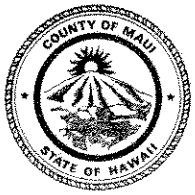
ALAN M. ARAKAWA
Mayor

GILBERT S. COLOMA-AGARAN
Director

MILTON M. ARAKAWA, A.I.C.P.
Deputy Director

Telephone: (808) 270-7745
Fax: (808) 270-7975



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND ENVIRONMENTAL MANAGEMENT
ENGINEERING DIVISION
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

January 21, 2004

RALPH NAGAMINE, L.S., P.E.
Development Services Administration

TRACY TAKAMINE, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

JOHN D. HARDER
Solid Waste Division

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

SUBJECT: FINAL ENVIRONMENTAL ASSESSMENT (FEA) FOR THE MARKET STREET IMPROVEMENT PROJECT, PROVIDING URBAN BEAUTIFICATION OF MARKET STREET FROM WELLS STREET TO THE INTERSECTION OF MARKET STREET AND PIIHANA AND MOKUHAU STREETS; WAILUKU, MAUI, HAWAII

Dear Ms. Salmonson:

The Department of Public Works and Environmental Management has reviewed the Final Environmental Assessment for the above-referenced project and has determined that a Findings of No Significant Impact (FONSI) determination is warranted. Please publish the notice of availability for this project in the February 8, 2004, OEQC Environmental Notice.

We have enclosed four (4) copies of the Final EA, and will be transmitting a completed OEQC publication form and project summary via e-mail (e-mail will be transmitted by Chris Hart & Partners, Inc.). Should you have any questions, please call Ms. Wendy Kobashigawa of our Engineering Division at 270-7745, or Mr. Michael Summers of Chris Hart & Partners, Inc., at 242-1955.

Very truly yours,

for GILBERT COLOMA-AGARAN
Director of Public Works
and Environmental Management

LL/WYK:c(ED04-040)
s:\eng\all\wyk\cip\01-11\FEAOEQCtransmittal.wpd

xc: Mike Summers, Chris Hart & Partners
R. T. Tanaka Engineers, Inc.
HWY-M

2004-02-08 FONSI
MARKET STREET IMPROVEMENT

Final Environmental Assessment For

Market Street Improvement Project

Wailuku • Maui • Hawaii

CHRIS HART & PARTNERS

January 2004

FINAL ENVIRONMENTAL ASSESSMENT
FOR

MARKET STREET BEAUTIFICATION PROJECT

Prepared for
Department of Public Works and Environmental Management
County of Maui
250 South High Street
Wailuku, HI 96793

Prepared by
Chris Hart & Partners
1955 Main Street
Wailuku, Maui, Hawaii 96793

Wailuku • Maui • Hawai`i

CHRIS HART &PARTNERS

January 2004

ENVIRONMENTAL ASSESSMENT

TABLE OF CONTENTS

ATTACHMENTS

FIGURES

APPENDICES

I. PROJECT DESCRIPTION

A. PURPOSE OF THE REQUEST

This Final Environmental Assessment is being filed in order to address the impacts associated with the Market Street Improvement Project, a County and Federal funded project intended to provide landscape planting, improve pedestrian and vehicular circulation, and urban beautification of Market Street from Wells Street to the intersection of Market Street and Piihana and Mokuhau Streets; Wailuku, Maui, Hawaii.

B. PURPOSE OF THE REQUEST

Maui County's Department of Public Works and Environmental Management is the proposing and accepting authority for this project. Contact information is listed below:

Accepting Authority

County of Maui
Department of Public Works and Environmental Management
Engineering Division
200 South High Street
Wailuku, Maui, Hawaii

Mr. Joe Krueger, Project Engineer, Engineering Division
Mr. Lloyd Lee, Engineering Division Chief
(808) 270-7745

Planning Consultant

Chris Hart & Partners, Inc.
1955 Main Street, Suite 200
Wailuku, Hawaii 96793

Mr. Christopher L. Hart, ASLA, President
(808) 242-1955

C. REQUIRED LAND USE PERMITS

The following land use and development permits are required for the project:

- Grading Permits
- Permit to Work within the County Right-of-Way
- Driveway Permits

D. PROJECT SCHEDULE ANDCOST

Initiation of construction is anticipated in the fall of 2004. The project will be completed in approximately 9 to 12 months.

Total estimated costs are $6.3 million. Funding for the project will be provided through the Maui County Department of Public Works and Environmental Management and the Federal Highway Administration (FHWA). FHWA will provide approximately 4.8 million of the required funds.

E. PRE-CONSULTED AGENCIES& PRIVATE INTERESTS

A. COUNTY OF MAUI
   1. Department of Planning
   2. Department of Public Works and Environmental Management
   3. Maui Redevelopment Agency

B. STATE OF HAWAII
   1. Department of Transportation

C. PRIVATE INTERESTS (See Appendix A, Pre-consultation)
   1. Wailuku Main Street Association (WMSA)
   2. Neighboring property owners

F. PROJECT LOCATION, DESCRIPTION, AND NEED

The Market Street Improvement Project will focus on Market Street from Wells Street through the heart of Wailuku's commercial district to the intersection Mokuhau and Piihana Roads in Happy Valley (See: Figure No. 1, Regional Location).

The affected section of streetscape is approximately 3,000 feet long and serves as a regional north/south collector roadway between Kaohu Street to the south and Kahekili Highway to the north. Several east/west (mauka/makai) collector roadways including Wells Street, Main Street, Vineyard Street, Mill Street, and Mokuhau and Piihana Roads intersect Market Street. Market Street is under the jurisdiction of the Maui County Department of Public Works and Environmental Management.

Market Street was originally constructed during the early 1900's. Pavement widths are generally substandard and range from 30-feet to 37-feet. Traffic flow is currently restricted to one-way traffic for northbound vehicles between Wells and Vineyard Streets and is open to two-way traffic between Vineyard and Piihana and Mokuhau Roads. Buildings fronting Market Street generally abut the pedestrian sidewalks making roadway widening costly and impractical. The predominant land use in the area is retail/office commercial with a mixture of single- and multi-family residential uses in Happy Valley.

The proposed project is wholly within the Wailuku Redevelopment Area, which has been identified as an area affected by slum and blight conditions. The Wailuku Redevelopment Area Plan was developed pursuant to Chapter 53, Hawaii Revised Statutes (HRS), the Urban Renewal Law. The Plan provides specific strategies and actions that need to be addressed in the short and long-term to eliminate slum and blight conditions within Wailuku Town's commercial core. The implementation of the Market Street Improvement Project is a principal implementing action identified in the plan.

The primary purpose of the proposed project is to facilitate and inspire the long-term economic revitalization and redevelopment of the Wailuku downtown business district through the landscape planting and urban beautification of Market Street.

The proposed roadway improvements include pavement reconstruction; construction of concrete sidewalks and handicapped wheel-chair ramps; reconstruction of driveways; installation of drainage facilities; construction of planter islands with street tree planting, lighting, benches, signage, etc; possible realignment of existing utilities such as water,

electric and telephone systems; possible undergrounding of secondary power distribution, telephone distribution, and CATV distribution duct; and related improvements. The construction of a 41-stall surface parking lot serving the business district at the rear of the Iao Theatre (TMK: (2) 3-4-012:022) will be financed by County funds as part of the Market Street Improvement Project. This parking lot will increase the supply of public parking along Market Street and will mitigate the impact caused by the loss of on-street parking due to the subject project. It is anticipated that construction of the parking lot may occur prior to the improvements to Market Street. The development impacts associated with the parking lot were assessed during the preparation of a Final Environmental Assessment for the Wailuku Mini-Park, Restroom and Police Resource Center (September 2001).

The objectives of the Market Street Beautification Project are as follows:

- Improve vehicular circulation and control vehicular access;
- Provide lighting, shade trees, signage, and street furniture to beautify the commercial core and improve the pedestrian experience;
- Construct and repair sidewalks to improve pedestrian mobility;
- Provide narrowed street crossings and concrete textured crosswalks to slow traffic and improve pedestrian safety; and
- Repave the existing street to improve storm drainage and driving conditions.

The proposed improvements will be constructed in phases thereby directly impacting only one section of the roadway at a time. During construction, one lane of traffic will be in operation at all times. Flagging crews will direct traffic flow during one-lane operation. It is anticipated that construction within the commercial core will occur during both standard work hours and during evening and weekend hours. Construction within Happy Valley will occur only during standard work hours due to existing residences in the area. Pedestrian traffic will be limited to one shoulder of the roadway during some construction operations. In response to concerns raised by the Wailuku Main Street Association (WMSA) regarding the project's potential impact on school aged pedestrians commuting to school, Wailuku Elementary School, Iao Intermediate School, Waihe'e School, and Baldwin High School will be notified of the construction schedule prior to initiation of construction.

G. ALTERNATIVES

Initial planning for this project began several years ago with the preparation of the Wailuku Market Street Landscape Design and Beautification Master Plan Report (April, 1997). The 1997 Master Plan Report identified three alternative plans, including:

- Concept "A" -- Parallel Parking on Both Sides of Market Street;
- Concept "B" -- One Traffic Lane and Parking on Both Sides of Market Street; and
- Option "C" -- Two Traffic Lanes and Parking on the East Side of Market Street.

The major differences in the plans center on streetscape beautification details and proposed parking and vehicular circulation patterns along Market Street. After consultation with neighboring property owners and concerned individuals, it was determined that Option "B", which proposes angled parking on the east side of Market Street and parallel parking on the west side of Market Street, with one lane of traffic traveling north to Vineyard Street was the preferred alternative. Option "B" represents the status quo with respect to existing parking and vehicular circulation patterns along Market Street. (See: Figure No. 7, "Wailuku Market Street Beautification Project, Concept Plans").

The proposed improvements are similar to Option "B", although urban design details have been changed to present a more modest and authentic treatment of textured pavers, light fixtures, and street furniture. These changes were made after receiving additional input form the Wailuku Main Street Association and neighboring property owners. Moreover, the scope of the project has expanded to include the section of Market Street extending from Wells Street to Main Street and from Vineyard Street to the intersection of Market Street and Mokuhau and Piihana Roads.

The No Action alternative would leave the existing roadway and sidewalks in their present condition and would therefore not provide the following benefits:

- Improved vehicular circulation and controlled vehicular access;
- Landscape beautification, lighting, and street furniture improvements to beautify the commercial core and enhance the pedestrian experience;

- Improved sidewalks and concrete textured crosswalks to slow traffic and improve pedestrian safety;

- Improved drainage facilities to mitigate periodic flooding in areas susceptible to shallow ponding during periods of heavy rain.

Because the No Action alternative is not consistent with the intent of the Wailuku Redevelopment Plan, which calls for the implementation of the Market Street Improvement Project, it is not a viable alternative.

II. AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

A. PHYSICAL ENVIRONMENT

1. Land Use

Existing Conditions. Market Street serves as a regional north/south collector roadway that stretches through the core of Wailuku Town's commercial district. Established land uses abutting the project site are predominantly commercial although single and multi-family residential uses are intermixed with commercial uses from Mill Street through Happy Valley to Piihana/Mokuhau Roads.

The proposed improvements are primarily limited to pavement resurfacing, repair of sidewalks, drainage improvements, the placement of concrete textured crosswalks at major intersections, lighting improvements and landscape planting. These improvements will take place within the existing right-of-way and are not designed to accommodate additional vehicular traffic or improve the level-of-service at affected intersections. Therefore, the project will not generate additional traffic.

During the construction phase, there is a potential for short-term impacts to existing businesses and residences. These temporary impacts may include the following:

- Temporary loss of on-street parking stalls;
- Temporary restricted traffic flow fronting the construction area; and
- Temporary noise and dust.

In order to address these issues, a survey was administered to neighboring property owners requesting input on the most convenient time for construction and other suggestions to mitigate construction related impacts (See: Appendix A, "Pre-consultation – Survey of Adjacent Property Owners"). The majority of businesses that responded to the survey were primarily concerned about the impact of daytime construction on their operations. These businesses prefer that construction be conducted

during evening hours and on Sunday. Within Happy Valley, evening construction will be challenging due to the impact that construction activities would have upon existing residences within close proximity to the project corridor. The DPWWM will hold additional informational meeting (s) in order to inform residents of the project scope and schedule. To the maximum extent practicable, construction will occur at times that are least disruptive to existing businesses and residences in the area.

2. Soils

Existing Conditions. According to the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, prepared by the United States Department of Agriculture, Soil Conservation Service (August 1972), the site is located in an area designated as Iao cobbly silty clay, 3 to 7 percent slopes (lbB) and Wailuku silty clay, 3 to 7 percent slopes (WvB).

The Iao series consist of well-drained soils on valley fill and alluvial fans. These soils developed in alluvium derived from basic igneous rock. The shrink-swell potential is moderate. (USDA, 1972, Plate 99 and pp. 46-47, 172-173).

The Wailuku series consist of well-drained soils on alluvial fans on the island of Maui. These soils developed in alluvium derived from basic igneous rock. The shrink-swell potential is moderate. (USDA, 1972, Plate 99 and pp. 133, 166-167).

Potential Impacts and Mitigation Measures. The proposed improvements will not require any significant change in topography or landforms. From information provided by Phillip Rowell and Associates, design traffic volume for this project will be 12,300 vehicles per day. Of this 12,300 vehicles per day, 369 (3%) will be trucks with heavy axle loads. The soil analysis suggests that the Maui County Class "A" pavement section is acceptable for use on this project. This new pavement section cosists of 2.5" Asphalt Concrete + 5" Asphalt Treated Base + 8" Subbase.

3. Flood and Tsunami Zone

Existing Conditions. The project site is beyond the limits of any established flood zones in accordance with Panel 150003 0190 D, March 16, 1995 of the Flood Insurance Rate Map for Maui County. The floodway of Iao Stream that crosses the project site is confined within the stream's existing concrete channel. Roadway ponding; however, might occur at the low area between Kapoai and Mokuhau Road during a heavy storm event due to lack of adequate collection facilities.

Potential Impacts and Mitigation Measures. The subject development is located within an area of minimal flooding and will therefore not be impacted by flood and tsunami related hazards.

4. Terrestrial Biota (Flora and Fauna)

Existing Conditions. The proposed improvements involve work to existing paved surfaces and will therefore not impact rare, threatened, or endangered species or habitat.

Potential Impacts and Mitigation Measures. There are no known significant habitats of rare, endangered or threatened species of flora and fauna located on the subject property. Thus, rare, endangered, or threatened species of flora and fauna will not be impacted by the proposed project.

5. Air Quality

Existing Conditions. Air quality refers to the presence or absence of pollutants in the atmosphere. It is the combined result of the natural background and emissions from many pollution sources. The impact of land development activities on air quality in a proposed development's locale differs by project phase (site preparation, construction, occupancy) and project type. In general, the air quality in the Wailuku-Kahului region is considered good as point sources and non-point sources of emissions do not generate high concentrations of pollutants. The relative high quality of air can also be attributed to the region's constant exposure to winds that quickly disperse concentrations of emissions. The Wailuku-Kahului area is currently in attainment of all criteria pollutants established by the Clean Air Act, as well as, the State of Hawaii Air Quality Standards.

Potential Impacts and Mitigation Measures. Air quality impacts attributed to the proposed project could include dust generated by the short-term construction related activities. Roadwork, for example, could generate airborne particulate. Adequate dust control measures that comply with the provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust, will be implemented during all phases of construction.

6. Noise Characteristics

Existing Conditions. The noise level is an important indicator of environmental quality. In an urban environment, noise is due primarily to vehicular traffic, air traffic, heavy machinery, and heating, ventilation, and air-conditioning equipment. Ramifications of

various sound levels and types may impact health conditions and an area's aesthetic appeal. Noise levels in the vicinity of the project area are generally low. Traffic noise along Market Street is the predominant source of background noise in the vicinity of the subject property. Once built, the subject beautification project will not increase ambient noise levels within the project area since the project does not propose increasing the capacity of the roadways.

Potential Impacts and Mitigation Measures. Long-term noise impacts are not anticipated as a result of the proposed project since the capacity of the affected roadways will not be increased. However, short-term noise impacts associated with construction activities along the existing roadway may occur. These impacts occur as a result of the short distances (less than 100 FT) between existing dwelling units and commercial establishments to the anticipated construction corridor. The total duration of the construction period for the proposed project is estimated to be approximately six months, but noise exposure from construction activities at any one receptor is not expected to be continuous during the total construction period.

Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work and due to the administrative controls available for its regulation. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the project site.

Construction noise levels at existing structures can intermittently exceed 90 dB when work is being performed at close distances in front of these structures. Along the roadway improvement project, distances between the construction sites and receptors are expected to be between 10 and 200 FT, and construction noise levels may intermittently exceed 90 dB. The State Department of Health currently regulates noise from construction activities under a permit system. Under current permit procedures, noisy construction activities are restricted to hours between 7:00 AM and 6:00 PM, from Monday through Friday, and exclude certain holidays. Noisy construction activities are normally restricted to the hours of 9:00 AM to 6:00 PM on Saturdays, with construction not permitted on Sundays. However, nighttime construction and construction during

Sundays may be desirable in the commercial core, between Well's and Vineyard Streets, since few residences exist in this area and because businesses are typically closed during these periods. If nighttime and Sunday construction activities are conducted, a variance will be required from the State Department of Health.

In areas where residences are present, construction will be limited to daylight hours, Monday through Friday, and Saturday. These restrictions minimize construction noise impacts on noise sensitive receptors along the roadway project corridor, and have generally been successfully applied. In this way, construction noise impacts on noise sensitive receptors can be minimized.

In addition, when feasible the use of quieted portable engine generators and diesel equipment will be specified for use within 500 FT of noise sensitive properties. Heavy truck and equipment staging areas will also be located at areas which are at least 500 FT from noise sensitive properties whenever possible. Truck routes, which avoid residential communities, will be identified wherever possible. The use of 8 to 12 FT high construction noise barriers may also be used where close-in construction work to noise sensitive structures is unavoidable.

7. Archaeological/Cultural Resources

Existing Conditions. The entire project area lies under pavement and concrete and has been significantly impacted by past earthmoving activities associated with the construction of the various buildings along Market Street as well as the street itself, along with the placement of sewer, water and other utilities. In pre-consultation meetings between Xamanek Researchers, the archaeological consultant for this project, and Dr. Melissa Kirkendall, of the State Historic Preservation Division's (SHPD) Maui Office, it was determined that an archeological inventory survey should be conducted concurrently with road construction. This methodology was chosen because of the logistical problems associated with the presence of the paved road, existing utilities and sidewalks, and the proximity of residences, businesses and other infrastructure along Market Street.

