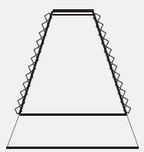
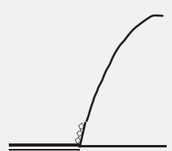
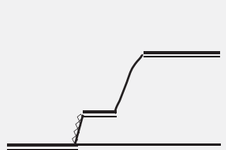
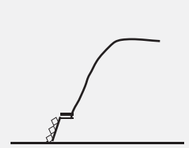
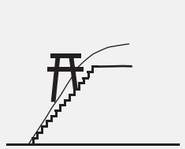
SLOPES OF UTATSU

UTATSU IS SURROUNDED BY MOUNDS ON THREE SIDES AND BORDERED BY SEA. WATER CANAL AND ELEVATED HIGHWAY CUTS ACROSS THE SOUTHERN BORDER OF UTATSU. THIS ANALYSIS LOOKS AT THE SLOPES ON THE NORTHERN SIDE, WHICH ACTED AS NATURAL BARRIERS TO THE 3.11 TSUNAMI.

2011年3月12日
国土地理院撮影

SLOPE CLASSIFICATION

VISUAL ANALYSIS OF EACH SLOPES AT EYE LEVEL

	A	B	C	D	E	F
DESCRIPTION (CULTURAL/BUILT ENVIRONMENT)	SLOPE BY ENTRY ROAD TO UTATSU	ARTIFICIAL MOUND FOR JR TRAIN. TUNNEL AT GROUND LEVEL	SLOPE BEHIND PARKING LOT	CUT AND FILLED SLOPE BY TWO SCHOOLS	SLOPE BEHIND RESIDENCES, DIVIDES HOUSES ON TOP FROM BELOW	SLOPE WITH SHRINE AT TOP, ELEVATED HIGHWAY CUTS ACROSS
POST-TSUNAMI CONDITIONS	TREES DAMAGED BY SALT WATER, UPROOTED TREES	EXPOSED TOP OUTER SURFACE OF TUNNEL	DEAD BAMBOO, UPROOTED TREES	NOT MUCH	UPROOTED TREES AND BAMBOO, HANGING ITEMS	UPROOTED TREES, HANGING ITEMS (UNREMOVED)
SURFACES	CONCRETE REINFORCEMENT, CONCRETE COVERED PATH, PILED STONE AT TOE,	PILED UP STONE, GRASS	ROCKY SURFACE, STONE CLIFF	CONCRETE WALL, GRASS PATHCES	TREES, EXPOSED BEDROCK, SOIL COLOR IS DIFFERENT	SALT WATER DAMAGE TO CEDAR TREES, DAMAGED HOUSE NEXT TO STAIRS
SLOPE/LANDFORM (DEGREES)	50	40	50-80	50-90	60-70	30 (STAIRS)
APPROXIMATE HEIGHT	8-10M	10-12M	18-22M	VARIES	15M	30M
CUT/FILL	CUT ON ROAD SIDE	ARTIFICIAL	CUT AT TOE, PILED STONE	CUT AT TWO LEVELS FOR RAMP, CONCRETE WALL	CUT AT TOE, FILLED WITH CONCRETE WALL	TOE/MIDDLE CUT AT NW SIDE FOR ROAD, SLICED AT SW SIDE FOR HIGHWAY
ACCESSIBILITY	THRU CONCRETE COVERED NARROW SLOPE PATH	RAMP UP TO STATION	NOT ACCESSIBLE	RAMP (CARS + PEOPLE)	HIDDEN PRIVATE RAMP BEHIND DESTROYED HOUSES	STAIRS TO SHRINE
SOIL/EROSION	SLIGHT EROSION ON SIDES EXPOSED BEDROCK	EXPOSED STONE INNER FILL, MISSING GRASS PATCHES	EROSION +++ 5M UP FROM GROUND ALL ERODED	NO VISIBLE EROSION	NEAR GROUND	NEAR GROUND
VEGETATION (SHRUB,TREE,GROUND COVER)	CEDAR TREES, SHRUBS	GRASS	TREES, BAMBOO, GRASS	GRASS	THIN TREES, BAMBOO, SMALL SHRUBS	DENSE CEDAR TREES
SLOPE SECTION						

