

N-96-01
II-A-143

APPENDIX B
HIGHWAY CONSTRUCTION NOISE FIELD MEASUREMENTS,
SITE 2: I-205 (OREGON)

October 1981

Office of Noise Abatement & Control
U. S. Environmental Protection Agency
Washington, D. C. 20460

N-96-01
II-A-143

| TECHNICAL REPORT DATA <i>(Please read instructions on the reverse before completing)</i> | | |
|--|---|---|
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| 16. ABSTRACT <p>This study investigated the noise associated with highway construction activities. It involved the identification and examination of: highway construction activities, noise characteristics associated with highway construction activities, availability of highway construction noise abatement measures, demonstration of construction site noise abatement measures, and development of a computer-based model for use as a tool to predict the noise impact of construction activities and to plan mitigation measures. The model was developed for use on the FHWA computer (IBM 360).</p> <p>A total of seven reports were prepared in this study and have been released for public distribution.</p> <p>Reports (Part D through Part G) contain field data gathered at the field demonstrations at highway construction sites in: Route I-201, California; I-205, Oregon; I-95/I-395, Maryland; and I-75, Florida. They contain noise data on single and multiple pieces of equipment, provide general description of highway site activities, and activity analyses of equipment.</p> | | |
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FORWARD

This study was jointly sponsored, through an Interagency Agreement (IAG), by the Office of Noise Abatement and Control (ONAC), U.S. Environmental Protection Agency (EPA), and the Federal Highway Administration (FHWA), U.S. Department of Transportation (DOT). The study was conducted by Wyle Laboratories under contract to FHWA Contract No. DOT-FH-11-9455. Wyle Research of El Segundo, California, and Wyle Research of Arlington, Virginia, performed the study.

The object of the study was to investigate and study the noise associated with highway construction activities. The study involved the identification and examination of: highway construction activities, noise characteristics associated with highway construction activities, availability of highway construction noise abatement measures, demonstration of construction site noise abatement measures, and development of a computer-based model for use as a tool to predict the noise impact of construction activities and to plan mitigation measures. The model was developed for use on the FHWA computer (IBM 360).

The principal project officers for Wyle Laboratories on this project were Mr. William Fuller of Wyle Research in El Segundo and Dr. Kenneth Plotkin of Wyle Research of Arlington, Virginia.

The government project managers for the study were Mr. Fred Romano of FHWA, and Mr. Roger Heymann of EPA/ONAC.

The various technical reports completed by Wyle under this contract and submitted to FHWA have been released for public distribution by EPA.

PREFACE

This study involved a comprehensive review of the environmental noise associated with highway construction activities. A total of seven reports have been released for public distribution. These reports are:

1. Analysis and Abatement of Highway Construction Noise, EPA 550/9-81-314-A, September 1981.
2. A Model for the Prediction of Highway Construction Noise, EPA 550/9-81-314-B, September 1981.
3. IBM 360/System Batch Version of Highway Construction Noise Model, EPA 550/9-81-314-C, September 1981.
4. Appendix A, Highway Construction Noise Field Measurements, Site 1: I-201 (California), EPA 550/9-81-314-D, September 1981.
5. Appendix B, Highway Construction Noise Field Measurements, Site 2: I-205 (Oregon), EPA 550/9-81-314-E, September 1981.
6. Appendix C, Highway Construction Noise Field Measurements, Site 3: I-95/I-395 (Maryland), EPA 550/9-81-314-F, September 1981.
7. Appendix D, Highway Construction Noise Field Measurements, Site 4: I-75 (Florida), EPA 550/9-81-314-G, September 1981.

The first two reports (Part A and Part B) might be considered the principal reports since they are relatively self-contained units on this study's efforts, the engineering studies and the computer model, respectively. In this regard, if there is to be a limited purchase of the reports, one might consider obtaining either or both of Part A and Part B, and obtaining the other reports as additional informational needs arise.

- The first report (Part A) contains all of the information from the engineering study phase of the project. It gives information on highway construction procedures, highway construction site noise characteristics, available abatement measures, and results from field demonstrations on noise abatement.

- The second report (Part B) presents a complete description of the highway noise prediction model. The report contains a description of the model's formulation and construction, a description of the program, and a user's manual.
- The third report (Part C) provides additional information to the Part B report on the highway construction noise model installed at DOT's Transportation Computer Center on an IBM 360 computer. It delineates the differences between the version of the model as installed on the IBM 360 and the two models (HINPUT and HICNOM) operating on the Wyle Computer (PDP-11). The report has additional user's manual information for use on the IBM 360, a programmer's manual describing changes in going from the PDP-11 to the IBM 360, and a maintenance manual.
- Reports 4, 5, 6, and 7 (Part D through Part G) contain field data gathered at the field demonstrations at highway construction sites in: Route I-201, California; I-205, Oregon; I-95/I-395, Maryland; and I-75, Florida. They contain noise data on single and multiple pieces of equipment, provide general description of highway site activities, and activity analyses of equipment.

APPENDIX B

This appendix summarizes field measurements performed at the I-205 (Oregon) construction site during September 1979. This site consisted of 9 miles of 6-lane divided highway being constructed on new alignment. The site topography was generally flat to gently rolling with some hilly canyon terrain. The highway cut through an urban area characterized by single-family dwellings, schools, small stores, etc. Further description of this site is presented in Section 3.5 of the main report.

The following data and information are presented in this appendix:

1. General highway site description.
2. Noise measurements of activities involving single or multiple pieces of equipment; diagrams describing each activity site are included.
3. Controlled single equipment noise measurements of selected equipment.
4. Equipment activity analysis of selected equipment.

A summary of key construction noise data derived from this site is presented in Section 3.5.3 of the main report.

CUT AREA II
HAUL ROAD II

LEGEND
--- EXISTING ROADWAY TO BE REMOVED
--- NEW CONSTRUCTION
--- SUBWAY
--- BICYCLE TRAIL

FILL (CUT) AREA I

CUT AREA III

BRIDGE SITE II

FILL AREA II

EASTERN BUSWAY CONNECTIONS

GATEWAY

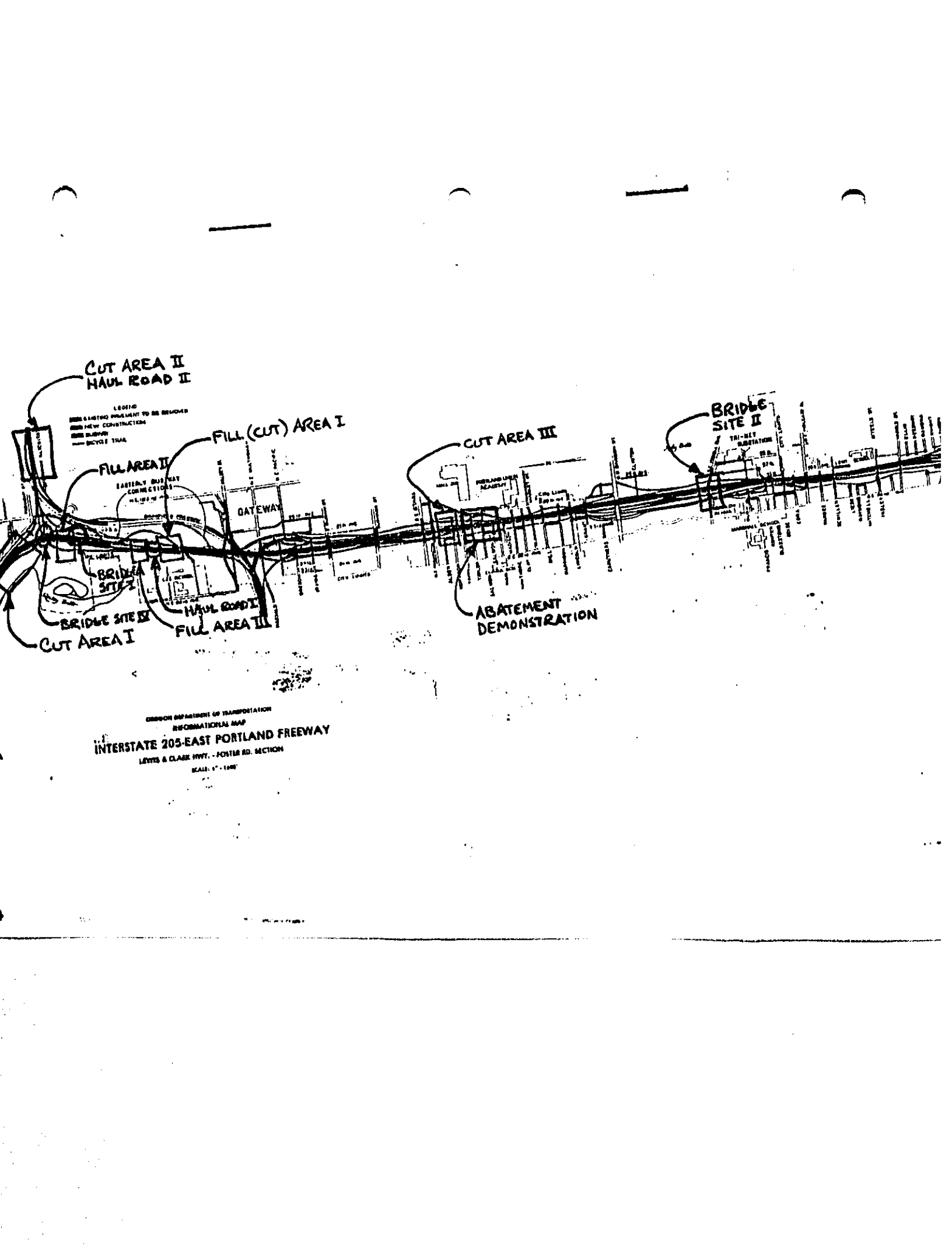
ABATEMENT DEMONSTRATION

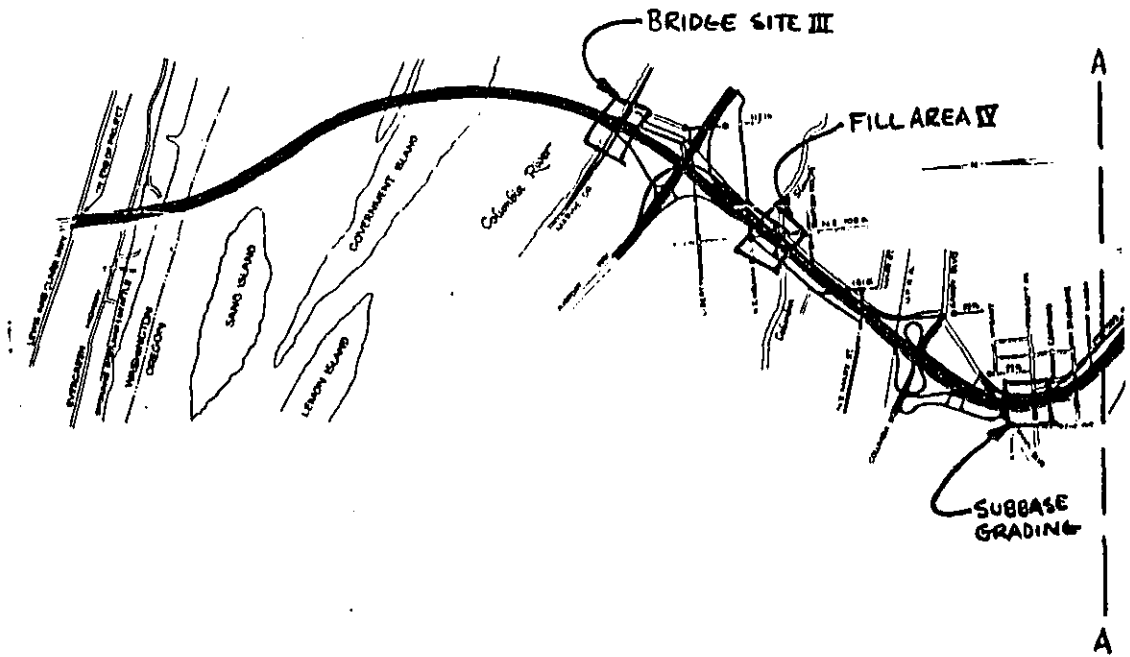
BRIDGE SITE I

HAUL ROAD I
FILL AREA I

CUT AREA I

OREGON DEPARTMENT OF TRANSPORTATION
INFORMATIONAL MAP
INTERSTATE 205-EAST PORTLAND FREEWAY
LEWIS & CLARK HWY. - FOSTER RD. SECTION
SCALE: 1" = 100'





Measurement Site Data

Highway: I-205

Date: SEPT. 1979

Site Location: Cut Area @ the Fairfield Freeway
Interchange

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Steep rocky slope. Retaining west side;
concrete retaining wall & earth berm borders east side;
multi-level terrain; large rock & loose soil.
All site boundary measurements made along east side
on top of earth berm.

Machinery Description:

Cat. D9B Dozer
Cat. D8H Dozer
Cat. 96C Dozer
FMC Link-Belt LS 4000 Backhoe
Rock Drill (pneumatic) w/ Gardner-Devereux 750 CFM Comp.
Fiat-Allis 460 Scrapers (only operating on 9-8-79)

Miscellaneous Information:

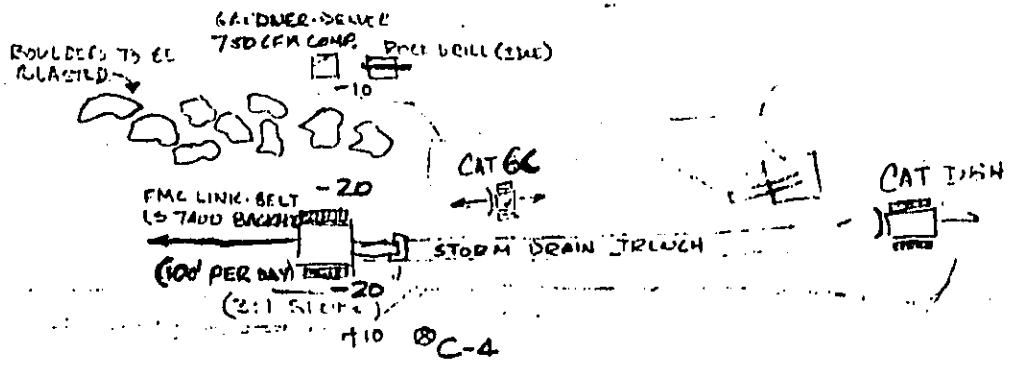
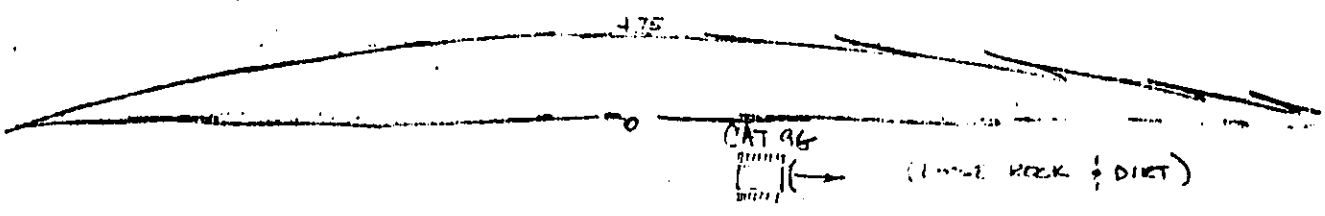
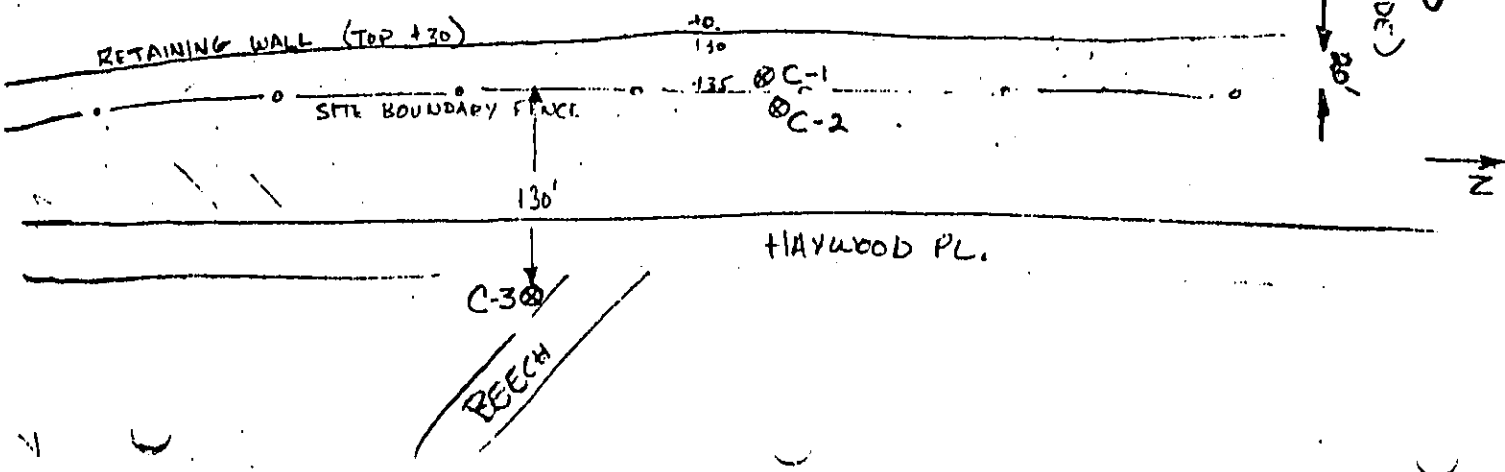


DIAGRAM 9-5D
(SEE REVERSE SIDE)



CORRECTION!