Potential Impacts and Mitigation Measures. An Archaeological Monitoring Plan has been prepared for the project and is currently being reviewed by the SHPD. The scope of the monitoring plan includes having an archaeological monitor present during all subsurface earthmoving activities in the project area. In the event that human skeletal remains are inadvertently encountered, notification of SHPD (HPDDP), the SHPD Maui office and the Maui/Lana`i Islands Burial Council will be made, and appropriate mitigation determined. A supervisory archaeologist will regularly visit the monitoring site as often as is necessitated by the nature of construction activities and archaeological findings. If significant discoveries are made, appropriate mitigation measures will be discussed with the SHPD Maui archaeologist. The archaeological consultant will curate any cultural materials, other that human remains recovered from the monitoring project,

until analysis is completed and then turned over to the appropriate parties. Long-term curation arrangements of such material will be approved by the SHPD. When fieldwork has been completed, a draft inventory survey report will be prepared. (See: Appendix B, "Archeological Monitoring Plan").

8. Visual Resources

Existing Conditions. Scenic resources to the west of the project area include Iao Valley and the West Maui Mountains. Looking to the south, view corridors of the Pacific Ocean exist at the intersection of Market Street and Vineyard Avenue and Market Street and Main Street.

Potential Impacts and Mitigation Measures. Roadway improvements are not anticipated to have any substantial impact on mauka or makai viewplanes. The improvements will not block ocean views or scenic mauka ridgelines.

9. Hazardous Waste

No hazardous wastes have been identified within the project corridor and no impacts due to hazardous wastes are anticipated.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Population and Economy

No substantial long-term impacts to population and economy are anticipated as a result of the proposed project.

The project will generate construction-phase economic impacts that are generally short-term effects. They include employment, income, and expenditure impacts that are created by on-site and off-site construction employment, on-site and off-site trade/transportation/service employment, and manufacturing employment in support of construction.

Using the State of Hawaii, Department of Business Economic Development and Tourism's Input-Output Model (1998), the direct employment impact during the

construction phase is estimated to be approximately 29 jobs. The direct, indirect, and induced employment impact during this period is approximately 71 jobs.

C. INFRASTRUCTURE

1. Water

The project area is served by the Central Maui System. The sources of water for this system are the Iao and Waihee aquifers, the Iao Tunnel and the Iao-Waikapu Ditch. The sustainable yield of the Iao aquifer is 20 MGD. According to the Department of Water Supply, the rolling annual average groundwater withdrawls as of December, 2002 were 16.848 MGD. Sustainable yield of the Waihee aquifer is 8 MGD. Rolling annual average groundwater withdrawls for the same period were 4.994 MGD.

Permanent landscape irrigation will be from the Central Maui Water System. It is anticipated that the project will require two 5/8-inch water meters for irrigation. Water demand for landscape irrigation is anticipated to be approximately 1,200 gpd. No substantial changes in water demand are anticipated as a result of the project.

Water infrastructure in the project area includes service laterals running along Market Street. Coordination with the Department of Water Supply will help mitigate any potential impacts to delivery infrastructure during construction.

2. Wastewater

No wastewater generating improvements are part of the project. No substantial impacts related to the wastewater disposal or transmission systems are anticipated as part of the project.

3. Drainage

The existing storm runoff quantities within the project corridor are not expected to increase after completion of the proposed roadway improvements since the existing ground characteristics and drainage flow patterns will not be significantly altered. Runoff from the project corridor is currently conveyed into the Sprekels Ditch, Iao Stream, and in certain locations flows into low-lying adjacent properties (See: Appendix C, "Preliminary Drainage and Soil Erosion Control Studies").

Proposed on-site drainage facilities will consist of grated inlets, catch basins, drain manholes and underground drainage pipes. These facilities will hasten the collection of runoff to prevent street flooding and minimize ponding along the roadway. Off-site drainage system improvements will be needed should the proposed Kahekili Highway drainage system be connected to the existing Mokuhau/Piihana Road Drainage System.

An Erosion Control Plan will be required prior to issuance of a grubbing and grading permit. The Erosion Control Plan will include Best Management Practices in compliance with Section 20-08.035 of the Maui County Code (Grading Ordinance No. 2684) and applicable sections of the Construction Best Management Practices (BMPs) for the County of Maui, May 2001.

Completion of the proposed improvements will not cause additional adverse drainage effects to adjacent and downstream properties. The proposed rehabilitation will not increase existing roadway runoff since the new ground characteristics and drainage flow patterns will be virtually similar to what it is at present. The installation of additional drainage facilities will improve runoff collection; thereby, preventing the potential occurrence of street flooding and ponding.

4. Roadways and Traffic

Existing Conditions. A Traffic Impact Assessment Report was prepared by Phillip Rowell and Associates which describes the traffic characteristics of the proposed project and likely impacts to the adjacent roadway network (See: Appendix F, "Traffic Impact Analysis Report"). The purpose of the study is as follows:

- Assess the proposed traffic improvements to confirm that the proposed improvements would not result in a lowering of the traffic levels-of-service.
- Identify traffic operational deficiencies adjacent to the project before and after implementation of the project.
- If required, identify and assess traffic improvements to mitigate the operational deficiencies identified above.

The conclusions and recommendations of the study are as follows:

1) The level-of-service analysis identified capacity deficiencies at the intersections of Market Street at Wells Street and Market Street at Vineyard Street.

2) The peak hour of warrants for a traffic signal are satisfied at the intersection of Market Street at Wells Street. It is understood that signalization is not within the scope of this project. Therefore, it is recommended that a full traffic signal warrant study be performed. This study should examine all eight warrants as well as alternative measures to increase the capacity of the intersection.

3) During the traffic surveys, it was observed that northbound drivers wanting to cross Wells Street or turn left from Market Street to westbound Wells Street had difficulty. This appeared to be because of limited sight distance. It is recommended that the sight distance for left turns and through traffic be examined. If deficient, the sight distance can be increased by removing one or two parking spaces along the south side of Wells Street west of Market Street.

4) For the intersection of Market Street at Vineyard, the feasibility analysis of installing an all-way STOP concluded that while the level-of-service of the side street would improve, the level-of-service for northbound Market Street would decrease from A to F. No modifications are recommended.

5) At the intersection of Market Street at Mill Street, left turns from Mill Street to Market Street will operate at Level-of-Service F without and with the project.

6) The left turn storage lane from southbound Market Street to eastbound Mill Street should be 175 feet long. Only 25 feet can be provided due to right-of-way and geometry constraints.

5. Electrical and Telephone

Existing Conditions. There are overhead electrical and telephone distribution systems along the entire length of Market Street. No changes in electrical or telephone service are anticipated as part of the project. As currently planned, the project does not call for the relocation of telephone or electrical utility poles.

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

A. GENERAL PLAN OF THE COUNTY

The General Plan of the County of Maui (1990 update) provides long-term goals, objectives, and policies directed toward improving living conditions in the County. The following General Plan Themes, Objectives and Policies are applicable to the proposed project:

Objective:

To support an advanced and environmentally sensitive transportation system which will enable people and goods to move safely, efficiently and economically.

Policy:

Support the development of a county-wide network of bikeways and pedestrian paths.

Objective:

To develop a program for anticipating and enlarging the local street and highway systems in a timely response to planned growth.

Policies:

Ensure that transportation facilities are anticipated and programmed for construction in order to support planned growth.

Support Maui County's street tree plan and encourage landscape planting, irrigation and maintenance programs along all public highways and right-of-way.

B. WAILUKU KAHULUI COMMUNITY PLAN

Nine community plan regions have been established in Maui County. Each region's growth and development is guided by a community plan, which contains objectives and

policies in accordance with the Maui County General Plan. The purpose of the community plan is to outline a relatively detailed agenda for carrying out these objectives.

The subject property is located within the Wailuku-Kahului Community Plan region. The Wailuku-Kahului Community Plan was recently updated on June 5, 2002.

The following Wailuku-Kahului Community Plan goals, objectives, and policies are applicable to the proposed action:

Economic Activity

- Support the revitalization of the Wailuku commercial core and adjacent areas by expanding the range of commercial services; improving circulation and parking; enhancing and maintaining the town's existing character through the establishment of a Wailuku Town design district; redevelopment of the Wailuku Municipal Parking Lot with emphasis on additional public parking; establishing urban design guidelines; and providing opportunities for new residential uses. Improve Wailuku's image and level of service as a commercial center for the region's population. A combination of redevelopment and rehabilitation actions is necessary to meet the needs of a growing center.

Environment

- Promote the planting and maintenance of trees and other landscape planting to enhance the streetscapes and the built-environment.

Urban Design

- Enhance the appearance of major public roads and highways in the region
- Improve pedestrian and bicycle access within the region.
- Promote a unified street tree planting program along major highways and streets.
- Maintain shrubs and trees at street intersections for adequate site distance.

Objectives and Policies for Wailuku Town

- Maintain the existing character of streets in the commercial core along Vineyard, Market, Central, and Main Streets.

- Foster an interesting and active street scene by developing a community gathering place, providing historically sensitive street furniture and making streetscape enhancements.
- Establish a unified street tree planting theme for streets within the commercial core which are to be pedestrian oriented.

Analysis. By providing landscape planting, improving pedestrian and vehicular circulation, and urban beautification of Market Street, the proposed project is supportive of the Wailuku-Kahului Community Plan's goals, objectives, and policies.

C. WAILUKU REDEVELOPMENT AREA PLAN

The Wailuku Redevelopment Area Plan (December 2000) was developed pursuant to Chapter 53, Hawaii Revised Statutes (HRS), the Urban Renewal Law. The Plan provides the vision, direction, and plan of action for the revitalization of the Wailuku Redevelopment Area. It includes specific strategies and actions that need to be addressed in the short and long term to eliminate slum and blight conditions within Wailuku Town's commercial core. The Plan identifies streetscape beautification as a "key element" of the plan, specifically:

- Concrete pavers at intersections
- Shade trees with irrigation
- Lighting for pedestrians and vehicles
- Street furniture (benches, trash receptacles, etc.)

The Market Street Beautification Project is identified as a major implementing action of the Plan.

Action Chart: Vehicular and Pedestrian Circulation

Projects	**Two to Five Years**
(VPC-5)	Make roadway and sidewalk design improvements to calm traffic, such as sidewalk bulb outs; textured paving at crossings and intersections; raised, textured or planted islands; or narrower travel lanes. Refer to Market Street Landscape Design and Beautification Plan.

Action Chart: Urban Design and Beautification

Projects	**Two to Five Years**
(UDB-3)	Implement the Market Street Landscape Design and Beautification Plan and expand to surrounding streets.

D. ENVIRONMENTAL ASSESSMENT SIGNIFICANCE CRITERIA

In accordance with Title 11, Department of Health, Chapter 200 and Subchapter 6, Section 11-200-12, Environmental Impact Statement Rules, and based on the detailed analysis contained within this document, the following conclusions are supported:

1. **The proposed action will *not* result in an irrevocable commitment to loss or destruction of natural or cultural resources.**

   Analysis. As documented in this report, the proposed project will not involve the loss or destruction of any natural or cultural resource (See Section III.A.B.C).

2. **The proposed action will *not* curtail the range of beneficial uses of the environment.**

   Analysis. No substantial impacts to land use or public facilities are anticipated due to the improvements

   Moreover, the County's land use and economic development policies, as articulated in the Wailuku-Kahului Community Plan and Wailuku Redevelopment Area Plan, support implementation of the project. Thus, the proposed action is not anticipated to curtail the range of beneficial uses of the environment.

3. **The proposed action will *not* conflict with State or County long-term environmental policies and goals as expressed in Chapter 344, HRS, and those which are more specifically outlined in the Conservation District Rules.**

   Analysis. The project is being developed in compliance with the State's long-term environmental goals. As documented in this report, the proposed project will not cause negative impact to the environment, including near and off-shore coastal waters, potable water resources, flora and fauna, archeological and cultural resources, and scenic resources.

4. **The proposed action will *not* substantially affect the economic or social welfare and activities of the community, county or state.**

   Analysis. Short-term economic impacts will result from the increase in activity associated with the construction of the project. In the longer-term, by providing streetscape beautification, enhancing the opportunity for safe pedestrian commuting, improving driving conditions, and enhancing existing drainage conditions the project will improve the social and economic welfare of Wailuku Town.

5. **The proposed action will *not* substantially affect public health.**

   Analysis. Short-term construction related impacts including air and noise will be mitigated. Adherence to rules and regulations set forth by the County of Maui and the State Department of Health will reduce temporary construction impacts. Such mitigation measures and best management practices are detailed in the Hawaii Administrative Rules (HAR), Chapter 11-46, Community Noise Control and the Maui County Grading Ordinance.

6. **The proposed action will *not* result in substantial secondary impacts, such as population changes or effects on public facilities.**

   Analysis. As documented in Section III of this report, the proposed project will not induce a significant change in population levels within the area. However, the proposed project may stimulate additional economic activity for area businesses by improving the visual and aesthetic quality of the built environment in which they operate. Although difficult to quantify, increased economic activity could produce a marginal increase in vehicular and pedestrian traffic and a greater demand for parking in the immediate area.

7. **The proposed action will *not* involve substantial degradation of environmental quality.**

   Analysis. Mitigation measures will be implemented during the construction phase in order to minimize negative impacts on the environment, especially with regards to air, noise, and construction runoff. As documented, no long-term environmental impacts are anticipated as a result of the improvements.

8. **The proposed project will not produce cumulative impacts and does *not* have considerable effect upon the environment or involve a commitment for larger actions.**

Analysis. As discussed, the proposed project will not induce a significant change in population levels within the area. However, the improvements may stimulate additional economic activity for area businesses by improving the visual and aesthetic quality of the built environment in which they operate. Although difficult to quantify, increased economic activity could produce a marginal increase in vehicular and pedestrian traffic and a greater demand for parking in the immediate area.

9. **The proposed project will *not* affect a rare, threatened, or endangered species, or its habitat.**

   Analysis. As described in Section III of this report, there are no rare, threatened, or endangered species of flora and fauna that are known to occupy the project boundaries.

10. **The proposed action will *not* substantially or adversely affect air and water quality or ambient noise levels.**

    Analysis. As described in Section III of this report, there is a potential for negative impacts to air or water quality and ambient noise levels related to short-term construction activities. Air, noise and dust impacts will be mitigated through implementation of standard mitigation measures as identified previously in this report. It is not anticipated that there will be significant long-term impacts to air or water quality and ambient noise levels due to the operation phase of the development.

11. **The proposed action will *not* substantially affect or be subject to damage by being located in an environmentally sensitive area, such as flood plain, shoreline, tsunami zone, erosion-prone areas, estuary, fresh waters, geologically hazardous land or coastal waters.**

    Analysis. The project site is beyond the limits of any established flood zones in accordance with Panel 150003 0190 D, March 16, 1995 of the Flood Insurance Rate Map for Maui County. The floodway of Iao Stream that crosses the project site is confined within the stream's existing concrete channel. Roadway ponding; however, might occur at the low area between Kapoai and Mokuhau Road during a heavy storm event due to lack of adequate collection facilities.

12. **The proposed action will *not* substantially affect scenic vistas or view planes identified in county or state plans or studies.**

Analysis. As discussed in Section III.A.9 of this report, the proposed roadway improvements are not anticipated to have any substantial impact on mauka or makai view corridors.

13. **The proposed action will not require substantial energy consumption**

Analysis. Construction of the proposed project will not require substantial energy consumption relative to other similar projects. Long-term energy consumption will not be significantly impacted by the project.

IV. FINDINGS AND CONCLUSIONS

This Final Environmental Assessment has been prepared in order to address the impacts associated with the Market Street Improvement Project, a State and Federal funded project intended to provide landscape planting, improve pedestrian and vehicular circulation, and urban beautification of Market Street from Wells Street to the intersection of Market Street and Piihana and Mokuhau Streets; Wailuku, Maui, Hawaii.

The Final Environmental Assessment concludes that the project will not result in significant environmental impacts to surrounding properties, nearshore waters, natural resources, or archaeological and historic resources on the site or in the immediate area. Public infrastructure and services should not be significantly impacted by the project. The proposed project will not impact public view corridors and will not produce significant adverse impact upon the visual character of the site and its immediate environs.

In light of the foregoing, the proposed project should not result in significant impacts to the environment and a Finding of No Significant Impact (FONSI) is warranted.

V. REFERENCES

Burchell, Robert W., David Listokin, et al. *Development Impact Assessment Handbook.* Washington, D.C.:ULI-the Urban Land Institute, 1994.

County of Maui, Department of Planning. 1991. *The General Plan of the County of Maui, 1990 Update.* Wailuku, Hawaii.

County of Maui, Department of Planning. December 2000. *Wailuku Redevelopment Plan. Wailuku, Hawaii.*

County of Maui, Department of Planning. 2002. *Wailuku-Kahului Community Plan.* Wailuku, Hawaii.

Federal Emergency Management Agency. *Flood Insurance Rate Map.* Community Panel 150003 0190 D, March 16, 1995.

U.S. Bureau of the Census. March 20, 1997. Estimate of the Population of Counties and Demographic Components of Population Change: Annual Time Series, July 1, 1990 to July 1, 1996. Bulletin CO-96-8. Washington, D.C.

U.S. Department of Agriculture, Soil Conservation Service in Cooperation with the University of Hawaii, Agricultural Experiment Station. 1972. *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* Washington, D.C.

