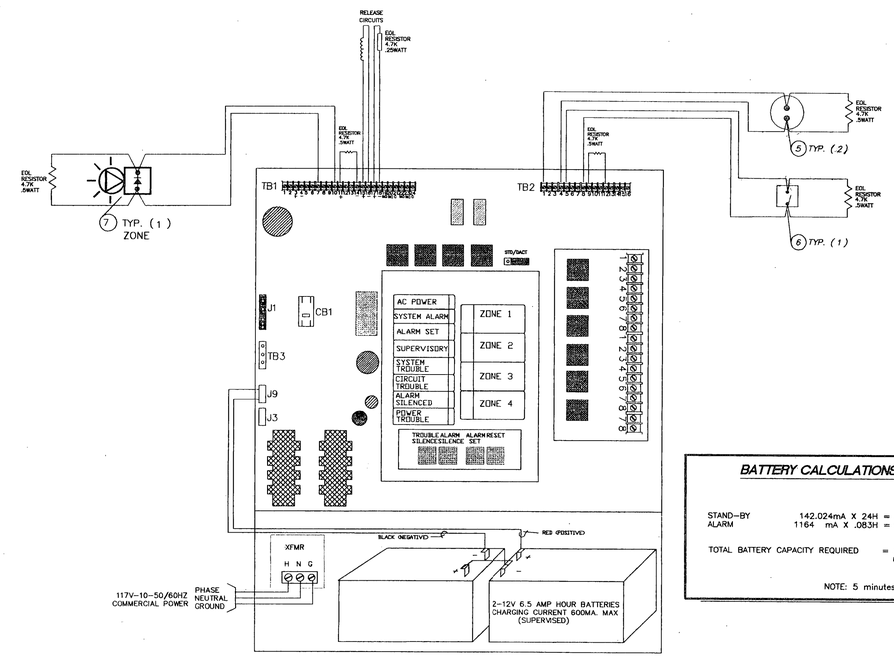


PIPING DETAIL
NOT TO SCALE



RISER DIAGRAM
NOT TO SCALE

RISER IS DIAGRAMATIC AND MAY NOT REFLECT TRUE CONDUIT LAYOUT.



NOTES:

1. CONDUCTOR TYPE: THHN – STRANDED.
2. CONDUCTOR SIZE: #14 MINIMUM.
3. RACEWAYS AND SIZES: EMT, 1/2" MINIMUM.
4. IDENTIFICATION OF EQUIPMENT AND CATALOG NUMBERS OF ALL SYSTEM COMPONENTS: SEE BILL OF MATERIALS.
5. ALL COMPONENTS SHALL REFLECT U.L. LISTING FOR FIRE SERVICE AND SHALL BE COMPATIBLE, SEE ATTACHED SUBMITTAL DATA.
6. POWER LIMITED – 24 VDC.
7. SYSTEM SHALL CONFORM TO ALL REQUIREMENTS OF NFPA 12, NFPA 72E, NFPA 72, NEC CHAPTER 7 ARTICLE 760, CHAPTER 9 TABLE 3B, STANDARD BUILDING CODE, UNIFORM RULE 4A-48 AND RULES AND REGULATIONS OF THE STATE FIRE MARSHALS OFFICE, F.S. 633.01 AND 633.701, AND ALL STATE AND LOCAL CODES.
8. ALL DEVICES WHICH ARE OPERATED BY HAND WILL BE MOUNTED AT 48" ABOVE FINISHED FLOOR TO THE TOP OF THE DEVICE.
9. ALL WALL MOUNTED SIGNAL DEVICES WILL BE MOUNTED AT 6" FROM THE CEILING OR 80" ABOVE FINISHED FLOOR (WHICHEVER IS LOWER), MEASURED TO THE TOP OF THE DEVICE.
10. ONE LINE RISER: SEE RISER DIAGRAM.

LEGEND

SYM.	DESCRIPTION
S.C.P.	FIRE ALARM CONTROL PANEL
	MANUAL PULL STATION
P	PHOTOELECTRIC SMOKE DETECTOR
H	HORN EXPLOSION PROOF
	HEAT DETECTOR

SEQUENCE OF EVENTS

	RING BELL/LIGHT	SOUND HORN/LIGHT	FLASH LIGHT	ROTATE BEACON	SHUTDOWN A/H	CLOSE MAGNETIC DOOR HOLDER	FIRE ETL DAMPERS	CLOSE MOTORIZED DAMPERS	LIGHT UNDERFLOOR ANNUNCIATOR	LIGHT REMOTE ANNUNCIATOR	SHUNT TRIP BREAKER	EXHAUST FAN SHUTDOWN	NOTIFY BUILDING FIRE ALARM SYSTEM	START CENTRAL STATION	START TIME DELAY	CO2 DISCHARGE	SOUND SIGNAL-SLOW PULSE	SOUND SIGNAL-FAST PULSE	SOUND SIGNAL-STEADY
FIRST DETECTOR		X														X			
SECOND DETECTOR																			
AUTOMATIC DISCHARGE		X														X			
MANUAL PULL STATION		X														X			
TROUBLE																			

COMMENTS: TIME DELAY SET FOR 30 SECONDS

GENERAL PIPING REQUIREMENTS

1.) ALL PIPE SHALL BE BLACK OR GALVANIZED STEEL ASTM A-53 SEAMLESS OR ERW, GRADE A or B, OR ASTM A-53 FURNACE WELD CLASS F OR ASTM A-106, GRADE A,B,OR C.
2.) A120 PIPE SHALL NOT BE USED.
3.) ALL FITTINGS SHALL BE 300 LB. CLASS CONFORMING TO ASTM A-197. FLANGED FITTINGS SHALL BE 300 LB. CLASS.
4.) CLASS 300 MALLEABLE IRON UNIONS or STREET ELBOWS SHALL NOT BE USED.
5.) ALL PIPE OVER 3/4" DIA. SHALL BE SCH. 80, BLACK, STAINLESS, OR GALVANIZED.
6.) GASKETS FOR FLANGED FITTINGS SHALL BE FLAT GRAY ASBESTOS, NEOPRENE IMPREGNATED.
7.) REAM, CLEAN, AND BLOW OUT ALL PIPE BEFORE INSTALLING.
8.) ALL DISTRIBUTION PIPE AND FITTINGS MUST BE ASSEMBLED USING PIPE TAPE OR PIPE DOPE.

BATTERY CALCULATIONS

STAND-BY 142.024mA X 24H = 3408.6 MilliAmpere
ALARM 1164 mA X .083H = 96.6 MilliAmpere

TOTAL BATTERY CAPACITY REQUIRED = 3502.2 MilliAmpere OR 3.5 Amp Hours

NOTE: 5 minutes = .083 Hours

As Builts

REQ.	ITEM	PART NUMBER	DESCRIPTION	REMARKS
–	11	--------	AGENT STORAGE CONTAINER	
–	10	--------	BELL/LIGHT	
3	9	79822	AGENT STORAGE CONTAINER	
–	8	76495	ABORT SWITCH	
1	7	417349	HORN/LIGHT	
1	6	34822	MANUAL PULL STATION DUAL ACTION	
2	5	4727	THERMAL DETECTORS 140°F	
–	4	FSS660	STROBE LIGHT	
–	3	79049	PHOTOELECTRIC SMOKE SENSOR	
–	2	-------	---------	
1	1	417696	CONTROL PANEL W/ BATT.	
Z 1				

BORRELL
SINCE 1947
A DIVISION OF BORRELL INC.
FL CERT EC 0000366
FL CERT FM 298465000187
FL CERT FM 297180000193

(26)

BORRELL FIRE SYSTEMS
501 NORTH NEWPORT AVENUE
TAMPA, FLORIDA 33606

TAMPA, FT. LAUDERDALE
ORLANDO, JACKSONVILLE
FT. MYERS, TALLAHASSEE

CO2 FIE SUPPRESSION SYSTEM
LAIDLAW
170 BARTOW MUNICIPAL AIRPORT
BARTOW,FLORIDA

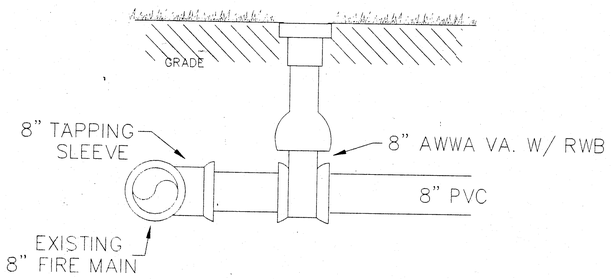
No.	DATE	DESCRIPTION
12		
11		
10		
09		
08		
07		
06		
05		
04		
03		
02	11-11-97	AS-BUILT DRAWING (J.S.)
01	10-28-97	CHANGES PER REVIEW

REVISIONS

CUST: LAIDLAW
DRAWN BY: M.M.
APPROVED BY:
JOB No. H79925A
SCALE AS NOTED
DATE 04-21-97
DWG No. 1 OF 1

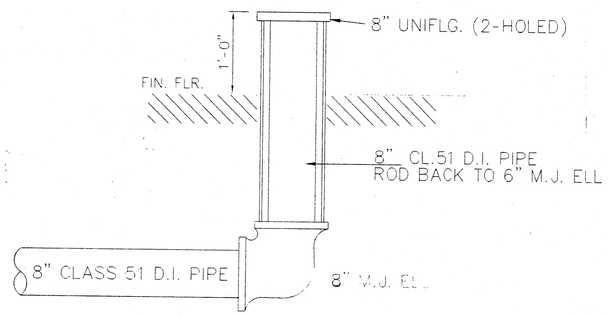
BORRELL
SINCE 1947
A DIVISION OF BORRELL INC.
FL CERT EC 0000366
FL CERT FM 298465000187
FL CERT FM 297180000193

THIS DRAWING IS THE PROPERTY OF BORRELL INC. AND ITS DIVISIONS. IT IS SUBMITTED IN CONFIDENCE AND IS NOT TO BE UTILIZED IN ANY FORM WHATSOEVER WITHOUT WRITTEN CONSENT.



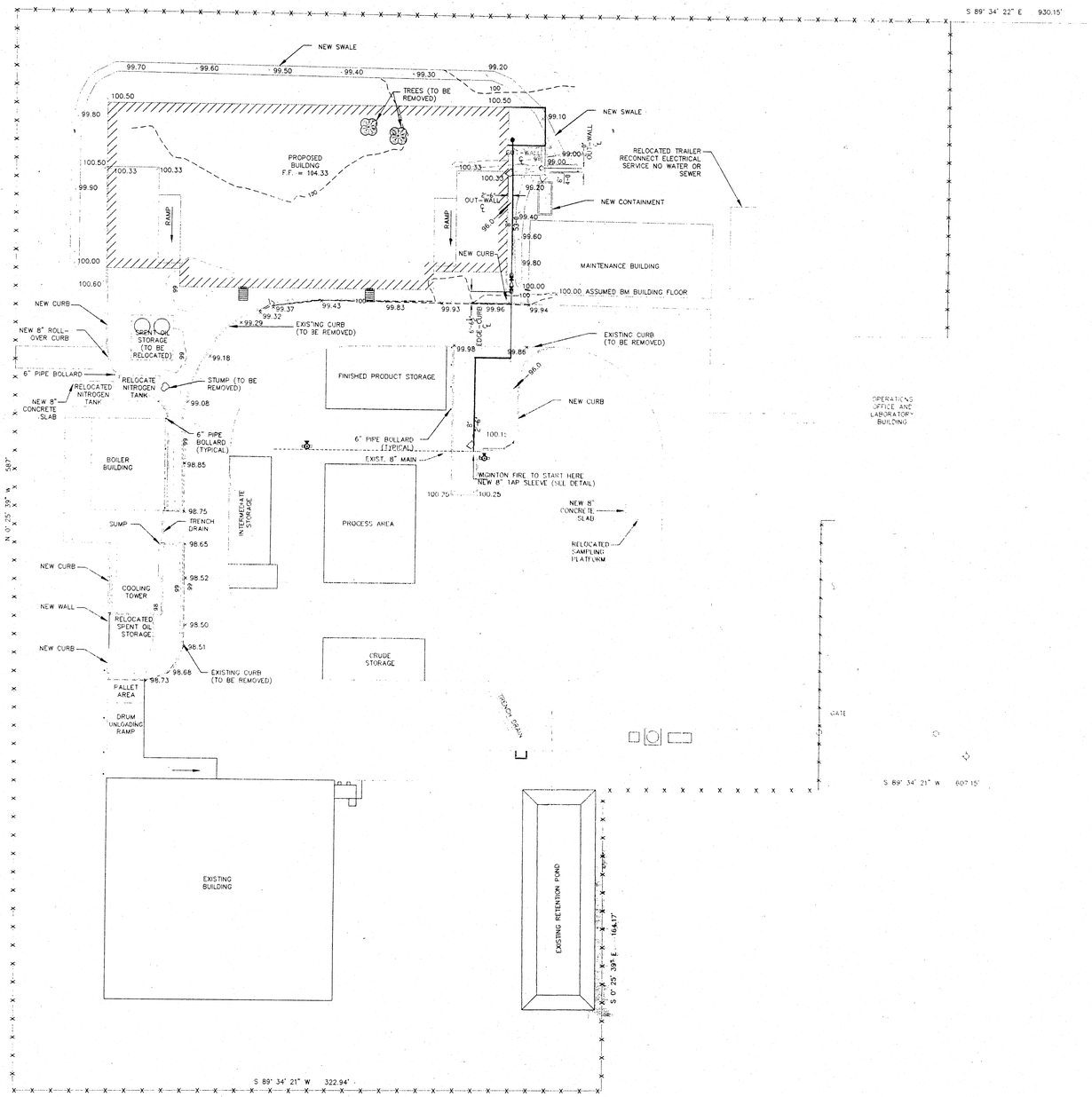
TIE-INTO EXISTING MAIN DETAIL

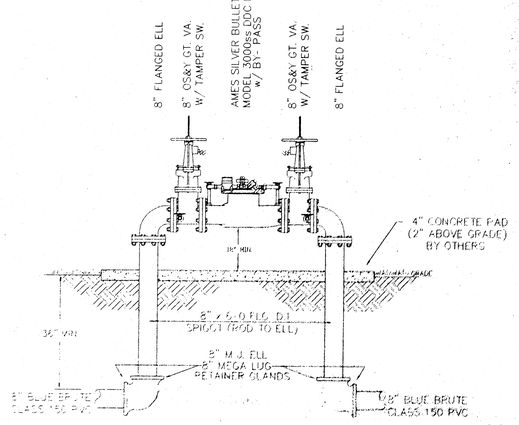
N.T.S.



STUB DETAIL

N.T.S.





BACKFLOW PREVENTOR DETAIL

N.T.S.

LEGEND

- NEW CONCRETE
- EXISTING STRUCTURES
- EXISTING STRUCTURES (TO BE REMOVED)
- NEW BUILDING
- +99.94 EXISTING SPOT ELEVATIONS
- 100.00 NEW SPOT ELEVATIONS

SYMBOLS LEGEND

- NEW UNDERGROUND PIPE
- EXIST. UNDERGROUND PIPE
- SYSTEM RISER
- BACKFLOW PREVENTOR
- CHECK VALVE
- AWWA VA. & ROADWAY BOX
- EXISTIG HYDRANT
- HYDRAULIC REFERENCE POINT

GENERAL NOTES

1) NEW UNDERGROUND PIPE TO BE C-900 P.V.C. PIPE.
2) PIPE FOR NEW STUB-IN TO BE DUCTILE IRON.
3) ALL PIPE TO BE INSTALLED 36" MIN. BELOW GRADE.T.O.P.(GRADE TO BE FIELD VERIFIED)
4) UNDERGROUND PIPING INSTALLATION TO MEET REQUIREMENTS OF NFPA 24 & LOCAL CODES.

UNDERGROUND FIRE PROTECTION PIPING PLAN

SCALE: 1" = 30'-0"

NORTH

AS BUILTS

WATER SUPPLY			
FLOW TEST		FIRE PUMP	
DATE OF TEST:		RATED CAPACITY:	1000
TIME OF TEST:		RATED PRESSURE:	80
STATIC PRESSURE:	58	PUMP TYPE:	DESEL
RESIDUAL PRESSURE:	36	WELL PUMP	
GALLONS FLOWING:	1119	GPM AVAILABLE:	
TESTED BY:		PSI AVAILABLE:	

ABBREVIATIONS
℄ = CENTERLINE
℄ = ELEVATION
TOS = TOP OF STEEL
G = GROOVED PIPE END
T = THREADED PIPE END
F = FLANGED PIPE END
C-C = CENTER TO CENTER

MATERIALS		
SIZE	LOCATION	TYPE
8"	UNDERGROUND MAIN	C-900
8"	UNDERGROUND MAIN	D.I.

DESIGN CRITERIA			
SYSTEM NO.			
HAZARD			
SPACING			
K FACTOR			
INSIDE HOSE			
OUTSIDE HOSE			
RACK GPM			

HYDRAULICALLY DESIGNED SYSTEM			
LOCATION			
NO. OF SPRINKLERS			
DENSITY			
DESIGN AREA			
GPM DISCHARGE			
RESIDUAL PSI AT			
CITY CONNECTION			

TYPES OF SPRINKLERS							
SYMBOLS	QUAN.	ORIF.	TEMP.	MAKE & MODEL	TYPE	FINISH	ESC.

HEADS THIS SHEET

KEY PLAN

NO.	DATE	REVISION DESCRIPTION	BY

Wiginton Fire Sprinklers, Inc.
Fire turns us on

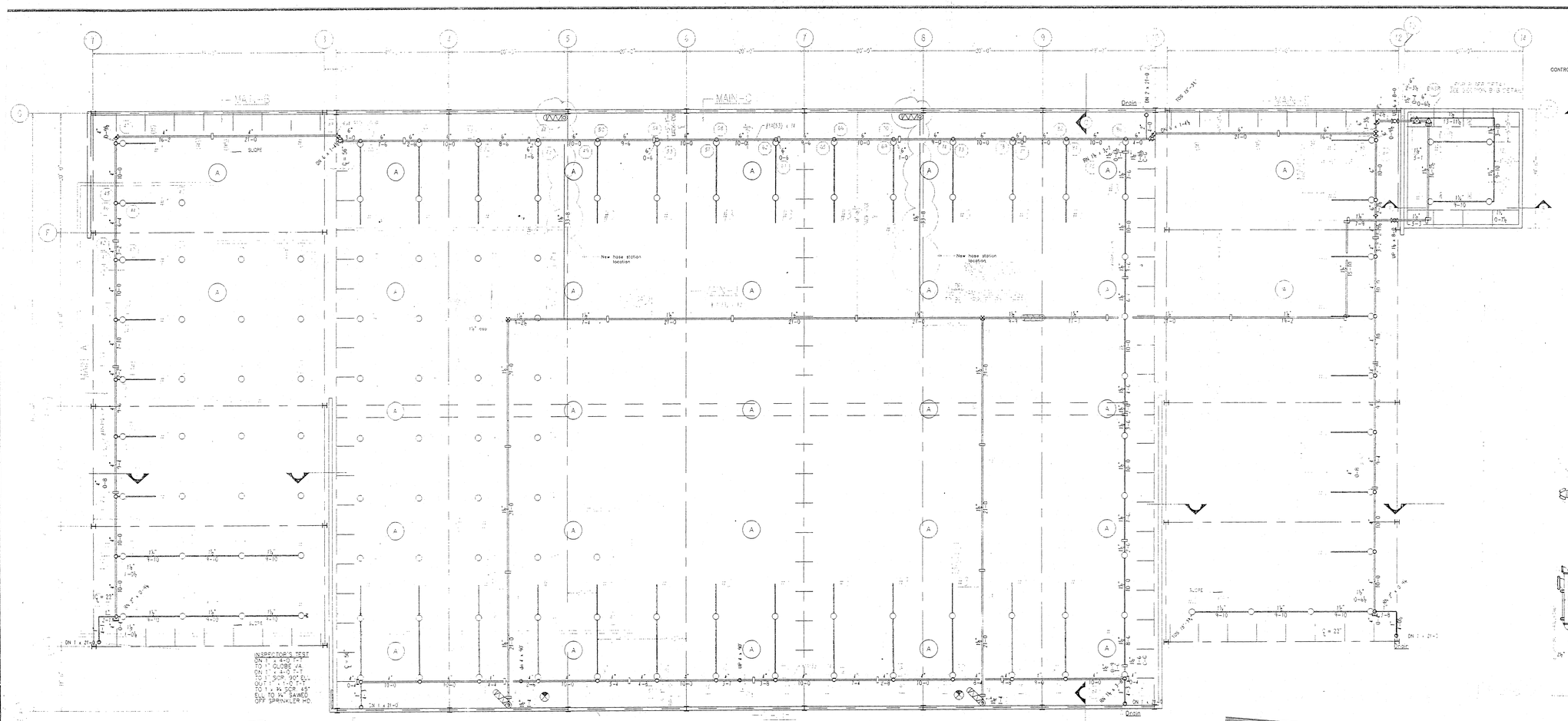
☐ Orlando, Florida (407) 831-3414 Office (407) 831-5740 Fax
☐ Jacksonville, Florida (904) 262-6107 Office (904) 262-7268 Fax
■ Tampa, Florida (813) 623-2333 Office (813) 623-0333 Fax
☐ Miami, Florida (305) 888-2402 Office (305) 888-2604 Fax
☐ Pompano, Florida (305) 960-0033 Office (305) 960-1650 Fax
☐ Melbourne, Florida (407) 722-5585 Office (407) 722-4775 Fax

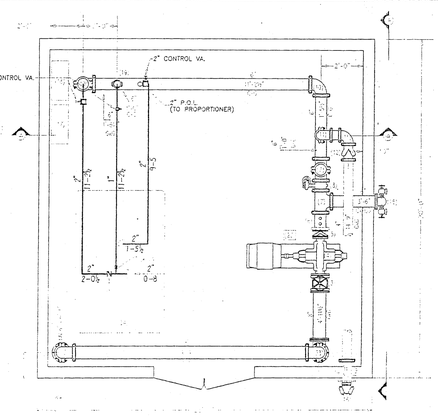
CUSTOMER PROJECT NO. | DRAWING NAME | CONTRACT NO. OR TYPE

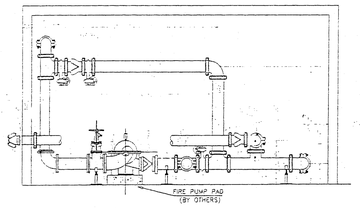
UNDERGROUND PIPING PLAN

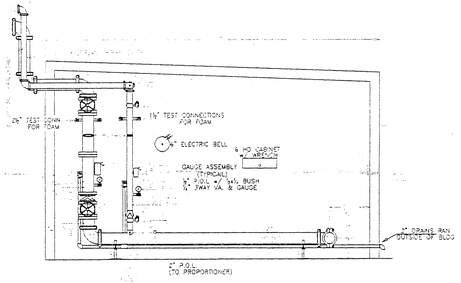
PROJECT NAME: *LAIDLAW DRUM STORAGE*
170 BARTOW MUNICIPLE AIRPORT
BARTOW, FLORIDA

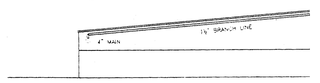
DRAWN BY: RICH JAVDEN | DATE: MARCH 26, 1997
SPRKS. ON JOB: | SCALE: 1" = 30'-0"
APPROVALS: LOCAL:











SECTION E-E

N.T.S.

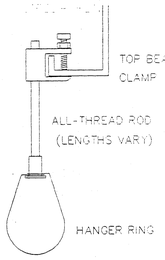
SECTION C-C

N.T.S.

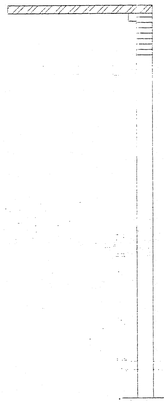
SECTION D-D

N.T.S.

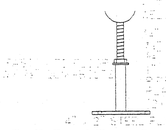
FIRE PROTECTION PIPING PLAN



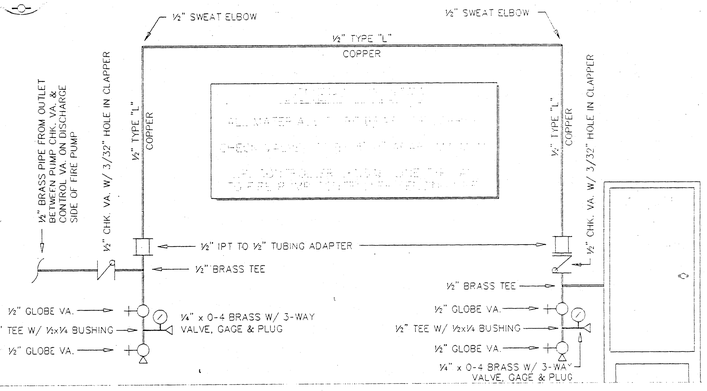
HANGER #1A



INSPECTORS TEST



FIRE STANDPIPE



FIRE PUMP & JOCKEY PUMP CONTROLLER SCHEMATIC

N.T.S.

BILL OF MATERIALS

(FIRE PUMP)

(1) - 8" GRV FLANGE
(2) - 8 FLANGE 90°
(3) - 8" O.S. & Y. VALVE
(4) - 1000 G.P.M. @ 80 P.S.I. ELEC. PUMP (3 PHASE / 60 HERTZ / 480 VOLTS)
(5) - 6" WATER CHECK VALVE
(6) - SPOOL PIECE
6"x0-6.0-C - 1-0 C-C - 0-6 C-G w/ (2) - 1" P.O.L.
(7) - 6" GRV TEE
(8) - 6" B-FLY VALVE w/ TAMPER
(9) - 6" GRV CHECK VALVE
(10) - 6" GRV 90° (FIRELOCK)
(11) - 4" GRV 90° (FIRELOCK)
(12) - 4" GRV CHECK VALVE
(13) - 4" GRV STUBBY
(14) - PIPE STAND (SEE DETAIL)
(15) - 6" TEST HEADER w/ 4-2½" HOSE VA.
(16) - 4x2½x2½ F.D.C. w/ WALL PLATE
(17) - JOCKEY PUMP CONTROLLER
(18) - FIRE PUMP CONTROLLER
(19) - 1½" GRV STUBBY
(20) - 1½" THR. O.S. & Y w/ TAMPER
(21) - 1½" THR. CHECK VALVE
(22) - 1½" GRV 90°
(23) - 2.0 HP JOCKEY PUMP
(23) - 600 gal. FOAM TANK (BY OTHERS)
(25) - 2" GLOBE VALVE w/ 2" x 5'-0" w/2" 90° OUT 2" x2'-6" w/ 2" 45°
(26) - 1" GLOBE VALVE w/ 1" x 5'-0" w/1" 90° OUT 1" x2'-6" w/ 1" 45°
(27) - 6" FLOW SWITCH
(28) - 1½" FLOW SWITCH
(29) - FOAM PROPORTIONER
(30) - 6" O.S. & Y VA. w/ TAMPER
(31) - 6" FLANGE CHECK VA.
(32) - 8" GRV TEE
(33) - 8" GRV 90°

AS BUILT

OVERHEAD PIPING PLAN

WATER SUPPLY		ABBREVIATIONS	MATERIALS			DESIGN CRITERIA		
FLOW TEST	FIRE PUMP		SIZE	LOCATION	TYPE	SYSTEM NO.	#1	#2
DATE OF TEST:	RATED CAPACITY: 1000	℄ = CENTERLINE	[illegible]	BRANCH LINE & MAIN	[illegible]	HAZARD	[illegible]	[illegible]
TIME OF TEST:	RATED PRESSURE: 80	ELEV = ELEVATION	[illegible]	MAIN TO FIRE PUMP	[illegible]	SPACING	100	100
STATIC PRESSURE: 58	PUMP TYPE: [illegible]	TOS = TOP OF STEEL				K FACTOR	5.6	5.6
RESIDUAL PRESSURE: 38	WELL PUMP	G = GROOVED PIPE END				INSIDE HOSE	[illegible]	[illegible]
GALLONS FLOWING: 1175	GPM AVAILABLE:	T = THREADED PIPE END				OUTSIDE HOSE		[illegible]
TESTED BY:	PSI AVAILABLE:	F = FLANGED PIPE END				RACK GPM		
		C-C = CENTER TO CENTER						

HYDRAULICALLY DESIGNED SYSTEM		
LOCATION	AREA #1	AREA #2
NO. OF SPRINKLERS	32	34
DENSITY	.3	.3
DESIGN AREA	2000	2000
GPM DISCHARGE	1492.29	1456.24
RESIDUAL PSI AT	73.384	77.929
20% CONTROL RISE		

TYPES OF SPRINKLERS							
SYMBOLS	QUAN.	ORIF.	TEMP.	MAKE & MODEL	TYPE	FINISH	ESC.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BRASS	N / A

HEADER THIS SHEET

KEY PLAN

NO.	DATE	REVISION DESCRIPTION	BY
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	AS BUILT	[illegible]

Wiginton Fire Sprinklers, Inc.
Fire turns us on
Orlando, Florida (407) 831-3414 Office (407) 831-5740 Fax
Tampa, Florida (813) 623-2333 Office (813) 623-0333 Fax
Pompano, Florida (305) 960-0033 Office (305) 960-1650 Fax
Jacksonville, Florida (904) 262-8107 Office (904) 268-7268 Fax
Miami, Florida (305) 888-2403 Office (305) 888-3804 Fax
Melbourne, Florida (407) 722-5585 Office (407) 722-4775 Fax

PROJECT NAME

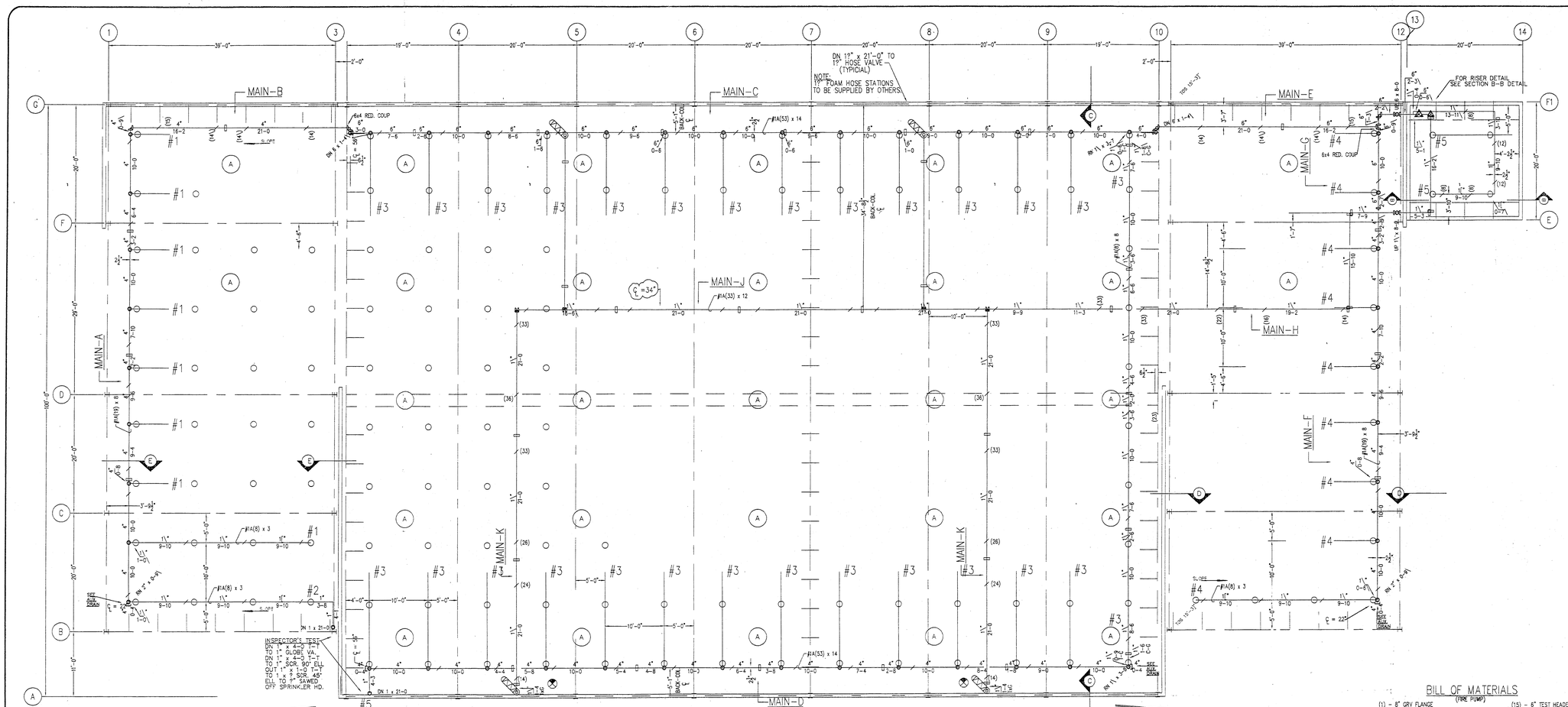
LAIDLAW DRUM STORAGE

170 BARTOW MUNICIPLE AIRPORT
BARTOW, FLORIDA

DRAWN BY: RICH JENSEN | DATE: JULY 3, 1997

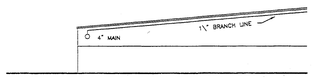
SPRKS. ON JOB: 212 | SCALE: 1/8" = 1'-0"

APPROVALS: LOCAL



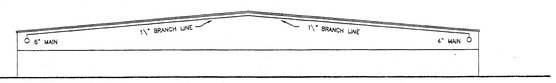
FIRE PROTECTION PIPING PLAN

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



SECTION E-E

N.T.S.



SECTION C-C

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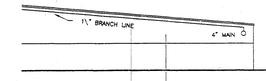
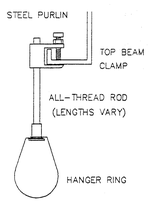


SECTION D-D

N.T.S.

NORTH



HANGER #1A

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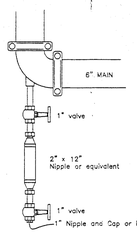

MAIN TEST AND DRAIN

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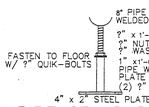
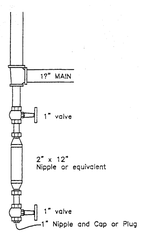


PIPE STAND DETAIL

N.T.S.



HOSE STATION TEST AND DRAIN

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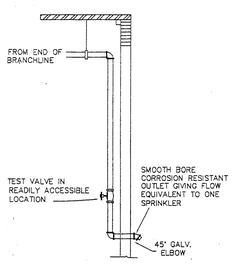

INSPECTORS TEST

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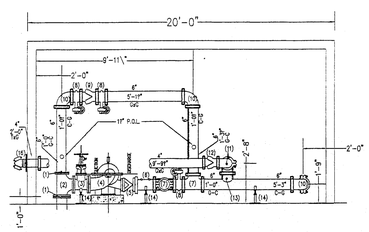

SECTION A-A

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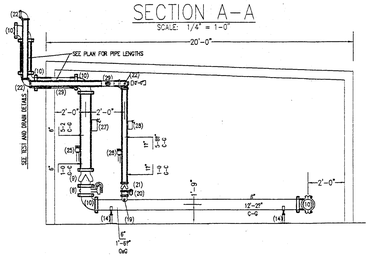
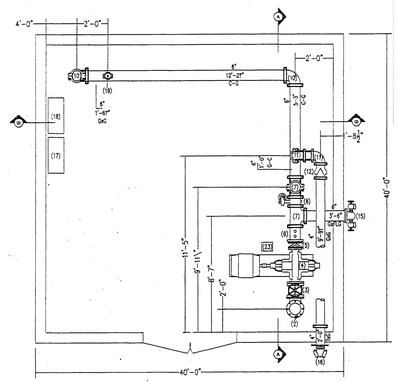


SECTION B-B

SCALE: 1/4" = 1'-0"



PUMP DETAIL

SCALE: 1/4" = 1'-0"

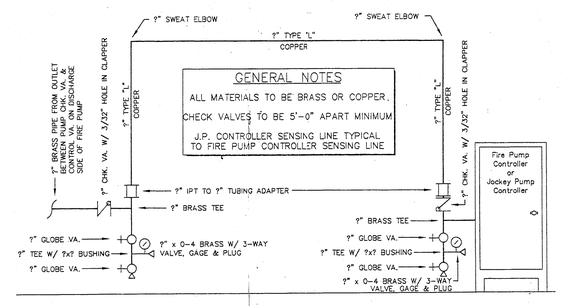
BILL OF MATERIALS

(FIRE PUMP)

(1) - 8" GRV FLANGE
(2) - 8x6x8 FLANGE TEE
(3) - 8" O.S. & Y. VALVE
(4) - 1000 G.P.M. @ 80 P.S.I. ELEC. PUMP (3 PHASE / 60 HERTZ / 480 VOLTS)
(5) - 6" WAFER CHECK VALVE
(6) - 6PONL RISER
6"O-6 O-C - 1-0 O-C - 0-6 O-G w/ (2) - 1" P.O.L.
(7) - 6" GRV TEE
(8) - 6" B-FLY VALVE w/ TAMPER
(9) - 6" GRV CHECK VALVE
(10) - 6" GRV 90° (FIRELOCK)
(11) - 4" GRV 90° (FIRELOCK)
(12) - 4" GRV CHECK VALVE
(13) - 4" GRV STUBBY
(14) - PIPE STAND (SEE DETAIL)
(15) - 6" TEST HEADER w/ 4-2½" HOSE VA.
(16) - 4x2½x2½ F.D.C. w/ WALL PLATE
(17) - JOCKEY PUMP CONTROLLER
(18) - FIRE PUMP CONTROLLER
(19) - 1½" GRV STUBBY
(20) - 1½" B-BALL VALVE w/ TAMPER
(21) - 1½" GRV CHECK VALVE
(22) - 1½" GRV 90°
(23) - 2.0 HP JOCKEY PUMP
(23) - FOAM TANK (BY OTHERS)
(25) - 2" GLOBE VALVE w/ 2" x 5'-0" w/2" 90° OUT 2" x2'-6" w/ 2" 45°
(26) - 1" GLOBE VALVE w/ 1" x 5'-0" w/1" 90° OUT 1" x2'-6" w/ 1" 45°
(27) - 6" FLOW SWITCH
(28) - 1½" FLOW SWITCH
(29) - FOAM PROPORTIONER

DESIGN NOTES

1) ALL WORK SHALL BE DONE IN ACCORDANCE W/ NFPA 13.
2) ALL HANGERS & MATERIALS TO BE IN ACCORDANCE W/ NFPA 13.
3) ALL MAINS TO BE SCH. 40 GALV. PIPE w/ WELDED OUTLETS AND GRV GALV. FITTINGS.
4) ALL BRANCH LINES TO BE SCH 40 GALV. PIPE w/ GALV. THREADED FITTINGS.
5) ALL GANG DRAINS & INSPECTORS TEST TO BE SCH 40 GALV. PIPE w/ GALV. THREADED FITTINGS.
6) MAINS TO SLOPE ?" PER 10'-0", BRANCH LINES AND AUXILARY DRAINS TO SLOPE ?" PER 10'-0".
7) PIPE LENGTHS NOTED ARE CUT LENGTH, (w/ TAKEOUTS)U.N.O.
8) NEW SYSTEMS TO BE HYDROSTATICALLY TESTED @ 200 PSI FOR 2 HOURS. (PER NFPA #13)
9) NEW SYSTEM HYDRAULICALLY CALCULATED @ .3 / 3000 W/ 500gpm HOSE ALLOWANCE.
10) A NON-CORROSIE METAL PLACARD INDICATING SYSTEM DEMANDS TO BE PROVIDED @ B.A.S.R.
11) ALL CENTER-LINES TAKEN FROM BOTTOM OF PURLIN.



FIRE PUMP / JOCKEY PUMP CONTROLLER SCHEMATIC

N.T.S.

As Builts

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FL CERT FM 297180000193

BORRELL FIRE SYSTEMS
501 NORTH NEWPORT AVENUE
TAMPA, FLORIDA 33606

TAMPA, FT. LAUDERDALE, ORLANDO, JACKSONVILLE, FT. MYERS, TALLAHASSEE

FOAM FIRE SUPPRESSION SYSTEM
LAIDLAW
170 BARTOW MUNICIPAL AIRPORT
BARTOW,FLORIDA

No.	DATE	DESCRIPTION
02	11-11-97	AS-BUILT DRAWING (J.S.)
01	10-28-97	CHANGES PER REVIEW (J.S.)

REVISIONS

CUST: LAIDLAW

DRAWN BY: M.M. | APPROVED BY:

JOB No. H7925B

SCALE: AS NOTED | DATE: 04-21-97

DWG No. 1 OF 2

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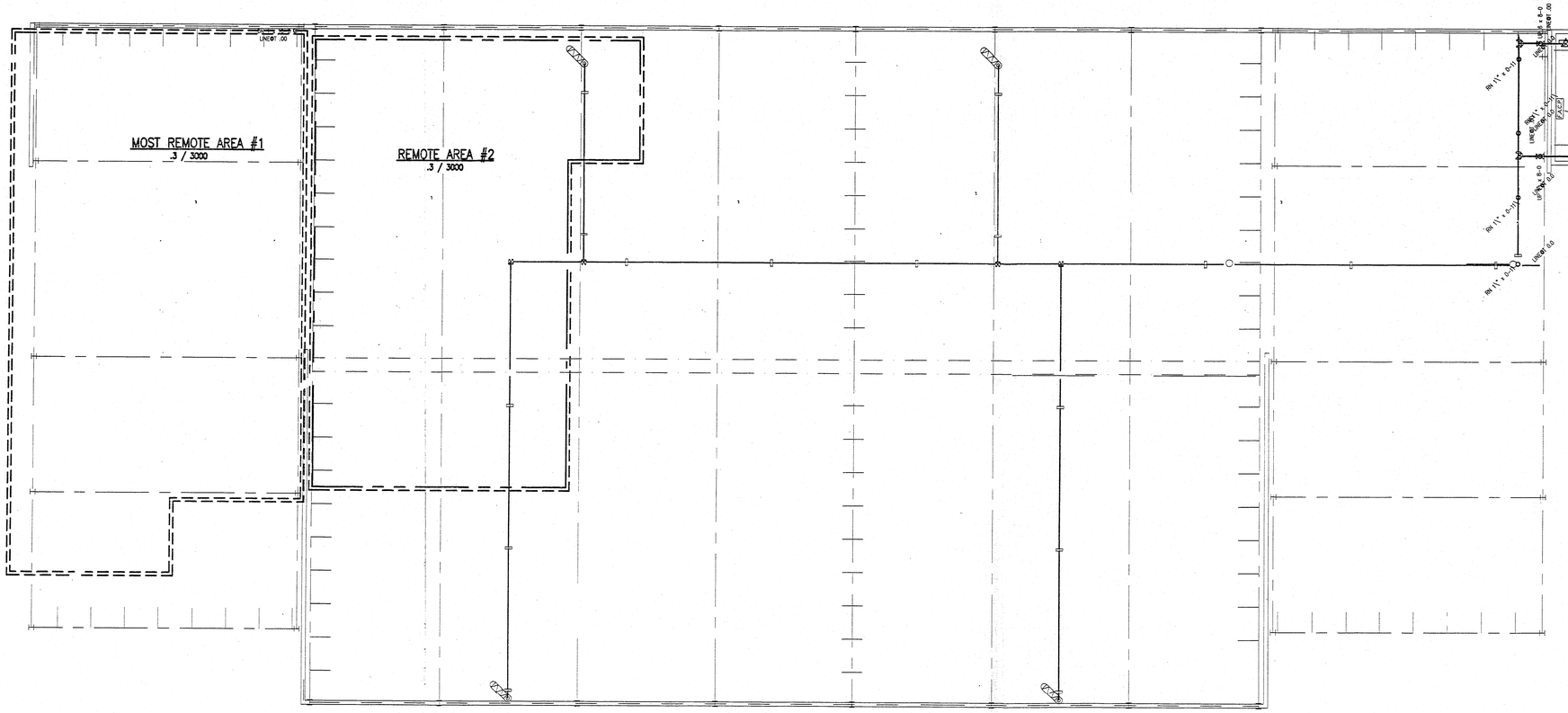
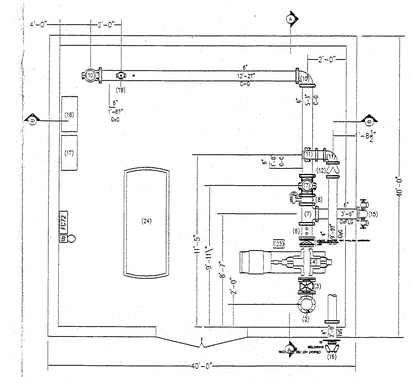
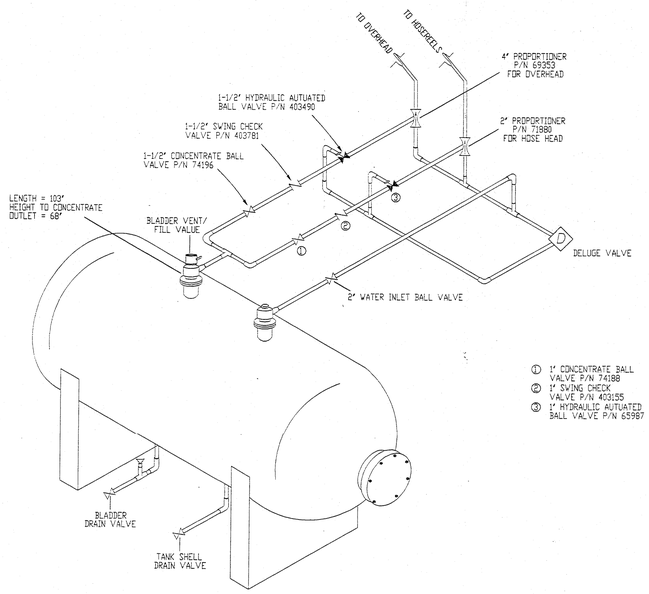
ROBERT R. COOPER
7113 SHENANDOAH COURT
TAMPA,FLORIDA 33615
813-884-5919
REG.#23275 ELECTRICAL

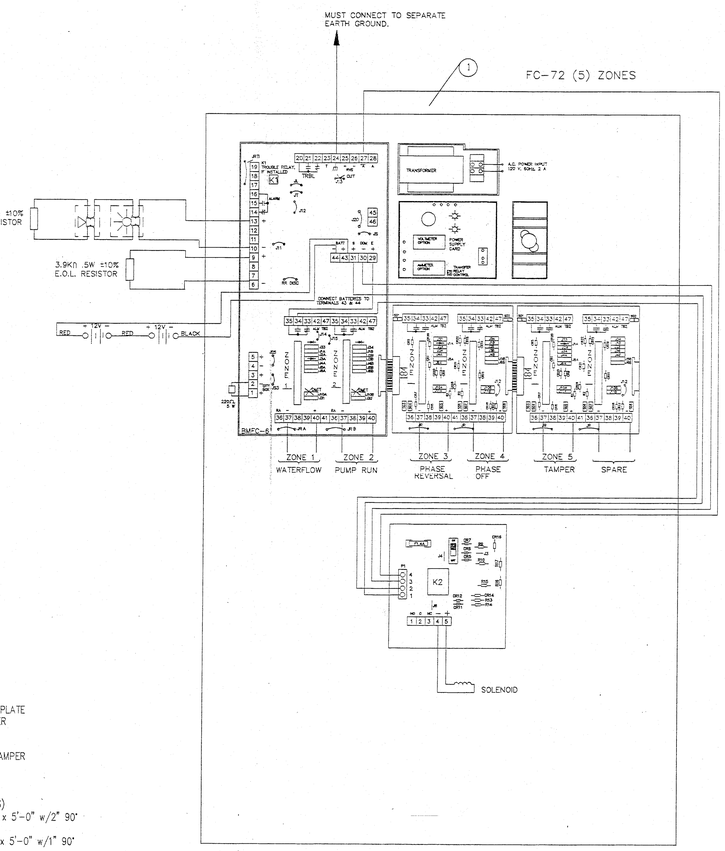


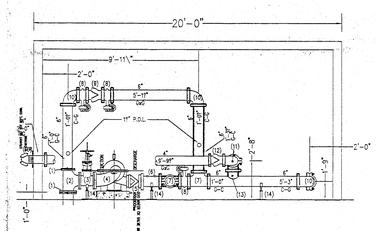


PUMP DETAIL
SCALE: 1/4" = 1'-0"

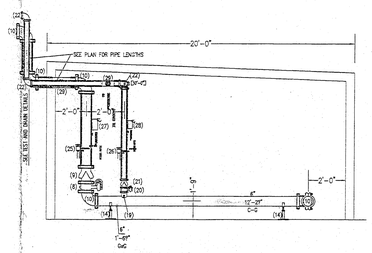


① 1" CONCENTRATE BALL VALVE P/N 74188
② 1" SWING CHECK VALVE P/N 403155
③ 1" HYDRAULIC AUTUATED BALL VALVE P/N 65987





SECTION A-A
SCALE: 1/4" = 1'-0"



SECTION B-B
SCALE: 1/4" = 1'-0"

LEGEND

SYM.	DESCRIPTION
D	DELUGE VALVE
	HOSE REEL
	PROPORTIONER
	CONCENTRATED BALL VALVE
	HYDRAULIC AUTUATED BALL VALVE
	SWING CHECK VALVE

BILL OF MATERIALS
(FIRE PUMP)

(1) - 8" GRV FLANGE
(2) - 5x6x8 FLANGE TEE
(3) - 8" O.S. & Y. VALVE
(4) - 1000 G.P.M. @ 80 P.S.I. ELEC. PUMP (3 PHASE / 60 HERTZ / 480 VOLTS)
(5) - 5" WAFER CHECK VALVE
(6) - SPOOL PIECE
6"-O-6 C-C - 1-O C-C - O-6 C-G w/ (2) - 1" P.O.L.
(7) - 6" GRV TEE
(8) - 6" B-FLY VALVE w/ TAMPER
(9) - 6" GRV CHECK VALVE
(10) - 6" GRV 90° (FIRELOCK)
(11) - 4" GRV 90° (FIRELOCK)
(12) - 4" GRV CHECK VALVE
(13) - 4" GRV STUBBY
(14) - PIPE STAND (SEE DETAIL)
(14) - 8x6 RED. GRV COUP.
(15) - 6" TEST HEADER w/ 4-2½" HOSE VA.
(16) - 4x2½x2½ F.D.C. w/ WALL PLATE
(17) - JOCKEY PUMP CONTROLLER
(18) - FIRE PUMP CONTROLLER
(19) - 1½" GRV STUBBY
(20) - 1½" B-BALL VALVE w/ TAMPER
(21) - 1½" GRV CHECK VALVE
(22) - 1½" GRV 90°
(23) - 2.0 HP JOCKEY PUMP
(24) - FOAM TANK (BY OTHERS)
(25) - 2" GLOBE VALVE w/ 2" x 5'-0" w/2" 90° OUT 2" x2'-6" w/ 2" 45°
(26) - 1" GLOBE VALVE w/ 1" x 5'-0" w/1" 90° OUT 1" x2'-6" w/ 1" 45°
(27) - 6" FLOW SWITCH
(28) - 1½" FLOW SWITCH
(29) - FOAM PROPORTIONER

As Builts

REQ.	ITEM	PART NUMBER	DESCRIPTION	REMARKS
1	12	LV2LBX25	SOLENOID VALVE	SKINNER
1	11	----------	TAMPER SWITCH	CONNECTION ONLY
2	10	----------	WATER FLOW	CONNECTION ONLY
–	9	131-3121A	ALARM BELL	F.C.I.
3	8	29-220000-286	MANUAL PULL STATION	----------
–	7	70-202006-020	DETECT-A-FIRE UNIT	140 F
–	6	70-211002-000	DUCT DETECTOR	DH-22
–	5	71-212001-001	PHOTOELECTRIC SMOKE DETECTOR	PSD-7121
–	4	70-202002-001	IONIZATION SMOKE DETECTOR	CPD-7021
–	3	30-220070-004	VOLTMETER	FDN ITEM 1
1	2	30-220070-001	BATTERY PACK	FENVAL
1	1	FC-72-5 ZONES	CONTROL PANEL	120 VAC 50/60 Hz

Z

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BORRELL FIRE SYSTEMS
501 NORTH NEWPORT AVENUE
TAMPA, FLORIDA 33606

TAMPA, FT. LAUDERDALE
ORLANDO, JACKSONVILLE
FT. MYERS, TALLAHASSEE

FOAM FIRE SUPPRESION SYSTEM
LAIDLAW
170 BARTOW MUNICIPAL AIRPORT
BARTOW,FLORIDA

REV.	DATE	DESCRIPTION
02		
01		
10		
09		
08		
07		
06		
05		
04		
03	11-11-97	AS-BUILT DRAWING (J.S.)
02	10-28-97	CHANGES PER REVIEW (J.S.)

REVISIONS

CUST: LAIDLAW
DRAWN BY: M.M.
APPROVED BY:
JOB No. H79925B
SCALE: AS NOTED
DATE: 04-21-97
DWG No. 2 OF 2

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FL CERT FM 297180000193

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LAIDLAW ENVIRONMENTAL SERVICES OF BARTOW, INC.

Report of Final Geotechnical Exploration Proposed Drum Storage Building Bartow, Florida

Ardaman & Associates, Inc.

OFFICES

Orlando, 8008 S. Orange Avenue, Orlando. Florida 32809, Phone (407) 855-3860
Bartow, 1525 Centennial Drive, Bartow. Florida 33831, Phone (813) 533-0858
Cocoa, 1300 N. Cocoa Blvd., Cocoa. Florida 32922, Phone (407) 632-2503
Fort Lauderdale, 3665 Park Central Boulevard, North. Pompano Beach, Florida 33064, Phone (305) 969-8788
Fort Myers, 9970 Bavaria Road, Fort Myers. Florida 33913, Phone (813) 768-6600
Miami, 2608 W. 84th Street, Hialeah. Florida 33016, Phone (305) 825-2683
Port Charlotte, 740 Tamiami Trail, Unit 3, Port Charlotte, Florida 33954, Phone (813) 624-3393
Port St. Lucie, 1017 S.E. Holbrook Ct., Port St. Lucie, Florida 34952, Phone (407) 337-1200
Sarasota, 2500 Bee Ridge Road, Sarasota. Florida 34239, Phone (813) 922-3526
Tallahassee, 3175 West Tharpe Street, Tallahassee, Florida 32303, Phone (904) 576-6131
Tampa, 1406 Tech Boulevard, Tampa. Florida 33619, Phone (813) 620-3389
West Palm Beach, 2511 Westgate Avenue, Suite 10, West Palm Beach, Florida 33409, Phone (407) 687-8200

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Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

March 25, 1997
File Number 97-51-9036

Laidlaw Environmental Services of Bartow, Inc.
17 Bartow Municipal Airport
Bartow, FL 33830

Attention: Mr. Liam Munroe

Subject: Report of Final Geotechnical Exploration, Proposed Drum Storage Building, Bartow Airport, Bartow, Polk County, Florida

Dear Mr. Munroe:

Ardaman & Associates, Inc. has completed the exploration of subsurface soil conditions beneath the proposed drum storage building at the referenced site, in general accordance with our Proposal Number 97-033, dated March 13, 1997. Authorization for the services in this study was verbally provided by you on March 13, 1997. The purposes of this exploration were to define the stratification and engineering properties of subsurface soils, to provide recommendations which address the design and installation of foundations, and to delineate recommended earthwork procedures and operations which should be implemented during the construction period. This study addresses foundation soils which are well within the influence of building loads, but this study does not address the condition of deep soil or bedrock strata.