**THE PREVIOUS DOCUMENT(S)
MAY HAVE BEEN FILMED
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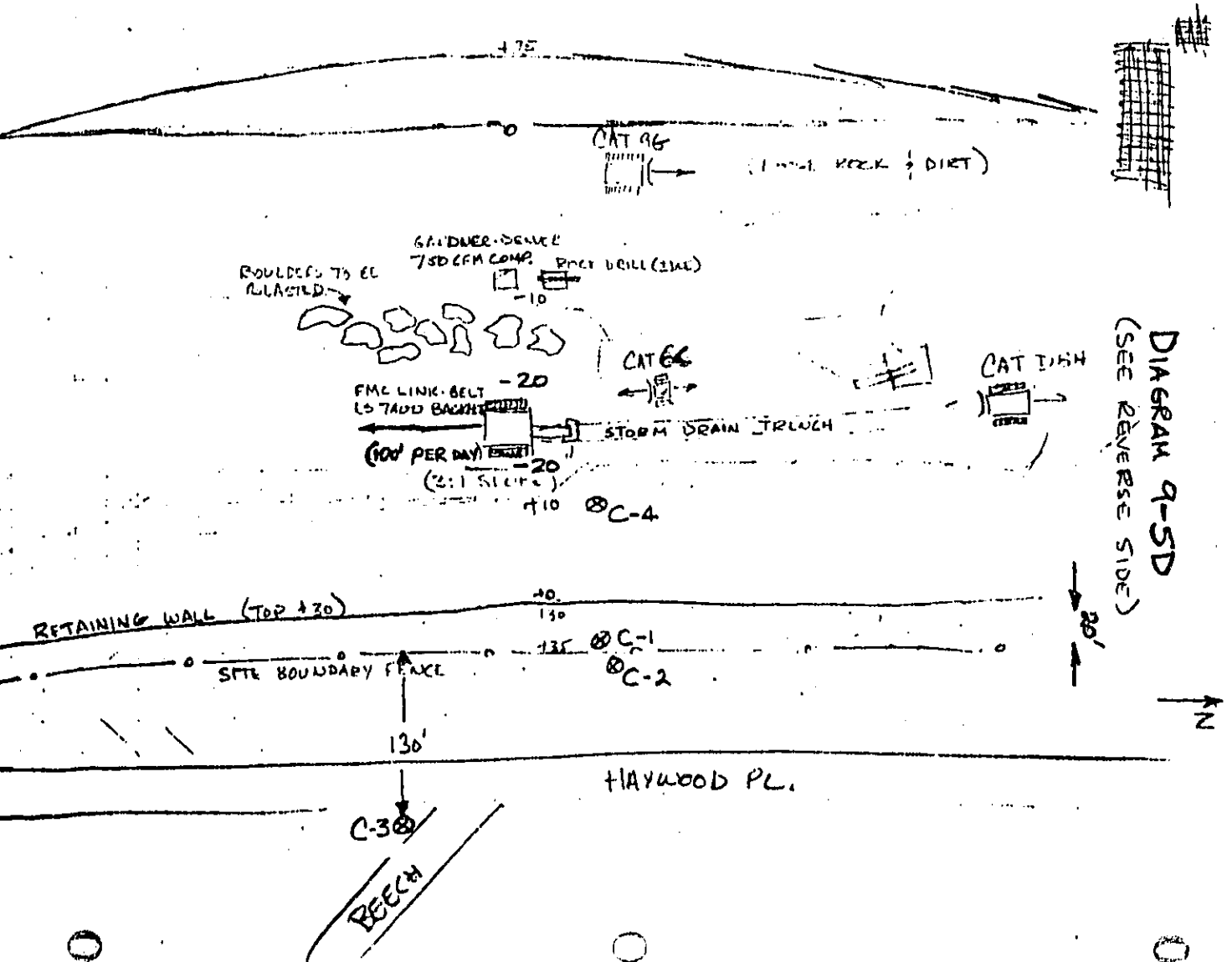


DIAGRAM 9-5D
 (SEE REVERSE SIDE)

DIAGRAM 9-5E

FMC LINK-BELT FS 7400 ENGINE
ENCLOSED ENGINE; ENGINE AS 111
RIGHT SIDE CYLINDER; DUAL EXHAUST

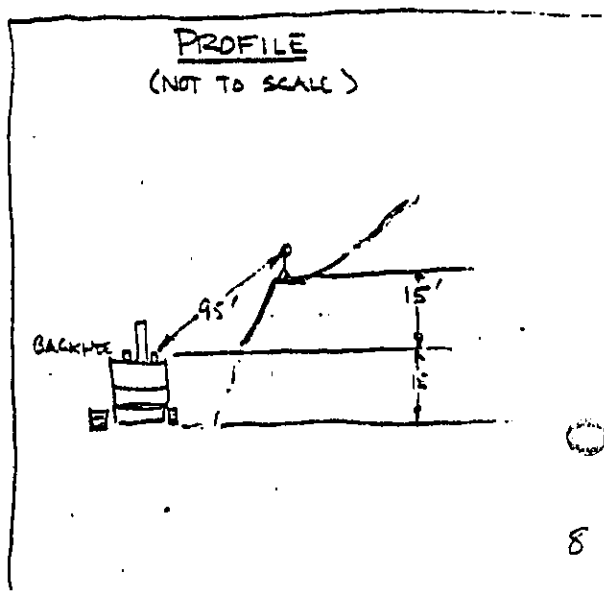
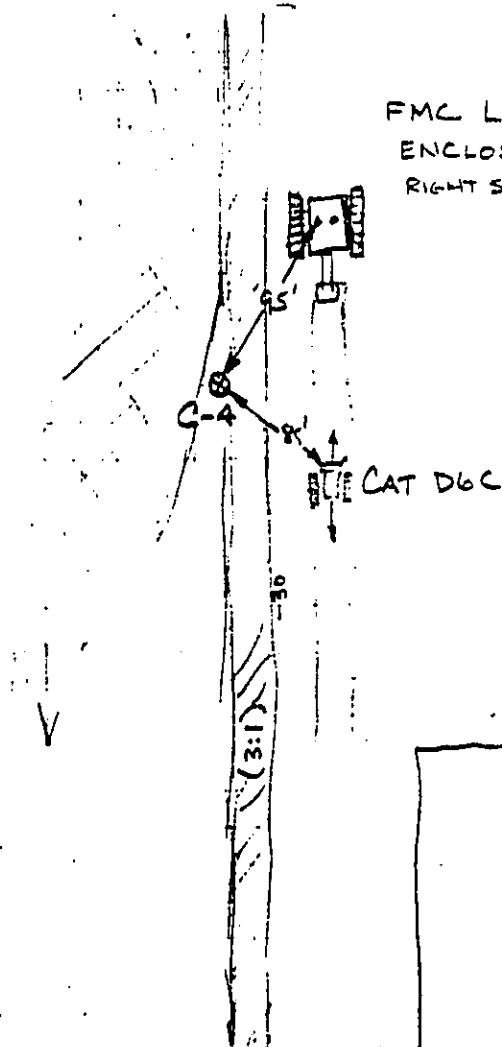
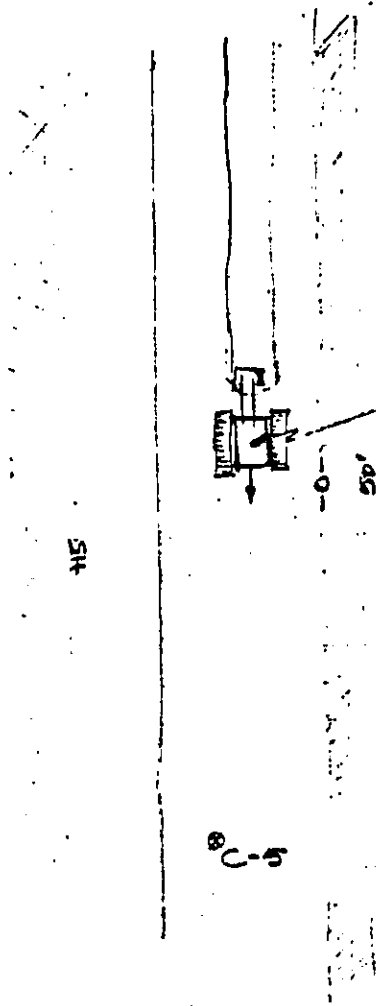
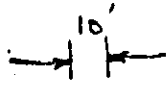


DIAGRAM 9-7C



FMC LINK-BELT
FS 7400
BALKITOC

C-5

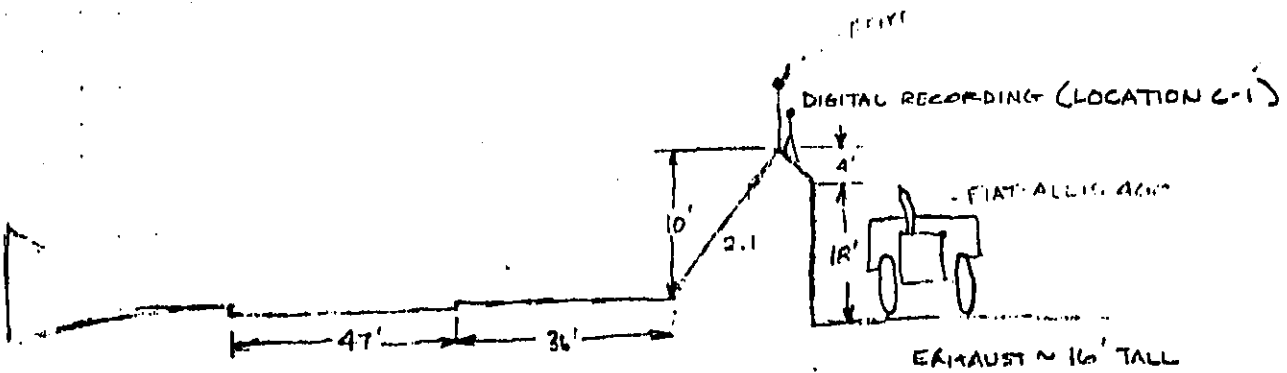
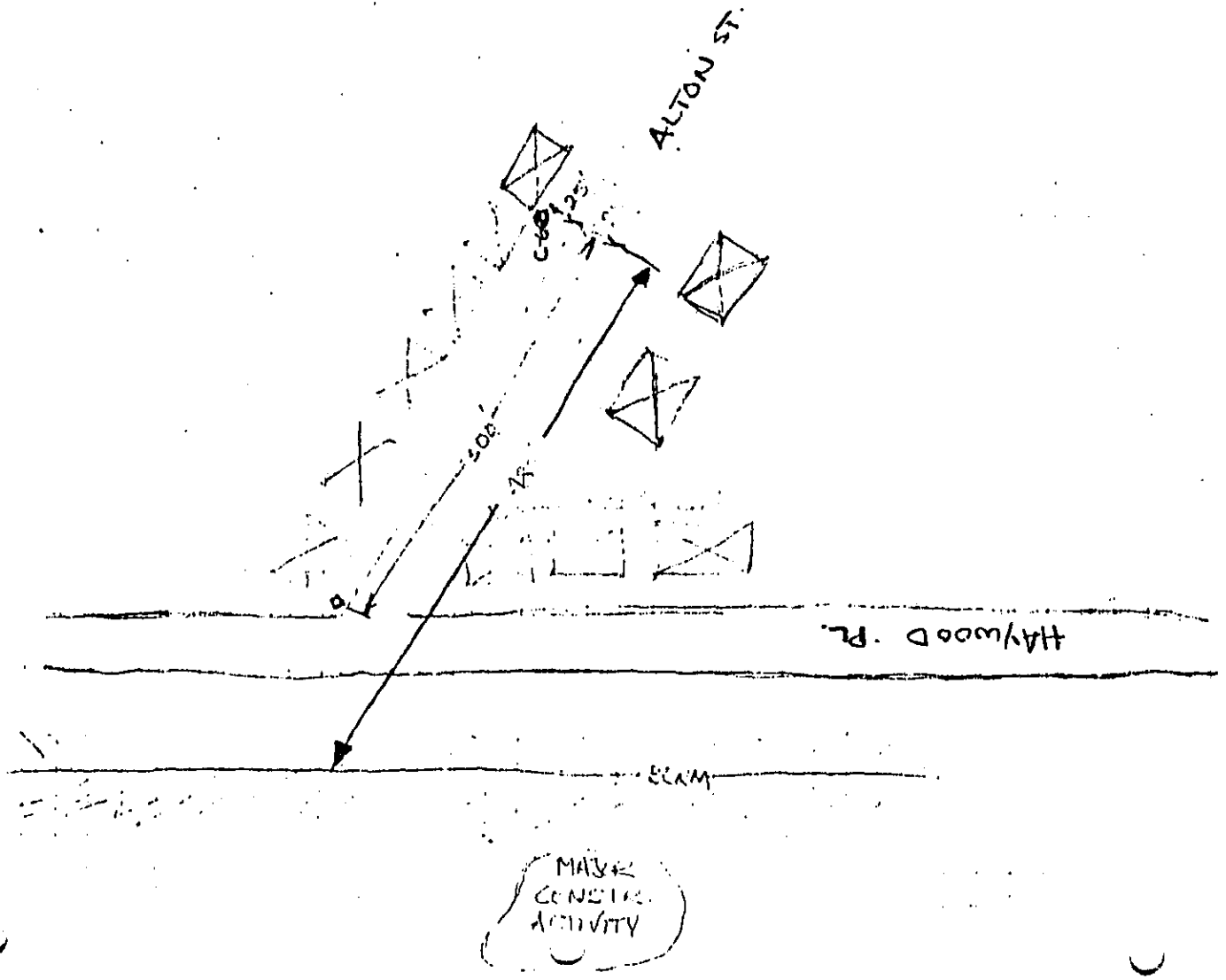


DIAGRAM A-8A

DIAGRAM 9-8B



Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Cut Area II; East of interchange on
Transitive Road to Banfield Freeway.

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

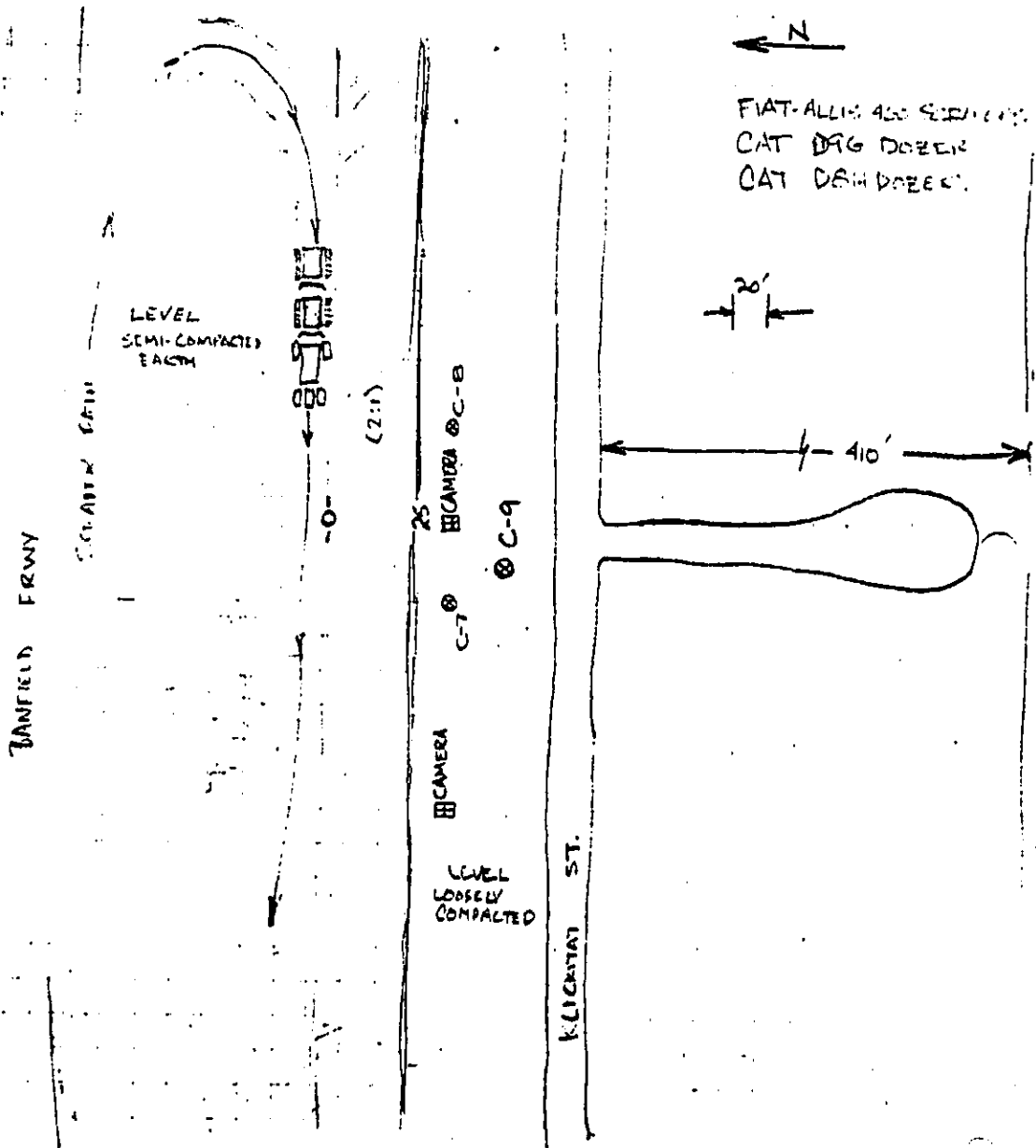
Soil/Terrain Conditions: Embankment between microphone &
equipment was hard, compacted soil with 2:1 slope.
Area around equipment was hard back earth.
Line of sight from mic. to equipment. Mic.
approximately 25 feet above equipment.