SLOPE A - CEDAR TREE MOUND BY ENTRY ROAD TO UTATSU

SLOPE BY ENTRY ROAD TO UTATSU

TREES DAMAGED BY SALT WATER, UP-ROOTED TREES

CONCRETE REINFORCEMENT,CONCRETE COVERED PATH, PILED STONE AT TOE,

50 DEGREES SLOPE

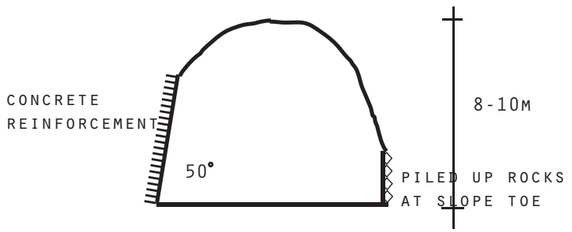
8-10M

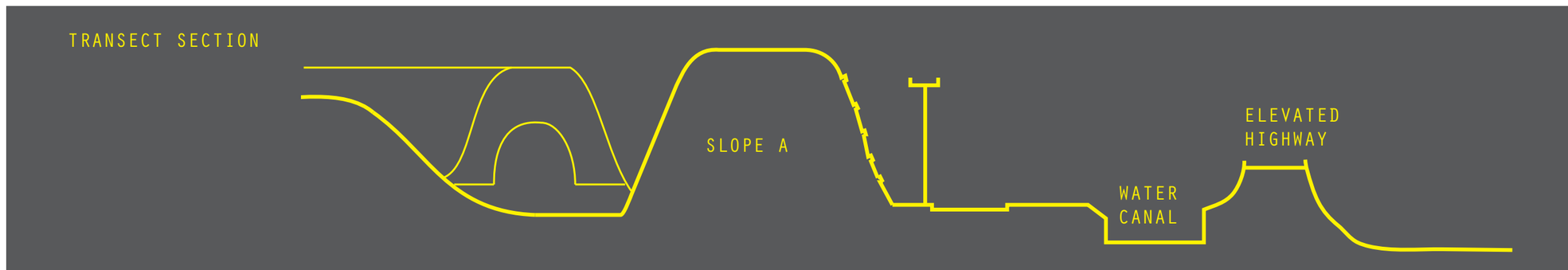
CUT ON ROAD SIDE

ACCESS THRU CONCRETE COVERED NARROW SLOPE PATH

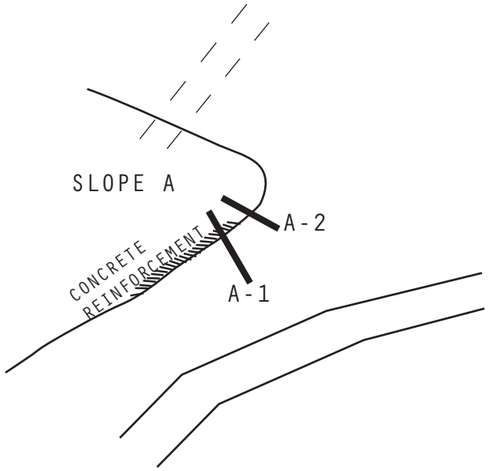
SLIGHT EROSION ON SIDES
EXPOSED BEDROCK

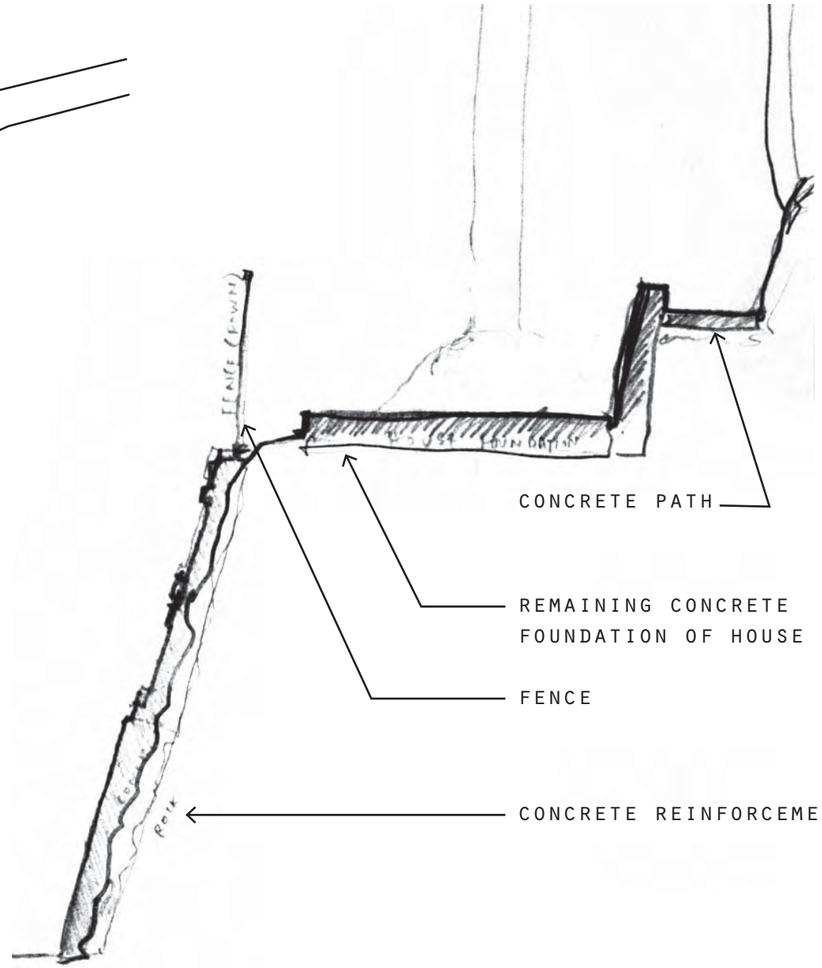
VEGETATION: CEDAR TREES, SHRUBS



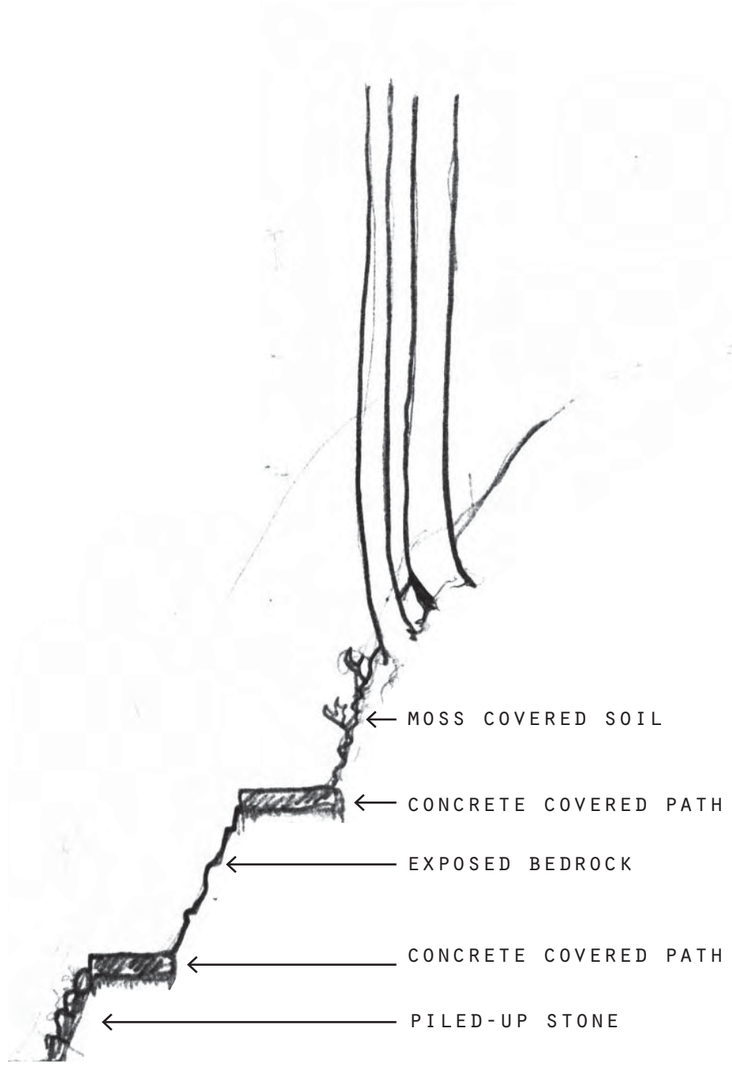