This report was prepared for the exclusive use of Laidlaw Environmental Services of Bartow, Inc. and their consultants. The conclusions and recommendations are applicable only to those structures and facilities are described herein. This geotechnical study was performed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

SCOPE

The scope of our services has included the following items:

1. Flagging of proposed soil boring locations and discussion with your on-site contractor to determine if any existing underground utilities were present within the proposed building area. Resolution of any conflicts between the proposed location of the soil borings and the known location of buried utility lines, as necessary, to maintain a margin of at least 5 feet between marked utility lines and the soil boring locations.

2. Initial reconnaissance of the site by the drill crew chief to document the condition of the site, at the time of our exploration. The reconnaissance includes recording the type and condition of vegetation, the existence and general condition of any structures on the site and adjacent to the site, the inclination and direction of site topography, site drainage features, and other particulars about the site which may be pertinent to this study. Also, areas of the site which appear to have been physically or chemically altered are noted during the reconnaissance.

3. Performance of seven (7) Standard Penetration Test (SPT) borings to determine the stratification and engineering properties of subsurface soils below the proposed drum storage building location.

4. Review of each soil sample obtained in our field testing program, by a soils engineer in our laboratory, for verification of classification and assignment of laboratory tests, if required.

5. Performance of laboratory soils classification tests, on selected soil samples, to confirm our visual soil classification of the site soils, and to provide pertinent test data to estimate soil engineering parameters.

6. Analysis of the existing building site soil and ground water conditions as they relate to the proposed development.

7. Preparation of this report to document the results of our field testing program, engineering analysis, and foundation design and site earthwork recommendations.

SITE LOCATION AND CONDITIONS

The proposed building site is located within a tract of land situated in the southwest one-quarter of the southeast one-quarter of Section 14, Township 29 South, Range 25 East, Polk County. More specifically, the proposed construction area is within the Bartow Municipal Airport property. It lies immediately west of an existing maintenance area.

Topography

The site is relatively flat. There appeared to be a slight downward slop from west to east, based on ground water levels obtained within the soil borings.

Vegetation

Most existing ground vegetation had been stripped and removed prior to our field exploration. However, trace amounts of roots were encountered within the borings to depths of 15 to 18 inches below the ground surface.

FIELD EXPLORATION

Soil Borings

Our field operations consisted of conducting a series of seven (7) SPT borings using procedures similar to those outlined in ASTM D-1586. The borings were performed at the locations indicated on the attached Figure 1. The test locations and depths of the borings were determined by our firm, as described in Proposal No. 97-033, dated March 13, 1997. The borings were performed to determine the stratification and engineering properties of the subsurface soils below the proposed drum storage building. Borehole depths ranged from a minimum depth of 19 feet to a maximum depth of 19.5 feet below the existing ground surface. A continuous drilling and sampling procedure was performed within the upper 8 to 10.5 feet of the SPT boring to detect subtle changes in soil stratigraphy and pertinent engineering properties within this critical depth. Furthermore, the borings were located in the field by our drilling crew by visual reckoning using a site plan, provided by the General Contractor, Semco Construction, having a reduced scale of 1 inch = 22 feet, and by tape measurement from the northwest corner of the adjacent maintenance building. Land surface elevations at the soil boring locations were not determined.

The accuracy of the boring locations is that implied by the measurement method used. Upon completion, each borehole was filled in with local soil. A brief summary of the drilling and testing procedures utilized in the boring is included in the attached Appendix I.

LABORATORY TESTING

The field soil boring logs and recovered soil samples were transported to our Bartow office from the project site. Following the completion of the field exploration activities, each soil sample was examined by a geotechnical engineer in our soils laboratory to identify the apparent engineering classification of the soil samples retrieved in the field exploration, and to select representative soil samples for assignment of pertinent laboratory soil classification tests. The visual classification of the samples was performed in accordance with the current Unified Soil Classification System (ASTM D-2487).

Moisture Content and Percent Fines Tests

Five (5) moisture content and two (2) percent fines tests (the percent by dry weight finer than the U.S. No. 200 sieve) were performed on soil samples obtained from within borings TH-1, TH-2, and TH-4. These indices are useful in estimating compressibility and permeability characteristics of clayey soils, and in evaluating the applicability of soil improvement methods for granular soils. Furthermore, the results of these tests provide partial confirmation of our visual classification of the soils penetrated in this exploration. The results of the tests are plotted adjacent to the final soil boring profiles on the attached Figures 2 and 3 at the depth of the individually tested soil sample.

Organic Content Tests

Two (2) tests were performed and samples were selected, from those returned in our exploration, for determination of their percentage of organic constituents. Samples were selected from Borings TH-1 and TH-4. The results of these tests are useful in confirming our visual classification of these soils, and in evaluating their compressibility. The results of these organic content tests are plotted, at the appropriate depth, adjacent to the soil boring profiles on Figures 2 and 3.

SOIL CONDITIONS

The delineation of the vertical extent of individual soil strata, the identification of pertinent soil engineering properties, where applicable, and a description of each geologic layer discovered in the course of our exploration, is given in the final soil boring profiles illustrated on the attached Figures 2 and 3. The final soil boring profiles were prepared by a geotechnical engineer, based upon a combination of his technical review of the field soil boring logs, his visual classification of the recovered soil samples, and his review of the results of laboratory soils tests performed for this study, as described above. The stratification lines shown are used to indicate a transition from one soil type to another. The actual boundary between the illustrated soil layers may be gradual, or indistinct. Consequently, the stratification boundary lines, shown on the final soil boring profiles, represent our best estimate of the location of the transition between distinct soil strata. They are in no way intended to designate a depth of exact geological change. Furthermore, the recommendations contained in this report are based on the contents of the final soil boring profiles. While the borings are representative of subsurface conditions at their respective locations and vertical reaches, local variations which are characteristic of the subsurface materials of the region, or which may be due to man-made alteration of the native geologic conditions, may be encountered.

The subsurface soil profile, based on the data obtained from seven (7) SPT borings is generally described below:

DEPTH (Feet)		DESCRIPTION
From	To	
Existing Ground Surface	4-6	Very loose to loose, find sands (SP). Trace amounts of root fragments were encountered within many of the samples.
4-6	7 - 9	Loose to very dense, very dark-colored sands with silt (SP-SM) containing trace amounts of organic fines (hardpan). Boring TH-4 encountered a 12-inch layer of organic sands (OL) at the top of this general stratum. A 6-inch layer of the material was encountered at a depth of 6 feet at TH-1. This general stratum was not encountered at Boring TH-5.
7 - 9	Term	Very dense, weakly cemented sands to sands with silt (SP, SP-SM).

GROUND WATER CONDITIONS

The ground water level readings were measured in the borehole upon completion of testing, where possible, and at the completion of each day's field work. The measured borehole ground water levels are plotted adjacent to the final logs. These water level readings may differ, somewhat, from the actual stable ground water table, due to variations in the permeability of various aquifer soils. The accuracy of the reported water levels is also related to the time allowed for the borehole water level to come to an equilibrium. Accurate determination of the ground water level is best obtained by use of a properly installed piezometer. It must be noted that fluctuations in the ground water level may occur due to variations in rainfall and other environmental or physical factors at the time measurements are made.

Unconfined (Surficial) Aquifer Conditions

The measured borehole, unconfined ground water table level ranged from 1' - 7" to 6' - 2" feet below land surface at the time of the field exploration. The range of fluctuation of the unconfined aquifer is largely dependent on the volume of water, which precipitates through the soil, at any given time, during the year. This water table will generally attain a peak level in the period from late August to mid-September, which is near the end of the three- to four-month period when 60 to 70 percent of the yearly precipitation falls. Conversely, the lowest water level is generally recorded in May, just prior to the commencement of the summer rains.

EVALUATION AND RECOMMENDATIONS

Proposed Development

The project plans we received, dated September 24, 1996, showed the proposed structure to be a single-story, metal-framed building, approximately 100 x 220 feet in plan area, with the floor slab-on-grade. Most of the building will be elevated about 4 to 4.5 feet above existing grade with structural fill contained within a masonry stem-wall foundation. Two truck loading and unloading areas are planned along the east and west sides of the structure. The pavement slab will be at existing grade. Steel columns are designed to bear on individual footings along the perimeter stem-wall. The continuous wall and isolated column footings are designed for an allowable soil bearing pressure of 2000 pounds per square foot. The plans show the wall footings to be 24 inches wide, and a maximum column footing size of 5 feet x 5 feet.

Has this changed?

Soil Evaluation

The SPT borings encountered mostly clean sands to a depth of 4 to 6 feet below existing grade, underlain by very dark-colored, organically stained sands with silt (SP-SM), or hardpan. Boring TH-4 encountered 12 inches of organic sand beginning at a depth of 4 feet. Boring TH-1 encountered about 6 inches of the same material at a depth of about 6.5 feet. Below the hardpan soil were very dense sands through the end of the borings.

Organic Soils

It is our opinion that the natural and fill soils encountered at the site, with the exception of buried organic strata, are capable of supporting the anticipated loads on a conventionally designed shallow foundation system, provided that surface re-working, organic soil removal and replacement, and compaction are performed.

Complete removal of the unsuitable organic strata and replacement with compacted granular fill in the buried organic areas will be necessary in order to allow safe building support by a conventional shallow foundation system. The organic material, as encountered, should be removed to its lateral and vertical extent within the building area, including the truck loading/unloading areas. This will reduce the potential of total and differential settlement caused by consolidation of the highly compressible organic layer under the weight of new fill and applied surface loads. Demucking limits should include a suitable margin beyond the perimeter of the foundation system that will be dependent upon the excavation depth. As a minimum, the excavation margin should extend 5 feet beyond the edge of structure or footing, or a horizontal distance of 1-foot for every foot of vertical cut below footing, as measured from the outer edge of the footing bottom, whichever is greater. The existing soil cover, except for the surface soils containing roots removed from above the organic stratum, may be stockpiled and reused as engineered fill under the direction of the soils engineer or his representative.

Once the organic soils have been removed where encountered, and the sand backfill placed and compacted to existing grade, the subgrade surfaces of both the floor slab-on-grade and the foundations should be densified. The purpose of the densification is to compress loose surficial soils, as well as subgrade soils disturbed by other site preparation procedures, thereby creating a more uniform and less yielding soil mass. The above-created conditions will promote uniform settlement of the structure, thereby, reducing the incidence and magnitude of differential settlement.

The following report subsection describes earthwork procedures which were found to be successful in achieving the required soil improvement, at similar sites. That section also includes target specifications for in-place soil densities. It has been our experience that the described procedures can be accomplished using conventional earthwork equipment and techniques.

Site Preparation Recommendations

The existing surficial soils should be prepared prior to placement of engineered fill and foundation construction on the soils, in accordance with the following site preparation recommendations. The recommended procedures should be covered in the project specifications, and completed prior to construction of the foundation system.

1. The building area, plus a margin of 5 feet beyond the perimeter of the foundation system, should be cleared and grubbed of any remaining vegetation, stumps, tree root systems, and sod. Organic topsoil should be excavated and removed. Strippings, debris, and organic soils should be disposed in accordance with the owner's instructions. Any hole larger than

3 feet in diameter resulting from the removal of any object should be ramped to allow compaction of the bottom and sides with mechanical equipment prior to filling.

2. The organic sands encountered at boring TH-4 must be removed to their full vertical and lateral extent within the construction area as defined above. A dewatering system, capable of lowering the water table below the excavation bottom, will be necessary to verify that the organic sands have been completed removed. Once it has been confirmed that the organic soils have been removed, backfilling of the excavation may commence. Backfill material should consist of sands as defined in Item 5 below, and be placed in 12-inch thick lifts. Each lift should be compacted to 95 percent of the soils Modified Proctor (ASTM D-1137) Maximum Dry Density. This operation should continue up to existing grade elevation.

3. After clearing, grubbing and organic topsoil removal, the exposed soils outside any excavated area but within the construction area plus the margin, should be proofrolled with appropriate compaction equipment. The soils should be compacted to a depth of 24 inches below existing grade to a minimum of 95 percent of the soil's Modified Proctor (ASTM D-1557) maximum dry density. This density level should be measured by a qualified soils technician using procedures described by ASTM D-2937 or approved equal, prior to commencement of subsequent procedures. In the event that initial rolling results in unstable, yielding or pumping conditions, the soils engineer shall be contacted to determine the cause of the problem and make recommendations for remediation. As a minimum, soft, yielding, excessively wet, or otherwise unsuitable material shall be cut out and replaced with compacted clean sand. In the event that applied water does not penetrate sufficiently deep into natural soils to act as a lubricant in the compaction process, it will be necessary to disk or otherwise break up the soils before and during application of water.

   Care should be exercised to avoid damaging any neighboring structures during the compaction operation.

4. Continuous wall footing trenches and individual footing pits should be excavated to at least 36 inches below footing line and bottom grade. This is to allow for visual verification of the presence of any organic soils. Therefore, a dewatering system will be necessary, as needed, to allow for visual inspection of the excavation bottom. If organic soils are encountered, they should be removed to their full vertical extent within the building area, plus a margin of 5 feet, and replaced with sand backfill as described above. Where organic soils are not encountered, the exposed undercut footing subgrade should be compacted with suitable mechanical equipment, to achieve the specified level of density, to the required depth. Exposed undercut foundation subgrade should be tested to confirm that a minimum density of 95 percent of the Modified Proctor maximum dry density exists to a depth of 12 inches below the undercut foundation subgrade. If necessary, the subgrade shall be excavated further, refilled, and recompacted with mechanical equipment to achieve the necessary minimum field density, to the required depth. Following confirmation of the above-stated soil density, the undercut foundation trench and/or pit should be backfilled using material defined in Item 5 below. It should be placed in level lifts of 12 inches or less and compacted to achieve 95 percent of the Modified Proctor maximum dry density.

Backfill density should be confirmed, as required, and the backfill should be constructed to the bottom of foundation subgrade, as necessary.

5. All fill and backfill soils should consist of clean sands containing less than 12 percent, non-plastic material passing the U.S. Sieve No. 200 (percent fines). These soils should be free of roots and debris. The existing soils above the dark-colored hardpan soils are suitable for use as backfill, except for the surficial sands containing roots.

6. After steps 1 through 4 are completed, fill necessary to raise the grade to finished floor subgrade, or any interim working grade, should then be placed in 12-inch thick layers, moisture-conditioned, and compacted to a minimum of 95 percent of the Modified Proctor maximum dry density. All fill should consist of clean sand as defined above.

   Hand-held compactors should be used within five feet of any stem-wall to reduce the potential of over stressing the wall. Thinner lifts (6 inches or less) may be necessary to achieve required compaction in this area.

7. Foundation backfill on sides of formed footings, if any, and building slab subgrade fill should consist of clean sand, defined in Item 5 above, which is placed in 12-inch lifts and compacted to 95 percent of the Modified Proctor maximum dry density.

8. Ardaman & Associates, Inc., Bartow office, should be engaged by the owner prior to site preparation to provide field observation of site preparation steps, compaction operations on natural and fill soils, and conduct field in-place density testing to confirm that the specified requirements are met.

Foundation Recommendations

For foundations placed on the soils prepared as previously recommended, the foundations may be proportioned for a maximum net allowable soil bearing pressure of 2000 pounds per square foot for design dead load plus sustained live load. This allowable pressure may be increased by one-third in the case where foundations will be exposed to transient live loads, such as wind.

A soil cover of 18 inches as measured from the bottom of the foundation system to lowest adjacent finished grade should be provided. Spread footings should be at least 2.5 feet wide. Also, for any continuous wall foundations, a minimum lateral dimension of 18 inches should be provided. The foundation should be designed for equal dead load distribution in accordance with Standard Building Code requirements.

Predicted Performance of Shallow Spread Footings

Selection of the recommended soil bearing pressure was based primarily on considerations of limiting the expected settlement to tolerable values. Considerations of overstress and general shear of the soils below the footings were found to not have a significant influence on the recommended soil bearing pressure. Based on the expected magnitude of the foundation loads,

we estimate that the maximum settlement will be on the order of 0.6 inches for the continuous wall footings, and 0.6 inches for the individual pad footings. The estimated differential settlement between adjacent footings is 0.4 inches. We also anticipate that most of the settlement will be distortional, in nature. That is, it will be the result of rearrangement of the soil particles which constitute the granular component of the soil and elastic compression of the soil particles which comprise the cohesive component of the soil, in response to the applied load. This distortional settlement would occur almost immediately following placement of dead load on the foundations. Furthermore, it is our judgment that the settlement would occur incrementally as the dead weight loads are applied due to the predominantly granular nature of the foundation soils. Further distortional settlement of the foundations due to the addition of sustained live loads during the useful life of the structure would also occur shortly following the application of those loads. Foundation settlement, which may be due to the application of transient live loads such as wind, is expected to be negligible.

Field Observations

Site earthwork procedures, including the removal and replacement of the organic soils, preparation of foundation bearing surfaces, and compaction of all fill and backfill, should be observed by a geotechnical engineer or his representative from Ardaman & Associates, Inc., to verify that subsurface conditions, revealed during the earthwork operations, are as anticipated in the design and that the earthwork procedures are completed in accordance with the recommendations contained in this report.

TERMINOLOGY

We have attached a Technical Glossary to this report, which defines certain phrases that may be incorporated into the test of this document. The reader is asked to review this Glossary to familiarize himself with these phrases and their definitions, as an aid to his understanding of the content, conclusions, and recommendations contained in this report.

Closure

The analyses and recommendations submitted in this report are based on the data obtained from seven (7) SPT borings performed at the locations indicated on the attached Figure 1. This report does not reflect any variation which may occur in-between the borings, the nature and extent of which may not become evident until during the course of construction. If variations then appear evident, it will be necessary for you to engage our firm to re-evaluate the recommendations of this report, on the basis of pertinent on-site observations made by us during the construction period, wherein the characteristics of any variations are noted.

When the final design and specifications are completed, we would like the opportunity to review them in order to determine whether changes in the original concept may have affected the validity of our recommendations, and whether these recommendations have been implemented in the design and specifications.

Was this done?

The recovered soil samples are available for examination at our Bartow office. Unless otherwise instructed in writing, the soil samples will be discarded 60 days after the issuance of this report.

It has been a pleasure assisting you with this phase of your project. If there are any questions or when we may be of further assistance, please contact the undersigned at (941) 533-0858.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

P. Rodney Mank, P.E. 3/27/97
Project Engineer
Florida Registration No. 41986

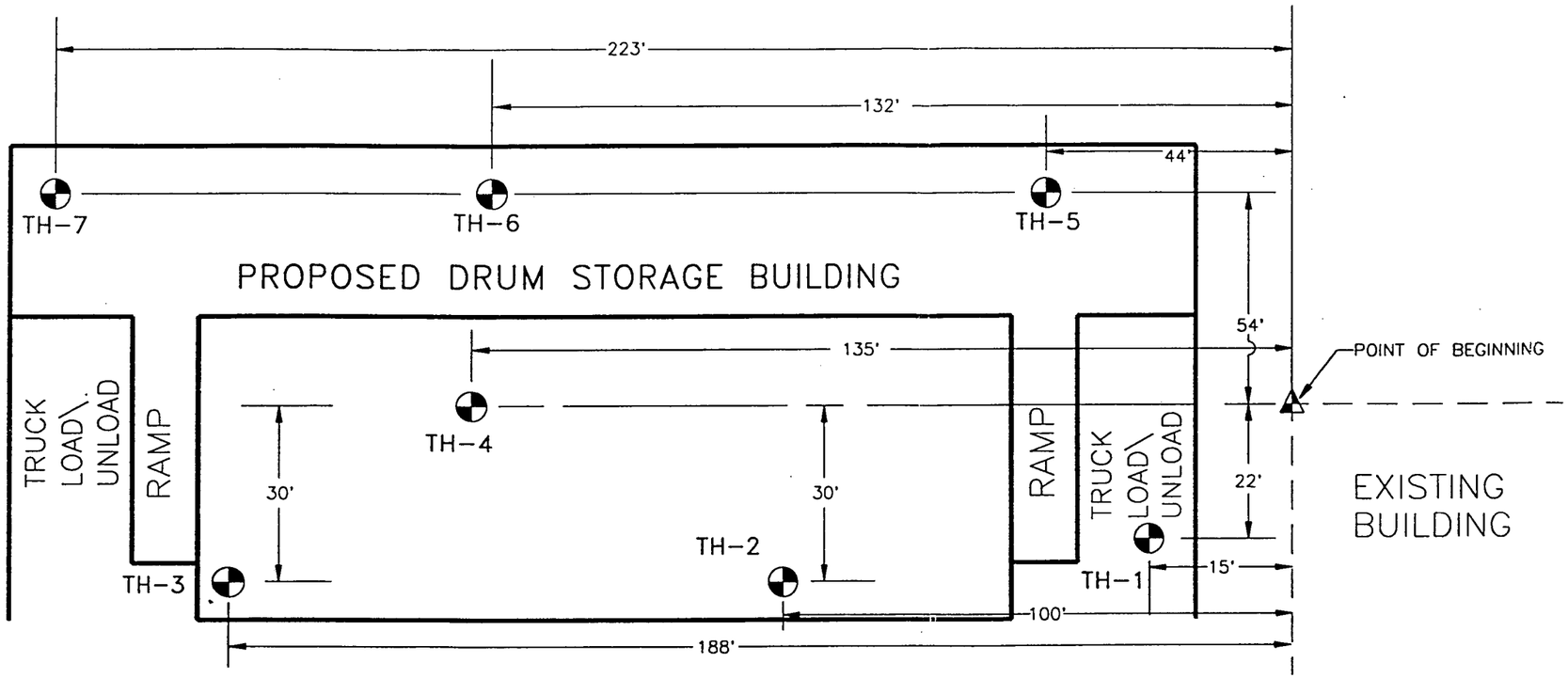
Thomas J. Leto, P.E.
Vice President
Florida Registration No.12458

TJL/PRM:tc
Enclosures

B1T\SSE\97-9036.sse

FIGURES

SOIL BORING LOCATION PLAN



NOT TO SCALE

LEGEND

TH-1 STANDARD PENETRATION TEST BORING (ASTM D1586)

NOTICE:

THE PURPOSE OF THIS DRAWING IS TO PRESENT THE LOCATION OF THE SOIL BORINGS AND OTHER FIELD TESTS, AND TO PRESENT SPECIAL FEATURES RELATED TO THE SUBSURFACE CONDITIONS AT THE SITE. THE PROPOSED SITE IMPROVEMENTS SHOWN ON THIS DRAWING MAY HAVE BEEN RELOCATED, AND/OR REDESIGNED BETWEEN RECEIPT OF THE SITE PLAN AND ISSUANCE OF CONSTRUCTION BID DOCUMENTS. CONSEQUENTLY, THE SELECTED CONTRACTOR SHALL NOT USE OR RELY ON THIS DRAWING TO PLAN AND PERFORM THE CONSTRUCTION, INSOFAR AS IT RELATES TO THE PROPOSED SITE IMPROVEMENTS SHOWN HEREON.

FURTHERMORE, BECAUSE THIS DRAWING WAS PREPARED, USING A DOCUMENT WHICH WAS NOT RELEASED FOR CONSTRUCTION BIDS. THE CONTRACTOR SHALL BEAR IN MIND THAT ERRORS MAY EXIST ON THIS DRAWING WHICH MAY NOT HAVE BEEN CORRECTED. UNLESS THE BORING AND TEST LOCATIONS HAVE BEEN LOCATED BY A REGISTERED LAND SURVEYOR, THE LOCATIONS SHALL BE CONSIDERED TO BE APPROXIMATE, AND SHALL REFLECT THE ACCURACY OF THE TEST LOCATION METHODS USED BY ARDAMAN & ASSOCIATES, INC.

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLERS LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THOSE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE

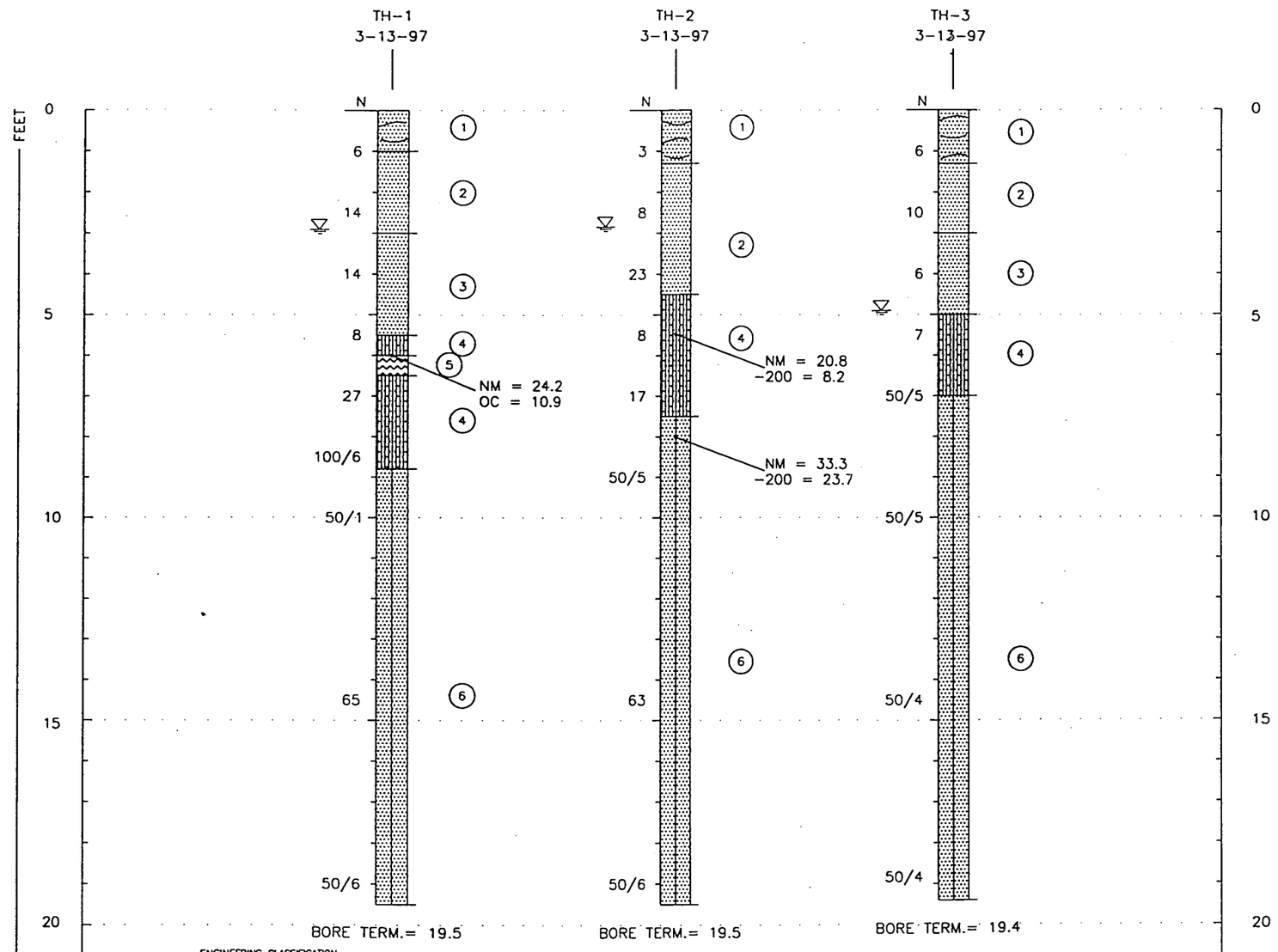
DATE DRILLED: 3-13, 3-14-97

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SOIL BORING LOCATION PLAN
LAIDLAW ENVIRONMENTAL SERVICES
PROPOSED DRUM STORAGE BUILDING
BARTOW MUNICIPAL AIRPORT
POLK COUNTY, FLORIDA

DRAWN BY: NPS	CHECKED BY:	DATE: 3-25-97
FILE NO. 97-9036	APPROVED BY:	FIG. NO. 1

FINAL BORING LOG PROFILES



LEGEND

1. DARK GRAY TO VERY DARK GRAY SAND (SP) TRACE ROOTS
2. GRAY TO LIGHT GRAY SAND (SP) TRACE ROOT FRAGMENTS
3. LIGHT GRAY TO PALE BROWN TO LIGHT YELLOWISH-BROWN SAND (SP)
4. VERT DARK BROWN TO BLACK SAND WITH SILT (SP-SM) TRACE ORGANIC FINES [HARDPAN]
5. VERY DARK BROWN ORGANIC SILTY SAND (OL)
6. DARK REDDISH-BROWN TO DARK YELLOWISH-BROWN SAND TO SAND WITH SILT (SP TO SP-SM) WEAKLY CEMENTED
7. DARK BROWN SAND (SP) TRACE ROOTS

TH-1	STANDARD PENETRATION TEST (SPT) BORING
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
50/3	50 BLOWS FOR 3-INCHES PENETRATION INTO SOIL
▽	GROUNDWATER LEVEL MEASURED ON DATE DRILLED
NM	NATURAL MOISTURE CONTENT IN PERCENT
-200	PERCENT PASSING NO. 200 SIEVE (PERCENT FINES)
OC	ORGANIC CONTENT IN PERCENT
SP,SM	UNIFIED SOIL CLASSIFICATION SYSTEM

ENGINEERING CLASSIFICATION

COHESIONLESS

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	ABOVE 50

COHESIVE

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH T.S.F.	BLOW COUNT "N"
VERY SOFT	BELOW .25	0 TO 2
SOFT	.25 TO .50	2 TO 4
MEDIUM STIFF	.50 TO 1.0	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	ABOVE 4	ABOVE 30

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLERS LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THOSE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE

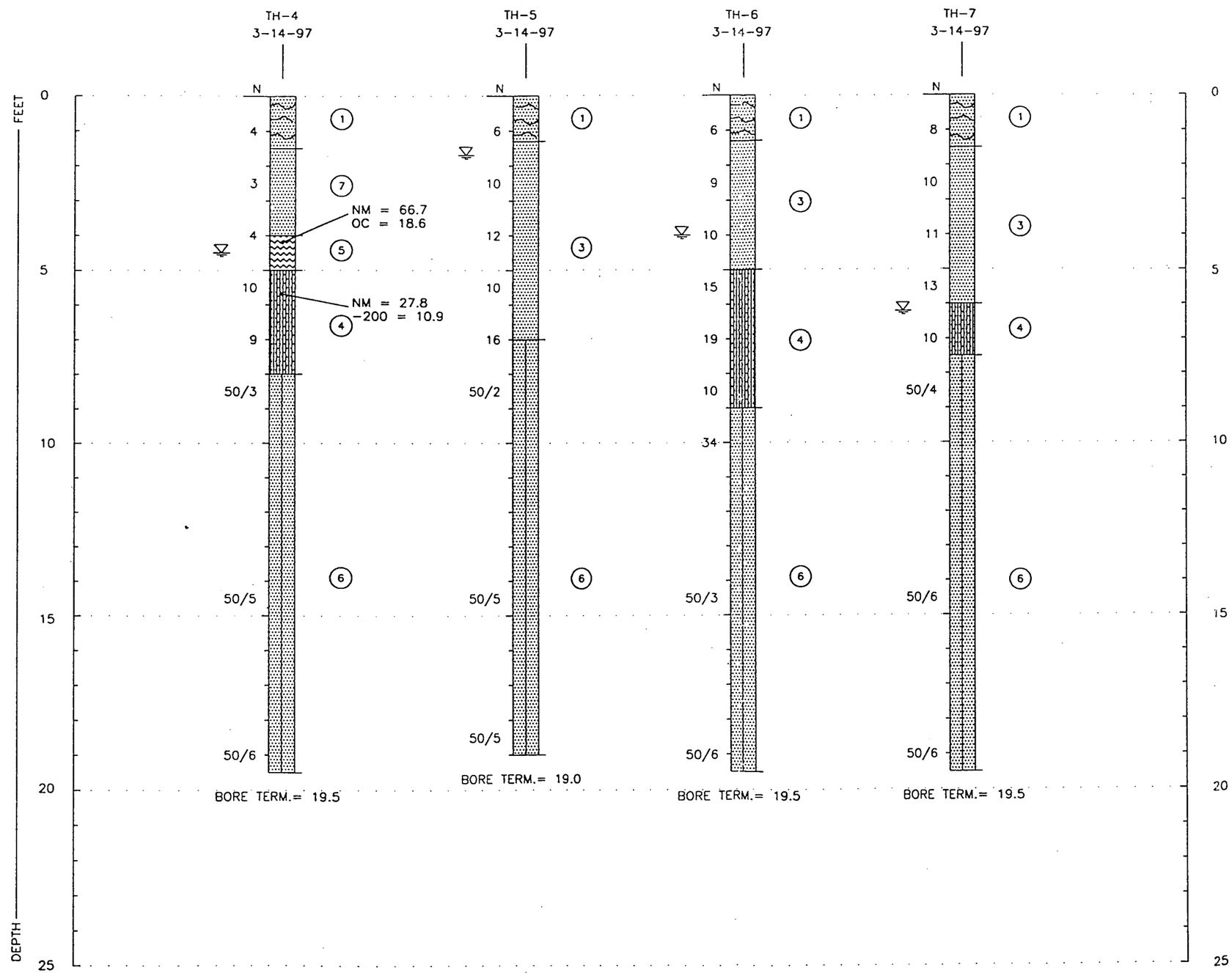
DATE DRILLED: 3-13, 3-14-97

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

FINAL BORING LOG PROFILES
LAIDLAW ENVIRONMENTAL SERVICES
PROPOSED DRUM STORAGE BUILDING
BARTOW MUNICIPAL AIRPORT
POLK COUNTY, FLORIDA

DRAWN BY: NPS	CHECKED BY:	DATE: 3-25-97
FILE NO. 97-9036	APPROVED BY:	FIG. NO. 2

FINAL BORING LOG PROFILES



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GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THOSE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE

DATE DRILLED: 3-13, 3-14-97

ENGINEERING CLASSIFICATION

COHESIONLESS

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	ABOVE 50

COHESIVE

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH T.S.F.	BLOW COUNT "N"
VERY SOFT	BELOW .25	0 TO 2
SOFT	.25 TO .50	2 TO 4
MEDIUM STIFF	.50 TO 1.0	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	ABOVE 4	ABOVE 30

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FILE NO. 97-9036	APPROVED BY:	FIG. NO. 3

APPENDIX I
FIELD EXPLORATION PROCEDURES

STANDARD PENETRATION TEST

The Standard Penetration Test is a widely accepted method of in-situ testing of foundation soils (ASTM D-1586). A 2-foot long, 2-inch outside diameter, split-barrel ("spoon") sampler, attached to the end of drilling rods, is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each six inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load.

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. Usually, the circulating fluid, which is a bentonite drilling mud, also serves to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or to prevent the loss of circulating fluid.

Representative split-spoon samples from soils at every 5 feet of drilled depth and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. Samples not used in testing are stored for at least sixty (60) days prior to being discarded. After completion of a test boring, the hole is kept open until a steady state ground water level is recorded. The hole is then sealed if necessary, and backfilled.

GEOTECHNICAL EXPLORATION

TECHNICAL GLOSSARY

TECHNICAL GLOSSARY

Clean Granular Fill - A natural deposit of granular silica soil or a deposit of silica soil which has been modified to meet with the following criteria:

- Organic Content (ASTM D 2974) - Less Than 3%
- Plasticity Index (ASTM D 4318) - Zero
- Maximum Particle Size - 0.75 Inches
- Maximum Percent Fines Content (ASTM D 1140) - 12%
- U.S.C.S. Classifications - SP, SW, SP-SM, GP, GW, GP-GM
- Free From Debris and Trash

Demolition Debris - The remnant of previous structures, in whole or in fragments, which is the result of removal and or demolition of those structures.

Inert Debris Fill - That mass of material, which is created as the result of intermingling of Inert Demolition Debris with Structural Fill.

Organic Soil - A natural or man-modified soil deposit which contains in excess of 5 percent organic constituents (ASTM D 2974).

Reconditioned Inert Debris Fill - Inert Debris Fill, that has been modified to produce a thoroughly blended composite material, which contains Demolition Debris fragments that are no larger than 4 inches, in any dimension.

Structural Fill - Clean Granular Fill or Select Granular Fill which is designated to be placed below structural elements, and within their zones of stress influence (foundations, slabs-on-grade, pavements), placed and compacted in accordance with site preparation recommendations.

Select Granular Fill - Clean Granular Fill which, when placed and compacted in accordance with site preparation recommendations, will yield a soil mass with coefficient of permeability greater than or equal to that specified in the report.

Trash - Biodegradable manufactured or natural products or objects and/or refuse, which may typically be found in Class I municipal landfill cells.

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

As the client of a consulting geotechnical engineer, you should know that site subsurface conditions cause more construction problems than any other factor. ASFE/The Association of Engineering Firms Practicing in the Geosciences offers the following suggestions and observations to help you manage your risks.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Your geotechnical engineering report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. These factors typically include: the general nature of the structure involved, its size, and configuration; the location of the structure on the site; other improvements, such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask your geotechnical engineer to evaluate how factors that change subsequent to the date of the report may affect the report's recommendations.

Unless your geotechnical engineer indicates otherwise, do not use your geotechnical engineering report:

- when the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size, elevation, or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems that may occur if they are not consulted after factors considered in their report's development have changed.

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time of subsurface exploration. Do not base construction decisions on a geotechnical engineering report whose adequacy may have been affected by time. Speak with your geotechnical consultant to learn if additional tests are advisable before construction starts.Note, too, that additional tests may be required when subsurface conditions are affected by construction operations at or adjacent to the site, or by natural events such as floods, earthquakes, or ground water fluctuations. Keep your geotechnical consultant apprised of any such events.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL JUDGMENTS

Site exploration identifies actual subsurface conditions only at those points where samples are taken. The data were extrapolated by your geotechnical engineer who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your geotechnical engineer can work together to help minimize their impact. Retaining your geotechnical engineer to observe construction can be particularly beneficial in this respect.

A REPORT'S RECOMMENDATIONS CAN ONLY BE PRELIMINARY

The construction recommendations included in your geotechnical engineer's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize recommendations. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your geotechnical engineer prepared your report expressly for you and expressly for purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the geotechnical engineer. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.

GEOENVIRONMENTAL CONCERNS ARE NOT AT ISSUE

Your geotechnical engineering report is not likely to relate any findings, conclusions, or recommendations

about the potential for hazardous materials existing at the site. The equipment, techniques, and personnel used to perform a geoenvironmental exploration differ substantially from those applied in geotechnical engineering. Contamination can create major risks. If you have no information about the potential for your site being contaminated, you are advised to speak with your geotechnical consultant for information relating to geoenvironmental issues.

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid misinterpretations, retain your geotechnical engineer to work with other project design professionals who are affected by the geotechnical report. Have your geotechnical engineer explain report implications to design professionals affected by them, and then review those design professionals' plans and specifications to see how they have incorporated geotechnical factors. Although certain other design professionals may be familiar with geotechnical concerns, none knows as much about them as a competent geotechnical engineer.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

Geotechnical engineers develop final boring logs based upon their interpretation of the field logs (assembled by site personnel) and laboratory evaluation of field samples. Geotechnical engineers customarily include only final boring logs in their reports. Final boring logs should not under any circumstances be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes, and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, give contractors ready access to the complete geotechnical engineering report prepared or authorized for their use. (If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared and that developing construction cost estimates was not one of the specific purposes for which it was prepared. In other words, while a contractor may gain important knowledge from a report prepared for another party, the contractor would be well-advised to discuss the report with your geotechnical engineer and to perform the additional or alternative work that the contractor believes may be needed to obtain the data specifically appropriate for construction cost estimating purposes.) Some clients believe that it is unwise or unnecessary to give contractors access to their geotechnical engineering reports because they hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems. It also helps reduce the adversarial attitudes that can aggravate problems to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical engineers. To help prevent this problem, geotechnical engineers have developed a number of clauses for use in their contracts, reports, and other documents. Responsibility clauses are not exculpatory clauses designed to transfer geotechnical engineers' liabilities to other parties. Instead, they are definitive clauses that identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report. Read them closely. Your geotechnical engineer will be pleased to give full and frank answers to any questions.

RELY ON THE GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Most ASFE-member consulting geotechnical engineering firms are familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a construction project, from design through construction. Speak with your geotechnical engineer not only about geotechnical issues, but others as well, to learn about approaches that may be of genuine benefit. You may also wish to obtain certain ASFE publications. Contact a member of ASFE of ASFE for a complimentary directory of ASFE publications.

ASFE THE ASSOCIATION OF ENGINEERING FIRMS PRACTICING IN THE GEOSCIENCES
8811 COLESVILLE ROAD/SUITE G106/SILVER SPRING, MD 20910
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BPC0592A/3.5M

Ardaman & Associates, Inc.
Geotechnical, Environmental and
Material's Consultants

April 18, 1997
File Number 97-9036A

Mr. Carl Locke, Jr.
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results, Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 1

Gentlemen:

As requested by you, on March 12, 1997 we performed field in-place density tests (ASTM D 2937) on the foundation subgrade soils at the subject project. Page 1 presents the test locations and results. The field density tests were correlated to the maximum density of the foundation subgrade soils as determined by a Modified Proctor tests (ASTM D1557) on a representative soil sample. Figure No. 1 presents a graphic representation of the moisture-density relationships.

Based on these test results, the foundation subgrade soils meet the specified degree of compaction of **98** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the building corner locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the foundation subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best

C. Alan Best
Technical Services Manager

P. Rodney Mark, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B5:\

1525 Centennial Drive (33830) Post Office Box 916 Bartow, Florida 33831 Phone (941) 533-0858 FAX (941) 533-7325
Offices: Bartow, Cocoa, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

FILE NO.: 97-9036A DATE: 4/18/97

CLIENT: SEMCO CONSTRUCTION

REPORT NO. 1 PAGE NO.: 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	21' N of SW corner of Building	3/12	1	106.1	5.6	BOF -1.0	95.7*
2	60' N & 12' W of SW Corner of Building	3/12	1	102.4	7.2	BOF -1.0	92.3*
3	18' S of NW Corner of Building	3/12	1	104.9	7.8	BOF -1.0	94.6*

* PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 98 PERCENT

FIELD TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D 1557	110.9	PCF @	10.7

BOF = BOTTOM OF FOOTING

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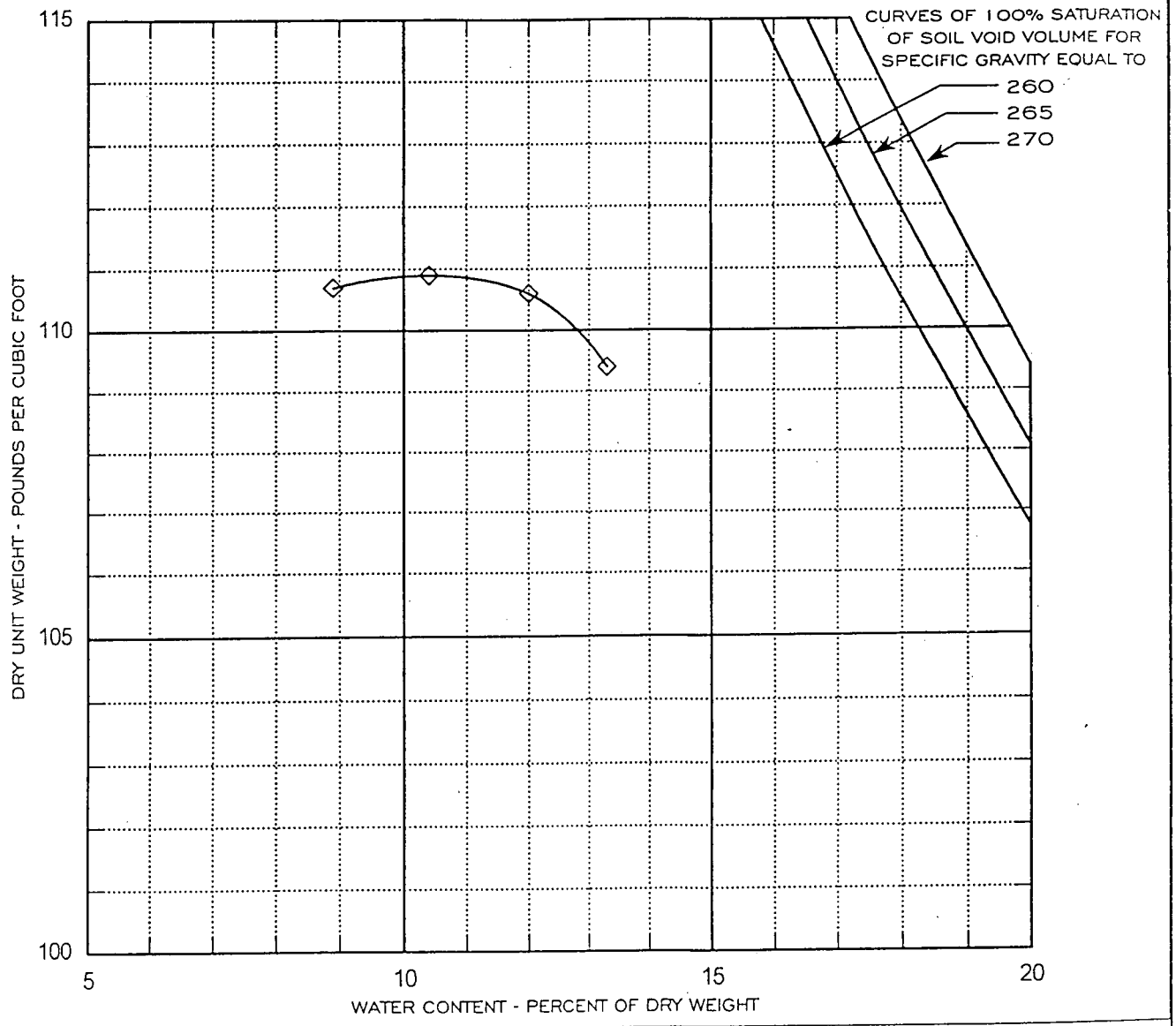
MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT

CURVE IDENTIFICATION

◇ MDR 1 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY: KH	CHECKED BY: PRM	DATE: 4/16/97
FILE NO: 97-9036A	APPROVED BY:	FIGURE NO: 1

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

Revised July 28, 1997
April 25, 1997
File Number 97-9036A

Mr. Carl Locke, Jr.
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results, Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 2

Gentlemen:

As requested by you, on April 8, 1997 we performed field in-place density tests (ASTM D 2937) on the excavation backfill soils at the subject project. The excavation was to remove the muck soils encountered in our field exploration program, as recommended in our geotechnical report for the project, dated March 15, 1997. We were not present to observe the demucking operation. However, we did observe the excavation bottom prior to backfilling, and it appeared that muck soils had been removed. Page 1 presents the test locations and results. The field density tests were correlated to the maximum density of the excavation backfill soils as determined by a Modified Proctor test (ASTM D1557) on a representative sample. Figure No. 1 presents a graphic representation of the moisture-density relationship.

Based on these test results, the excavation backfill soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per the revised project specifications, except where noted.

The test locations were established by tape measurement from the building corner locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the excavation backfill soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B5:\97-9036a.02

cc: Virogroup, Inc. - John W. Bale, P.E.

1728 Commerce Drive 33834 • Post Office Box 706 Bartow, Florida 33831 Phone (941) 533-0858 FAX (941) 533-7325
Offices in Bartow, Jacksonville, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

FILE NO.: 97-9036A **DATE:** 4/25/97
REVISED: 7/28/97

CLIENT: SEMCO CONSTRUCTION

REPORT NO. 2 **PAGE NO.:** 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	63' E & 51' N of SW Corner of Building	4/08	1	109.7	5.5	GR -5.0	98.9
2	SAME LOCATION	4/08	1	107.9	8.0	GR -4.0	97.3
3	SAME LOCATION	4/08	1	109.4	8.2	GR -3.0	98.6
4	SAME LOCATION	4/08	1	108.8	9.0	GR -2.0	98.1
5	SAME LOCATION	4/08	1	107.5	5.0	GR -1.0	96.9

* IN-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

FIELD TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D 1557	110.9	PCF @	10.7%

GR = GRADE

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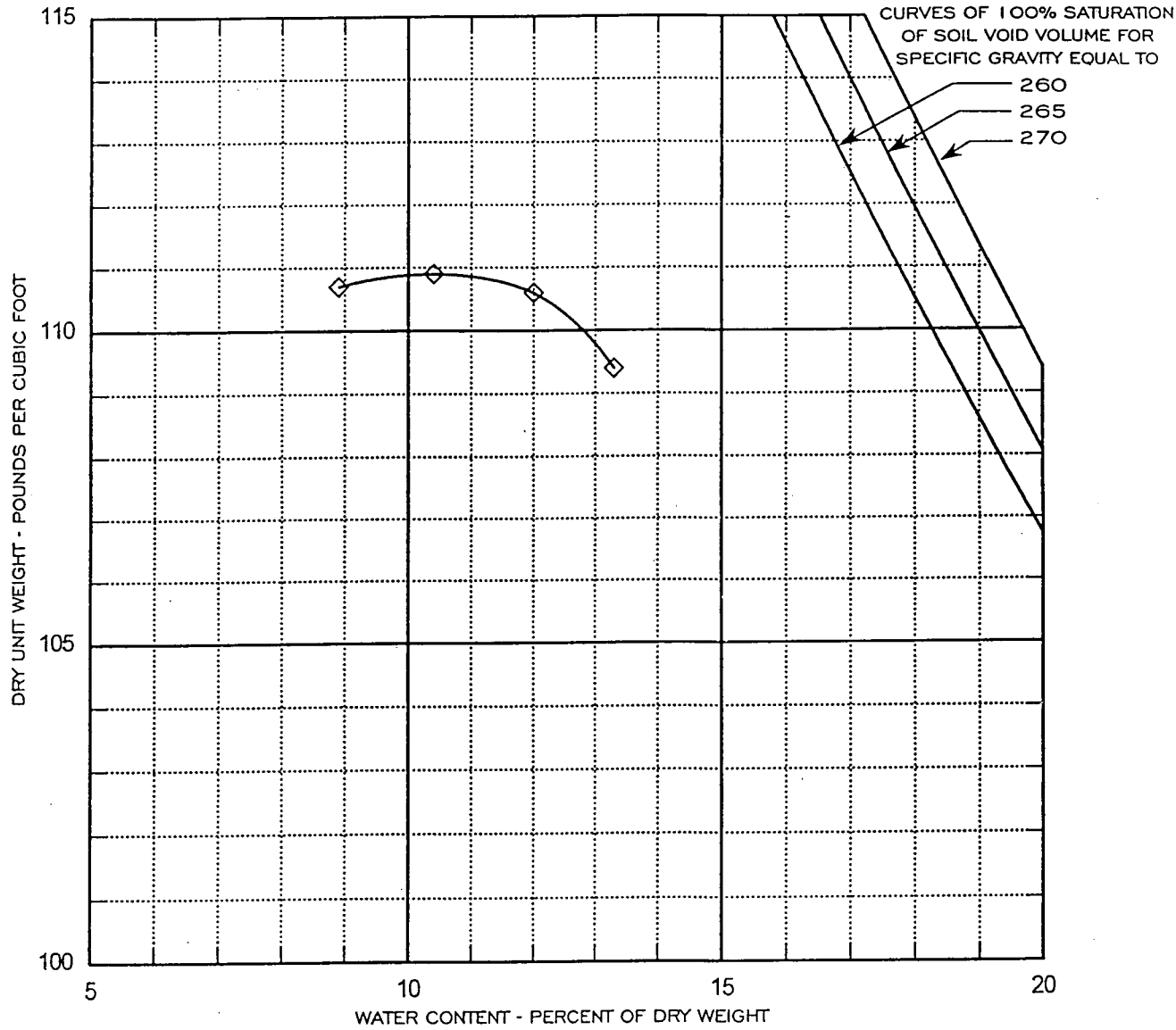
MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT

CURVE IDENTIFICATION

◇ MDR 1 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY: KH	CHECKED BY: PRM	DATE: 4/16/97
FILE NO. 97-0038A	APPROVED BY:	FIGURE NO. 1

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

Revised July 28, 1997
April 18, 1997
File Number 97-9036A

Mr. Carl Locke, Jr.
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results, Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 3

Gentlemen:

As requested by you, on April 9 and 10, 1997 we performed field in-place density tests (ASTM D 2937) on the foundation subgrade soils at the subject project. Page 1 presents the test locations and results. The field density tests were correlated to the maximum density of the foundation subgrade soils as determined by a Modified Proctor test (ASTM D1557) on a representative sample. Figure No. 1 presents a graphic representation of the moisture-density relationship.

Based on these test results, the foundation subgrade soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per the revised project specifications, except where noted.

The test locations were established by tape measurement from the building corner locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the foundation subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best

C. Alan Best
Technical Services Manager

P. Rodney Mank

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B5:\97-9036a\ipd.03

cc: **Virogroup, Inc. - John W. Bale, P.E.**

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

FILE NO.: 97-9036A **DATE:** 4/18/97
REVISED: 7/28/97

CLIENT: SEMCO CONSTRUCTION

REPORT NO. 3 **PAGE NO.:** 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	69' E of NW Corner of Building	4/09	1	101.1	7.0	BOF -4.0	91.2*
2	21' E of NW Corner of Building	4/09	1	103.6	4.0	BOF -4.0	93.4*
3	27' S of NW Corner of Building	4/09	1	103.7	6.0	BOF -4.0	93.5*
4	Retest of Test #1	4/09	1	105.4	6.5	BOF -4.0	95.1
5	Retest of Tets #2	4/09	1	106.8	2.5	BOF -4.0	96.3
6	Retest of Test #3	4/09	1	108.6	5.0	BOF -4.0	97.9
7	20' N of Column Line A3	4/09	1	107.5	8.9	BOF -4.0	96.9
8	10' E of Column Line A4	4/09	1	105.8	9.0	BOF -4.0	95.4
9	Column Line G4	4/10	2	105.5	4.4	BOF -3.0	99.1
10	Column Line G1	4/10	2	103.7	2.8	BOF -3.0	97.3
11	3' E of Column Line B1	4/10	2	109.2	5.8	BOF -3.0	100+
12	10' W of Column Line B3	4/10	2	108.9	6.0	BOF -3.0	100+
13	10' E of Column Line A3	4/10	2	104.8	3.0	BOF -3.0	98.4

* IN-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

FIELD TEST METHOD: ASTM D 2937 ✔ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D 1557	110.9	PCF @	10.7%
2	ASTM D 1557	106.5	PCF @	12.2%

BOF = BOTTOM OF FOOTING

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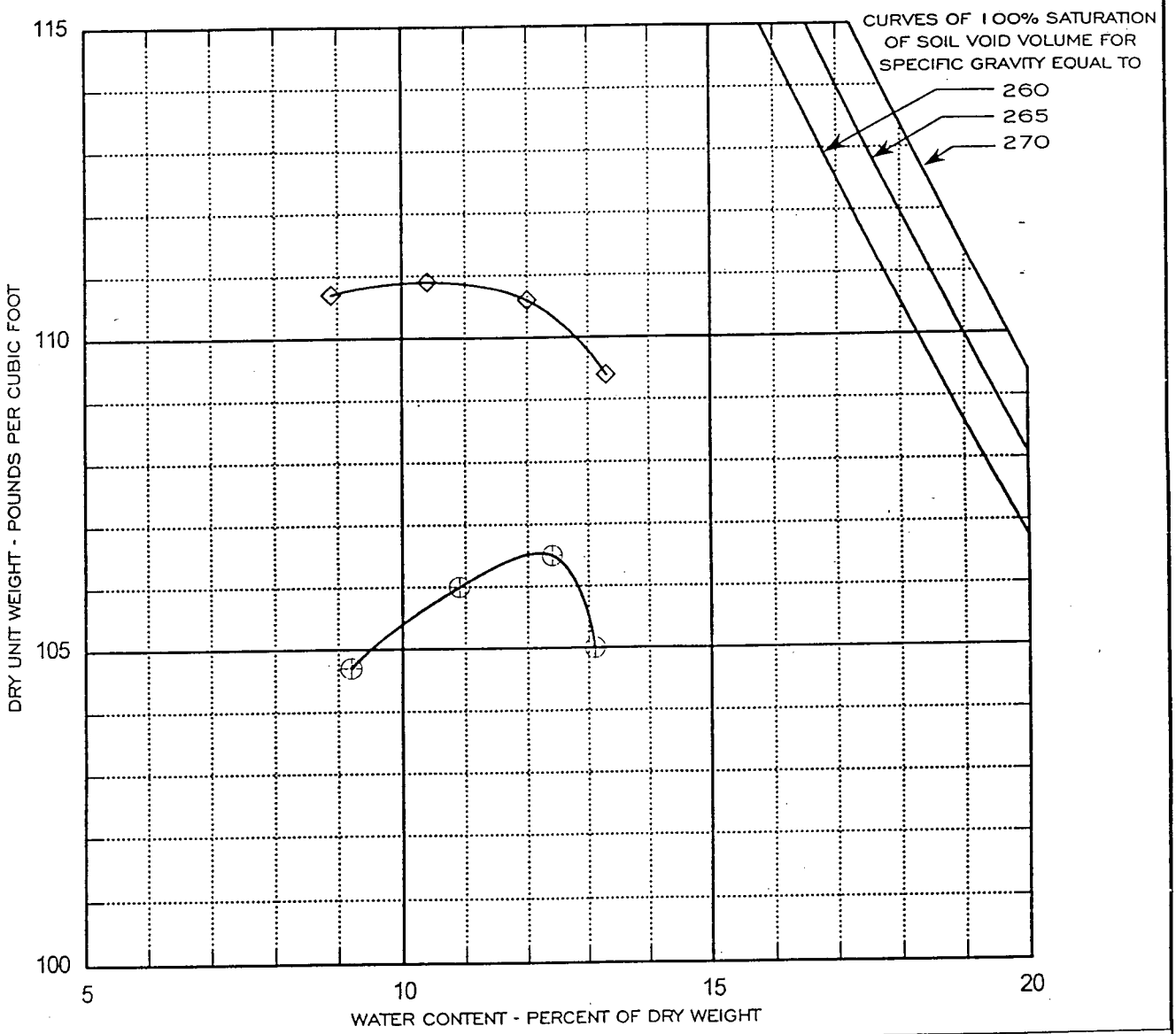
MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT
2	4/07/97	ASTM D1557	106.5	12.2	WHITE SAND WITH SILT

CURVE IDENTIFICATION

◇ MDR 1 DATA CURVE

⊕ MDR 2 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY: KH	CHECKED BY: PRM	DATE: 4/16/97
FILE NO. 97-9036A	APPROVED BY:	FIGURE NO. 1

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Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

April 23, 1997
File Number 97-9036A

Mr. Carl Locke, Jr.
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results, Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 4

Gentlemen:

As requested by you, from April 11 through April 21, 1997 we performed field in-place density tests (ASTM D 2937) on the foundation subgrade soils at the subject project. Page 1 presents the test locations and results. The field density tests were correlated to the maximum density of the foundation subgrade soils as determined by a Modified Proctor test (ASTM D1557) on a representative sample. Figure No. 1 presents a graphic representation of the moisture-density relationship.