FIGURES

RECEIVED AS FOLLOWS

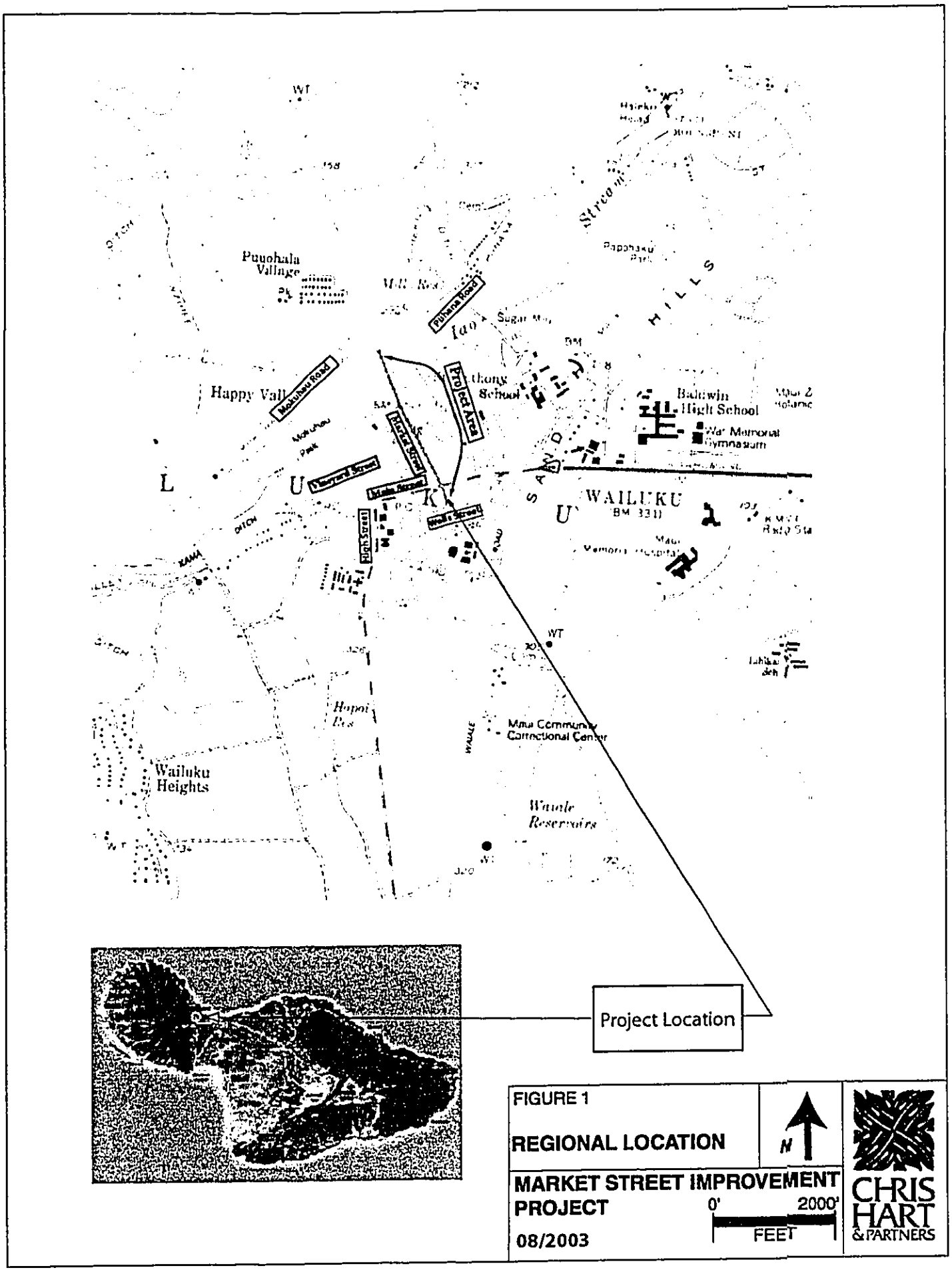


FIGURE 1

REGIONAL LOCATION

N

MARKET STREET IMPROVEMENT PROJECT

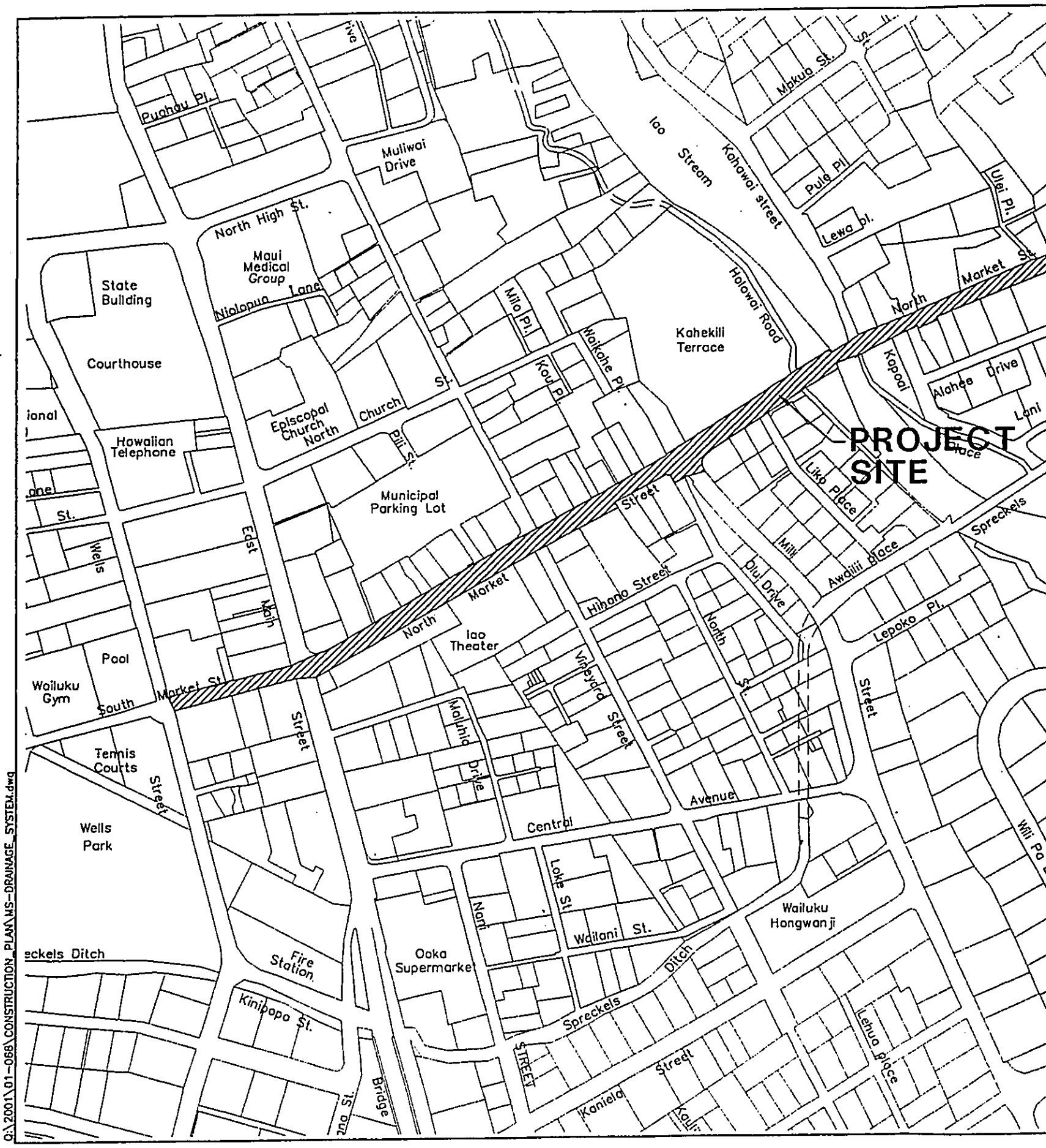
0' 2000'

