CONTRACTS AND SCHEDULES

INDUSTRY BRIEFING
AUGUST 6, 1996

GERHARD STAPFER

OVERVIEW

- HOW DOES LIGO GET BUILT
  - IN-HOUSE TASKS
  - CONTRACTED WORK
- THE LIVINGSTON OBSERVATORY
  - BEAM TUBE SLAB AND ENCLOSURES
  - BUILDINGS AND INFRASTRUCTURE
  - BEAM TUBE
  - VACUUM EQUIPMENT
  - SUPPORT CONTRACTS
- WHEN AND WHERE DOES IT ALL TAKE PLACE
  - PROCUREMENTS
  - CONSTRUCTION SCHEDULES
  - LOCATION

THE PARTS OF LIGO

- THE DETECTOR
  - LASER INTERFEROMETER, CONTROL AND DATA SYSTEM
- THE VACUUM EQUIPMENT
  - HOUSES THE INTERFEROMETER, ULTRA HIGH VACUUM
- THE BEAM TUBE
  - PROVIDES A "CLEAN" PATH FOR THE LASER BEAM;
- THE FACILITY
  - BUILDINGS AND INFRASTRUCTURE TO HOUSE THE VACUUM EQUIPMENT AND DETECTOR
  - PROVIDES THE FOUNDATION AND PROTECTION FOR THE BEAM TUBE
  - LABORATORY AND OFFICE SPACE

THE DETECTOR

- WORLD'S MOST SENSITIVE OPTICAL INSTRUMENT
  - » RESEARCH AND DEVELOPMENT IS ONGOING AT THE CALIFORNIA INSTITUTE OF TECHNOLOGY (CALTECH) AND THE MASSACHUSETT INSTITUTE OF TECHNOLOGY (MIT)
  - » DESIGNED BY CALTECH AND MIT'S SCIENTISTS AND ENGINEERS
  - » FABRICATED BY SPECIALTY VENDORS
  - » ASSEMBLED AND INSTALLED AT THE SITES BY A TEAM OF LIGO SCIENTISTS AND ENGINEERS

THE VACUUM EQUIPMENT AND BEAM TUBE

- HIGHLY TECHNICAL AND SPECIALIZED WORK SCOPE
    - SOME IN-HOUSE AND SOME CONTRACTED WORK

» IN-HOUSE TASK
    - THE REQUIREMENTS AND CONCEPTUAL DESIGNS WERE COMPLETED BY LIGO

» CONTRACTED TASK
    - PROCESS SYSTEM INTERNATIONAL (PSI) IS UNDER CONTRACT TO PERFORM THE DESIGN, FABRICATION AND INSTALLATION OF TE VACUUM EQUIPMENT AT BOTH SITES
    - CHICAGO BRIDGE & IRON (CBI) IS UNDER CONTRACT FOR FOR THE DESIGN, FABRICATION AND INSTALLATION OF THE BEAM TUBE AT BOTH SITES

THE FACILITY

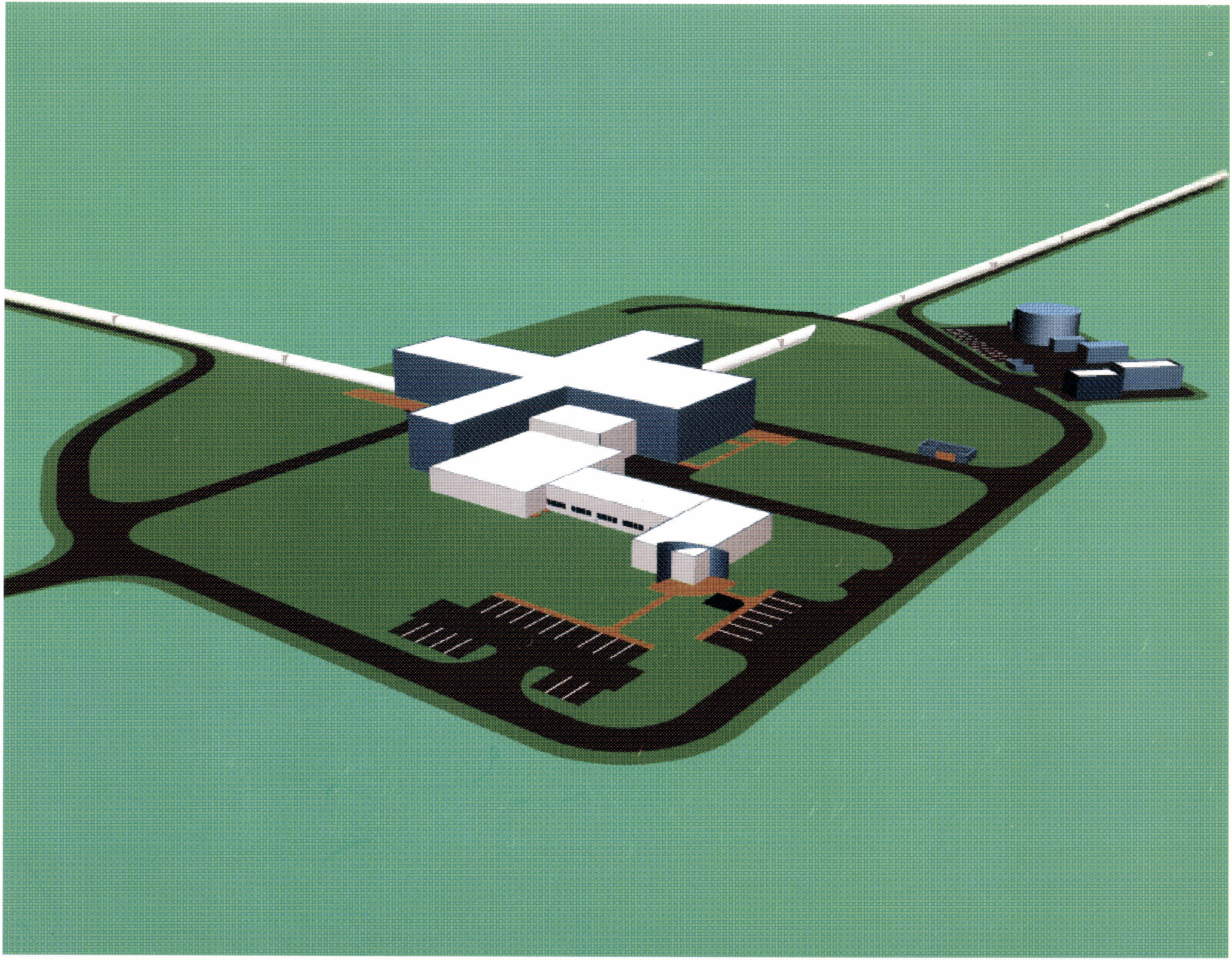
- MAJOR CONTRACTED EFFORTS
  - DESIGN
  - CLEARING AND ROUGH GRADING
  - BUILDING AND INFRASTRUCTURE
  - CONCRETE SLAB AND PRE-CAST ENCLOSURES
  - SUPPORT CONTRACTS