Based on these test results, the foundation subgrade soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the building corner locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the foundation subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best

C. Alan Best
Technical Services Manager

P. Rodney Mank 4/24/97

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
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Offices in Bartow, Orlando, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

FILE NO.: 97-9036A DATE: 4/25/97

CLIENT: SEMCO CONSTRUCTION

REPORT NO. 4 PAGE NO.: 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	54' E of NW Corner of Building	4/11	2	104.3	3.3	BOF -2.0	97.9
2	4' E of NW Corner of Building	4/11	2	103.0	3.7	BOF -2.0	96.5
3	12' E & 33' S of NW Corner Building	4/11	2	104.4	6.8	BOF -2.0	98.0
4	39' N of SW Corner of Building	4/11	2	102.0	6.6	BOF -2.0	95.8
5	15' N of SW corner of Building	4/11	2	101.4	3.1	BOF -3.0	95.2
6	Same Location	4/11	2	101.2	3.3	BOF -2.0	95.1
7	50' W of NE Corner of Building	4/16	3	103.8	11.4	BOF -3.5	98.5
8	3' S of NE Corner of Building	4/16	3	100.9	7.5	BOF -3.5	95.7
9	33' S & 10' W of NE Corner of Building	4/16	3	104.2	13.4	BOF -3.5	98.9
10	26' S of NW Corner of Building	4/16	2	104.1	5.3	BOF -1.0	97.7
11	24' E of NW Corner of Building	4/16	2	101.8	5.5	BOF -1.0	95.6
12	74' E of NW Corner of Building	4/16	2	104.2	4.8	BOF -1.0	97.8
13	10' E & 33' S of NW Corner of Building	4/16	2	105.3	6.4	BOF -1.0	98.9
14	20' N of SW Corner of Building	4/16	2	105.6	3.5	BOF - 1.0	99.1
15	21' W of SE Corner of Building	4/17	1	107.8	13.3	BOF -3.5	97.2
16	30' N of SE Corner of Building	4/17	3	113.3	14.4	BOF -3.5	100+
17	32' S & 21' W of NE Corner of Building	4/17	2	102.3	6.4	BOF -2.0	96.1
18	10' S of NE Corner of Building	4/17	2	102.1	5.0	BOF -2.0	95.7
19	39' W of NE Corner of Building	4/17	2	108.2	7.9	BOF -2.0	100+
20	45' W of NECorner of Building	4/18	2	103.6	7.5	BOF -2.0	97.2
21	10' S of NE Corner of Building	4/18	2	104.2	9.6	BOF -2.0	97.9
22	36' S & 27' W of NE Corner of Building	4/18	2	102.6	5.5	BOF -2.0	96.3
23	24' N of SE Corner of Building	4/18	2	105.9	5.7	BOF -2.0	99.5
24	27' W of SE Corner of Building	4/18	2	101.4	8.7	BOF -2.0	95.2
25	51' E of SW Corner of Building	4/18	2	103.6	5.7	BOF -2.0	97.3
26	62' W of NE Corner of Building	4/21	2	102.5	5.5	BOF -1.0	96.2
27	12' W of NECorner of Building	4/21	2	109.2	4.8	BOF -1.0	100+
28	33' S of NE Corner of Building	4/21	2	105.9	8.0	BOF -1.0	99.5
29	50' N of SE Corner of Building	4/21	2	101.3	4.4	BOF -1.0	95.1
30	SE Corner of Building	4/21	2	102.8	6.6	BOF -1.0	96.5
31	50' W of SE Corner of Building	4/21	2	102.5	5.0	BOF -1.0	96.2

* IN-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

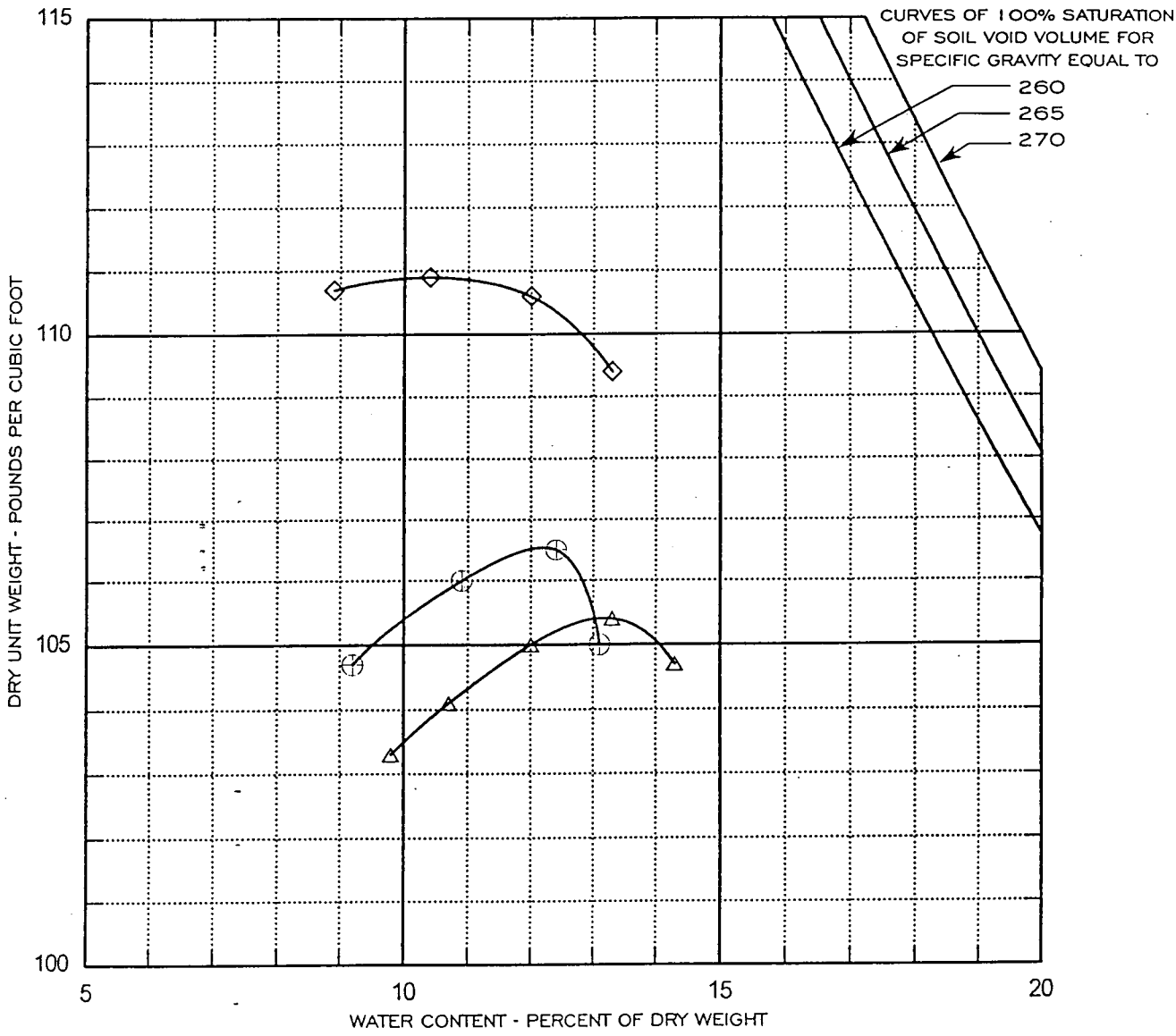
FIELD TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D 1557	110.9	PCF @	10.7%
2	ASTM D 1557	106.5	PCF @	12.2%
3	ASTM D 1557	105.4	PCF @	13.3%

BOF = BOTTOM OF FOOTING

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF THE CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT
2	4/07/97	ASTM D1557	106.5	12.2	WHITE SAND WITH SILT
3	4/16/97	ASTM D1557	105.4	13.3	WHITE TO LIGHT GRAY SAND WITH SILT & SMALL ROOTS

CURVE IDENTIFICATION

- ◇ MDR 1 DATA CURVE
- ⊕ MDR 2 DATA CURVE
- △ MDR 3 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY KH	CHECKED BY PRM	DATE 4/23/97
FILE NO. 97-0036A	APPROVED BY PRM	FIGURE NO. 1

ORF4WIN/B:/97-0036A/02.GRF

Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

Revised: August 21, 1997
May 23, 1997
File Number 97-51-9036A

Mr. Carl Locke, Jr.
SEMCO Construction
P.O. Box 706
Bartow, FL 33830

Subject: Field In-Place Density Test Results, Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Polk County, Florida

REPORT NUMBER 5

Gentlemen:

As requested by you, on April 24 through May 1, 1997, we performed field in-place density tests (ASTM D 2937) on the natural ground and foundation subgrade soils at the subject project. Pages 1 and 2 present the test locations and results. The field density tests were compared to the maximum density of the natural ground and foundation subgrade soils as determined by a Modified Proctor test (ASTM D 1557) on representative soil samples. Figure No. 1 presents a graphic representation of the moisture-density relationships.

Based on these test results, the natural ground and foundation subgrade soils meet the specified degree of compaction (**95** percent Modified Proctor) at the tested location as per project specifications, except where noted.

The test locations were established by tape measurement from building corner locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the natural ground and foundation subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:tc
Enclosures
B5\QC REPORTS\97-9036a.5

CC: Virogroup, Inc. - Mr. John W. Bale, P.E.

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

FILE NO.: 97-9036A

DATE: 5/23/97
REVISED: 8/21/97

CLIENT: SEMCO CONSTRUCTION

REPORT NO. 5

PAGE NO.: 1 of 2

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	10' N & 15' E OF SW CORNER OF BUILDING	4/24	1	111.4	6.8	NG -1.0	100+
2	SAME LOCATION	4/24	1	100.2	6.4	NG -2.0	90.4*
3	15' N & 10' N OF SE CORNER OF BUILDING	4/24	1	105.9	4.8	NG -1.0	95.5
4	RETEST OF #2	4/24	1	104.9	6.4	NG -2.0	94.5*
5	RETEST OF #4	4/24	1	105.6	6.4	NG -2.0	95.7
6	SAME LOCATION	4/24	1	106.5	7.5	NG -2.0	96.1
7	10' S & 25' E OF NW CORNER OF BUILDING	4/24	1	107.4	8.2	NG -1.0	96.9
8	SAME LOCATION	4/24	1	106.6	5.3	NG -2.0	96.1
9	15' S & 20' W OF NE CORNER OF BUILDING	4/24	1	105.3	9.6	NG -1.0	95.0
10	SAME LOCATION	4/24	1	114.4	3.3	NG -2.0	100+
11	45' N & 24' W OF SE CORNER OF BUILDING	4/25	1	105.6	5.9	NG -1.0	95.2
12	SAME LOCATION	4/25	1	105.7	3.6	NG -2.0	95.4
13	46' N & 20' E OF SW CORNER OF BUILDING	4/25	1	109.3	6.7	NG -1.0	98.6
[illegible]	SAME LOCATION	4/25	1	105.3	6.4	NG -2.0	95.0
15	EAST TRUCK LOADING PAD, SOUTH COLUMN PAD	4/25	2	108.9	12.9	BOF -3.5	100+
16	SAME LOCATION	4/25	2	106.2	11.4	BOF -3.5	99.8
17	EAST EAST TRUCK LOADING PAD, NORTH COLUMN PAD	4/25	2	104.9	15.7	BOF -3.5	98.5
18	40' E & 12' N OF SE CORNER OF BUILDING, CANOPY COLUMN PAD	4/29	2	109.7	12.4	BOF -1.0	100+
19	SAME LOCATION	4/29	2	107.7	12.1	BOF -2.0	100+
20	40' E & 12' N OF SE CORNER OF BUILDING, CANOPY COLUMN PAD	4/29	2	108.2	14.9	BOF -3.0	100+
21	SAME LOCATION	4/29	2	106.3	6.2	BOF -1.0	99.8
22	40' E & 51' N OF SE CORNER OF BUILDING, CANOPY COLUMN PAD	4/29	2	103.8	6.8	BOF -2.0	97.5
23	SAME LOCATION	4/29	2	104.1	17.5	BOF -3.0	97.7
24	40' E & 31' N OF SE CORNER OF BUILDING, CANOPY COLUMN PAD	4/29	2	109.1	8.8	BOF -1.5	100+
25	SAME LOCATION	4/29	2	110.3	9.5	BOF -2.5	100+
26	SAME LOCATION	4/29	2	102.6	14.5	BOF -3.5	96.4
27	12' N & 2' E OF SE CORNER OF BLDG @ FORK LIFT RAMP FOOTINGS	4/30	2	106.7	13.9	BOF -3.0	100+
28	16' N & 12' E OF SE CORNER OF BLDG @ FORKLIFT RAMP FOOTINGS	4/30	1	106.3	21.7	BOF -3.0	95.8
29	42' N & 12' E OF SE CORNER OF BLDG @ FORKLIFT RAMP FOOTINGS	4/30	3	109.5	18.2	BOF -3.0	100+

* IN-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

FIELD TEST METHOD: ASTM D 2937 ✔ ASTM D 2922 ____ ASTM D 2167 ____ ASTM D 1556 ____

[illegible]	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D1557	110.9	PCF @	10.7%
2	ASTM D1557	106.5	PCF @	12.2%
3	ASTM D1557	105.4	PCF @	13.3%

NG = NATURAL GROUND
BOF - BOTTOM OF FOOTING

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF THE CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

CIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

FILE NO.: 97-9036A

DATE: 5/23/97
REVISED: 7/23/97

CLIENT: SEMCO CONSTRUCTION

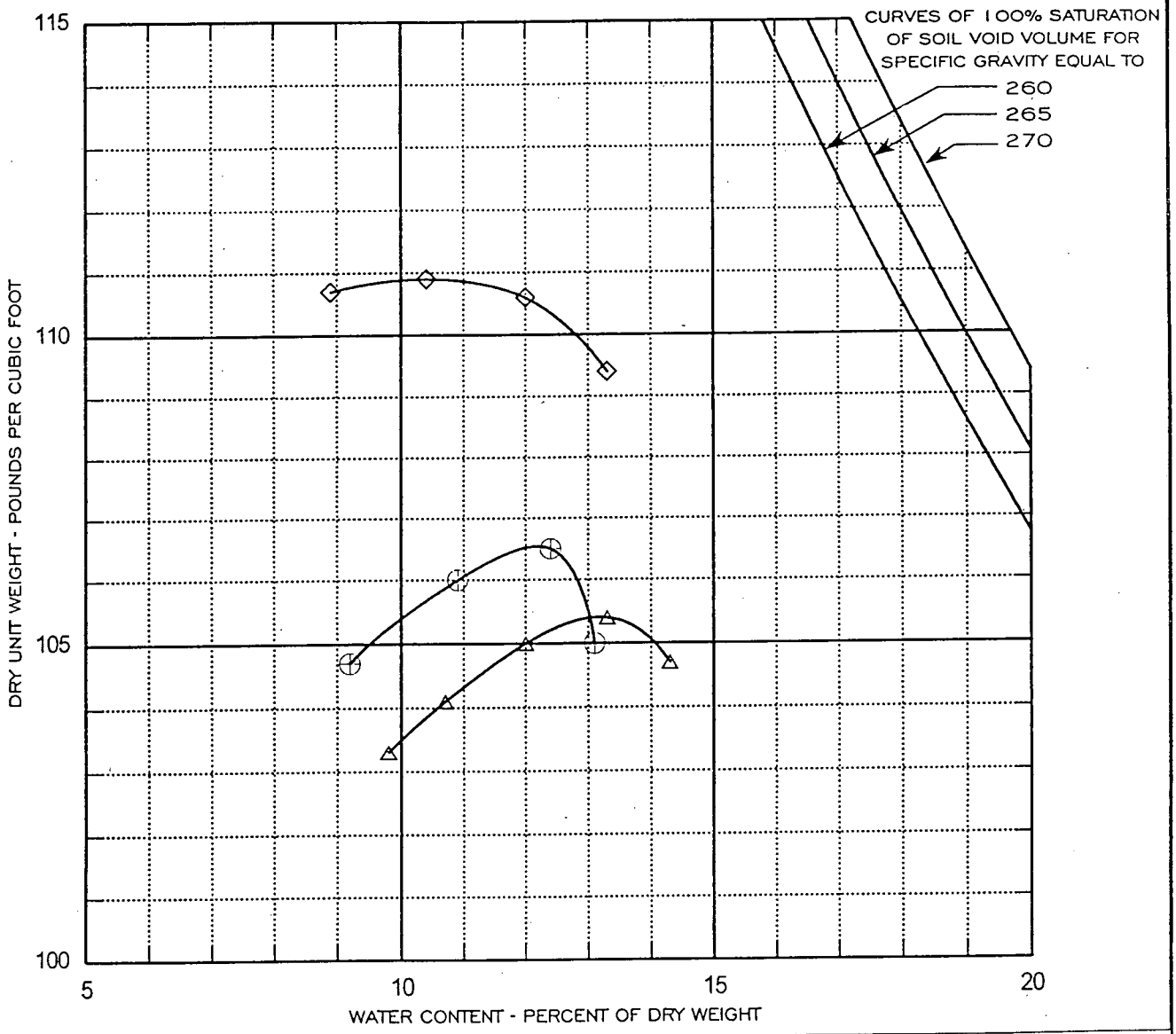
REPORT NO. 5

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%
30	12' N & 2' E OF SE CORNER OF BLDG @ FORKLIFT RAMP FOOTINGS	4/30	2	105.2	5.5	BOF -2.0	98.8
31	16' N & 12' E OF SE CORNER OF BLDG @ FORKLIFT RAMP FOOTINGS	4/30	2	108.2	8.1	BOF -2.0	100+
32	42' N & 12' E OF SE CORNER OF BLDG @ FORKLIFT RAMP FOOTINGS	4/30	2	103.7	7.7	BOF -2.0	97.4
33	12' N & 2' E OF SE CORNER OF BLDG @ FORKLIFT RAMP FOOTINGS	5/01	2	103.9	6.9	BOF -1.0	97.6
34	16' N & 12' E OF SE CORNER OF BLDG @ FORKLIFT RAMP FOOTINGS	5/01	2	105.4	5.8	BOF -1.0	99.0
35	42' N & 12' E OF SE CORNER OF BLDG @ FORKLIFT RAMP FOOTINGS	5/01	2	107.2	6.8	BOF -1.0	100+

* IN-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF THE CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT
2	4/07/97	ASTM D1557	106.5	12.2	WHITE SAND WITH SILT
3	4/16/97	ASTM D1557	105.4	13.3	WHITE TO LIGHT GRAY SAND WITH SILT & SMALL ROOTS

CURVE IDENTIFICATION

◇ MDR 1 DATA CURVE

⊕ MDR 2 DATA CURVE

△ MDR 3 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY KH	CHECKED BY PRM	DATE 4/23/97
FILE NO. 97-9036A	APPROVED BY PRM	FIGURE NO. 1

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Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

Revised July 28, 1997
July 15, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results
Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 6

Gentlemen:

As requested by you, from June 19 through June 24, 1997 we performed field in-place density tests (ASTM D 2937) on the floor slab subgrade soils at the subject project. Page 1 presents the test locations and results. The field density tests were compared to the maximum density of the floor slab subgrade soils as determined by a Modified Proctor test (ASTM D 1557) on a representative sample. Figure No. 1 presents a graphic representation of the moisture-density relationship.

Based on these test results, the floor slab subgrade soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the building corner locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the floor slab subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B10\97-9036A.06

cc: Viro Group, Inc., Mr. John Bale, P.E.

1525 Centennial Drive (33830), Post Office Box 812, Bartow, Florida 33831 Phone (941) 533-0858 FAX (941) 533-7325
Offices in: Bartow, Cocoa, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIR BASE, BARTOW, FLORIDA

FILE: 97-9036A DATE: 7/28/97

CLIENT: SEMCO CONSTRUCTION

REPORT: 6 PAGE NO.: 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	28' W & 15' N OF SE CORNER OF BUILDING	6/19	3	107.2	8.3	FS -3.5	100+
2	28' W & 60' N OF SE CORNER OF BUILDING	6/19	3	104.1	7.3	FS -3.5	98.8
3	12' S & 12' W OF NE CORNER OF BUILDING	6/19	3	105.4	6.6	FS -3.5	100
4	18' W & 18' N OF SE CORNER OF BUILDING	6/19	3	102.6	9.3	FS -2.5	97.3
5	18' W & 51' N OF SE CORNER OF BUILDING	6/19	3	103.8	6.7	FS -2.5	98.5
6	26' W & 21' S OF NE CORNER OF BUILDING	6/19	3	105.9	9.6	FS -2.5	100+
7	1' N & 25' W OF SE CORNER OF BUILDING	6/23	2	99.7	4.2	FS -0.5	93.6*
8	32' S & 35' W O F NE CORNER OF BUILDING	6/23	2	102.9	8.8	FS -0.5	96.6
9	25' S & 42' W OF NE CORNER OF BUILDING	6/23	2	104.3	7.4	FS -0.5	98.0
10	1' N & 25' W OF SE CORNER OF BUILDING	6/23	2	98.9	5.5	FS -1.5	92.9*
11	32' S & 35' W O F NE CORNER OF BUILDING	6/23	2	102.4	6.3	FS -1.5	96.2
12	25' S & 42' W OF NE CORNER OF BUILDING	6/23	2	108.8	4.4	FS -1.5	100+
13	RETEST OF TEST #7	6/24	2	103.8	7.1	FS - 0.5	97.5
	RETEST OF TEST #10	6/24	2	101.6	7.5	FS - 1.5	95.4
16							
17							
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N-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

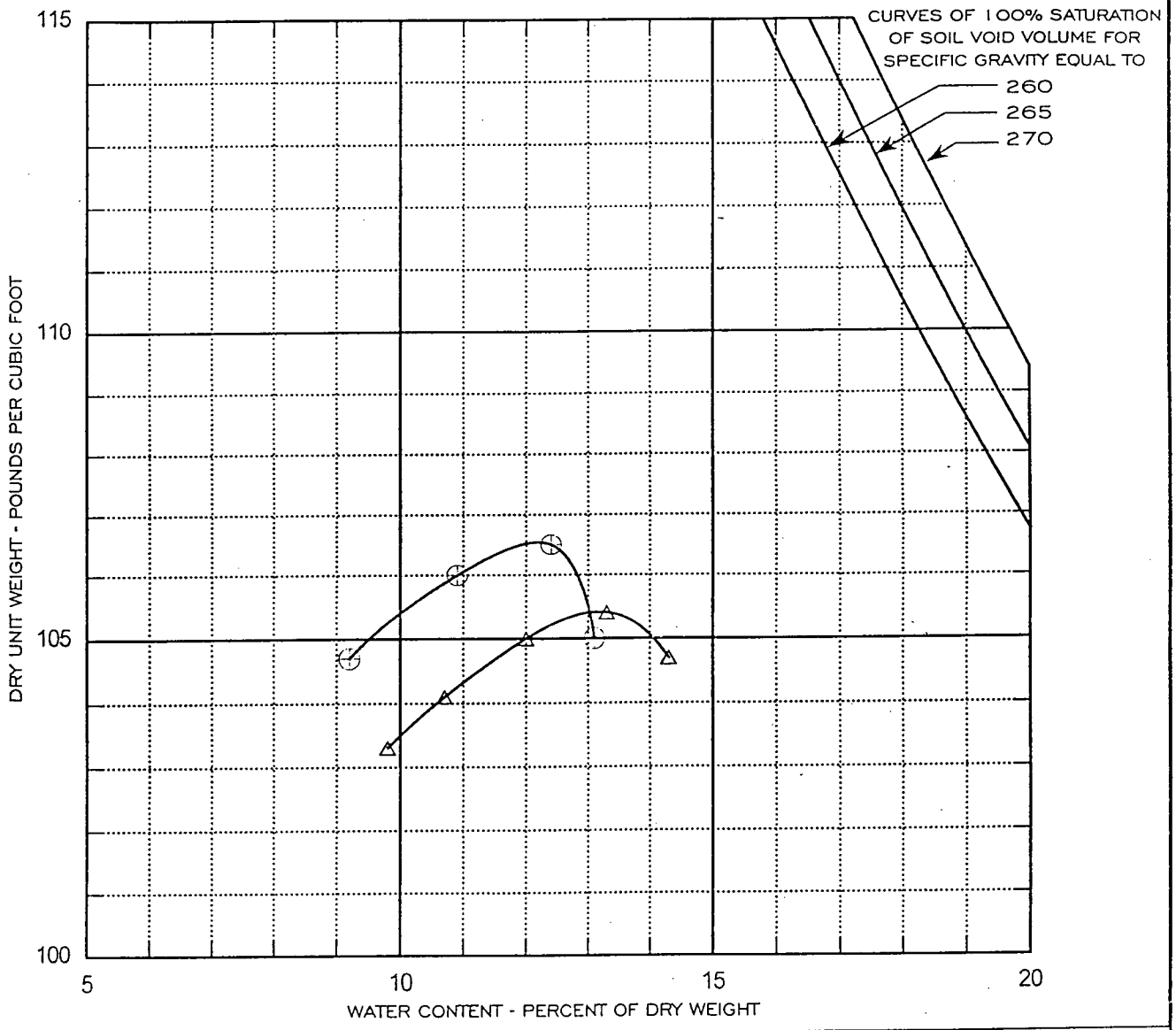
D TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
2	ASTM D 1557	106.5	@ PCF	12.2%
3	ASTM D1557	105.4	@ PCF	13.3%

FS = FLOOR SLAB SUBGRADE

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF THE CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
2	4/07/97	ASTM D1557	106.5	12.2	WHITE SAND WITH SILT
3	4/16/97	ASTM D1557	105.4	13.3	WHITE TO LIGHT GRAY SAND WITH SILT & SMALL ROOTS

CURVE IDENTIFICATION

⊕ MDR 2 DATA CURVE

△ MDR 3 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY: KH	CHECKED BY: PRM	DATE: 7/15/97
FILE NO: 97-9036A	APPROVED BY:	FIGURE NO. 1

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Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

July 17, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results
Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 7

Gentlemen:

As requested by you, from June 26 through July 9, 1997 Ardaman and Associates, Inc. performed field in-place density tests (ASTM D 2937) on the subgrade fill and floor slab subgrade soils at the subject project. Page 1 presents the test locations and results. The field density tests were compared to the maximum density of the subgrade fill and floor slab subgrade soils as determined by a Modified Proctor test (ASTM D 1557) on a representative sample. Figure No. 1 presents a graphic representation of the moisture-density relationship.

Based on these test results, the subgrade fill and floor slab subgrade soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the building corner locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the subgrade fill and floor slab subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best

C. Alan Best
Technical Services Manager

P. Rodney Mank 7/17/97

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B10\97-9036A.7

cc: Viro Group, Inc., Mr. John Bale, P.E.

1525 Centennial Drive (33830), Post Office Box 812, Bartow, Florida 33831 Phone (941) 533-0858 FAX (941) 533-7325
Offices in: Fort St. Lucie, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIR BASE, BARTOW, FLORIDA

FILE: 97-9036A DATE: 7/17/97

CLIENT: SEMCO CONSTRUCTION

REPORT: 7 PAGE NO.: 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	25' N & 65' E OF SW CORNER OF BUILDING	6/26	2	106.4	11.9	FS -3.5	99.9
2	50' N & 25' E OF SW CORNER OF BUILDING	6/26	2	107.1	7.8	FS -3.5	100+
3	10' S & 45' E OF NW CORNER OF BUILDING	6/26	2	105.9	5.9	FS -3.5	100+
4	10' S & 1' E OF NW CORNER OF BUILDING	6/30	2	107.8	5.7	FS -3.5	100+
5	30' S & 60' E OF NW CORNER OF BUILDING	6/30	2	105.3	6.2	FS -2.5	98.9
6	15' N & 55' E OF SW CORNER OF BUILDING	6/30	2	103.3	6.2	FS -2.5	96.9
7	FOUNDATION PAD, COLUMN LINE #1, PIER B	7/01	1	110.3	7.3	BOF -3.5	99.5
8	SAME LOCATION	7/01	2	105.8	6.4	BOF -2.5	99.3
9	FOUNDATION PAD, COLUMN LINE #1, PIER C	7/01	2	103.3	6.8	BOF -2.5	96.9
10	SAME LOCATION	7/01	1	111.4	10.4	BOF -3.5	100+
11	FOUNDATION PAD, COLUMN LINE #1, PIER D	7/01	1	112.6	9.7	BOF -2.5	100+
12	SAME LOCATION	7/01	1	110.9	11.4	BOF -3.5	100+
13	FOUNDATION PAD, COLUMN LINE #1, PIER B	7/01	2	104.1	3.9	BOF -0.5	97.7
[illegible]	FOUNDATION PAD, COLUMN LINE #1, PIER C	7/01	1	113.8	6.9	BOF -0.5	100+
[illegible]	FOUNDATION PAD, COLUMN LINE #1, PIER B	7/01	2	104.9	4.4	BOF -1.5	98.5
16	FOUNDATION PAD, COLUMN LINE #1, PIER C	7/01	1	107.5	7.1	BOF -1.5	96.9
17	FOUNDATION PAD, COLUMN LINE #1, PIER D	7/01	2	104.8	3.9	BOF -0.5	98.4
18	SAME LOCATION	7/01	2	102.4	7.2	BOF -1.5	96.2
19	1' N & 25' E OF SW CORNER OF BUILDING (WEST WING)	7/02	2	106.5	7.3	FS -1.5	100
20	1' S & 65' E OF NW CORNER OF BUILDING	7/02	2	104.7	4.2	FS -1.5	98.3
21	30' N & 30' E OF SW CORNER OF BUILDING	7/02	2	106.4	6.8	FS -2.5	99.9
22	15' E & 18' S OF NW CORNER OF BUILDING	7/09	3	104.7	6.0	FS -0.5	99.4
23	SAME LOCATION	7/09	3	104.5	7.2	FS -1.5	99.2
24	75' E & 15' N OF SW CORNER OF BUILDING	7/09	3	103.7	5.8	FS -0.5	98.4
25	75' E & 40' N OF SW CORNER OF BUILDING	7/09	3	104.1	7.5	FS -0.5	98.8
26	75' E & 75' N OF SW CORNER OF BUILDING	7/09	3	104.2	6.0	FS -0.5	98.9
27	9' W & 9' N OF SE CORNER OF BUILDING	7/09	3	104.0	4.5	FS -0.5	98.7
28							
29							
30							

* IN-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

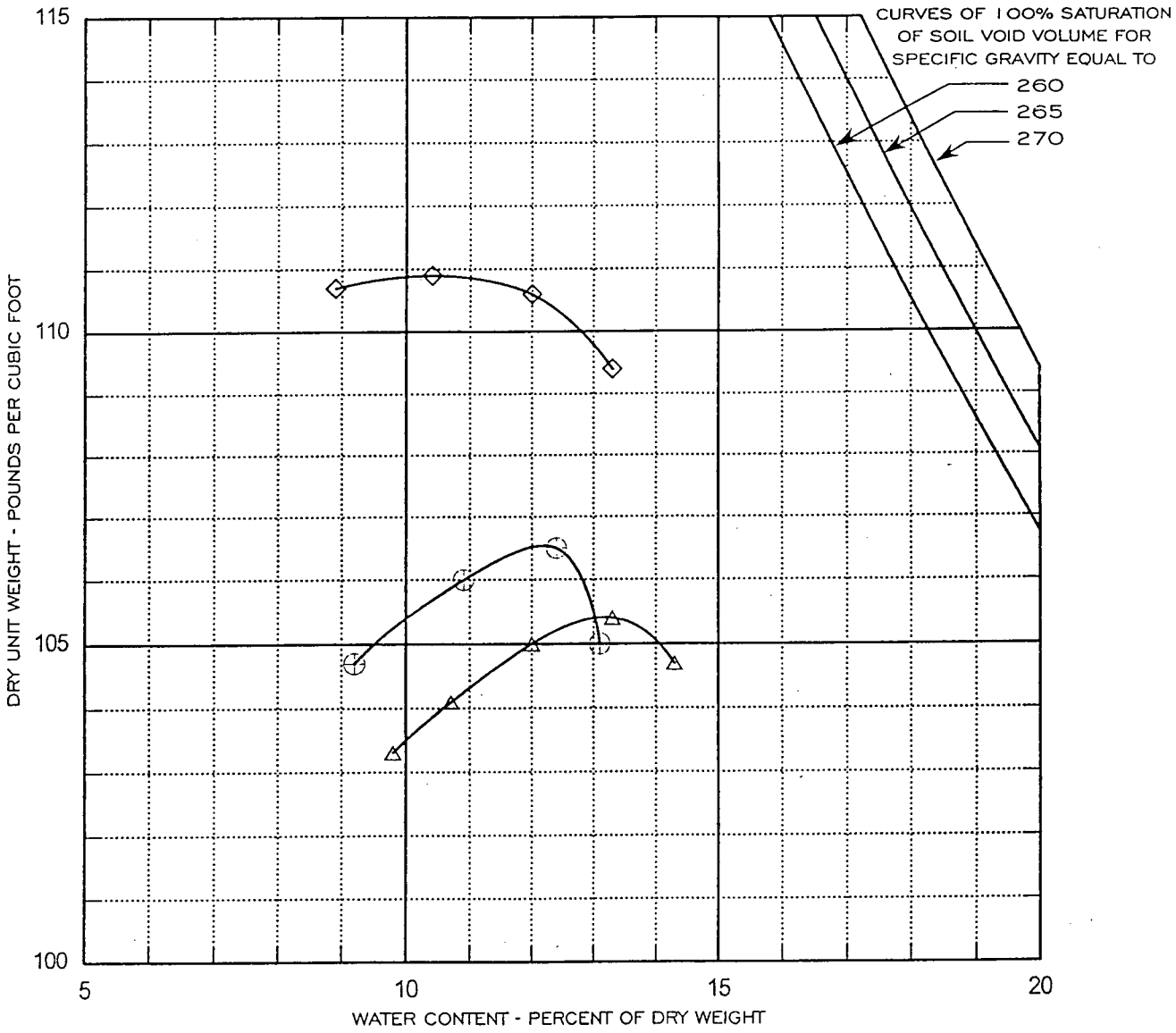
[illegible]D TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

[illegible]	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D 1557	110.9	@ PCF	10.7%
2	ASTM D 1557	106.5	@ PCF	12.2%
3	ASTM D1557	105.4	@ PCF	13.3%

FS = FLOOR SLAB SUBGRADE
BOF = BOTTOM OF FOUNDATION

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF THE CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT
2	4/07/97	ASTM D1557	106.5	12.2	WHITE SAND WITH SILT
3	4/16/97	ASTM D1557	105.4	13.3	WHITE TO LIGHT GRAY SAND WITH SILT & SMALL ROOTS

CURVE IDENTIFICATION

- ◇ MDR 1 DATA CURVE
- ⊕ MDR 2 DATA CURVE
- △ MDR 3 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY: KH	CHECKED BY: PRM	DATE: 4/23/97
FILE NO. 97-9036A	APPROVED BY:	FIGURE NO. 1

GRF4WIN/B:/97-9036A/02.GRF

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

Revised August 1, 1997
July 31, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results
Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 9

Gentlemen:

As requested by you, from July 10 and July 17, 1997 we performed field in-place density tests (ASTM D 2937) on the floor slab subgrade soils at the subject project. Page 1 presents the test locations and results. The field density tests were compared to the maximum density of the floor slab subgrade soils as determined by a Modified Proctor test (ASTM D 1557) on a representative sample. Figure 1 presents a graphic representation of the moisture-density relationship.

Based on these test results, the floor slab subgrade soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the building corner locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the floor slab subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B12\97-9036A.09

cc: Viro Group, Inc., Mr. John Bale, P.E.

Bartow, Florida 33831 Phone (941) 533-0658 FAX (941) 533-7325
Sarasota, Tallahassee, Lutz, W. Palm Beach

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIR BASE, BARTOW, FLORIDA

FILE: 97-9036A

DATE: 7/31/97
REVISED: 8/01/97

CLIENT: SEMCO CONSTRUCTION

REPORT: 9

PAGE NO.: 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	6' S OF NORTH END OF EAST RAMP, ON CENTERLINE	7/10	4	110.0	7.3	FS -1.0	92.0*
2	SAME LOCATION	7/10	4	108.9	8.1	FS -3.0	91.0*
3	21' S OF NORTH END OF EAST RAMP, ON CENTERLINE	7/10	4	110.6	9.6	FS -0.5	92.4*
4	RETEST OF TEST #1	7/17	4	113.4	7.3	FS -1.0	94.7*
5	RETEST OF TEST #2	7/17	4	108.9	8.1	FS -3.0	91.0*
6	RETEST OF TEST #3	7/17	4	114.1	7.2	FS -0.5	95.3

* DENOTES DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

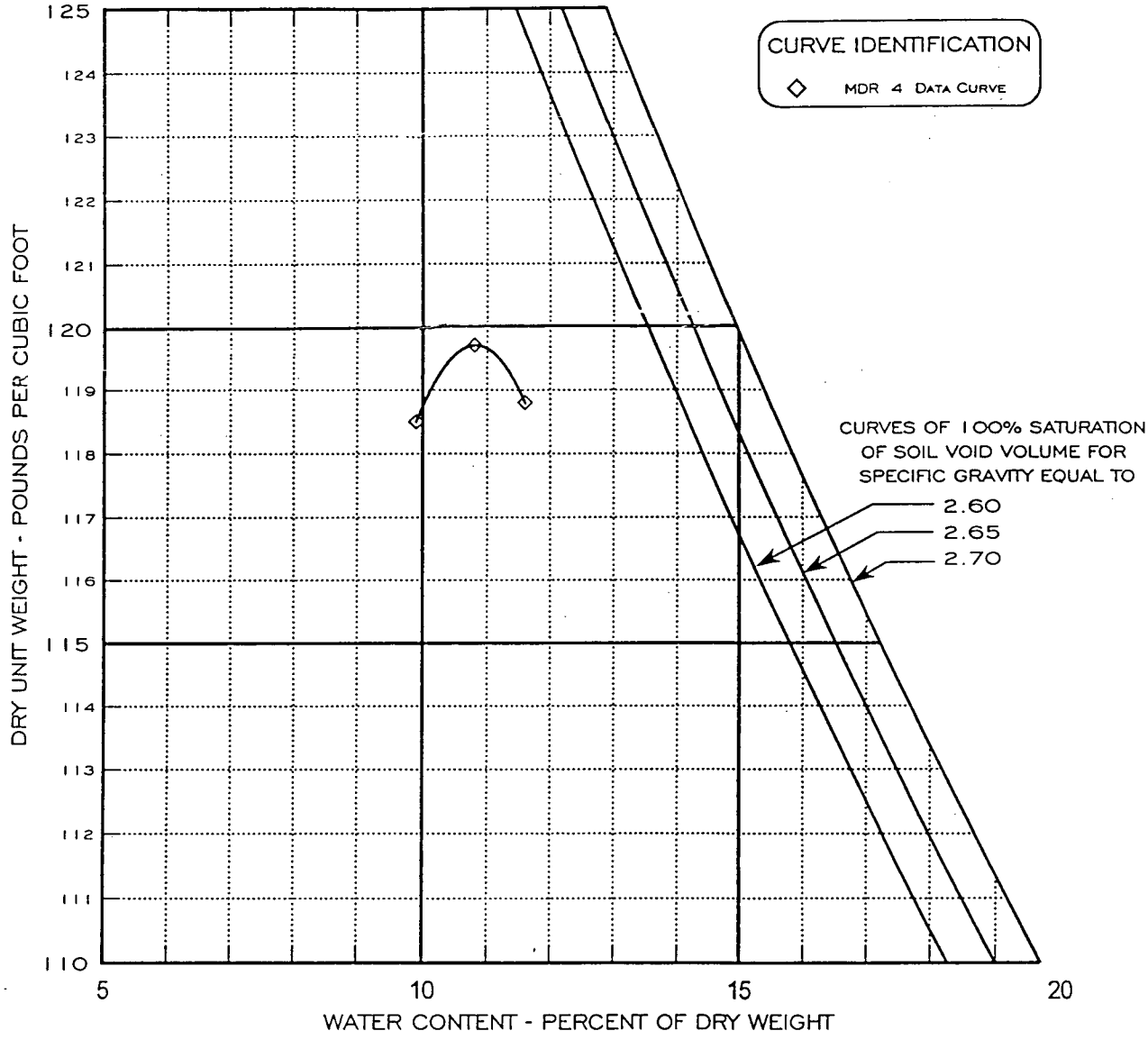
FIELD TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
4	ASTM D 1557	119.7	@ PCF	11.0%

FS = FLOOR SLAB SUBGRADE

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF THE CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
4	7/10/97	ASTM D 1557	119.7	11.0	YELLOWISH SILTY SLIGHTLY CLAYEY SAND

GRF4WIN/B5:97-9036A.03

Ardaman & Associates, Inc.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FLORIDA

DRAWN BY: KRH	CHECKED BY: PRM	DATE: 7/30/97
FILE NO. 97-9036A	APPROVED BY:	FIGURE NO 1

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

September 8, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results
Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 10

Gentlemen:

As requested by you, on August 6, 1997 we performed field in-place density tests (ASTM D 2937) on the subgrade soils for the fork lift ramp at the subject project. Page 1 presents the test locations and results. The field density tests were compared to the maximum density of the ramp slab subgrade soils as determined by a Modified Proctor test (ASTM D 1557) on a representative sample. Figure 1 presents a graphic representation of the moisture-density relationship.

Based on these test results, the ramp slab subgrade soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the ramp slab corner as located locations by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the floor slab subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E. 9/15/97
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B14\97-9036A.10

cc: Viro Group, Inc., Mr. John Bale, P.E.

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIR BASE, BARTOW, FLORIDA

FILE: 97-9036A DATE: 9/05/97

CLIENT: SEMCO CONSTRUCTION

REPORT: 10 PAGE NO.: 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	RETEST OF TEST #4, REPORT #9 6' S OF NORTH END OF EAST RAMP, ON CENTERLINE	8/06	4	119.7	9.4	FS - 1.0	100
2	3' N & 4.5' W OF SE CORNER OF RAMP, EAST END	8/06	4	115.7	11.8	FS - 0.6	96.7
3	RETEST OF TEST #5, REPORT #9 6' S OF NORTH END OF EAST RAMP, ON CENTERLINE	8/06	4	121.3	8.9	FS - 3.0	100+

IN-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

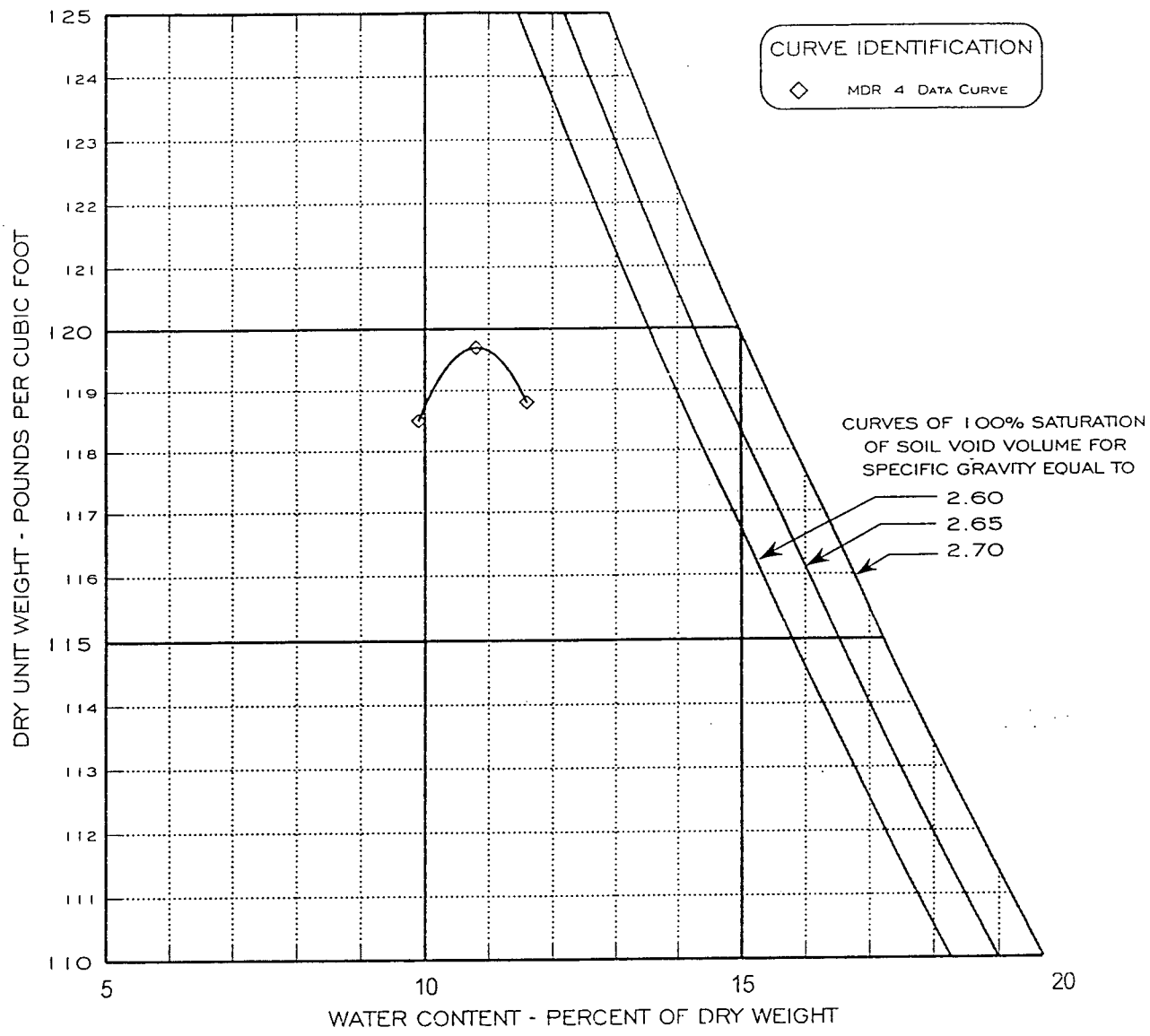
FIELD TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
4	ASTM D 1557	119.7	@ PCF	11.0%

FS = FLOOR SLAB SUBGRADE

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF THE CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
4	7/10/97	ASTM D 1557	119.7	11.0	YELLOWISH SILTY SLIGHTLY CLAYEY SAND

GRF4WIN/B5:97-9036A.03

Ardaman & Associates, Inc.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FLORIDA

DRAWN BY: KRH | CHECKED BY: PRM | DATE: 7/30/97
FILE NO: 97-9036A | APPROVED BY: | FIGURE NO: 1

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

September 12, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results
Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 11

Gentlemen:

As requested by you, on August 19, 1997 we performed field in-place density tests (ASTM D 2937) on the subgrade soils for the west fork lift ramp at the subject project. Page 1 presents the test locations and results. The field density tests were compared to the maximum density of the ramp slab subgrade soils as determined by a Modified Proctor test (ASTM D 1557) on a representative sample. Figure 1 presents a graphic representation of the moisture-density relationship.

Based on these test results, the ramp slab subgrade soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the ramp slab corner as located locations by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the floor slab subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E. 9/15/97
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B14\97-9036A.11

cc: Viro Group, Inc., Mr. John Bale, P.E.

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIR BASE, BARTOW, FLORIDA

FILE: 97-9036A **DATE:** 9/05/97

CLIENT: SEMCO CONSTRUCTION **REPORT:** 11 **PAGE NO.:** 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	WEST RAMP, 10' N & 4' E OF SW CORNER	8/18	2	107.9	10.6	FS -3.0	100+
2	WEST RAMP, 40' N & 4' E OF SW CORNER	8/18	2	106.0	7.4	FS -3.0	100
3	WEST RAMP FOOTER, 10' N OF SW CORNER	8/19	1	116.9	9.0	BOF -3.0	100+
4	WEST RAMP FOOTER, 4' E OF SW CORNER	8/19	2	105.8	16.3	BOF -2.0	99.3
5	WEST RAMP, 15' N & 4' E OF SW CORNER	8/19	2	112.4	5.0	FS -1.5	100+
6	WEST RAMP FOOTER, 12' NOF SW CORNER	8/19	1	114.9	4.0	BOF -0.5	100+
7	WEST RAMP, 12' N & 4' E OF SW CORNER	8/19	2	112.4	8.0	FS -0.5	100+
8	WEST RAMP FOOTER, 6' N OF SW CORNER	8/19	1	115.4	8.2	BOF -1.0	100+
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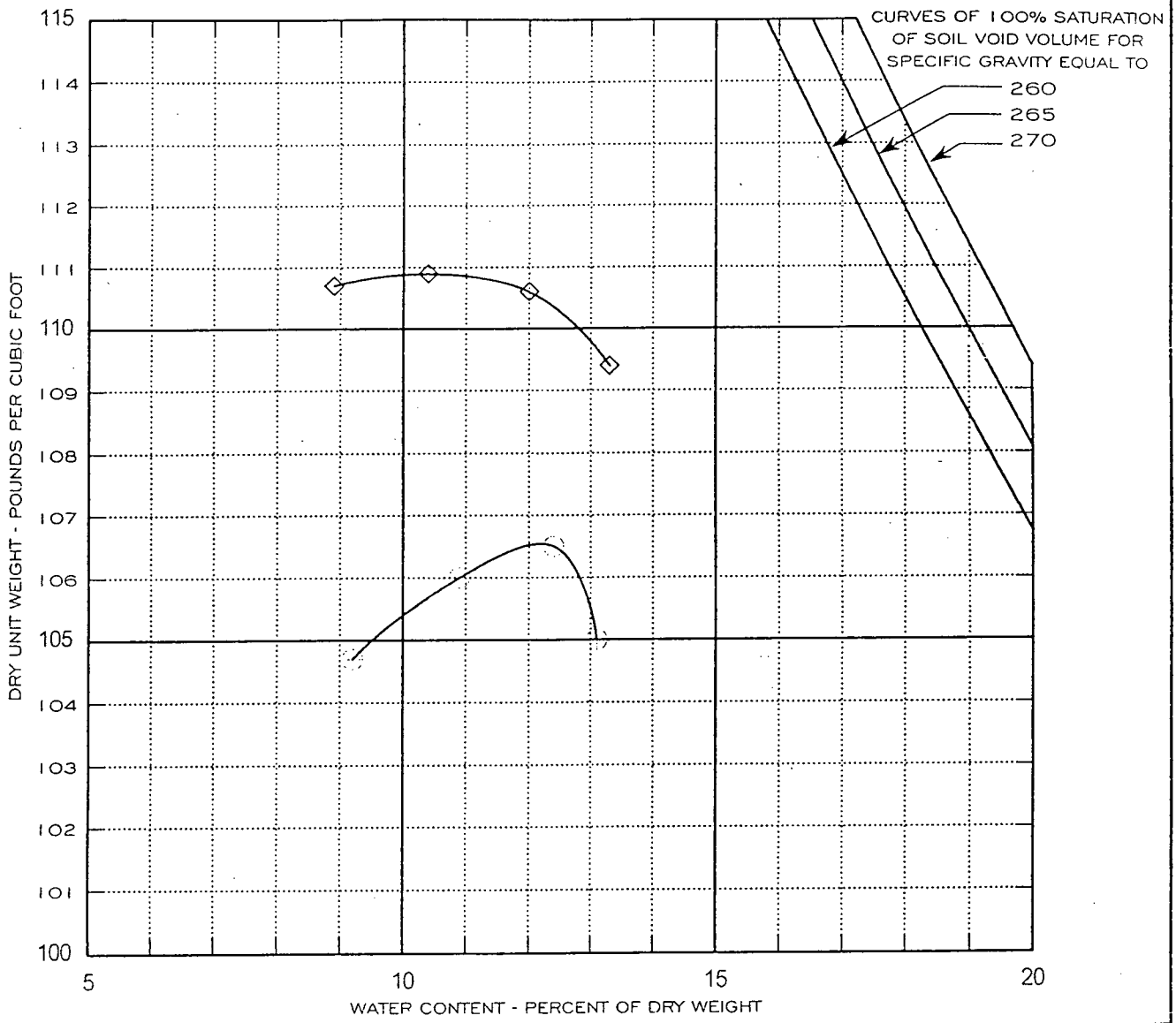
-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

FIELD TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D 1557	110.9	PCF@	10.7%
2	ASTM D 1557	106.5	PCF@	12.2%

FS = RAMP SLAB SUBGRADE
BOF = BOTTOM OF FOOTER

MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT
2	4/07/97	ASTM D1557	106.5	12.2	WHITE SAND WITH SILT

CURVE IDENTIFICATION

◇ MDR 1 DATA CURVE

⊕ MDR 2 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY	CHECKED BY	DATE
KH	PRM	9/10/97

FILE NO.	APPROVED BY	PAGE NO.
97-9036A		1

DRF4WIN/B6:97-9036A.DRF

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

October 2, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results
Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 12

Gentlemen:

As requested by you, on September 22 and 23, 1997 we performed field in-place density tests (ASTM D 2937) on the ramp slab subgrade fill soils for the west fork lift ramp at the subject project. Page 1 presents the test locations and results. The field density tests were compared to the maximum density of the ramp slab subgrade fill soils as determined by Modified Proctor tests (ASTM D 1557) on representative samples. Figure 1 presents a graphic representation of the moisture-density relationships.