Machinery Description:

Cat D9G Dozer
Cat D8H Dozer
Fiat-Allis 400 Scrapers

Miscellaneous Information: Dozers worked in tandem pushing
scrapers as they filled

DIAGRAM 9-7A



Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Cut Area III; S. of Washington St.

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Terrain is generally flat. Area from microphone to cut operation was flat and grass covered. Area where equipment worked was depressed by about 5 feet.

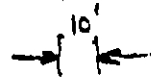
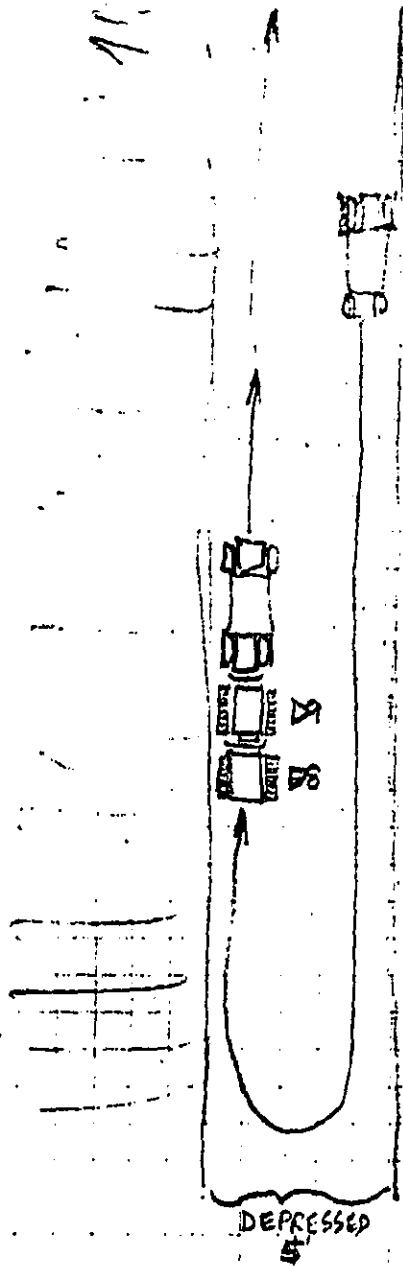
Machinery Description:

Cat. D9G Dozer
Cat. DAH Dozer
Cat. 631 Scrape

Miscellaneous Information:

Dozer worked in tandem pushing scrape

DIAGRAM 9-75



Cat D16
Cat DBH
Cat 631B Screener

⊙ C-11

22

Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Fill (Cut) Area I; S. of interchange

Type of Measurements:

- | | | |
|---|--|--|
| <input type="checkbox"/> Community | <input checked="" type="checkbox"/> Activity | <input type="checkbox"/> Propagation |
| <input checked="" type="checkbox"/> Site Boundary | <input type="checkbox"/> Single Equipment | <input checked="" type="checkbox"/> Movies |

Soil/Terrain Conditions: Steep rocky slope along western side of right. Hard compacted earth at bottom of slope, representing highway right-of-way. Eastern edge of right-of-way slopes off sharply.

Machinery Description:

Fiat - Allis 460 Scrapper (during 9-5-79 measurements)
Compactor (no name; during 9-5-79 measurements)
Cat D9G Dozer
2 Cat D8H Dozers
Cat 988 Loader
2 Cat. 769 End Dumps

Miscellaneous Information:

Scrapper brought in fill soil; operated only on 9-5-79
Cat. 769 End Dumps used to carry heavy rocks; loaded by Cat. 988 loader.

DIAGRAM 9-5B

WYLE LABORATORIES - Wyle Research, El Segundo, California Page _____

Prepared by: _____ Date: _____ Subject: _____
(SEE REVERSE SIDE)

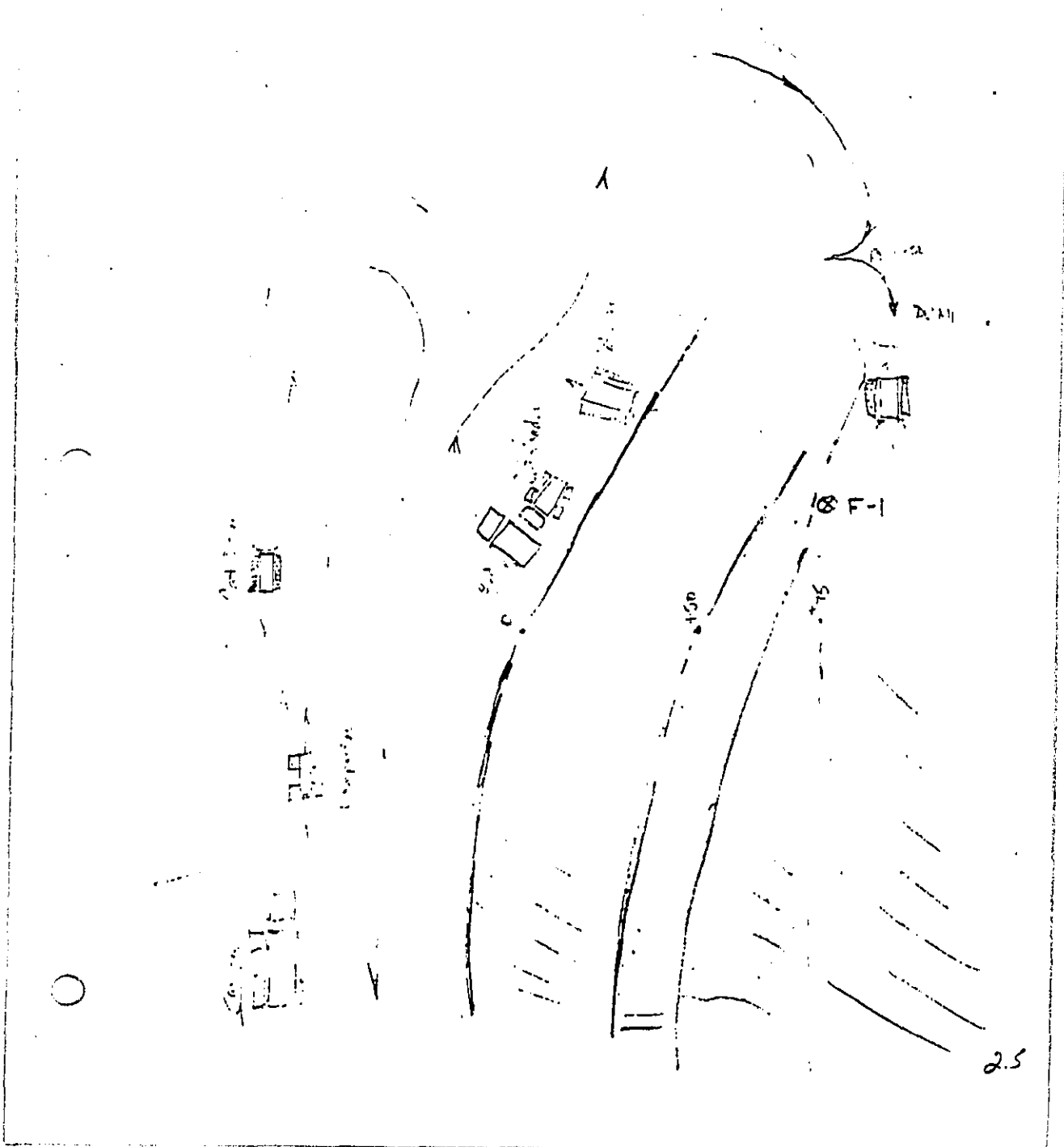
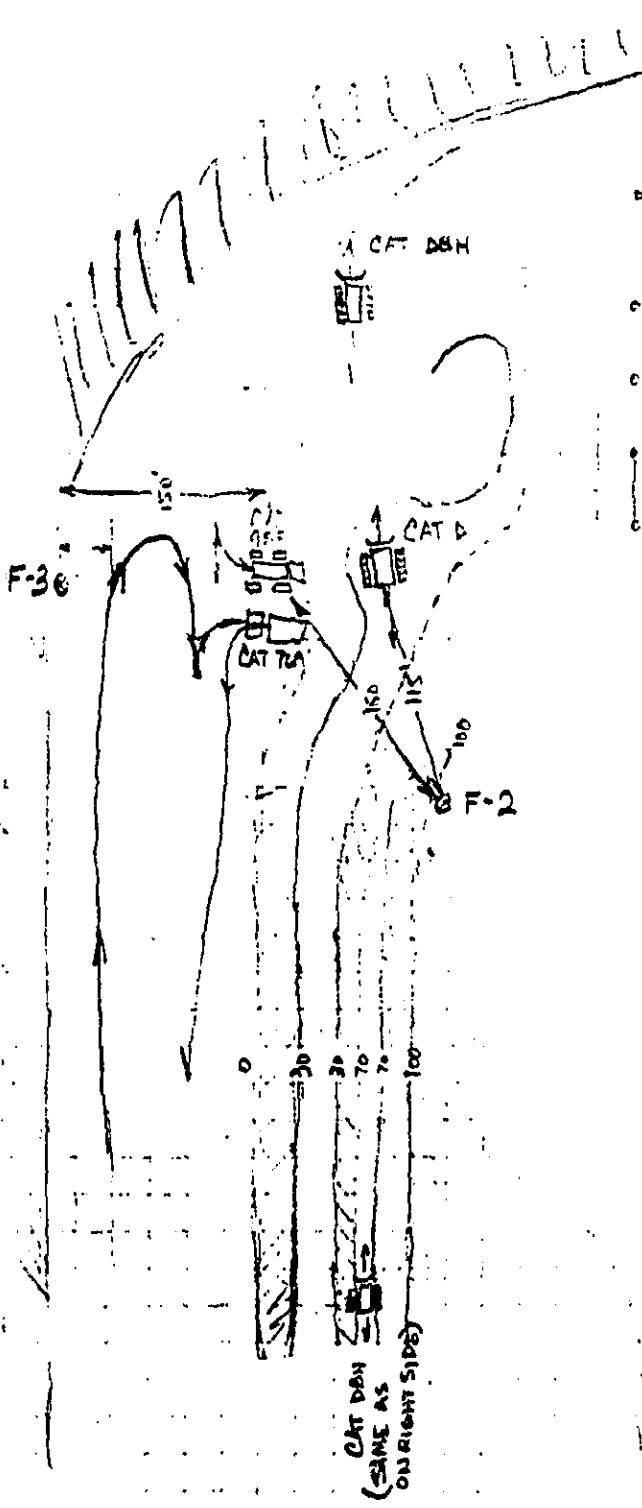


DIAGRAM 9-6A



- 2 CAT 769
- 1 CAT D9H
- 1 CAT D8H
- 1 CAT 983

CAT D8H
(SAME AS
ON RIGHT SIDE)

0
26

Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Fill Area II; just S. of interchange

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Area between microphone (F-4) and scraper unloading area was level, loosely compacted soil. Large ravine between microphones. Second microphone (F-5) located on loosely compacted embankment, 5 feet below level of haul road.

Machinery Description:

Fiat-Allis 460 Scraper

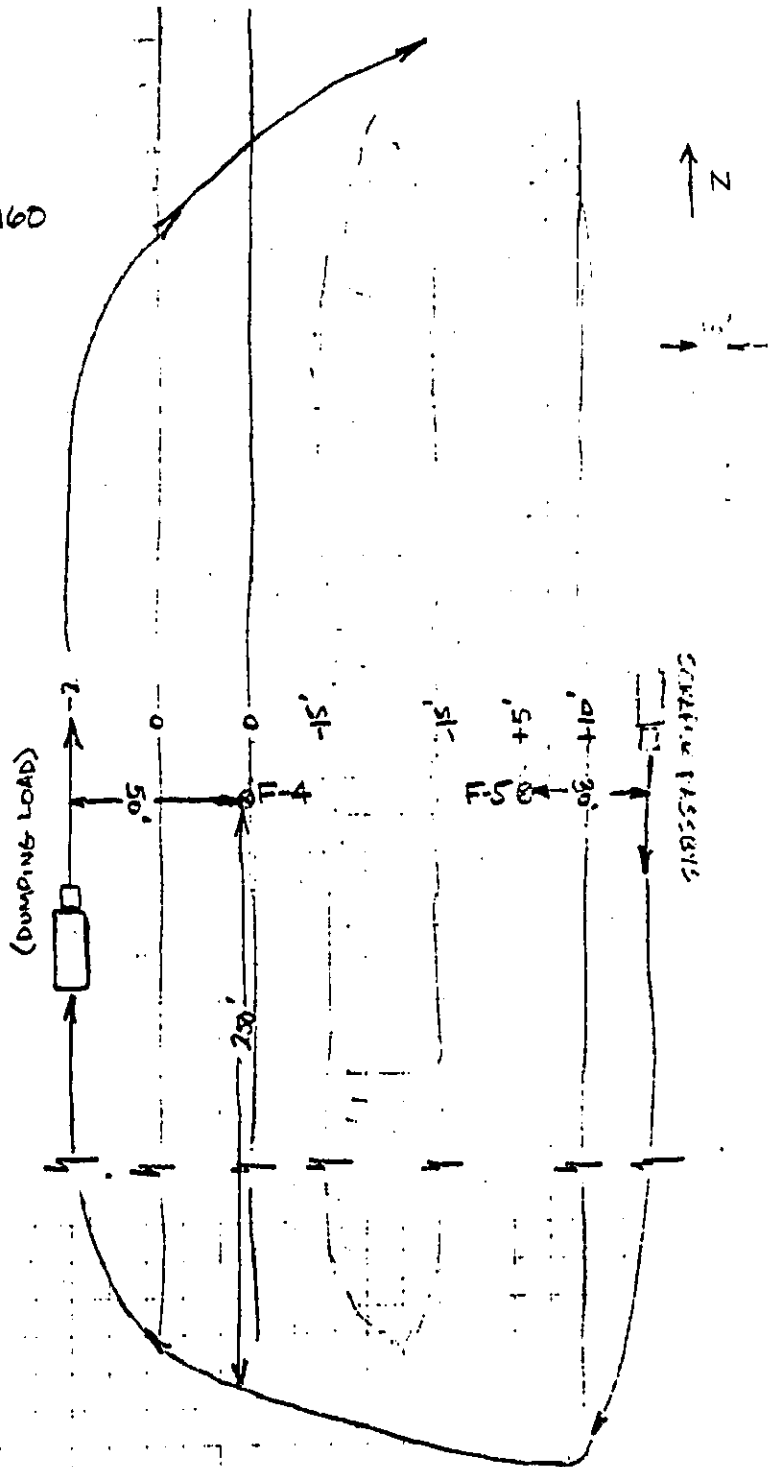
Cat. Dozer (type not identified)

Miscellaneous Information:

Dozer did not aid scraper during unloading

DIAGRAM 9-6B

FIAT-ALLIS 460
SCRAPERS



Measurement Site Data

Highway: I-205

Date: Sept 1977

Site Location: Fill Area III - S. of interchange, between
Fill Areas I & II

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Right-of-way area was flat, compacted
earth. Soil was very wet due to rain the previous
day. Embankment was steep slope covered
with large boulders.