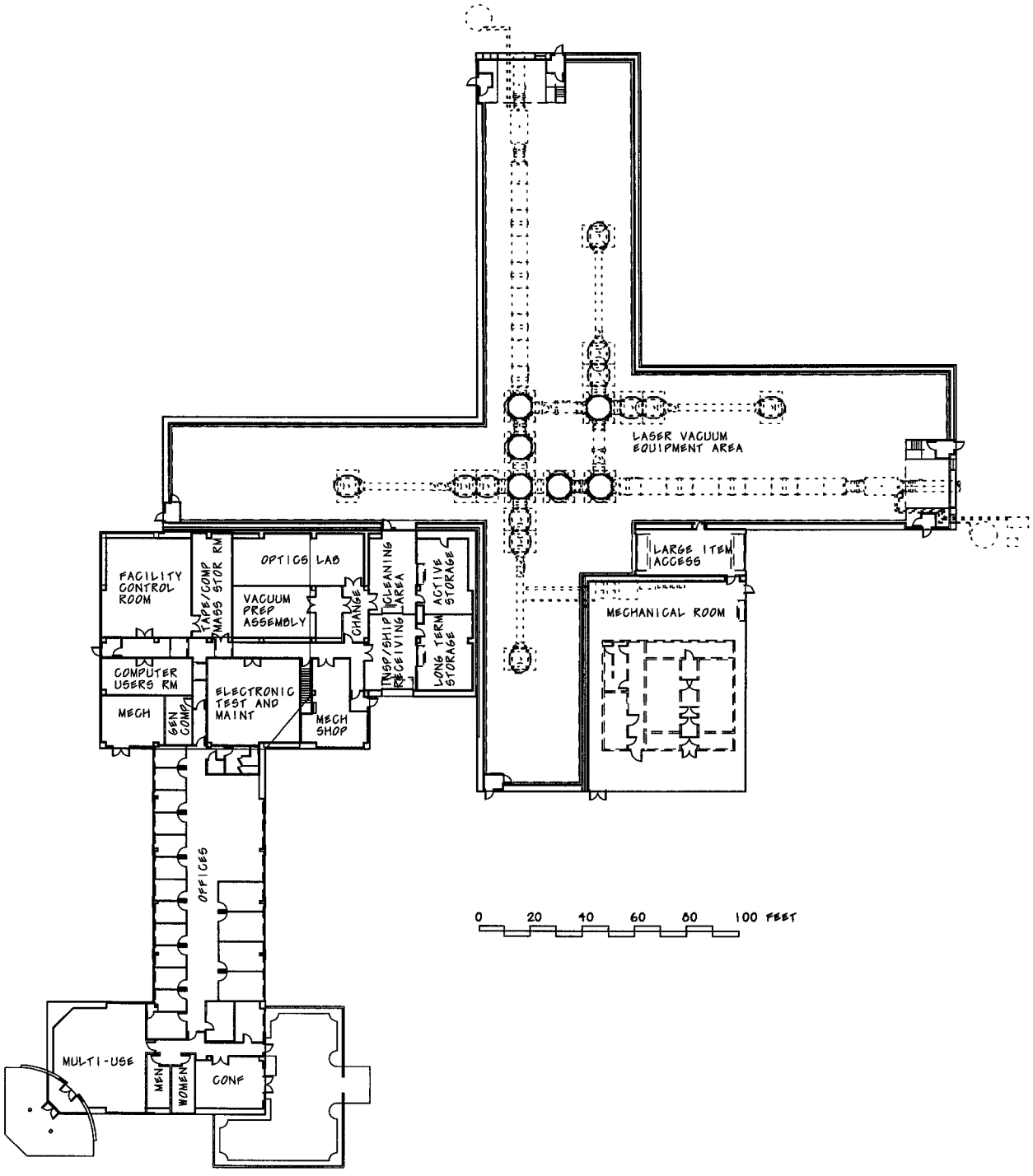
DESIGN, CLEARING AND ROUGH GRADING

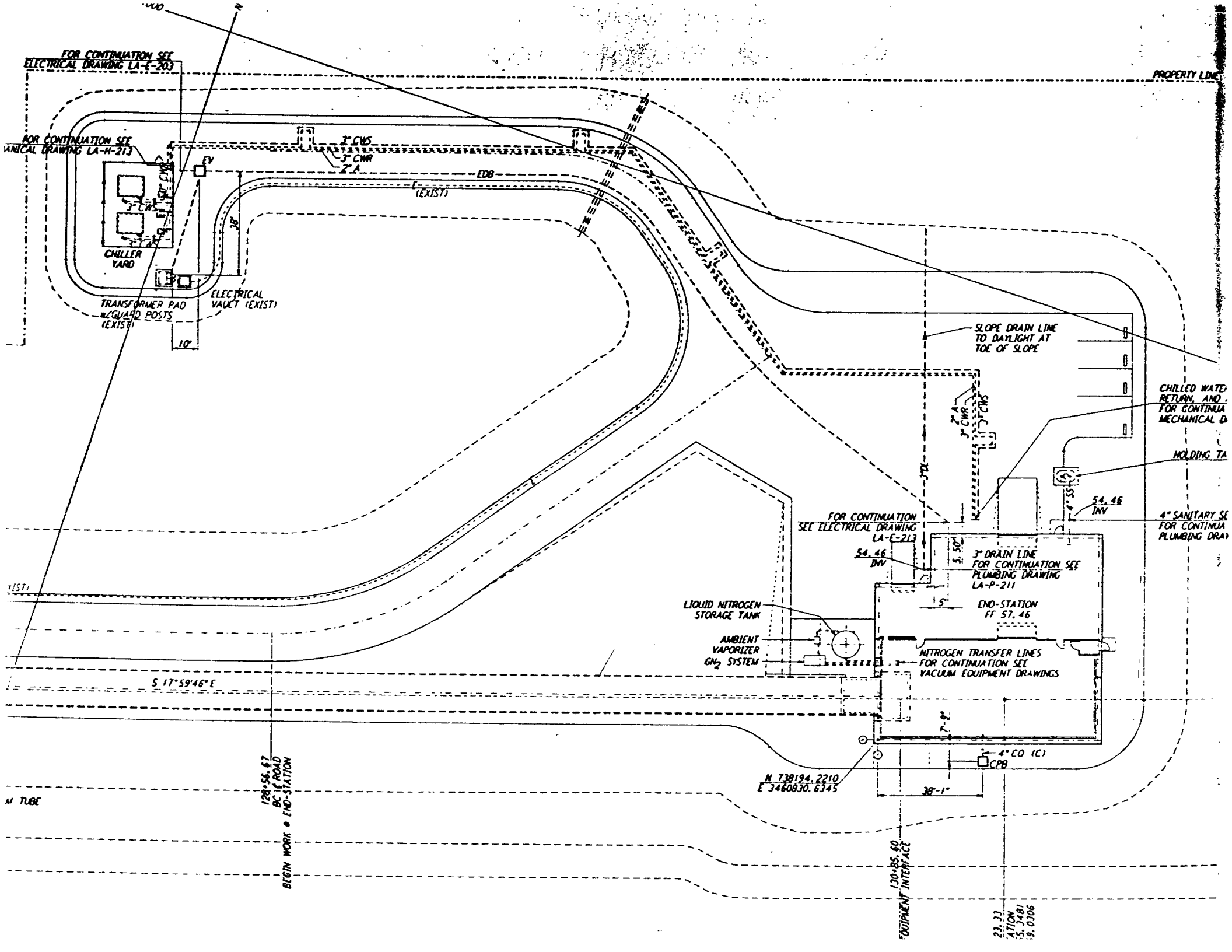
- DESIGN
  - DESIGN, BY PARSONS, HAS BEEN ESSENTIALLY BEEN COMPLETED
  - CONSTRUCTION MANAGEMENT IS CONTRACTED TO PARSONS
- CLEARING
  - HAS BEEN COMPLETED
- ROUGH GRADING
  - IS (ALMOST) COMPLETED
  - SETTLEMENT OF BERM IS INSTRUMENTED