Based on these test results, the ramp slab subgrade fill soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the ramp slab corner as located locations by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the ramp slab subgrade fill soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Menk, P.E. 10/2/97
Project Engineer
Florida Registration No. 41986

PRM/CAB:kms
Enclosures
B17\97-9036A.12

cc: Viro Group, Inc., Mr. John Bale, P.E.

1525 Centennial Drive (33830), Post Office Box 812, Bartow, Florida 33831 Phone (941) 533-0858 FAX (941) 533-7325
Offices in: Bartow, Cocoa, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST REPORT

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIR BASE, BARTOW, FLORIDA

FILE: 97-9036A DATE: 10/2/97

CLIENT: SEMCO CONSTRUCTION

REPORT: 12 PAGE NO.: 1 of 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	10' N & 6' E OF SW CORNER OF WEST FORKLIFT RAMP	9/22	2	109.4	12.3	GR -1.5	100+
2	6' S & 6' E OF NW CORNER OF WEST FORKLIFT RAMP	9/22	2	105.0	4.4	GR -2.0	98.6
3	SAME LOCATION	9/22	2	111.1	11.2	GR -3.0	100+
4	RAMP WEST SIDE	9/23	1	108.6	5.0	FS -1.0	97.9
5	SAME LOCATION	9/23	1	109.2	7.4	FS -0.5	98.5
6	EAST SIDE DRIVE	9/23	1	104.9	12.4	FS -1.0	99.1
7	SAME LOCTION	9/23	1	111.3	6.0	FS -0.5	100+
8	FOAM ROOM	9/23	1	110.0	6.0	FS -1.0	99.2
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* IN-PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

FIELD TEST METHOD: ASTM D 2937 ✓ ASTM D 2922 ___ ASTM D 2167 ___ ASTM D 1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D 1557	110.9	PCF@	10.7%
2	ASTM D 1557	106.5	PCF@	12.2%

FS = RAMP SLAB SUBGRADE
GR = GRADE

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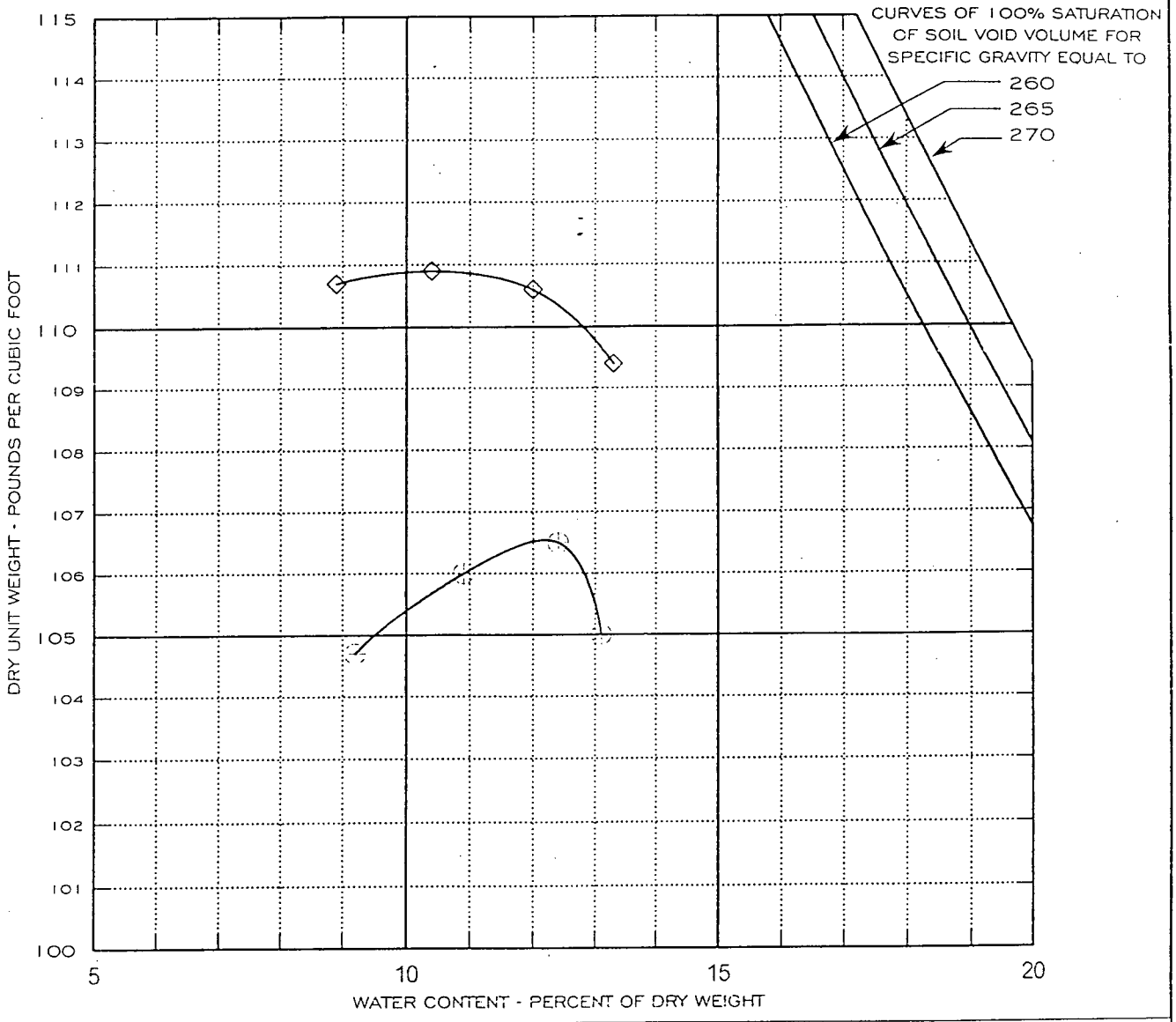
MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT
2	4/07/97	ASTM D1557	106.5	12.2	WHITE SAND WITH SILT

CURVE IDENTIFICATION

◇ MDR 1 DATA CURVE

MDR 2 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY	KMS	CHECKED BY	RM	DATE	10/01/97
FILE NO. 97-9036A		APPROVED BY		FIGURE NO.	1

GRF4WIN/B:/97-9036A/02.GRF

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

November 12, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Field In-Place Density Test Results
Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 14

Gentlemen:

As requested by you, on October 30, 1997 we performed field in-place density tests (ASTM D 2937) on the concrete slab subgrade soils for the southwest loading dock at the subject project. Page 1 presents the test locations and results. The field density tests were compared to the maximum density of the concrete roadway subgrade soils as determined by a Modified Proctor test (ASTM D 1557) on a representative sample. Graphic representation of the moisture-density relationship is presented in Figure 1.

Based on these test results, the concrete slab subgrade soils meet the specified degree of compaction of **95** percent Modified Proctor at the tested locations as per project specifications, except where noted.

The test locations were established by tape measurement from the locations as provided by others. The degree of accuracy of test locations is that implied by the method of layout. The in-place density test results are representative of the concrete roadway subgrade soils at each respective test location and vertical reach at the time the test was performed.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E. 11/14/97
Project Engineer
Florida Registration No. 41986

PRM/CAB:kms
Enclosures
B20\97-9036A.14

cc: Viro Group, Inc., Mr. John Bale, P.E.

Main Office: 3800 Drane Street, Post Office Box 612, Bartow, Florida 33831 Phone (941) 533-0858 FAX (941) 533-7325
Offices: Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

ARDAMAN & ASSOCIATES, INC.
FIELD IN-PLACE DENSITY TEST RESULTS

PROJECT: LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FLORIDA

FILE NO. 97-9036A **DATE** 11/12/97

CLIENT: SEMCO CONSTRUCTION

REPORT NO. 14 **PAGE NO.** 1 OF 1

Test No.	Location	Test Date	MDR NO.	Dry Density (pcf)	Moisture (%)	Depth Elevation (feet)	Percent Compaction (%)
1	10' E OF SW CORNER OF SW LOADING DOCK	10/30	1	108.8	6.2	GR -0.6	98.1
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*[redacted]PLACE DENSITY TEST DOES NOT MEET MINIMUM COMPACTION REQUIREMENT OF 95 PERCENT

FIELD TEST METHOD: ASTM D2937 ✓ ASTMD2922 ___ ASTM D 2167 ___ ASTM D1556 ___

MDR	TEST METHOD	MAXIMUM DENSITY		OPTIMUM MOISTURE
1	ASTM D1557	110.9	PCF @	10.7%

GR = CONCRETE ROADWAY SUBGRADE

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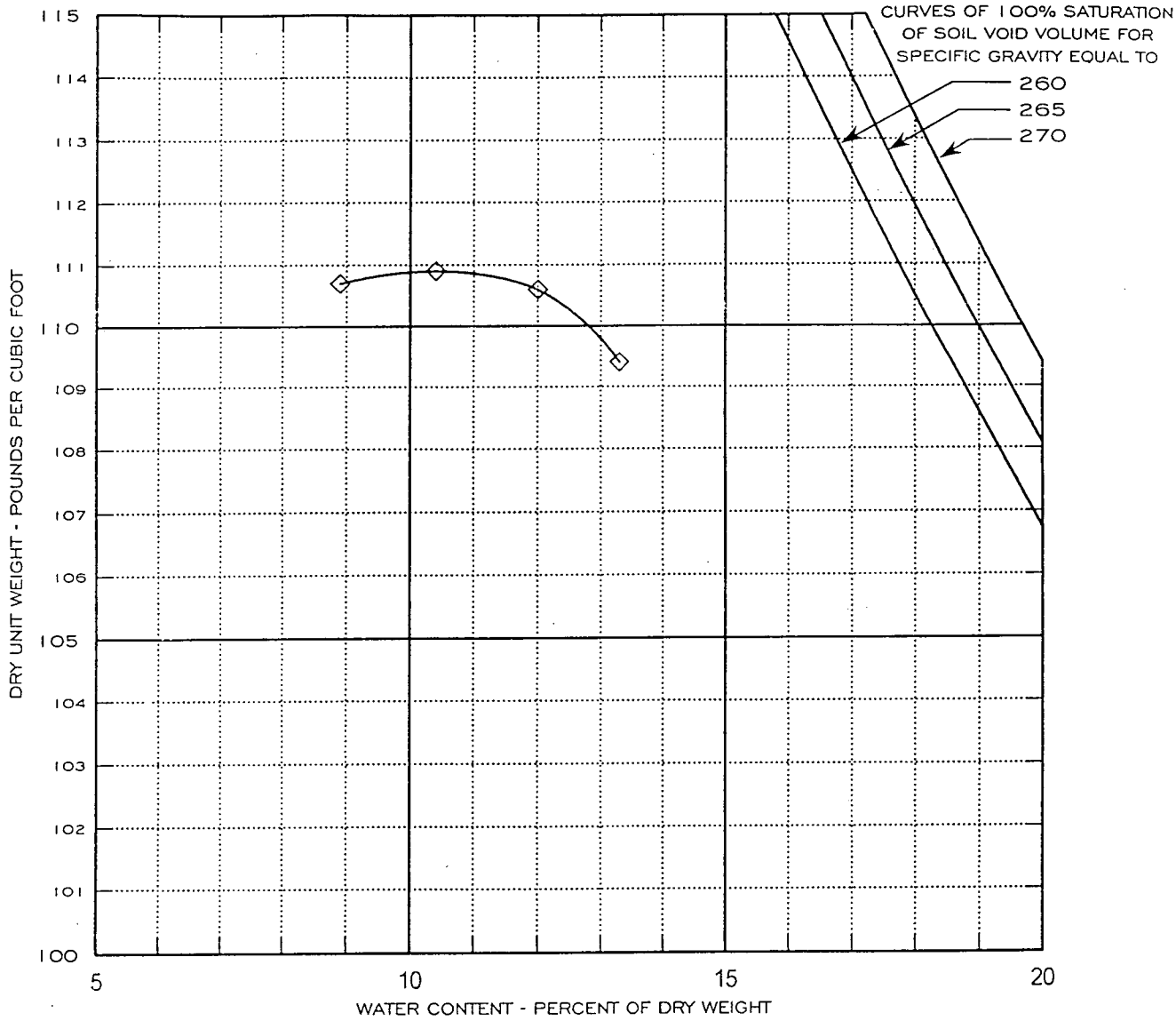
MOISTURE - DENSITY RELATIONSHIP



MDR NO.	DATE TESTED	TEST METHOD	MAXIMUM DRY DENSITY (PCF)	OPTIMUM WATER CONTENT (%)	SOIL DESCRIPTION
1	2/28/97	ASTM D1557	110.9	10.7	DARK GRAYISH-BROWN SAND WITH SILT

CURVE IDENTIFICATION

◇ MDR 1 DATA CURVE

ARDAMAN & ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL AND MATERIALS CONSULTANTS

SEMCO CONSTRUCTION
LAIDLAW DRUM STORAGE BUILDING
BARTOW AIRBASE, BARTOW, FL

DRAWN BY	CHECKED BY	DATE
KMS	PRM	11/11/97

FILE NO	APPROVED BY	FIGURE NO
97-9036A		1

GRF4WIN/B:/97-9036A/0

Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

July 17, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Concrete Reinforcement Steel Inspection
Laidlaw Drum Storage Building, Bartow Air Base
Bartow, Florida

REPORT NUMBER 8

Gentlemen:

As requested by you, on May 8, 30 and June 20, 1997 Ardaman and Associates, Inc. visited the subject site to conduct a visual inspection of the concrete reinforcement steel for size, placement, and concrete cover. Please find enclosed copies of our Field Inspection Reports and associated findings.

Based our observations as recorded on the field inspection reports, it is the opinion of Ardaman and Associates, Inc. that the concrete reinforcing steel within the inspected elements has been installed in accordance with the project plans and specifications.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E. 7/17/97
Project Engineer
Florida Registration No. 41986

PRM/CAB:krh
Enclosures
B10\97-9036A.8

cc: Viro Group, Inc., Mr. John Bale, P.E.

1625 Centennial Drive (33830) Post Office Box 812, Bartow, Florida 33831 Phone (941) 533-0858 FAX (941) 533-7325
Offices in Bartow, Cocoa, Fort Lauderdale, Fort Myers, Miami, Orlando, Port Charlotte, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 2.5 hrs.

Project: Laidlaw Drum Storage
Date: 5/8/97
File No. 97-9036A

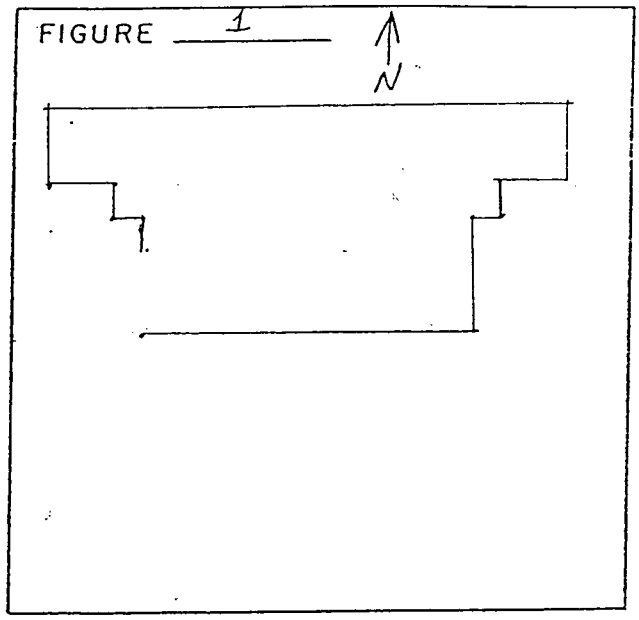
Travel Time: .5 hrs.
Time on Job: 2.0 hrs.
Time in Office: ____ hrs.
Delay Time: ____ hrs.

Drawing Used:
- [x] structural
- [ ] shop drawings

Elements Inspected and Location:

1. Foundations, as on Sketch
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

FIGURE 1



DEVIATIONS, NOTES AND CONVERSATIONS:

The Foundation system reinforcing steel inspected at the above depicted area was found to be in accordance with the project plans except: ALL #4 deformed bar used in this area does not bare Grade 60 markings. Contractor provided manufacturers mill certification & suppliers statement attached.

Bar splice on North wall approximately 40' W of the N.E. Corner does not provide for proper bar lap. Extra #4 bars added providing correct lap.

Contractor notified of bar to form clearance, resupporting or movement of rebar done during concrete pour providing proper concrete coverage

Inspected By C. Alan Bent

QUALITY PRECAST & CO.

"STRONG" ON SERVICE
P.O. Box 11 - Brandon, Florida 33509-0011
(813) 685-5815
Fax: (813) 653-3240

Orlando (407) 877-1000
Lake Helen (904) 228-2112

Pinellas (813) 821-6227

Lakeland (941) 425-3070
Eastern Polk County (941) 421-2019

May 8, 1997

SEMCO CONSTRUCTION
P.O Box 706
Bartow,FL 33830

To WhomIt May Concern:

Re: Bartow Airport Job

Please be advised that all rebar delivered to this job was Grade 60, per ASTM-A615M.

Sincerely,

Robert M. Phelps
Vice Pres.

BEST AVAILABLE COPY

( )

Grade 60 Steel
Tensile Strength min ,000 P.S.
Yeild min 60,000 P.S.I

CHEMICAL AND PHYSICAL TEST REPORT

JACKSONVILLE STEEL DIVISION
METALLURGICAL DEPARTMENT
P.O. BOX 518 BALDWIN, FLORIDA 32234

AMERISTEEL PRODUCING MILL IS KNOWN BY HEAT ID NUMBER PREFIX:
C = CHARLOTTE. J = JACKSONVILLE. K = KNOXVILLE. T = TAMPA. V = WEST TENNESSEE

SHIP TO: QUALITY PRECAST-MULBERRY D
1590 INDUSTRIAL BLVD
813-685-5615
MULBERRY FL 00000

INVOICE TO: QUALITY PRECAST CO. INC.
BOX 11
BRANDON FL 33511

SHIP DATE: 03-04-97
SHIPPERS NUMBER: 2211-077858
CUST. ACCOUNT NO.: 40080947

SIZE	GRADE	SPECIFICATION	S.O. NO.	CUST. P.O. NUMBER
13MM REBAR (# 4)	420 (60)	ASTM-A615M-96A	7019264	MULBERRY

HEAT ID NO.	C	MN	P	S	V	SI	CR	CU	NI	SN	AL	MO		YIELD PSI LBS/SQ IN	TENSILE LBS/SQ IN	% ELONG 8 IN	BEND	DEF	% LIGHT HEAVY
07-4538	.39	.96	.02	.04										65504	103269	14.0	OK	.037	2.7L
METRIC EQUIVALENT: YIELD = 451.63 MPA. TENSILE 712.01 MPA. ZELONG./200MM =14.0 DEF. = .94MM C E .58																			
13MM REBAR (# 4)					420 (60)		ASTM-A615M-96A							7019264		MULBERRY			
07-4537	.43	.96	.02	.04										68689	108454	12.2	OK	.038	2.8L
METRIC EQUIVALENT: YIELD = 473.59 MPA. TENSILE 747.76 MPA. ZELONG./200MM =12.2 DEF. = .97MM C E .52																			
13MM REBAR (# 4)					420 (60)		ASTM-A615M-96A							7019264		MULBERRY			
07-4539	.39	.01	.02	.05										66813	105135	13.6	OK	.037	1.2L
METRIC EQUIVALENT: YIELD = 460.66 MPA. TENSILE 724.88 MPA. ZELONG./200MM =13.6 DEF. = .94MM C E .59																			

THIS MATERIAL, INCLUDING THE BILLETS, WAS PRODUCED AND MANUFACTURED IN THE UNITED STATES OF AMERICA.
A. J. TURNER
QUALITY ASSURANCE MGR.
MILL GROUP

WE HEREBY CERTIFY THAT THE ABOVE FIGURES ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY

CHEMICAL AND PHYSICAL TEST REPORT

AMERISTEEL

JACKSONVILLE STEEL MADE IN USA DIVISION
METALLURGICAL DEPARTMENT
P.O. BOX 518 BALDWIN, FLORIDA 32234
PRODUCING MILL IS KNOWN BY HEAT ID NUMBER PREFIX:
C = CHARLOTTE. J = JACKSONVILLE. K = KNOXVILLE. T = TAMPA. V = WEST TENNESSEE

SHIP TO	INVOICE TO	SHIP DATE	SHIPPERS NUMBER
QUALITY PRECAST-MULBERRY D 1596 INDUSTRIAL BLVD 813-685-5615 MULBERRY FL 00000	QUALITY PRECAST CO. INC. BOX 11 BRANDON FL 33511	03-05-97	2211-077910
		CUST. ACCOUNT NO. 40080947	

SIZE	GRADE	SPECIFICATION	S.O. NO.	CUST. P.O. NUMBER

HEAT ID NO.	C	MN	P	S	V	SI	CR	CU	NI	SN	AL	MO		YIELD PT LBS/SQ. IN	TENSILE LBS/SQ. IN	% ELONG 8 IN	BEND	DEF.	% LIGHT HEAVY
16MM REBAR (# 5)					420 (60)		ASTM-A615M-96A									7019264 MULBERRY			
J7-4280	.40	1.12	.02	.04										66797	107662	10.6	DK	.034	.52
METRIC EQUIVALENT: YIELD = 460.55 MPA: TENSILE 742.30 MPA: %ELONG./200MM =10.6 DEF. = .86MM C E .61																			
16MM REBAR (# 5)					420 (60)		ASTM-A615M-96A									7019264 MULBERRY			
J7-4279	.40	1.12	.02	.04										66437	106841	12.3	DK	.035	2.21
METRIC EQUIVALENT: YIELD = 458.07 MPA: TENSILE 738.60 MPA: %ELONG./200MM =12.3 DEF. = .89MM C E .62																			
16MM REBAR (# 5)					420 (60)		ASTM-A615M-96A									7019264 MULBERRY			
J7-4278	.41	1.13	.01	.04										66236	107061	11.9	DK	.039	3.21
METRIC EQUIVALENT: YIELD = 456.68 MPA: TENSILE 738.16 MPA: %ELONG./200MM =11.9 DEF. = .99MM C E .63																			

THIS MATERIAL, INCLUDING THE BILLETS,
WAS PRODUCED AND MANUFACTURED IN THE
UNITED STATES OF AMERICA.
A. J. TURNER
QUALITY ASSURANCE MGR.
MILL GROUP

WE HEREBY CERTIFY THAT THE ABOVE FIGURES ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY

8/94

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(941) 533-0858 / 533-3893

File No.	Job	Sheet	of
Calculated by		Date	

YIELD
460.55 MPa → 460,550,000 Pa × $\frac{1 \text{ psi}}{6894.76 \text{ Pa}}$ = 66,797 psi
say 66 500 psi

TENSILE
742.30 MPa → 742,300,000 Pa × $\frac{1 \text{ psi}}{6894.76 \text{ Pa}}$ = 107,661 psi
say 107,500 psi

YIELD
451.63 MPa → 451,630,000 Pa × $\frac{1 \text{ psi}}{6894.76 \text{ Pa}}$ = 65 503 psi
say 65,500 psi

TENSILE
712.01 MPa → 712,010,000 Pa × $\frac{1 \text{ psi}}{6894.76 \text{ Pa}}$ = 103,268 psi
say 103,000 psi

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.25 hrs.

Project: Laidlaw Drum Storage
Date: 5/30/97
File No. 97-9036A

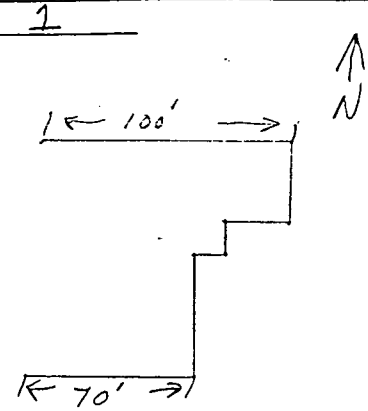
Travel Time: .50 hrs.
Time on Job: .75 hrs.
Time in Office: _____ hrs.
Delay Time: _____ hrs.

Drawing Used:
- [x] structural
- [ ] shop drawings

Elements Inspected and Location:

1. Stem Wall & Columns, See Sketch
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

FIGURE 1



DEVIATIONS, NOTES AND CONVERSATIONS:

Reinforcing Steel found to be of correct size and placement. however water stop is not present in formwork at time of Inspection. Reinspection Monday 6/2/97 prior to Concrete pour showed water-stop installation completed.

Inspected By C. Alan Best

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.75 hrs.

Travel Time: .75 hrs.
Time on Job: 1.0 hrs.
Time in Office: ____ hrs.
Delay Time: ____ hrs.

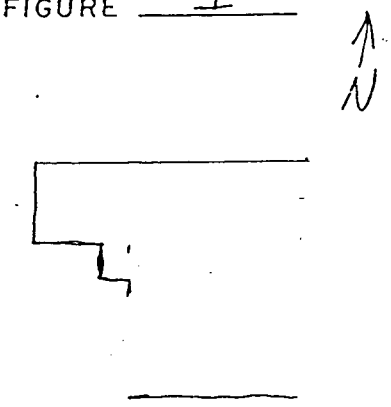
Project: Laidlaw, Drum Storage
Date: 6/20/97
File No. 97-9036A

Drawing Used:
- [x] structural
- [ ] shop drawings

Elements Inspected and Location:

1. Stem WALL, N. W. & South WALLS
2. Columns, Same. See Sketch
3.
4.
5.
7.
8.
9.
10.
11.
12.

FIGURE 1



DEVIATIONS, NOTES AND CONVERSATIONS:

Top #3 Band at 40' E of S.W. Corner of Footing missing in Column. Band or Stirrup placed in Column. Area of Inspection Approved for Concrete pour.

Inspected By C. Allan Bost

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.5 hrs.

Project: Laidlaw Drum Storage
Date: 7/18/97
File No. 97-9036A

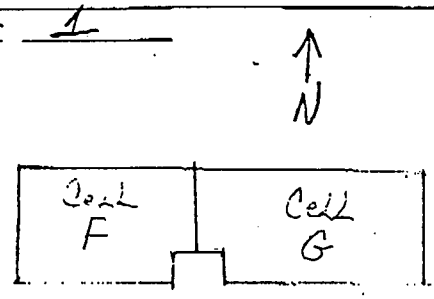
Travel Time: .5 Hr hrs.
Time on Job: 1.0 Hr hrs.
Time in Office: .25 hrs.
Delay Time: hrs.

Drawing Used:
- [x] structural
- [ ] shop drawings

Elements Inspected and Location:

1. Floor Slab, Cells F & G @ N.E. Corner
2. of Building See Sketch
3.
4.
5.
6.
8.
9.
10.
11.
12.

FIGURE 1



DEVIATIONS, NOTES AND CONVERSATIONS:

#1 Inspection of Floor Slab in Cells "F" & "G" showed #3 bars to average a 12" x 12" spacing each way. #3 bars show No Grade 60 cast markings! See Mill Certificate & Qualification Letter of Previous Report.

#2 6x6x8 gage welded wire fabric in place, will need to be lifted during pour to provide proper elevation in slab.

#3 3/2" Smooth Dowels at Construction Joint to be installed after concrete placement.

Inspected area approved for concrete placement, provided above items #2 & 3 are completed during and after pour.

Inspected By C. Alan Bent

FAX

ARDAMAN & ASSOCIATES, INC.
1525 CENTENNIAL DRIVE
BARTOW, FL 33830
(941)453-4528
FAX: (941)533-7325

To: Virogroup Inc **Date:** 7/18/97
ATTN: John W. Bate P.E
Fax #: 803-957-3845 **Pages:** 2, including cover sheet.
From: C. Alan Best, Ardaman Bartow
Subject Concrete Reinforcement Steel Inspection

COMMENTS: Area Appears Ready For Concrete Placement

If this message is incomplete, or requires further explanation, please call (941)533-0858.

Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

October 27, 1997
File Number 97-9036A

Mr. Ed Locke
SEMCO Construction
P.O. Box 706
Bartow, FL 33831-0706

Subject: Concrete Reinforcement Steel Inspection
Laidlaw Drum Storage Building, Bartow Air Base, Bartow, Florida

REPORT NUMBER 13

Gentlemen:

As requested by you, from July 18 through October 24, 1997 Ardaman and Associates, Inc. visited the subject site to conduct a visual inspection of the concrete reinforcement steel for size, placement, and concrete cover. Please find enclosed copies of our Field Inspection Reports and associated findings.

Based our observations as recorded on the field inspection reports, it is the opinion of Ardaman and Associates, Inc. that the concrete reinforcing steel within the inspected elements has been installed in accordance with the project plans and specifications.

It has been a pleasure assisting you with this important phase of your project. If there are any questions or when we may be of further service, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mark, P.E.
Project Engineer
Florida Registration No. 41986

PRM/CAB:kms
Enclosures
B19\97-9036A.13

cc: Viro Group, Inc., Mr. John Bale, P.E.

Corporate Office: [illegible] Tampa, Florida 33637 Ph. (941) 593-0558 FAX (941) 593-7335
[illegible] Orlando, Port Orange, Port St. Lucie, Sarasota, Tallahassee, Tampa, W. Palm Beach

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

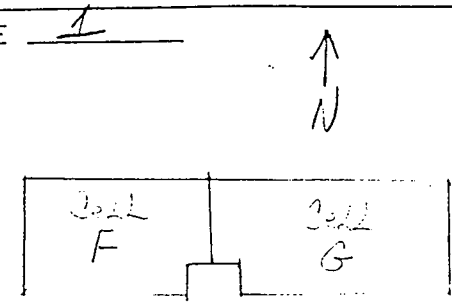
Total Time: 1.5 hrs.

Project: Saffaw Drum Storage
Date: 7/18/97
File No. 97-9036A

Travel Time: .5 Hr hrs.
Time on Job: 1.0 Hr hrs.
Time in Office: .25 hrs.
Delay Time: hrs.

Drawing Used:
- [x] structural
- [ ] shop drawings

FIGURE 1



Elements Inspected and Location:

1. Floor Slab, Cells F & G @ N.E. Corner
2. of Building See Sketch
3.
4.
5.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

#1 Inspection of Floor Slab in Cells "F" & "G" Showed #3 bars to Average a 12" x 12" Spacing Each way. #3 bars show No Grade 60 CAST markings! See Mill Certificate & Qualification Letter of Previous Report.

#2 6x6x8 gage welded wire fabric in place, will need to be lifted during pour to provide proper elevation in slab.

#3 3/2" Smooth Dowels at Construction Joint to be installed After Concrete placement.

Inspected area approved for concrete placement, provided Above Items #2 & 3 are completed during and after pour.

Inspected By C. Alan Dent

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

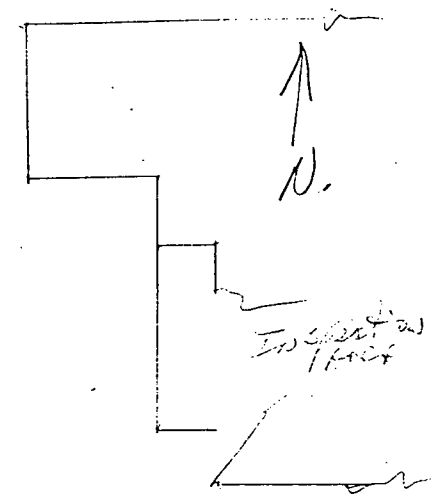
Total Time: _____ hrs.

Travel Time: _____ hrs.
Time on Job: _____ hrs.
Time in Office: _____ hrs.
Delay Time: _____ hrs.

Project: Laidlaw Drum Storage
Date: 8/6/97
File No. 97-9036

Drawing Used:
- ☐ structural
- ☐ shop drawings

FIGURE _____



Elements Inspected and Location:

1. Stem Wall Footing with Column Pads &
2. Vertical Steel. Inside Wall of West
3. Ramp From the S. W. Corner of Building
4. North Approximately 40'
5.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

Vertical Steel For Column Found out of place, Approx 4" East out of Wall. Vertical Steel moved & retied. Approved for pour.

Inspected By C. Allen Best

FIELD INSPECTION REPORT

PROJECT NAME: Sandlsw

DATE: 8/12/97

FILE NUMBER:

INSPECTOR: DWP

TYPE OF INSPECTION (CHECK ONE OR MORE)

- CLEARING & GRUBBING ☐
- FOUNDATION SUBGRADE COMPACTION ☐
- FOUNDATION BACKFILL COMPACTION ☐
- FLOOR SLAB SUBGRADE (FILL) ☐
- TRENCH BACKFILL COMPACTION ☐
- OTHER ☐

SAMPLE SOILS, PROCTOR, FBV, LBR, CBR, A/C, ETC.)

DID YOU OBTAIN:

TEST ELEVATION	YES ☐	NO ☐
DESCRIPTIVE LOCATION	YES ☐	NO ☐
MINIMUM REQUIREMENTS	YES ☐	NO ☐
ADEQUATE COVERAGE	YES ☐	NO ☐
SOILS DESCRIPTION	YES ☐	NO ☐

DID YOU READ, OR ARE YOU FULLY AWARE OF THE PROJECT'S SPECIFICATIONS? YES ☐ NO ☐

(IF NO, EXPLAIN IN REMARKS SECTION)

JOB SITE TIME

ARRIVAL TIME: _____ DEPARTURE TIME: _____

ROAD TIME

TRIP MILEAGE: _____ TRIP TIME: _____

REMARKS

Arrived at site before the concrete pour. Checked steel along NW stem wall. All spacings were correct and all steel looked correct according to specifications.

DWP

FIELD INSPECTOR SIGNATURE

SIGN EACH DATA SHEET & ATTACH

A5134 8/95

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(941) 533-0858 • Fax (941) 533-7325

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.5 hrs.

Project: Laidlaw Drum Storage
Date: 8/25/97
File No. 97-9036

Travel Time: .50 hrs.
Time on Job: .75 hrs.
Time in Office: .25 hrs.
Delay Time: _____ hrs.

Drawing Used:
- ☐ structural
- ☐ shop drawings

FIGURE _____

Elements Inspected and Location:

1. Floor Slab at N.E & S.W. Quarters of Cells
2. A thru E.
2. Exterior Columns (3) West side of West
4. Loading Dock.
3. Foundation, West & South of West Ramp
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

Exterior Columns & Foundation as per plans, approved for pour.
Floor Slab - 6x6x8ga WWF Eliminated, #3 bars each way 12" on-center
Now supported on 4" chairs. Concrete now to include Fiber-mesh.
No drawings on site reflecting changes.

Inspected By C. Allan Best

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.0 hrs.

Project: Laidlaw Drum Storage
Date: 8/29/97
File No. 97-9036A

Travel Time: .50 hrs.
Time on Job: .50 hrs.
Time in Office: hrs.
Delay Time: hrs.

Drawing Used:
- [x] structural
- [ ] shop drawings

FIGURE

Elements Inspected and Location:

1. Floor Slab, N.E & S.W. Quadrants
2. of Cells M, N, P & Q
3.
4.
5.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

Inspected Elements found to be in accordance with Project Plans & Specifications

Inspected By C. Allan Reed

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.0 hrs.

Project: Indian Drum Storage
Date: 9/3/97
File No. 97-4086

Travel Time: .50 hrs.
Time on Job: .50 hrs.
Time in Office: hrs.
Delay Time: hrs.

Drawing Used:
- [x] structural
- [x] shop drawings

FIGURE

Elements Inspected and Location:

1. Floor Slab, N.W. & S.E. Quadrants of
2. Cells A thru E.
3.
4.
5.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

Noted a few of the 1" smooth dowel bars, doweled into previous cell quadrant pours fail to have clearance from top of slab. These bars bent down slightly providing proper clearance. Other areas where #4 bars were touching water stop corrected.
Inspected Area approved to pour.

Inspected By C. Allen Bent

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.25 hrs.

Project: Laidlaw Drum Storage
Date: 9/4/97
File No. 97-9036 A

Travel Time: .50 hrs.
Time on Job: .75 hrs.
Time in Office: hrs.
Delay Time: hrs.

Drawing Used:
- [x] structural
- [x] shop drawings

FIGURE

Elements Inspected and Location:

1. Floor Slab, N.W. & S.E. Quadrants
2. of Cells M, N, P, Q & L
3.
4.
5.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

Some 1" Dowels needed more Clearance & Some #3 bars touching the water stop. These Areas, Corrected & Inspected Area Approved for Concrete placement.

Inspected By C. Allen Reed

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.0 hrs.

Travel Time: .50 hrs.
Time on Job: .50 hrs.
Time in Office: _____ hrs.
Delay Time: _____ hrs.

Project: Laidlaw Drum Storage
Date: 9/8/97
File No. 97-9036A

Drawing Used:
- ☐ structural
- ☐ shop drawings

FIGURE _____

Elements Inspected and Location:

1. Floor Slab N.E & S.W. Quadrants of
2. Cells J, K & L.
2. Floor Slab, E.-W. Forklift Runway,
3. From E. End of Building West 160'
4. ℄ to South to the slope of the
5. East Ramp
6.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

Reinforcement steel found to be typical #3 bars on 12" centers each way supported by 4" chairs. Water stop installed between ajoining quadrants. 1" smooth steel ungreased dowels on 12" centers are inserted into previously poured quadrants ajacent to pour areas. Per day S.E. & N.W. Quadrants of Cell "L" are doweled. Ajoining areas of Cell Floor to Fork-Lift Runway floor has #3 bars on 18" centers doweled between slabs. Inspected areas approved for pour

Inspected By C. Van Best

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.0 hrs.

Project: LaidLAW Drum Storage Bldg
Date: 9/10/97
File No.

Travel Time: .50 hrs.
Time on Job: .50 hrs.
Time in Office: hrs.
Delay Time: hrs.

Drawing Used:
- ☐ structural
- ☐ shop drawings

FIGURE

Elements Inspected and Location:

1. Floor Slab, Fork-Lift Runway From
2. 61' to 123' From E. End of Bldg
3. Floor Slab in S.E & N.W. Quadrants
4. of Cells K & J
5. Floor Slab, Fork Lift Runway From
6. N.W. Corn, East Runway to South
7. WALL.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

Inspected Areas found to be in Accordance with project plans & Specifications

Inspected Areas Approved

Inspected By C. Alan Best

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: 1.0 hrs.

Project: Laidlaw Drum Storage
Date: 9/15/97
File No. 97-9036B

Travel Time: .50 hrs.
Time on Job: .50 hrs.
Time in Office: hrs.
Delay Time: hrs.

Drawing Used:
- ☐ structural
- ☐ shop drawings

FIGURE

Elements Inspected and Location:

1. Floor Slab, N.W. & S.E. Quadrants of
2. Cells H, I & "O"
3. Floor Slab, Forklift Runway From W.
4. End of Building 70' E. & South Leg
5. to S.W. Ramp
6.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

Reinforcement steel [illegible] and placed Correctly.
Inspected Area approved for Concrete pour

Inspected By C.A. Dest

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: .50 hrs.

Project: LAidlAW Drum Storage
Date: 9/19/97
File No. 97-9036

Travel Time: .25 hrs.
Time on Job: .25 hrs.
Time in Office: hrs.
Delay Time: hrs.

Drawing Used:
- ☐ structural
- ☐ shop drawings

FIGURE

Elements Inspected and Location:

1. Floor Slab, N.E. & S.W. Quadrants
2. of Cells "O", "H" & "I"
3. West End wall of West Ramp
4.
5.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

All reinforcement steel of correct size and placement in place. Areas approved for pour

Inspected By [illegible]

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: .75 hrs.

Travel Time: .50 hrs.
Time on Job: .25 hrs.
Time in Office: _____ hrs.
Delay Time: _____ hrs.

Project: Laidlaw Drum Storage
Date: 9/23/97
File No. 97-9036 A

Drawing Used:
- [x] structural
- [x] shop drawings

FIGURE _____

Elements Inspected and Location:

1. Floor Slab, E.-W. Forklift
2. Runway From 65' to 90' E. of the
3. W. End of Building & South Runway
4. to S. End of Building
5.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

No Deviations Noted From Plans & Specs
Inspected Area Approved for Concrete Placement

Inspected By C. Allen Reed

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

Total Time: .75 hrs.

Project: Laidlaw Drum Storage
Date: 10/24/97
File No. 97-9036A

Travel Time: .50 hrs.
Time on Job: .25 hrs.
Time in Office: — hrs.
Delay Time: — hrs.

Drawing Used:
- [x] structural
- [ ] shop drawings

FIGURE _____

Elements Inspected and Location:

1. Roof Slab, Haz-mat Room, Cell "L"
2.
3.
4.
5.
7.
8.
9.
10.
11.
12.

DEVIATIONS, NOTES AND CONVERSATIONS:

No deviations from plans & specs. noted
Approved for concrete placement.

Inspected By C. Mon Cat

FILE NO. 97-9036 A

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW - DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

52-5217

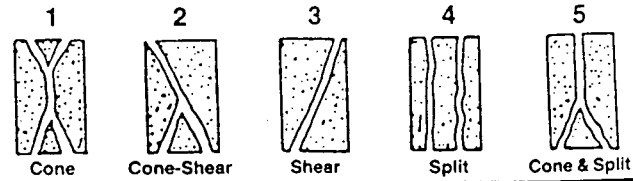
Specified Strength: 4000 p.s.i. @ 28 days		Slump (inches): 3 - 4½"	Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other			
[X] Transit Mixed: [ ] Pump Mix Other			

FIELD and LAB DATA

Date: 4-11-97	Time Concrete Batched: 8:11	Time Concrete Sampled: 9:10	Sampled By: ALLEN WATSON
Concrete Truck No.: 4489	Ticket No.: 173278	Size of Load (C.Y.): 10	Weather Conditions: CLOUDY & COOL
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 3½"	Air Temperature (°F): 80°	Concrete Temperature (°F): 76°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): 3.0%	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: DRIVE WAY SLAB AT COOLING TOWER.			

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-1	4-14								
1		4-18	7	6.00	28.27	116,500	4120	2	
2		4-18	7	6.00	28.27	118,000	4170	2	
3		5-09	28	5.98	28.09	150,500	5360	2	
4		5-09	28	5.98	28.09	147,500	5250	2	
5		5-09	SP						
6		5-09	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-4 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: [signature] 5/9/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES, INC.
ATTN: BOYD ROBERTSON - SITE
DENNIS WALTON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

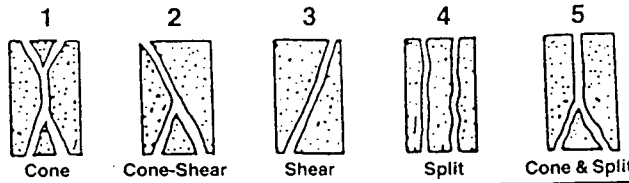
Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 4 1/2"
Air Content (percent): 3 - 6%
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other
[X] Transit Mixed: [ ] Pump Mix Other 3" PUMP

FIELD and LAB DATA

Date: 5-08-97
Time Concrete Batched: 2:05
Time Concrete Sampled: 2:40
Sampled By: ALLEN WATSON
Concrete Truck No.: 4252
Ticket No.: 10452
Size of Load (C.Y.): 10
Weather Conditions: P/C. & HOT
Water Added At Job Site: [X] Yes [ ] No If Yes 10 Gal. To 10 C.Y.
Extra Water Authorized By: PUMPMAN
Slump: (inches): 4"
Air Temperature (°F): 85°
Concrete Temperature (°F): 82°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): 4.5%
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: FOUNDATIONS 30' NORTH OF SOUTHWEST CORNER OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-1	5-09								
1		5-15	7	6.00	28.27	102,500	3630	3	PHW
2		5-15	7	6.00	28.27	101,000	3570	4	PHW
3		5-22	14	6.00	28.27	112,000	3960	3	
4		6-05	28	6.00	28.27	144,250	5100	2	CAB
5		6-05	28	6.00	28.27	143,000	5060	2	CAB
6		6-05	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P Rodney Mann 6/5/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 5-08-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW AIR BASE

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	TRUCK WAS TESTED - CYLINDERS MOLDED, SET #1.							
2	TRUCK WAS TESTED - CYLINDERS MOLDED, SET #2.							
3	8999	10455	3:10	4:35	15	10	4 1/4	N/A
4	6011	10456	3:25	5:15	10	10	4	N/A
5	3505	10457	4:55	5:57	5	10	4	N/A
6	TRUCK WAS TESTED - CYLINDERS MOLDED, SET #3.							
7	6011	10459	6:15	7:00	10	10	4 1/4	N/A
8	TRUCK WAS TESTED - CYLINDERS MOLDED, SET #4.							

FLORIDA REGISTRATION NO. 41984 BY P Rodney Wand 5/15/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES, INC.
ATTN: BOYD ROBERTSON - SITE
DENNIS WALTON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

52517

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 4 1/2"
Air Content (percent): 3 - 6"
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other
[X] Transit Mixed: [ ] Pump Mix Other 3" PUMP

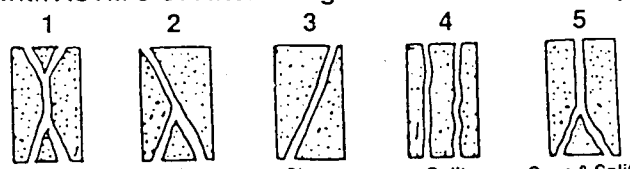
FIELD and LAB DATA

Date: 5-08-97
Time Concrete Batched: 2:35
Time Concrete Sampled: 3:20
Sampled By: ALLEN WATSON
Concrete Truck No.: 3505
Ticket No.: 10453
Size of Load (C.Y.): 10
Weather Conditions: P/C & HOT
Water Added At Job Site: [X] Yes [ ] No If Yes 20 Gal. To 10 C.Y.
Extra Water Authorized By: PUMPMAN
Slump: (inches): 5 3/4" *
Air Temperature (°F): 85°
Concrete Temperature (°F): 80°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): 5.0%
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: FOUNDATION 15' EAST OF NORTHWEST CORNER OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-2	5-09								
1		5-15	7	6.00	28.27	107,500	3800	3	
2		6-05	28	6.00	28.27	157,500	5570	2	
3		6-05	28	6.00	28.27	159,000	5620	3	
4		6-05	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* THIS IS AN EXTRA SET OF CYLINDERS MADE, DUE TO HIGH SLUMP, AS ORDERED BY B. ROBERTSON; LAIDLAW REPSENTATIVE.



FORM 1001 DO THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P Rodney Mann 6/5/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES, INC.
ATTN: BOYD ROBERTSON - SITE
DENNIS WALTON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 4 1/2"
Air Content (percent): 3 - 6%

Mix Type: ☒ Normal wt. ☐ Lightweight ☐ Mortar Mix ☐ Gunite ☐ Grout Other

☒ Transit Mixed: ☐ Pump Mix Other

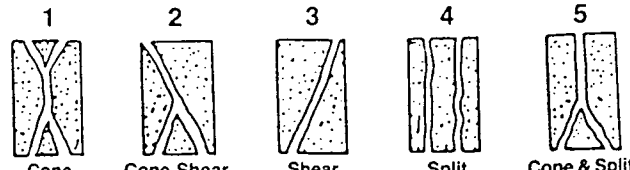
FIELD and LAB DATA

Date: 5-08-97
Time Concrete Batched: 5:35
Time Concrete Sampled: 6:20
Sampled By: ALLEN WATSON
Concrete Truck No.: 8999
Ticket No.: 10458
Size of Load (C.Y.): 10
Weather Conditions: P/C & HOT
Water Added At Job Site: ☒ Yes ☐ No If Yes 5 Gal. To 10 C.Y.
Extra Water Authorized By: CONTRACTOR
Slump: (inches): 5"
Air Temperature (°F): 85°
Concrete Temperature (°F): 83°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): 3.2%
Molded and Cured * to ASTM C-31 ☒ Yes ☐ No ☐ Unknown
Tested to ASTM C-39 ☒ Yes ☐ No

Location of Concrete Placement:
FOUNDATIONS
10' SOUTH OF NORTHEAST
CORNER OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-3	5-09								
1		5-15	7	6.00	28.27	111,500	3940	2	
2		5-15	7	6.00	28.27	110,000	3890	2	
3		5-22	14	6.00	28.27	132,000	4670	4	
4		6-05	28	6.00	28.27	151,500	5360	2	
5		6-05	28	6.00	28.27	153,000	5410	2	
6		6-05	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 001 DO THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P. Rodney Mann 6/5/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES, INC.
ATTN: BOYD ROBERTSON - SITE
DENNIS WALTON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 4 1/2"
Air Content (percent): 3 - 6%
Mix Type: ☒ Normal wt. ☐ Lightweight ☐ Mortar Mix ☐ Gunite ☐ Grout Other
525217
☒ Transit Mixed: ☐ Pump Mix Other 3" PUMP

FIELD and LAB DATA

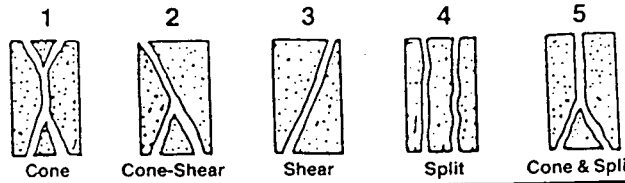
Date: 5-08-97	Time Concrete Batched: 7:00	Time Concrete Sampled: 8:35	Sampled By: ALLEN WATSON
Concrete Truck No.: 3505	Ticket No.: 10460	Size of Load (C.Y.): 10	Weather Conditions: P/C & HOT
Water Added At Job Site: ☐ Yes ☒ No If Yes 0 Gal. To 10 C.Y.			Extra Water Authorized By: N/A
Slump: (inches): 8¼" / 3" *	Air Temperature (°F): 80°	Concrete Temperature (°F): 83°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 ☒ Yes ☐ No ☐ Unknown		Tested to ASTM C-39 ☒ Yes ☐ No

Location of Concrete Placement:
FOUNDATION
SOUTHWEST CORNER OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-4	5-09								
1		5-15	7	6.00	28.27	119,000	4210	3	
2		6-05	28	6.00	28.27	168,750	5970	2	

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* TRUCK SENT BACK TO PLANT TO ADD 1/2 YARD OF CONCRETE TO DRY UP LOAD. EXTRA SET ORDERED BY ROBERTSON; LAIDLAW REPRESENTATIVE.



FORM 1001 D-3-4 THIS FORM CONFORMS TO ASTM-C39

AS111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: [signature] 6/6/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES, INC.
ATTN: BOYD ROBERTSON - SITE
DENNIS WALTON
VIROGROUP. INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6½" MAX.
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other
[X] Transit Mixed: [ ] Pump Mix Other 3" PUMP

525217

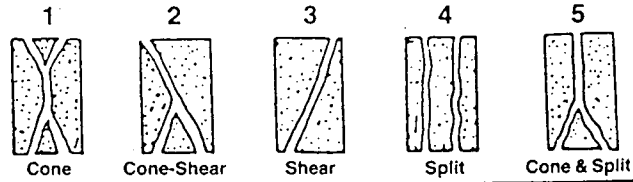
FIELD and LAB DATA

Date: 6-02-97
Time Concrete Batched: 9:03
Time Concrete Sampled: 9:50
Sampled By: ALLEN WATSON
Concrete Truck No.: 3505
Ticket No.: 10827
Size of Load (C.Y.): 10
Weather Conditions:
Water Added At Job Site: [X] Yes [ ] No If Yes 8 Gal. To 10 C.Y.
Extra Water Authorized By: FLORIDA ROCK REP.
Slump: (inches): 6" *
Air Temperature (°F): 80°
Concrete Temperature (°F): 86°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): 1.4%
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: STEM WALL 15' WEST OF SOUTHEAST CORNER OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-5	6-03								
1		6-09	7	6.00	28.27	96,500	3410	3	CAB
2		6-09	7	6.00	28.27	95,000	3360	3	CAB
3		6-16	14	6.00	28.27	125,750	4450	2	CAB
4		6-30	28	5.99	28.18	147,000	5220	2	CAB
5		6-30	28	5.99	28.18	147,500	5230	2	CAB
6		6-30	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* SAMPLE TAKEN FROM CHUTE OF TRUCK.



FORM THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P Rodney Wand 6/30/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 6-02-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW AIR BASE

PROJECT CONTRACTOR: SEMCO

CONCRETE SUPPLIER: FLORIDA ROCK

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	CONCRETE TEMP.
1	8999	10826	8:20	9:27	5	10	5	75° CAB
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #5.							
3	8999	10831	10:10	11:04	0	10	6 1/2	85° CAB
4	3505	10833	11:10	12:08	10	10	6 1/2	85° CAB
5	8999	10836	11:45	1:00	0	10	5 3/4	86° CAB
6	LOAD WAS TESTED - CYLINDERS MOLDED, SET #6.							
7	6011	10845	2:35	3:30	13	10	5 3/4	85° CAB

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES, INC.
ATTN: BOYD ROBERTSON - SITE
DENNIS WALTON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6½" MAX.
Air Content (percent): N/A
Mix Type: ☒ Normal wt. ☐ Lightweight ☐ Mortar Mix ☐ Gunite ☐ Grout Other
☒ Transit Mixed: ☐ Pump Mix Other 3" PUMP

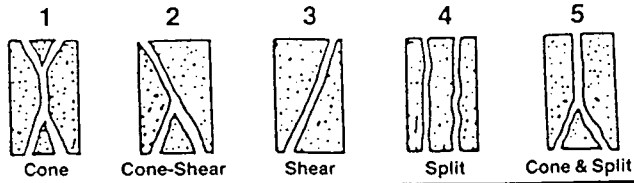
FIELD and LAB DATA

Date: 6-02-97
Time Concrete Batched: 12:30
Time Concrete Sampled: 1:05
Sampled By: ALLEN WATSON
Concrete Truck No.: 4497
Ticket No.: 10838
Size of Load (C.Y.): 10
Weather Conditions: CLOUDY & LT. RAIN
Water Added At Job Site: ☐ Yes ☒ No If Yes Gal. To C.Y.
Extra Water Authorized By:
Slump: (inches): 6¼" *
Air Temperature (°F): 90°
Concrete Temperature (°F): 86°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): 2.0%
Molded and Cured * to ASTM C-31 ☒ Yes ☐ No ☐ Unknown
Tested to ASTM C-39 ☒ Yes ☐ No
Location of Concrete Placement:
STEM WALL
45' WEST OF NORTHEAST
CORNER OF BUILING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ/IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-6	6-03								
1		6-09	7	6.00	28.27	98,000	3470	2	CAB
2		6-09	7	6.00	28.27	97,000	3430	3	CAB
3		6-16	14	6.00	28.27	128,500	4540	2	CAB
4		6-30	28	5.99	28.18	153,500	5450	2	CAB
5		6-30	28	5.99	28.18	152,500	5410	3	CAB
6		6-30	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* SAMPLE TAKEN FROM CHUTE OF TRUCK.