Machinery Description:

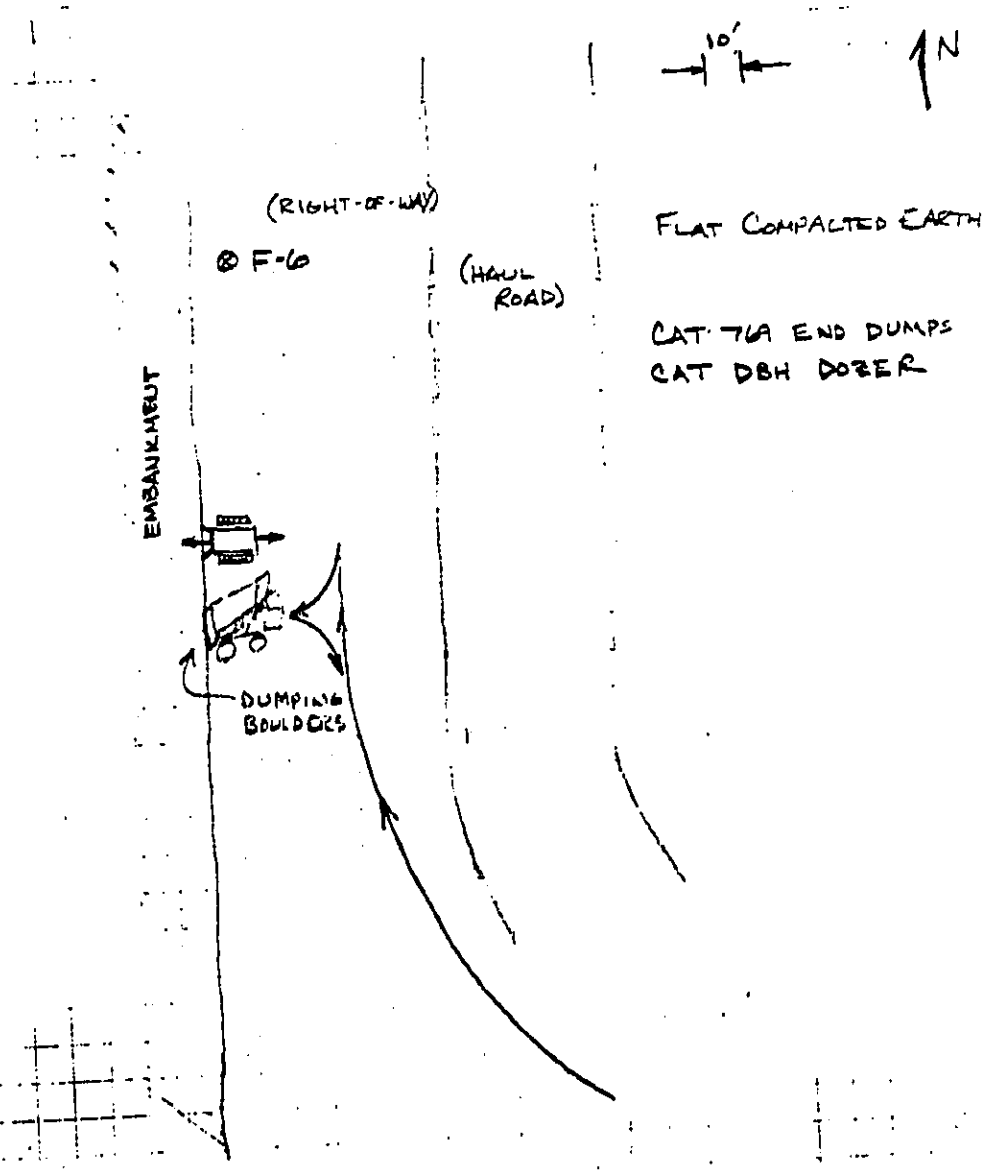
Cat 769 End Dumps with exhaust. Built into
truck bed.

Cat. DBH Dozer

Miscellaneous Information:

End dumps were unloading rocks
hailed from Fill Area I. Trucks would unload onto
the embankment. Dozer would push loose rock over
the embankment. Activity occurred along a portion of
the right-of-way for which earthwork appeared complete

DIAGRAM 9-6C



Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Fill Area IV; northern section of project; near 105th St.

Type of Measurements:

- | | | |
|--|--|--------------------------------------|
| <input type="checkbox"/> Community | <input checked="" type="checkbox"/> Activity | <input type="checkbox"/> Propagation |
| <input type="checkbox"/> Site Boundary | <input type="checkbox"/> Single Equipment | <input type="checkbox"/> Movies |

Soil/Terrain Conditions: All equipment working in loose, compacted soil. Embankment in Diagram 9-76 is hard, compacted soil, approximately 25' high (represents termination of raised right-of-way). Area where equipment is working in Diagram 9-76 will be cross street.

Machinery Description:

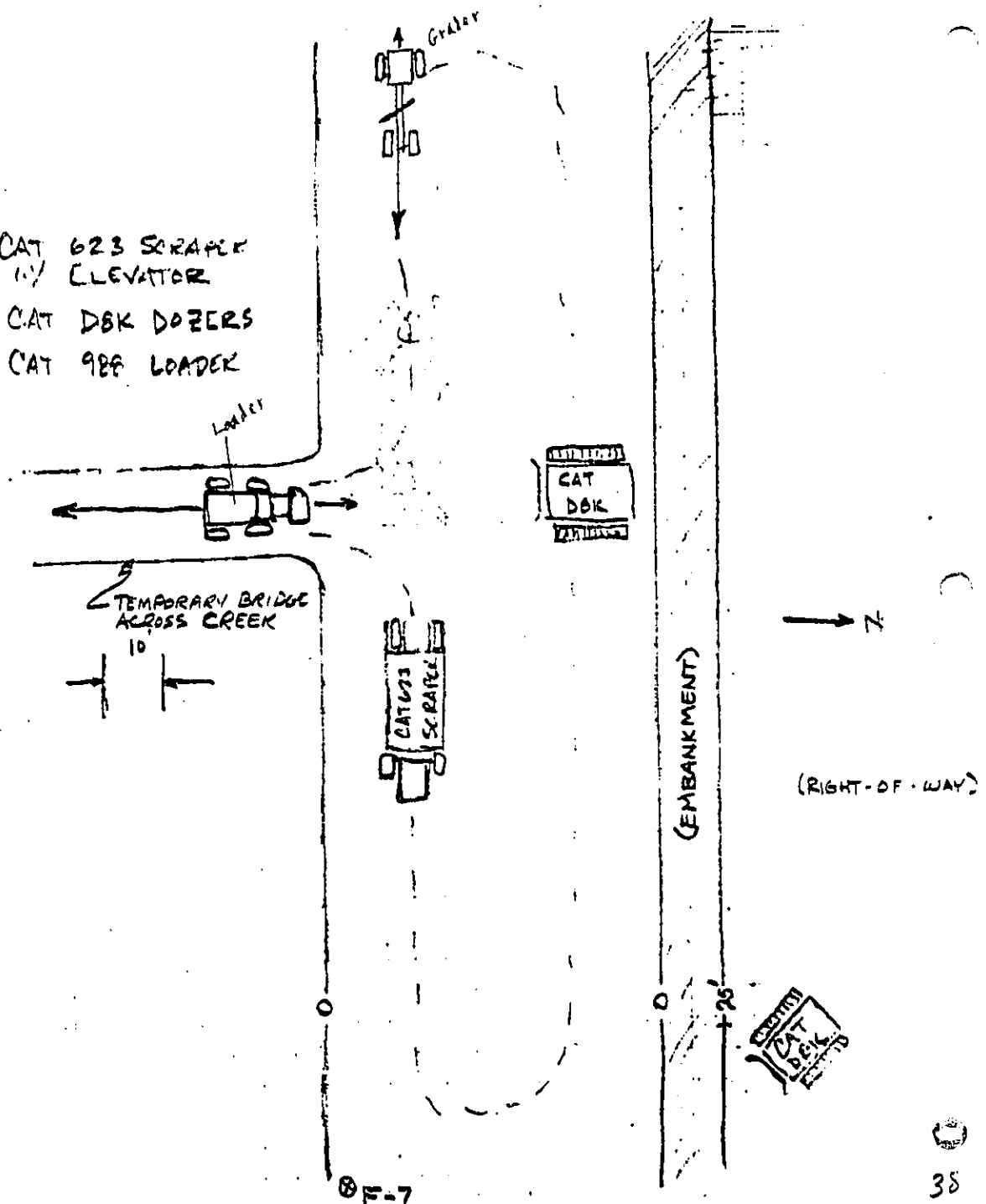
2 Cat DBK Dozer
Cat 623 Scooper w/ elevator
Cat 988 Loader
Motor Grader (type unknown)

Miscellaneous Information:

Loader would move forward across bridge, load, then reverse back across bridge to unloading area shown in Diagram 9-76

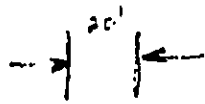
DIAGRAM 9-7G

- CAT 623 SCRAPER
- 1/2 ELEVATOR
- 2 CAT DBK DOZERS
- 1 CAT 98F LOADER

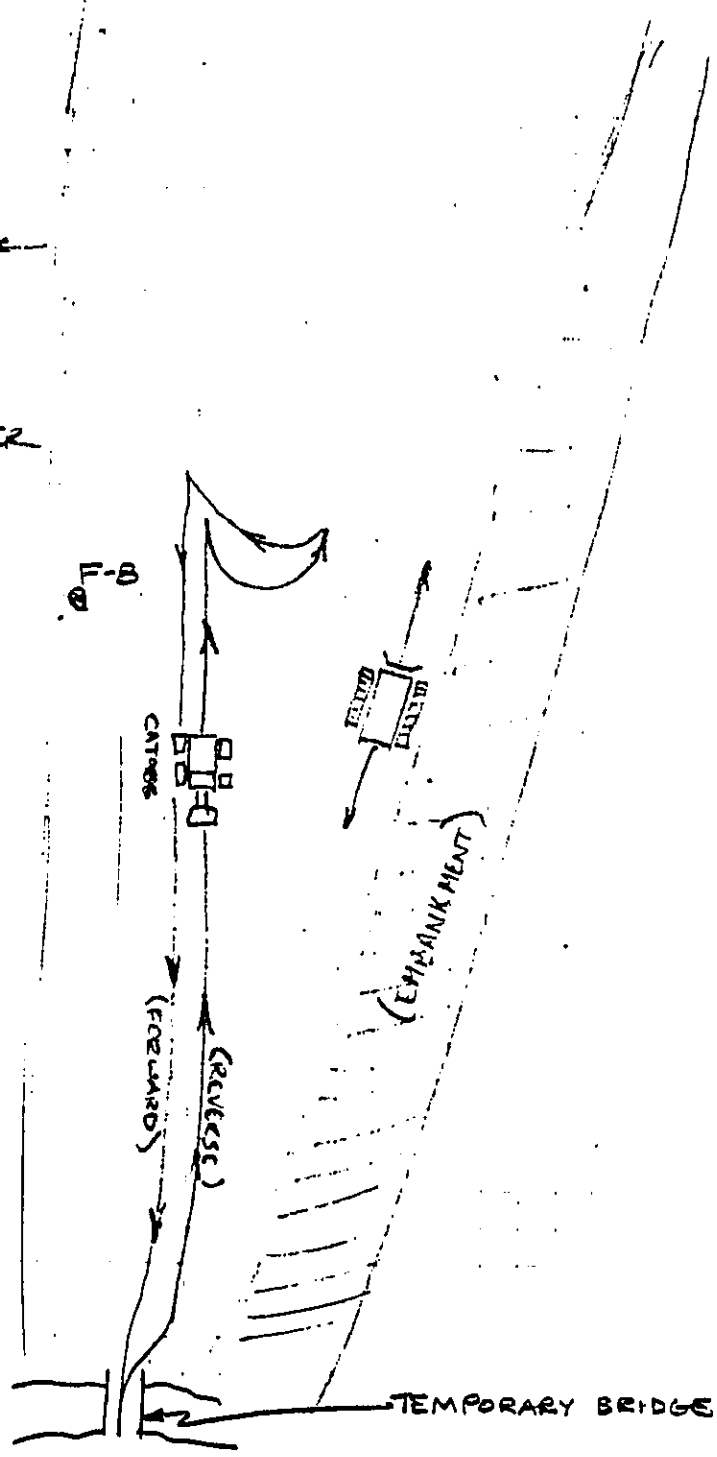


F-7

DIAGRAM 9-7H



CAT 988 LOADER
CAT DBK DOZER
CAT 623 SCRAPER



TEMPORARY BRIDGE

Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Subbase Finish Grading; S. of Sandy Blvd.

Type of Measurements:

- | | | |
|--|--|--------------------------------------|
| <input type="checkbox"/> Community | <input checked="" type="checkbox"/> Activity | <input type="checkbox"/> Propagation |
| <input type="checkbox"/> Site Boundary | <input type="checkbox"/> Single Equipment | <input type="checkbox"/> Movies |

Soil/Terrain Conditions: Major grading is completed in this section; right-of-way, median and embankment are hard, compacted soil. Embankment approximately 30 feet high, w/ 2:1 slope

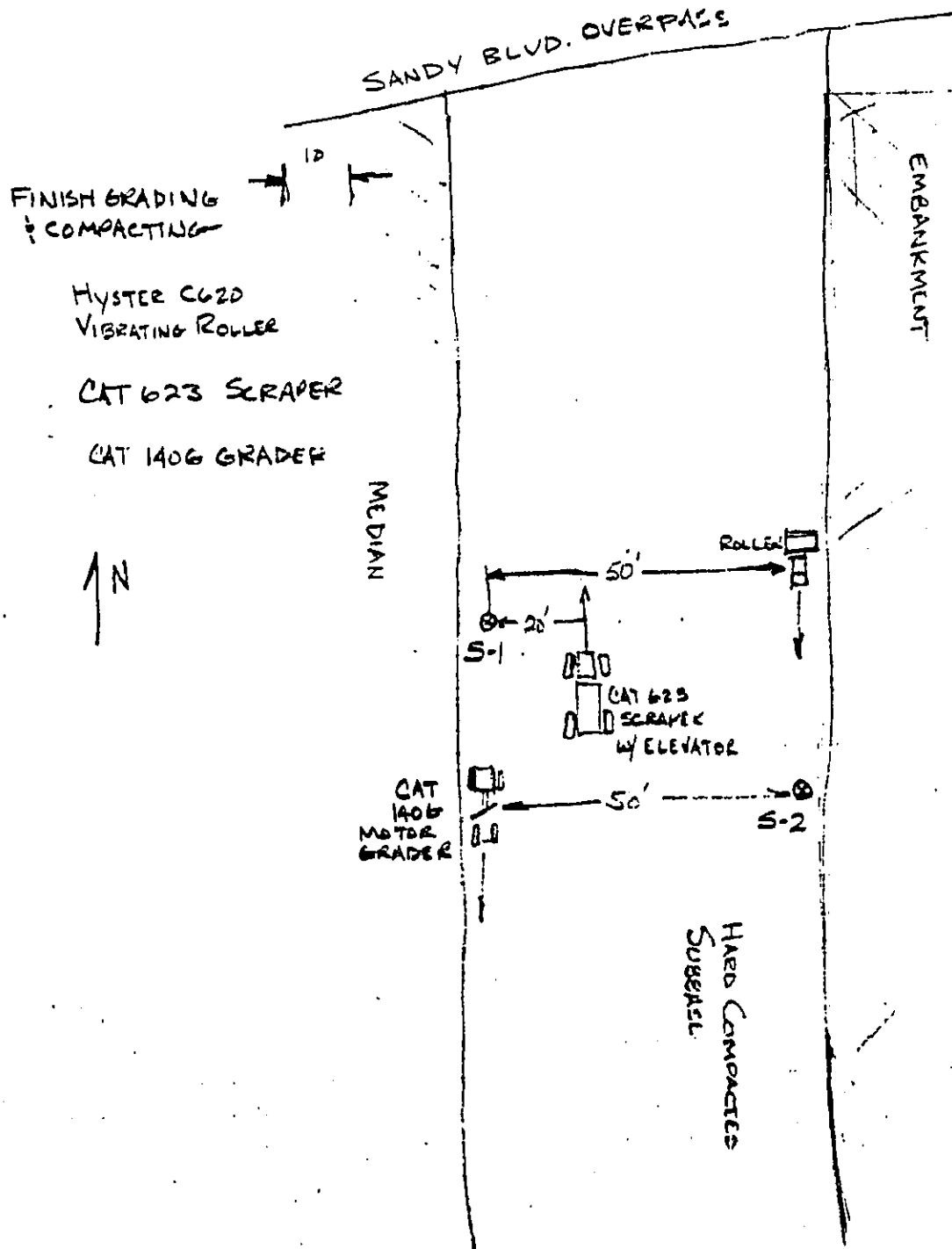
Machinery Description:

Hyster C600 vibratory roller
Cat 623 Scraper with elevator
Cat 140G Motor Grader

Miscellaneous Information:

Note: Engine fan on Roller was spring mis. during snack-to-work party

DIAGRAM 9-7F



Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Bridge Site I; S.E. corner of inter. ramp

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Bank earth with some small
scrubbery. Ground was wet due to rain.