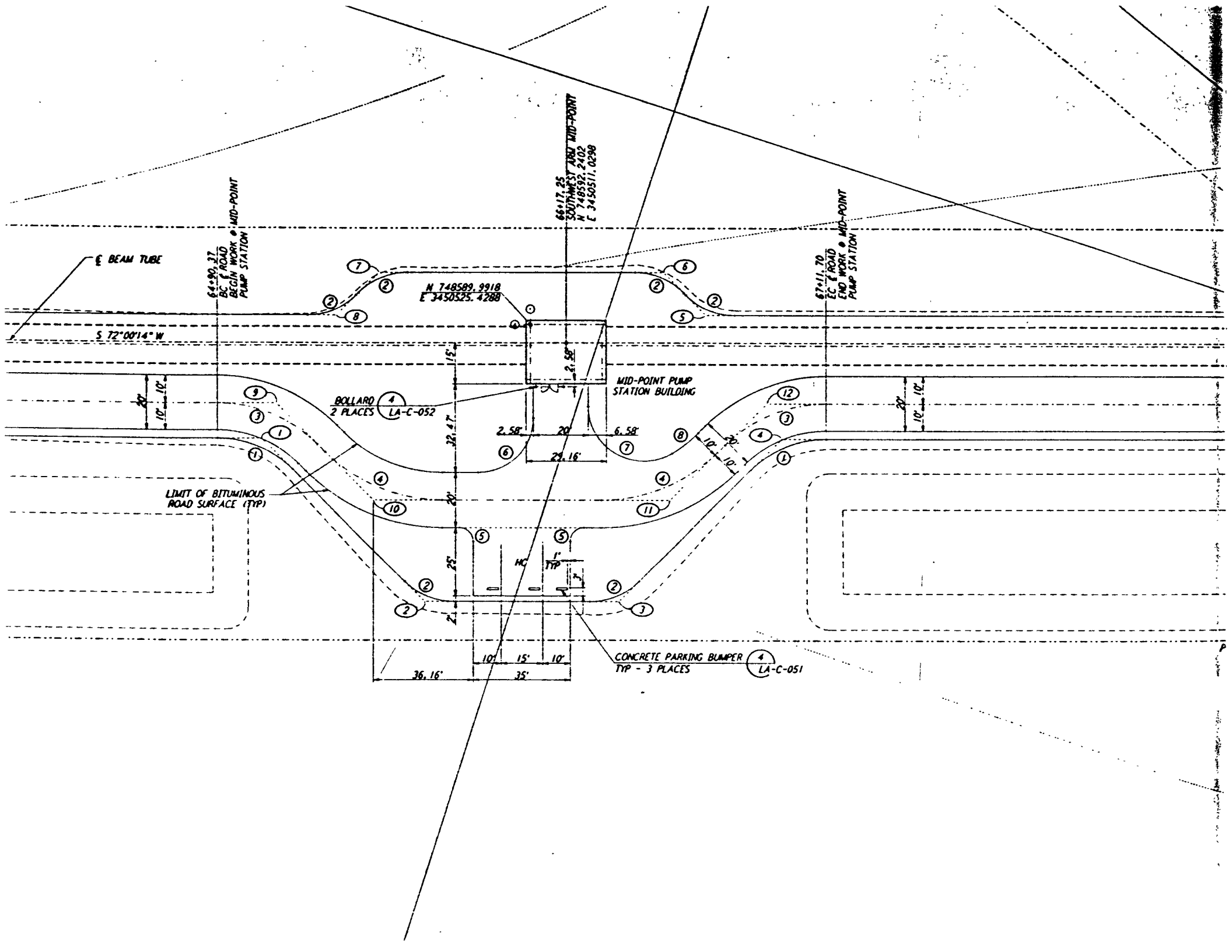
BUILDING AND INFRASTRUCTURE

- GENERAL CONTRACTOR (TBD)
  - SINGLE FIXED PRICE CONTRACT WITH CALTECH
- WORK SCOPE SUMMARY
  - » CORNER STATION
    - APPROXIMATELY 57,000 SQUARE FEET OF HIGH BAY, LABORATORIES AND OFFICES
    - HIGH BAY, CRANES, 32 FEET CEILING HEIGHT
  - » TWO END STATIONS
    - APPROXIMATELY 8,000 SQUARE FEET, HIGH BAY
  - » TWO MID STATIONS
    - SMALL MINIMAL BUILDINGS WITHOUT FACILITIES
  - » INFRASTRUCTURE
    - CHILLER PLANTS, ROADS, PARKING, POWER DISTRIBUTION