FEET

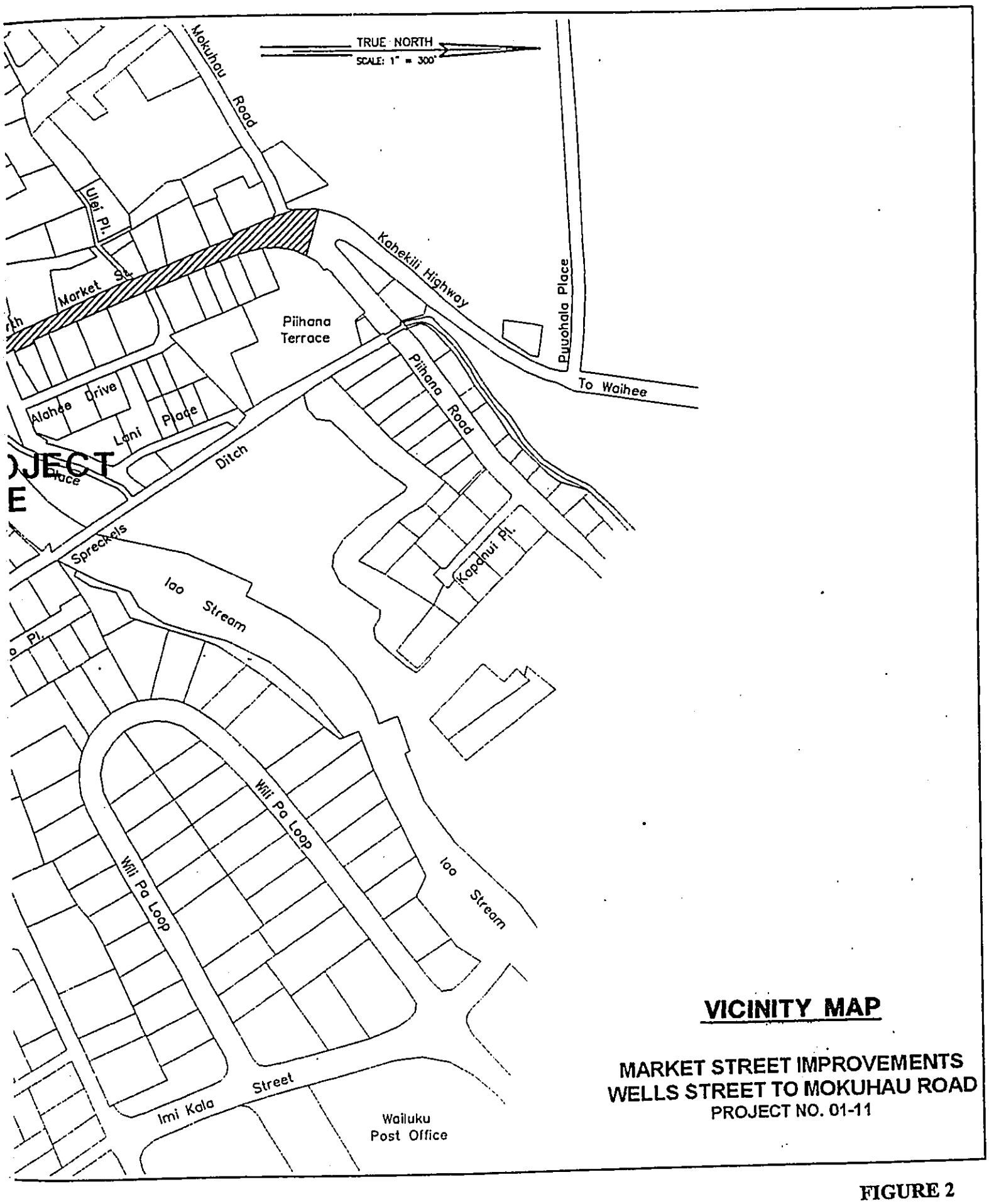
08/2003

CHRIS HART & PARTNERS

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS



VICINITY MAP

MARKET STREET IMPROVEMENTS
WELLS STREET TO MOKUHAU ROAD
PROJECT NO. 01-11

FIGURE 2

RECEIVED AS FOLLOWS

FIGURE 3

Aerial Photograph

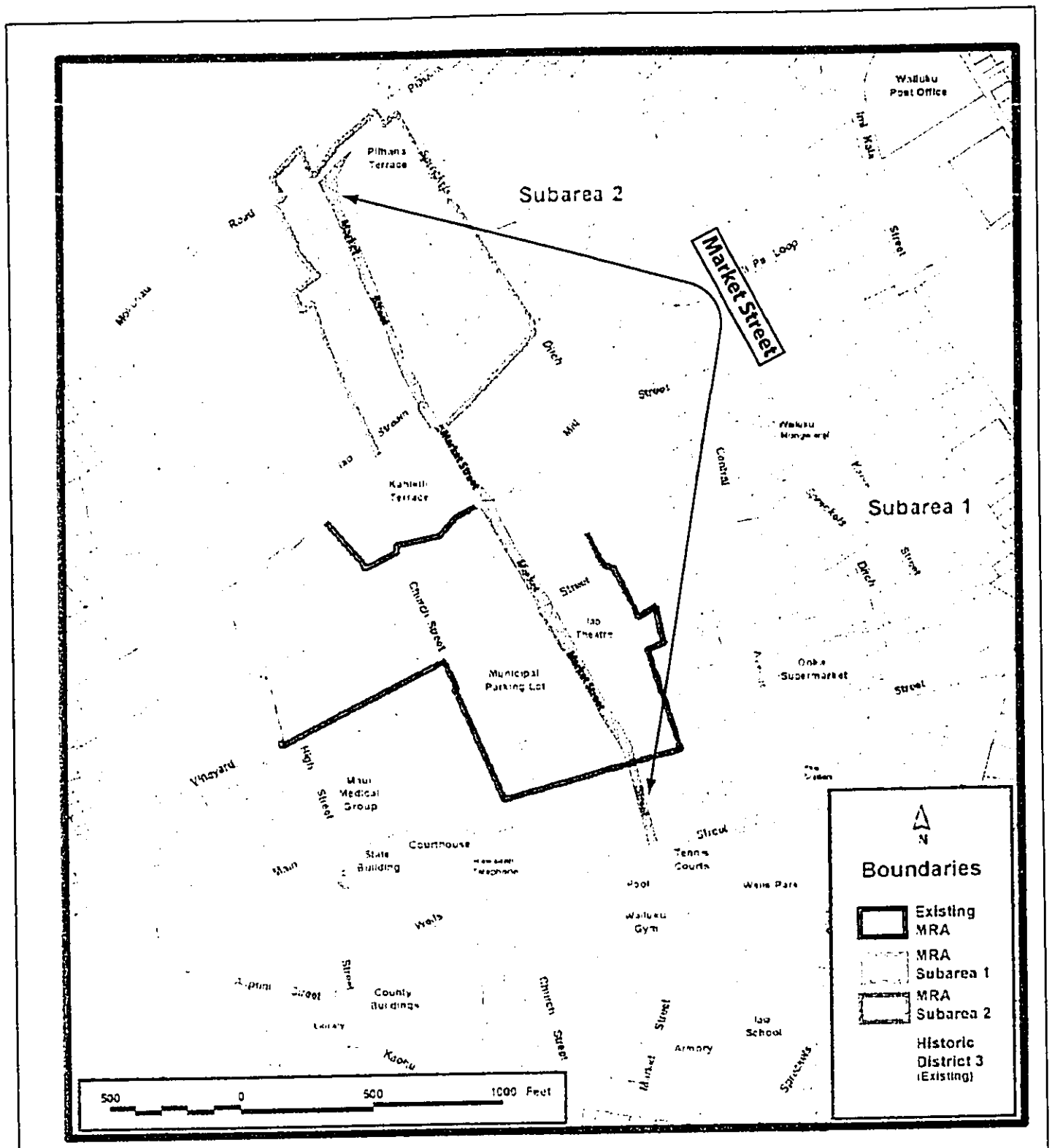
N

MARKET STREET IMPROVEMENT PROJECT

08/2003

CHRIS HART & PARTNERS

RECEIVED AS FOLLOWS



Source: Wailuku Redevelopment Plan, December 2000

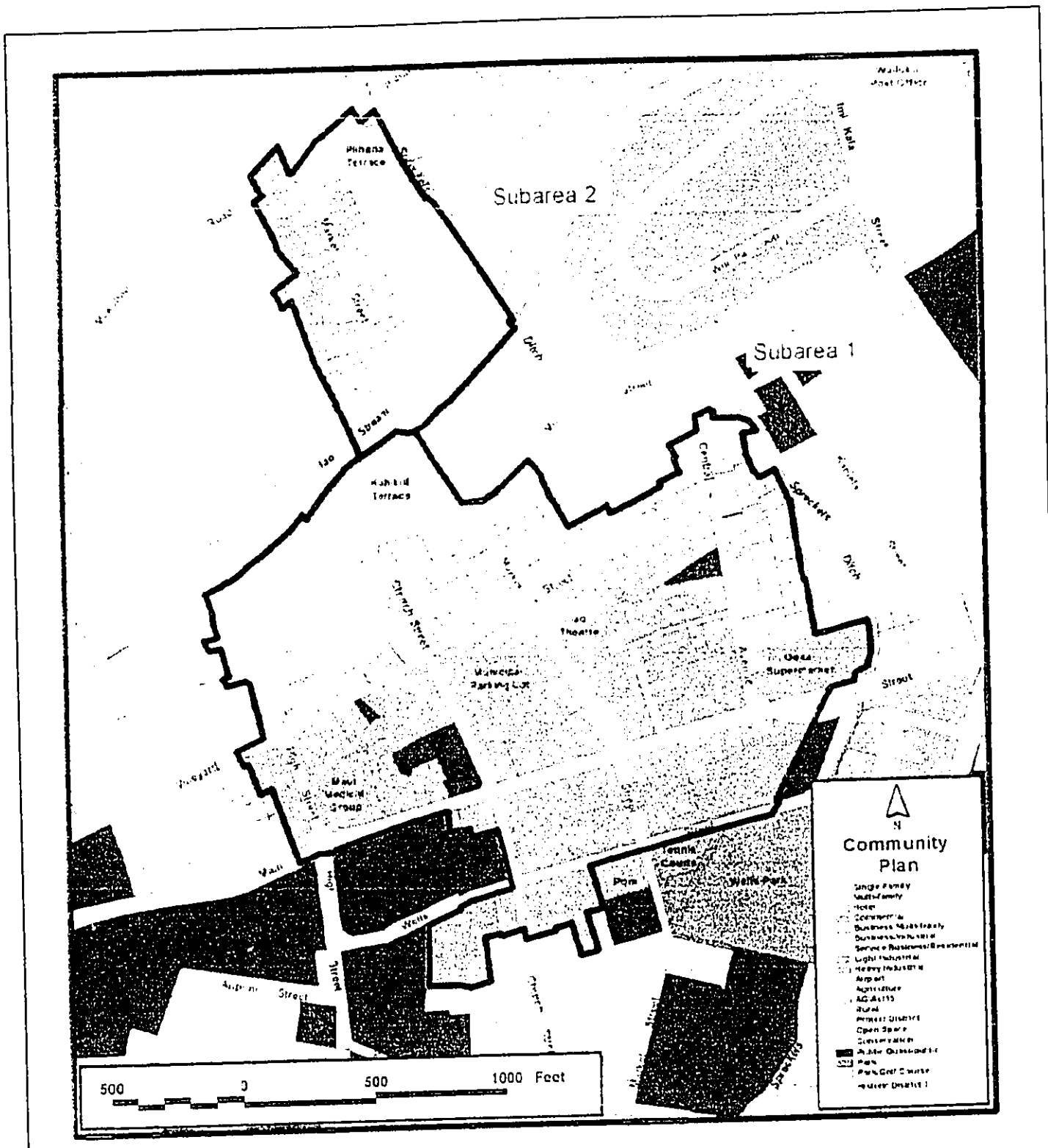
Figure 4
Wailuku Redevelopment Area

MARKET STREET IMPROVEMENT PROJECT
08/2003

0' 500'
FEET

CHRIS HART & PARTNERS

RECEIVED AS FOLLOWS



Source: Wailuku Redevelopment Plan, December 2000

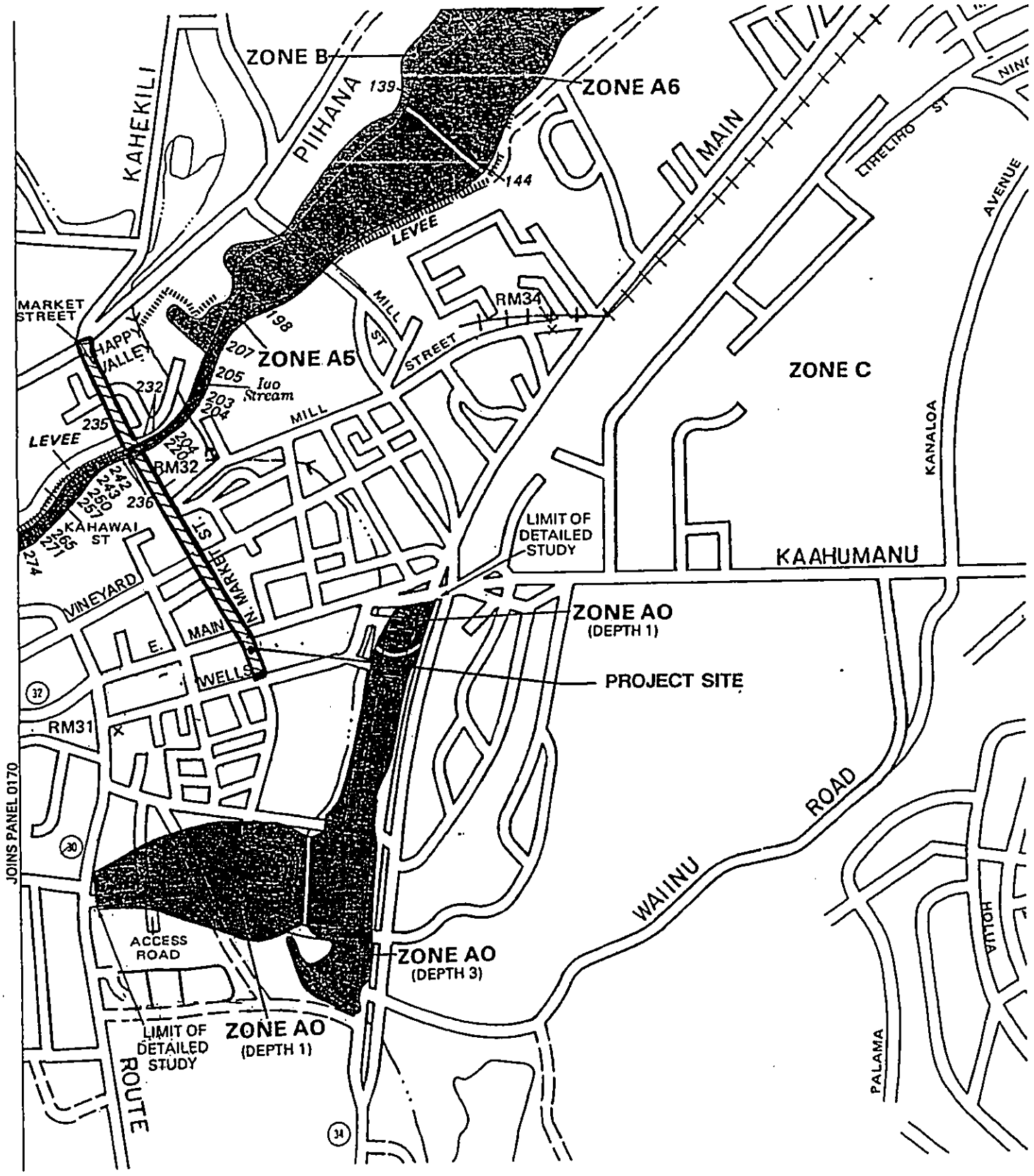
Figure 5
Community Plan

MARKET STREET IMPROVEMENT PROJECT
08/2003

0' 500'
FEET

CHRIS HART & PARTNERS

RECEIVED AS FOLLOWS

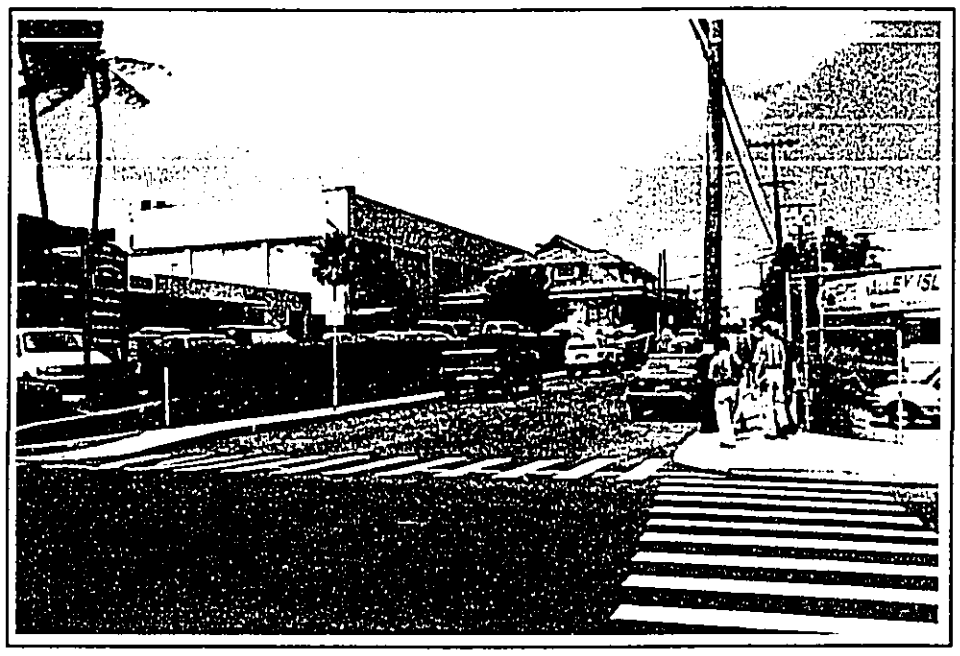


FLOOD MAP

Scale: 1" = 1,000'

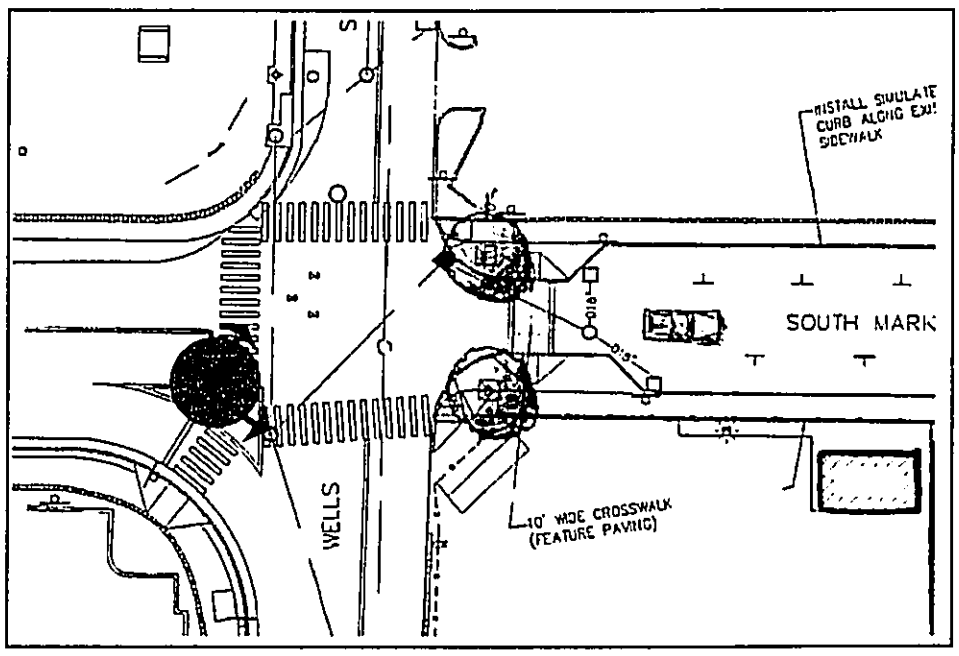
FIGURE 6

RECEIVED AS FOLLOWS

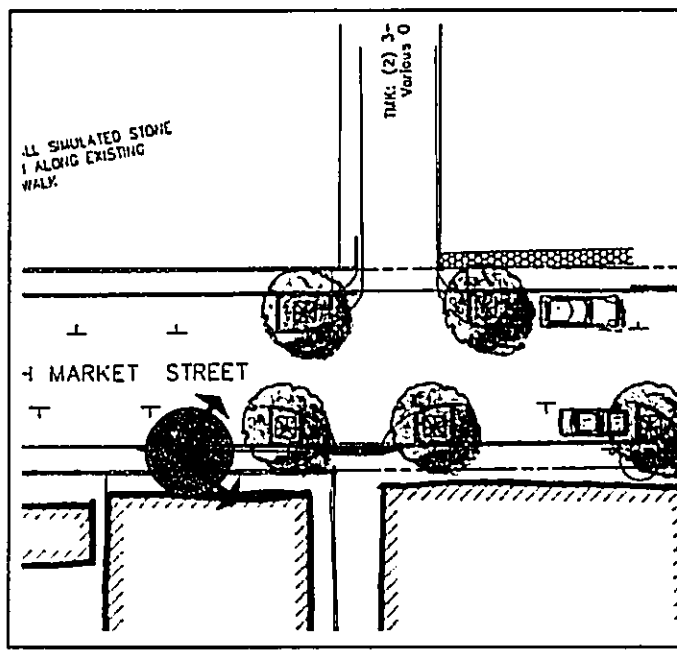


1. Looking in a northerly direction at the corner of Wells and South Market Streets.

2. Looking in a northerly direction along South M
Main Street.



Conceptual improvements at the corner of Wells and South Market Streets.



Conceptual improvements along South Market St

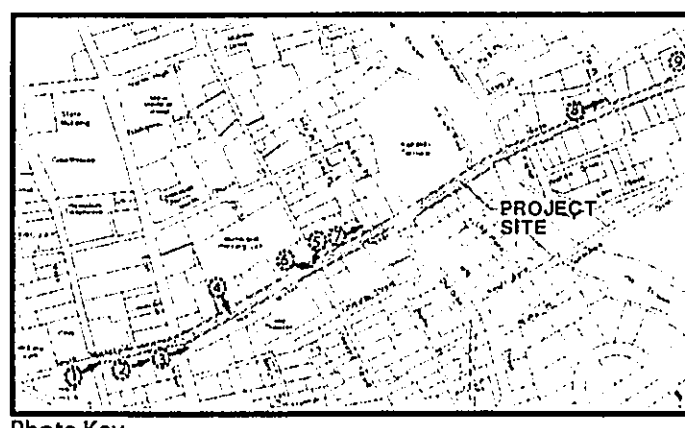
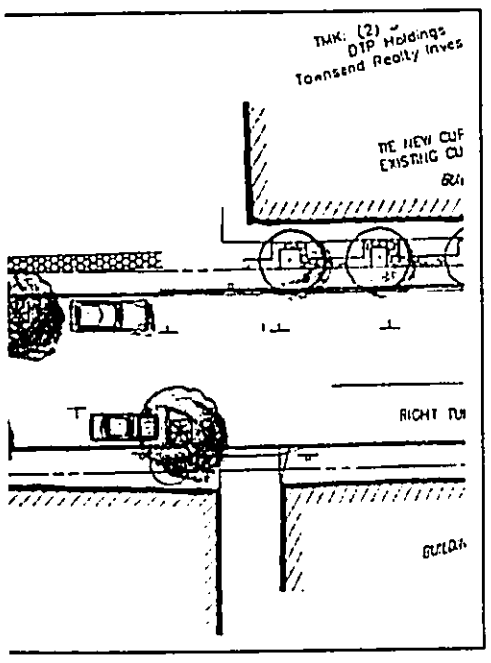


Photo Key

RECEIVED AS FOLLOWS

along South Market Street towards

3. Looking in a northerly direction at the corner of Main and Market Streets.



outh Market Street.

Photo simulation of the proposed improvements at the corner of Main and Market Streets.

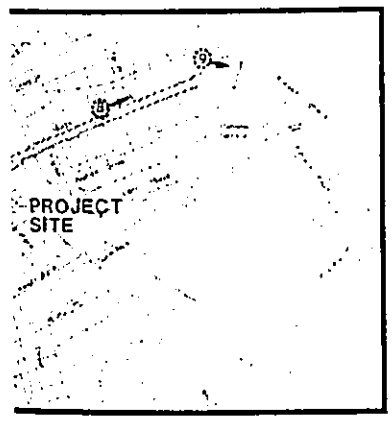


FIGURE 7, A

SITE PHOTOGRAPHS / ASSOCIATED IMPROVEMENTS

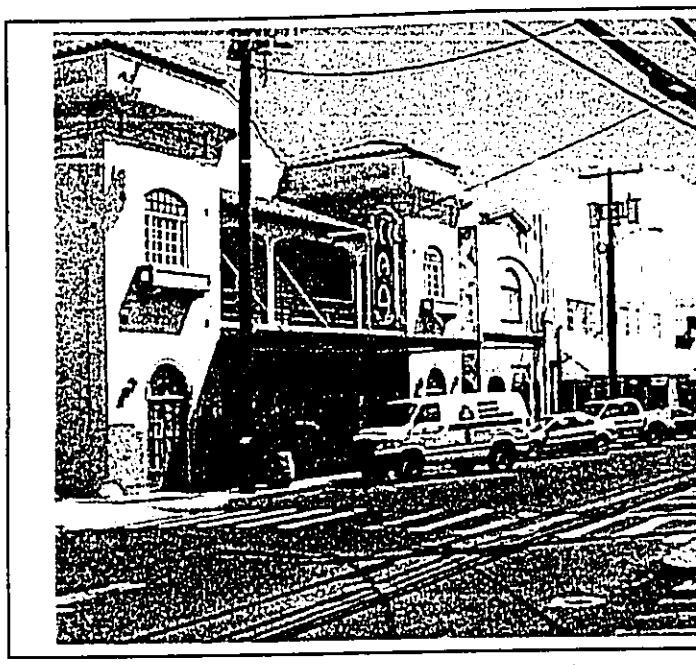
Market Street Improvement Project

08/2003

CHRIS HART & PARTNERS

RECEIVED AS FOLLOWS

4. Looking in an easterly direction mid-block across North Market Street towards the White Orchid and Brown Kobayashi retail stores.



5. Looking in a southeasterly direction at the corner North Market Streets towards the Iao Theatre.

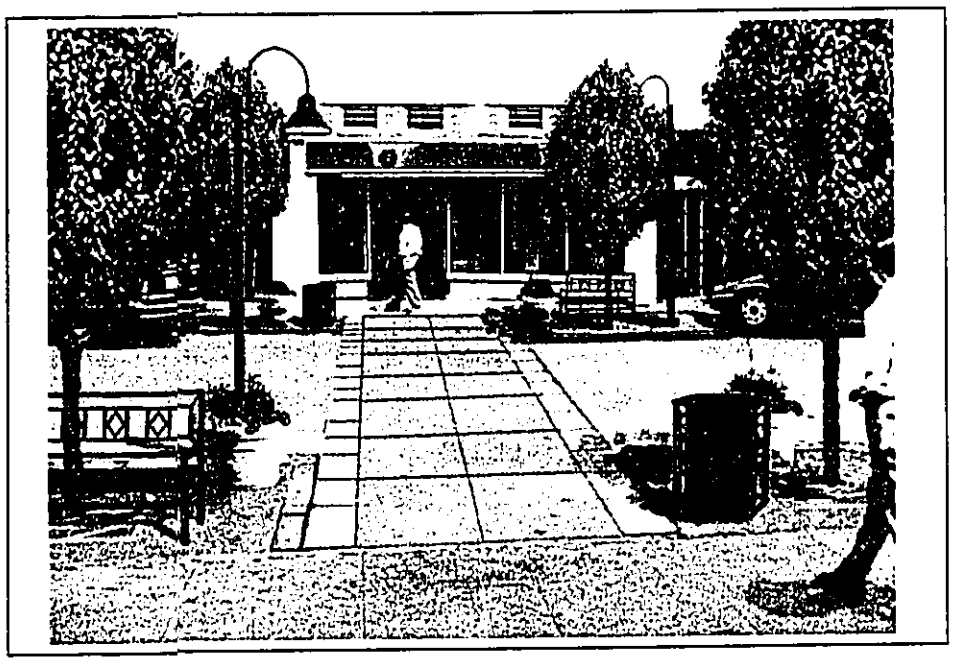
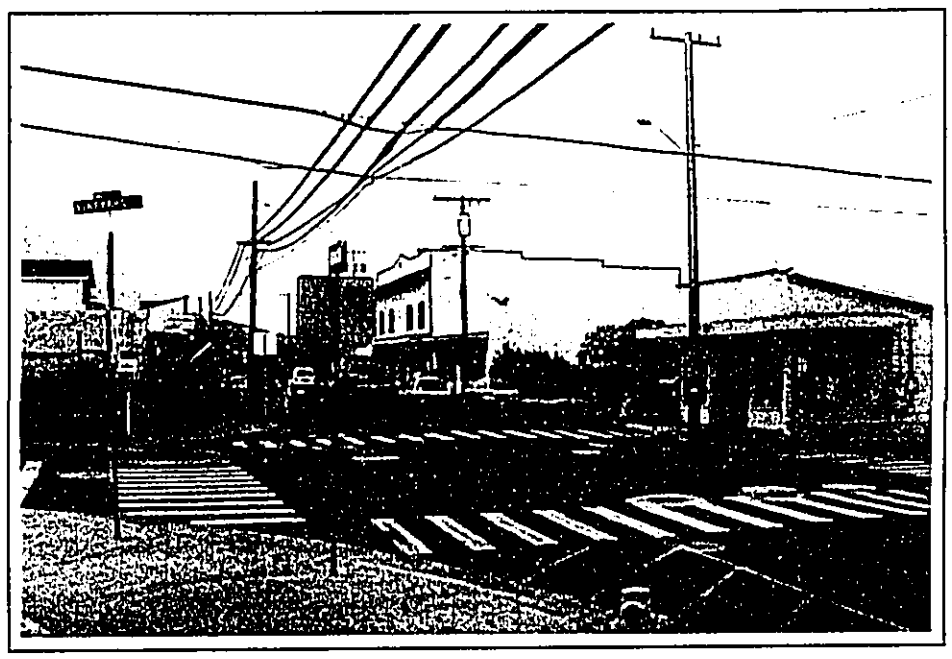


Photo simulation of conceptual improvements fronting the White Orchid and Brown Kobayashi retail stores.