DETAILED SECTION THRU SLOPE A





DETAIL A-1
@ CONCRETE REINFORCEMENT WALL



DETAIL A-2
@ EXPOSED ROCK/CONCRETE PATH

SLOPE B - ARTIFICIAL MOUND / JR LINE TRAIN TRACK

**ENGINEERED SLOPE

ARTIFICIAL MOUND FOR JR TRAIN.
TUNNEL AT GROUND LEVEL

EXPOSED TOP OUTER SURFACE OF TUNNEL

PILED UP STONE, GRASS

40 DEGREES SLOPE

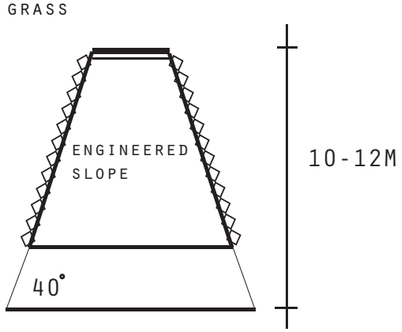
10-12M

ARTIFICIAL

RAMP UP TO STATION

EXPOSED STONE INNER FILL,
MISSING GRASS PATCHES

GRASS



SLOPE C - BEHIND PARKING LOT

WHERE: SLOPE BEHIND PARKING LOT