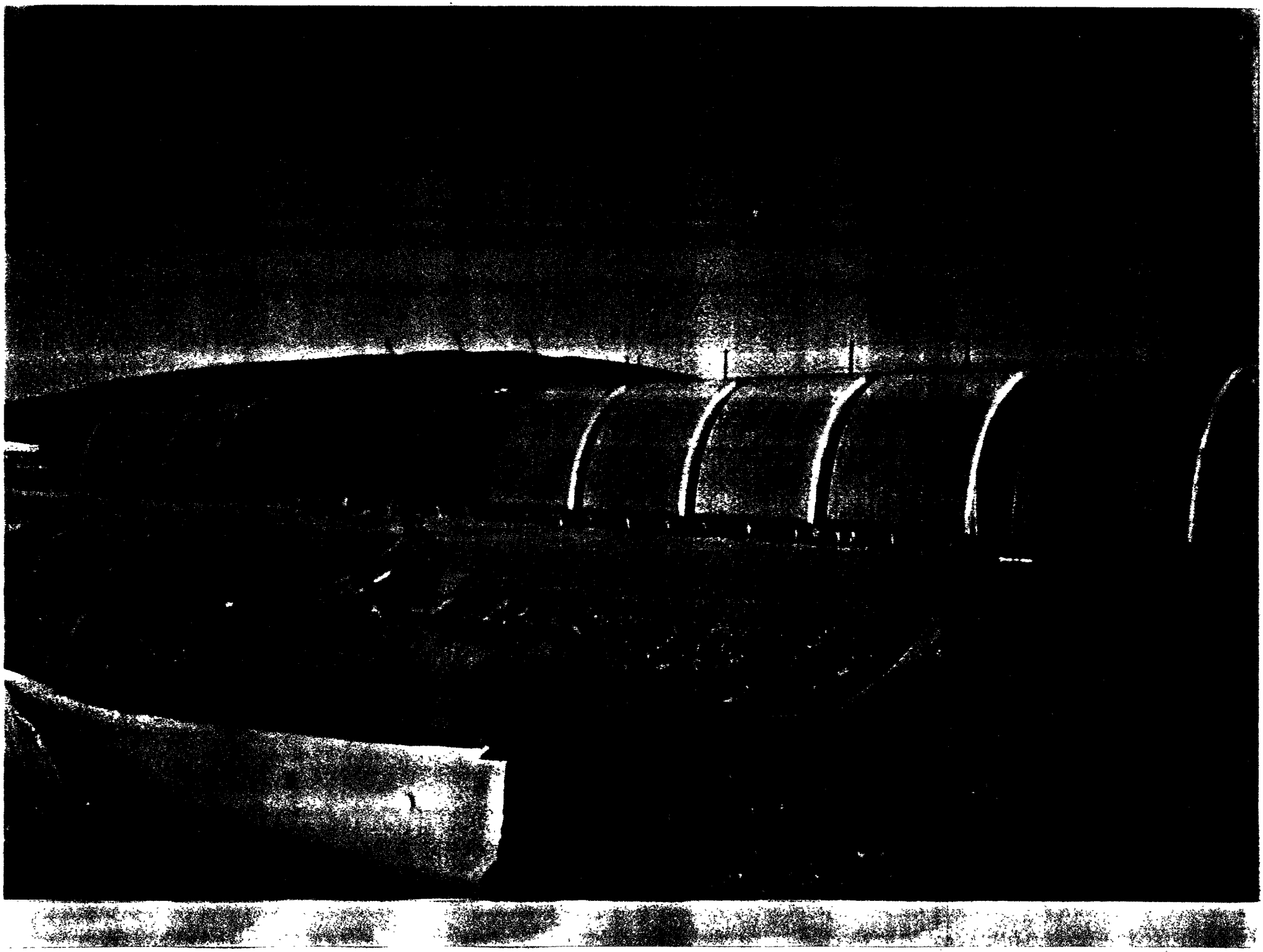

LASER VACUUM EQUIPMENT AREA
LARGE ITEM ACCESS
MECHANICAL ROOM
FACILITY CONTROL ROOM
TAPE/COMP MASS STOR RM
OPTICS LAB
VACUUM PREP ASSEMBLY
CHANGE
CLEANING AREA
ACTIVE STORAGE
LONG TERM STORAGE
TRNSP/SHIP RECEIVING
COMPUTER USERS RM
MECH
GEN COMP
ELECTRONIC TEST AND MAINT
MECH SHOP
OFFICES
MULTI-USE
MEN
WOMEN
CONF
0 20 40 60 80 100 FEET