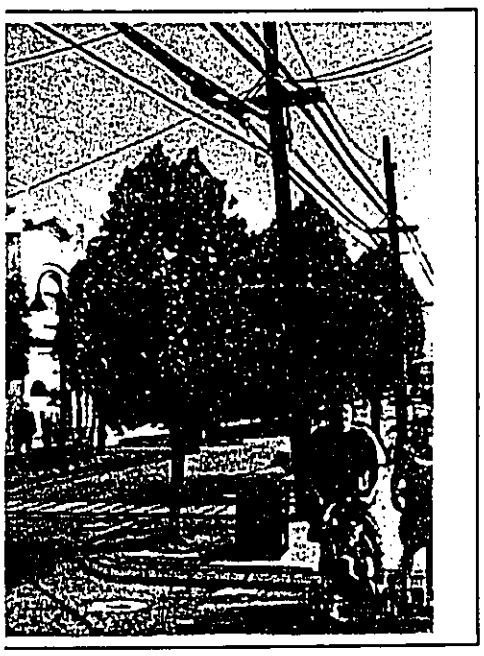
Photo simulation of conceptual improvements at th and North Market Streets and fronting the Iao Theat

RECEIVED AS FOLLOWS

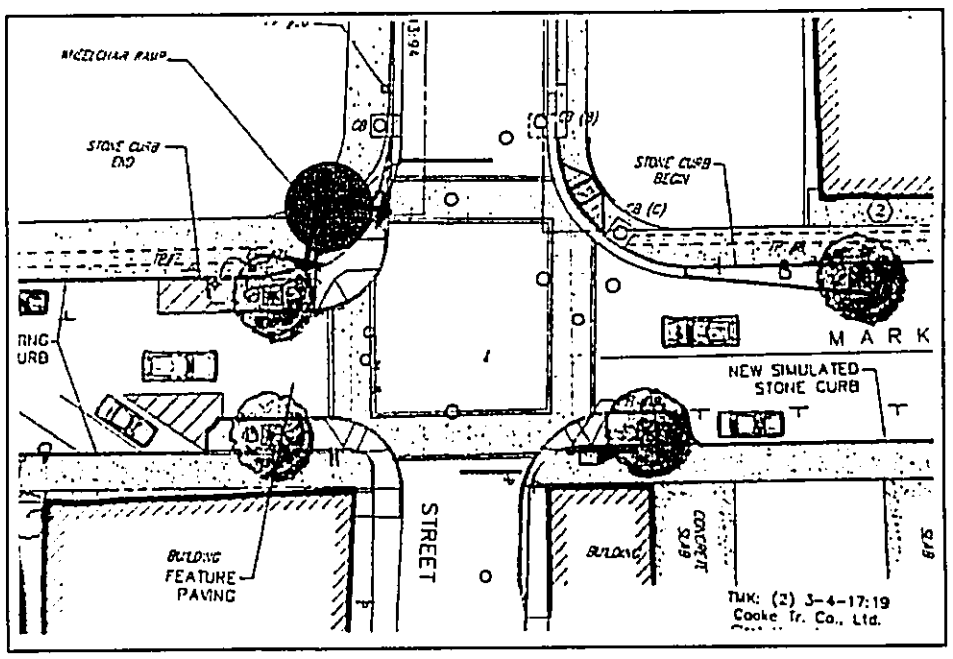
:ion at the corner of Vineyard and
ao Theatre.



6. Looking in a northerly direction at the intersection of Vineyard and North Market Streets.



rovements at the corner of Vineyard
ing the lao Theatre.



Conceptual improvements at the intersection of Vineyard and North Market Streets.

FIGURE 7, B

SITE PHOTOGRAPHS / ASSOCIATED IMPROVEMENTS

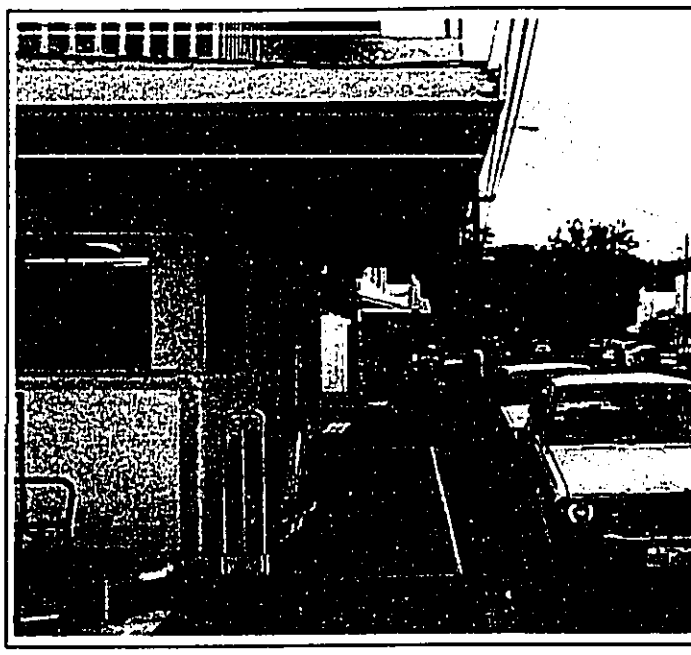
Market Street Improvement Project

08/2003

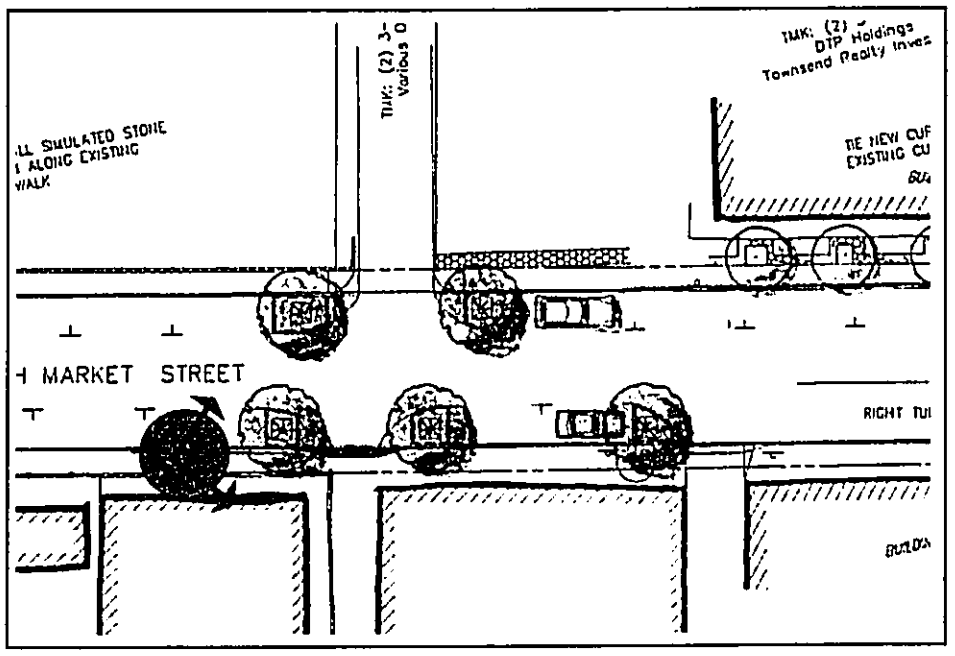
CHRIS HART & PARTNERS

RECEIVED AS FOLLOWS

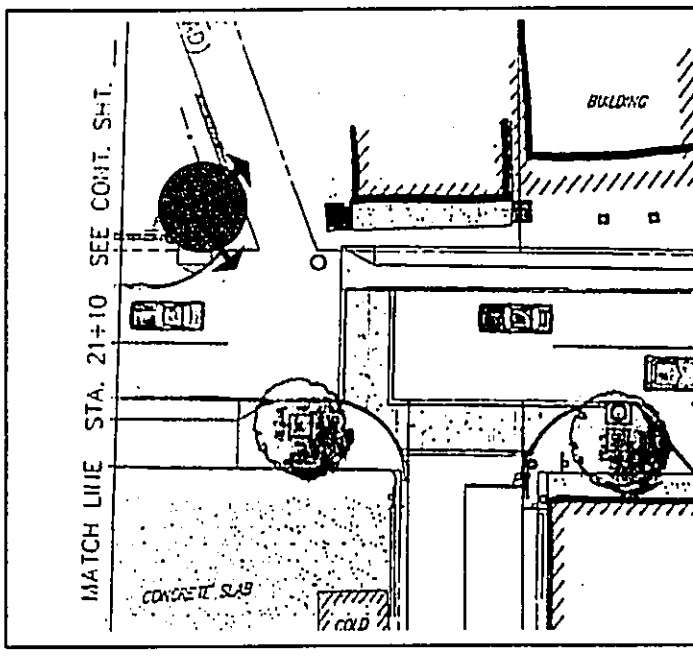
7. Looking in a northerly direction along North Market Street.



8. Looking in a northerly direction along North M
Takamiya Market on Left.



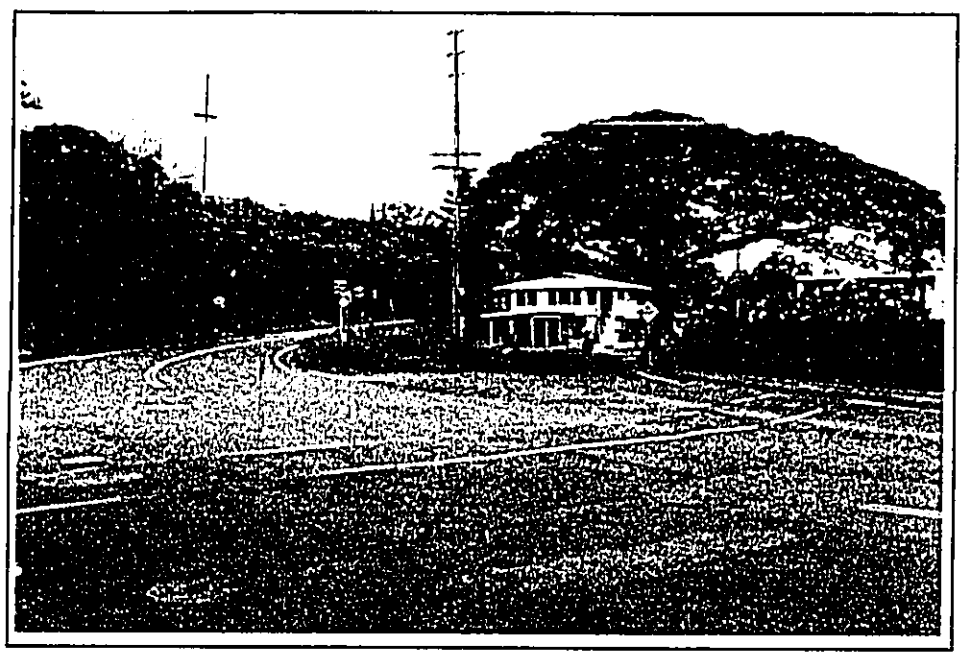
Conceptual impromements along North Market Street.



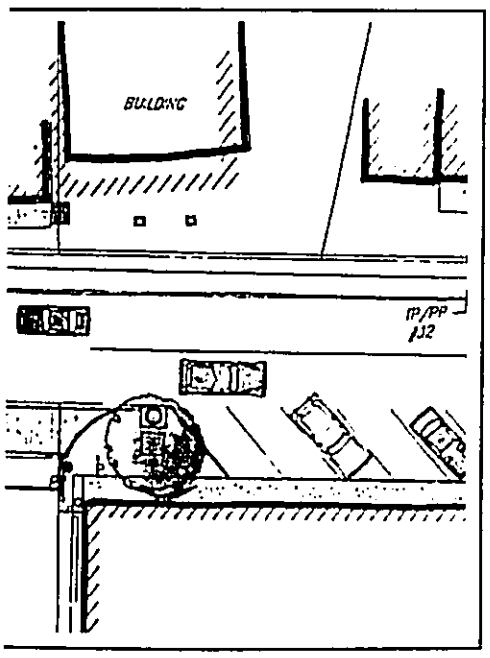
Conceptual improvements fronting Takamiya Ma
North Market Street.

RECEIVED AS FOLLOWS

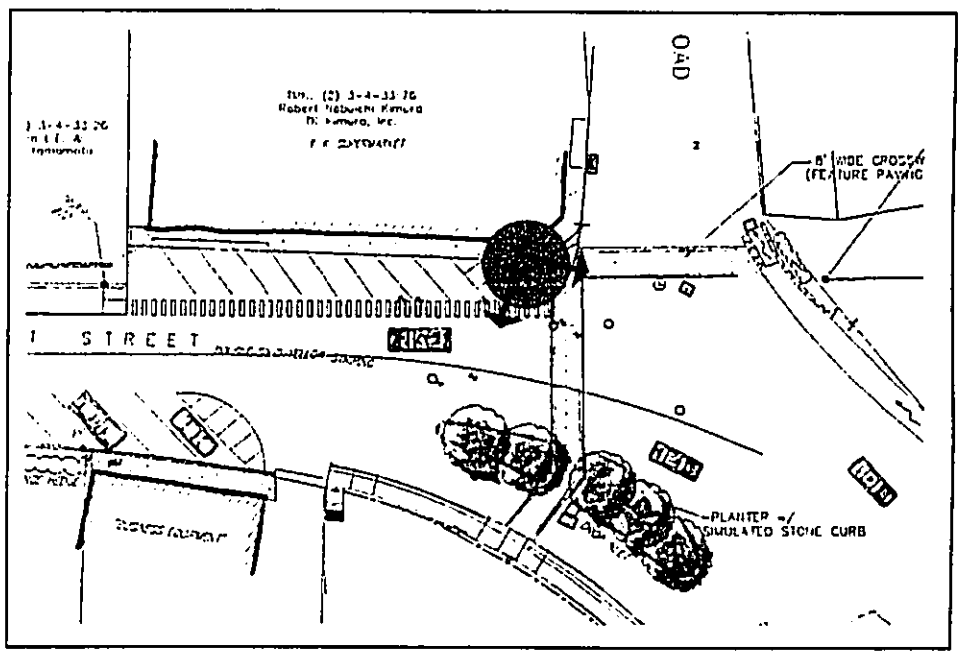
ın along North Market Street with



9. Looking in a northerly direction at the intersection of North Market Street and Piihana and Mokuhau Roads.



ıg Takamiya Market along



Conceptual improvements at the intersection of North Market Street and Piihana and Mokuhau Roads.

FIGURE 7, C

SITE PHOTOGRAPHS / CONCEPTUAL IMPROVEMENTS

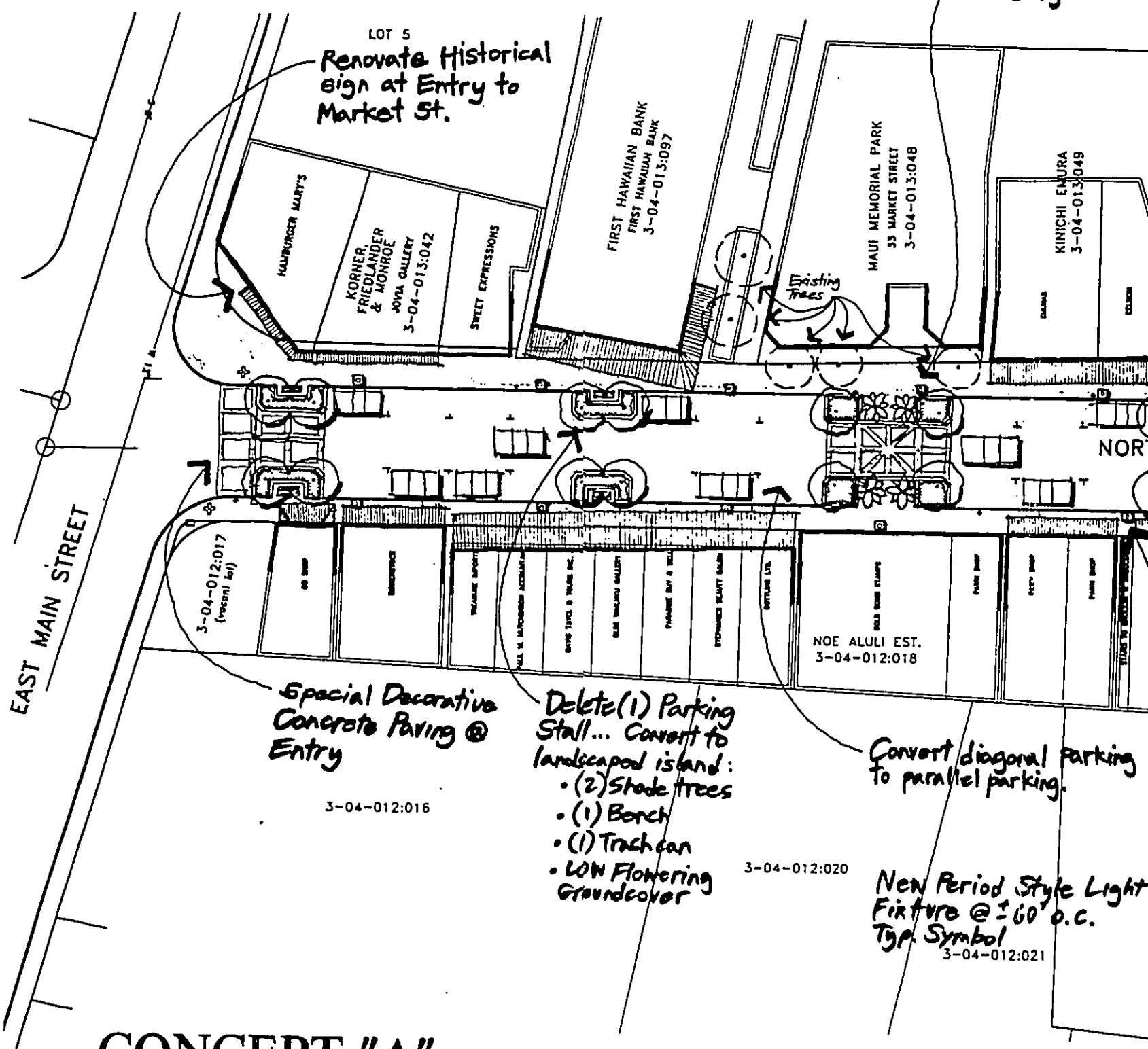
Market Street Improvements Project

08/2003

CHRIS HART &PARTNERS

RECEIVED AS FOLLOWS

GENERAL NOTES:
1. RETAIN PARALLEL PARKING ON WEST SIDE OF STREET. (CONVERT (4) SPACES INTO LANDSCAPED ISLANDS. NET 16 STACES)
2. CONVERT DIAGONAL PARKING ON EAST SIDE TO PARALLEL PARKING. (INCLUDE LANDSCAPED ISLANDS TYPICAL TO WEST SIDE.) NET 15 SPACES.
3. PROVIDE MAIN CROSSING AT MID-BLOCK.
4. INSTALL NEW PAVING ON BOTH SIDES OF STREET.
5. REDUCE SIZE OF PILI STREET AND MAKE ONE-WAY.