POST TSUNAMI CONDITION: DEAD BAMBOO, UPROOTED TREES

SURFACE: ROCKY SURFACE, STONE CLIFF

50-80 DEGREES SLOPE

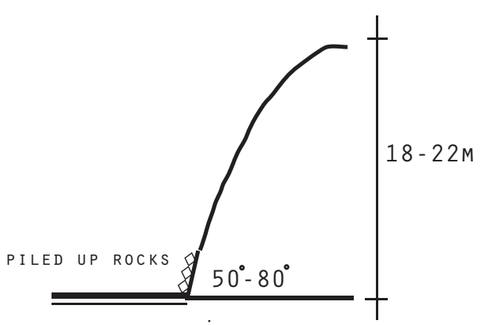
18-22M

CUT AT TOE, PILED STONE

NOT ACCESSIBLE

EROSION +++
5M UP FROM GROUND ALL ERODED

VEGETATION - TREES, BAMBOO, GRASS



SLOPE D - SCHOOL GROUNDS

CUT AND FILLED SLOPE BY TWO SCHOOLS

NOT MUCH VISIBLE DAMAGE

SURFACE: CONCRETE WALL, GRASS PATHCES

50-90 DEGREES SLOPE

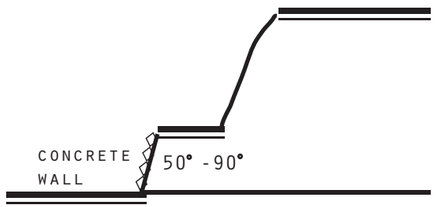
HEIGHT VARIES

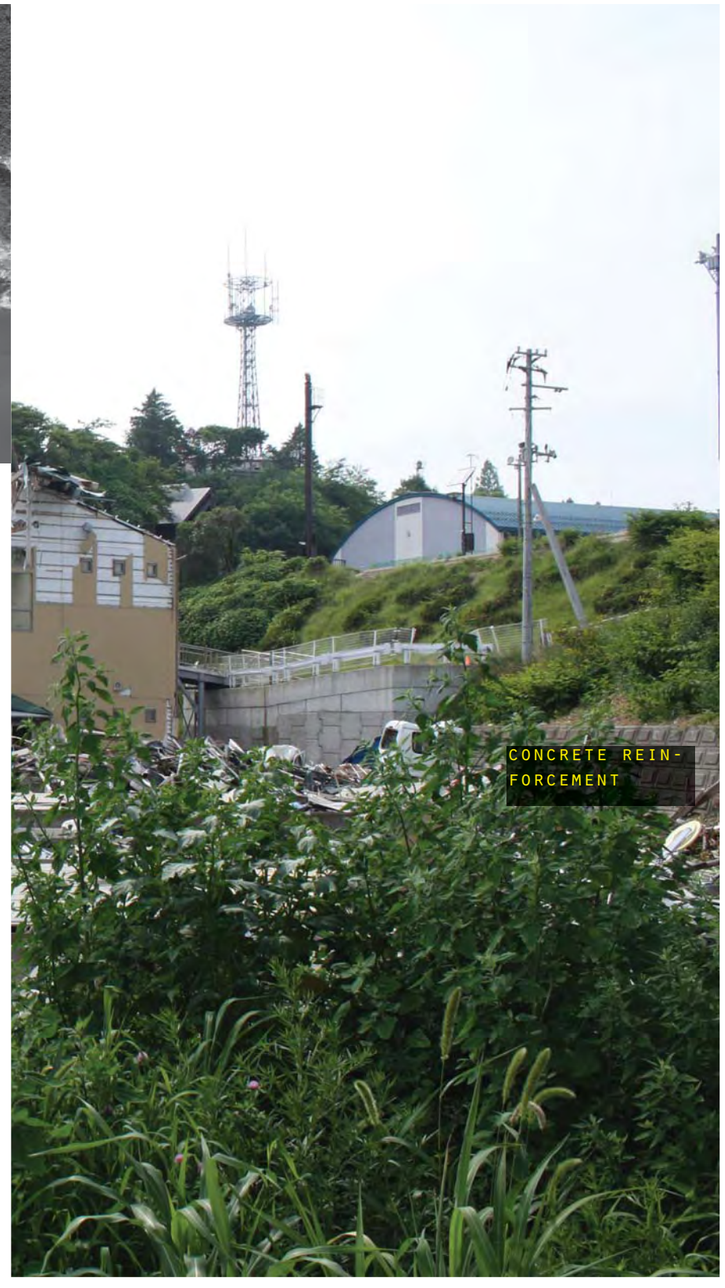
CUT AT TWO LEVELS FOR RAMP, CONCRETE WALL