FORM DESIGNED TO THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P Rodney Ward 6/30/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6 1/2" MAX.
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other
[X] Transit Mixed: [ ] Pump Mix Other PEA ROCK, PUMP MIX

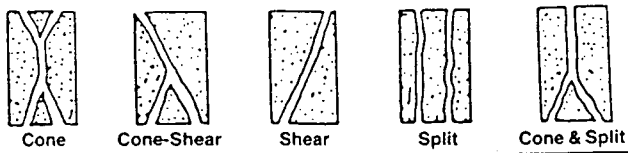
FIELD and LAB DATA

Date: 6-20-97	Time Concrete Batched: 9:55	Time Concrete Sampled: 10:46	Sampled By: JOHNNY PURVIS
Concrete Truck No.: 6011	Ticket No.: 11249	Size of Load (C.Y.): 10	Weather Conditions: HAZY & HOT
Water Added At Job Site: [X] Yes [ ] No If Yes 16 Gal. To 8 C.Y.			Extra Water Authorized By: M.D. MONIT
Slump: (inches): 6 1/2"	Air Temperature (°F): 92°	Concrete Temperature (°F): 86°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
STEM WALL
75' EAST OF NORTHWEST CORNER OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-7	6-23								
1		6-27	7	6.00	28.27	110,500	3910	2	CAD
2		6-27	7	6.00	28.27	112,000	3960	2	CAD
3		7-07	17						
4		7-18	28						
5		7-18	28						
6		7-18	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. NO

By:

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6 1/2" MAX.
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

[X] Transit Mixed: [ ] Pump Mix Other PEA ROCK, PUMP MIX

FIELD and LAB DATA

Date: 6-20-97
Time Concrete Batched: 9:55
Time Concrete Sampled: 10:46
Sampled By: JOHNNY PURVIS

Concrete Truck No.: 6011
Ticket No.: 11249
Size of Load (C.Y.): 10
Weather Conditions: HAZY & HOT

Water Added At Job Site: [X] Yes [ ] No If Yes 16 Gal. To 8 C.Y.
Extra Water Authorized By: M.D. MONIT

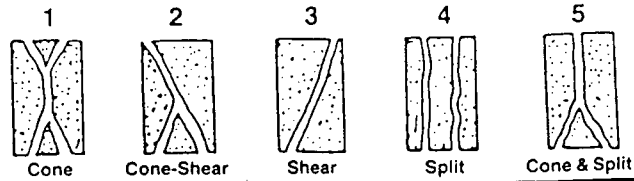
Slump: (inches): 6 1/2"
Air Temperature (°F): 92°
Concrete Temperature (°F): 86°
Wet Weight (P.C.F.): N/A

Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
STEM WALL
75' EAST OF NORTHWEST CORNER OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ. IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-7	6-23								
1		6-27	7	6.00	28.27	110,500	3910	2	
2		6-27	7	6.00	28.27	112,000	3960	2	
3		7-07	17	6.00	28.27	120,500	4260	2	
4		7-18	28						
5		7-18	28						
6		7-18	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. NO

By:

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

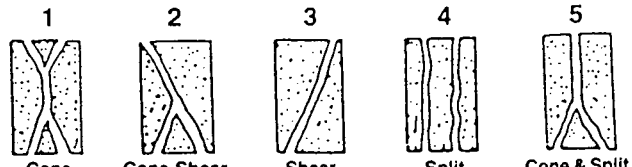
Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6 1/2" MAX.
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other
[X] Transit Mixed: [ ] Pump Mix Other PEA ROCK, PUMP MIX

FIELD and LAB DATA

Date: 6-20-97
Time Concrete Batched: 9:55
Time Concrete Sampled: 10:46
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 6011
Ticket No.: 11249
Size of Load (C.Y.): 10
Weather Conditions: HAZY & HOT
Water Added At Job Site: [X] Yes [ ] No If Yes 16 Gal. To 8 C.Y.
Extra Water Authorized By: M.D. MONIT
Slump: (inches): 6 1/2"
Air Temperature (°F): 92°
Concrete Temperature (°F): 86°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: STEM WALL
75' EAST OF NORTHWEST CORNER OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-7	6-23								
1		6-27	7	6.00	28.27	110,500	3910	2	
2		6-27	7	6.00	28.27	112,000	3960	2	
3		7-07	17	6.00	28.27	120,500	4260	2	
4		7-18	28	6.00	28.27	152,000	5380	3	
5		7-18	28	6.00	28,27	157,000	5340	3	
6		7-18	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 DO NOT THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. № 41984

By: P. Rodney Mund 7/18/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6 1/2" MAX.
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

525217

[X] Transit Mixed: [ ] Pump Mix Other PEA ROCK, PUMP MIX

FIELD and LAB DATA

Date: 6-20-97
Time Concrete Batched: 1:10
Time Concrete Sampled: 1:50
Sampled By: JOHNNY PURVIS

Concrete Truck No.: 6011
Ticket No.: 11256
Size of Load (C.Y.): 10
Weather Conditions: HAZY & HOT

Water Added At Job Site: [X] Yes [ ] No If Yes 3 Gal. To 10 C.Y.
Extra Water Authorized By: FLORIDA ROCK

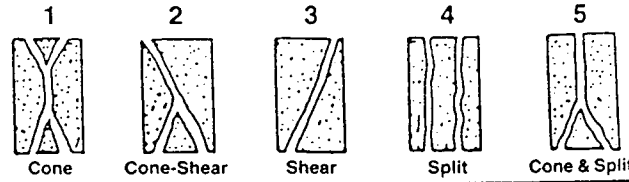
Slump: (inches): 6 1/2"
Air Temperature (°F): 94°
Concrete Temperature (°F): 89°
Wet Weight (P.C.F.): N/A

Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
STEM WALL
WEST WALL, NORTHWEST CORNER.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-8	6-23								
1		6-27	7	6.00	28.27	129,500	4580	3	
2		6-27	7	6.00	28.27	125,000	4420	3	
3		7-07	17						
4		7-18	28						
5		7-18	28						
6		7-18	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. NO.

By:

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

(9)

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6 1/2" MAX.
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

[X] Transit Mixed: [ ] Pump Mix Other PEA ROCK, PUMP MIX

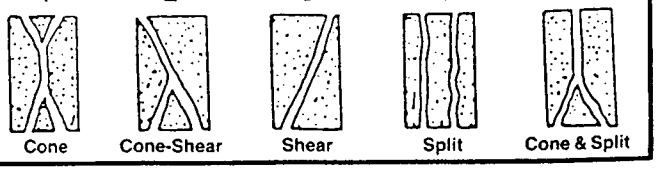
FIELD and LAB DATA

Date: 6-20-97	Time Concrete Batched: 1:10	Time Concrete Sampled: 1:50	Sampled By: JOHNNY PURVIS
Concrete Truck No.: 6011	Ticket No.: 11256	Size of Load (C.Y.): 10	Weather Conditions: HAZY & HOT
Water Added At Job Site: [X] Yes [ ] No If Yes 3 Gal. To 10 C.Y.			Extra Water Authorized By: FLORIDA ROCK
Slump: (inches): 6 1/2"	Air Temperature (°F): 94°	Concrete Temperature (°F): 89°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
STEM WALL
WEST WALL, NORTHWEST CORNER.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-8	6-23								
1		6-27	7	6.00	28.27	129,500	4580	3	
2		6-27	7	6.00	28.27	125,000	4420	3	
3		7-07	17	6.00	28.27	142,500	5040	2	
4		7-18	28						
5		7-18	28						
6		7-18	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. NO

By:

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

(9)

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6 1/2" MAX.
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

[X] Transit Mixed: [ ] Pump Mix Other PEA ROCK, PUMP MIX

FIELD and LAB DATA

Date: 6-20-97
Time Concrete Batched: 1:10
Time Concrete Sampled: 1:50
Sampled By: JOHNNY PURVIS

Concrete Truck No.: 6011
Ticket No.: 11256
Size of Load (C.Y.): 10
Weather Conditions: HAZY & HOT

Water Added At Job Site: [X] Yes [ ] No If Yes 3 Gal. To 10 C.Y.
Extra Water Authorized By: FLORIDA ROCK

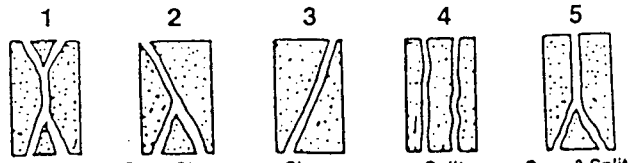
Slump: (inches): 6 1/2"
Air Temperature (°F): 94°
Concrete Temperature (°F): 89°
Wet Weight (P.C.F.): N/A

Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
STEM WALL
WEST WALL, NORTHWEST CORNER.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-8	6-23								
1		6-27	7	6.00	28.27	129,500	4580	3	CAB
2		6-27	7	6.00	28.27	125,000	4420	3	CAB
3		7-07	17	6.00	28.27	142,500	5040	2	PRW
4		7-18	28	6.00	28.27	157,000	5550	3	CAB
5		7-18	28	6.00	28.27	159,000	5620	3	CAB
6		7-18	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 001 DO NOT DISTRIBUTE THIS FORM CONFORMS TO ASTM C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. NO. 41986

By: P. Rodney Manl 7/18/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 6-20-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	LOAD WAS TESTED - CYLINDERS MOLDED, SET #7.							
2	3505	11250	10:55	12:00	10	10	4 & 6 1/2	N/A
3	6011	11251	11:40	12:45	0	10	6	N/A
4	3505	11254	12:55	1:32	0	10	6 1/2	N/A
5	LOAD WAS TESTED - CYLINDERS MOLDED, SET #8.							
6	8999	11260	2:22	3:15	6	10	4 3/4&6½	N/A

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: MR. JOHN W. BALE, P.E.
LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 3 1/2"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other
[X] Transit Mixed: [ ] Pump Mix Other 6" BOOM PUMP

25602

FIELD and LAB DATA

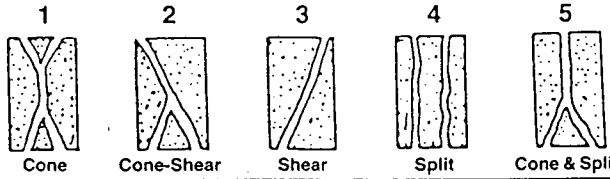
Date: 7-21-97	Time Concrete Batched: 9:05	Time Concrete Sampled: 9:35	Sampled By: JOHNNY PURVIS
Concrete Truck No.: 8875	Ticket No.: 11754	Size of Load (C.Y.): 10	Weather Conditions: P/C & MILD
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 4 1/2" / 3 3/4"	Air Temperature (°F): 88°	Concrete Temperature (°F): 82°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
25' WEST & 15' SOUTH OF
NORTHEAST CORNER OF BUILDING.
[FLOOR SLAB]

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LLSB-9	7-22								
1		7-28	7	6.00	28.27	133,000	4700	2	
2		7-28	7	6.00	28.27	136,000	4810	3	
3		8-11	28						
4		8-11	28						
5		8-11	SP						
6		8-11	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* SAMPLED FROM HOSE.



Form 100 Rev 9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: MR. JOHN W. BALE, P.E.
LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 3 1/2"
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

25602

[X] Transit Mixed: [ ] Pump Mix Other 6" BOOM PUMP

FIELD and LAB DATA

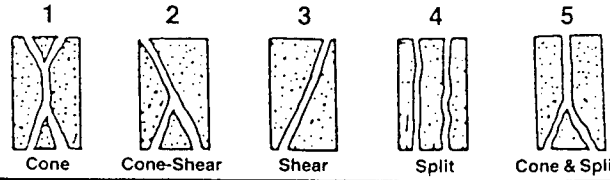
Date: 7-21-97	Time Concrete Batched: 9:05	Time Concrete Sampled: 9:35	Sampled By: JOHNNY PURVIS
Concrete Truck No.: 8875	Ticket No.: 11754	Size of Load (C.Y.): 10	Weather Conditions: P/C & MILD
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 4 1/2" / 3 3/4"	Air Temperature (°F): 88°	Concrete Temperature (°F): 82°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
25' WEST & 15' SOUTH OF
NORTHEAST CORNER OF BUILDING.
[FLOOR SLAB]

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LLSB-9	7-22								
1		7-28	7	6.00	28.27	133,000	4700	2	
2		7-28	7	6.00	28.27	136,000	4810	3	
3		8-11	28	6.00	28.27	155,000	5480	3	
4		8-11	28	6.00	28.27	160,000	5660	3	
5		8-11	SP						
6		8-11	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* SAMPLED FROM HOSE.



FORM 1001 03-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P Rodney Ward 8/11/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: MR. JOHN W. BALE, P.E.
LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 3 1/2"
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

25602

[X] Transit Mixed: [ ] Pump Mix Other 6" BOOM PUMP

FIELD and LAB DATA

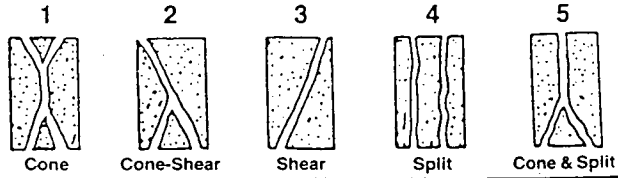
Date: 7-21-97	Time Concrete Batched: 9:42	Time Concrete Sampled: 10:15	Sampled By: JOHNNY PURVIS
Concrete Truck No.: 6611	Ticket No.: 11755	Size of Load (C.Y.): 10	Weather Conditions: P/C & HOT
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 6 1/2" *	Air Temperature (°F): 90°	Concrete Temperature (°F): 85°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
45' WEST & 15' SOUTH OF
NORTHEAST CORNER OF BUILDING.
[FLOOR SLAB]

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-10	7-22								
1		7-28	7	6.00	28.27	139,500	4930	2	CAB
2		7-28	7	6.00	28.27	139,000	4920	3	CAB
3		8-11	28						
4		8-11	28						
5		8-11	SP						
6		8-11	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* TRUCK SENT BACK.



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

VIROGROUP, INC.
ATTN: MR. JOHN W. BALE, P.E.
LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 3 1/2"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other
[X] Transit Mixed: [ ] Pump Mix Other 6" BOOM PUMP

25602

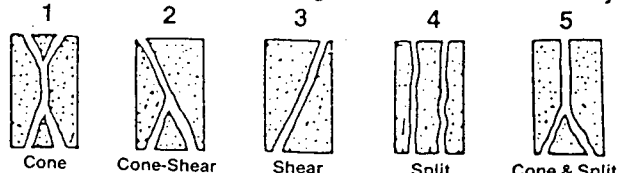
FIELD and LAB DATA

Date: 7-21-97
Time Concrete Batched: 9:42
Time Concrete Sampled: 10:15
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 6611
Ticket No.: 11755
Size of Load (C.Y.): 10
Weather Conditions: P/C & HOT
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.
Extra Water Authorized By:
Slump: (inches): 6 1/2" *
Air Temperature (°F): 90°
Concrete Temperature (°F): 85°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement:
45' WEST & 15' SOUTH OF
NORTHEAST CORNER OF BUILDING.
[FLOOR SLAB]

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-10	7-22								
1		7-28	7	6.00	28.27	139,500	4930	2	
2		7-28	7	6.00	28.27	139,000	4920	3	
3		8-11	28	6.00	28.27	168,000	5940	2	
4		8-11	28	6.00	28.27	172,000	6080	3	
5		8-11	SP						
6		8-11	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* TRUCK SENT BACK.



D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: [signature] 8/11/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 7-21-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDINGS

PROJECT LOCATION: BARTOW

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	8999	11753	8:23	9:18	10	10	2 3/4*/ 4	N/A
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #9.							
3	LOAD WAS TESTED - CYLINDERS MOLDED, SET #10.							
4	8875	11757	10:33	11:18	0	10	4 3/4 *	N/A
**	ADDED 10 GALLONS AFTER 1ST SLUMP.							
*	OUT OF PUMP HOSE.							

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

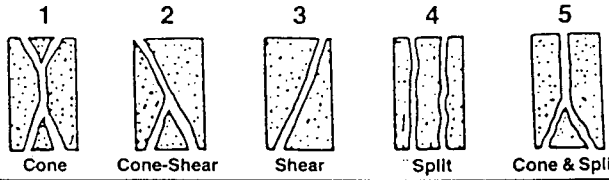
Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 5"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 2" HOSE, 50' LONG
[X] Transit Mixed: [ ] Pump Mix Other P.R.P.M.

FIELD and LAB DATA

Date: 8-12-97
Time Concrete Batched: 9:42
Time Concrete Sampled: 10:29
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 8999
Ticket No.: 12072
Size of Load (C.Y.): 10
Weather Conditions: P/C & HOT
Water Added At Job Site: [X] Yes [ ] No If Yes 9 Gal. To 10 C.Y.
Extra Water Authorized By:
Slump: (inches): 4 1/2"
Air Temperature (°F): 92°
Concrete Temperature (°F): 88°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 X[ ] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: 30' NORTH OF SOUTHWEST CORNER OF BUILDING; STEM WALL.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-11	8-13								
1		8-19	7	6.00	28.27	131,500	4650	3	
2		8-19	7	6.00	28.27	132,000	4670	3	
3		9-09	28						
4		9-09	28						
5		9-09	SP						
6		9-09	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

525217

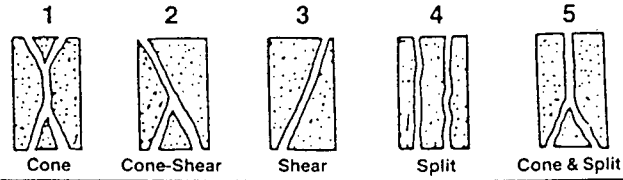
Specified Strength: 4000 p.s.i. @ 28 days		Slump (inches): 5"	Air Content (percent): N/A
Mix Type: ☒ Normal wt. ☐ Lightweight ☐ Mortar Mix ☐ Gunite ☐ Grout Other 2" HOSE, 50' LONG			
☒ Transit Mixed: ☐ Pump Mix Other P.R.P.M.			

FIELD and LAB DATA

Date: 8-12-97	Time Concrete Batched: 9:42	Time Concrete Sampled: 10:29	Sampled By: JOHNNY PURVIS
Concrete Truck No.: 8999	Ticket No.: 12072	Size of Load (C.Y.): 10	Weather Conditions: P/C & HOT
Water Added At Job Site: ☒ Yes ☐ No If Yes 9 Gal. To 10 C.Y.			Extra Water Authorized By:
Slump: (inches): 4 1/2"	Air Temperature (°F): 92°	Concrete Temperature (°F): 88°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 ☒ Yes ☐ No ☐ Unknown		Tested to ASTM C-39 ☒ Yes ☐ No
Location of Concrete Placement: 30' NORTH OF SOUTHWEST CORNER OF BUILDING; STEM WALL.			

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-11	8-13								
1		8-19	7	6.00	28.27	131,500	4650	3	
2		8-19	7	6.00	28.27	132,000	4670	3	
3		9-09	28	6.00	28.27	161,000	5690	2	
4		9-09	28	6.00	28.27	164,500	5820	3	
5		9-09	SP						
6		9-09	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P Rodney Mann 9/10/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: BOYD ROBERTSON
DENNIS WALTON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): N/A
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other W/SUPERPLASTICIZER
[X] Transit Mixed: [X] Pump Mix Other 6" BOOM PUMP

25606

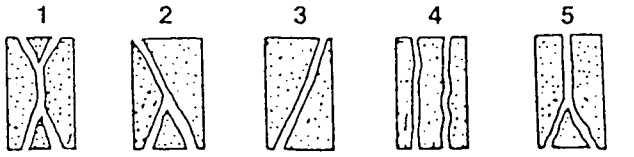
FIELD and LAB DATA

Date: 8-28-97
Time Concrete Batched: 7:48
Time Concrete Sampled: 8:30
Sampled By: TONY SKIPPER
Concrete Truck No.: 8875
Ticket No.: 192295
Size of Load (C.Y.): 9.0
Weather Conditions: P/C & WARM
Water Added At Job Site: [X] Yes [ ] No If Yes 18 Gal. To 9.0 C.Y.
Extra Water Authorized By: M.D.
Slump: (inches): 6" *
Air Temperature (°F): 85°
Concrete Temperature (°F): 88°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: 4' SOUTH & 78' WEST OF NORTHEAST CORNER OF BUILDING. [FLOOR SLAB]

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LL-12									
1		9-04	7	6.00	28.27	123,500	4370	2	CAB
2		9-14	7	6.00	28.27	125,000	4420	2	CAB
3		9-25	28						
4		9-25	28						
5		9-25	SP						
6		9-25	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* SAMPLED FROM CHUTE OF TRUCK.



FORM 10. /4 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: BOYD ROBERTSON
DENNIS WALTON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): N/A
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other W/SUPERPLASTICIZER

25606

[X] Transit Mixed: [X] Pump Mix Other 6" BOOM PUMP

FIELD and LAB DATA

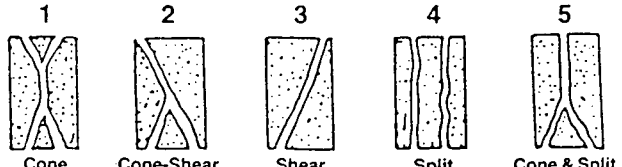
Date: 8-28-97	Time Concrete Batched: 7:48	Time Concrete Sampled: 8:30	Sampled By: TONY SKIPPER
Concrete Truck No.: 8875	Ticket No.: 192295	Size of Load (C.Y.): 9.0	Weather Conditions: P/C & WARM
Water Added At Job Site: [X] Yes [ ] No If Yes 18 Gal. To 9.0 C.Y.			Extra Water Authorized By: M.D.
Slump: (inches): 6" *	Air Temperature (°F): 85°	Concrete Temperature (°F): 88°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
4' SOUTH & 78' WEST OF
NORTHEAST CORNER OF BUILDING.
[FLOOR SLAB]

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LL-12									
1		9-04	7	6.00	28.27	123,500	4370	2	
2		9-14	7	6.00	28.27	125,000	4420	2	
3		9-25	28	6.00	28.27	145,250	5140	2	
4		9-25	28	6.00	28.27	151,000	5340	2	
5		9-25	SP						
6		9-25	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* SAMPLED FROM CHUTE OF TRUCK.



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 4198 G

By: P Rodney Ward 9/25/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

August 28, 1997
File Number: 97-51-9036A

FAX: (803) 957-6270

Mr. Mike Clough
Virogroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072

Subject: Concrete Testing @ Laidlaw's Drum Storage Building, Bartow, Florida

Dear Mr. Clough;

Ardaman & Associates, Inc. performed concrete testing at the subject project during today's pour. Specifically, slump tests were performed on each load at the plant, prior to the addition of Daracem 100 (superplasticizer), and at the job site, after this addition and water, if any, was added. One set of cylinders was cast after the first load. The concrete temperature was also taken on the first load. The slump and temperature measurements are tabulated below:

LOAD NO.	TRUCK NO.	CONTROL NO.	TIME BATCHED	TIME POURED	WATER ADDED AT SITE (gal)	CUBIC YARDS CONCRETE	SLUMP (ins) PLANT / SITE	TEMP (°F)
*1	8875	192295	7:48	8:55	18	9	1/2" / 6"	88°
2	8999	192298	8:35	9:34	5	9	1/2" / 7-1/4"	---
3	3505	192300	9:25	10:16	5	9	1-3/4" / 7"	---
4	8875	192302	9:58	10:47	0	9	2" / 7-3/4"	---

* Test Load

It has been a pleasure assisting you with this phase of your project. If there are any questions or when we may be of further assistance, please contact the undersigned at (941) 533-0858.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PPM/CAB:tc
B1T\REPORTS\97-9036A.ctr

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 8-28-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	LOAD WAS	TESTED - CYLINDERS MOLDED, SET #12.						
2	8999	192298	8:35	9:34	5	9 / 18	7 1/4	N/A
3	3505	192300	9:25	10:16	5	9 / 27	7	N/A
4	8875	192302	9:58	10:47	0	9 / 36	7 3/4	N/A

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength:	Slump (inches):	Air Content (percent):
4000 p.s.i. @ 28 days	7½" MAX.	N/A

Mix Type: ☒ Normal wt. ☐ Lightweight ☐ Mortar Mix ☐ Gunite ☐ Grout Other

☒ Transit Mixed: ☐ Pump Mix Other

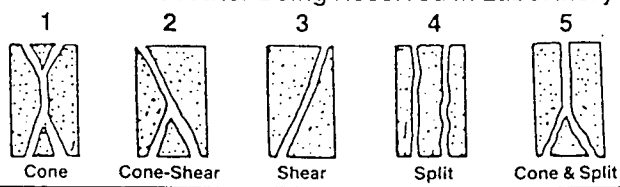
FIELD and LAB DATA

Date:	Time Concrete Batched:	Time Concrete Sampled:	Sampled By:
8-29-97	7:55	8:40	C.A. BEST
Concrete Truck No.: 5	Ticket No.: 12306	Size of Load (C.Y.): 9	Weather Conditions: CLEAR & WARM
Water Added At Job Site: ☐ Yes ☒ No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 7"	Air Temperature (°F): 83°	Concrete Temperature (°F): 85°	Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 ☒ Yes ☐ No ☐ Unknown		Tested to ASTM C-39 ☒ Yes ☐ No

Location of Concrete Placement:
FLOOR SLAB
NORTHEAST & SOUTHWEST
QUADRANTS OF CELL Q.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDS-13									
1		9-05	7	6.00	28.27	132,750	4700	2	CAB
2		9-05	7	6.00	28.27	137,750	4870	5	CAB
3		9-12	14						
4		9-26	28						
5		9-26	28						
6		9-26	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

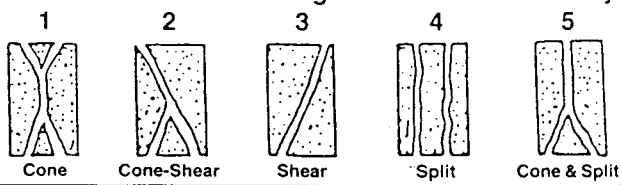
Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 7½" MAX.
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other
[X] Transit Mixed: [ ] Pump Mix Other

FIELD and LAB DATA

Date: 8-29-97
Time Concrete Batched: 7:55
Time Concrete Sampled: 8:40
Sampled By: C.A. BEST
Concrete Truck No.: 5
Ticket No.: 12306
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & WARM
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.
Extra Water Authorized By:
Slump: (inches): 7"
Air Temperature (°F): 83°
Concrete Temperature (°F): 85°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: FLOOR SLAB NORTHEAST & SOUTHWEST QUADRANTS OF CELL Q.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDS-13									
1		9-05	7	6.00	28.27	132,750	4700	2	CAB
2		9-05	7	6.00	28.27	137,750	4870	5	CAB
3		9-12	14	6.00	28.27	145,750	5150	2	CAB
4		9-26	28						
5		9-26	28						
6		9-26	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength:	Slump (inches):	Air Content (percent):
4000 p.s.i. @ 28 days	7½" MAX.	N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

[X] Transit Mixed: [ ] Pump Mix Other

FIELD and LAB DATA

Date:	Time Concrete Batched:	Time Concrete Sampled:	Sampled By:
8-29-97	7:55	8:40	C.A. BEST
Concrete Truck No.:	**Ticket No.:**	**Size of Load (C.Y.):**	**Weather Conditions:**
5	12306	9	CLEAR & WARM

Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.

Extra Water Authorized By:

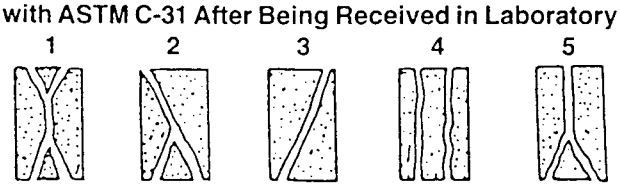
Slump: (inches):	Air Temperature (°F):	Concrete Temperature (°F):	Wet Weight (P.C.F.):
7"	83°	85°	

Air Content (% by Vol.):	Molded and Cured * to ASTM C-31	Tested to ASTM C-39
N/A	[X] Yes [ ] No [ ] Unknown	[X] Yes [ ] No

Location of Concrete Placement:
FLOOR SLAB
NORTHEAST & SOUTHWEST
QUADRANTS OF CELL Q.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDS-13									
1		9-05	7	6.00	28.27	132,750	4700	2	CAB
2		9-05	7	6.00	28.27	137,750	4870	5	CAB
3		9-12	14	6.00	28.27	145,750	5150	2	CAB
4		9-26	28	6.00	28.27	162,500	5750	2	CAB
5		9-26	28	6.00	28.27	161,000	5690	3	CAB
6		9-26	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FOR. D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P. Rodney Mann 9/26/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

FAX: (803) 957-6270

August 29, 1997
File Number 97-51-9036A

Mr. Mike Clough
Virogroup, Inc.
1445 Pisgah Church Road
Lexington, SC 29072

Subject: Concrete Testing @ Laidlaw's Drum Storage Building, Bartow, Florida

Dear Mr. Clough,

Ardaman & Associates, Inc. performed concrete testing at the subject project during today's pour. Specifically, a slump test was performed on the first load at the plant, prior to the addition of Daracem 100 (superplasticizer). Slump tests were performed on each truck at the job site after water, if any, was added. The concrete temperature was also taken on each load. The slump and temperature measurements are tabulated below:

Load No.	Truck No.	Ticket No.	Time Batched	Time Poured	Water Added At Site (gal)	Cubic Yards Concrete	Slump (ins)		Temp (°F)
							Plant	Site	
1	4489	12303	7:30	8:40	10	9	0	5"	88
2*	NR	12306	7:55	8:40	0	9	NM	7"	85
3	5110	12307	8:35	9:15	4	9	NM	6-1/2"	86
4	4489	12309	8:55	9:45	5	9	NM	7-1/2"	86
5	5110	12313	9:48	10:20	0	6.5	NM	7-1/4"	90

*One Set of test cylinders was cast on this load NR = Not Recorded NM = Not Measured

A unit weight test was performed on a sample of the concrete obtained from the second load. The result was 142 pounds per cubic foot (pcf).

It has been a pleasure assisting you with this phase of your project. If there are any questions or when we may be of further assistance, please contact the undersigned at (941) 533-0858.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

C. Alan Best
Technical Services Manager

P. Rodney Mank, P.E.
Project Engineer
Florida Registration No. 41986

PPM/CAB:krh
B1T\REPORTS\97-9036A.ltr

cc: Ed Locke, Jr., Semco Construction, P.O. Box 706, Bartow, FL 33831 (Fax #941/533-3376)

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

DATE: 8-28-97

PROJECT LOCATION: BARTOW

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	LOAD WAS	TESTED - CYLINDERS MOLDED, SET #12.					6	
2	8999	192298	8:35	9:34	5	9 / 18	7 1/4	N/A
3	3505	192300	9:25	10:16	5	9 / 27	7	N/A
4	8875	192302	9:58	10:47	0	9 / 36	7 3/4	N/A
	Notes:	Slumps at Concrete Plant as follows:						
1							1/2"	
2							1/2"	
3							1 3/4"	
4							2"	

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

DATE: 8-29-97

PROJECT LOCATION: BARTOW

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	CONCRETE TEMP.	
1	4489	12303	7:30	8:40	10	9	0 / 5	88°	CAH
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #13.								
3	5110	12307	8:35	9:15	4	9	6 1/2	86°	CAH
4	4489	12309	8:55	9:45	5	9	7 1/2	86°	CAB
5	5110	12313	9:48	10:20	0	6.5	7 1/4	90°	CAB

INDICATED SLUMP OF 1ST LOAD IS BEFORE & AFTER ADDITION OF SUPERPLASTICIZER & WATER.

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6"
Air Content (percent):
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other W/SUPERPLASTICIZER
[X] Transit Mixed: [ ] Pump Mix Other

25606

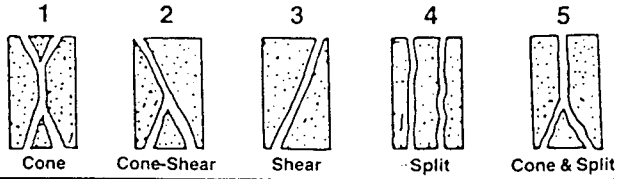
FIELD and LAB DATA

Date: 9-03-97	Time Concrete Batched: 8:20	Time Concrete Sampled: 9:05	Sampled By: TONY SKIPPER
Concrete Truck No.: 3505	Ticket No.: 192364	Size of Load (C.Y.): 9	Weather Conditions: P/C & WARM
Water Added At Job Site: [X] Yes [ ] No If Yes 5 Gal. To 9 C.Y.			Extra Water Authorized By: M.D. MERIT
Slump: (inches): 6 3/4"	Air Temperature (°F): 85°	Concrete Temperature (°F): 85°	Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
5' SOUTH & 98' EAST OF
NORTHWEST CORNER OF BUILDING.
[FLOOR SLAB]

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-14	9-04								
1		9-10	7	6.00	28.27	126,000	4460	2	CAB
2		9-10	7	6.00	28.27	127,500	4510	2	CAB
3		10-01	28						
4		10-01	28						
5		10-01	SP						
6		10-01	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 10... 9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6"
Air Content (percent):
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other W/SUPERPLASTICIZER
[X] Transit Mixed: [ ] Pump Mix Other

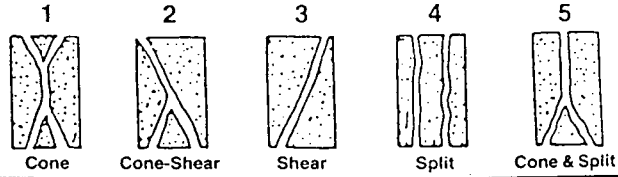
25606

FIELD and LAB DATA

Date: 9-03-97
Time Concrete Batched: 8:20
Time Concrete Sampled: 9:05
Sampled By: TONY SKIPPER
Concrete Truck No.: 3505
Ticket No.: 192364
Size of Load (C.Y.): 9
Weather Conditions: P/C & WARM
Water Added At Job Site: [X] Yes [ ] No If Yes 5 Gal. To 9 C.Y.
Extra Water Authorized By: M.D. MERIT
Slump: (inches): 6 3/4"
Air Temperature (°F): 85°
Concrete Temperature (°F): 85°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement:
5' SOUTH & 98' EAST OF
NORTHWEST CORNER OF BUILDING.
[FLOOR SLAB]

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-14	9-04								
1		9-10	7	6.00	28.27	126,000	4460	2	CAB
2		9-10	7	6.00	28.27	127,500	4510	2	CAB
3		10-01	28	6.00	28.27	152,500	5390	2	CAB
4		10-01	28	6.00	28.27	154,000	5450	2	CAB
5		10-01	SP						
6		10-01	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 4198 C

By: Rodney Mann 10/1/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 9-03-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW, FLORIDA

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	4489	192362	7:13	8:10	0	9	6 3/4	N/A CAB
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #14.							
3	6011	192365	8:42	10:00	0	9 / 27	7 1/2	N/A CAB
4	4489	192369	9:40	10:20	0	9 / 36	7 1/2	N/A CAB

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 7"
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 6" BOOM PUMP

25606
FIBER

[X] Transit Mixed: [ ] Pump Mix Other SUPER PLASTICIZER

FIELD and LAB DATA

Date: 9-05-97
Time Concrete Batched: 7:45
Time Concrete Sampled: 8:30
Sampled By: JOHNNY PURVIS

Concrete Truck No.: 3505
Ticket No.: 12390
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & WARM

Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.
Extra Water Authorized By:

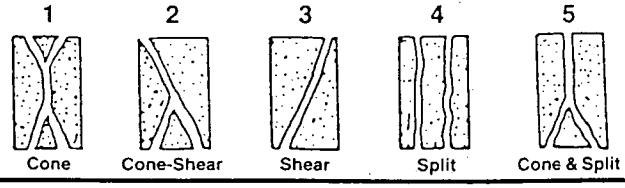
Slump: (inches): 7"
Air Temperature (°F): 84°
Concrete Temperature (°F): 81°
Wet Weight (P.C.F.): N/A

Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement: SOUTHEAST QUARTER OF CELL 'P'.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-15	9-08								
1		9-12	7	6.00	28.27	117,750	4160	2	CAB
2		9-12	7	6.00	28.27	125,500	4440	2	CAB
3		10-03	28						
4		10-03	28						
5		10-03	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM C-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 9-05-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW AIR BASE

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	4252	12388	7:22	8:03	5	9	4 / 5½	N/A
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #15.							
3	4578	12391	7:57	9:11	5	9	7	N/A
4	4357	12392	8:15	9:33	0	9	4½	N/A
5	3505	12396	9:30	10:18	0	9	5	N/A
6	4357	12399	10:15	10:40	0	7	8	N/A
	SLUMPS INDICATED FOR 1ST LOAD ARE BEFORE & AFTER ADDITION OF SUPER PLASTICIZER AT PLANT.							

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 7"
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 6" BOOM PUMP

25606
FIBER

[X] Transit Mixed: [ ] Pump Mix Other SUPER PLASTICIZER

FIELD and LAB DATA

Date:	Time Concrete Batched:	Time Concrete Sampled:	Sampled By:
9-05-97	7:45	8:30	JOHNNY PURVIS
Concrete Truck No.: 3505	Ticket No.: 12390	Size of Load (C.Y.): 9	Weather Conditions: CLEAR & WARM

Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.
Extra Water Authorized By:

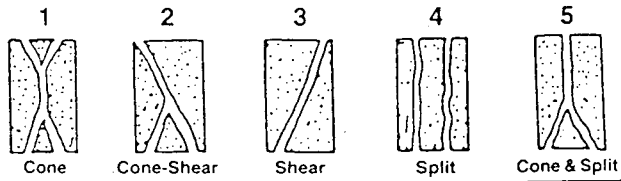
Slump: (inches):	Air Temperature (°F):	Concrete Temperature (°F):	Wet Weight (P.C.F.):
7"	84°	81°	N/A

Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31: [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39: [X] Yes [ ] No

Location of Concrete Placement: SOUTHEAST QUARTER OF CELL 'P'.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-15	9-08								
1		9-12	7	6.00	28.27	117,750	4160	2	CAB
2		9-12	7	6.00	28.27	125,500	4440	2	CAB
3		10-03	28	6.00	28.27	162,000	5730	2	CAB
4		10-03	28	6.00	28.27	161,000	5690	2	CAB
5		10-03	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: [signature] 10/6/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 5"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 6" BOOM PUMP
[X] Transit Mixed: [ ] Pump Mix Other FIBERMESH WITH SUPER PLASTICIZER

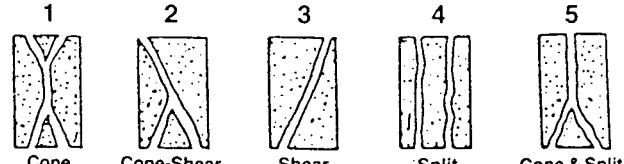
25606

FIELD and LAB DATA

Date: 9-09-97
Time Concrete Batched: 7:43
Time Concrete Sampled: 8:06
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 4252
Ticket No.: 12445
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & MILD
Water Added At Job Site: [X] Yes [ ] No If Yes 5 Gal. To 9 C.Y.
Extra Water Authorized By: M.D. MERRIT
Slump: (inches): 5 1/2"
Air Temperature (°F): 73°
Concrete Temperature (°F): 80°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement:
2ND HALF OF CELL 'L'
1ST HALF OF K & J
EAST END OF CELL 'F'.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LLSB-16	9-10								
1		9-16	7	6.00	28.27	135,000	4770	2	CAB
2		9-16	7	6.00	28.27	138,500	4900	3	CAB
3		10-07	28						
4		10-07	28						
5		10-07	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 100. /4 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
BOYD ROBERTSON
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 5"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 6" BOOM PUMP FIBERMESH WITH SUPER PLASTICIZER
[X] Transit Mixed: [ ] Pump Mix Other

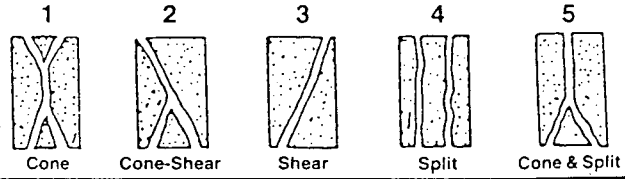
25606

FIELD and LAB DATA

Date: 9-09-97
Time Concrete Batched: 7:43
Time Concrete Sampled: 8:06
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 4252
Ticket No.: 12445
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & MILD
Water Added At Job Site: [X] Yes [ ] No If Yes 5 Gal. To 9 C.Y.
Extra Water Authorized By: M.D. MERRIT
Slump: (inches): 5 1/2"
Air Temperature (°F): 73°
Concrete Temperature (°F): 80°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement:
2ND HALF OF CELL 'L'
1ST HALF OF K & J
EAST END OF CELL 'F'.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LLSB-16	9-10								
1		9-16	7	6.00	28.27	135,000	4770	2	CAB
2		9-16	7	6.00	28.27	138,500	4900	3	CAB
3		10-07	28	6.00	28.27	153,000	5410	3	PW
4		10-07	28	6.00	28.27	155,500	5500	3	PW
5		10-07	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: [signature] 10/2/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 9-09-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW AIR BASE

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	3505	12442	7:15	8:05	0	9	4 3/4	N/A
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #16.							
3	8875	12446	8:10	9:30	0	9	5	N/A
4	4252	12449	9:28	10:01	0	9	6	N/A
5	8999	12451	9:50	10:32	5 *	9	4½ / 5½	N/A
6	8875	12452	10:03	10:47	0	9	5	N/A
7	8999	12455	11:00		3	4	5 1/2	N/A
*	AFTER 1ST SLUMP.							

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name:	LAIDLAW DRUM STORAGE BUILDING	LAIDLAW ENVIRONMENTAL SERVICES
Project Location:	BARTOW	ATTN: DENNIS WALTON
Project Contractor:	SEMCO CONSTRUCTION	BOYD ROBERTSON
Concrete Supplier:	FLORIDA ROCK INDUSTRIES	VIROGROUP, INC.
		ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days	Slump (inches): 7½" MAX.	Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other FIBER

25606 MIX

[X] Transit Mixed: [ ] Pump Mix Other W/SUPER PLASTICIZER

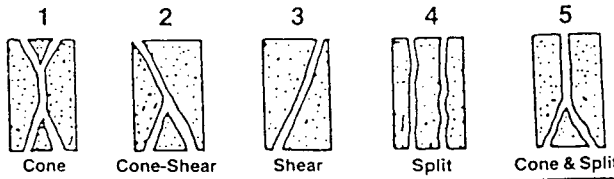
FIELD and LAB DATA

Date: 9-11-97	Time Concrete Batched: 8:30	Time Concrete Sampled: 8:58	Sampled By: C.A. BEST
Concrete Truck No.: 3505	Ticket No.: 12510	Size of Load (C.Y.): 9	Weather Conditions: CLEAR & WARM
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 6½"	Air Temperature (°F):	Concrete Temperature (°F): 86°	Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
FLOOR SLAB, FORK LIFT RUNWAY
FROM 100' TO 125' WEST OF EAST
END OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-17									
1		9-18	7	6.00	28.27	130,500	4620	2	CAB
2		9-18	7	6.00	28.27	131,000	4630	2	CAB
3		10-09	28						
4		10-09	28						
5		10-09	SP						
6		10-09	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 106 - THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

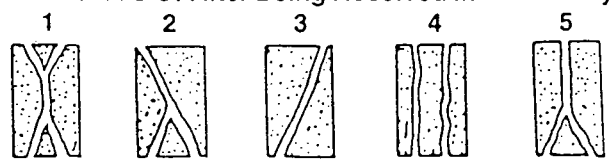
Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 7½" MAX.
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other FIBER
25606 MIX
[X] Transit Mixed: [ ] Pump Mix Other W/SUPER PLASTICIZER

FIELD and LAB DATA

Date: 9-11-97
Time Concrete Batched: 8:30
Time Concrete Sampled: 8:58
Sampled By: C.A. BEST
Concrete Truck No.: 3505
Ticket No.: 12510
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & WARM
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.
Extra Water Authorized By:
Slump: (inches): 6½"
Air Temperature (°F):
Concrete Temperature (°F): 86°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement:
FLOOR SLAB, FORK LIFT RUNWAY
FROM 100' TO 125' WEST OF EAST
END OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-17									
1		9-18	7	6.00	28.27	130,500	4620	2	CAB
2		9-18	7	6.00	28.27	131,000	4630	2	CAB
3		10-09	28	6.00	28.27	151,000	5340	2	CAB
4		10-09	28	6.00	28.27	153,000	5410	2	CAB
5		10-09	SP						
6		10-09	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P. Rodney Mann 10/9/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 7-11-97 ? (9-11-97)

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW, FLORIDA

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	CONCRETE TEMP.	
1	4252	12506	7:25	8:10	0	9	1½ / 7	86°	CAB
2	4578	12507	7:43	8:25	0	9	5 3/4	86°	CAB
3	LOAD WAS TESTED - CYLINDERS MOLDED, SET #17.								
4	3508	12511	8:42	9:18	0	9	7	86°	CAB
5	4252	12512	8:50	9:30	0	9	6 1/2	86°	CAB
6	8875	12513	9:00	9:45	0	9	5 1/2	87°	CAB
7	4578	12514	9:10	9:55	0	9	6	87°	CAB
8	8999	12519	10:15	11:15	0	5	7	87°	CAB

BATCH COMPUTER SET FOR 3.25% FREE MOISTURE IN FINE AGGREGATE.
0.0% FREE MOISTURE IN COARSE AGGREGATE.

INDICATED SLUP ON 1ST LOAD ARE BEFORE & AFTER ADDITION OF SUPER PLASTICIZER AT PLANT.

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 7"
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

25606 MIX

[X] Transit Mixed: [ ] Pump Mix Other

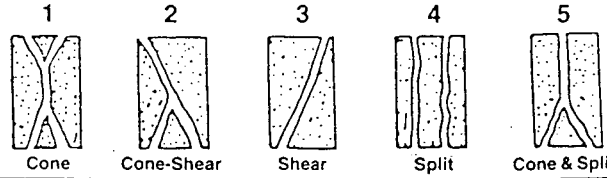
FIELD and LAB DATA

Date: 9-16-97	Time Concrete Batched: 8:05	Time Concrete Sampled: 8:32	Sampled By: C.A. BEST
Concrete Truck No.: 4578	Ticket No.: 12605	Size of Load (C.Y.): 9	Weather Conditions: CLEAR & WARM
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 6"	Air Temperature (°F): 78°	Concrete Temperature (°F): 89°	Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
FLOOR SLAB
NORTHWEST & SOUTHEAST QUADRANTS OF CELL 'H'.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-18	9-17								
1		9-23	7	6.00	28.27	132,500	4690	2	CAB
2		9-23	7	6.00	28.27	135,000	4770	2	CAB
3		10-14	28						
4		10-14	28						
5		10-14	SP						
6		10-14	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001-CS-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 7"
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

25606 MIX

[X] Transit Mixed: [ ] Pump Mix Other

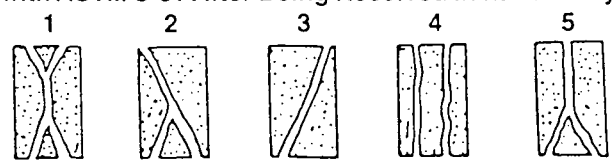
FIELD and LAB DATA

Date: 9-16-97	Time Concrete Batched: 8:05	Time Concrete Sampled: 8:32	Sampled By: C.A. BEST
Concrete Truck No.: 4578	Ticket No.: 12605	Size of Load (C.Y.): 9	Weather Conditions: CLEAR & WARM
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 6"	Air Temperature (°F): 78°	Concrete Temperature (°F): 89°	Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
FLOOR SLAB
NORTHWEST & SOUTHEAST QUADRANTS OF CELL 'H'.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-18	9-17								
1		9-23	7	6.00	28.27	132,500	4690	2	CAB
2		9-23	7	6.00	28.27	135,000	4770	2	CAB
3		10-14	28	6.00	28.27	167,000	5910	2	CAB
4		10-14	28	6.00	28.27	168,500	5960	2	CAB
5		10-14	SP						
6		10-14	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 100.4 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P. Rodney Mann 10/14/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

DATE: 9-16-97

PROJECT LOCATION: BARTOW, FLORIDA

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	
1	6011	12601	7:28	8:10	0	9	1 3/4&6 1/2	89° CAB
2	4489	12604	7:45	8:25	0	9	5 1/2	89° CAB
3	LOAD WAS TESTED - CYLINDERS MOLDED, SET #18.							
4	5110	12607	8:30	9:06	0	9	7	89° CAB
5	6011	12608	8:50	9:23	0	9	7	89° CAB
6	4252	12609	9:05	9:33	0	9	7 1/4	88° CAB
7	8875	12612	9:55	10:25	0	9	4 1/2	89° CAB

INDICATED SLUMP OF 1ST LOAD IS BEFORE & AFTER ADDITION OF SUPER PLASTICIZER AT PLANT.

COMPUTER SET AT 3.0% FREE MOISTURE IN FINE AGGREGATE.
AND 0.0% FREE MOISTRUE IN COARSE AGGREGATE.

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION, INC.
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000p.s.i. @ 28 days
Slump (inches): 7"
Air Content (percent): N/A

Mix Type: ☒ Normal wt. ☐ Lightweight ☐ Mortar Mix ☐ Gunite ☐ Grout Other FIBERMESH WITH

25606

☒ Transit Mixed: ☐ Pump Mix Other SUPERPLASTICIZER

FIELD and LAB DATA

Date: 9-19-97
Time Concrete Batched: 7:50
Time Concrete Sampled: 8:38
Sampled By: C. ALAN BEST

Concrete Truck No.: 4578
Ticket No.: 12742
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & WARM

Water Added At Job Site: ☒ Yes ☐ No If Yes 10 Gal. To 9 C.Y.
Extra Water Authorized By: M.D. MERIT

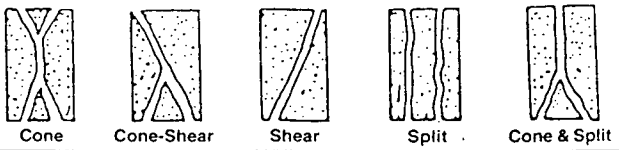
Slump: (inches): 4 1/2"
Air Temperature (°F): 80°
Concrete Temperature (°F): 86°
Wet Weight (P.C.F.):

Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 ☒ Yes ☐ No ☐ Unknown
Tested to ASTM C-39 ☒ Yes ☐ No

Location of Concrete Placement:
FLOOR SLAB
NORTHEAST & SOUTHWEST QUADRANTS OF CELL 'H'.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-19									
1		9-26	7	6.00	28.27	128,500	4540	2	
2		9-26	7	6.00	28.27	131,000	4630	2	
3		10-17	28						
4		10-17	28						
5		10-17	SP						
6		10-17	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 ... THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 9-19-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	CONCRETE TEMP.
1	4252	12740	7:28	8:20	0	9	2 / 5	86°
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #19.							
3	8999	12743	8:16	9:30	0	9	6 3/4	86°
4	4489	12748	9:30	10:15	0	6.5	6 1/2	87°

INDICATED SLUMP OF 1ST LOAD IS BEFORE & AFTER ADDITION OF SUPER PLASTICIZER AT PLANT.

COMPUTER SET FOR 3.5% FREE MOISTURE IN FINE AGGREGATE AND 0.0% FREE MOISTRUE IN COARSE AGGREGATE.

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW
Project Contractor: SEMCO CONSTRUCTION, INC.
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

25606

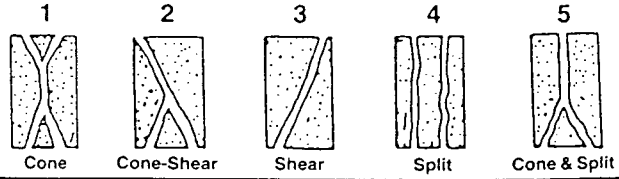
Specified Strength: 4000p.s.i. @ 28 days
Slump (inches): 7"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other FIBERMESH WITH
[X] Transit Mixed: [ ] Pump Mix Other SUPERPLASTICIZER

FIELD and LAB DATA

Date: 9-19-97
Time Concrete Batched: 7:50
Time Concrete Sampled: 8:38
Sampled By: C. ALAN BEST
Concrete Truck No.: 4578
Ticket No.: 12742
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & WARM
Water Added At Job Site: [X] Yes [ ] No If Yes 10 Gal. To 9 C.Y.
Extra Water Authorized By: M.D. MERIT
Slump: (inches): 4 1/2"
Air Temperature (°F): 80°
Concrete Temperature (°F): 86°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement:
FLOOR SLAB
NORTHEAST & SOUTHWEST QUADRANTS OF CELL 'H'.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-19									
1		9-26	7	6.00	28.27	128,500	4540	2	
2		9-26	7	6.00	28.27	131,000	4630	2	
3		10-17	28	6.00	28.27	158,000	5590	2	
4		10-17	28	6.00	28.27	160,000	5660	2	
5		10-17	SP						
6		10-17	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 33318

By: Joseph O. Edwards

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 7"
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other FIBERMESH

25606

[X] Transit Mixed: [ ] Pump Mix Other W/SUPER PLASTICIZER

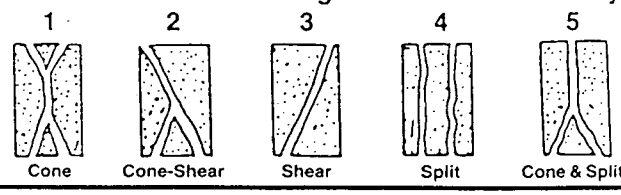
FIELD and LAB DATA

Date: 9-24-97	Time Concrete Batched: 8:05	Time Concrete Sampled: 8:21	Sampled By: DARYL TADLOCK
Concrete Truck No.: 6011	Ticket No.: 192825	Size of Load (C.Y.): 9	Weather Conditions: P/C & HOT
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.			Extra Water Authorized By:
Slump: (inches): 7 3/4"	Air Temperature (°F): 87°	Concrete Temperature (°F): 90°	Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
SLAB 45' EAST & 12' NORTH
OF SOUTHWEST CORNER.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDS-20	9-25								
1		10-01	7	6.00	28.27	132,000	4670	2	
2		10-01	7	6.00	28.27	132,500	4690	2	
3		10-22	28						
4		10-22	28						
5		10-22	SP						
6		10-22	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 10.., 3-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 7"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other FIBERMESH
[X] Transit Mixed: [ ] Pump Mix Other W/SUPER PLASTICIZER

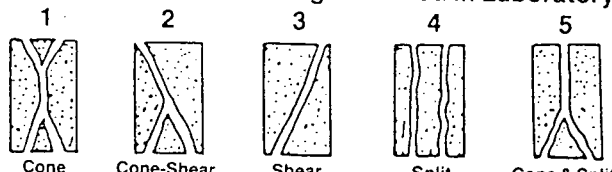
25606

FIELD and LAB DATA

Date: 9-24-97
Time Concrete Batched: 8:05
Time Concrete Sampled: 8:21
Sampled By: DARYL TADLOCK
Concrete Truck No.: 6011
Ticket No.: 192825
Size of Load (C.Y.): 9
Weather Conditions: P/C & HOT
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To C.Y.
Extra Water Authorized By:
Slump: (inches): 7 3/4"
Air Temperature (°F): 87°
Concrete Temperature (°F): 90°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: SLAB 45' EAST & 12' NORTH OF SOUTHWEST CORNER.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDS-20	9-25								
1		10-01	7	6.00	28.27	132,000	4670	2	
2		10-01	7	6.00	28.27	132,500	4690	2	
3		10-22	28	6.00	28.27	162,500	5750	2	
4		10-22	28	6.00	28.27	164,000	5800	2	
5		10-22	SP						
6		10-22	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P Rodney Wan 10/22/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

DATE: 9-24-97

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

PROJECT LOCATION: BARTOW AIR BASE

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	CONCRETE TEMP.	
1	3505	192818	7:10	7:45	0	9	6 1/2	84°	CHB
2	8999	192822	7:45	8:11	5	9	6	83°	CHB
3	LOAD WAS TESTED - CYLINDERS MOLDED, SET #20.								
4	8808	192829	8:48	9:20	0	9	4 3/4	88°	CHB
5	6011	192831	9:05	10:00	0	9	3 1/2	86°	CHB
	* #1 LOAD WAS 1 3/4" SLUMP AT PLANT BEFORE SUPER PLASTICIZER ADDED.								