CONCEPT "A"

PARALLEL PARKING ON BOTH SIDES OF MARKET ST.

SCALE: 1"=20'

AUGUST

RECEIVED AS FOLLOWS

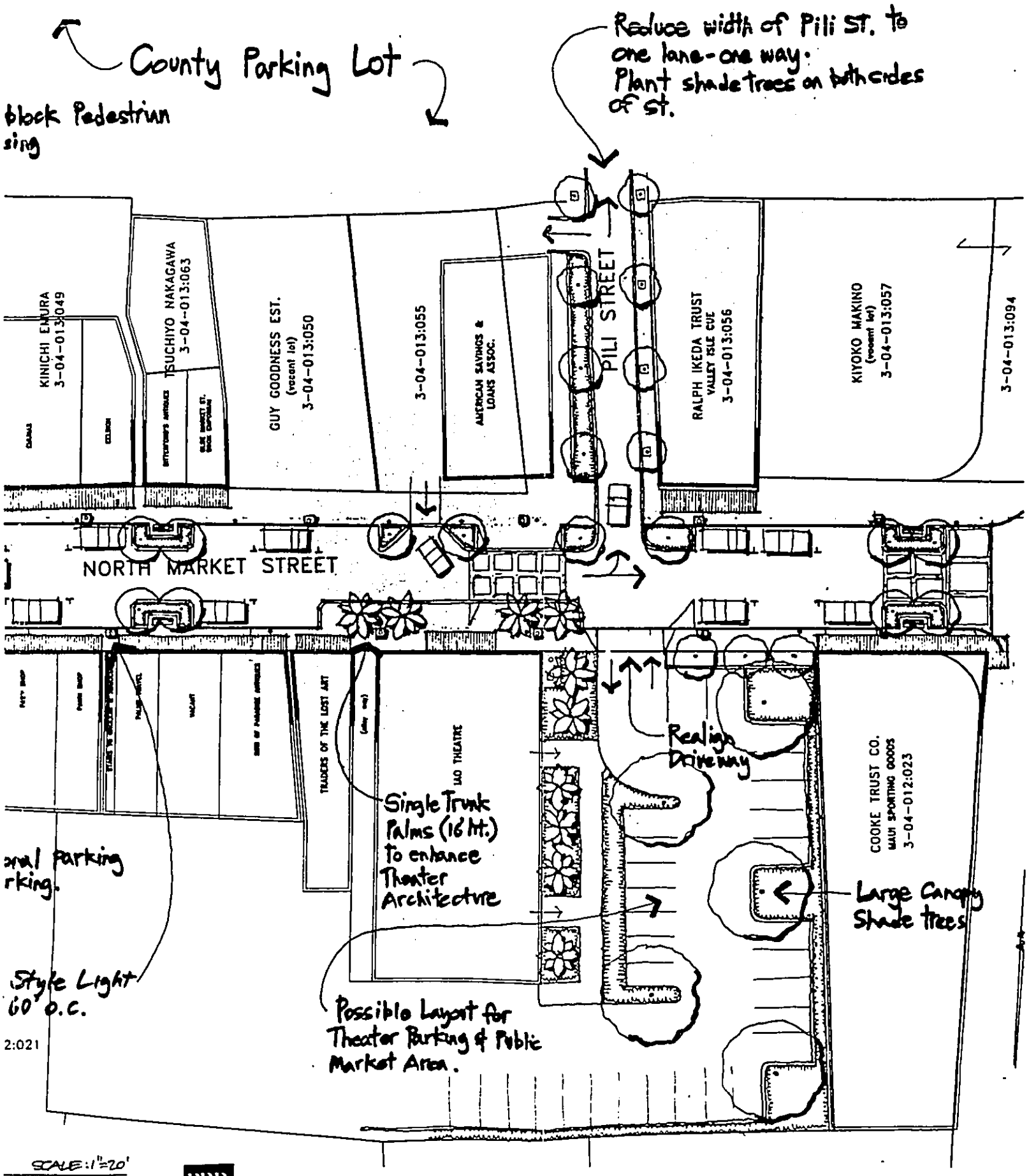
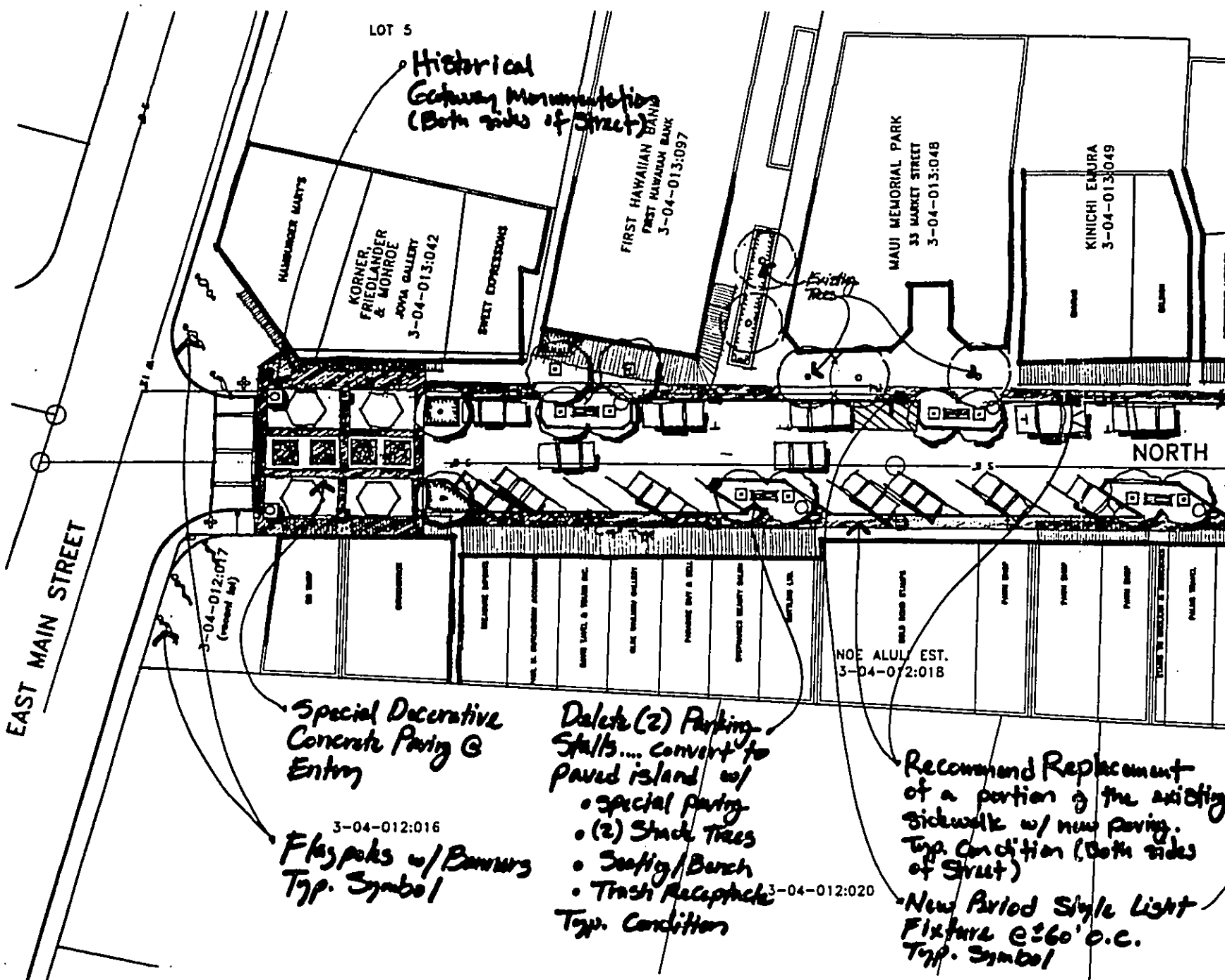


FIGURE 8, A

RECEIVED AS FOLLOWS

GENERAL NOTES:
1. RETAIN PARKING ON BOTH SIDES OF STREET (15) Stalls deleted)
2. RETAIN (1) TRAVEL LANE
3. TWO RAISED CROSSWALKS TO CONNECT SIDEWALKS AND SLOW TRAFFIC FOR PEDESTRIANS
4. INSTALL 4' WIDE BAND OF CONCRETE PAVERS ALONG CUT STONE CURBING.
5. SMALL CANOPY SHADE TREES NODED ALONG STREET TO PROVIDE GREENERY & SHADE FOR VISITORS.



CONCEPT "B"

SCALE: 1" = 20'

ONE TRAFFIC LANE and PARKING ON BOTH SIDES OF MARKET STREET

RECEIVED AS FOLLOWS

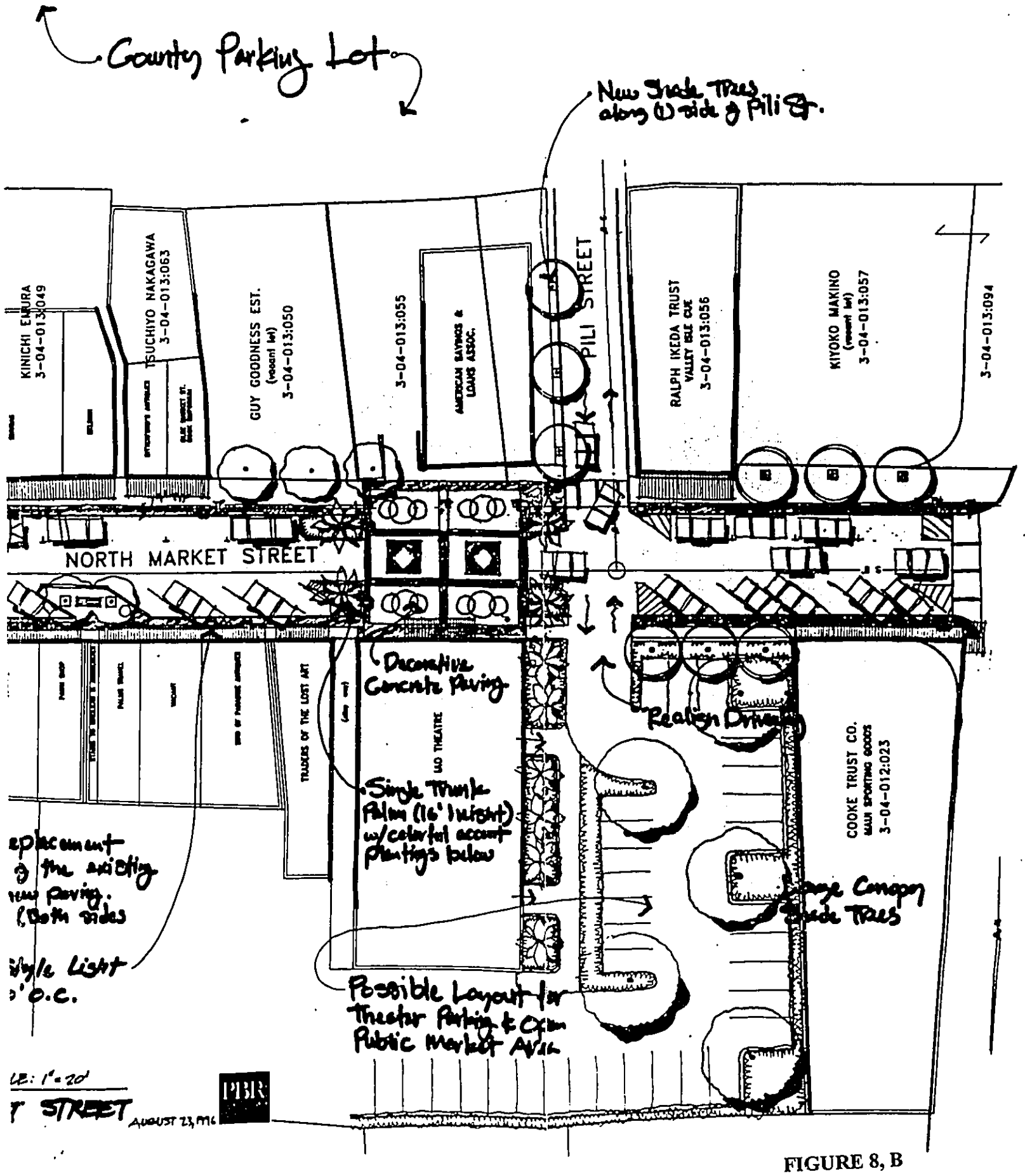
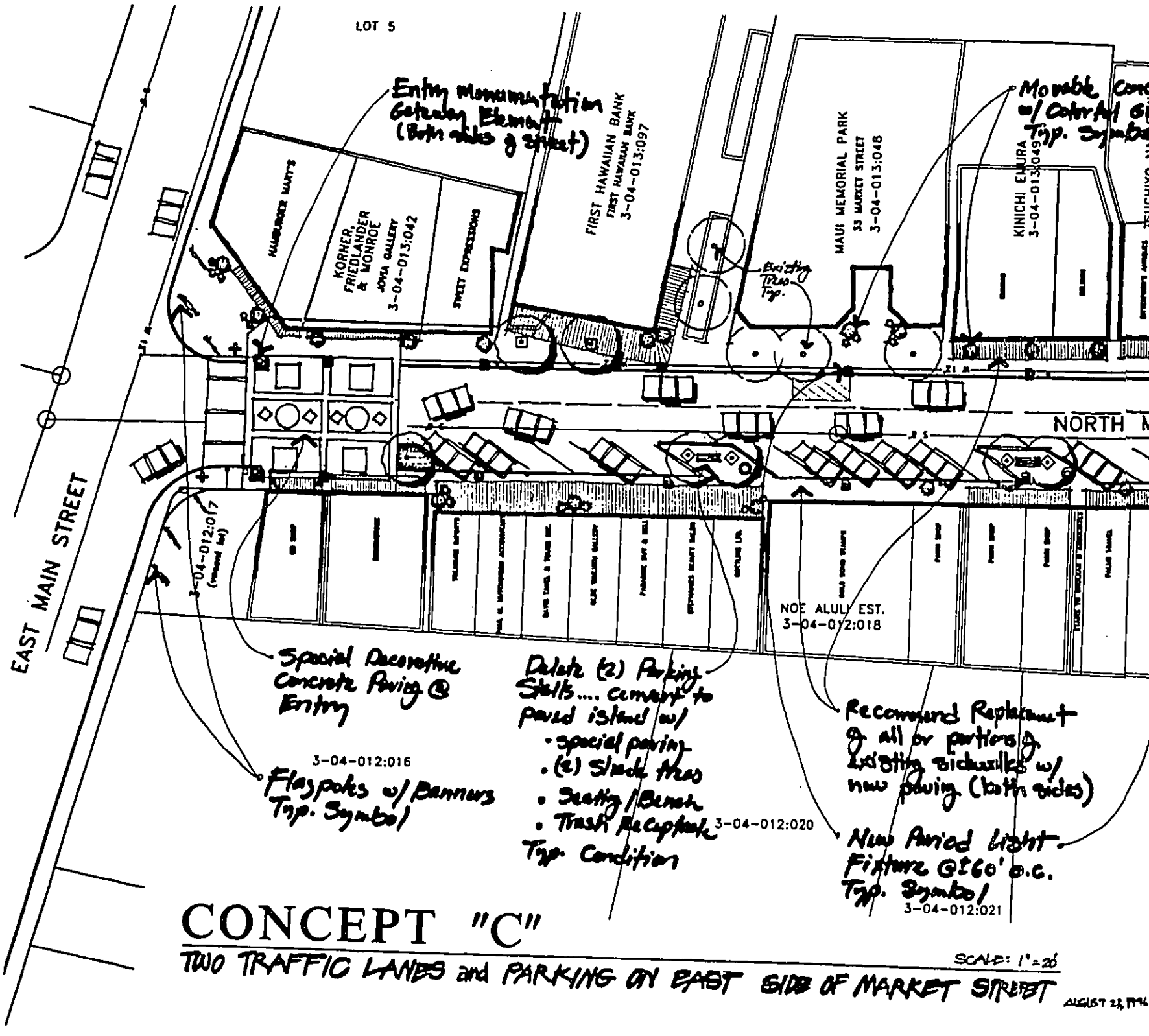


FIGURE 8, B

RECEIVED AS FOLLOWS

GENERAL NOTES:
1. ELIMINATION OF PARALLEL PARKING ALONG MARKET STREET.
2. TOTAL OF TWO TRAVEL LANES.
3. 29 DIAGONAL PARKING SPACES.
4. TWO RAISED CROSSWALKS TO BRIDGE SIDEWALKS AND SLOW TRAFFIC FOR PEDESTRIANS.
5. ELIMINATION OF 9 DIAGONAL PARKING SPACES.
6. ADDITION OF LANDSCAPE ISLANDS ALONG EAST SIDE.
7. REALIGNED ACCESS DRIVEWAY TO THEATER.