RAMP (CARS + PEOPLE)

NO VISIBLE EROSION

VVEGETATION: GRASS





SLOPE E - BEHIND RESIDENCES

SLOPE BEHIND RESIDENCES, DIVIDES HOUSES ON TOP FROM BELOW

UPROOTED TREES AND BAMBOO, HANGING ITEMS

TREES, EXPOSED BEDROCK, SOIL COLOR IS DIFFERENT

60-70 DEGREES SLOPE

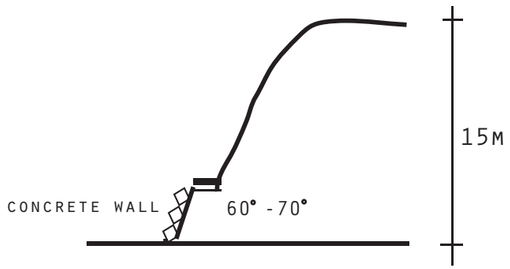
15M APPROXIMATE HEIGHT

CUT AT TOE, FILLED WITH CONCRETE WALL

HIDDEN PRIVATE RAMP BEHIND DESTROYED HOUSES

EROSION NEAR GROUND

VEGETATION: THIN TREES, BAMBOO, SMALL SHRUBS



SLOPE F - SHRINE

SLOPE WITH SHRINE AT TOP, ELEVATED HIGHWAY CUTS ACROSS

UPROOTED TREES, HANGING ITEMS (UNREMOVED)