Machinery Description:

Bucyrus-Erie 65C Crane w/ concrete bucket.
Generator (type unknown)
Ready-Mix Concrete Trucks

Miscellaneous Information:

Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Bridge Site II; Powell St Overpass

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Microphone at grade with bridge deck and concrete pump. Bridge deck consisted of concrete box girders.

Machinery Description:

Truck-mounted concrete pump, run by diesel engine.
Ready-mix concrete trucks; 2 hooked up to concrete pump at all times.

Miscellaneous Information:

Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Bridge Site III; S. shore of Columbia;
construction of bridge piers

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Microphone located on embank-
ment at same level as vibratory pile driving
sheet pile into damp soil. Compressor located
southeast of driver, about 20 feet below
level of microphone.

Machinery Description:

Vibratory pile driver (type unknown)
Compressor
Crane

Miscellaneous Information:

Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Bridge Site IV, @ Benfield interchange

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Microphone at grade with bridge deck consisting of wood and rebar; mic. 8' above ground level of concrete pump. One ready-mix truck backed up to pump at all times.

Machinery Description:

Truck-mounted concrete pump run by diesel engine
Ready-mix concrete trucks

Miscellaneous Information:

DIAGRAM 9-5A

WYLE LABORATORIES - Wyle Research, El Segundo, California Page: _____ of _____

Prepared by: _____ Date: _____ Subject: _____

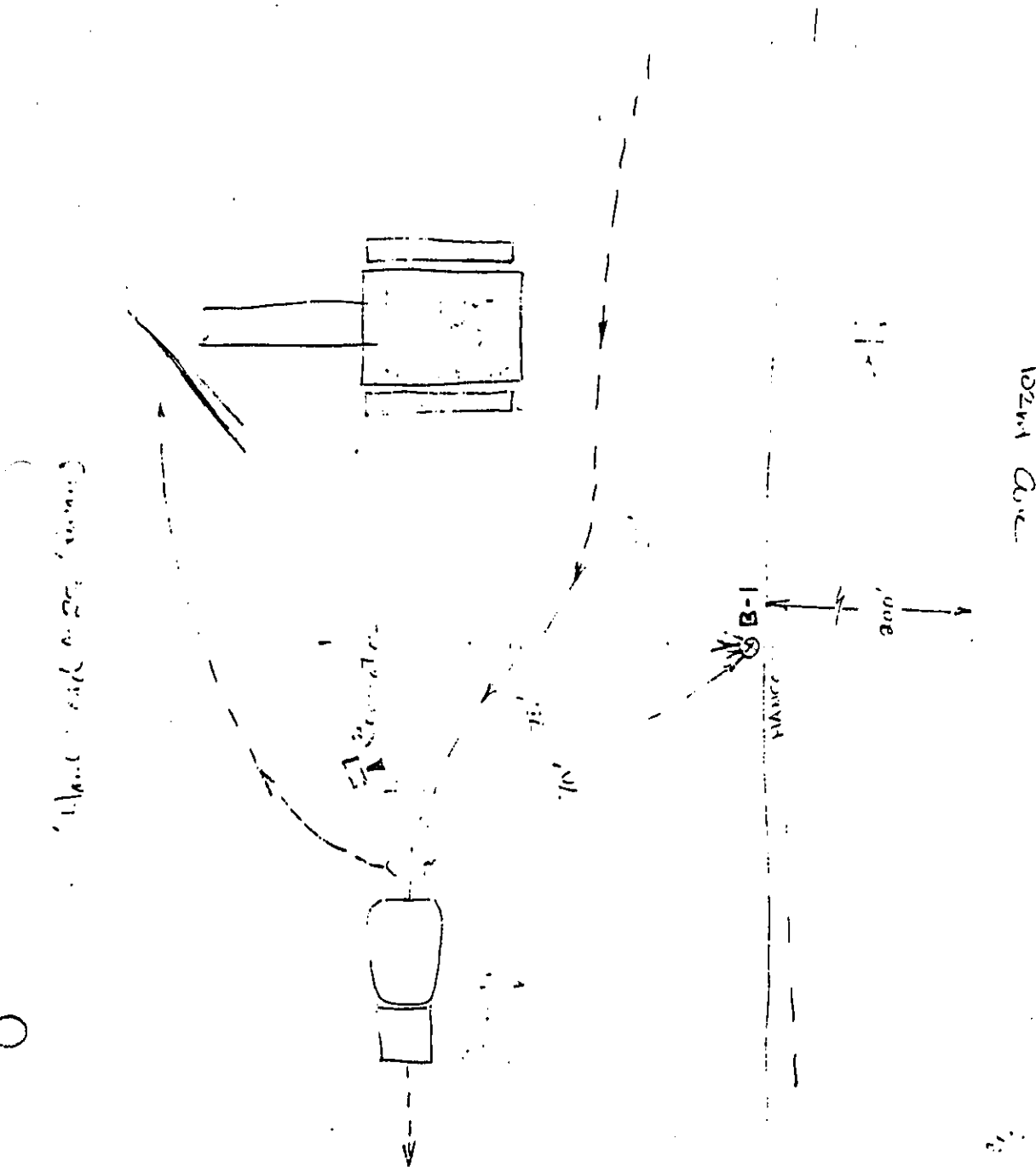


DIAGRAM 9-5C

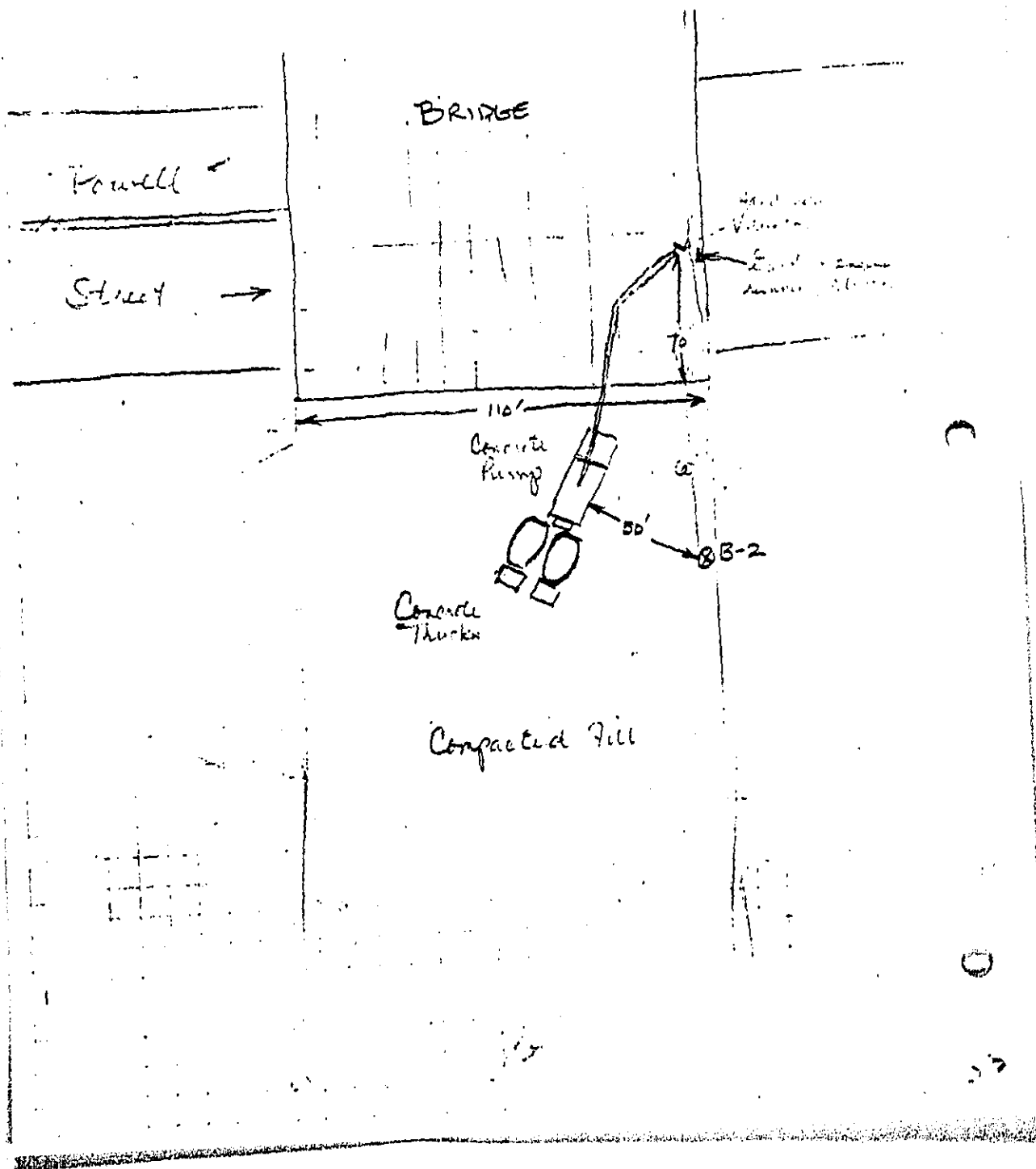
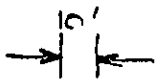


DIAGRAM 9-6E

FIRST 10 MINUTES
ANALOG #12 N/G

CSL REVERSE SIDE



VIBRO-HAMMER

PILL DRIVER
OPERATED INTER-
MITTENTLY 500'
FROM MIC.
POSITION

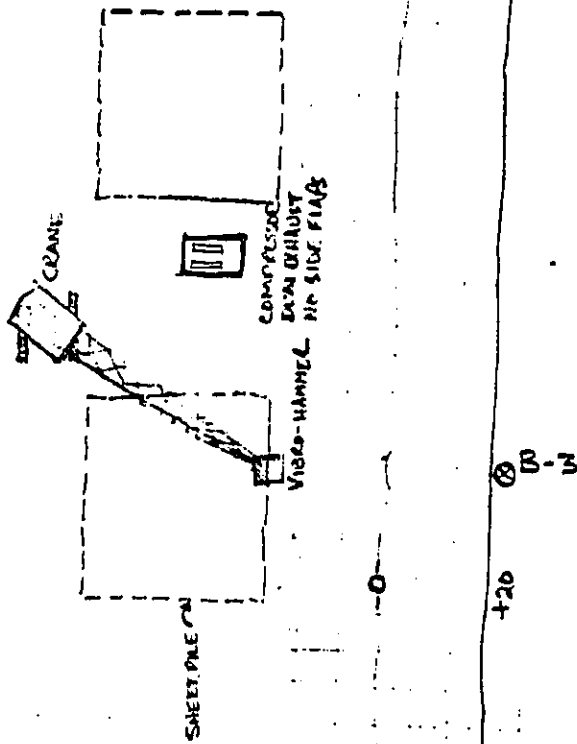
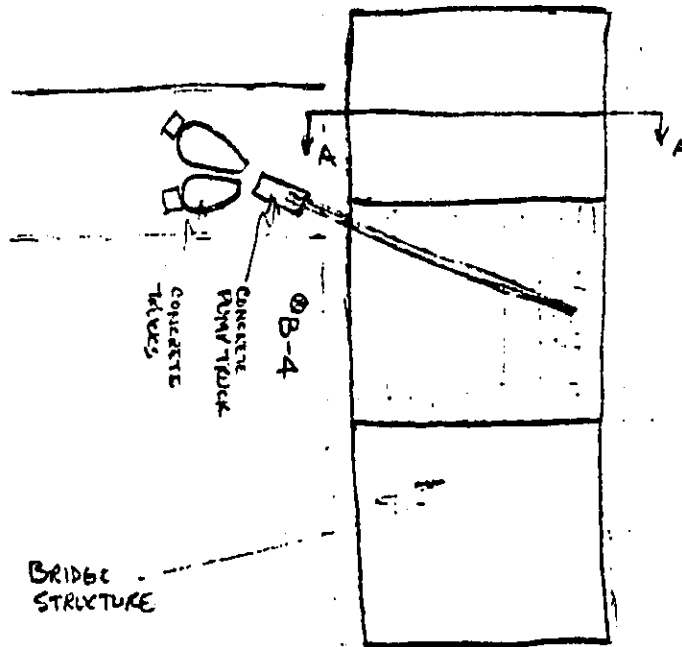
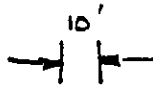


DIAGRAM 9-7B

CONCRETE POUR
ON BRIDGE



Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Haul Road Pavements of End Dumps
and Scrapers

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Diagram 9-6D: Level ground. Hard, compacted soil vehicle path & H-1; loosely compacted, uneven soil between vehicle path & H-2. Ground was very wet. Diagram 9-7D: Hard, compacted soil between vehicle path and H-3. Embankment with 2:1 slope behind microphone.

Machinery Description:

Cat. 769 End Dumps w/ exhaust built into bed of trailer. Exhaust port faces microphone during unloaded runs.

Fiat-Allis 460 & 460C Scrapers

Miscellaneous Information: Scrapers approaching microphone the west (unloaded) were coming up a small grade.

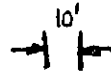
DIAGRAM 9-6D

CAT 769 END DUMP PASSIBYS
(EXHAUST ON RIGHT SIDE)

VALLEY C. AN. AENI



HAUL ROAD
(COMPACTED, WET)
LEVEL

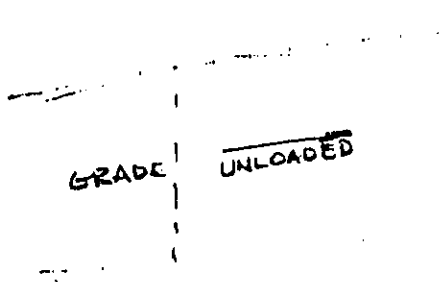


69



BANFIELD FRWY.

LEVEL, LOOSELY COMPACTED



GRADE

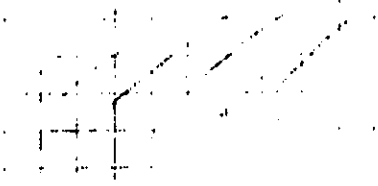
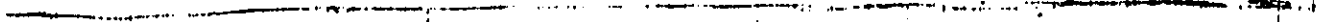
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UNLOADED

HAUL ROAD
HARD COMPACTED
LEVEL AT MEASUREMENT PT.

@H-3

(2:1 SLOPE, COMPACTED)



Measurement Site Data

Highway: I-205

Date: Sept 1979

Site Location: Cut Area I; Propagation Measurements
for Dozer

Type of Measurements:

Community

Activity

Propagation

Site Boundary

Single Equipment

Movies

Soil/Terrain Conditions: Level area. Loosely compacted
soil and small rock. Ground very wet
from rains the previous day.

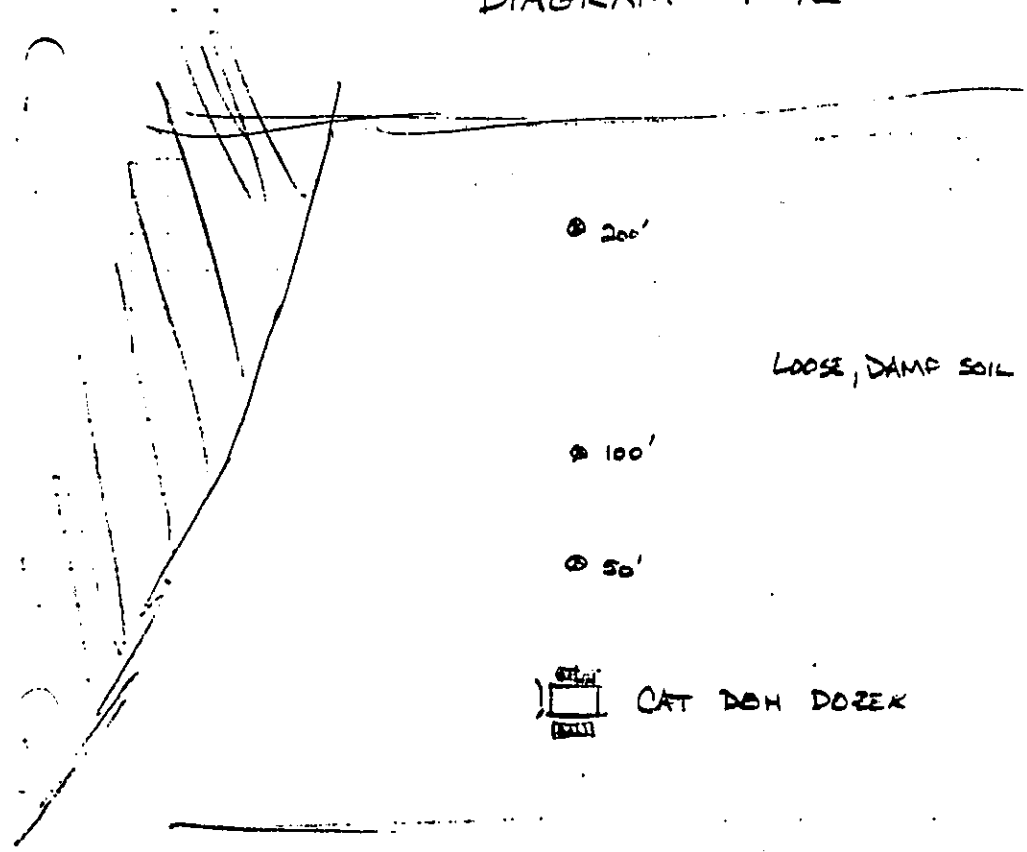
Machinery Description:


Cat. DBH Track Dozer

Miscellaneous Information:

Measurements made at 50' & 100';
then measurements repeated with mic's at 50' and 100'.
Dozer noise levels measured for IMI's.