FLORIDA REGISTRATION NO. _____ BY _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIROMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 5"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 6" BOOM PUMP
[X] Transit Mixed: [ ] Pump Mix Other SUPER PLASTICIZER

25606

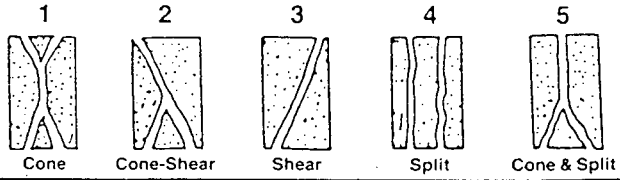
FIELD and LAB DATA

Date: 9-30-97
Time Concrete Batched: 7:30
Time Concrete Sampled: 7:55
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 4578
Ticket No.: 12916
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & COOL
Water Added At Job Site: [X] Yes [ ] No If Yes * 10 Gal. To 9 C.Y.
Extra Water Authorized By: CONTRACTOR
Slump: (inches): 3 3/4 / 7"
Air Temperature (°F): 72°
Concrete Temperature (°F): 75°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: CONCRETE PAVEMENT
EAST SIDE OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-21									
1		10-07	7	6.00	28.27	143,500	5080	2	PLW
2		10-07	7	6.00	28.27	145,000	5130	2	PLW
3		10-28	28						
4		10-28	28						
5		10-28	SP						
6		10-28	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* ADDED AFTER 1ST SLUMP.



FORM 10... 9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

DATE: 9-30-97

PROJECT LOCATION: BARTOW AIR BASE

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)
1	8999	12914	7:05	7:43	0	9	8"	N/A
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #21.							
3	6289	12917	7:40	8:33	0	9	6	N/A
4	6011	12919	7:53	8:44	10	9	6 1/2	N/A
5	5110	12920	8:03	9:00	7	9	7	
6	LOAD WAS TESTED - CYLINDERS MOLDED, SET #22.							
7	8875	12922	8:15	9:32	0	9	6	N/A
8	6289	12925	9:05	9:45	0	9	7	N/A
9	6011	12926	9:18	10:11	0	9	7 1/2	N/A
10	3505	12927	9:20	10:30	12	9	4 1/2	N/A
11	5110	12929	9:50	11:00	5	9	7	N/A

FLORIDA REGISTRATION NO. 41986

BY P. Rodney Hart 10/8/97

AS A MUTUAL PROTECTION TO CLIENTS THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZED FOR PUBLICATION OF STATEMENTS CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIROMENTAL SERVICES
ATTN: DENNIS WALTON
HORACE KIRKLAM
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 5"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 6" BOOM PUMP
[X] Transit Mixed: [ ] Pump Mix Other SUPER PLASTICIZER

25606

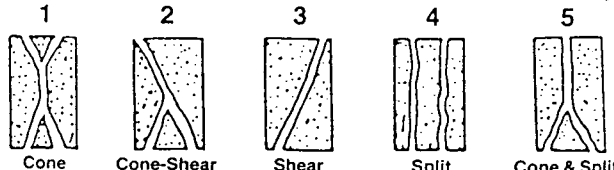
FIELD and LAB DATA

Date: 9-30-97
Time Concrete Batched: 7:30
Time Concrete Sampled: 7:55
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 4578
Ticket No.: 12916
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & COOL
Water Added At Job Site: [X] Yes [ ] No If Yes * 10 Gal. To 9 C.Y.
Extra Water Authorized By: CONTRACTOR
Slump: (inches): 3 3/4 / 7"
Air Temperature (°F): 72°
Concrete Temperature (°F): 75°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: CONCRETE PAVEMENT EAST SIDE OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-21									
1		10-07	7	6.00	28.27	143,500	5080	2	
2		10-07	7	6.00	28.27	145,000	5130	2	
3		10-28	28	6.00	28.27	181,500	6420	2	
4		10-28	28	6.00	28.27	183,500	6490	2	
5		10-28	SP						
6		10-28	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* ADDED AFTER 1ST SLUMP.



FORM ... 9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES INC.

Florida Registration No. 41986

By: [signature] 10/28/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
FOREST KIRKLAND
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 5"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 6" BOOM PUMP
[X] Transit Mixed: [ ] Pump Mix Other SUPER PLASTICIZER

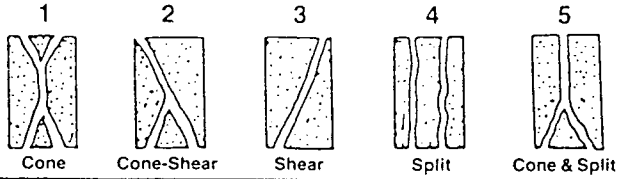
25606

FIELD and LAB DATA

Date: 9-30-97
Time Concrete Batched: 8:08
Time Concrete Sampled: 9:00
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 8999
Ticket No.: 12921
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & WARM
Water Added At Job Site: [X] Yes [ ] No If Yes 7 Gal. To 9 C.Y.
Extra Water Authorized By: CONTRACTOR
Slump: (inches): 8"
Air Temperature (°F): 83°
Concrete Temperature (°F): 84°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: CONCRETE PAVEMENT EAST SIDE OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-22									
1		10-07	7	6.00	28.27	141,000	4990	2	
2		10-07	7	6.00	28.27	138,000	4880	2	
3		10-28	28						
4		10-28	28						
5		10-28	SP						
6		10-28	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 09-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
HORACE KIRKLAM
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 5"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other 6" BOOM PUMP
[X] Transit Mixed: [ ] Pump Mix Other SUPER PLASTICIZER

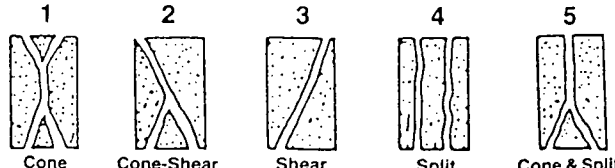
25606

FIELD and LAB DATA

Date: 9-30-97
Time Concrete Batched: 8:08
Time Concrete Sampled: 9:00
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 8999
Ticket No.: 12921
Size of Load (C.Y.): 9
Weather Conditions: CLEAR & WARM
Water Added At Job Site: [X] Yes [ ] No If Yes 7 Gal. To 9 C.Y.
Extra Water Authorized By: CONTRACTOR
Slump: (inches): 8"
Air Temperature (°F): 83°
Concrete Temperature (°F): 84°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: CONCRETE PAVEMENT EAST SIDE OF BUILDING.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-22									
1		10-07	7	6.00	28.27	141,000	4990	2	
2		10-07	7	6.00	28.27	138,000	4880	2	
3		10-28	28	6.00	28.27	168,000	5940	2	
4		10-28	28	6.00	28.27	169,000	5980	2	
5		10-28	SP						
6		10-28	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



FORM 1001 10-3-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: P. Rodney Ward 10/28/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
HORACE KIRKLAM
VIROGROUP, INC.
ATTN: JOHN W. BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6" MAX.
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

#525217

[X] Transit Mixed: [X] Pump Mix Other 4" TO 2" PUMP

FIELD and LAB DATA

Date: 10-27-97
Time Concrete Batched: 9:57
Time Concrete Sampled: 10:45
Sampled By: DAN PEMBLE

Concrete Truck No.: 8999
Ticket No.: 13493
Size of Load (C.Y.): 9.5
Weather Conditions: UNDER LT. RAIN/MAIN ROOF

Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To 9.5 C.Y.
Extra Water Authorized By: N/A

Slump: (inches): 5" *
Air Temperature (°F): 73°
Concrete Temperature (°F): 85°
Wet Weight (P.C.F.): N/A

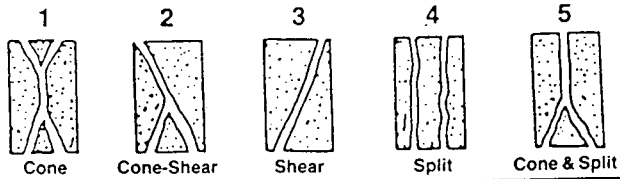
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
ROOF SLAB , CELL 'L'
UNDER MAIN ROOF.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LL-23									
1		11-03	7	6.00	28.27	111,500	3940	2	CAB
2		11-03	7	6.00	28.27	113,500	4010	2	CAB
3		11-24	28						
4		11-24	28						
5		11-24	SP						
6		11-24	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* SAMPLED FROM CHUTE OF TRUCK.



FORM 1001 D-9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
HORACE KIRKLAM
VIROGROUP, INC.
ATTN: JOHN W. BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6" MAX.
Air Content (percent): N/A

Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other

#525217

[X] Transit Mixed: [X] Pump Mix Other 4" TO 2" PUMP

FIELD and LAB DATA

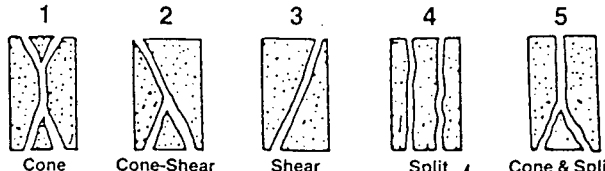
Date: 10-27-97	Time Concrete Batched: 9:57	Time Concrete Sampled: 10:45	Sampled By: DAN PEMBLE
Concrete Truck No.: 8999	Ticket No.: 13493	Size of Load (C.Y.): 9.5	Weather Conditions: UNDER LT. RAIN/MAIN ROOF
Water Added At Job Site: [ ] Yes [X] No If Yes Gal. To 9.5 C.Y.			Extra Water Authorized By: N/A
Slump: (inches): 5" *	Air Temperature (°F): 73°	Concrete Temperature (°F): 85°	Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A	Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown		Tested to ASTM C-39 [X] Yes [ ] No

Location of Concrete Placement:
ROOF SLAB , CELL 'L'
UNDER MAIN ROOF.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LL-23									
1		11-03	7	6.00	28.27	111,500	3940	2	CAB
2		11-03	7	6.00	28.27	113,500	4010	2	CAB
3		11-24	28	6.00	28.27	164,000	5800	2	CAB
4		11-24	28	6.00	28.27	168,000	5940	2	CAB
5		11-24	SP						
6		11-24	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory

* SAMPLED FROM CHUTE OF TRUCK.



FORM -9-74 THIS FORM CONFORMS TO ASTM-C39

A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. 41986

By: F. Rodney Ward 11/24/97

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
HORACE KIRKLAM
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other SUPER PLASTICIZER
[X] Transit Mixed: [ ] Pump Mix Other 6" BOOM PUMP

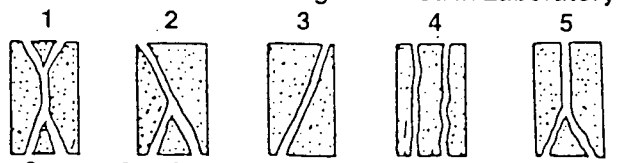
25606

FIELD and LAB DATA

Date: 11-05-97
Time Concrete Batched: 7:10
Time Concrete Sampled: 7:45
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 6011
Ticket No.: 13671
Size of Load (C.Y.): 10
Weather Conditions: CLEAR & COOL
Water Added At Job Site: [X] Yes [ ] No If Yes 10 Gal. To 10 C.Y.
Extra Water Authorized By: M.D.
Slump: (inches): 7 1/2"
Air Temperature (°F): 63°
Concrete Temperature (°F): 79°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: 10' WEST & 10' SOUTH OF NORTHWEST CORNER OF WEST RAMP.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-24	11-06								
1		11-12	7	6.01	28.37	137,000	4830	2	CAB
2		11-12	7	6.01	28.37	138,500	4880	2	CAB
3		12-13	28						
4		12-13	28						
5		12-13	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



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A5111 (9/91)

ARDAMAN & ASSOCIATES, INC.

Florida Registration No. _____ By: _____

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Ardaman & Associates, Inc.
1525 CENTENNIAL DRIVE
BARTOW, FLORIDA 33830
(813) 533-0858

FILE NO.: 97-9036/B

CONCRETE DATA RECORD

PROJECT NAME: LAIDLAW DRUM STORAGE BUILDING

DATE: 11-05-97

PROJECT LOCATION: BARTOW AIR BASE

PROJECT CONTRACTOR: SEMCO CONSTRUCTION

CONCRETE SUPPLIER: FLORIDA ROCK INDUSTRIES

LOAD NO.	TRUCK NO.	TICKET NO.	TIME BATCHED	TIME POURED	WATER ADDED (gal.)	CUBIC YARDS CONCRETE	SLUMP (inches)	AIR CONTENT (%)	
1	3507	13670	6:53	7:40	0	10	5 1/4	N/A	CAB
2	LOAD WAS TESTED - CYLINDERS MOLDED, SET #24.								
3	7292	13674	7:55	8:27	10 *	10	5 3/4 / 7	N/A	CAB
4	4578	13676	8:25	9:11	10	10	7	N/A	CAB
5	3507	13677	8:42	9:45	5 *	10	6 1/2 / 7	N/A	CAB
6	LOAD WAS TESTED - CYLINDERS MOLDED, SET #25.								
7	4242	178099	9:42	10:40	5 / 5	10	5 / 6	N/A	CAB
8	8999	193677	9:55	10:55	5	10	6 1/2	N/A	CAB
9	4489	178100	9:54	11:10	5	10	5 3/4	N/A	CAB
10	4578	178103	10:24	11:25	10	10	6 1/2	N/A	CAB
11	LOAD WAS TESTED - CYLINDERS MOLDED, SET #26.								
12	4489	13687	11:50	12:15	5	10	7 1/2	N/A	CAB
13	4578	13688	12:00	12:39	0	10	7 1/4	N/A	CAB
14	4489	13691	12:55	1:20	5	10	7	N/A	CAB
15	LOAD WAS TESTED - CYLINDERS MOLDED, SET #27.								
16	8999	13695	1:38	2:09	5	10	7 3/4	N/A	CAB
17	4578	13698	2:10	2:45	5	10	7 1/4	N/A	CAB
18	5110	13699	2:22	3:05	5	10	6	N/A	CAB
	* AFTER 1ST SLUMP.								

FLORIDA REGISTRATION NO. _____ BY _____

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FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
HORACE KIRKLAM
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other SUPER PLASTICIZER
[X] Transit Mixed: [ ] Pump Mix Other 6" BOOM PUMP

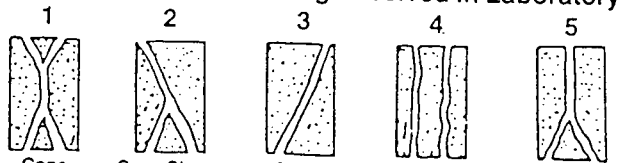
25606

FIELD and LAB DATA

Date: 11-05-97
Time Concrete Batched: 9:23
Time Concrete Sampled: 10:05
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 6011
Ticket No.: 178098
Size of Load (C.Y.): 10
Weather Conditions: CLEAR & COOL
Water Added At Job Site: [X] Yes [ ] No If Yes 5 Gal. To 10 C.Y.
Extra Water Authorized By: M.D.
Slump: (inches): 7 1/4"
Air Temperature (°F): 66°
Concrete Temperature (°F): 79°
Wet Weight (P.C.F.): N/A
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: 10' WEST OF SOUTHWEST CORNER OF WEST RAMP.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN.)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-25	11-06								
1		11-12	7	6.01	28.37	159,250	5610	2	CAB
2		11-12	7	6.01	28.37	165,000	5820	2	CAB
3		12-13	28						
4		12-13	28						
5		12-13	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



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FORM A5111 (9/91)

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FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO: CC. DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
HORACE KIRKLAM
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other SUPER PLASTICIZER
[X] Transit Mixed: [ ] Pump Mix Other 6" BOOM PUMP

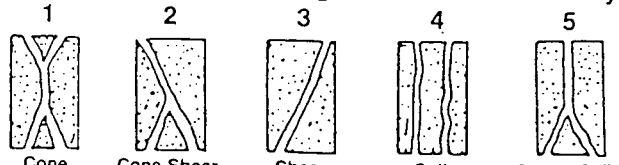
25606

FIELD and LAB DATA

Date: 11-05-97
Time Concrete Batched: 10:37
Time Concrete Sampled: 11:40
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 7292
Ticket No.: 178104
Size of Load (C.Y.): 10
Weather Conditions: CLEAR & COOL
Water Added At Job Site: [X] Yes [ ] No If Yes 5 Gal. To 10 C.Y.
Extra Water Authorized By: CONTRACTOR
Slump: (inches): 6 3/4"
Air Temperature (°F): 72°
Concrete Temperature (°F): 80°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: 10' SOUTH & 15' WEST OF SOUTHWEST CORNER OF WEST RAMP.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB-26	11-06								
1		11-12	7	6.01	28.37	149,500	5270	2	CAB
2		11-12	7	6.01	28.37	150,750	5310	2	CAB
3		12-13	28						
4		12-13	28						
5		12-13	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



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FILE NO. 97-9036/B

Ardaman & Associates, Inc.

1525 Centennial Drive
Bartow, Florida 33830

COMPRESSIVE STRENGTH OF CONCRETE CYLINDERS

TO:

CC.

DATE:

Project Name: LAIDLAW DRUM STORAGE BUILDING
Project Location: BARTOW AIR BASE
Project Contractor: SEMCO CONSTRUCTION
Concrete Supplier: FLORIDA ROCK INDUSTRIES

LAIDLAW ENVIRONMENTAL SERVICES
ATTN: DENNIS WALTON
HORACE KIRKLAM
VIROGROUP, INC.
ATTN: JOHN BALE, P.E.

DESIGN DATA

Specified Strength: 4000 p.s.i. @ 28 days
Slump (inches): 6"
Air Content (percent): N/A
Mix Type: [X] Normal wt. [ ] Lightweight [ ] Mortar Mix [ ] Gunite [ ] Grout Other SUPER PLASTICIZER
[X] Transit Mixed: [ ] Pump Mix Other 6" BOOM PUMP

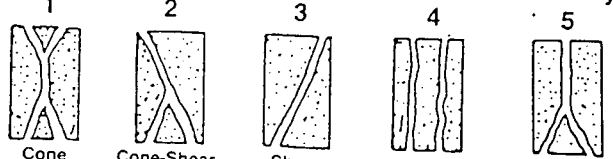
25606

FIELD and LAB DATA

Date: 11-05-97
Time Concrete Batched: 1:13
Time Concrete Sampled: 1:35
Sampled By: JOHNNY PURVIS
Concrete Truck No.: 4578
Ticket No.: 13693
Size of Load (C.Y.): 10
Weather Conditions: CLEAR & COOL
Water Added At Job Site: [X] Yes [ ] No If Yes 5 Gal. To 10 C.Y.
Extra Water Authorized By: CONTRACTOR
Slump: (inches): 7 1/2"
Air Temperature (°F): 73°
Concrete Temperature (°F): 81°
Wet Weight (P.C.F.):
Air Content (% by Vol.): N/A
Molded and Cured * to ASTM C-31 [X] Yes [ ] No [ ] Unknown
Tested to ASTM C-39 [X] Yes [ ] No
Location of Concrete Placement: 25' SOUTH & 20' WEST OF SOUTHWEST CORNER OF WEST RAMP.

SET NO.	DATE RECEIVED IN LAB	DATE TESTED	AGE (DAYS)	TEST SPECIMEN SIZE DIAMETER (IN.)	TEST SPECIMEN SIZE AREA (SQ.IN)	TOTAL LOAD (LBS)	TEST STRENGTH (PSI)	TYPE OF FRAC	SPECIMEN WEIGHT (AIR DRY - LBS)
LDSB- 27	11-06								
1		11-12	7	6.01	28.37	132,250	4660	2	CAB
2		11-12	7	6.01	28.37	132,500	4670	2	CAB
3		12-13	28						
4		12-13	28						
5		12-13	SP						

REMARKS: *Concrete Test Specimen Cured in Accordance with ASTM C-31 After Being Received in Laboratory



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Florida Registration No. _____

By: _____

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SOUTHWEST DISTRICT

Four Year Study

Effects of Polypropylene Fibers in Reducing Corrosion of Rebar in Concrete

A Summary of a Report presented at the ACI Conference Hong Kong, Dec. 5, 1991

Included in ACI Publication SP-128

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Effects of Polypropylene Fibers in Reducing Corrosion of Rebar in Concrete

A. L. Landau
FIBERMESH COMPANY

T.E. Webster
WEBSTER ENGINEERING ASSOCIATES

In early 1986, Webster Engineering Associates, Inc initiated an investigation into the effect of polypropylene fibers on the corrosion of reinforcing steel in concrete. The results of those first tests were reported in 1987 by Webster and Vondron at the International Bridge Conference in Pittsburg, Pennsylvania and by Landau at the Research Institute Conference in Hong Kong.

Webster Engineering continued the test program. In August, 1988, Webster and Landau reported on the data and results that could then be developed from the continuing study. This report was included in the Post-OWIC Conference Symposium on Concrete and Structures on August, 1988 at Kuala Lumpur, Malaysia.

This current report was presented on December 6, 1991 at the ACI International Conference on Rehabilitation of Concrete Structures in Hong Kong. It is based on a further examination of the same concrete prisms studied and produced in 1987 and reported upon in 1988.

THE CAUSES OF CORROSION

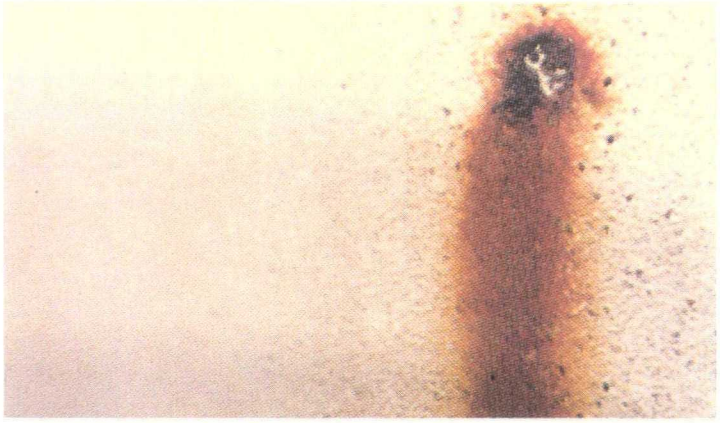
Most corrosion of reinforcing steel in concrete is caused by the migration of chloride ions reaching the surface of the steel. Marine environments, industrial processes, and deicing salts are the most common sources of such alien chloride ions. The steel in concrete is protected from corrosion by a combination of the chemical reactions at the steel surface, known as passivation, and by the protection from the environment provided by the cover of the concrete

PASSIVATION

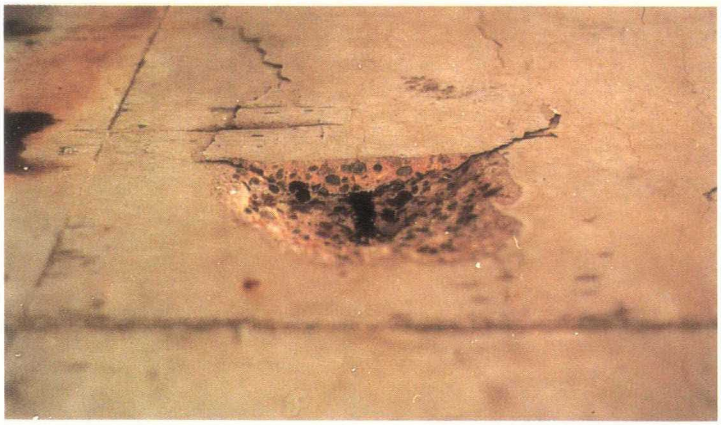
Hydration of Portland cement releases alkalis (the hydroxides of sodium, calcium, and potassium). The water in the pores of new concrete will have a high pH in the range of 13.6 - 13.9. At this high pH level chemical reactions that occur on the surface of the steel rapidly create a condition in which the steel surface is described as being passive. This passivation layer inhibits the electrochemical reaction of the corrosion process. In ordinary concrete the surface of the steel will remain passive as long as the pH level is maintained even though oxygen and moisture contact the steel.

Oxygen in small quantities is required to maintain the passivity of the surface of the steel, but normally there is enough oxygen in the concrete.

There are two common conditions which cause the loss of passivity of steel reinforcement in concrete and therefore permit corrosion. The first is the concentration of a significant number of free chloride ions in the pore water adjacent to the steel.The second is the reduction of the alkalinity of the concrete



1. Corrosion pumping to the surface



2. Example of spalling

3. Rusting at roadside caused by deicing salts, Montreal, Canada

adjacent to the steel, normally attributed to the carbonation of the concrete. Any reduction in the passivity of the steel will permit corrosion to occur.

Free chloride ions are the most common cause of the deterioration of the protective passivation of steel. Usually there are small amounts of chlorides in concrete present from the time of mixing but they are generally bound into the solid paste. These chlorides originate in the aggregate, water content, and admixtures but do not create any problems when the amount is small and they are firmly anchored.

Because carbonation involves reactions with carbon dioxide in the air, it proceeds from the outer surface to the interior of the concrete.The rate of penetration depends upon a number of factors and, most importantly with respect to fibers in concrete, this includes humidity and the permeability of the concrete. Surface defects such as honeycombing, air bubbles or cracks will enable carbon dioxide to proceed into the concrete at a greater rate.

Moisture is required for the carbonation reaction, which occurs as a gas dissolved in a moisture film reacting with alkalis in solution. Carbonation occurs most rapidly at humidities ranging from 50 to 75 percent. At lower humidity levels moisture films do not tend to form on the surface of the pores; while at higher levels water tends to block the penetration of additional carbon dioxide. If the concrete in contact with the steel becomes carbonated it no longer protects the steel through the passivation process. Corrosion will then commence whenever moisture becomes available. From that point on, the rate of corrosion will depend upon the quality of the concrete and degree of cracking, in addition to moisture availability.

4. Spalling of the same area, Montreal, Canada

5. Repair of overpass, without fibers, Montreal, Canada

6. Close-up of failed repair, without fibers

OXYGEN

Oxygen can migrate through even the highest quality of concrete, either as a gas or dissolved in liquid. It will move quicker in gaseous form than in a liquid, but it will still move if there is a moving force such as the consumption of oxygen by corrosion or if there are cycles of wetting and drying. The damage by corrosion is usually worse in areas subjected to cycles of wetting and drying and this is partially related to the increased movement of oxygen under these conditions.

The quality of concrete has an influence on the degree and rate of corrosion. As the quality of concrete improves, the movement of oxygen is increasingly restricted. Therefore the early stages of corrosion of steel reinforcement will be very slow for a period of years due mainly to the limited amount of oxygen present at the steel. Cracks in the concrete, poor workmanship or insufficient cover over the reinforcing steel allow easier access of the oxygen and, therefore, will allow the rate of corrosion to increase.

RUST

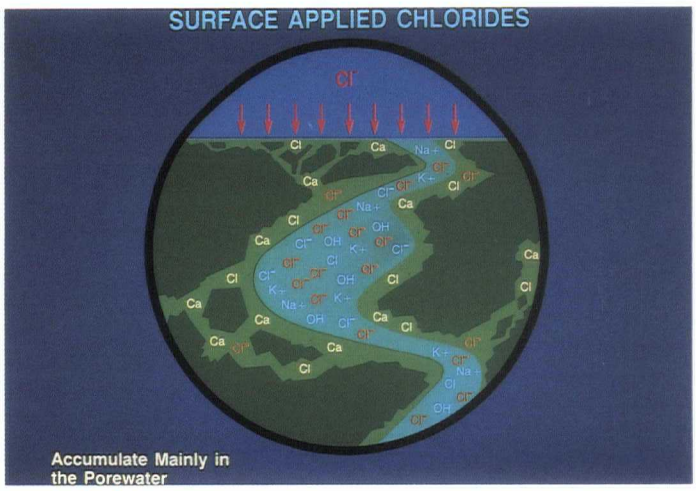
Rust is commonly recognized as the expansive by-product of the corrosion of steel. As the rust, or expansive by-product of corrosion, continues to be produced, there is a progressively greater

expansive force developed between the reinforcing steel and the concrete. Cracks in the concrete will develop as the concrete fails in tension because the expansive forces exceed the tension strength of the concrete.

Cracking and spalling at the surface are the visible symptoms of active corrosion at this stage and this is not necessarily accompanied by rust staining. In some circumstances there will be horizontal cracking between reinforcing steel members which will develop small to large areas of delamination within the concrete without signs of distress on the surface.

CHLORIDE IONS

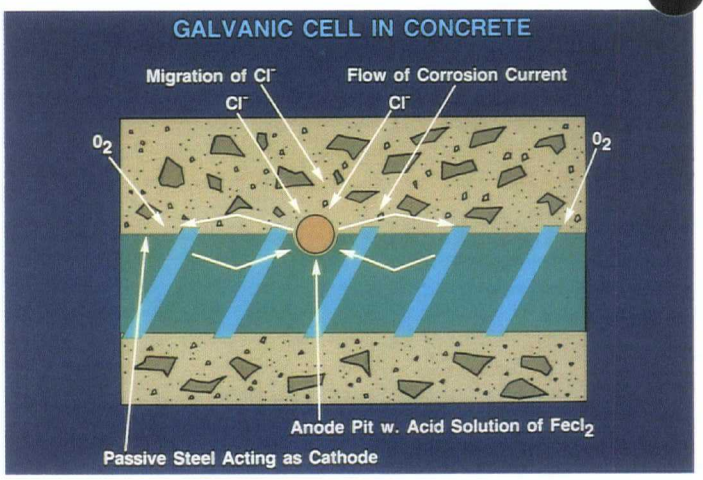
The chloride ions which create damage are the alien chlorides from marine exposure, deicing salts and similar environments which tend to accumulate in the pores of the concrete. While some of these alien chloride ions will become loosely combined with the crystalline hydration products of cement, the remainder will concentrate in the pore water and will be relatively free to move. (See Illustration 7).



7. Chloride Ions in the Porewater. Alien chloride ions from marine environments, deicing salts, or industrial processes enter the concrete as part of the pore water. Upon reaching the steel reinforcement they become a primary cause of corrosion.

The mechanism of corrosion of steel in concrete containing chlorides is complex and is really beyond the scope of this report. The chloride ions disrupt the passivating reactions that occur on the surface of the steel in the highly alkaline environment within an uncarbonated concrete. If the concrete is partially or totally carbonated, even smaller concentrations of free chlorides may initiate corrosion. (See Illustration 8).

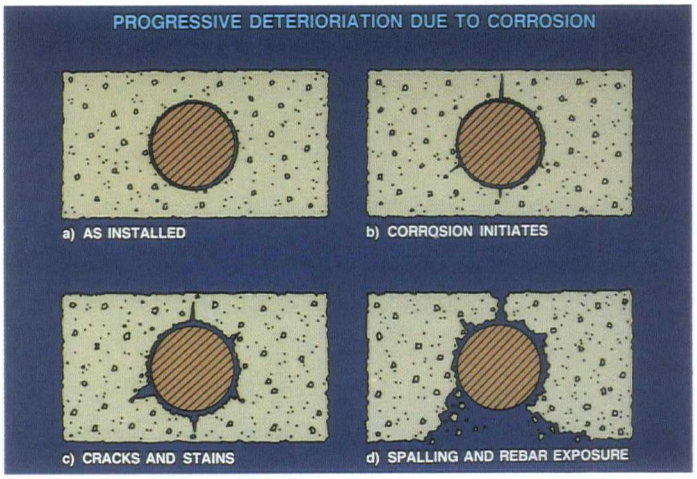
The access of chlorides into concrete is controlled by the quality of concrete, the thickness of cover and sometimes the presence of an effective chloride retarding surface sealer. Unless the concrete surface is completely sealed by an impermeable coating, the chloride ions will penetrate the concrete. The concentration of chlorides will tend to be greatest at the surface and will be gradually reduced at increasing depths within the concrete.



8. Galvanic Cell in Concrete. The uneven concentration of alien chlorides at the surface of the steel will create an anode-cathode relationship resulting in the formation and flow of a corrosive electrical current.

CARBONATION

The second means by which loss of alkalinity occurs in concrete is by carbonation, which is the reaction of the alkaline materials in the concrete with the carbon dioxide in the atmosphere. The reaction reduces the alkalinity of the pore water. When the pH of the pore water becomes less than approximately 11.5, the processes that cause and maintain the passivation layer no longer occur and the passivation protection is destroyed. The steel is then free to corrode exactly as if exposed to the open atmosphere. (See Illustration 9).



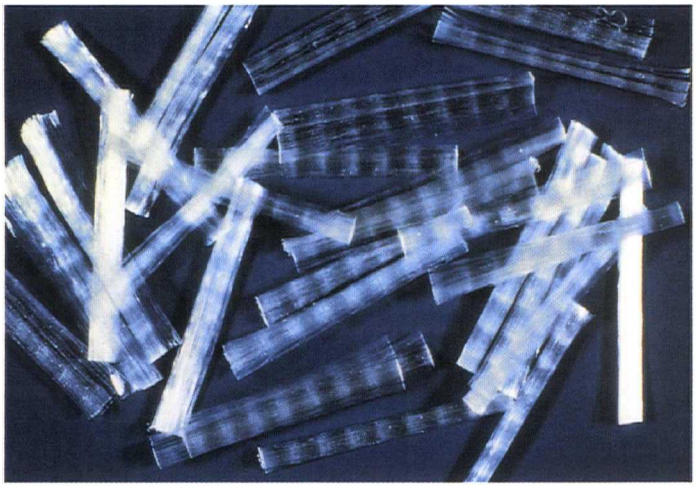
9. Progressive deterioration of steel in concrete.

THE ROLE OF FIBERS IN CONCRETE

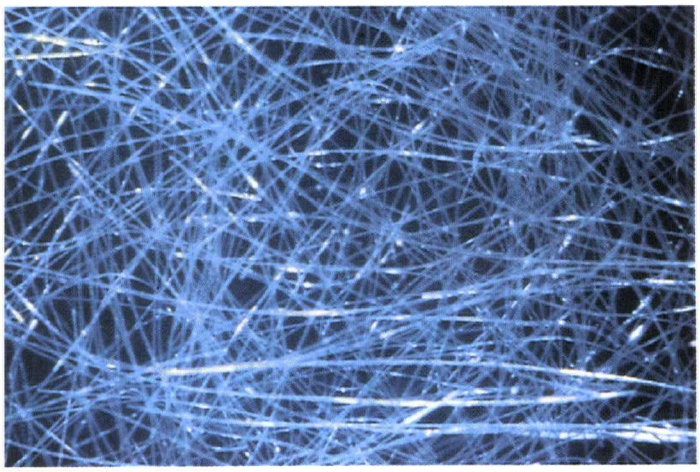
Fibers in concrete have two major functions. The first is to prevent plastic shrinkage cracking. The second is to reduce the segregation of the components of the concrete. There are a number of other physical properties which are improved by the addition of fibers to concrete. The reduction in permeability of the concrete is an attribute of prime importance with regard to the protection against corrosion. The high Toughness Index, which is the ability of concrete to sustain a load after initial crack, is also important as it relates both to spalling and to a continuing bond to the steel reinforcement.

Polypropylene fibers are considered the best type of fibers to be placed in concrete. Polypropylene is inert and is not affected by either acids or the alkalis found in concrete. It will not degrade in concrete. It is not subject to any form of corrosion. It is light, with a specific gravity of .91 and, therefore, there is a large volume of fibers for a given weight. It is strong, with a tensile strength of over 50 Ksi. It is an economical fiber and so can be used in adequate quantities without a large expenditure of money. Normally, for slabs and other horizontal concrete flat work, polypropylene fibers are found to be more satisfactory in use than wire mesh or other steel members used for secondary reinforcement and for these reasons can replace these steel units. The fibers cannot replace primary steel reinforcement.

The normal dosage of polypropylene fibers is .9 kilos per cubic meter of concrete (1-1/2 pounds per cubic yard). The fiber length is usually 19mm (3/4"). The fibrillated bundles of fibers prevent balling and during mixing are separated into individual fibers and become evenly distributed throughout the concrete. There are approximately 7,100,00 individual fibers per cubic meter or about 7 fibers per cubic centimeter.
(See Illustrations 10, 11, 12).



10. Groups of fibrillated fibers. The polypropylene fibers are fed into the concrete in fibrillated bundles in order to prevent balling during mixing. The mixing cycle breaks the bundles into individual fibers as shown in Illustration #12.

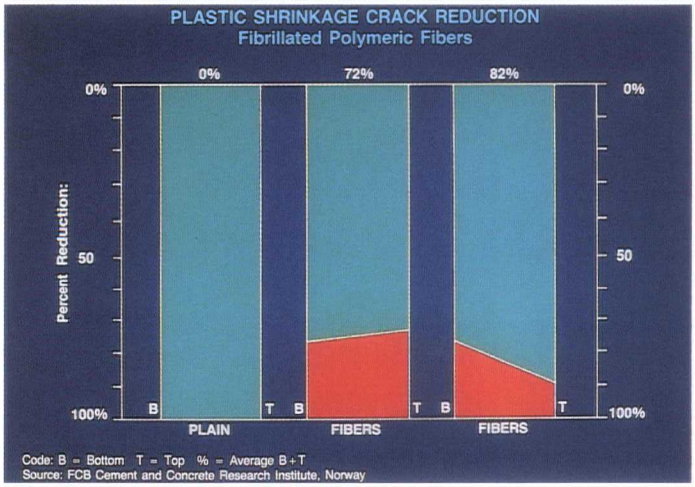


11. A demonstration of fiber distribution. This block of acrylic simulates the manner in which the fibers are located throughout the entire mass of concrete.

12. Micro-photo of fibers in concrete. This 50x photograph shows the manner in which the fibers are evenly distributed throughout the concrete in a tri-dimensional plane to assure firm anchorage.

PLASTIC SHRINKAGE CRACKING

It has been noted that cracks in concrete allow ready access to the reinforcing steel of rust-inducing elements such as moisture, chlorides, carbon dioxide, and oxygen. Fibers are able to reduce this type of cracking by 95% to 100% in a slab composed of good quality concrete, placed and cured following recommended concrete practices. The Norwegian Cement and Concrete Research Institute, in testing the control of plastic shrinkage cracks, found that approximately 80% of all plastic shrinkage cracks extended completely through the concrete. Therefore cracks of this type must be regarded as a major source of damage. If such cracks were superficial, penetrating only slightly into the concrete, then the incidence of plastic shrinkage cracks would not be serious as the integrity of the concrete would not be affected. (See Illustrations 13 & 14).

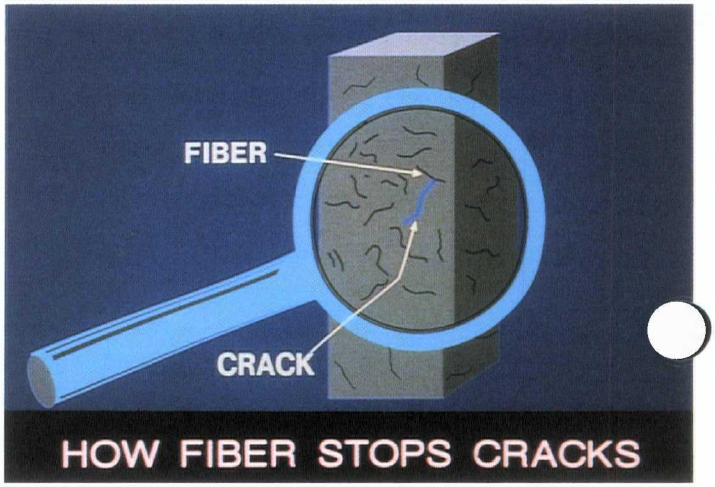


13. Most plastic shrinkage cracks extend through the concrete. Tests by the Norwegians proved that approximately 80% of all plastic shrinkage cracks extend throughout the thickness of the concrete.

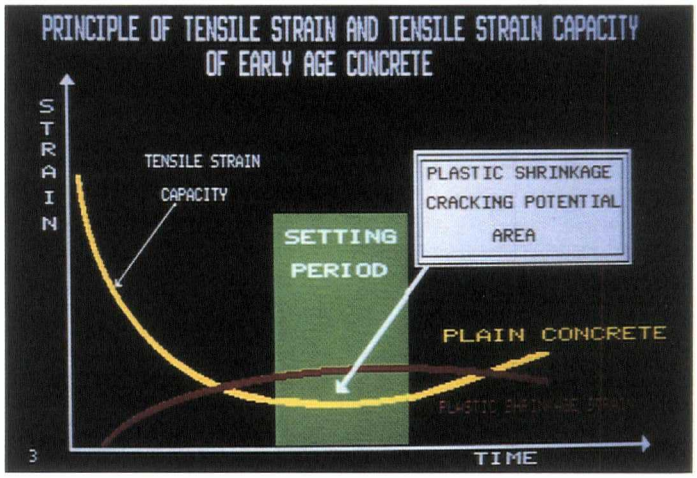
14. Typical plastic shrinkage crack. Plastic shrinkage cracks destroy the integrity of the concrete and permit easy access of destructive elements to the reinforcing steel.

In concrete without fibers, removal of the bleed water is basically responsible for causing plastic shrinkage cracking. As the bleed water moves to the surface of the concrete, microscopic capillary canals are formed. Throughout the concrete a multitude of microscopic cracks are developed and these begin to meet, join and become larger cracks, known as macro-cracks. The macro-cracks also meet, join and grow into major damaging plastic shrinkage cracks.

When fibers are introduced into the concrete, the micro-cracks begin to form. However, when a micro-crack reaches a fiber it is prevented from further growth. The tiny micro-crack remains in its initial small size. Somewhere adjacent to the first crack another micro-crack appears and it also is intersected by another fiber and prevented from further growth. In this manner the micro-cracks are not allowed to develop into cracks which could create a reduction in the concrete's integrity. (See Illustration 15 & 16).



15. How fibers stop cracks. A micro-crack, developed by the bleed water, is stopped and prevented from growing when it intersects a fiber.

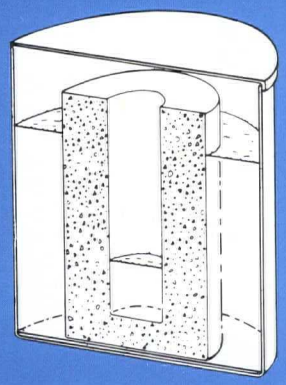


16. Principle of tensile strain capacity. Fibers prevent plastic shrinkage cracks during the critical stage prior to final set by increasing the resistance to the internal stresses created by plastic shrinkage of the concrete.

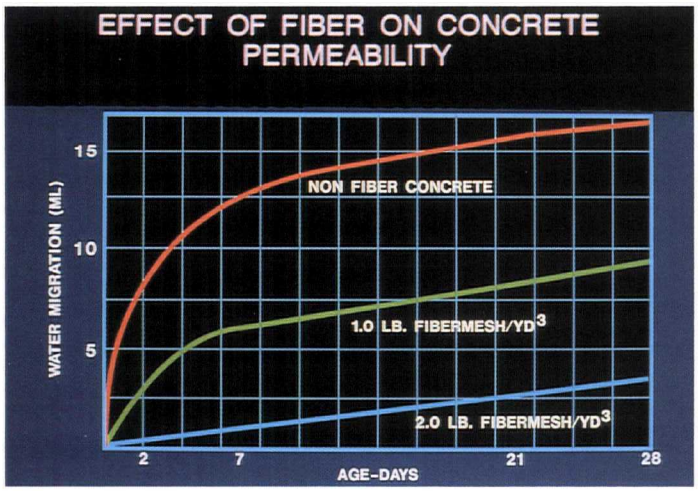
PERMEABILITY OF CONCRETE

The permeability of concrete will vary widely for a number of reasons. The addition of fibers will also vary in the degree of the reduction in permeability they will provide in a given application. The amount of fiber in the concrete has a great effect upon the improvement to be expected. In the Von Test, as a part of this report, there was a 44% reduction in permeability when the equivalent of 593 grams of polypropylene per cubic meter was added to the plain concrete. This improvement was increased to 79% when the equivalent of 1187 grams per cubic meter was included in the mix. (See Illustration 17 and 18).

Permeability-Von Test Method-B
Sealed 5 gallon vessel containing 6" x 12" concrete cylinder. Specimen has 2" x 11" inner bore. Permeability is tested by measuring the milliliters of water migrating into the inner bore.



17. The Von Test for permeability. The Von Test truly measures the permeability of concrete and is preferred to methods which measure absorption.



Effect of fiber on permeability. The Von Test shows that the ee of permeability is affected by the amount of fiber in the concrete.

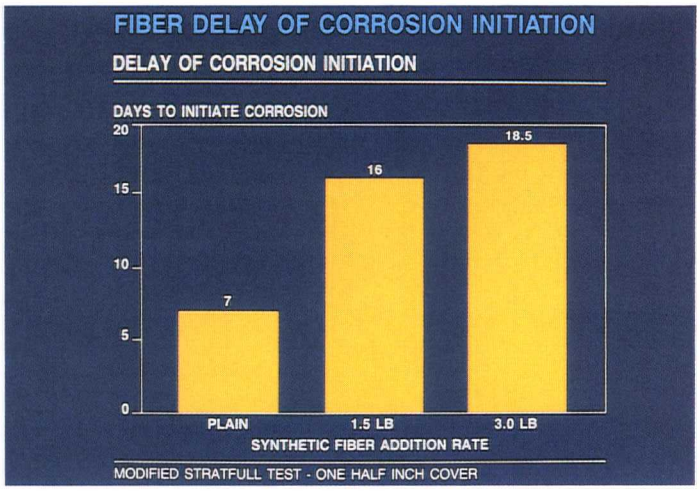
INITIAL TEST PROGRAM — 1986

The initial test program by Webster Engineering to evaluate the effect of fibers on the corrosion of steel in concrete began in April, 1986 and a report indicated that, on a preliminary basis, the addition of fibers in concrete could significantly prolong the time before the occurrence of corrosion of steel in concrete.

The program consisted of two separate sets of tests. In both stages the procedure of testing was the same and followed the Stratful method. In the first test, the test units consisted of four (4) single #4 reinforcing bars cast in 38mm (1-1/2") diameter cylinders of concrete. The first bar was cast in plain concrete. The second bar was in concrete containing polypropylene fibers at the rate of 890 grams per cubic meter (1-1/2 pounds per cubic yard). The third bar was in plain concrete with the addition of 10% of calcium chloride by weight of cement. The fourth bar was cast in concrete which contained both the addition of 10% of calcium chloride and also the equivalent of 890 grams per cubic meter (1 1/2 pounds per cubic yard) of polypropylene fiber.

After curing for 28 days, the specimens were then submerged to 2/3 of their length in water containing 15% sodium chloride. Each specimen was then examined for corrosion by measuring the electrical potential of the reinforcing bar with a copper/copper sulfate electrode. When the observed potential exceeded 350 mV, the specimens were also examined for cracks due to internal pressure created by the steel corrosion .

The second set of tests were then performed with the only difference being the doubling of the amount of fiber in the two appropriate specimens. In this test, the two plain concrete specimens attained a corrosive potential of negative 500 mV at five (5) and seven (7) days, respectively, while the specimens with fibers did not attain the same negative 500 mV potential until the sixteenth (16) and twenty-first (21) days. These tests indicated that the addition of fibers reduces the rate of ion diffusion and thus delays the initiation of corrosion. (See Illustration 19).



19. Fibers delay corrosion. The Stratful tests by Webster showed that the addition of fibers doubled the time before corrosion began.

PRESENT TEST PROGRAM — 1987

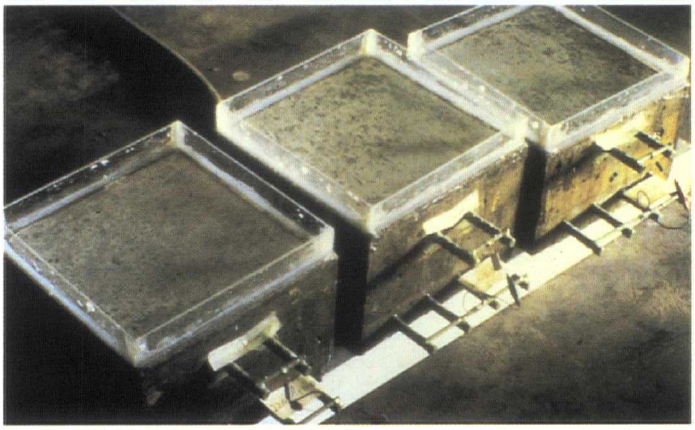
In January 1987, Webster Engineering began the test program still underway to evaluate the long-term effects of adding polypropylene fibers to concrete with relation to the protection of steel reinforcement against corrosion. The specimens were 300mm x 300mm x 175mm prisms (approximately 12" x 12" x 7"). Polypropylene fibers were included in selected prisms. The specimens contained an upper mat of "anodic steel" consisting of a 25mm (1") cover over two (2) reinforcing bars in a location that eventually became chloride contaminated and moist from salt water ponding. (See Illustration 20).

The lower mat remained in a chloride free environment and became cathodic. This lower mat consisted of a 25mm cover over either four (4) reinforcing bars, a double layer of welded wire mesh, or no reinforcing steel at all. All exposed ends of steel were epoxy coated to prevent any end corrosion. The upper and lower mats were electrically connected so that the flow of macrocell corrosion current between the cathoodic and anodic mats was isolated and could be measured. Other corrosion parameters such as linear polarization, copper/copper sulfate half-cell potential at the top surface and concrete electrical resistance could also be measured.

After 21 days of air curing, the specimens began a cycle of 92 hours of ponding of 15% sodium salt water solution at a depth of 13mm (1/2") in the laboratory at 15 to 21 degrees Celsius (60 - 70°F.). At the end of the 92 hours exposure, the salt water was removed, the slabs were rinsed with fresh water, and then placed in a heating chamber at 38 degrees Celsius (100°F.) for a period of 68 hours. After the specimens were removed from the heating chamber, the ponding cycle was resumed.

It is estimated that 24 weeks of this cyclic treatment represents 10 to 20 years of chloride penetration in a typical northern climate, for bridges and parking decks.

Two variables were to be tested in this program. The first was the length and amount of polypropylene fiber. The second was the type and placement of the reinforcing steel. The detailed description of each specimen follows:



20. Preparation of specimens. The prisms during the test period of 48 weeks, prepared for the salt water ponding.

SPECIMEN DESIGN

MIX DESIGNS FOR VARIOUS VOLUMES OF 19.1mm FIBRILLATED POLYMERIC FIBERS

Note: Batch weights are given for a volume of 0.055 m³, sufficient to cast 3 beam specimens.

	Conventional Water Reducer			Superplasticizer	
	0.1%	0.3%	0.5%	0.3%	0.5%
Cement			12.55 kg	for all mixes	
Fly ash			3.15 kg		
Sand+			48.60 kg		
5-10 mm aggregate++			10.45 kg		
10-20 mm aggregate++			48.40 kg		
Added water			8.34 kg		
TOTAL			131.49 kg		
19.1 mm Fibers	49.5 gms	148.5 gms	247.5 gms	148.5 gms	247.5 gms
Air entrainment	4 ml	4 ml	4 ml	—	—
Water reducer	40 ml	40 ml	40 ml	—	—
Superplasticizer	—	—	—	25 ml	150 ml
Slump (cm)	18	13	5	6	5
Unit weight (kg/m³)	2381	2345	2361	*	*
% Air	2.5	5.4	4.2	*	*

* Not measured
\+ Moisture content of sand = 2.14%
++ Moisture content of combined coarse aggregate = 1.16%

Specimen	Description
100 A & B	Plain Portland Cement Concrete Rebar top & bottom
101 A & B	.890 kg/m³, 38mm fiber Rebar top & bottom
102 A & B	.890 kg/m³, 38mm fiber Rebar top, mesh bottom
103 A & B	.890 kg/m³, 38mm fiber Rebar top, no bottom steel
104 A & B	1.780 kg/m³, 19mm fiber Rebar top & bottom
105 A & B	3.560 kg/m³, 19mm fiber Rebar top & bottom
106 A & B	1.780 kg/m³, 38mm fiber Rebar top & bottom

(Note — The amount of fiber is the equivalent per cubic meter)

PARAMETERS TO BE MEASURED

The following five (5) parameters were measured, with the exception of Specimen #103, which did not have any bottom steel. Only half-cell potentials and visual appearance could be evaluated for Specimen #103.

Half Cell Potential ..... Millivolts to copper sulfate electrode
(-.250 mV = active corrosion)

Corrosion Current ..... Macro currrent between upper and lower mats

Resistance ..... Electrical resistance in ohms

Linear Polarization ..... Rate of corrosion

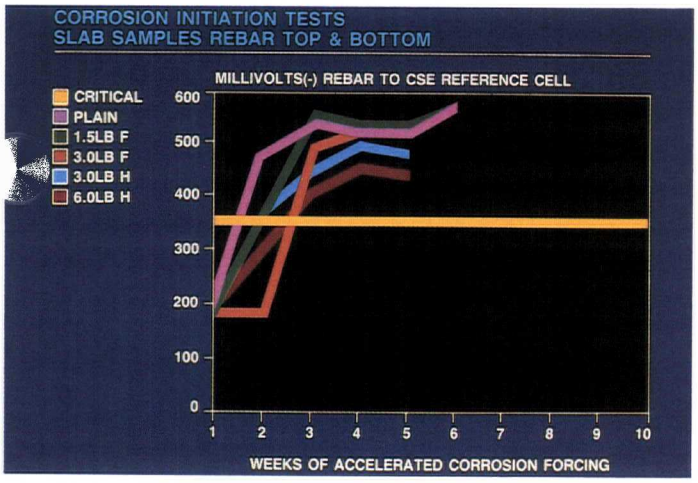
Appearance ..... Visual, as per Item E, chart, page 9:
(1) No cracking, no spalling
(2) No cracking, spalling with minimal oxidation
(3) No cracking, minimal spalling and oxidation
(4) Minimal cracking, spalling and oxidation
(5) Cracking, spalling and oxidation

CORROSION RESISTANCE RATINGS

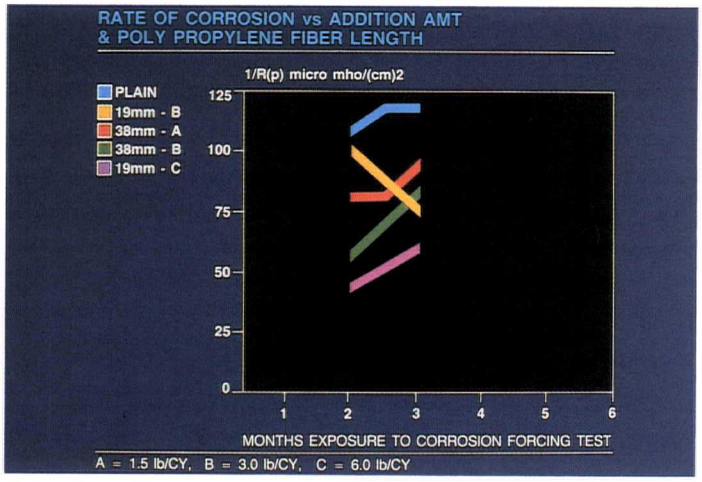
	100 A&B	101 A&B	102 A&B	103 A&B	104 A&B	105 A&B	106 A&B
A	5	4	3	5	4	3	3
B	3	2	2	-	5	4	3
C	5	3	3	-	3	3	3
D	2	5	1	-	3	3	4
E	5	4	3	1	2	3	3
F	20	18	12	*	17	15	16
G		10%	40%		15%	25%	20%

* - Due to no bottom steel, several tests were not performed

A = Half-cell potentials
B = Corrosion current
C = Resistance
D = Linear polarization
E = Appearance
F = Point total
G = Percent reduction



21. 1988 test results. Basically, the tests pointed out that an increase in the amount of fiber would result in an increase in the amount of time before corrosion would commence.



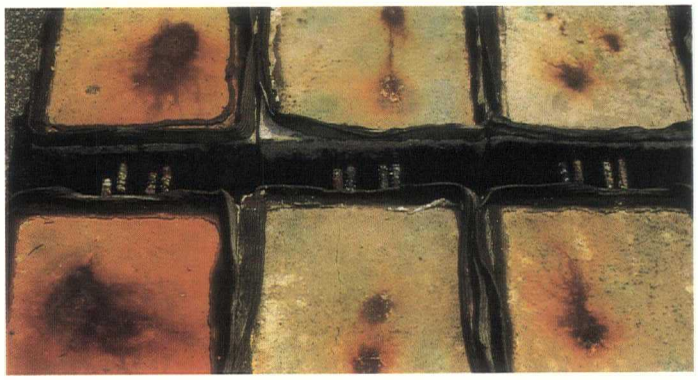
22. 1988 test results. The tests also confirmed that it was the amount of fiber, not fiber length, that controlled the delay in corrosion.