SALT WATER DAMAGE TO CEDAR TREES, DAMAGED HOUSE NEXT TO STAIRS

30 DEGREES (STAIRS)

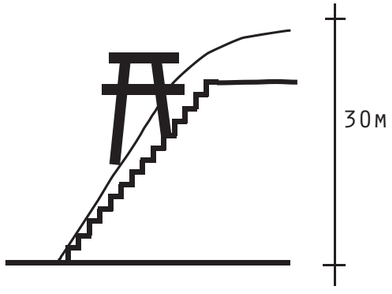
30M HEIGHT

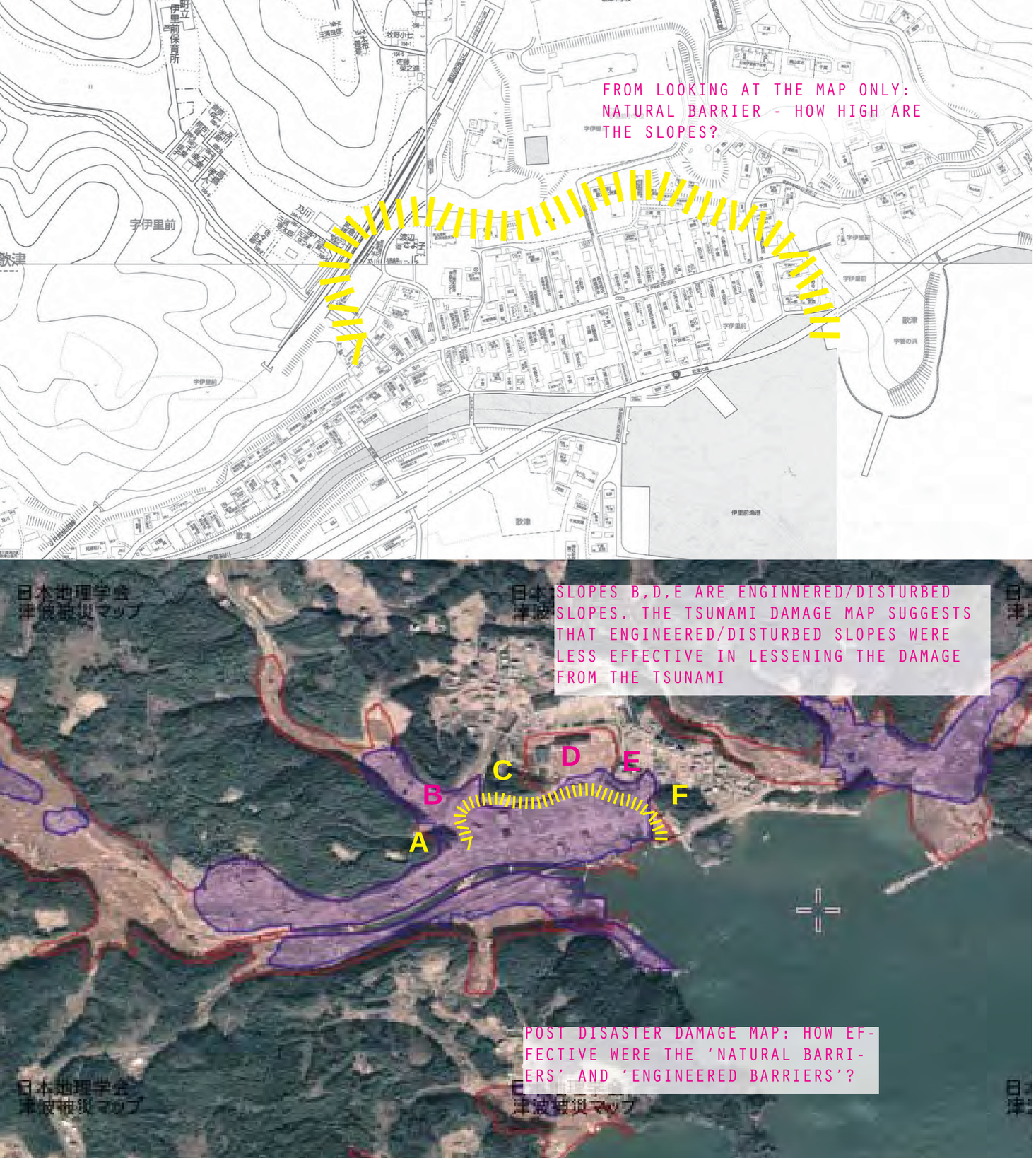
TOE/MIDDLE CUT AT NW SIDE FOR ROAD, SLICED AT SW SIDE FOR HIGHWAY

STAIRS TO SHRINE FOR ACCESS

EROSION NEAR GROUND

VEGETATION: DENSE CEDAR TREES





SLOPES OF UTATSU -
FINDINGS FROM THE VISIT

Prior to visiting Utatsu, students studied the aerial photos and topographic maps of the site. some of the questions we had were the effectiveness of the natural barriers of slopes against tsunami, incurred damage on the slopes, and also whether the slopes were accessible for residents as evacuation routes.

Actual visit to the site showed different reading of the slopes. almost all slopes were cut at toe up to mid level, and filled with layered stone or concrete. thus, slopes WERE NOT ACCESSIBLE to be used as evacuation routes. AN ALTERNATIVE USE OF THE ENGINEERED PORTION OF THE SLOPES (CONCRETE EMBANKMENTS) COULD BE TO USE THE THICKNESS OF THE WALLS AND OCCUPY THE THICKNESS BY CREATING RAMPED ACCESS, ETC.

However these slopes created a FORTRESS for the upper grounds from tsunami inundation. Interesting finding from the site visit was that disturbed slopes were relatively less effective in lessening the damage from the tsunami. the damage map shows that the areas beyond slopes B,D,and E were also effected by tsunami. these were slopes that were either entirely engineered (slope B- train station slope), or disturbed (slope D - cut and filled to create ramped access, slope E- sliced to create road)