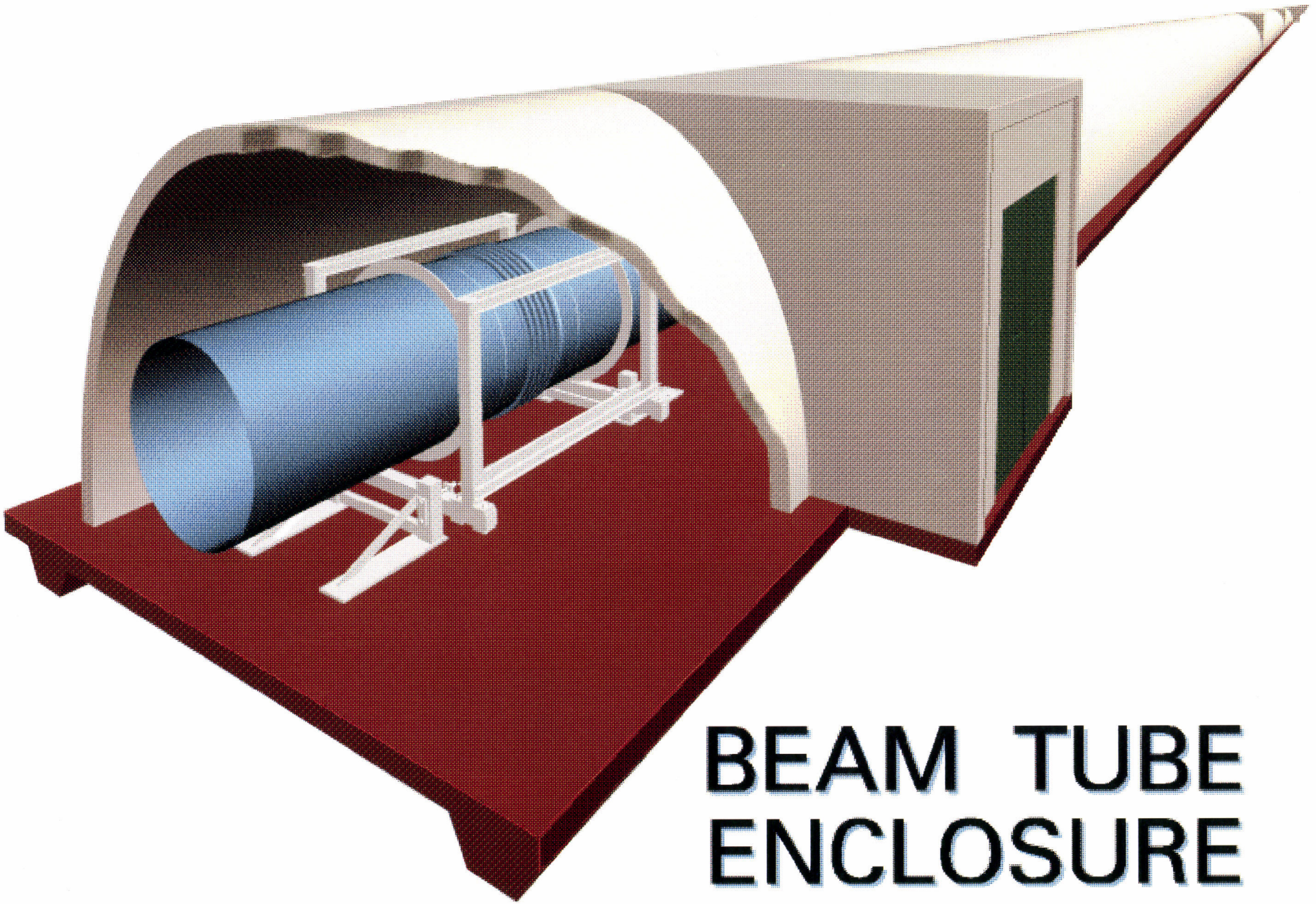

FOR CONTINUATION SEE ELECTRICAL DRAWING LA-E-203
PROPERTY LINE
FOR CONTINUATION SEE MECHANICAL DRAWING LA-M-213
2" CWS
3" CWR
2" A
EV
EDB
(EXIST)
3" CWS
3" CWR
2" A
CHILLER YARD
38'
TRANSFORMER PAD w/GUARD POSTS (EXIST)
ELECTRICAL VAULT (EXIST)
10'
SLOPE DRAIN LINE TO DAYLIGHT AT TOE OF SLOPE
2" CWR
2" CWS
CHILLED WATER RETURN, AND FOR CONTINUATION MECHANICAL D
HOLDING TA
4" SS
54.46 INV
4" SANITARY SE FOR CONTINUA PLUMBING DRA
FOR CONTINUATION SEE ELECTRICAL DRAWING LA-E-213
54.46 INV
5.50'
3" DRAIN LINE FOR CONTINUATION SEE PLUMBING DRAWING LA-P-211
5'
END-STATION FF 57.46
LIQUID NITROGEN STORAGE TANK
AMBIENT VAPORIZER GN_2 SYSTEM
NITROGEN TRANSFER LINES FOR CONTINUATION SEE VACUUM EQUIPMENT DRAWINGS
S 17°59'46" E
7'-9"
4" CO (C)
CP8
N 738194.2210
E 3460830.6345
38'-1"
128+56.67
BC ℄ ROAD
END-STATION
BEGIN WORK
TUBE
130+85.60
EQUIPMENT INTERFACE
23.33
ATION
5.3481
9.0306


℄ BEAM TUBE
64+90.27
BC ℄ ROAD
BEGIN WORK ● MID-POINT
PUMP STATION
S 72°00'14" W
66+17.25
SOUTHWEST JOG MID-POINT
N 748592.2402
E 3450511.0298
N 748589.9918
E 3450525.4288
67+11.70
EC ℄ ROAD
END WORK ● MID-POINT
PUMP STATION
MID-POINT PUMP
STATION BUILDING
BOLLARD 4
2 PLACES LA-C-052
LIMIT OF BITUMINOUS
ROAD SURFACE (TYP)
CONCRETE PARKING BUMPER 4
TYP - 3 PLACES LA-C-051
HC
1' TYP
2.58'
20'
6.58'
29.16'
32.47'
15'
25'
2'
10'
36.16'
35'

CONCRETE SLAB AND PRECAST ENCLOSURES