SURVEY OF SPECIMENS — 1991

Since the end of the active period taking readings from the prisms in 1987, the specimens have been stored outside at the location of Webster Engineering at Cleveland, Ohio. Therefore the prisms have been subjected to typical northern climatic conditions. The specimens have been stored on a paved uncovered surface subject to rain, the heat of the sun in the summer and the cold temperatures of ice and snow in the winter.

Duplicate prisms of each configuration had been made. Webster Engineering has completed a visual inspection in one of each set of prisms by sawing into the prism to the point of revealing the location of the steel reinforcement in order to evaluate the [illegible]ee of corrosion of the steel. Also, the amount of delamination, if any, would then be noted.

The photographs reproduced here show the condition of the steel rebar after over 4 years of being embedded in concrete that has been subjected to a simulated marine environment. There is every indication that the addition of polypropylene fibers will benefit concrete which is exposed to the possibility of excessive corrosion. The authors stress that there is a difference between laboratory testing and performance in the field. Probably, due to more varied conditions of concrete, workmanship, and environment, the benefical effect of the addition of fibers may be greater in the field. The present series of tests are being carried out to simulate field conditions and the results are presented to stimulate interest in finding economical means of reducing the massive damage to concrete structures by corrosion, the world over.



23. This photograph was taken in 1987 after aging the prisms for 48 weeks

From left to right, top row:

100B	101B	106B
Plain concrete	.890 kg, 38mm fiber	1.780 kg, 38mm fiber
Rebar Top & Bottom	Rebar Top & Bottom	Rebar Top & Bottom

From left to right, bottom row:

100A	101A	106A
Plain concrete	.890 kg, 38mm fiber	1.780 kg, 38mm fiber
Rebar Top & Bottom	Rebar Top & Bottom	Rebar Top & Bottom

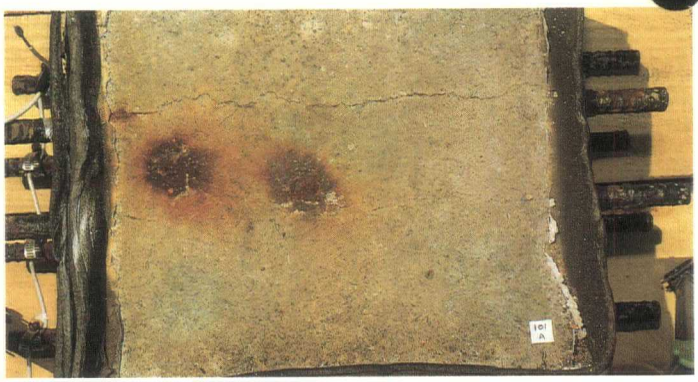
(Note — the amount of fiber is the equivalent per cubic meter)

24. Prism 100A Year 1987 No fiber

A close-up of Prism 100A . Plain concrete with rebar top and bottom. Showing the surface staining from interior corrosion of the steel.

25. Prism 100A Year 1991 No fiber

A significant amount of delamination can be seen as a direct result of corrosion crossing from one steel member to another.



26. Prism 101A Year 1987 .890 kg, 38mm fiber

Prism 101A, with the equivalent of .890 kilos of 38mm fiber per cubic meter of concrete and rebar top and bottom, shows considerable staining from internal corrosion.There is a crack in the concrete which is not from plastic shrinkage but developed at a later period during testing. This crack is probably mainly responsible for the degree of corrosion which has occurred at one side of the specimen during the 48 week test period.

27. Prism 101A Year 1991 .890 kg, 38mm fiber

As suspected from the visual examination of the surface, this prism has also undergone considerable delamination as a result of corrosion from rebar to rebar. However, as noted, on the opposite side from the crack there has been very little corosion of the steel.

28. Prism 101A Year 1991 .890 kg, 38mm fiber

As noted above, the steel in the prism on the side opposite from the crack has suffered only slight damage from corrosion.

29. Prism 106A Year 1987 1.780 kg, 38mm fiber

This prism has the equivalent of 1.780 kilos of 38mm polypropylene fiber added to the mix. There is rebar on top and bottom. Visually, there seems to be a large amount of corrosion present.

30. Prism 106A Year 1991 1.780 kg, 38mm fiber

It is interesting to note the small amount of corrosion of the steel that has occurred and which is responsible for the staining of the surface.

31. Prism 106A Year 1991 1.780 kg, 38mm fiber

A close-up of the single small area of the prism that shows any indication of corrosion.

32. This photograph was taken in 1987, after 48 weeks of aging.

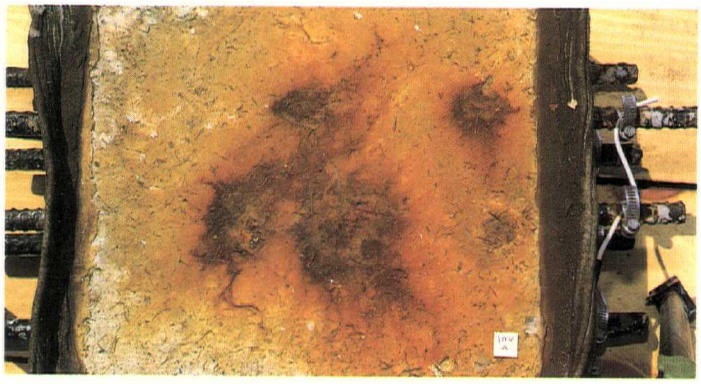
From left to right, top row:

100B	104B	105B
Plain concrete	1.780 kg, 19mm fiber	3.560 kg, 19mm fiber
Rebar Top & Bottom	Rebar Top & Bottom	Rebar Top & Bottom

From left to right, bottom row:

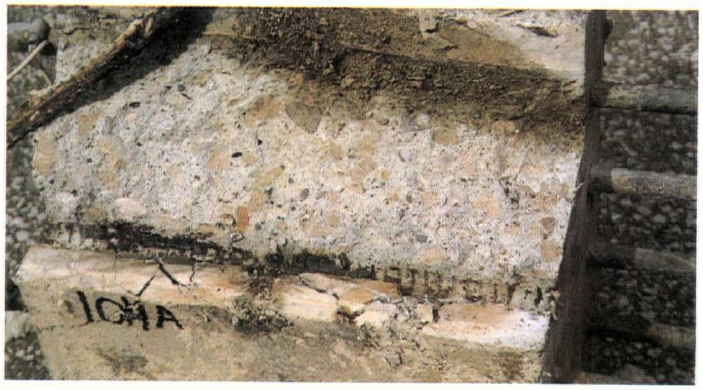
100A	104A	105A
Plain concrete	1.780 kg, 19mm fiber	3.560 kg, 19mm fiber
Rebar Top & Bottom	Rebar Top & Bottom	Rebar Top & Bottom

(Note — the amount of fiber is the equivalent per cubic meter)



33. Prism 104A 1987 1.780 kg, 19 mm fiber

This prism has the equivalent of 1.780 kilos of 19mm polypropylene fiber per cubic meter, with rebar top and bottom.This photograph was taken in 1987, after the specimen had undergone 48 weeks of aging under extreme laboratory conditions. Compare the condition of this prism to its duplicate, Prism 104B, in illustration # 32.

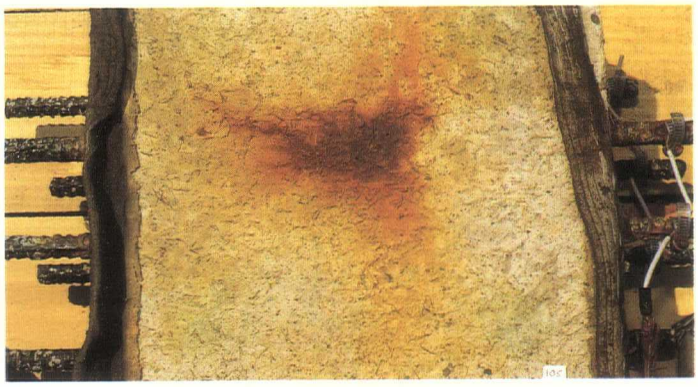


34. Prism 104A 1991 1.780 kg, 19mm fiber

The specimen after being sawn to examine the two sections of rebar. Note that only minimal corrosion has occurred and the rebar appears to be in excellent condition.

35. Prism 104A 1991 1.780 kg, 19mm fiber

The same prism as shown in Illustration #34, showing the single small area in which corrosion has taken place.



36. Prism 105A 1987 3.560 kg, 19mm fiber

This specimen, with the equivalent of 3.5 kilos of 19mm polypropylene fiber and rebar top and bottom, has a moderate amount of staining showing on the surface. Its duplicate, Prism 105B, upper row in Illustration 32, appears to have less internal corrosion. Prism 105A was therefore selected in 1991 for disassembly to evaluate the degree corrosion had taken place.

CONCLUSION

It is not claimed that the addition of polypropylene fibers will prevent the corrosion of steel in concrete. The tests shown in this report show that there continues to be corrosion, even with relatively large amounts of fiber present. There are many alternative methods to reduce corrosion. The major point of consideration is that the addition of fibers to concrete provides valuable improvements to a number of the physical properties of concrete, without regard to the effect on corrosion control. If, in addition to these advantages, the time before corrosion commences in a concrete structure and if the rate of corrosion is reduced, then the use of polypropylene fibers becomes a long-term economical and technical alternative worthy of serious consideration.

37. Prism 105A 1991 3.560 kg, 19mm fiber

Sawing to the rebar reveals only a minor amount of corrosion of the steel. The surface of the rebar is only slightly corroded.

38. Prisms 100, 102, and 103

This photograph was taken in 1987 at the completion of the 48 weeks of initial aging under test conditions.

From left to right, top row:

100B	102B	103B
Plain concrete	.890 kg, 38mm fiber	.890 kg, 38mm fiber
Rebar Top & Bottom	Rebar Mesh bottom	Rebar No Bottom

From left to right, bottom row:

100A	102A	103A
Plain concrete	.890 kg, 38mm fiber	.890 kg, 38mm fiber
Rebar Top & Bottom	Rebar Top & Bottom	Rebar Top & Bottom

(Note — the amount of fiber is the equivalent per cubic meter)

The prisms with mesh bottom show indications of corrosion, as there is still an anode-cathode relationship to promote corrosion. As expected, the prisms without bottom layers of steel do not show any signs of corrosion.

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Date Tested:	06/15/97
Reference:	Well Water
Sample Location	Bartow

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Parameter	Specification Limits	Results
Alkalinity (as $CaCO_3$)	0.05%	0.017%
Total Organic Solids	0.05%	0.009%
Total Inorganic Solids	0.08%	0.019%
Total Chlorides	0.05%	0.003%

The water sample *meets or exceeds* specifications in Section 923-1 of FDOT Standard Specifications for Road and Bridge Construction.

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Certificate of Inspection

THIS CERTIFIES THAT THE SCALES LOCATED

Ft. Rock - Bartow, Fl.

HAVE BEEN TESTED AND APPROVED THIS DATE 3 - 21 - 97

SCALE TEST BASED ON STANDARDS SET BY U.S. GOVERNMENT AND FLORIDA DEPT. OF AGRICULTURE AND THIS TEST COMPLIES WITH D.O.T. SPECIFICATIONS AND FLA. STATUTE CHAPTER 531.

SANFORD CO., INC. SCALE

SANFORD SCALE CO., INC.
P. O. BOX 1388
SANFORD, FLORIDA 32772-1388

Bill - Harrold
SERVICE DEPT. TECHNICIAN

SANFORD SCALE CO., INC.

A99

Certificate of Inspection

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P. O. BOX 1388
SANFORD, FLORIDA 32772-1388

Bill Harold
SERVICE DEPT. TECHNICIAN

PAGE 4 -2 &

SANFORD SCALE CO., INC.

Cement

Certificate of Inspection

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Ft. Rock - Bartow, Fl

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SANFORD CO., INC. S C A L E

SANFORD SCALE CO., INC.
P. O. BOX 1388
SANFORD, FLORIDA 32772-1388

Bill - Herold

SERVICE DEPT. TECHNICIAN

Concrete Products Performance Evaluation

Mix Design Information

General Mix Design Information

Mix Design Number: **52-5217**

Mix Design Class: **4000 PSI 2" Pump Mix**

Specified Strength (psi): **4000**

Slump (in.): **6.0 + - 1.5**

Air Content (%): **3.5 + - 2.0**

Water/Cementitious Ratio: **0.44**

Unit Weight (pcf): **137.0**

Mix Design Proportions

Material	Weight (lb.)	Volume (cu. ft.)
Type I Portland	**520**	**2.65**
Fly Ash (2.20)	**160**	**1.17**
Silica Sand	**1372**	**8.36**
S FL Lmstn. FRI, #89	**1350**	**9.13**
Water	**296**	**4.74**
Air Entrainment, oz.	**6.8**	**0.95**
Lignosulfonate Admix, oz.	**13.6**	**----**

Concrete Products Performance Evaluation

Collected Data and Preliminary Analysis

Seq. Test Num.	Lab Test Num.	Date Made	Strength Specimens (psi) 3 day 4x12 Cyl	7 day 6x12 Cyl	28 day 6x12 Cyl	28 day 6x12 Cyl	56 day 6x12 Cyl	Slump (in.)	Air Content (%)	Unit Weight (pcf)	Conc. Temp. (deg F)	Amb. Temp. (deg F)	Water Added (gl/yd)	Plastic Age (min.)	Test (psi)	Moving Avg. of 3 Tests	Range of Test
1	1	09-12-95		4420	5270	5550		5.0	N/A		N/A	N/A	0		5410	—	280
2	2	10-17-95		4650	6120	5940		4.0	N/A		86	N/A	0		6030	—	180
3	3	10-24-95		3920	4270	4900		7.0	N/A		80	76	1		4590	5340	630
4	4	10-26-95		4460	5590	5700		4.5	N/A		85	82	1		5650	5420	110
5	5	11-01-95		3750	5110	4970		8.0	N/A		75	80	5		5040	5090	140
6	7	11-02-95		5580	6470	6610		6.0	N/A		78	52	.7		6540	5740	140
7	8	11-03-96		4340	6030	5900		7.0	N/A		79	84	.5		5990	5860	180
8	9	11-07-95		3920	5030	5000		6.0	N/A		82	87	.7		5020	5850	30
9	10	11-14-95		3540	4940	5380		7.25	N/A		79	65	1		5120	5380	360
10	11	11-14-95		3890	4940	5050		7.5	N/A		79	65	1		5000	5040	110
11	12	12-01-95		3900	5580	5080		5.5	N/A		71	62	0		5330	5150	500
12	13	12-04-95		3580	5130	5040		7.5	N/A		79	77	1		5090	5140	90
13	14	12-06-95		3250	4740	4740		6.0	N/A		74	84	.6		4740	5050	0
14	15	12-14-95		3980	5460	5460		6.0	N/A		75	60	0		5460	5100	0
15	16	12-19-95		4200	5380	5470		6.0	N/A		74	72	0		5430	5210	90
16	17	12-22-95		4450	5660	5710		9.0	N/A		57	45	.4		5690	5520	50
17	19	01-05-96		3130	4820	5000		6.5	N/A		63	52	0		4910	5340	180
18	20	01-12-96		3760	5010	5010		7.0	N/A		67	55	1		5010	5200	0
19	21	01-17-96		3600	4350	4400		7.0	N/A		72	74	.5		4360	4770	50
20	22	01-18-96		4100	5170	5170		7.5	N/A		76	74	0		5170	4850	0
21	23	01-24-96		3920	4800	5350		6.25	N/A		68	70	0		5080	4870	550
22	24	01-25-96		3400	5340	5060		5.0	N/A		72	58	0		5200	5150	280
23	25	01-25-96		4030	5520	4620		7.5	N/A		72	59	0		5070	5120	900
24	26	01-29-96		3400	4640	4640		10.0	N/A		74	64	.6		4640	4970	0
25	27	01-29-96	2630	3760	5270	5340		7.5	N/A		76	66	1		5320	5010	90
26	28	01-31-96		1130	5640	5640		8.0	N/A		82	74	1		5640	5200	0
27	29	02-01-96		3600	4900	5220		N/A	N/A		N/A	69	0		5060	5340	320
28	30	02-07-96		4250	6300	5740		7.5	N/A		74	56	1		6020	5570	560
29	31	02-09-96		3820	5760	6330		6.5	N/A		64	52	0		6050	5710	570
30	32	02-13-96		3940	5490	5550		7.5	N/A		65	38	0		5520	5860	60
31	33	02-14-96		3480	4980	5130		8.0	N/A		67	36	0		5060	5540	150
32	34	02-16-96		4100	5990	6200		8.0	N/A		72	58	0		6100	5560	210
33	35	02-16-96		4280	5880	6170		6.5	N/A		70	61	.6		6030	5730	290
34	36	02-20-96		3560	5110	4790		9.0	N/A		73	64	1		4950	5690	320
35	37	02-21-96		4360	5520	5620		8.5	N/A		72	58	0		5570	5520	100
36	38	03-13-96		4450	5530	5530		7.0	N/A		64	64	0		5530	5350	0
37	39	03-14-96		4270	5340	5520		6.5	N/A		69	68	0		5430	5510	180
38	40	03-19-96		3220	5430	5250		7.0	N/A		74	64	1.258		5340	5430	180
39	41	03-22-96		5740	6100	6440		8.0	N/A		80	65	2		6270	5680	340

Concrete Products Performance Evaluation

American Concrete Institute Analysis

Average Strength: **5370 psi** Number of Tests: **39**

Design Strength: **4000 psi**

Standard Deviation: **492 psi** Correction Factor (ACI 301-89 Table 3.9.1.2): **1.00**

Adjusted Standard Deviation **492 psi**

Determination of Required Average Strength

(ACI 301-89 Section 3.9.2.1 Equation 3-3): **4659 psi**

(ACI 301-89 Section 3.9.2.1 Equation 3-4): **4646 psi**

Minimum Required Average Strength (the larger of above equations) **4659 psi**

Performance Above ACI 301/318 Minimum Required: **711 psi**

Meets ACI 301-89 Section 17.2 and ACI 318-89 Section 5.6.2.3 for the acceptance of concrete strength (no single test < f'c - 500 psi and no average of 3 consecutive tests < f'c): **YES**

Control Standards (ACI 214-77{89} Table 3.5)

Class of Operation: **General Construction/Field Control Testing**

Concrete Performance: **Very Good** Adj. Standard Deviation **492 psi**

Laboratory Testing Proficiency: **Very Good** Within Test C.V.: **3.5**

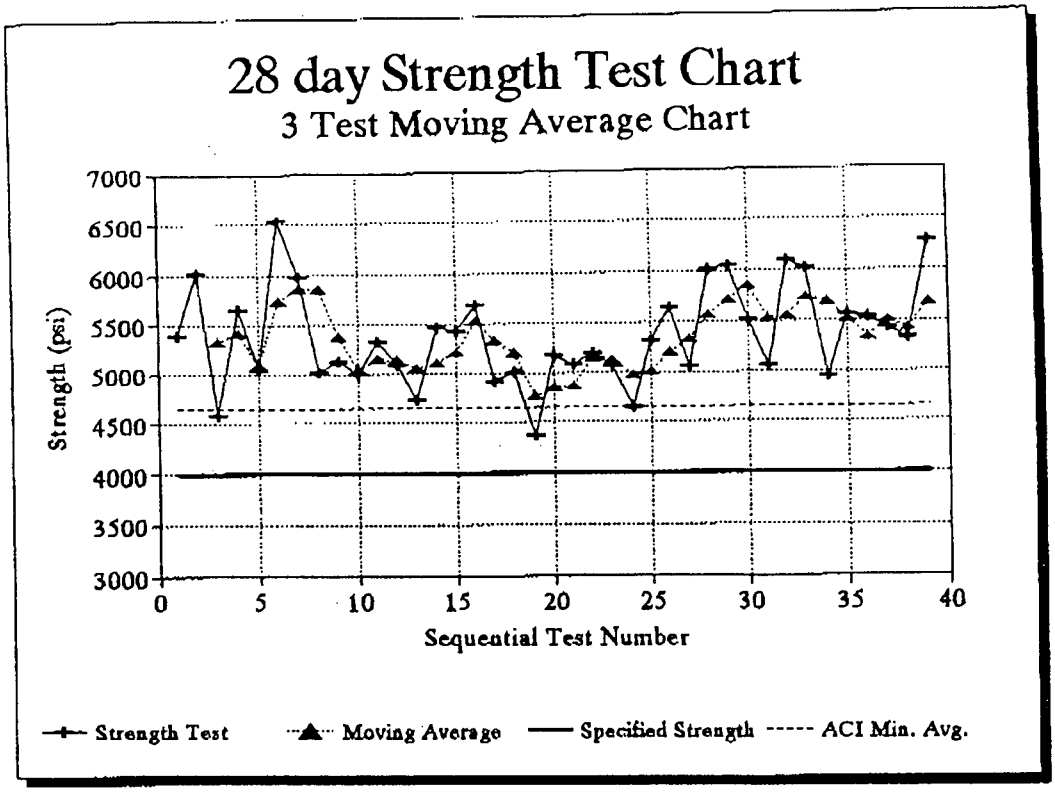
As per ACI 301-89 Section 3.9.1.1 and ACI 318 Section 4.3.1.1, the above information also qualifies these mix designs:

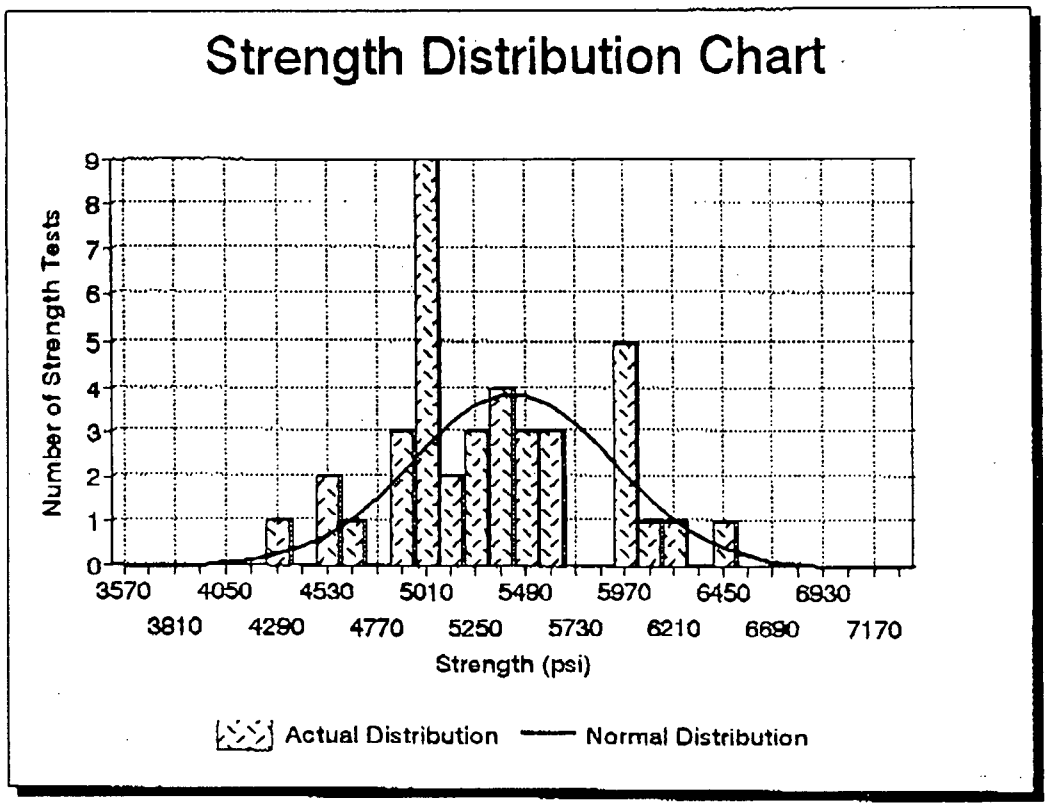
_____ _____ _____
Signature

_____ _____ _____
Title

Concrete Products Performance Evaluation

Control Chart Summary





A & S LABORATORIES, INC.
2165 Sunnydale Blvd., Suite Q
Clearwater, FL 34625
(813) 441-2044

Customer:	FLORIDA ROCK INDUSTRIES, INCORPORATED
Attention:	David McFall
A & S Sample Number:	550628
Date Sampled:	06/10/97
Date Tested:	06/15/97
Reference:	Well Water
Sample Location	Bartow

The results of tests performed in accordance with FDOT Test Method TM1-T 026, Quality of Water to be Used in Concrete are as follows:

Parameter	Specification Limits	Results
Alkalinity (as $CaCO_3$)	0.05%	0.017%
Total Organic Solids	0.05%	0.009%
Total Inorganic Solids	0.08%	0.019%
Total Chlorides	0.05%	0.003%

The water sample *meets or exceeds* specifications in Section 923-1 of FDOT Standard Specifications for Road and Bridge Construction.

Very truly yours,

Gregory P. Allen
Laboratory Director

[redacted]

SOUTHDOWN, INC.
BROOKSVILLE CEMENT LABORATORY TEST CERTIFICATE

16301 Ponce de Leon Boulevard - Brooksville, Florida 34614
(352) 796-7241

CONSIGNED TO: FL Rock Taft

100

DATE: MAY 1997 6-4-97
QUANTITY 27,140 TONS
TYPE I/II SILO #7 & 8

Chemical Composition	TEST RESULT		SPECIFICATION LIMITS TYPE I ASTM C-150	TYPE I AASHTO M-85	TYPE II ASTM C-150	TYPE II AASHTO M-85
% Silicon Dioxide (SiO2)	20.75	Min %	—	—	20.0	20.0
% Aluminum Oxide (Al2O3)	5.01	Max %	—	7.5	6.0	6.0
% Ferric Oxide (Fe2O3)	3.84	Max %	—	6.0	6.0	6.0
% Calcium Oxide (CaO)	63.99	—	—	—	—	—
% Magnesium Oxide (MgO)	0.77	Max %	6.0	6.0	6.0	6.0
% Sulfur Trioxide (SO3):	2.91					
When C3A is 8.0% or less		Max %	3.0	3.0	3.0	3.0
When C3A is over 8.0%		Max %	3.5	3.5	—	—
% Tricalcium Silicate (C3S)	52.96	Max %	—	—	—	55.0
% Tricalcium Aluminate (C3A)	7.71	Max %	—	—	8.0	8.0
% Alkalis (Na2O+0.658K2O)	0.51	Max %	—	0.60	—	0.60
% Insoluble Residue	0.36	Max %	0.75	0.75	0.75	0.75
% Loss on Ignition	1.68	Max %	3.0	3.0	3.0	3.0
Physical Properties						
Fineness: Blaine (m2/kg)	391	Min	280	280	280	280
		Max	—	400	—	400
Time of Setting (Gillmore):						
Initial (hours:mins)	1:57	Min	1 hour	1 hour	1 hour	1 hour
Final (hours:mins)	3:59	Max	10 hours	10 hours	10 hours	10 hours
%Air Content	7.17	Max %	12.0	12.0	12.0	12.0
Compressive Strength (PSI):						
1 Day:	2,140					
3 Day:	3,583	Min	1800	1800	1500	1500
7 Day:	4,561	Min	2800	2800	2800	2800
%Autoclave Expansion	0.010	Max %	0.80	0.80	0.80	0.80
Heat of Hydration (cal/g)	77.84					

We certify that the cement contained in this shipment complies with the following current applicable specifications:

ASTM C150 [X] AASHTO M-85 TYPE I [X] Consignee's Specs [ ]

Fed.SS-C-1960/3 [X] AASHTO M-85 TYPE II [X]

Cement covered by this Mill Certificate has been produced in the U.S.A.

Marty Dodson
Quality Control Manager

BEST AVAILABLE COPY

SEMCO CONSTRUCTION, INC.
205 CENTURY BLVD., P.O. BOX 706, BARTOW, FL 33831-0706
CGC 009876 • PHONE 941 / 533-7193 • FAX 941 / 533-3376

LETTER OF TRANSMITTAL

DATE	JOB NO
07/07/97	97086

ATTENTION: John Bale

RE: Laidlaw Environmental Services, Inc.

Concrete submittal

TO ViroGroup, Inc.
P.O. Box 1867
Lexington, S.C. 29072
Via Fax: 803-957-3845

GENTLEMEN:

WE ARE SENDING YOU [X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications
[ ] Copy of letter [ ] Change order [ ] _____

COPIES	DATE	NO.	DESCRIPTION
1	07/03/97	-	#57 Straight cement 4000PSI concrete
			Submittal complete

THESE ARE TRANSMITTED as checked below:

[ ] For approval [ ] Approved as submitted [ ] Resubmit _____ copies for approval
[X] For your use [ ] Approved as noted [ ] Submit _____ copies for distribution
[ ] As requested [ ] Returned for corrections [ ] Return _____ corrected prints
[ ] For review and comment [ ] _____
[ ] FOR BIDS DUE _____ 19 _____ [ ] PRINTS RETURNED AFTER LOAN TO US

REMARKS

Please call if any problems.

Thank you

Ed Locke

COPY TO File

SIGNED: Ed Locke

GENERAL OFFICE: 155 East 21st Street / P.O. Box 4667 / Jacksonville, Florida 32201 / (904) 355-1781
FLORIDA ROCK INDUSTRIES INC Mining, Ready Mix Concrete and Construction Products

Reply To: CENTRAL FLORIDA DIVISION
P.O. BOX 119
Bartow, Florida 33830

July 3, 1997

Semco Construction
Ed Locke
P.O.Box 706
Bartow, FL 33831

Dear Ed,

As requested enclosed is the new mix design for your Laidlaw Project at the Bartow Airport.

After researching our file the only data we found was poured in 1995. As we discussed the use of straight cement in our mix designs is hardly ever used.

As far as the dosage rate of W.R.D.A. 64, we will adjust the amount depending on the job conditions and weather to meet your project requirements. This amount will be adjusted if ambient temperature is 90 degrees and rising.

Thank You,

Charles D. Kreitner

SEMCO CONSTRUCTION, INC.
SHOP DRAWING REVIEW
No Exceptions Taken ☐
Note Markings ☐ Resubmit ☐
Contractor's review is for general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the supplier / Subcontractor from compliance with the project plans and specifications nor departures therefrom. The supplier / Subcontractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly and construction, and for performing his work in a safe manner.

By_____ Date_____

MATERIALS TESTING LABORATORY
5109 Carder Road / P.O. Box 547819
Orlando, Florida 32854-7819
(407) 298-1900

ACCREDITED CONCRETE TESTING LABORATORY

CONCRETE MIX DESIGN

CLASS OF CONCRETE: **4000 PSI** MIX NO.: **2-5602**

PROJECT: **Laidlaw at Bartow Airbase**
ARCHITECT:
ENGINEER:
CONTRACTOR: **Semco Construction**

DATE: **07-01-97**
REPORT NO.: **1**

MATERIALS

CEMENT:	Type I/II	ASTM C 150	Broco (Florida Mining)
CEMENTITIOUS MATERIAL:			
FINE AGGREGATE:	Silica Sand	ASTM C 33	Florida Rock Industries Inc
COARSE AGGREGATE I:	#57 Cr. Limestone	ASTM C 33	Florida Rock Industries Inc
COARSE AGGREGATE II:			
AIR-ENTRAINING AGENT:	Darex AEA	ASTM C 260	W. R. Grace & Company
CHEMICAL ADMIXTURE:	WRDA - 64	ASTM C 494	W.R. Grace & Company

TESTS ON AGGREGATES

FINE AGGREGATE	Specific Gravity	Unit Weight	Colorimetric Test	GRADATION (% PASSING U.S. SIEVE) 3/8"	#4	#8	#16	#30	#50	#100	#200	F.M.
I	2.63	102	Lighter Than Std.		100	99	91	62	20	3		2.25

COARSE AGGREGATE	Specific Gravity	Unit Weight	L.A. Abrasion	GRADATION (% PASSING U.S. SIEVE) 2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	F.M.
I	2.37	84.2	35		100	100	83	34	13	4	3		6.97
II													

MIX DESIGN FOR **4000** PSI CONCRETE AT **28** DAYS

Cement Content*:	5.6 cwt/cu. yd.	Slump:	3.0 + - 1.5 in.	Fine Agg. Volume:	42.1 %
Water/Cement (by weight)*:	0.45	Air:	3.0 + - 2.0 %	Unit Weight:	140.6 PCF

* Based on total cementitious material.

MATERIALS	QUANTITIES (SSD BASIS)	VOLUME (CU. FT.)
Type I/II	560	2.85
Silica Sand	1331	8.11
#57 Cr. Limestone	1650	11.16
Water	254	4.07
Darex AEA, oz.	1.7	.81
WRDA - 64, oz.	11.2	-------
		27.00

REMARKS:

Contractor assumes responsibility for ordering and placing mixes by Mix No. as approved by Architect/Engineer.

The concrete supplier can be responsible for concrete strength only if field sampling, specimen molding, curing and testing are done by qualified personnel (ACI Certification or equal) and conform with applicable ASTM Standards (C31, C39, C94, C1077). The concrete supplier is entitled to a copy of all concrete test reports (ASTM C94) for the documentation of control standards required by ACI 301 and ACI 318.

Concrete Products Performance Evaluation

Mix Design Information

General Mix Design Information

Mix Design Number: **2-5402**

Mix Design Class: **4000 PSI**

Specified Strength (psi): **4000**

Slump (in.): **4.0 + - 1.0**

Air Content (%): **3.0 + - 2.0**

Water/Cementitious Ratio: **0.48**

Unit Weight (pcf): **140.2**

Mix Design Proportions

Material	Weight (lb.)	Volume (cu. ft.)
Type I Portland	540	2.75
Silica Sand	1338	8.15
S FL Lmstn. FRI, #57	1650	11.16
Water	258	4.13
Air Entrainment, oz.	1.6	0.81
Lignosulfonate Admix, oz.	10.8	----

Concrete Products Performance Evaluation

Collected Data and Preliminary Analysis

Seq. Test Num.	Lab Test Num.	Date Made	Strength Specimens (psi) 3 day 6x12 Cyl	7 day 6x12 Cyl	28 day 6x12 Cyl	28 day 6x12 Cyl	56 day 6x12 Cyl	Slump (in.)	Air Content (%)	Unit Weight (pcf)	Conc. Temp. (deg F)	Amb. Temp. (deg F)	Water Added (gl/yd)	Plastic Age (min.)	Test (psi)	Moving Avg. of 3 Tests	Range of Test
1	1	3-24-95		4080	5790	5810		5.25	N/A		73	70	3		5800	—	20
2	2	4-24-95		4400	6060	5800		5.0	N/A		84	71	0		5930	—	260
3	3	4-25-95		4910	6070	6160		5.75	N/A		76	72	0		6120	5950	90
4	4	4-25-95		4100	5190	5280		5.75	N/A		76	63	0		5240	5760	90
5	5	5-01-95		4750	5780	5500		4.25	N/A		84	72	0		5640	5660	280
6	6	5-01-95		4960	6170	5600		4.5	N/A		83	72	0		5890	5590	570
7	9	5-11-95		2990	5370	5460		N/A	N/A		N/A	N/A	N/A		5420	5650	90
8	18	9-28-95		5370	6060	6060		6.0	N/A		80	74	0		6060	5790	0
9	19	9-28-95		4670	5810	5740		6.5	N/A		81	76	1.5		5780	5750	70
10	20	9-28-95		5190	6160	6230		5.5	N/A		93	79	0		6200	6010	70
11	21	9-28-95		5160	6340	6270		5.5	N/A		93	80	0		6310	6090	70
12	23	10-03-95		5120	5990	6110		6.0	N/A		92	75	0		6050	6180	120
13	24	10-03-95		4930	5640	5740		6.5	N/A		91	78	0		5690	6020	100
14	25	10-03-95		4560	5340	5430		6.0	N/A		95	80	0		5390	5710	90
15	29	10-30-95		4660	5760	5810		4.0	N/A		86	80	0		5790	5620	50
16	30	10-31-95		4580	5740	5700		4.5	N/A		83	76	0		5720	5630	40

Concrete Products Performance Evaluation

American Concrete Institute Analysis

Average Strength: **5810 psi** Number of Tests: **16**

Design Strength: **4000 psi**

Standard Deviation: **300 psi** Correction Factor (ACI 301-89 Table 3.9.1.2): **1.16**

Adjusted Standard Deviation **348 psi**

Determination of Required Average Strength

(ACI 301-89 Section 3.9.2.1 Equation 3-3): **4466 psi**

(ACI 301-89 Section 3.9.2.1 Equation 3-4): **4311 psi**

Minimum Required Average Strength (the larger of above equations) **4466 psi**

Performance Above ACI 301/318 Minimum Required: **1344 psi**

Meets ACI 301-89 Section 17.2 and ACI 318-89 Section 5.6.2.3 for the acceptance of concrete strength (no single test < f'c - 500 psi and no average of 3 consecutive tests < f'c): **YES**

Control Standards (ACI 214-77{89} Table 3.5)

Class of Operation: **General Construction/Field Control Testing**

Concrete Performance: **Excellent** Adj. Standard Deviation **348 psi**

Laboratory Testing Proficiency: **Excellent** Within Test C.V.: **1.9**

As per ACI 301-89 Section 3.9.1.1 and ACI 318 Section 4.3.1.1, the above information also qualifies these mix designs:

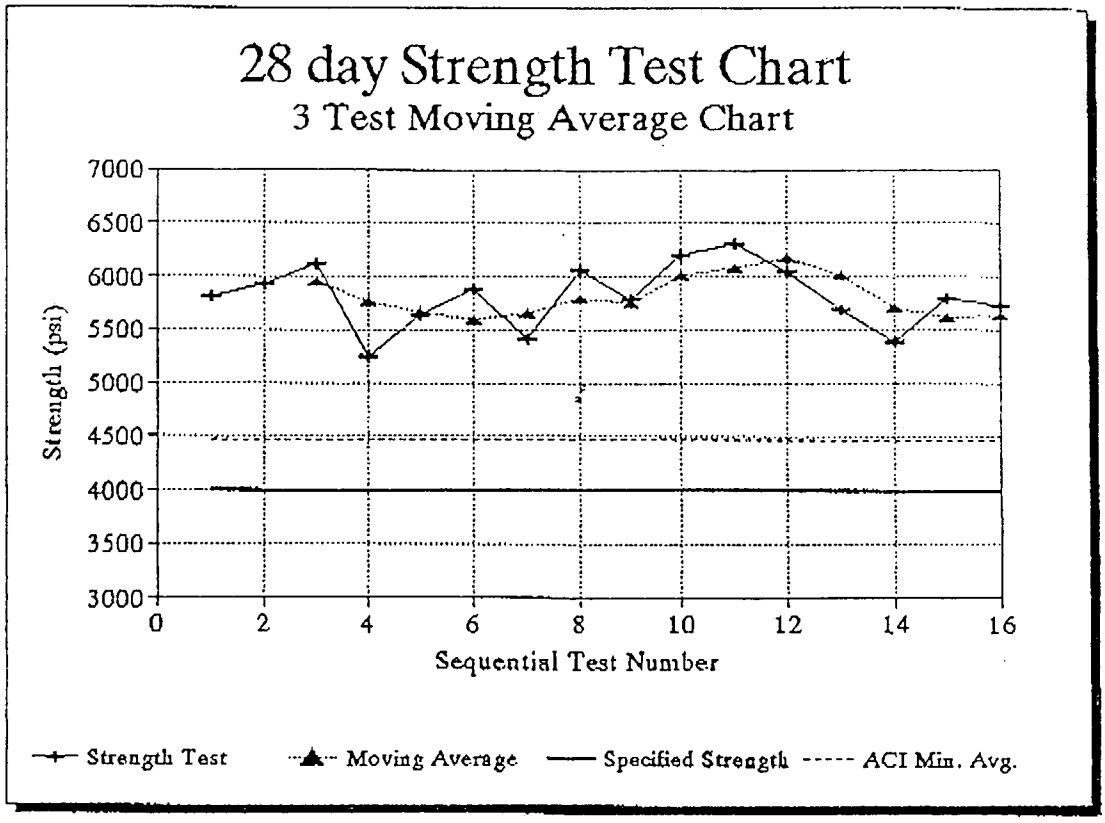
2-5602 4000 PSI 0.45 W/C Ratio

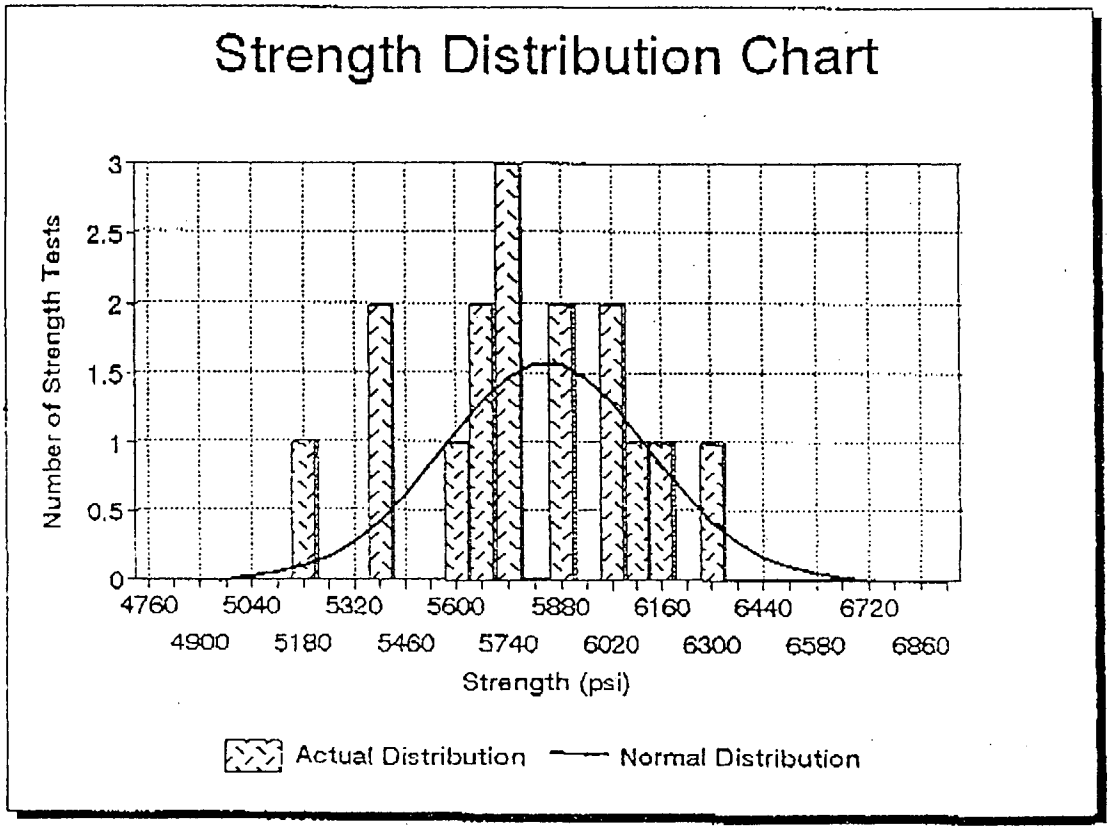
John Ruehlen
Signature

Quality Control Manager
Title

Concrete Products Performance Evaluation

Control Chart Summary





Brooksville Cement

A Southdown Company

Florida Rock Industries
P.O. Box 547819
Orlando, FL 32854

Gentlemen:

This letter is to certify that Broco Type I and Type II portland cement, when shipped, is guaranteed to meet current ASTM Designation C-150.

Sincerely,

Paul H. Owen, Jr.
Manager, Technical Services

PHO/db

Southdown, Inc.
P.O. Box 6 ; Brooksville, Florida 34605-0006
(904) 796-7241 ; Fax: (904)754-9836

GENERAL OFFICE: 155 East 21st Street / P.O. Box 4667 / Jacksonville, Florida 32201 / (904) 355-1781
FLORIDA ROCK INDUSTRIES INC Mining, Ready Mix Concrete, and Construction Products

REPLY TO: Sales Office
8500 Florida Rock Road
Orlando, Florida 32824-7824
407-856-0455
FAX #407-856-6255

LETTER OF CERTIFICATION

Mr. John Ruehlen
Florida Rock Industries, Inc.
P. O. Box 547819
Orlando, FL 32854-7819

Dear John:

This letter is to certify that the materials produced at our Sandland Sand Mine, FDOT Pit# 16-077, Lake Wales, Florida, meets specifications as set forth in current ASTM C-33 and/or the applicable State Department of Transportation (FDOT) Specifications for road and bridge construction as contained in the applicable State DOT book of Standard Specifications, latest edition. Also wil meet ASTM C-144 specifications for use as Masonry Sand for Masonry purposes.

If any further information is needed please let us know.

FLORIDA ROCK INDUSTRIES, INC.
AGGREGATES DIVISION

W. McFall/mm

Walter A. McFall
Vice President Sales
State of Florida

WAM/mm

AGGREGATE GROUP TERMS OF SALE: All offers, quotations and shipments are upon the following terms: Payment due on or before 10th of the month following invoice date. Discount, if offered, and terms will be shown on invoice. All quotations are withdrawn after 30 days if not accepted by written purchase order. All orders, contracts and agreements are contingent upon strikes, accidents, and all other delays unavoidable or beyond our control. Our liability in the case of unsuitable materials is limited strictly to the proper replacement thereof. We do not guarantee freight rates. If invoice is not paid when due, interest on the unpaid balance will accrue at the highest rate allowed by law. If after due dates the account is placed in the hands of an attorney or collection agency for collection of all or part of amount of invoices, the customer shall be liable for all costs of collection including a reasonable attorney's fee or collection charge. All amounts due shall be paid to Florida Rock Industries, Inc. - Aggregate Group in Jacksonville, Duval County, Florida, at the address shown or at such other address as may be furnished from time to time in writing.

GENERAL OFFICE: 155 East 21st Street / P.O. Box 4667 / Jacksonville, Florida 32201 / (904) 355-1781
FLORIDA ROCK INDUSTRIES INC Mining, Ready Mix Concrete, and Construction Products

REPLY TO: Sales Office
8500 Florida Rock Road
Orlando, Florida 32824-7824
407-856-0455
FAX #407-856-6255

LETTER OF CERTIFICATION

Mr. John Ruehlen
Florida Rock Industries, Inc.
P. O. Box 547819
Orlando, FL 32854-7819

Dear John:

This letter is to certify that the #57 and S-1-B (#89) stone distributed from our Auburndale Distribution Terminal, #TM-478, Winter Haven, Florida, meets specifications as set forth in current ASTM C-33 and/or the applicable State Department of Transportation (FDOT) Specifications for road and bridge construction as contained in the applicable State DOT book of Standard Specifications, latest edition.

If any further information is needed please let us know.

FLORIDA ROCK INDUSTRIES, INC.
AGGREGATES DIVISION

W. McFall/mm

Walter A. McFall
Vice President Sales
State of Florida

WAM/mm

AGGREGATE GROUP TERMS OF SALE: All offers, quotations and shipments are upon the following terms: Payment due on or before 10th of the month following invoice date. Discount, if offered, and terms will be shown on invoice. All quotations are withdrawn after 30 days if not accepted by written purchase order. All orders, contracts and agreements are contingent upon strikes, accidents, and all other delays unavoidable or beyond our control. Our liability in the case of unsuitable materials is limited strictly to the proper replacement thereof. We do not guarantee freight rates. If invoice is not paid when due, interest on the unpaid balance will accrue at the highest rate allowed by law. If after due dates the account is placed in the hands of an attorney or collection agency for collection of all or part of amount of invoices, the customer shall be liable for all costs of collection including a reasonable attorney's fee or collection charge. All amounts due shall be paid to Florida Rock Industries, Inc. - Aggregate Group in Jacksonville, Duval County, Florida, at the address shown or at such other address as may be furnished from time to time in writing.

A & S LABORATORIES, INC.
2165 Sunnydale Blvd., Suite Q
Clearwater, FL 34625
(813) 441-2044

Customer:	FLORIDA ROCK INDUSTRIES, INCORPORATED
Attention:	David McFall
A & S Sample Number:	550628
Date Sampled:	06/10/97
Date Tested:	06/15/97
Reference:	Well Water
Sample Location	Bartow

The results of tests performed in accordance with FDOT Test Method FM1-T 026, Quality of Water to be Used in Concrete are as follows:

Parameter	Specification Limits	Results
Alkalinity (as $CaCO_3$)	0.05%	0.017%
Total Organic Solids	0.05%	0.009%
Total Inorganic Solids	0.08%	0.019%
Total Chlorides	0.05%	0.003%

The water sample *meets or exceeds* specifications in Section 923-1 of FDOT Standard Specifications for Road and Bridge Construction.

Very truly yours,

Gregory P. Allen

Gregory P. Allen
Laboratory Director

GRACE

Grace Construction Products

W.R. Grace & Co.-Conn.
1200 N.W. 15th Avenue
Pompano Beach, FL 33069

(800) 433-0020
(954) 974-6700
Fax (954) 968-5586

February 6, 1997

Florida Rock Industries
5109 Carder Rd.
Orlando, FL 32810

Attn: John Ruchlen

This is to certify that DAREX AEA, an air-entraining admixture, as manufactured and supplied by the Construction Products Division, W. R. Grace & Co.-Conn., is formulated to comply with Specification for Air-Entraining Admixtures for Concrete, ASTM Designation: C- 260 (AASHTO M 154).

DAREX AEA does not contain calcium chloride or chloride containing compounds as a functional ingredient. There are trace amounts of chloride present contributed from domestic water supply during manufacturing.

This is in addition to and not in substitution for our standard Condition of Sale printed on the reverse side hereof.

DLB:de

D. L. Bobolts
Regional Manager

STATE OF FLORIDA :
COUNTY OF BROWARD :

Sworn to and subscribed, before me, this Thursday, February 06, 1997.

Notary Public, State of Florida at Large
My Commission Expires: [illegible]
Bonded thru Notary Public Underwriters.

GRACE

Grace Construction Products

W.R. Grace & Co.-Conn.
1200 N.W. 15th Avenue
Pompano Beach, FL 33069

(800) 433-0020
(954) 974-6700
Fax (954) 968-5586

February 6, 1997

Florida Rock Industries
5109 Carder Rd.
Orlando, FL 32810

Attn: John Ruehlen

This to certify that WRDA-64, a water-reducing and water-reducing retarder admixture, as manufactured and supplied by the Construction Products Division, W. R. Grace & Co.-Conn., is formulated to comply with Specifications for Chemical Admixtures for Concrete, ASTM Designation: C 494-92, Type A & D (AASHTO M194, Types A &D).

WRDA-64 does not contain calcium chloride. There are trace amounts of chloride present contributed from domestic water supply during manufacturing.

The foregoing is in addition to and not in substitution for our standard Condition of Sale printed on the reverse side hereof.

DLB:dc

D. L. Bobolts
Regional Manager

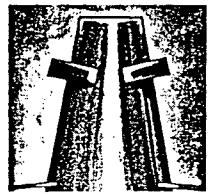
STATE OF FLORIDA :
COUNTY OF BROWARD :

Sworn to and subscribed, before me, this Thursday, February 06, 1997.

Notary Public, State of Florida at Large

WRDA®-64

Water Reducing Admixture
ASTM C494 Types A & D



DESCRIPTION:

WRDA® -64 is a polymer based aqueous solution of complex organic compounds. WRDA-64 is a ready-to-use low viscosity liquid which is factory pre-mixed in exact proportions to minimize handling, eliminate mistakes and guesswork.

WRDA-64 contains no calcium chloride. One gallon weighs approximately 10.1 lbs.

USES:

WRDA-64 produces a concrete with lower water content (typically 8 to 10% reduction), greater plasticity and higher strength. It is used in ready-mix plants, block and concrete product plants, in lightweight and prestressed work . . . wherever concrete is produced.

ADVANTAGES:

WRDA-64 offers significant advantages over single component water reducers. Water reduction and setting times are more consistent due to the polymer components. WRDA-64 also performs especially well in concrete containing fly ash and other pozzolans.

The use of WRDA-64 produces a plastic concrete that is more workable, easier to place and more finishable than plain or other admixtured concrete. In the hardened state, WRDA-64 concrete has higher compressive and flexural strengths at all ages than untreated or conventional admixtured concrete.

The greater degree of plasticity achieved, compared with conventional water reducing admixtures, allows improved finishability.

FINISHABILITY:

Finishers have stated that the cement paste, or mortar, in WRDA-64 admixtured concrete has improved trowelability. The influence of WRDA-64 on the finishability of lean mixes has been particularly noticeable. Floating and troweling, by machine or hand, imparts a smooth, close tolerance surface.

ADDITION RATE:

The addition rate range of WRDA-64 is 3 to 6 fluid ounces per 100 pounds of cement. Pretesting is required to determine the appropriate addition rate for Type A and Type D performance. Optimum addition depends on the other concrete mixture components, job conditions, and desired performance characteristics.

DISPENSING EQUIPMENT:

A complete line of accurate, automatic dispensing equipment is available. WRDA-64 may be introduced to the mix on the sand or in the water.

COMPATIBILITY WITH OTHER ADMIXTURES:

WRDA-64 is compatible in concrete with all air entraining admixtures such as DAREX® AEA and Daravair®. Due to the slight air entraining properties of WRDA-64, itself, the addition rate of air entraining admixture may be reduced by about 25%. By combining the separate effects of air entraining and dispersion, the water requirement of concrete may be reduced up to 15%. Each admixture should be added separately. While WRDA-64 contains no calcium chloride, it is compatible with calcium chloride in concrete mixes. Again, each should be added separately.

PACKAGING:

WRDA-64 is available in bulk, delivered by metered tank trucks, and in 55-gallon drums. WRDA-64 contains no flammable ingredients. It will freeze at about 28°F, but will return to full strength after thawing and thorough agitation.

ARCHITECT'S SPECIFICATION FOR CONCRETE WATER REDUCING ADMIXTURE:

Concrete shall be designed in accordance with ACI Standard Recommended Practice for Selecting Proportions for Concrete, ACI 211.

The water reducing (or water reducing and retarding) admixture shall be WRDA-64, as manufactured by Grace Construction Products, or equal. The admixture shall not contain calcium chloride. It shall be used in strict accordance with the manufacturer's recommendations. The admixture shall comply with ASTM Designation C494, Type A water reducing (or Type D water reducing and retarding) admixtures. Certification of compliance shall be made available on request.

The admixture shall be considered part of the total water. The admixture shall be delivered as a ready-to-use liquid product and shall require no mixing at the batching plant or job site.

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WRDA, Darex and Daravair are registered trademarks of Construction Products Division, W.R. Grace & Co.-Conn. We hope the information given here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the user's consideration, investigation and verification but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. Construction Products Division, W.R. Grace & Co.-Conn., 62 Whittemore Avenue, Cambridge, MA 02140.

GRACE
Construction Products

GRACE · CONCRETE ADMIXTURES

DESCRIPTION:

DAREX® AEA® admixture is an aqueous solution of a complex mixture of organic acid salts. It contains a catalyst for more rapid and complete hydration of portland cement. DAREX AEA is specially formulated for use as an air entraining admixture for concrete and is manufactured under rigid control which provides uniform, predictable performance. It is supplied ready-to-use and does not require premixing with water. One gallon weighs approximately 8.5 lbs.

USES:

DAREX AEA is used in ready-mix, block, and concrete products plants. It is also used on the job with job-site mixers, highway pavers. . .wherever concrete is mixed and there is a need for purposeful air entrainment.

Because DAREX AEA plasticizes or "fattens" the mix, it is particularly effective with slag, lightweight, or manufactured aggregates which tend to produce harsh concrete. It also makes possible the use of natural sand deficient in fines.