CONCEPT "C"

TWO TRAFFIC LANES and PARKING ON EAST SIDE OF MARKET STREET

SCALE: 1" = 20'

AUGUST 23, 1996

RECEIVED AS FOLLOWS

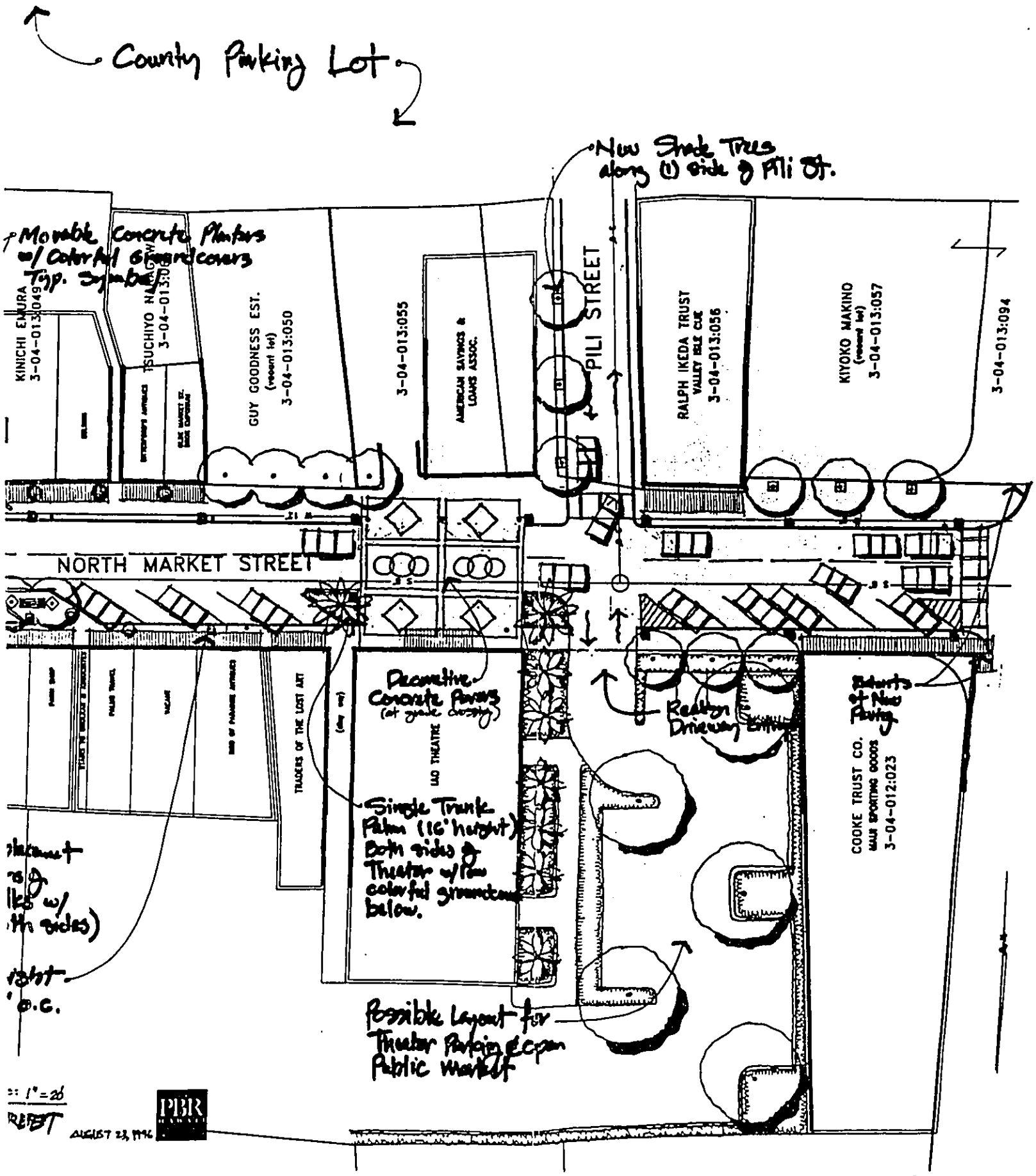
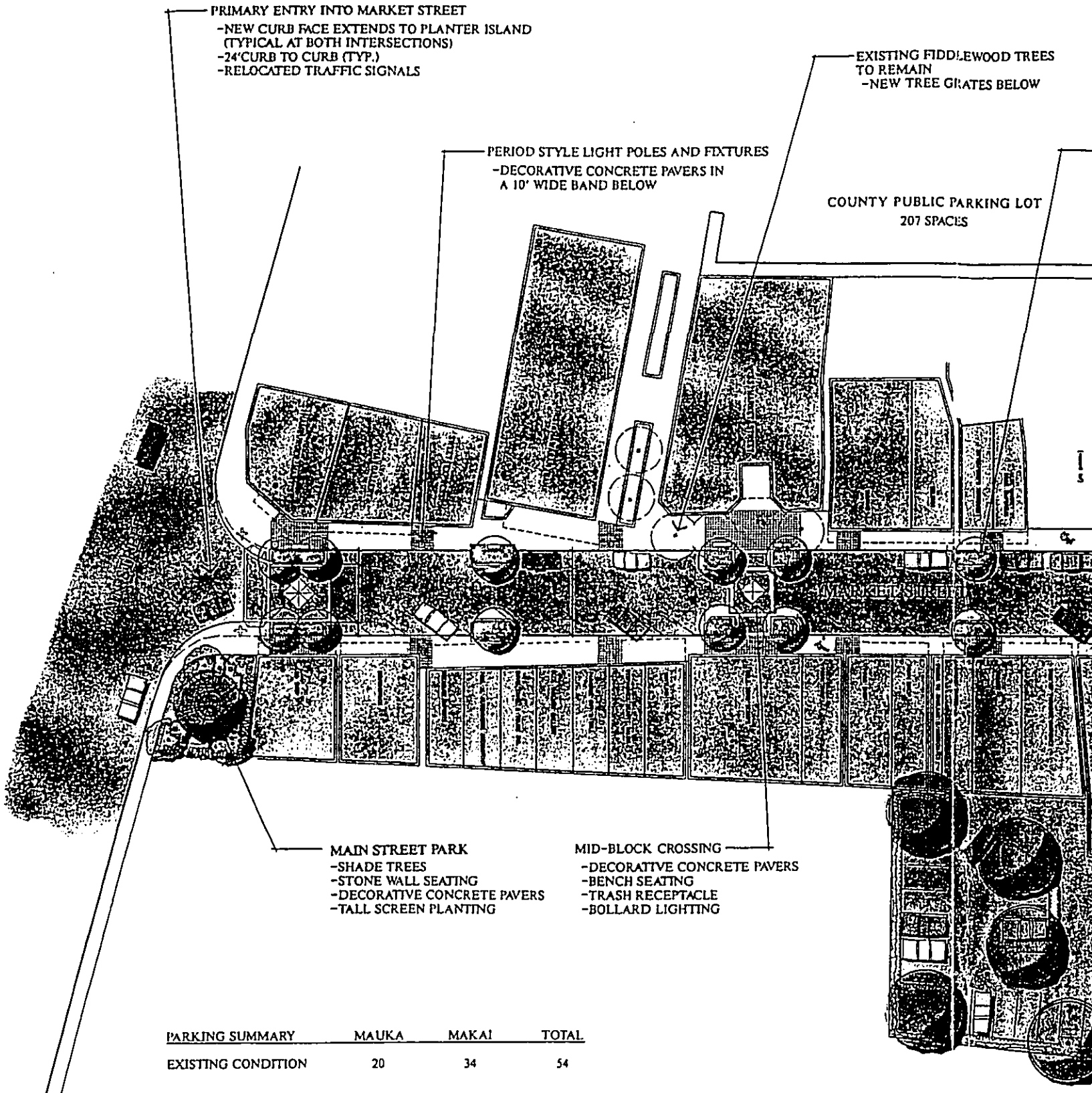


FIGURE 8, C

RECEIVED AS FOLLOWS

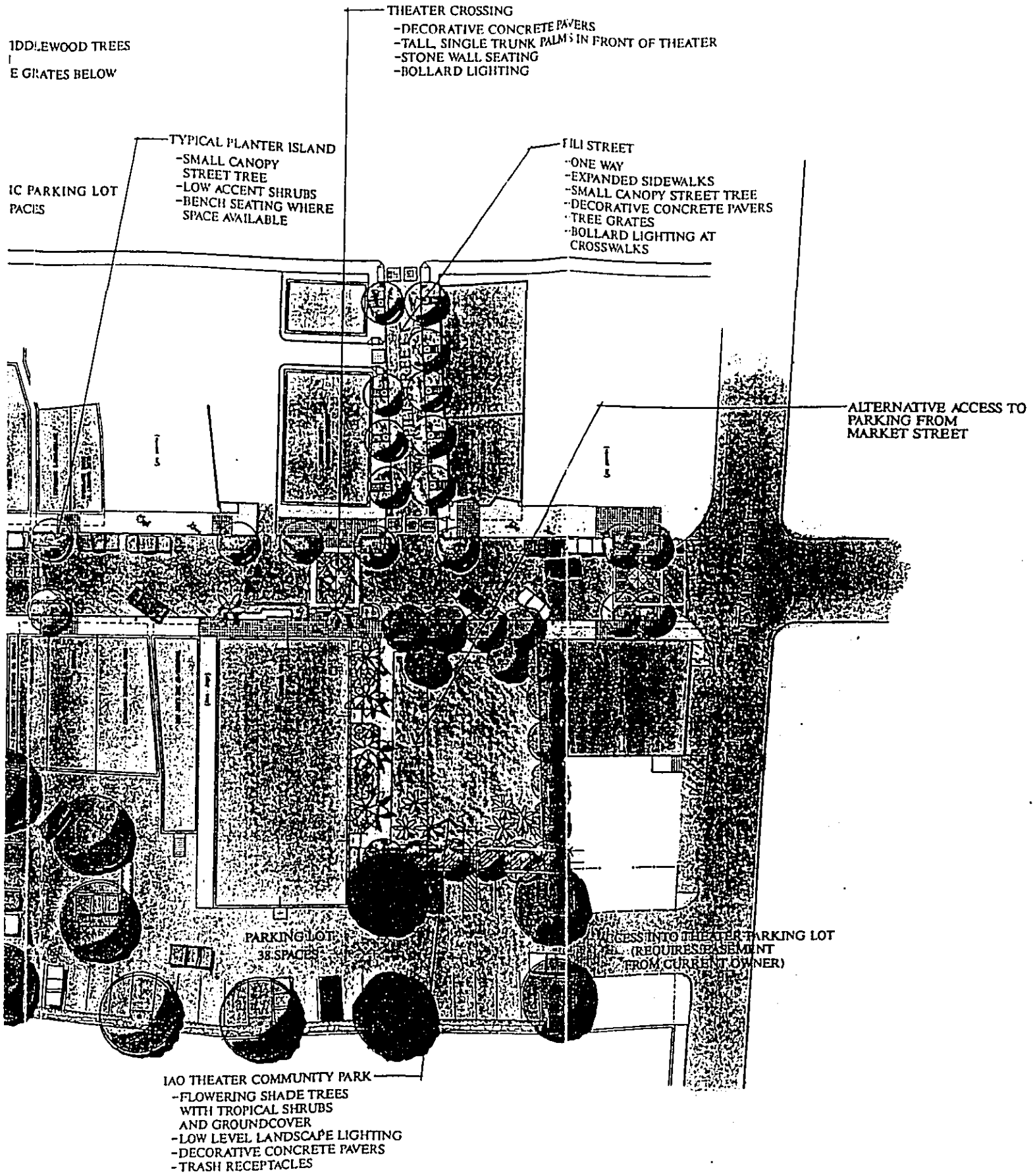


PARKING SUMMARY	MAUKA	MAKAI	TOTAL
EXISTING CONDITION	20	34	54
PARALLEL ONE SIDE ONLY	16	22	38
PARALLEL BOTH SIDES	16	18	34