- GENERAL CONTRACTOR (TBD)
  - SINGLE FIXED PRICE CONTRACT WITH CALTECH
- WORK SCOPE SUMMARY
  - CONSTRUCT APPROXIMATELY 5 MILES OF SERVICE ROAD, 20 FEET WIDE
  - 5 MILES OF PRECISION LEVELED CONCRETE SLAB, 14 FEET WIDE, 8 INCHES THICK
  - FABRICATE AND DELIVER 2,600 PRECAST CONCRETE ENCLOSURES
  - INSTALL ENCLOSURES OVER THE BEAM TUBE, GROUT AND SEAL




BEAM TUBE
ENCLOSURE

SUPPORT CONTRACTS

- QUALITY ASSURANCE
  - INDEPENDENT TESTING
- SURVEYING
  - PRECISION SURVEYING
  - VERIFICATION
- MAINTENANCE
  - GROUNDS
  - JANITORIAL
  - POWER

PROCUREMENT SCHEDULE

- PROCUREMENT
  - INVITATION FOR BID
  - PARALLEL PROCUREMENT PROCESS FOR BOTH IFBs
- ISSUE IFB
  - BID PACKAGE IS AVAILABLE ON AUGUST 2, 1996
  - COST IS $200 PER PACKAGE (**REQUEST PACKAGE BY IFB NUMBER!**)
- JOB WALK *(CROWN STERLING SUITES HOTEL, BATON ROUGE)*
  - AUGUST 29, 1996, 9:00AM FOR ISB-EJ-250
  - AUGUST 29, 1996 ,1:00PM FOR ISB-EJ-246
- BID DUE DATE *(CROWN STERLING SUITES HOTEL, BATON ROUGE)*
  - OCTOBER 1, 1996, 2:00PM

PERFORMANCE SCHEDULE

- CONTRACT
  - SIGNED CONTRACT IS ANTICIPATED BY END OF OCTOBER 1996
  - NOTICE TO PROCEED IS PLANNED FOR MID NOVEMBER 1996
- START OF OFF-SITE WORK
  - AFTER NOTICE TO PROCEED
  - MATERIAL DATA SUBMITTAL, PROCUREMENT OF LONG LEAD ITEMS ETC.
- START OF ON-SITE WORK
  - DEPENDING ON GROUND SETTLEMENT DATA
  - COULD BE AS EARLY AS NOTICE TO PROCEED
  - ANTICIPATED NO LATER THAN MARCH 1, 1997