AIR ENTRAINING ACTION:

Air is entrained by the development of a semi-microscopic bubble system—introduced into the mix by agitation and stabilized by DAREX AEA—in the mortar phase of the concrete.

Workability is Improved. Millions of tiny air bubbles entrained with DAREX AEA act as flexible ball bearings, lubricating and plasticizing the concrete mix. This permits a substantial reduction in mixing water with no loss in slump. Placeability is improved. . . bleeding, green shrinkage and segregation are minimized.

Durability is Increased. DAREX AEA concrete is extremely durable, particularly when subjected to freezing and thawing. It has resistance to frost and deicing salts, as well as to sulfate, sea and alkaline waters.

COMPATIBILITY WITH OTHER ADMIXTURES:

DAREX AEA is compatible in concrete with all known accelerating admixtures, water reducing admixtures and water reducing retarders. By combining the separate effects of air entrainment with the dispersion of a water reducing admixture, the water requirement of concrete may be reduced with proportional increases in strength and improvement in durability. EACH ADMIXTURE SHOULD BE ADDED SEPARATELY TO THE MIX.

ADDITION RATES:

There is no standard addition rate for DAREX AEA. The amount to be used will depend upon the amount of air required under job conditions, usually in the range of 4 to 8%. Typical factors which might influence the amount of air entrained are: temperature, cement, sand gradation, and use of extra fine materials such as fly ash. Typical DAREX AEA addition rates range from ¾ to 3 fluid ounces per 100 lbs. of cement.

The air entraining efficiency of DAREX AEA becomes even greater when used with water reducing and set retarding agents. This may allow a reduction of up to two-thirds in the amount of DAREX AEA required for the specified air content.

MIX ADJUSTMENT:

Entrained air results in increased yields with a consequent decrease in the cement content of the placed concrete. This condition calls for a mix adjustment, usually accomplished by reducing the fine aggregate content. This is in addition to the reduction in water content brought about by the increase in plasticity.

DISPENSING EQUIPMENT:

A complete line of automatic DAREX AEA dispensers is available. Accurate and simple, these dispensers are easily adapted to existing facilities on paving mixers and in batching plants.

PACKAGING:

DAREX AEA is available in bulk, delivered in metered tank trucks, and 55-gallon drums. DAREX AEA contains no flammable ingredients. IT FREEZES AT ABOUT 30°F, BUT ITS AIR ENTRAINING PROPERTIES ARE COMPLETELY RESTORED BY THAWING AND THOROUGH AGITATION.

ARCHITECTS' SPECIFICATION FOR CONCRETE AIR ENTRAINING ADMIXTURE:

Concrete shall be air entrained concrete, containing 4 to 8% entrained air. The air contents in the concrete shall be determined by the pressure method (ASTM Designation C 231) or gravimetric method (ASTM Designation C 138). The air entraining admixture shall be a purified hydrocarbon type with a cement catalyst, such as DAREX AEA, as manufactured by the Construction Products Division of W.R. Grace & Co.-Conn., or equal. The air entraining admixture shall be added at the concrete mixer or batching plant at approximately ¾ to 3 fluid ounces per 100 lbs. of cement, or in such quantities as to give the specified air contents.

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We hope the information given here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the user's consideration, investigation and verification but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. Construction Products Division, W.R. Grace & Co-Conn., 62 Whittemore Ave., Cambridge, Mass. 02140

GRACE
Concrete Products

Add at the end of Appendix 9

1.5 SUPERVISION

1.5.1 All concrete work indicated on the Drawings and specified herein shall be performed under the personal and constant supervision of a competent construction superintendent or foreman experienced in this class of work.

1.6 CORRECTION OF CONCRETE WORK

1.6.1 The Contractor is responsible for correcting concrete work that does not conform to the specified requirements, including requirements for strength, tolerances, and finishes. Correct deficient concrete as directed by the Engineer.

PART 2 — PRODUCTS

2.1 MATERIALS:

2.1.1 Water — Potable and free of deleterious substances per ACI 318.

2.1.2 Cement — Portland Cement, ASTM C-150, Type 1, Gray, only one brand permitted throughout work.

2.1.3 Admixtures —

2.1.3.1 Air Entraining agent per ASTM C-260. Air content shall be given percent plus or minus one percent.

2.1.3.2 Water reducing agent per ASTM C494, Type A, and contain not more chlorideions than are present in municipal drinking water.

2.1.3.3 High range water reducing admixture (superplasticizer): Per ASTM C494, Type F or G, and contain not more chloride ions than are present in municipal drinking water.

2.1.4 Prohibited Admixtures: Calcium chloride, thiocyanates, or admixture containing more than .05% chloride ions are not permitted.

2.1.5 Aggregates —

2.1.5.1 Fine aggregate shall be sand conforming to ASTM C-33.

2.1.5.2 Coarse aggregate shall be gravel or crushed stone conforming to ACI 318, and ASTM C-33, Size #57.

2.1.6 Curing and Sealing Compounds per ASTM C309, minimum 30% solids content. Sodium silicate compounds are not permitted. Compounds must be non-toxic and free of taste and color. Provide "Master-cure" as manufactured by Master Builders, Inc., or an approved equal.

2.1.7 Polymer bonding agent shall be Weld Crete by Larsen Products Corporation or an approved equal.

2.1.8 Epoxy Adhesive (Bonding Agent) shall be Sikadur Hi-Mod by the Sika Chemical Corporation or an approved equal. Formulation to suit application.

2.1.9 Non-Shrink Cement Grout: Masterflow 713 as manufactured by Master Builders or approved equal.

2.1.10 Vapor Barrier and Moist Curing Sheeting shall be per ASTM C171, minimum 6 mil polyethylene clear plastic sheets by Visking Company or approved equal.

2.1.11 Polymer Patching Mortar shall be SikaTop by the Sika Chemical Corporation. Formulation to suit application.

2.1.12 Cement Grout Patch Mix: Equal parts of cement and sand and sufficient water to attain workability to patch honeycombed areas and fill form tie holes solid and permanently bond to concrete.

2.1.13 Cement Grout Slurry Mix: Equal parts of cement and sand and sufficient water to attain consistency of heavy paint. Alternate slurry mixes and may be used by the Contractor, subject to Engineer's approval.

PART 3 — EXECUTION

3.1 INSTALLATION:

3.1.1 Concrete mixes shall be designed to meet the required strength qualities as noted on the structural plans by the approved testing laboratory, or use standard performance tested mix design of supplier subject to approval by the Engineer for each strength of concrete required.

3.1.1.1 Class A: 4,000 psi minimum compressive strength at 28 days — minimum 5.5 bags of cement per cubic yard, air entrained, with max. water : cement ratio of 0.45. Class A concrete to be used in all structure, including base slabs on grade, tanks, basins, footings, foundations, wells, trench drains, and sumps. Class A concrete may be used throughout the work at the Contractor's option.

3.1.1.2 Class B: 4,000 psi minimum compressive strength at 28 days — minimum 5.5 bags of cement per cubic yard with max. water : cement 0.45. Class B concrete to be used in all structures, including base slabs on grade, trench drains, and sumps not exposed to the elements.

3.1.2 Allowable slumps: 3 to 4-1/2 inches at delivery point

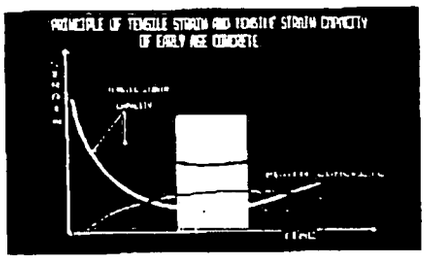
3.1.3 Air entrained concrete shall be used for all work exposed to the elements.

3.1.4 Workability of concrete shall be such that concrete can be handled, placed, and worked into angles and corners of forms, around reinforcing steel and inserts without segregation and without water and fine material rising to the surface.

FIBERMESH ENGINEERING DATA

IMPORTANT
All test data reported on the following pages apply only and strictly to Fibermesh fibers.

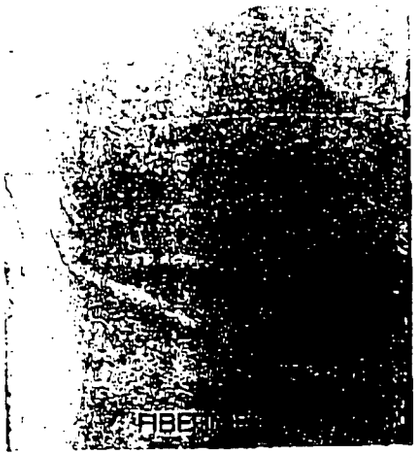
PROVED to Reduce Plastic Cracking and Concrete Permeability



Testing at Webster Engineering & Associates, Inc. has shown that the addition of Fibermesh fibers to plastic concrete substantially increases the resistance of the concrete to early age plastic shrinkage cracking and cracking in response to vibrations at early ages. The addition at the rate of 1.5 lb/yd³ (0.9 Kg/m³) of Fibermesh polypropylene fibers increases the tensile strain capacity (ability to resist strain without developing visible cracking) of the immature concrete (see graph). This is particularly important since a large amount of the cracking of concrete occurs during the first 24 hours after placement, when the concrete is most susceptible to vibrations, plastic shrinkage and settlement cracking. Early age cracks, if they develop, have an effect of increasing the net permeability of the concrete and exposing substantially greater surface areas of the concrete to the detrimental environment, thus prematurely aging the concrete and shortening its performance life.

CRACK PANEL STUDIES

Tests run at San Jose State University and the University of California, Berkeley, clearly show the beneficial effect of Fibermesh fibers in controlling the magnitude of concrete cracking under adverse curing conditions. The crack inhibiting action of Fibermesh became evident in the first 4 hours of the tests and was maintained as the concrete aged through 28 days. Tests were conducted with numerous sources of materials and mix proportions, with and without wire mesh. Without exception, the Fibermesh concrete inhibited cracking typically in the range of 90% to 100% over the non-fiber control specimen.



These accelerated test photos show a comparison between the two slabs at 24 hours. The cracking in the control slab without fiber started at 2.5 hours — most of the cracking patterns were developed at 4 hours. At 24 hours, and even after 28 days, the Fibermesh slab had virtually no cracking.

"The cycle of cracking, agents permeating and steel corroding can be somewhat interrupted or reduced by using Fibermesh polypropylene fibers."
Webster Engineering & Associates, Inc.
Cleveland, Ohio

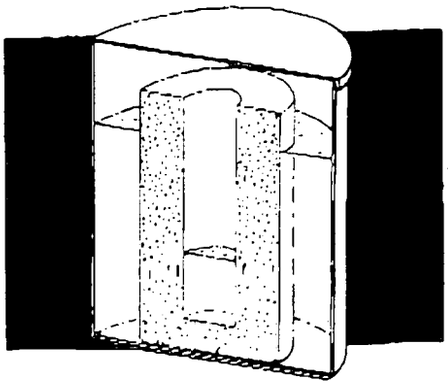
Water Migration/Permeability

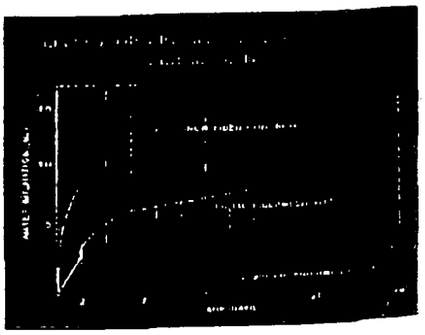
The Von Test Method of water migration measurement was used at San Jose State University to compare plain concrete with concrete reinforced with various amounts of Fibermesh.

Migration of water rates indicated reduction in permeability of 33-44% at 1.0 lb/yd³ (0.593 Kg/m³) and as high as 79% at 2.0 lb/yd³ (1.186 Kg/m³)

Note: General reduction of permeability

Cross section of Von Test Apparatus





FIBERMESH ENGINEERING DATA

PROVED to Increase Concrete Abrasion Resistance

A test program designed to evaluate relative abrasion resistance was developed to measure the effect of Fibermesh fibers in concrete when exposed to excessive wear. The Army Corps of Engineers' "Method of Test for Resistance of Concrete or Mortar Surfaces to Abrasion" (Rotating Cutter Method CRD-C52-54) was used.

CONCLUSION:

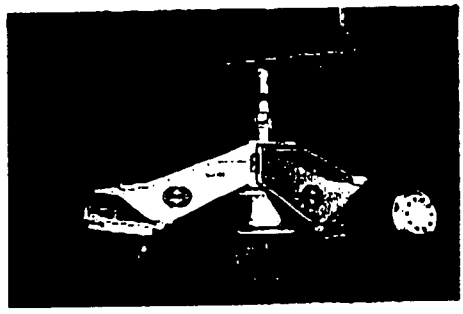
"Based on the data derived from the rotating-cutter method of testing, the use of Fibermesh will increase the abrasion resistance by 105%. This added toughness with the use of Fibermesh will double the serviceable life of concrete exposed to similar wear conditions."

Paul P. Kraal, P.E.
State of California

Tests were also run in cooperation with the Norwegian Highways Laboratories. Tests were conducted on Norcem Cement's studded tire, abrasion test machine. At 42 MPH utilizing steel studded tires and 10 ton axle loads the equipment can accurately demonstrate the effects of 10 years of highway wear at the rate of 15,000 vehicles per day.

CONCLUSION:

The Fibermesh C-75 specimen exhibited a 52% increase in abrasion resistance by sustaining 34.4% less material loss than the control specimen without fibers.



Significantly, the C-50 Fibermesh specimen, containing less cement, still exhibited a 20% increase in abrasion resistance over the C-75 control specimen by sustaining 17.2% less material loss.

The C-50 concrete has a base design strength of 7,252 psi while the C-75 concrete has a design strength equivalent to 10,878 psi.

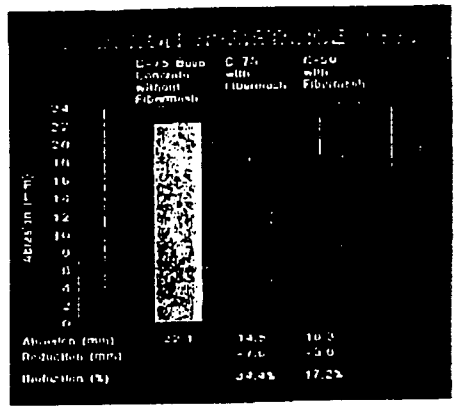


Photo and graph courtesy Norcem Cement A/S.

PROVED in Static Load Test as Alternate to Welded Wire Fabric

A comprehensive study was conducted in the laboratories of Wiss, Janney, Elstner & Associates, Inc., Consulting & Research Engineers by registered Professional Engineers. Results apply only to Fibermesh.

PURPOSE OF THE TEST

This test program compared on a large scale the flexural capacity and deflections of concrete slabs containing the recommended quantity of Fibermesh polypropylene fibers to a plain concrete slab and a concrete slab containing a typical amount of welded wire fabric (WWF) for drying shrinkage crack control purposes. All three slabs were cast from one batch of concrete.

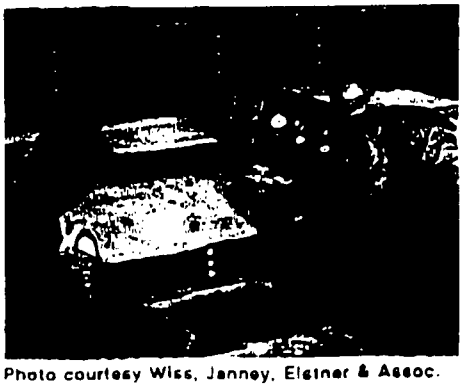


Photo courtesy Wiss, Janney, Elstner & Assoc.

CONCLUSIONS:

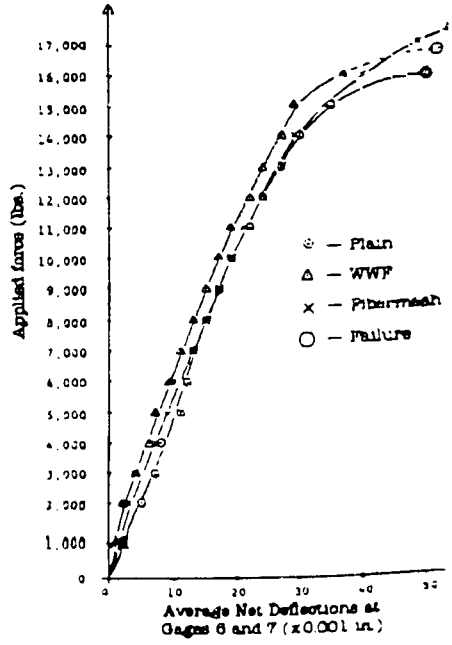
The results of the study reported herein indicate that substituting welded wire fabric with Fibermesh at a rate of 1.5 lbs. per cubic yard (0.9 kilograms/cubic meter) of concrete yields:

- *Equivalent flexural strength capacity of the slab.*
- *Equivalent load-deflection relationship.*

The flexural capacity of the slab containing Fibermesh was 2% higher than the slab containing welded wire fabric and 8% higher than the plain concrete slab.

The load-deflection data indicate that, with respect to flexural response characteristics, Fibermesh fibers can be used as a practical alternative to welded wire fabric which is commonly used for shrinkage crack control purposes essentially unreinforced concrete.

Direct excerpts from the Wiss, Janney, Elstner & Associates rep



Force-versus-deflection curves for the 3 a

FIBERMESH ENGINEERING DATA

PROVED as Alternate to Welded Wire Fabric in Composite Deck Systems

LOAD TESTS AND ENGINEERING STUDY

An engineering study based on load tests conducted by recognized authorities compared the Fibermesh micro-reinforcement system to welded wire fabric in composite metal decks.

CONCLUSION:
"As all the tests using the Fibermesh fiber reinforced concrete were equal or better than the welded wire fabric reinforced concrete tests, an equivalency for structural performance in composite slabs has been demonstrated for use of Fibermesh fibers in lieu of the normally required welded wire fabric. Also, equivalency of the diaphragm behavior with the use of Fibermesh fibers has been demonstrated." ***Clarkson W. Pinkham, S.E., President, S.B. Barnes Associates, Consulting Structural Engineers.***

HEADED STUD SHEAR CONNECTOR STRENGTH TEST

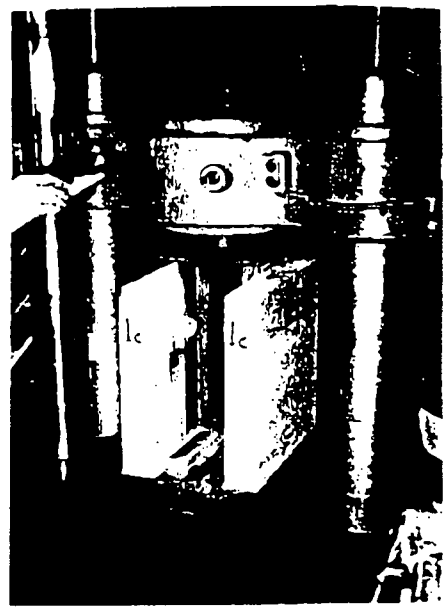
As a follow-up to the load tests, a test program was conducted on the strengths of headed stud shear connectors in concrete comparing the use of Fibermesh micro-reinforcing system to the use of welded wire fabric.

The use of welded wire fabric with metal decking has always been a problem because the correct position of the mesh is difficult to maintain in a slab that is only 2 to 3 inches (51 mm -75 mm) thick above the ribs.

The use of fiber reinforced concrete in place of welded wire fabric eliminates the construction problems and provides a consistent solution to the problems concerning the amount and location of the reinforcement.

The results of the Pushout Tests show that the strength and ductility of shear connectors in steel mesh and Fibermesh reinforced concrete are comparable.

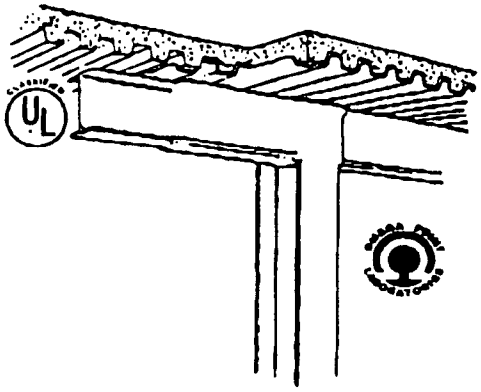
CONCLUSION:
"Fibermesh may be substituted for welded wire fabric in composite beams with no change in the shear connector design. Shear connector values given in the AISC Specification Manual of Steel Construction may be used for Fibermesh Concrete." ***Roger G. Slutter, Fritz Engineering Laboratory, Lehigh University, Bethlehem, Pennsylvania.***



Slab Testing Machine

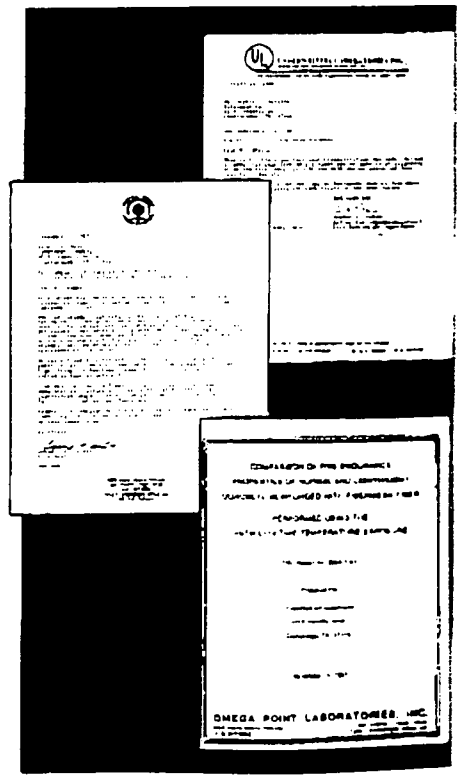
PROVED by Underwriters Laboratories and Omega Point Laboratories as Acceptable Alternate to Welded Wire Fabric in Metal Deck Assemblies

A series of fire tests was conducted at these facilities using standard ASTM Tests E84, E119 (UL263) on various metal deck assemblies.



CONCLUSION OF UNDERWRITERS LABORATORIES:
". . . based upon the full-scale fire test data developed with the use of your product in a protected concrete-steel form unit assembly, it is our conclusion that your polymeric fiber reinforcement would be a suitable alternate to welded wire fabric in similar type constructions. That is, concrete-steel form unit floor assemblies with protection material directly applied to the steel form unit. These constructions are currently described in the Fire Resistance Directory as D700 Series or D800 Series Designs."

CONCLUSION OF OMEGA POINT LABORATORIES
"The results presented herein have convinced Omega Point Laboratories to issue a blanket recognition for Fibermesh fiber as a substitution for welded wire mesh in concrete walls, floorceiling and roofceiling assemblies."



PROVED to Increase Impact Resistance

A sophisticated study of the impact resistance of concrete

IMPACT FRACTURE ENERGY FIBERMESH FRC BEAMS WITHOUT REBAR

ways. They "bridge" the cracks that develop, thereby inhibiting

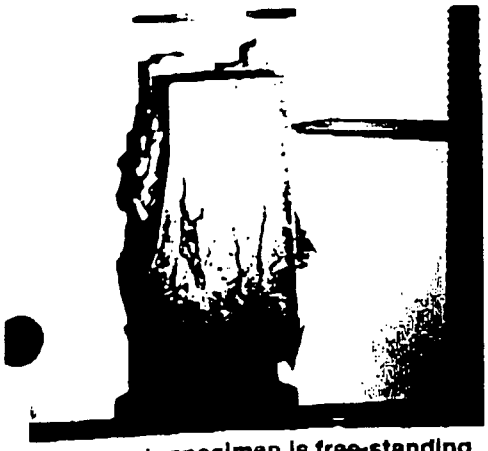
FIBERMESH ENGINEERING DATA

PROVED to Increase Shatter Resistance of Concrete

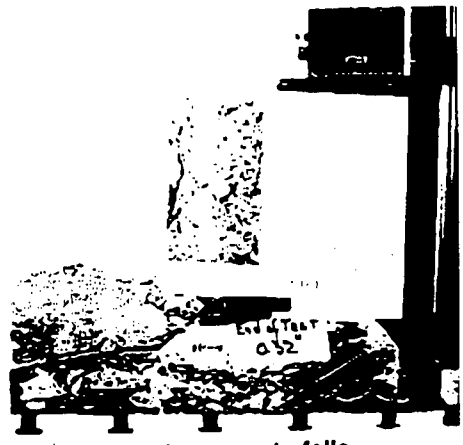
A test program evaluated the shatter resistance of Fibermesh concrete and plain concrete when exposed to crushing loads. The specimens were 21" x 6" x 6" (525 mm x 150 mm x 150 mm) giving a height/thickness (H/T) ratio of 3½ to 1 in order to simulate a column in a high rise building. All columns were tested in a standard compression strength machine. The rate of compression was .025" (0.635 mm) per minute and was automatically instrumented on an X-Y recorder.

CONCLUSION:
Results show the ability of Fibermesh concrete to sustain itself and not shatter after more than 10% compression as compared to plain concrete which shattered completely shortly after first crack. This characteristic of Fibermesh concrete is important to applications where there are impact or seismic concerns for safety to life and property.

Research engineer removes Fibermesh specimen after test ended. Column was compressed 10% and still remained intact.



Fibermesh specimen is free-standing after 2.0" (51 mm) compression



Plain concrete falls at 0.32" (8 mm) compression

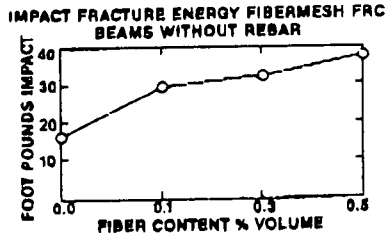
"During the fracture, fibers are exposed. The surface of the fibers are ploughed lengthwise during pull-out which indicates a good bond between fibers and cement paste."

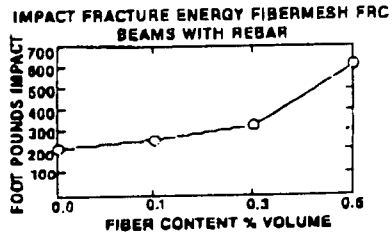
G.M. Idorn Consult A/S
Consulting and Research Engineers
Denmark

PROVED to Increase Impact Resistance

A sophisticated study of the impact resistance of concrete containing Fibermesh was conducted at the University of British Columbia, utilizing an instrumented impact machine developed by Dr. Sidney Mindess.

The results indicate the foot pounds of energy to fracture beams with and without rebar.





CONCLUSION: The addition of Fibermesh fibers shows remarkable increases in energy absorption/impact of both plain and steel reinforced concrete. The Fibermesh fibers act in two ways. They "bridge" the cracks that develop, thereby inhibiting further crack growth and enhance the bond between the concrete and the reinforcing bars by inhibiting cracking of the concrete under bearing stresses in the vicinity of the bar deformations.

"It is worth emphasizing the point that there appears to be a synergistic effect when fibers are combined with conventional reinforcement; together, they are much more effective than when the effects of each are considered separately."

Sidney Mindess, Arnon Bentur,
Department of Civil Engineering,
University of British Columbia,
Vancouver, Canada

FIBERMESH ENGINEERING DATA

PROVED— Physical Properties of Fibermesh

Absorption	— Nil
Specific Gravity	— 0.9
Fiber Length	— ¼", ½", ¾", 1⅛", 2" and Multi-Design Gradations (nominal 3, 13, 19, 38, 51mm and Multi-Design Gradations)
Melt Point	— 320°F-340°F (160°C-170°C)
Ignition Point	— 1100°F (590°C)
Thermal Conductivity	— Low
Electrical Conductivity	— Low
Acid and Salt Resistance	— High
Modulus (Youngs) 10^3ksi	— 0.5 (3.5 kN/mm²)

The following test data were produced by Signet Laboratory from ready mixed concrete and issued in a report entitled *"Evaluation of FIBERMESH Synthetic Fibers in Concrete,"* by P. Kraai, PE.

A. NORMAL WEIGHT CONCRETE

I. COMPRESSIVE STRENGTH
ASTM C-39, psi (MPa)
1 psi = .006895 MPa

	Control	Fibermesh
7 days	2030 (14.0)	2270 (15.7)
28 days	3905 (26.9)	4240 (29.2)

II. FLEXURAL STRENGTH
ASTM C-78, psi (MPa) (6"×6"×18" Beams) (15×15×46cm) Modulus of Rupture

	Control	Fibermesh
7 days	258 (1.8)	288 (2.0)
28 days	358 (2.5)	390 (2.7)

III. SPLITTING TENSILE STRENGTH
ASTM C-496, psi (MPa)

	Control	Fibermesh
7 days	178 (1.2)	194 (1.3)
28 days	275 (1.9)	290 (2.0)

B. LIGHTWEIGHT AGGREGATE CONCRETE

I. COMPRESSIVE STRENGTH
ASTM C-39, psi (MPa)

	Control	Fibermesh
7 days	1295 (8.9)	1275 (8.8)
28 days	2655 (18.3)	2780 (19.2)

II. FLEXURAL STRENGTH
ASTM C-78, psi (MPa)

	Control	Fibermesh
3 days	315 (2.2)	300 (2.1)
28 days	515 (3.6)	563 (3.9)

III. SPLITTING TENSILE STRENGTH
ASTM C-496, psi (MPa)

	Control	Fibermesh
7 days	248 (1.7)	215 (1.5)
28 days	303 (2.1)	310 (2.1)

FIBERMESH GUIDE SPECIFICATION

Use only 100 percent virgin polypropylene fibrillated, MD Graded, fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation for use as concrete secondary reinforcement. Application per cubic yard shall equal a minimum of 1.5 pounds (0.9 Kg/m3). Fibers are for the control of cracking due to drying shrinkage and thermal expansion/contraction, to lower concrete permeability, to increase impact capacity, shatter resistance and abrasion resistance, while adding fibrillated toughness and residual strength. Fiber manufacturer must document evidence of 5 year satisfactory performance history, ISO 9002 certification of manufacturing facility, compliance with applicable building codes and certify performance in accordance with ASTM C-1116, Type III, 4.1.3 and ASTM C-1116 (Ref: ASTM C-1018) Performance Level 1, I_5 outlined in Section 21, Note 17 and a minimum average Residual Strength of 50 psi, of 4 beams from a single batch. Fibrous concrete reinforcement shall be manufactured by Fibermesh, 4019 Industry Drive, Chattanooga, Tennessee, USA, 37416. (423) 892-7243.

Available in The Construction Specifications Institute format, both as printed hardcopy and as IBM-PC/DOS, MS/DOS computer software. Call your local Fibermesh representative.

APPLICATION GUIDELINES

Do specify Fibermesh for:

- The reduction of concrete cracking as a result of intrinsic stresses.
- A superior method and cost-effective alternate to welded wire fabric for secondary and/or temperature reinforcement.
- A reduction in the permeability of concrete.
- Greater impact, abrasion, shatter and fatigue resistance in concrete.
- Support and cohesiveness in the concrete on steep inclines and/or slipformed placements.
- Provides Residual Strength.
- Placements where all materials must be non-metallic.
- Areas requiring materials which are both alkaliproof and chemical resistant.
- Improved durability.
- Fibrillated toughness.

Don't specify Fibermesh for:

- The control of cracking as a result of external stresses.
- Increasing the structural number of PC concrete in pavement or slabs on grade.
- Higher structural strength development.
- The elimination or reduction in curling and/or creep.
- The justification for a reduction in the size of the support columns.
- The replacement of any moment or structural steel reinforcement.
- Increasing of ACI and/or PCA control joint guidelines.
- The thinning-out of bonded or unbonded overlay sections.
- Decreasing the thickness of slabs on grade.

Active member of

American Concrete Institute — ACPA - American Concrete Pavement Association; ARTBA - American Road & Transportation Builders Association; ACPA - American Concrete Pipe; ASCC - American Society for Concrete Construction

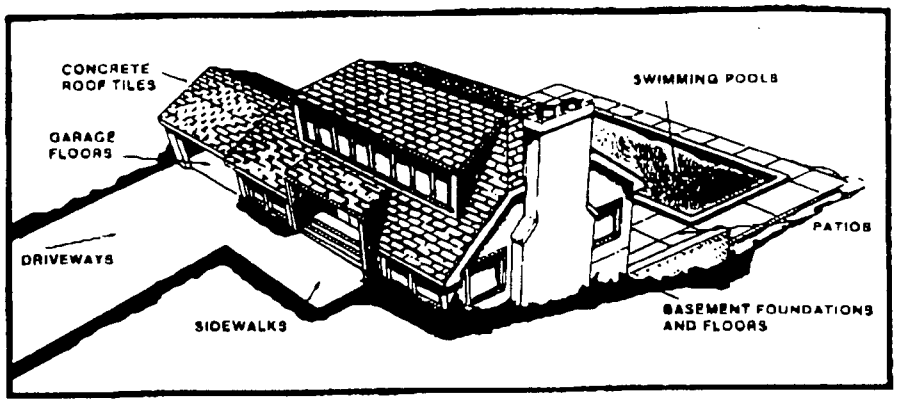
National Ready Mixed Concrete Association — NPCA - National Precast Concrete Association; SFA - Synthetic Fiber Association

CLASSIFIED Underwriters Laboratories, Omega Point Laboratories
RECOGNIZED in NES Report No. 284 • **CONFORMANCE** ASTM C1116
Certified ISO 9002 manufacturing facility

FIBERMIX® and FIBERMIX® STEALTH® — for Concrete

FIBERMIX® is 100% polypropylene synthetic fiber specially engineered to inhibit the formation of concrete plastic shrinkage cracking.

- Building Code Report NES No. 414
- Distributes tens of millions of crack inhibiting engineered fibers
- Achieves a superior concrete job
- Safe and simple to use
- Easy to finish
- Pumpable
- Rustproof and alkaliproof



DON'T GIVE CONCRETE CRACKS A HOME.

HARBOURITE® — for Stucco, Precast Products, Shotcrete

Harbourite® is 100% polypropylene fiber engineered for micro-reinforcement of stucco and shotcrete. Also used in precast concrete pipe, block and tile.

- Inhibits cracking due to drying shrinkage
- Provides new dimension in stucco toughness, shatter resistance
- Easy, safe to use—just add to mix
- No corrosion or chemical reaction —alkaliproof
- Reduces rebound and material loss in gunite, shotcrete applications
- Makes concrete pipe and precast products tougher, more durable with resistance to spalling and impact
- Alternate system to non-structural wire mesh

Fibermesh®, Fibermix®, Stealth® and Harbourite® are registered trademarks of Synthetic Industries, Inc., 309 LaFayette Road, Chickamauga, GA 30707.
Microban® is a registered trademark of Microban Products Company.

THE FIBERMESH DIVISION OF SYNTHETIC INDUSTRIES HAS NO CONTROL OVER THE DESIGN, MANUFACTURE, OR TESTING OF THE CONCRETE PRODUCTS WHICH INCORPORATE OUR MATERIALS. THEREFORE, FIBERMESH ASSUMES NO RESPONSIBILITY FOR THE END PRODUCTS OR USES MADE OF OUR MATERIALS. THE CONCRETE MANUFACTURER OR PROCESSOR IS RESPONSIBLE FOR TESTING ITS PRODUCTS TO ESTABLISH THE PHYSICAL PROPERTIES THEREOF. IT IS THE CONCRETE MANUFACTURER'S OR PROCESSOR'S RESPONSIBILITY TO CERTIFY COMPLIANCE OF ITS PRODUCT, INCLUDING ANY FORMULATION WHICH MAY INCLUDE OUR SYNTHETIC FIBER MATERIALS.

Fibermesh®

Making Good Concrete Better®

SYNTHETIC INDUSTRIES

Fibermesh® Division

Fibermesh
4619 Industry Drive
Chattanooga, TN 37416 USA
Phone (423) 892-7243
Fax (423) 499-9764
E-Mail fibermesh@aol.com
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Sherebridge
Chesterfield S41 9PZ England
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Fax (+44) 1246 455841

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LAMBERT CORPORATION
QUALITY PRODUCTS
Over 50 years of experience in the construction industry.

1. PRODUCT NAME
AQUA KURE - WHITE

Liquid membrane forming concrete curing compound, WATER BASED, WHITE PIGMENTED.

2. MANUFACTURER
LAMBERT CORPORATION
20 N. COBURN AVENUE
ORLANDO, FLORIDA 32805
PHONE (407) 841-2940
TOLL FREE 800-432-4746
FAX (407) 839-1890

3. PRODUCT DESCRIPTION

AQUA KURE - WHITE is a liquid membrane forming concrete curing compound. When applied to freshly placed concrete surfaces, it forms a surface membrane which prevents rapid evaporation of the mixing water necessary for proper concrete curing and strength development. AQUA KURE -WHITE when tested according to the water retention test ASTM C-156, will restrict the loss of water to not more than 0.55 kg/m² in 72 hours. The white pigmentation of AQUA KURE reflects the heat-producing rays of the sun, thereby helping to keep the concrete surface cooler. The white pigmentation will also help prevent excessive heat build-up and reduce the cause of thermal cracking during the curing period. AQUA KURE - WHITE is available in two groups of product, one for State Department of Transportation application (state certified), and the second for construction application meeting ASTM C-309.

The concrete curing state begins at the moment the cement hydration process begins and continues until hydration is complete, approximately 28 days. This is one of the most critical periods in concrete construction. The chemical reaction which takes place during the first few days after the pour will determine greatly the final quality of concrete. Concrete will develop the majority of its strength in the first 7-14 days, but the hydration process must be allowed to continue if the concrete is to reach its planned strength. If the moisture content of the concrete is lost before the hydration is complete, the concrete cannot develop its maximum planned strength.

Advantages

- Most economical of all curing methods.
- Permits proper hydration of cement.
- Assures concrete that is hard and highly resistant to deterioration.
- Prevents scaling, hair checking, and dusting of concrete.
- Excellent reflectance qualities.
- Easy application by hand or power spray.
- Protects the surface of fresh concrete from damage resulting from early rainfall.

Basic Uses

Protection of concrete is considered vital in today's high tech world. This is particularly true of structures like bridges and highways which are subject to a variety of damaging chemicals and physical abuse. Most concrete engineers are unanimous in their insistence that fresh concrete be protected as quickly as possible with a concrete curing compound. The concept of a liquid membrane system for curing concrete was developed in the early 1950's. It was a great simplification over the previous curing methods. AQUA KURE - WHITE is a thoroughly tested water based liquid membrane curing compound that will conform to ASTM C-309, federal, state, county, and municipal specifications. It provides efficient, economical concrete curing for all types of construction.

Limitations

Do not use AQUA KURE - WHITE on surfaces to be covered by paint, resilient flooring or ceramic tile, or other subsequent products without removal of the AQUA KURE - WHITE residue. This may be done through a stiff wire brooming of the surface, a riding floor scrubber, water blast or sandblast. Around columns or perimeters near walls, removal may entail grinding, sandblasting or liquid strippers depending on the thickness of the compound. Good concrete paints, epoxies, liquid floor hardeners, sealers, ceramic tile cements, are formulated to give maximum adhesion when applied to a clean concrete surface. Always follow the surface preparation requirements of the manufacturer of the subsequent product to be installed.

Test areas should be applied when uncertain of surface conditions or unfamiliarity of product exist. Tests will determine if the surface is properly prepared for adequate adhesion, best method of application, and probable coverage rate.

Applicable Standards

ASTM C-309-91, Type 2, Class A,B (Liquid Membrane Forming Compounds for Curing Concrete)

AASHTO-M148, Type 2, Class A,B (when light reflectance is waived)

Composition and Materials

Hydrocarbon resin emulsion, white pigment, suspended in water. Contains no wax, paraffin or oil.

4. TECHNICAL DATA

Color	White
Solids	26-30%
Bulk Density	7.45#/gal.
Flash Point	120°F
Freeze Point	32°F
Dry Time	2-4 hours
Moisture Loss	.37 Kg/M²

5. INSTALLATION

Before using this product, please refer to the Material Safety Data Sheet for additional handling instructions. Proper handling precautions MUST be taken.

When To Apply -Horizontal Surfaces

Curing compounds only work if they are on top of the concrete surface and do not penetrate. The timing of application is important. AQUA KURE -WHITE should be applied after setting of cement, immediately after evaporation of the surface water sheen and the concrete surface will not be marred by foot traffic. It is during this time that the concrete is most vulnerable to spalling, hairchecking, and other surface defects. If surface is dry, it should be completely dampened (no puddles) before applying AQUA KURE.

Vertical Surfaces

Application should be made immediately after the forms have been removed and walls are rewetted with clean water. Allow excess water to run off before applying AQUA KURE - WHITE. For uniform application on vertical surfaces, the specified rate of application may be achieved by two coats applied at an interval of approximately 4 hours. Do not apply to interfacing of channels to be caulked with elastomeric sealants. This can be avoided by masking.

Application Methods

Stir AQUA KURE - WHITE thoroughly prior to use. Do not dilute or alter product. Apply with spray, brush, roller, or lambswool applicator. On smooth concrete use spray, lambswool applicator or short-nap roller. On rough concrete (broomed or textured) use spray, brush, or long-nap roller. Apply uniformly to form a continuous film on the surface without thick or ponded areas. A power airless sprayer will give best results for large areas. Industrial low pressure type pump sprayer is recommended for small areas. To ensure proper application with sprayers, use only a clean or new industrial grade sprayer equipped with a non-adjustable fan tipped nozzle, neoprene hose and gaskets. Maintain sufficient pump pressure throughout application. Uniform surface coverage is essential, avoid puddling in low areas. If material starts to come out of nozzle in a stream, versus a fog, or starts to come out in spits and sputters, the nozzle has become clogged. Stop immediately and clean nozzle with lacquer thinner before proceeding. Clean the sprayer immediately after use with soap and water or lacquer thinner.

Cautions

Apply at temperatures above 50°F. Use adequate ventilation. For interior applications, ventilation system should be capable of exchanging total air volume in application area in 30 minutes or less. Avoid prolonged or repeated breathing of vapor or spray mist. KEEP OUT OF THE REACH OF CHILDREN. Contains a petroleum distillate.

Clean Up

Clean brushes, tools, sprayers, rollers and other equipment with soap and water, lacquer thinner, toluol, or xylol.

First Aid

Eye Contact: Hold eyelids open and immediately flush with plenty of lukewarm water for at least 15 minutes and call a physician.

Skin Contact: Wash thoroughly with soap and water. If irritation persists, seek medical aid.

Inhalation: Remove from exposure, administer oxygen if breathing is difficult.

Ingestion: Do not induce vomiting. Small amounts of liquid aspirated into lungs may cause serious pulmonary injury.

Safety Equipment

Solvent resistant gloves, goggles and if applied in areas of poor or inadequate ventilation, use mine safety mask and canister (Organic Vapor Canister No. 77705 GMA).

6. COVERAGE

Compliance with ASTM C-309 specification is an application rate of 200 square feet per gallon.

Dept. of Transportation coverage rate is 200 square feet per gallon.

7. PACKAGING

55 gallon drums
5 gallon pails

8. STORAGE

Store upright or on side away from excessive heart. Retighten bungs immediately after each use to avoid contamination.

9. WARRANTY NOTICE

LAMBERT CORPORATION products are designed to be used in the construction industry and should be applied by competent persons in accordance with current published instructions. We cannot be held responsible for difficulty caused by other materials and conditions, or by inferior workmanship. LAMBERT reserves the right to have the true cause of any difficulty determined by accepted test methods by an independent party. Any claim regarding product defect must be received in writing 1 year from day of shipment. No claim will be considered without such written notice or after the specified time interval.

DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY: LAMBERT CORPORATION, (Seller) warrants that if any goods supplied prove defective in workmanship or material, that Seller shall replace them or refund their purchase price. THIS WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND/OR FITNESS WHICH ARE HEREBY DISCLAIMED. IT IS UNDERSTOOD AND AGREED THAT BUYER'S SOLE REMEDY, AND THEREFORE SELLER'S LIABILITY, WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, IN NEGLIGENCE, OR OTHERWISE SHALL BE LIMITED TO THE RETURN OF THE PURCHASE PRICE PAID BY PURCHASER OR REPLACEMENT OF ANY DEFECTIVE GOODS SOLD BY SELLER AND UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES. THE PRICE STATED FOR THE GOODS IS A CONSIDERATION IN LIMITING SELLER'S LIABILITY. Any liability or risk resulting from the use of this product is assumed by the PURCHASER/USER except where a specific warranty is provided by the manufacturer in writing. Before application, the PURCHASER USER shall determine the suitability of the product for his intended use and PURCHASER/USER assumes all liabilities and risks whatsoever in connection therewith. **THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE FACE HEREOF.**

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Skin Contact: Wash thoroughly with soap and water. If irritation persists, seek medical aid.

Inhalation: Remove from exposure, administer oxygen if breathing is difficult.

Ingestion: Do not induce vomiting. Small amounts of liquid aspirated into lungs may cause serious pulmonary injury.

Safety Equipment

Solvent resistant gloves, goggles and if applied in areas of poor or inadequate ventilation, use mine safety mask and canister (Organic Vapor Canister No. 77705 GMA).

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5 gallon pails

8. STORAGE

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9. WARRANTY NOTICE

LAMBERT CORPORATION products are designed to be used in the construction industry and should be applied by competent persons in accordance with current published instructions. We cannot be held responsible for difficulty caused by other materials and conditions, or by inferior workmanship. LAMBERT reserves the right to have the true cause of any difficulty determined by accepted test methods by an independent party. Any claim regarding product defect must be received in writing 1 year from day of shipment. No claim will be considered without such written notice or after the specified time interval.

DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY: LAMBERT CORPORATION, (Seller) warrants that if any goods supplied prove defective in workmanship or material, that Seller shall replace them or refund their purchase price. THIS WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND/OR FITNESS WHICH ARE HEREBY DISCLAIMED. IT IS UNDERSTOOD AND AGREED THAT BUYER'S SOLE REMEDY, AND THEREFORE SELLER'S LIABILITY, WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, IN NEGLIGENCE, OR OTHERWISE SHALL BE LIMITED TO THE RETURN OF THE PURCHASE PRICE PAID BY PURCHASER OR REPLACEMENT OF ANY DEFECTIVE GOODS SOLD BY SELLER AND UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES. THE PRICE STATED FOR THE GOODS IS A CONSIDERATION IN LIMITING SELLER'S LIABILITY. Any liability or risk resulting from the use of this product is assumed by the PURCHASER/USER except where a specific warranty is provided by the manufacturer in writing. Before application, the PURCHASER USER shall determine the suitability of the product for his intended use and PURCHASER/USER assumes all liabilities and risks whatsoever in connection therewith. **THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE FACE HEREOF.**

APPENDIX 10

Secondary Containment Hydrostatic Test Results

specified strength, and not more than 10% of the strength tests shall have values less than the specified strength.

3.3.14 Additional tests (including coring) may be required if deemed necessary by the Engineer due to failure of any of the above tests, poor workmanship, questionable concrete, etc. These tests shall be paid for by the Contractor.

3.3.15 If core tests fall below the design specified strength, concrete represented by the weaker strength samples shall be removed and replaced.

3.3.16 Testing laboratory representative shall inspect all reinforcing steel placement prior to concrete placement and this inspection shall verify bar size, spacing, location in member and concrete cover is per the Plans and Specifications.

3.3.17 Copies of all inspection and test results shall be forwarded to the Gen. Contractor, Engineer, Concrete Subcontractor and Owner.

3.4 REPAIR/REPLACEMENT OF DEFECTIVE CONCRETE

3.4.1 The Engineer may required the complete replacement of excessively defective concrete, and repairs as required to correct defective concrete.

3.5 CLEAN-UP:

3.5.1 At the completion of the work, remove from the site all excess materials and debris. Leave entire area in a neat and broom clean condition. Throughout work, maintain areas free of materials and debris which would interfere or be dangerous to other trades.

3.6 TESTING OF REQUIRED WATERTIGHT CONCRETE STRUCTURES

3.6.1 All concrete structures which are to hold stormwater, liquids, water and/or provide containment (tanks, basins, wells, sumps, trench drains, etc.) shall be tested by the Contractor prior to any backfilling for watertightness.

3.6.2 The test shall be hydrostatic test by filling the structure to maximum 1' above the operating level or to the top level with water and allowing to stand for a period of 48 hours. The level of the water shall be checked after 24 hours and at the end of the time period. Allowance for evaporation will be taken into account.

3.6.3 Any detectable leaks are to be repaired and the structure retested until a satisfactory test is made.

3.6.4 If the water level is lower at the end of the test period by a significant amount and no leaks are detected, the structure shall be drained and the bottom slab inspected for any leaks. After repair, the structure shall be retested until a satisfactory test is made.

-END OF SECTION-

Add at start of Appendix 10

Water Levels for Cells with Fiber Concrete (1.5 lbs./cubic yard)

Cell	Base Reading	24-hours	48-hours	Delta @ 24-hours	Delta @ 48-hours	Evaporation @ 48-hours (2.)	Water Loss - Evap. @ 48-hours
A	4 7/16	4 9/16	4 5/8	1/8	3/16	1/16	2/16
B	4 3/8	4 1/2	4 9/16	1/8	3/16	1/16	2/16
C	4 3/8	4 17/32	4 5/8	5/32	1/4	1/16	3/16
D	4 5/16	4 15/32	4 17/32	5/32	7/32	1/16	3/16
E	4 7/16	4 11/16	4 25/32	1/4	11/32	1/16	5/16
H	4 3/4	4 15/16	5	3/16	1/4	1/16	3/16
I	4 1/8	4 3/8	4 3/8	1/4	1/4	1/16	3/16
J	4 1/2	4 1/2	4 5/8	0	1/8	1/16	1/16
K	4 23/32	4 25/32	4 13/16	1/16	3/32	1/16	1/16
L	4 3/16	4 5/16	4 7/16	1/8	1/4	1/16	3/16
M	4 3/8	4 7/16	4 1/2	1/16	1/8	1/16	1/16
N	4 3/8	4 7/16	4 7/16	1/16	1/16	1/16	0
O	3 7/8	3 29/32	4 3/32	1/32	7/32	1/16	3/16
P	4 11/16	4 25/32	4 13/16	3/32	1/8	1/16	1/16
Q	4 7/16	4 5/8	4 5/8	3/16	3/16	1/16	2/16

Average	**2/16**
Range	**0 to 5/16**
Standard Deviation	**1/16**
Average Permeability	**1.92E-06 cm/sec**

Water Levels for Cells without Fiber Concrete

Cell	Base Reading	24-hours	48-hours	Delta @ 24-hours	Delta @ 48-hours	Evaporation @ 48-hours (2.)	Water Loss - Evap. @ 48-hours	Water Migration Rate (3.) Adjusted for Fiber
F	5 5/32	5 1/2	5 11/16	11/32	17/32	1/16	8/16	3/16
G	4 13/16	5 21/32	7 5/32	27/32	2 11/32	1/16	2 5/16	14/16

	Actual Permeability (cm/sec)	Adjusted Permeability (cm/sec)
Cell F	**6.91E-06**	**2.66E-06**
Cell G	**3.36E-05**	**1.31E-05**

Notes:
1. All readings reported to the nearest 1/32-inches and calculations to the nearest 1/16-inches.
2. Evaporation based on an average temperature of 73 F and a relative humidity of 46% for the first 24 hours and an average temperature 71 F and a relative humidity of 44% for the second 24 hours under the following conditions: no sunlight and no wind. This resulted in an evaporation of 1/16-inches over the 48-hour period.
3. Fiber assumed to result in a 61.5% reduction in water migration based on testing conducted by Dr. Paul P. Kraai, P.E. at San Jose State University in California.
4. The theoretical permeabilities of concrete without fiber and with 1.5 lbs of fiber per cubic yard are 5.21E-6 cm/sec and 8.68E-7 cm/sec respectfully based upon Dr. Kraai's research

Results of Previous Hydrostatic Test indicated that Cells F and G would require repair and retesting. Following is the results of the retest for Cells F and G performed after addition repairs where completed. Tests were conducted between December 4. 1997 to December 6, 1997 by Mr. Horace Kirklam (LES). Results of the retest indicate that Cells F and G are performing satisfactory.

Results of Hydrostatic Water Test for Cells F and G

Cell	Base Reading	24-hours	48-hours	Delta @ 24-hours	Delta @ 48-hours	Evaporation @ 48-hours (2.)	Water Loss - Evap. @ 48-hours
F	5 7/16	5 17/32	5 5/8	3/32	3/16	1/16	2/16
G	5 3/32	5 5/32	5 1/4	1/16	5/32	1/16	2/16

	Actual Permeability (cm/sec)
Cell F	**1.86E-06**
Cell G	**1.40E-06**

Notes:
1. All readings reported to the nearest 1/32-inches and calculations to the nearest 1/16-inches.
2. Evaporation rate assumed to be the same as previous tests, 1/16 of an inch.
3. Fiber assumed to result in a 61.5% reduction in water migration based on testing conducted by Dr. Paul P. Kraai, P.E. at San Jose State University in California.
4. The theoretical permeabilities of concrete without fiber and with 1.5 lbs of fiber per cubic yard are 5.21E-6 cm/sec and 8.68E-7 cm/sec respectfully based upon Dr. Kraai's research

Revised:
12/22/97

LES FACILITY
BARTOW, FL
DRUM STORAGE BUILDING
CELL VOLUMES

CELL	ACTUAL VOLUME (CUBIC FEET)	DESIGN VOLUME (CUBIC FEET)	REQUIRED VOLUME (CUBIC FEET)
A	175.69	188.60	117.6
B	145.69	154.68	94.1
C	101.56	106.32	70.6
D	118.68	137.73	94.1
E	88.17	106.32	70.6
F	120.54	154.68	94.1
G	162.32	188.60	117.6
H	231.83	239.23	176.5
I	186.54	193.64	141.2
J	153.35	163.03	105.9
K	162.54	163.03	105.9
L	109.12	105.28	58.8
M	161.48	163.03	105.9
N	163.13	163.03	105.9
O	211.39	207.69	117.6
P	251.87	239.23	176.5
Q	199.88	193.64	141.2

Notes:
1. Actual volume for each cell based on field measurements taken by Mr. Horace Kirkland, LES, on October 31, 1997.
2. Design and required volumes based on calculations performed by ViroGroup on January 22, 1997.
3. Required volume is equal to 10 percent of the total volume to be stored in each cell with the exception of Cell O which requires a volume of 25 percent of the total volume to accommodate a planned future permit to store PCB's.
4. A factor of 7.48 gallons per cubic foot was used.
5. This table replaces an earlier version. This table contains no changes in "Actual Volumes" or "Design Volumes" columns. A review of the "Required Volumes" data revealed that a clerical error had been made in transferring this data from the planning and design effort to the preparation of design drawings.

Exchange
for
Appendix
11

11/24/95

LES FACILITY
BARTOW, FL
DRUM STORAGE BUILDING
CELL VOLUMES

CELL	ACTUAL VOLUME (CUBIC FEET)	DESIGN VOLUME (CUBIC FEET)	REQUIRED VOLUME (CUBIC FEET)
A	175.69	188.60	70.6
B	145.69	154.68	94.1
C	101.56	106.32	94.1
D	118.68	137.73	94.1
E	88.17	106.32	94.1
F	120.54	154.68	94.1
G	162.32	188.60	94.1
H	231.83	239.23	70.6
I	186.54	193.64	70.6
J	153.35	163.03	117.7
K	162.54	163.03	82.4
L	109.12	103.65	94.1
M	161.48	163.03	94.1
N	163.13	163.03	94.1
O	211.39	207.69	47.1
P	251.87	239.23	176.5
Q	199.88	193.64	141.2

Notes:
1. Actual volume for each cell based on field measurements taken by Mr. Horace KirklaM, LES, on October 31, 1997.
2. Design volumes based on calculations performed by ViroGroup on July 12, 1997.
3. Required volume is equal to 10 percent of the total volume to be stored in each cell.