DIAGRAM 9-7E



 CAT DOH DOZER

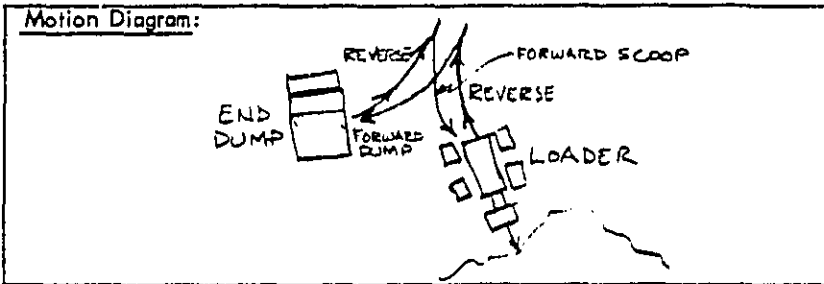
EQUIPMENT ACTIVITY ANALYSIS

HIGHWAY: I-205

DATE: Sept. 1979

EQUIPMENT CYCLE: CAT. 988 LOADER; LOADING CAT 769

END DUMPS



| Motion Characteristics | Measured Time | | | | | | | | Average |
|------------------------|---------------|-------|--------|-------|--------|-------|--------|-------|---------|
| | Motion | Cycle | Motion | Cycle | Motion | Cycle | Motion | Cycle | |
| FORWARD SCOOP | 12 | | (13) | | 6 | | | | |
| REVERSE | 7 | | 7 | | 15 | | | | |
| FORWARD DUMP | 13 | 39 | 9 | 38 | 9 | | | 42 | |
| REVERSE | 7 | | 9 | | 12 | | | | |
| FORWARD SCOOP | 13 | | 16 | | 7 | | | | |
| REVERSE | 10 | | 9 | | 14 | | | | |
| FORWARD DUMP | 17 | 47 | 14 | 47 | 10 | | | 42 | |
| REVERSE | 7 | | 8 | | 11 | | | | |
| FORWARD SCOOP | 12 | | 12 | | 5 | | | | |
| REVERSE | 8 | | - | | 10 | | | | |
| FORWARD DUMP | 17 | 44 | | | 11 | | | 37 | |
| REVERSE | (7) | | | | 11 | | | | |
| FORWARD SCOOP | | | | | 7 | | | | |
| REVERSE | | | | | 11 | | | | |
| FORWARD DUMP | | | | | 10 | | | 45 | |
| REVERSE | | | | | 17 | | | | |
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Photo Log - 35 mm

| Frame # | Location | Date | Time | View or Subject |
|---------|-------------------|------|-------|---|
| 25 | Cut Area I | 9/5 | 9:00 | @ C-2, looking west from top of site <i>Lower Basin beam</i> |
| 26 | " " " | | | Same as #25, looking S.W. |
| 27 | Bridge Site I | | | Concrete truck loading bucket |
| 28 | " " " | | | Crane used for concrete pour |
| 29 | " " " | | | Same as #28 |
| 30 | Bridge Site II | | 12:00 | @ B-2, looking S.E. at concrete pump. |
| 31 | " " " | | | @ B-2, looking east at concrete truck and pump. |
| 32 | Cut Area I | | | general vicinity of C-4, looking at backhoe |
| 33 | " " " | | | @ C-1, looking west |
| 34 | " " " | | | @ C-1, looking S.W. |
| 35 | " " " | | | @ C-1, looking N.W. |
| 1 | Cut Area I | 9/5 | 1615 | @ C-4; trenching operation |
| 2 | | | | same as #1 |
| 3 | Fill (Cut) Area I | 9/6 | 0900 | @ F-1, looking down on dozer/loader operation, looking east |
| 4 | " " " " | | | same as #3 |
| 5 | Fill Area II | | 0915 | F-4; scraper unloading near mic. |
| 6 | " " " | | | F-4; parking directly west of scraper |
| 7 | Fill Area II | | | @ F-4; looking due east, with F-5 in background; haul road behind |
| 8 | Fill Area III | | | F-6; looking south of it and dump unloading |
| 9 | " " " | | | same as #8 |
| 10 | " " " | | | looking southeast at end dump unloading |

#1

#2

Photo Log - 35 mm

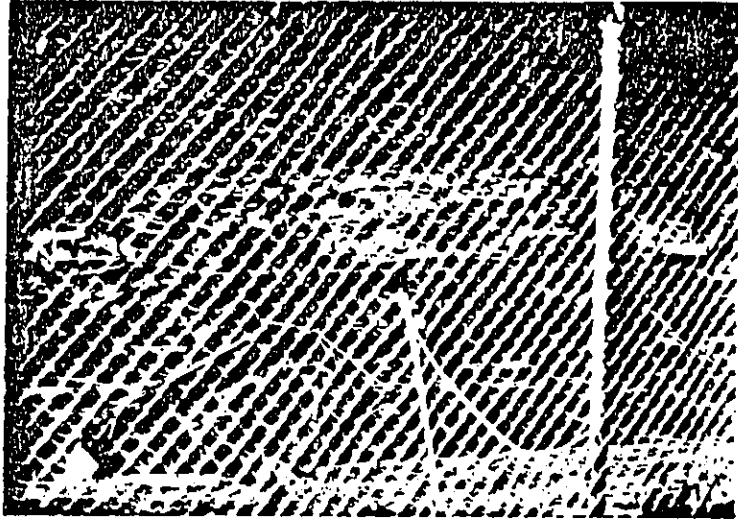
| Frame # | Location | Date | Time | View or Subject |
|---------|-------------------------|------|------|---|
| 11 | Fill (Cut) Area I | 9/6 | 1040 | @F-3, looking west at loading operation |
| 12 | " " " " | | | same as #11; Cat. 769 End Dump |
| 13 | " " " " | | | Cat. 769 End Dump |
| 14 | Bridge Site III | | 1400 | B-3; looking north at vibratory drivers |
| 15 | " " " " | | | B-3; vibratory drivers |
| 16 | " " " " | | | B-3; Crane supporting the driver. Compressor at right is pile driver power source |
| 17 | Cut Area II | 9/7 | 0800 | C-8; looking down at loading operation |
| 18 | " " " " | | | same as #17; movie camera in foreground |
| 19 | " " " " | | | C-10; community site near cut area |
| 20 | Cut Area I | | | C-5; looking north at breaking operation |
| 21 | " " " " | | | Same as #21 |
| 22 | Bridge Site 4 | | | B-4; looking south at bridge deck; bottom of concrete pump visible |
| 23 | " " " " | | | B-4; looking east at concrete trucks loading concrete pump |
| 24 | Haul Road Site II | | | H-3; looking north at scraper paving mid. position |
| 25 | " " " " | | | Same as #24 |
| 26 | " " " " | | | Same as #24 |
| 27 | Single Equip. Site: E-1 | | | Looking S.W. part 50' and 100' mic |
| 28 | " " " " | | | General view of terrain over which propagation measurements were made |
| 29 | " " " " | | | CAT DRH Dredge used for single radio propagation measurements |
| 30 | Subbase Finish Grading | | | S-1; looking east at Hydrac roller |
| 31 | " " " " | | | Hydrac C620 Roller |

Photo Log - 35 mm

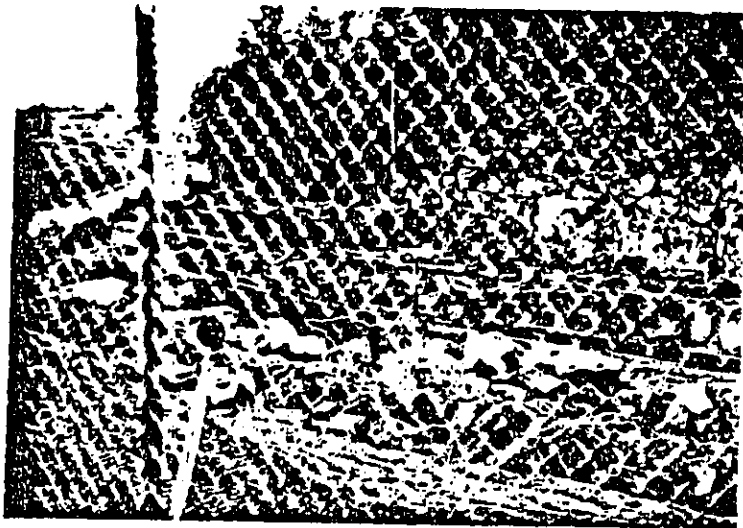
| Frame # | Location | Date | Time | View or Subject |
|---------|------------------------|------|------|--|
| 32 | Subbase Finish Grading | 9/7 | | S-2, looking N.W. at CAT 140G grader |
| 33 | Fill Area IV | | | #-7; looking west |
| 34 | " " " | | | Same as #33 |
| 35 | " " " | | | F-8; looking S.W. at loader & dozer |
| 36 | " " " | | | From embankment N of F-7, looking S.W. at loader and scraper. |
| 1 | Abutment Demo. | | | D-1, looking east at rd. apron paved with asphalt. |
| 2 | " " | | | D-1, looking S. at highway side of earth berm. |
| 3 | " " | | | Top of berm looking west towards D-2 |
| 4 | " " | | | D-1, looking N. at highway side of earth berm. |
| 5 | " " | | | Looking east towards D-1 from top of berm. |
| 6 | " " | | | Looking south at highway side of earth berm. |
| 7 | " " | | | D-2, looking east at residential side of berm. |
| 8 | " " | | | Same as #7 |
| 9 | " " | | | Top of berm looking west towards D-2 |
| 10 | " " | | | Same as #9 |
| 11 | Cut Area I | 9/8 | 0850 | C-6; community measurement site |
| 12 | " " " | 9/8 | | C-6; looking west towards com- munity measurement site |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

L#3

ROLL #1



#25

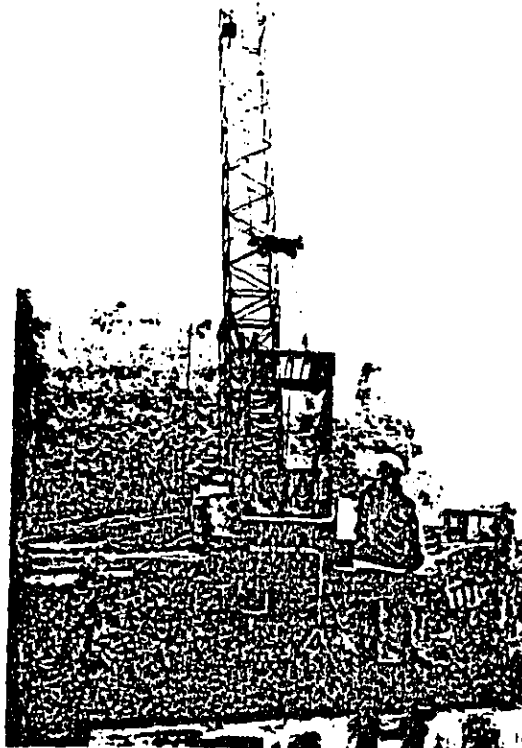


#26

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#27

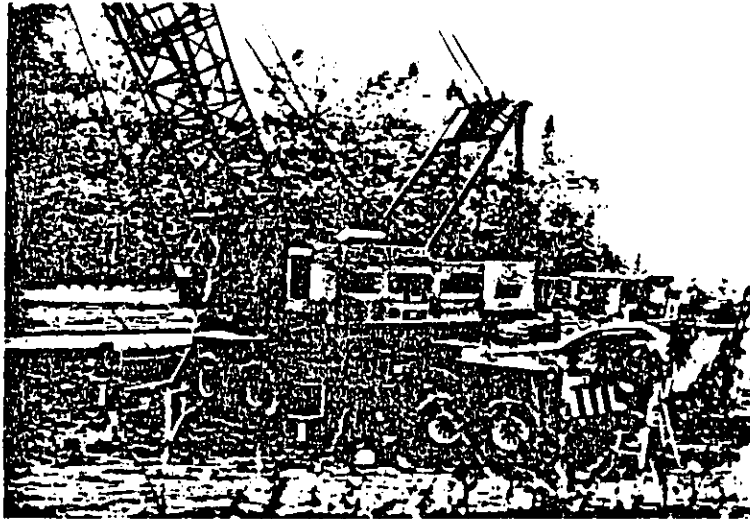


#28

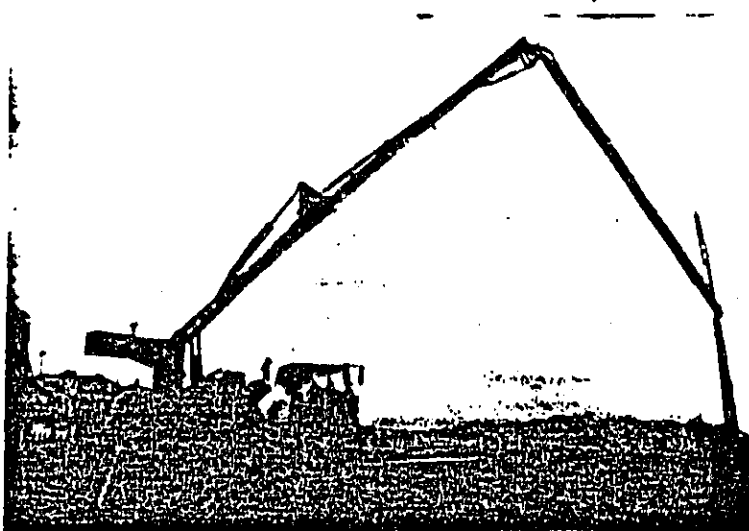
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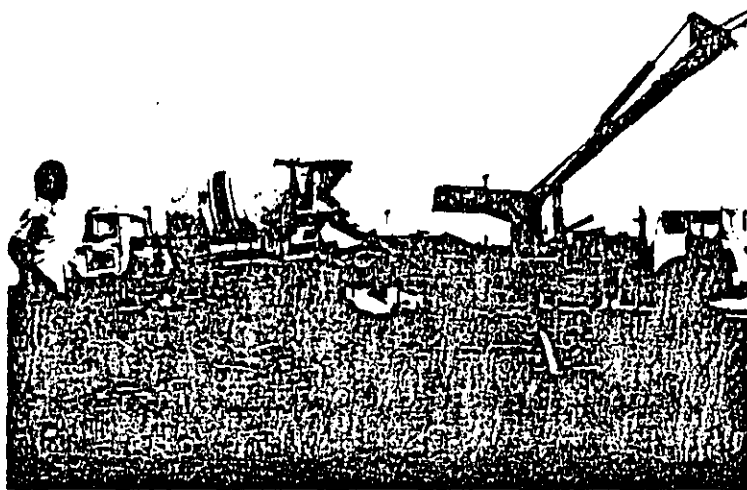