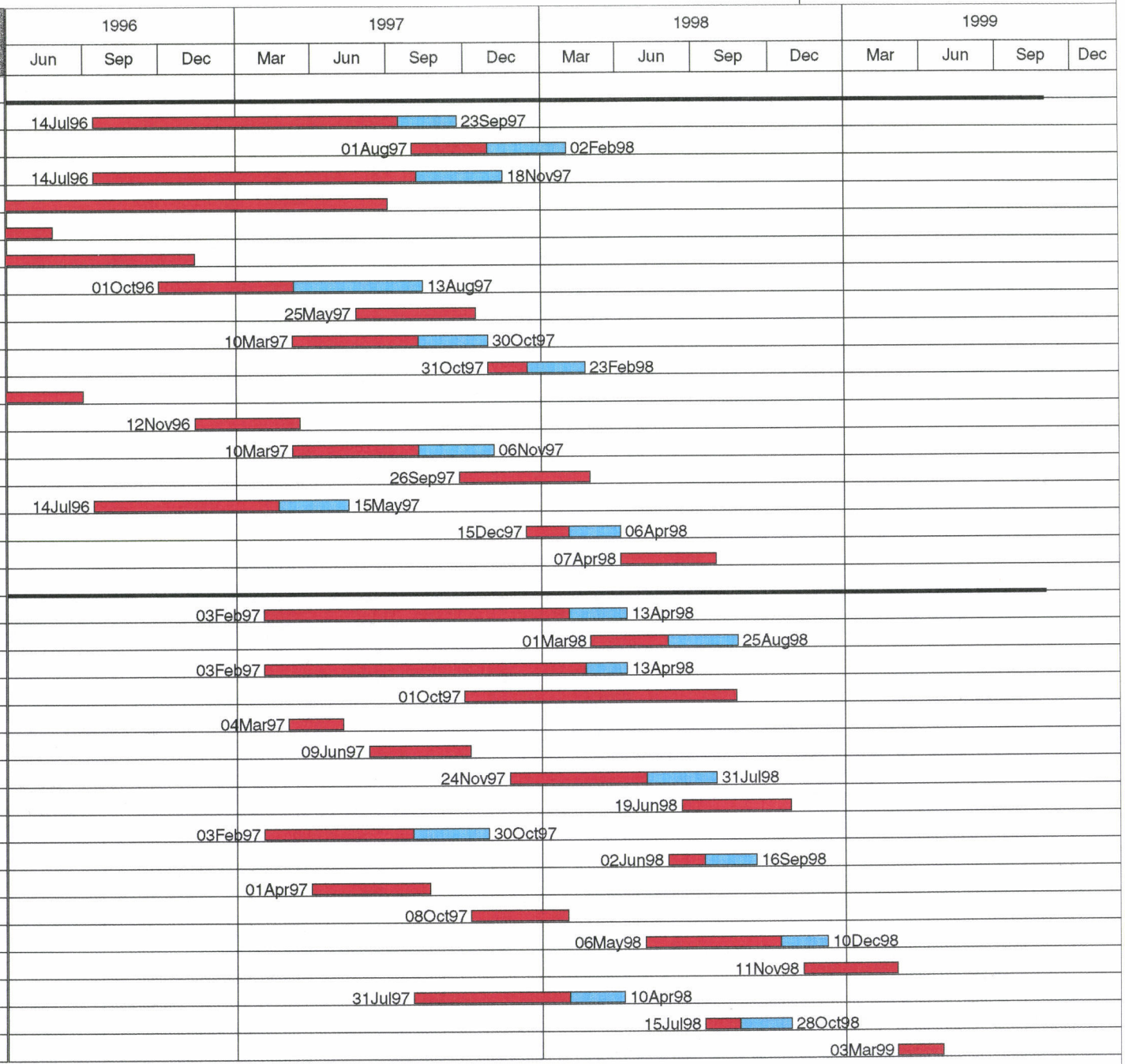
Project:	SITESCH1
Time Now:	01/01/96
Start:	01/01/96
Finish:	03/03/99
Run:	07/30/96
Page:	1 of 1

LIGO
FACILITIES SCHEDULE
HANFORD/LIVINGSTON

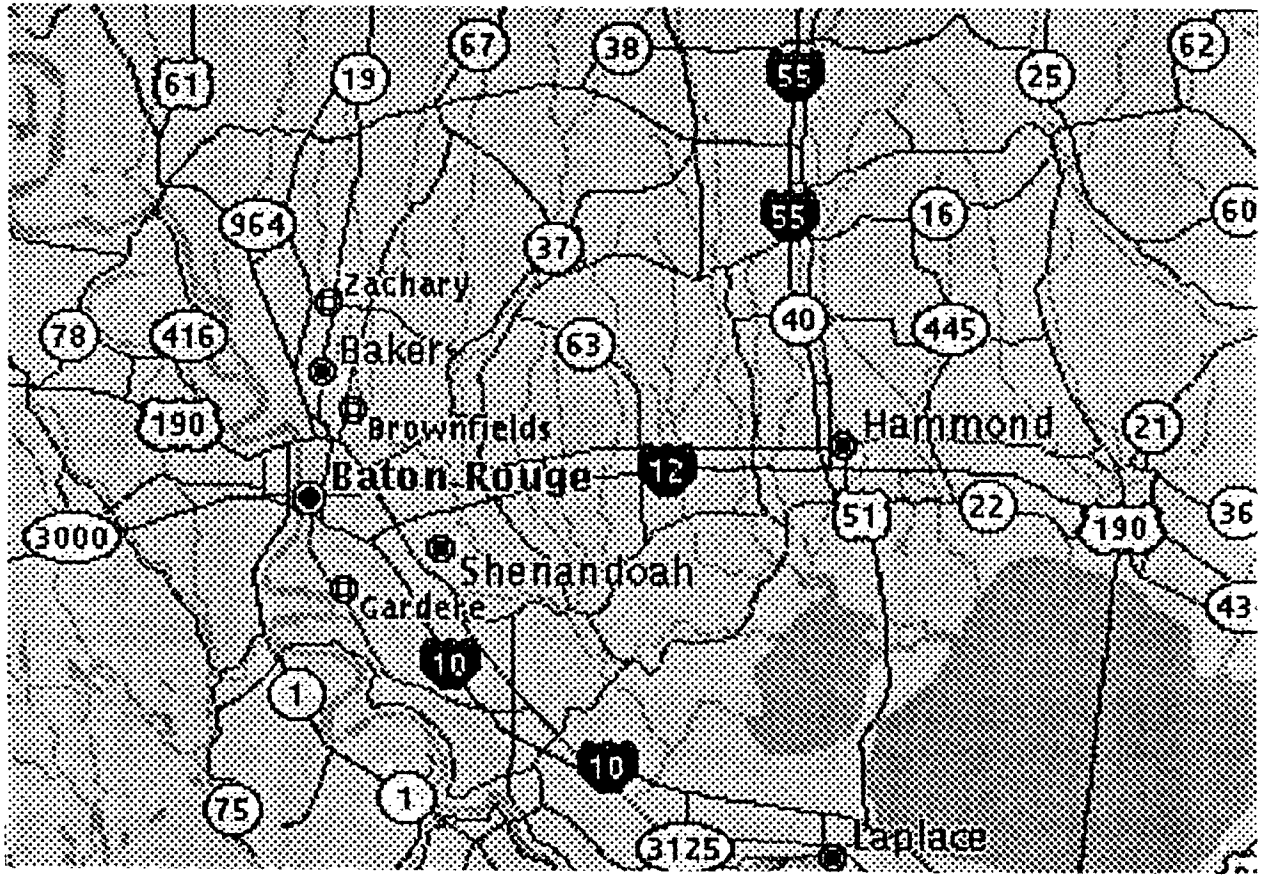
INSTALLATION

ACCEPTANCE

Activity Desc.	TStart	TFinish	Field 2
WASHINGTON			
LVEA CONST/ACCEPTANCE	07/14/96	07/14/97	09/23/97
VE CORNER INST/ACCEPT	08/01/97	10/30/97	02/02/98
OSB CONST/ACCEPTANCE	07/14/96	08/04/97	11/18/97
BT FABRICATION	01/01/96	07/01/97	
GRADING/ROAD/SLAB	01/01/96	05/24/96	
ENCLOSURE FAB ARM-2	01/01/96	11/11/96	
BT ARM-2 INST/ACEPT	10/01/96	03/10/97	08/13/97
BT ARM-2 BAKE	05/25/97	10/15/97	
MID/END ARM-2 BUILDING	03/10/97	08/06/97	10/30/97
VE ARM-2 INST/ACCEPT	10/31/97	12/16/97	02/23/98
GRADING/ROAD/SLAB	01/01/96	07/01/96	
ENCLOSURE FAB ARM-1	11/12/96	03/18/97	
BT ARM-1 INST/ACCEPTANC	03/10/97	08/06/97	11/06/97
BT ARM-1 BAKE	09/26/97	02/28/98	
MID/END ARM-1 BUILDING	07/14/96	02/20/97	05/15/97
VE ARM-21INST/ACCEPT	12/15/97	02/03/98	04/06/98
FACILITY SHAKEDOWN	04/07/98	07/29/98	
LOUISIANA			
LVEA CONST/ACCEPTANCE	02/03/97	02/03/98	04/13/98
VE CORNER INST/ACCEPTA	03/01/98	06/01/98	08/25/98
OSB CONST/ACCEPTANCE	02/03/97	02/23/98	04/13/98
BT FABRICATION	10/01/97	08/21/98	
GRADING/ROAD/SLAB ARM-:	03/04/97	05/07/97	
ENCLOSURE FAB ARM-2	06/09/97	10/07/97	
BT ARM-2 INST/ACCEPTANC	11/24/97	05/06/98	07/31/98
BT ARM-2 BAKE	06/19/98	10/26/98	
MID/END ARM-2 BUILDING	02/03/97	07/30/97	10/30/97
VE ARM-2 INST/ACCEPT	06/02/98	07/14/98	09/16/98
GRADING/ROAD/SLAB ARM-	04/01/97	08/20/97	
ENCLOSURE FAB ARM-1	10/08/97	02/01/98	
BT ARM-1 INST/ACCEPTANC	05/06/98	10/13/98	12/10/98
BT ARM-1 BAKE	11/11/98	03/02/99	
MID/END ARM-1 BUILDING	07/31/97	02/02/98	04/10/98
VE ARM-1 INST/ACCEPT	07/15/98	08/25/98	10/28/98
FACILITY SHAKEDOWN	03/03/99	04/27/99	



LOCATION


61
19
67
38
55
25
62
964
55
16
60
37
Zachary
40
445
78
416
Baker
63
Brownfields
190
Hammond
21
Baton Rouge
12
51
22
190
36
3000
Shenandoah
Gardere
43
10
1
10
75
1
3125
Laplace

SITE