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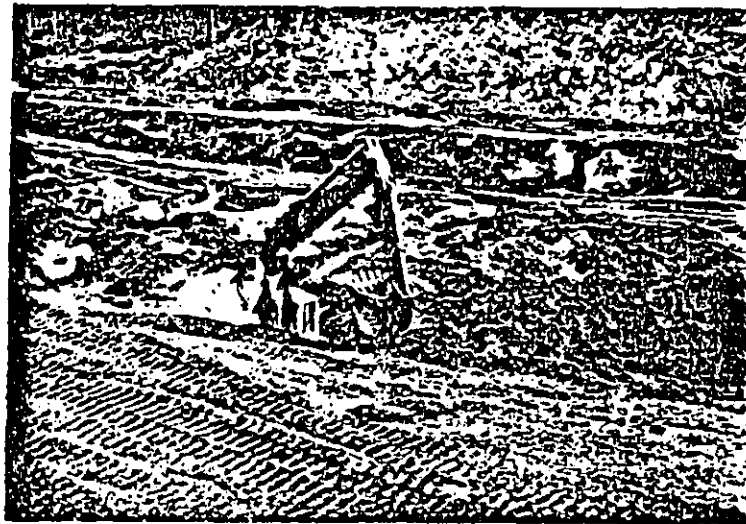
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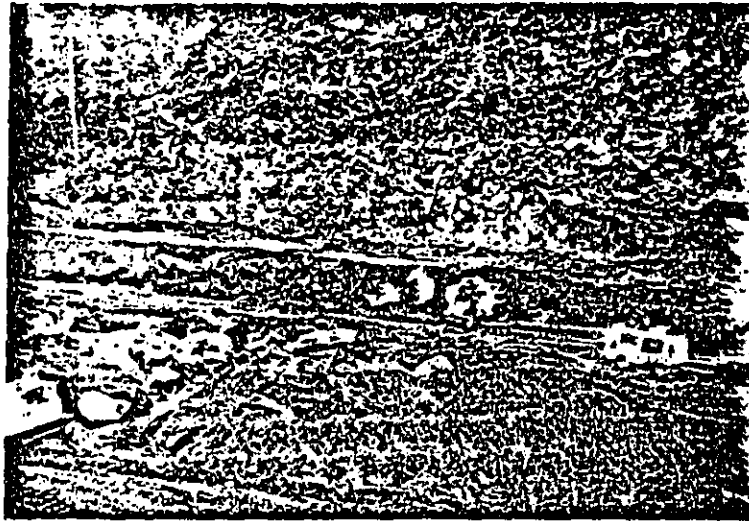


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ASUJ 734 14



33



34

ABUJ MAY 10

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72



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Roll #2



1



2

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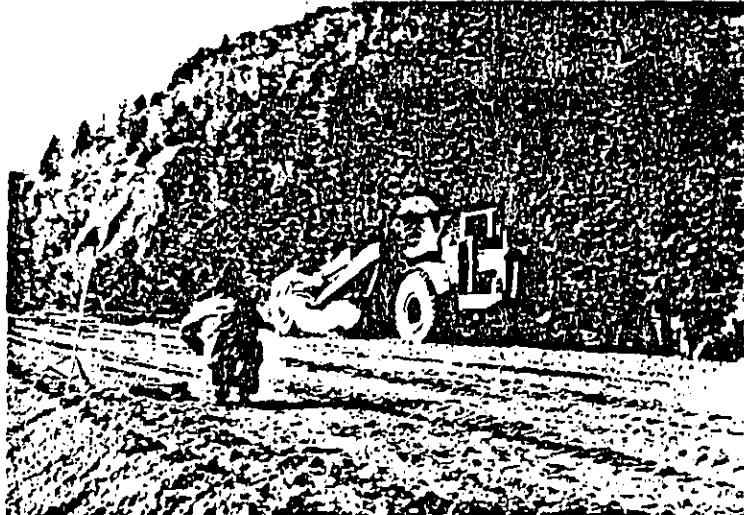
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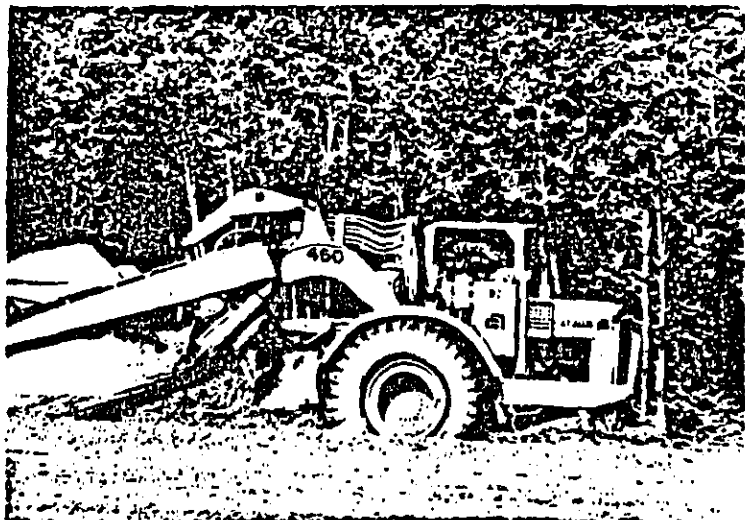
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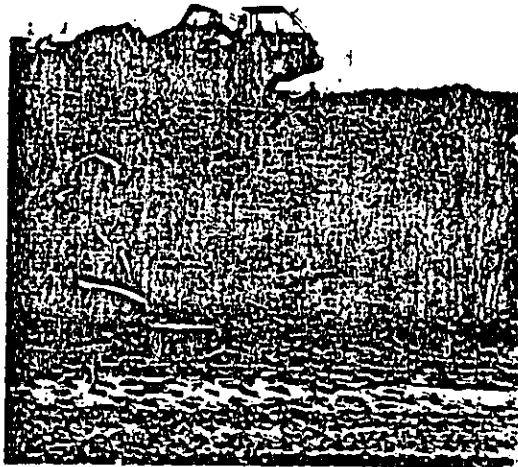


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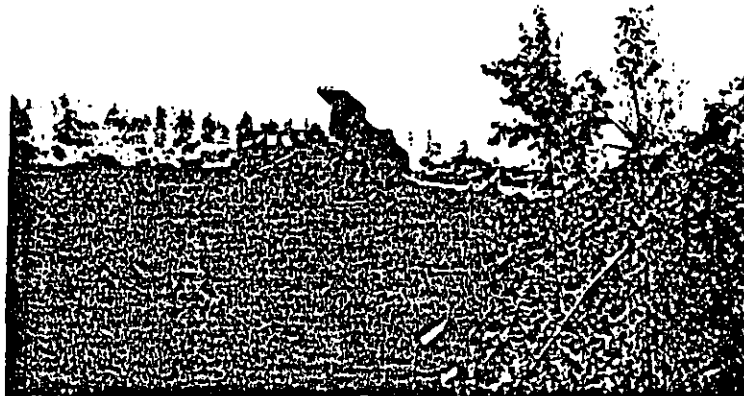
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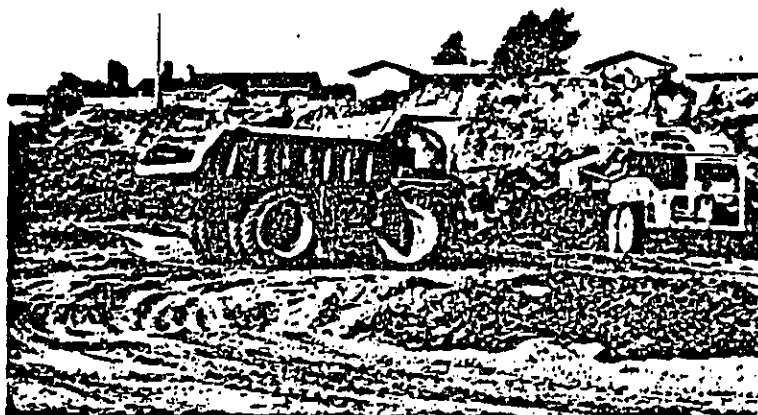


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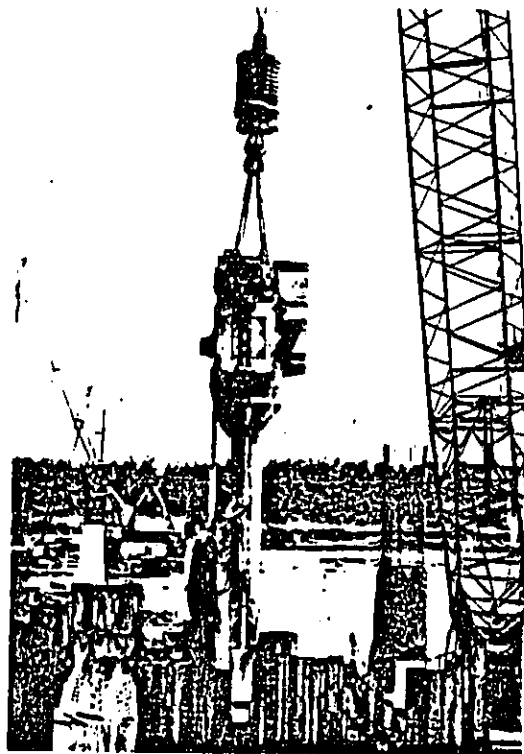
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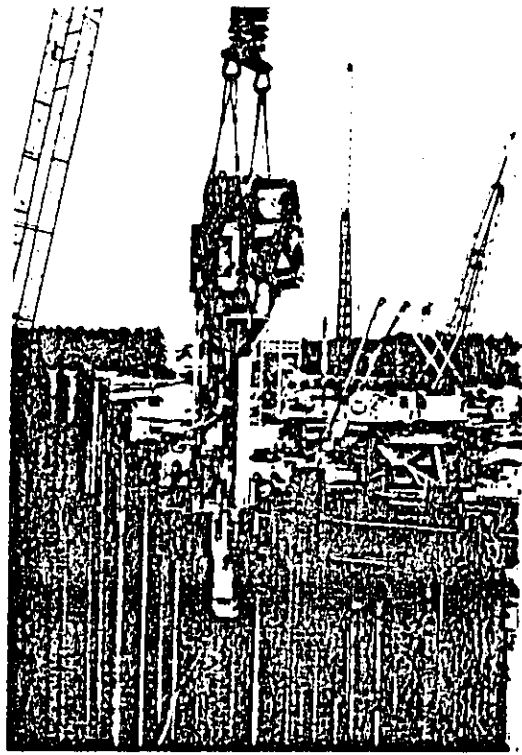
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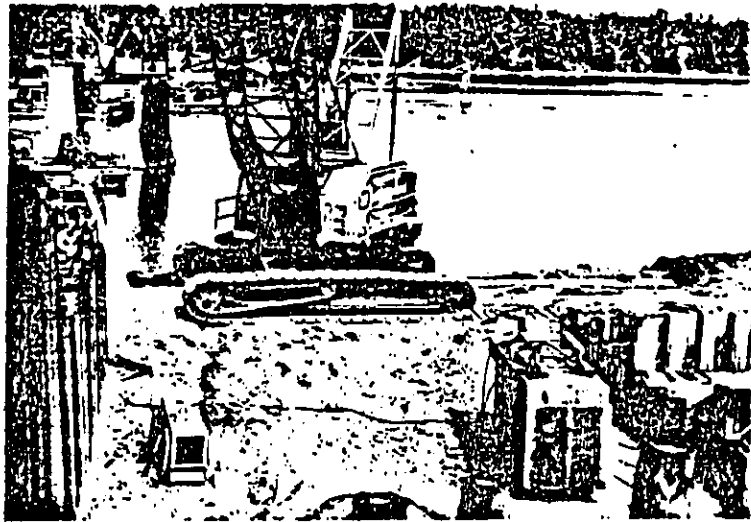
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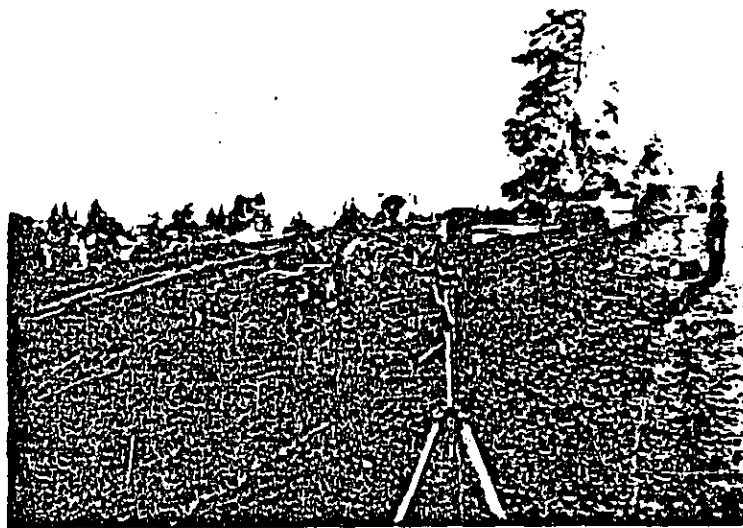
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14 10/17/2004



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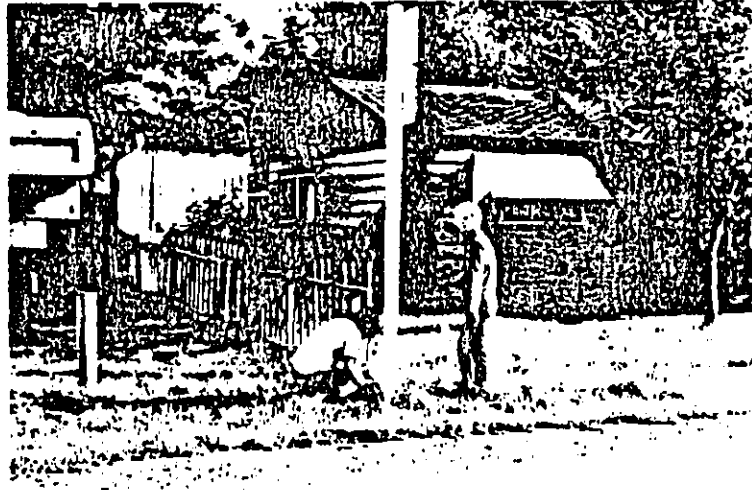


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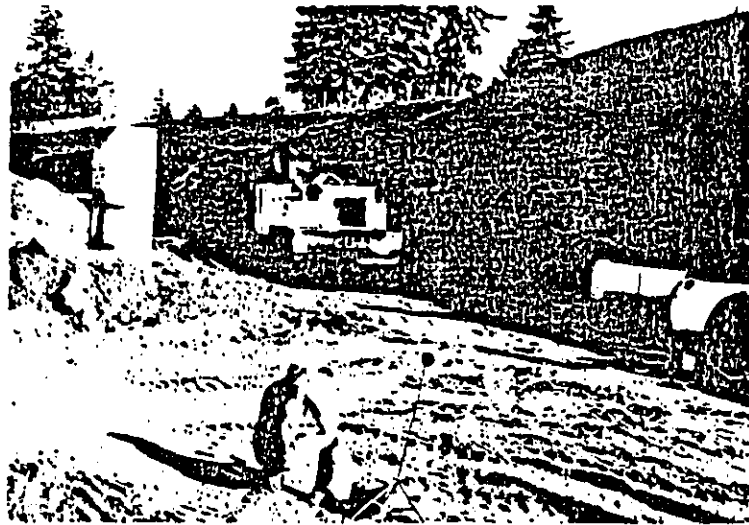
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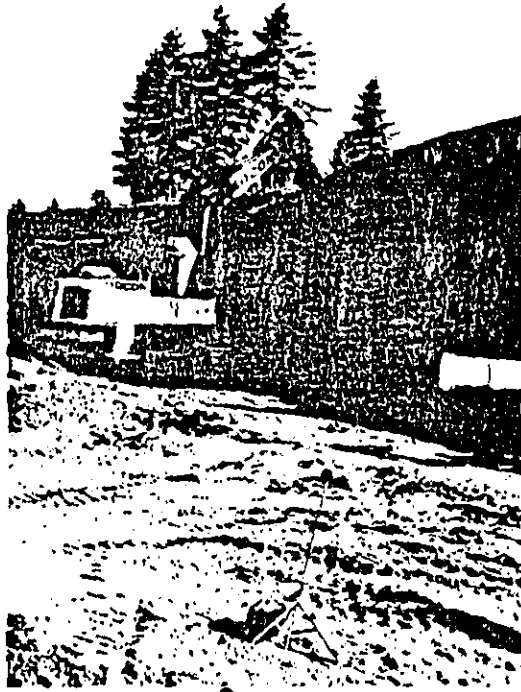


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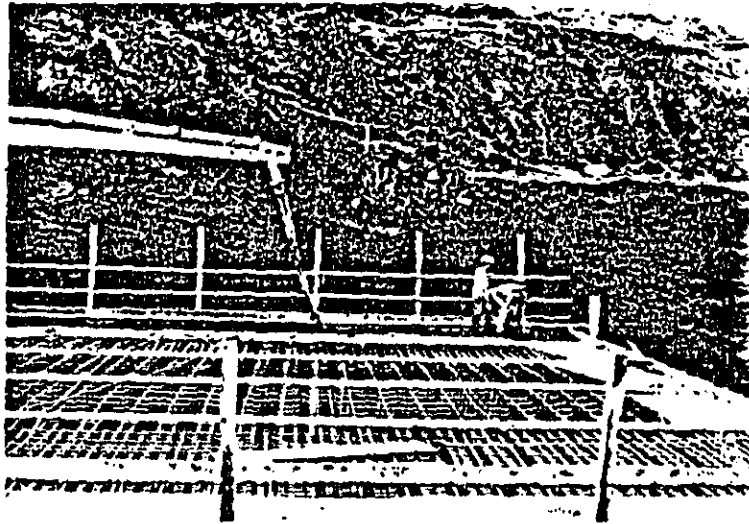
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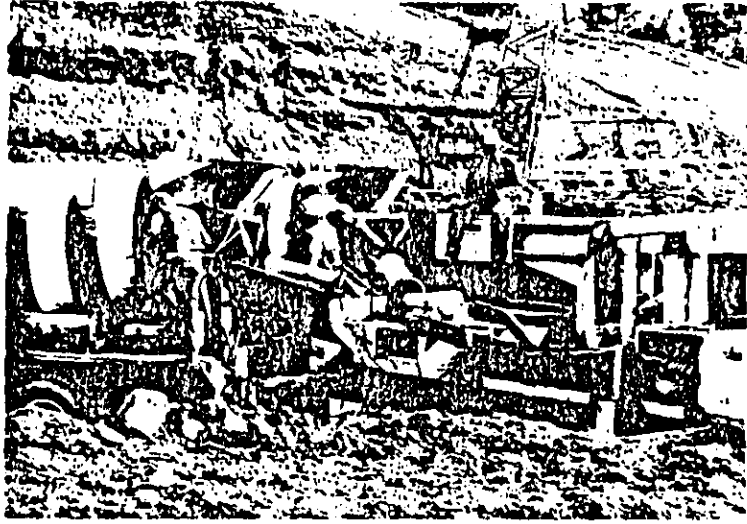
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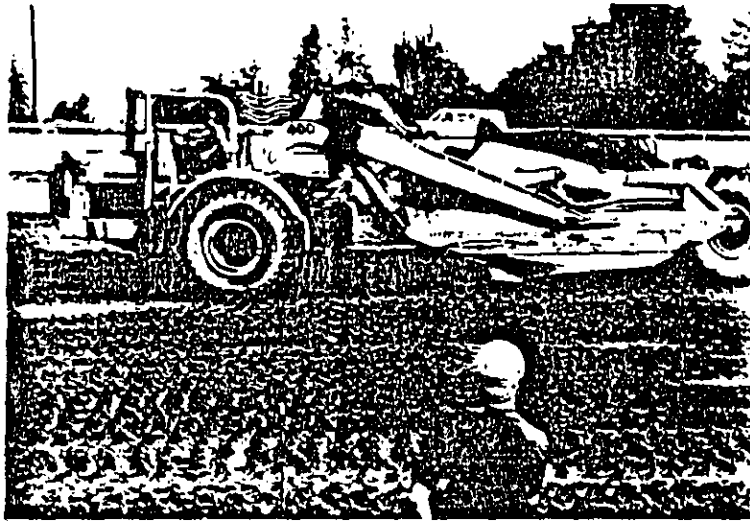
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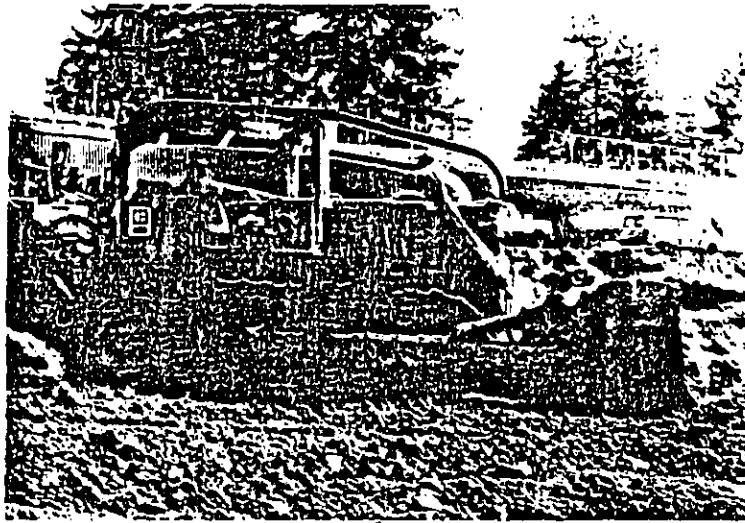
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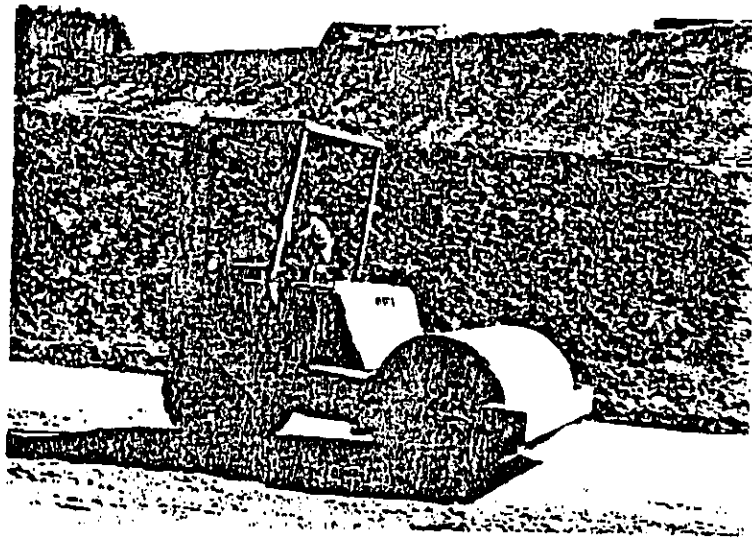


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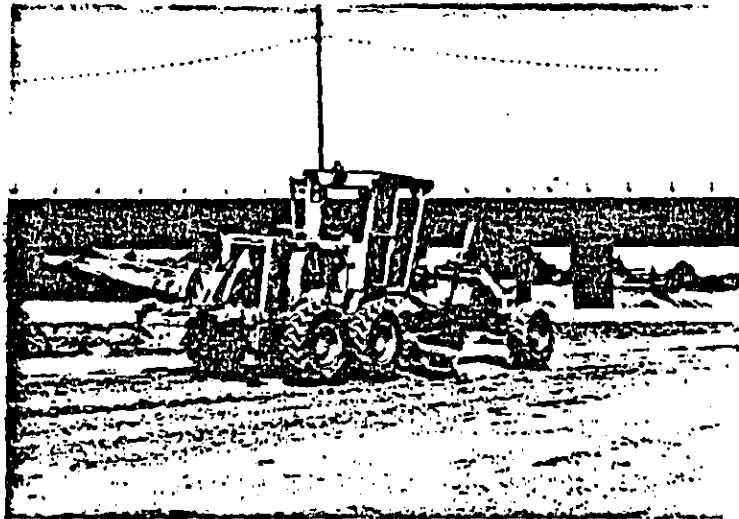
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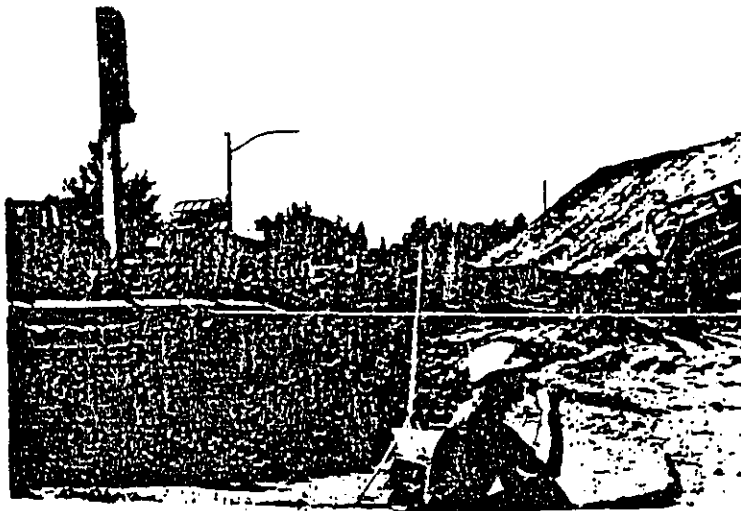
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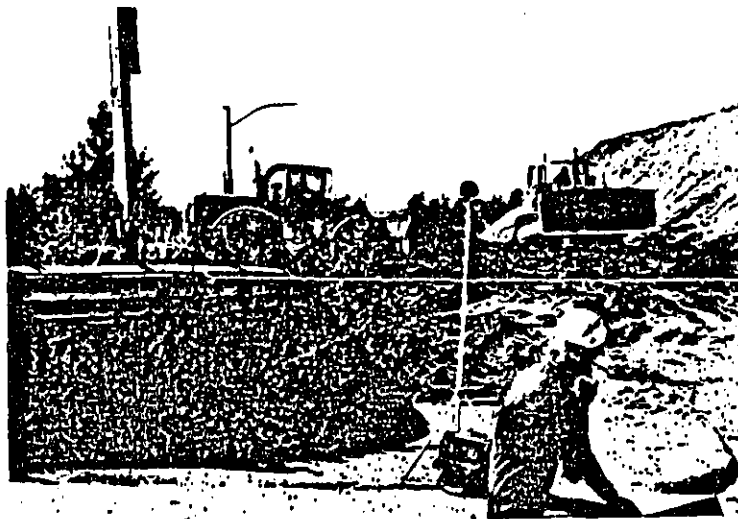
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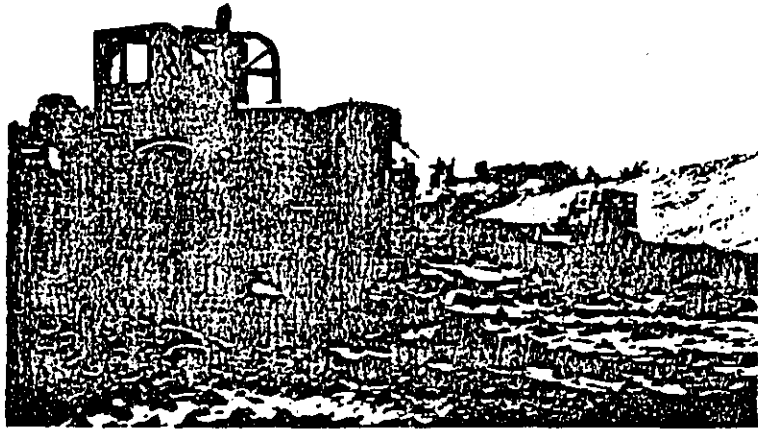


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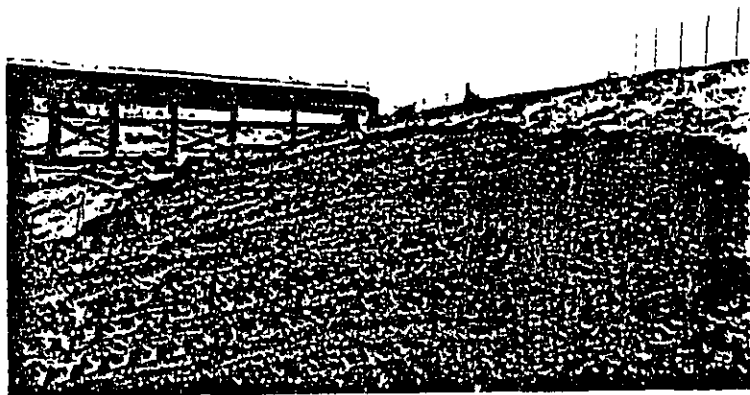


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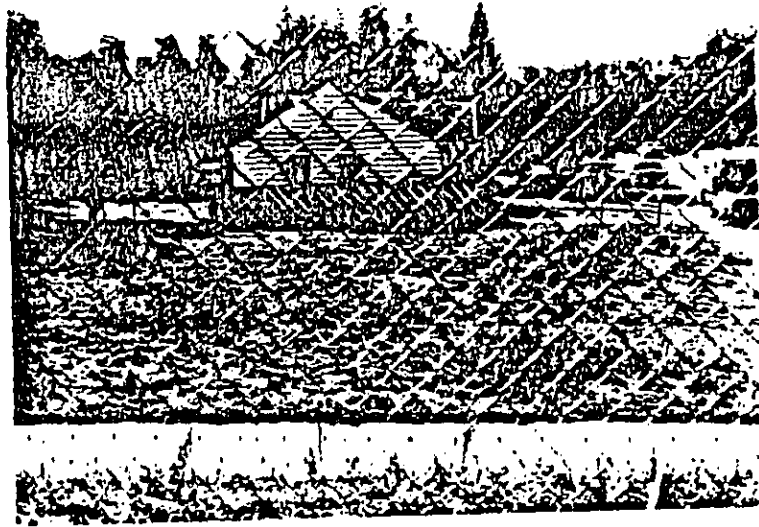
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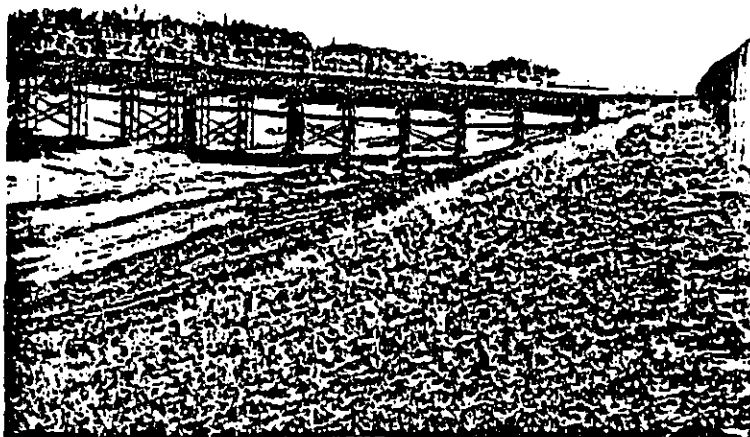
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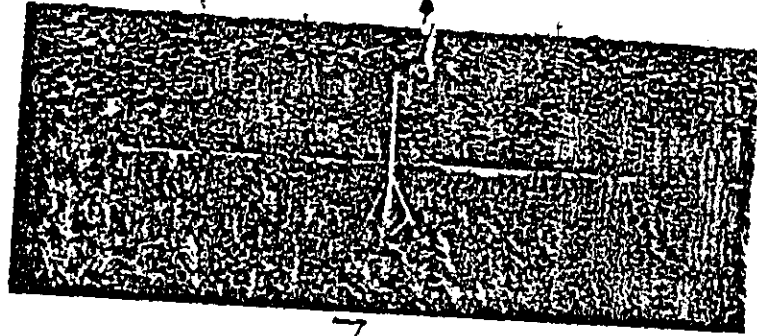
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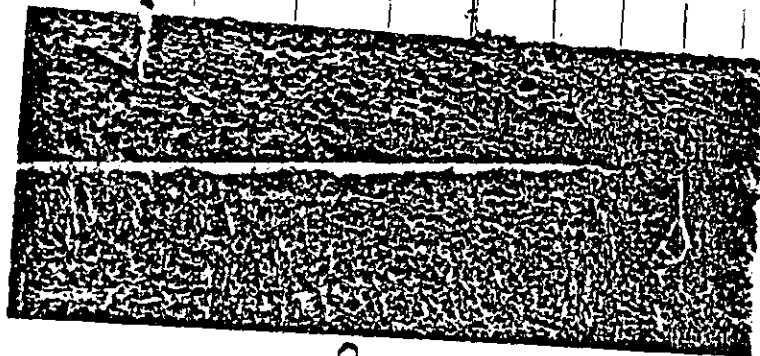
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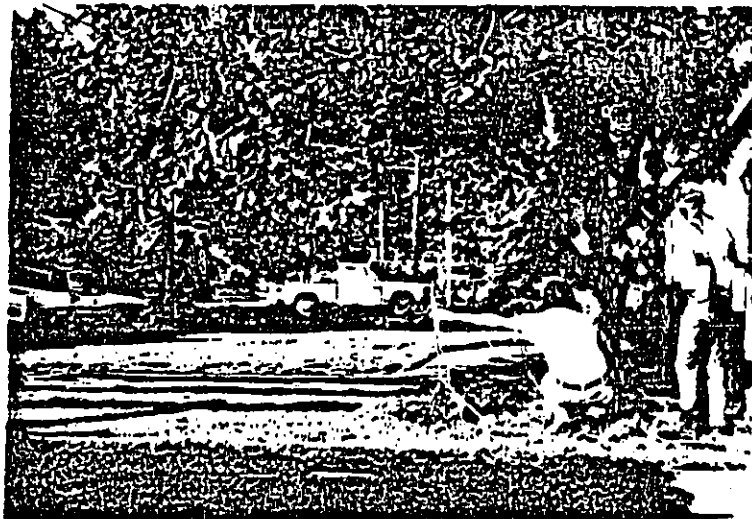
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