Final Urban Design Master Plan

WAILUKU MARKET STREET BEAUTIFICATION PROJEC

RECEIVED AS FOLLOWS



PROJECT

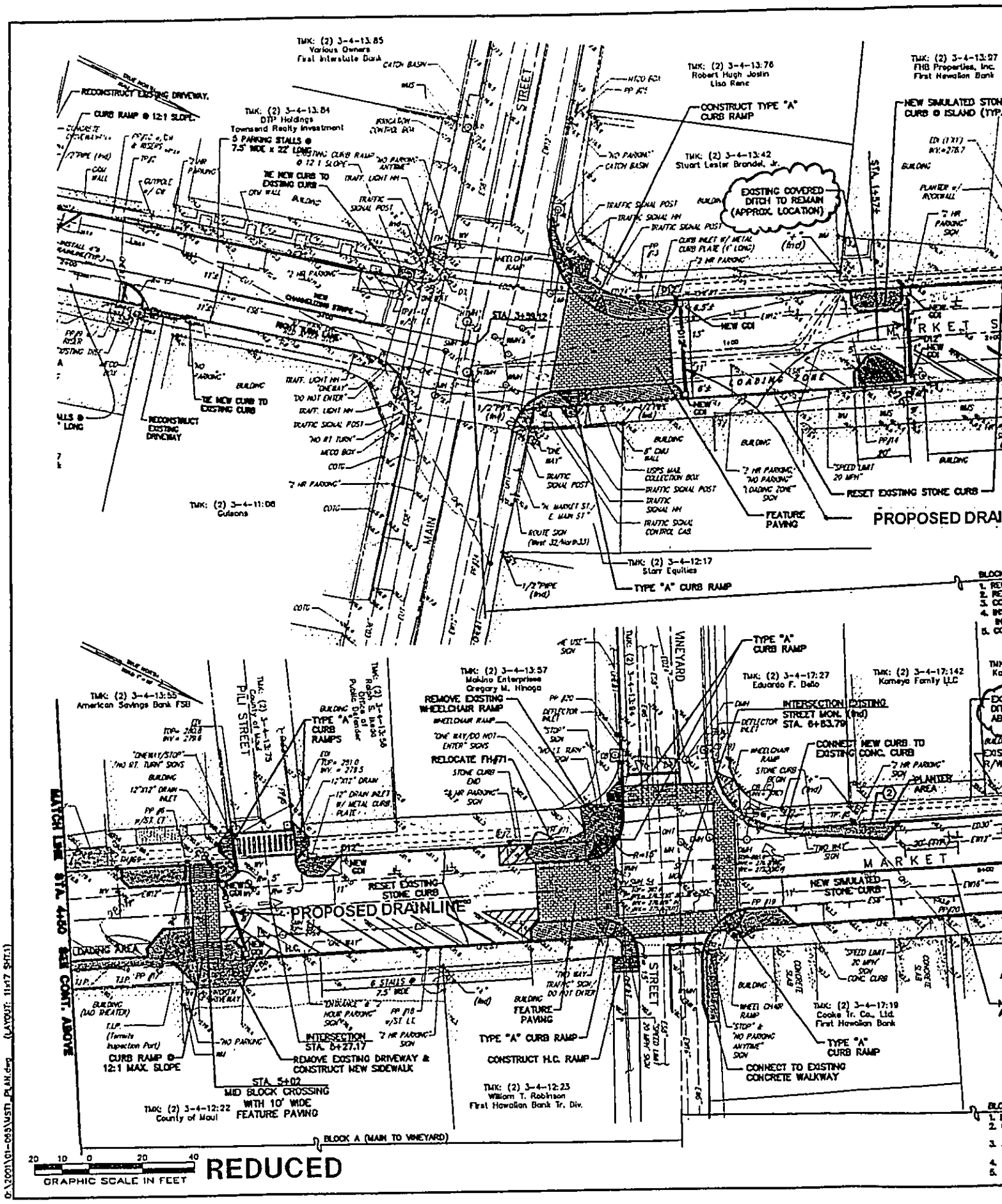
FEBRUARY 1997

0 10 20 40 80 FEET

PBR

FIGURE 8, D

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS

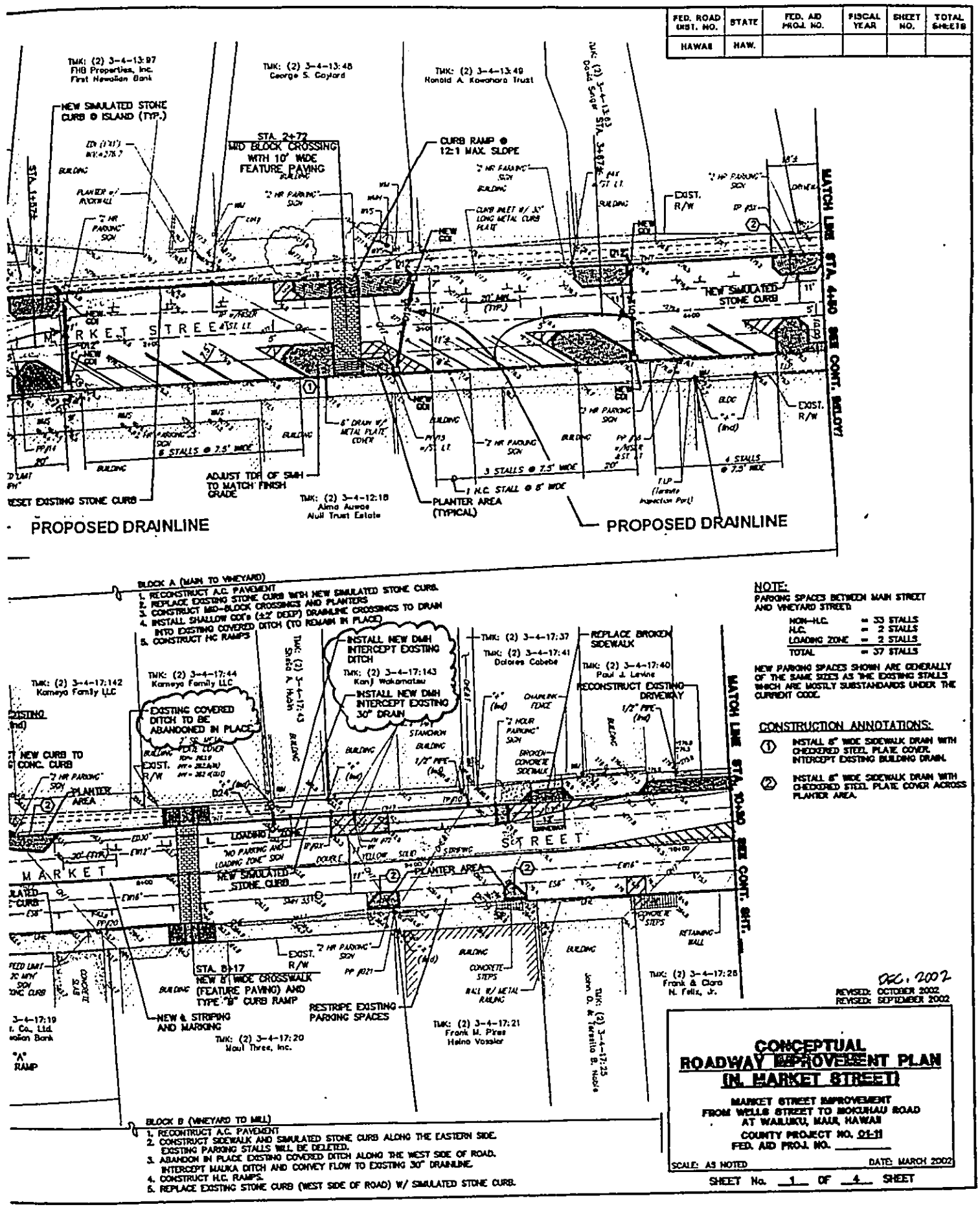
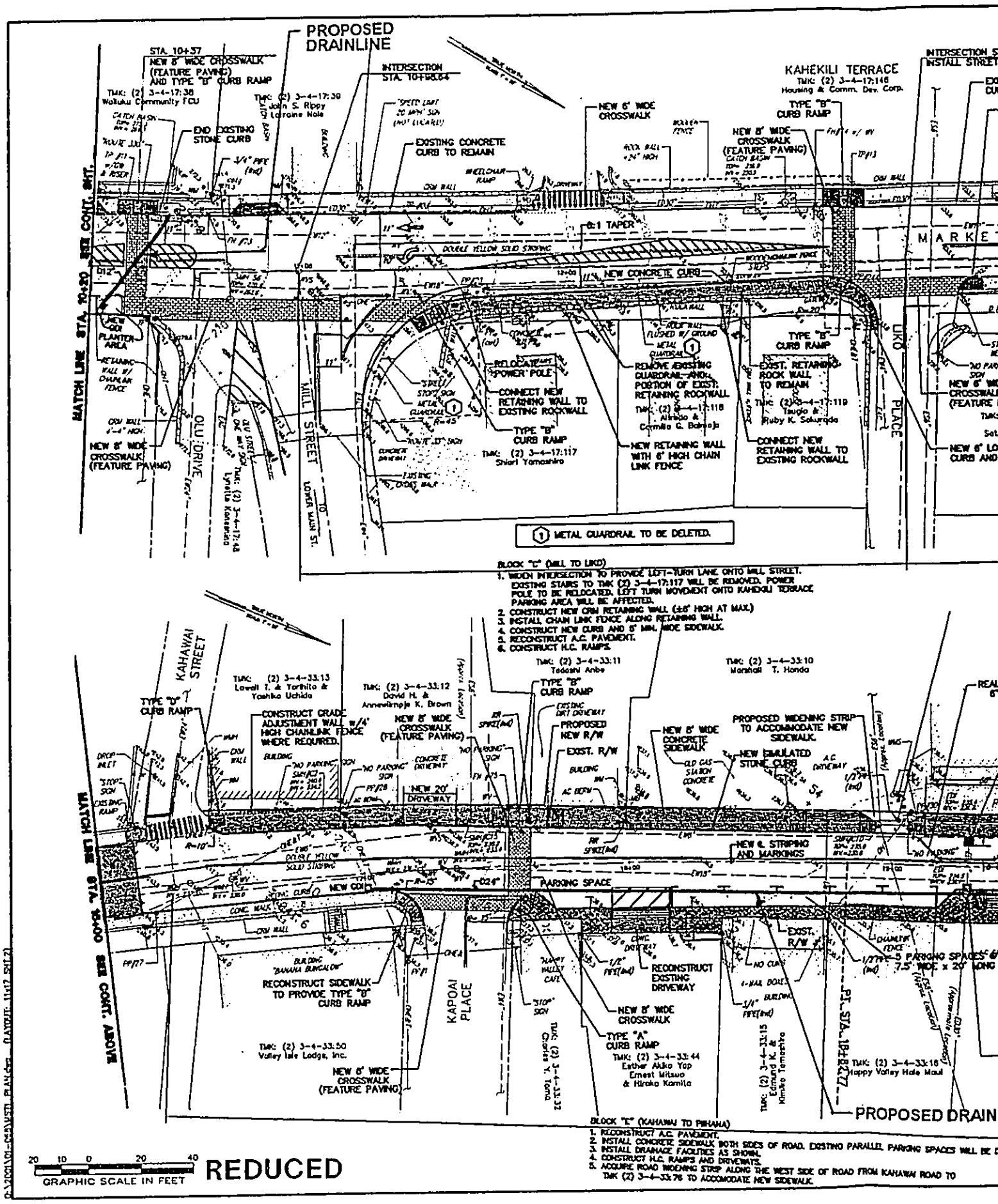
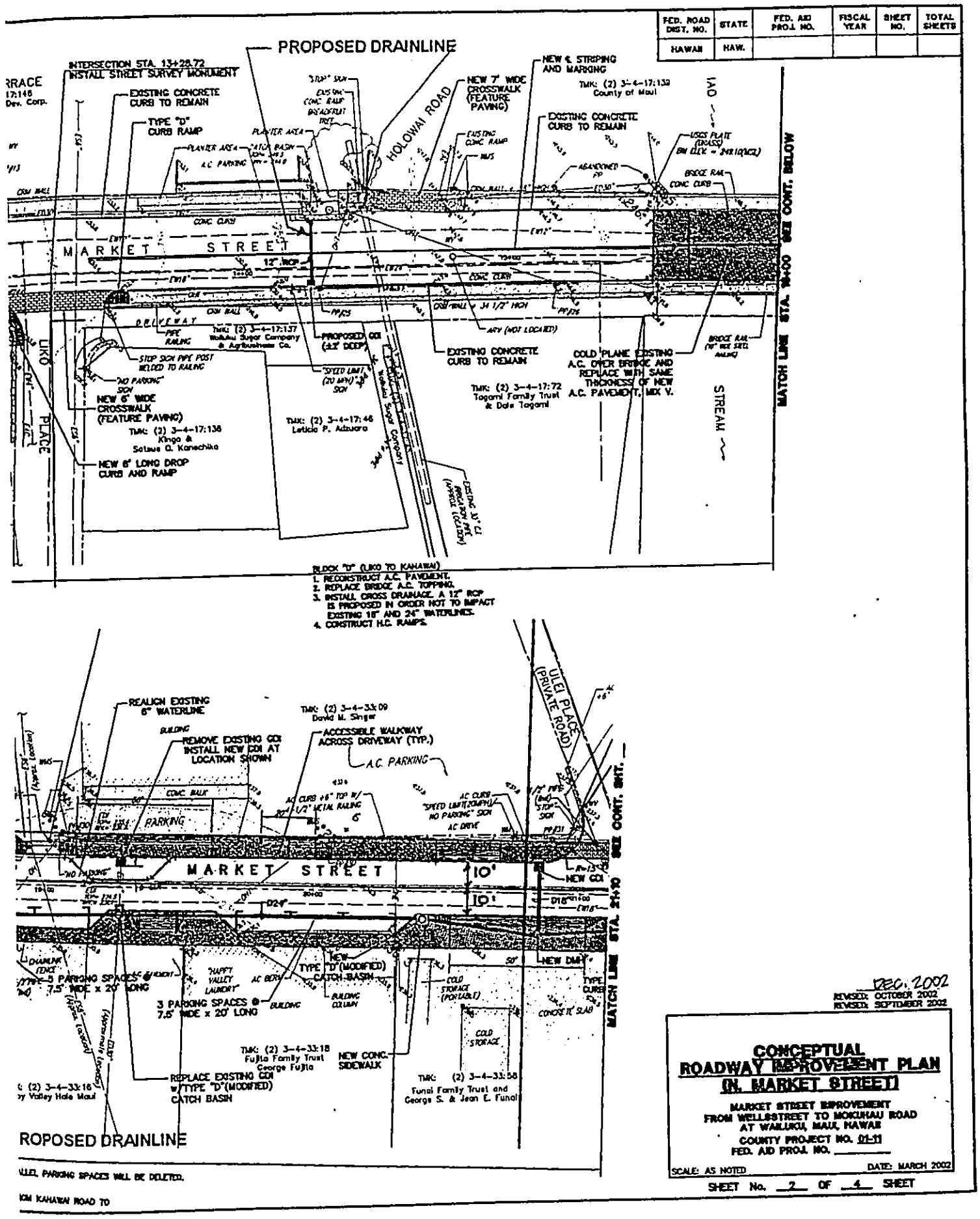


FIGURE 9, A

RECEIVED AS FOLLOWS



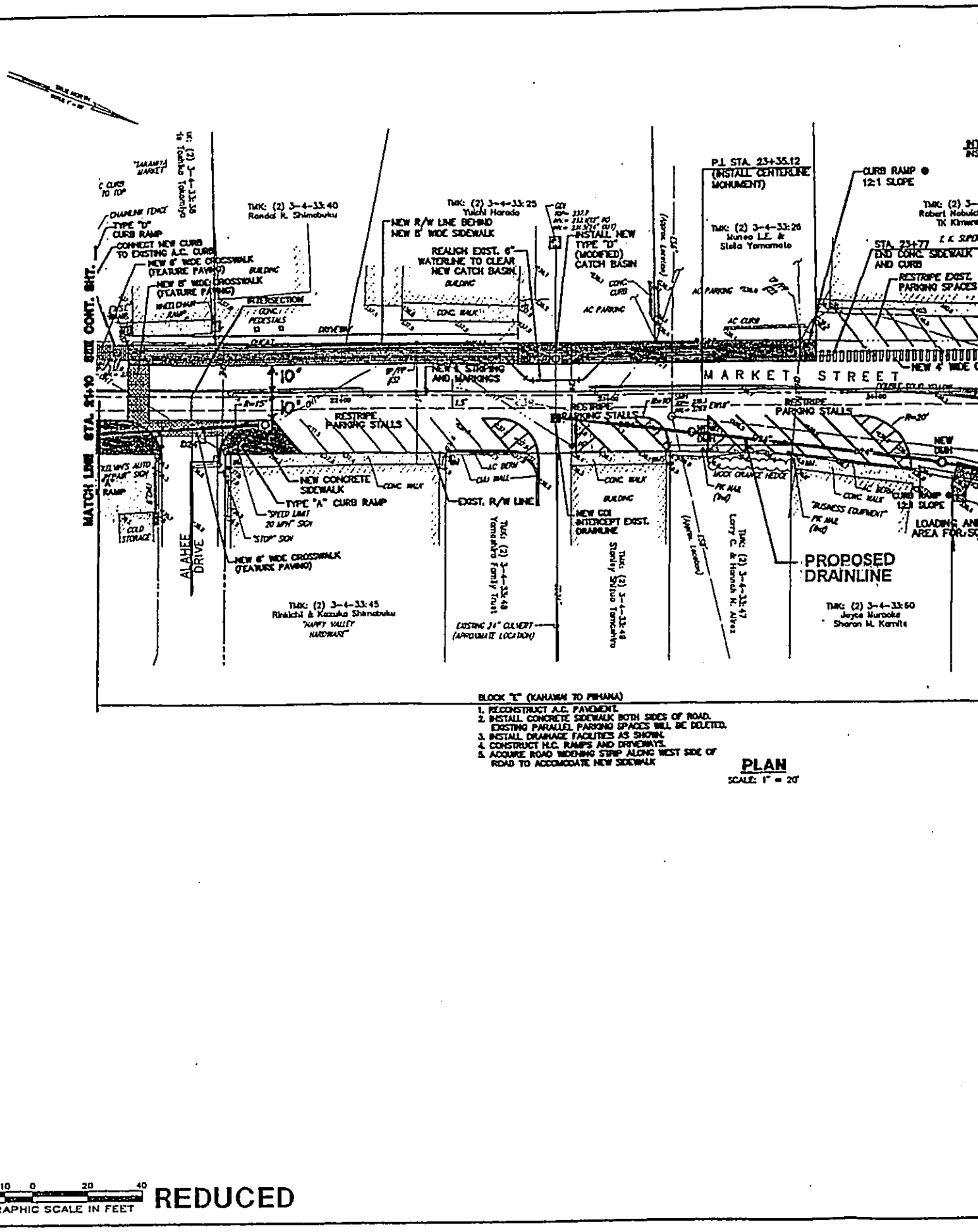
RECEIVED AS FOLLOWS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.				

FIGURE 9, B

RECEIVED AS FOLLOWS



BLOCK "E" (KAHAWAI TO PIHANA)

1. RECONSTRUCT A.C. PAVEMENT.
2. INSTALL CONCRETE SIDEWALK BOTH SIDES OF ROAD. EXISTING PARALLEL PARKING SPACES WILL BE DELETED.
3. INSTALL DRAINAGE FACILITIES AS SHOWN.
4. CONSTRUCT H.C. RAMPS AND DRIVEWAYS.
5. ACQUIRE ROAD WIDENING STRIP ALONG WEST SIDE OF ROAD TO ACCOMODATE NEW SIDEWALK

PLAN
SCALE: 1" = 20'

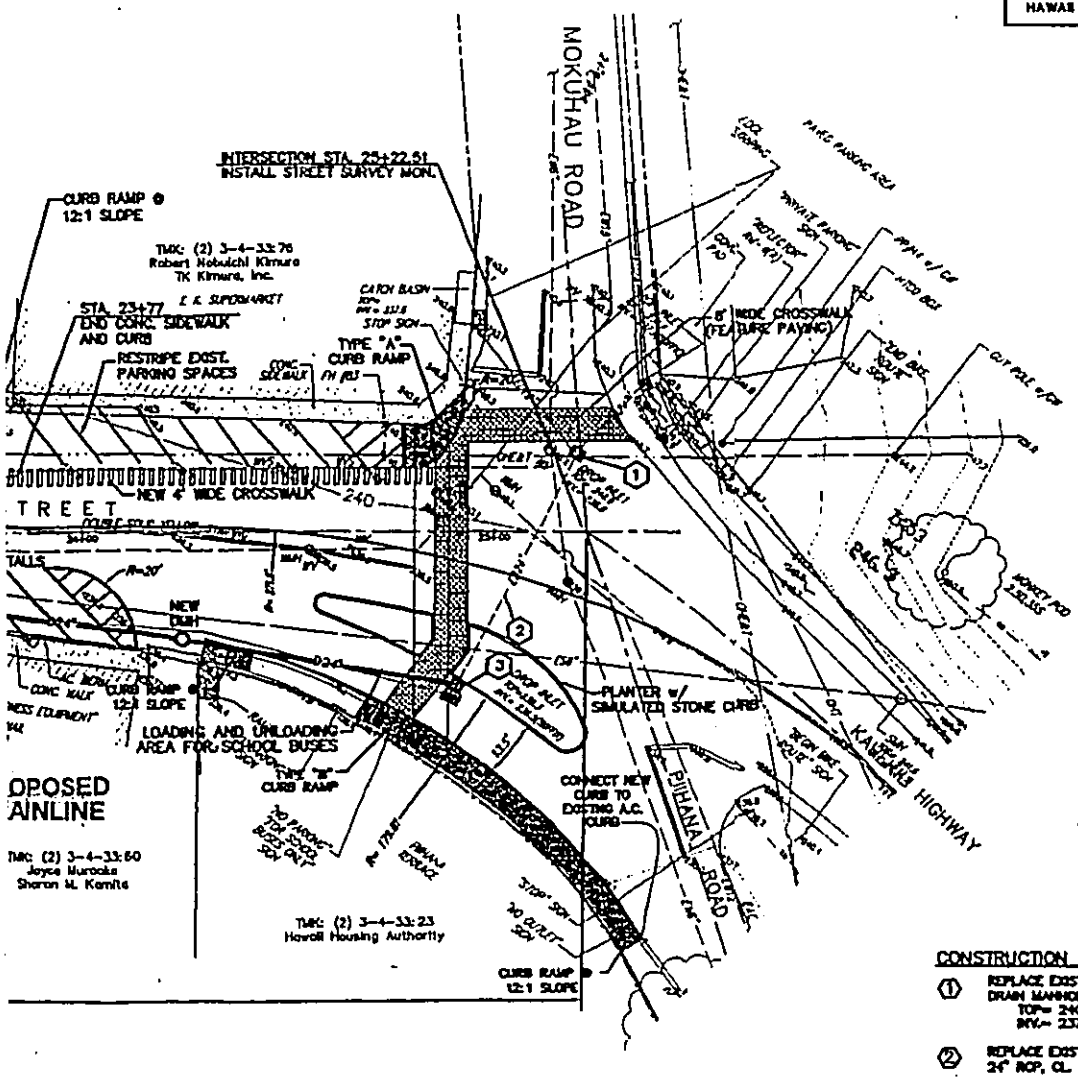
C:\2001\01-065\ST1_PLAN.dwg (LAYOUT: 11x17 SHT.3)

20 10 0 20 40
GRAPHIC SCALE IN FEET

REDUCED

RECEIVED AS FOLLOWS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.				



CONSTRUCTION ANNOTATIONS:

① REPLACE EXISTING DRAIN INLET WITH NEW SHALLOW DRAIN MANHOLE FOR PAVEMENT AREA (STD. DETAIL D-18)
TOP= 240.46
INV.= 237.04

② REPLACE EXISTING 24" RCP CULVERT WITH NEW 24" RCP, CL. IV.

③ REPLACE EXISTING DRAIN INLET WITH NEW CDI
TOP= 238.3
INV.= 234.5 (EXISTING)

DEC. 2002
REVISED: OCTOBER 2002
REVISED: SEPTEMBER 2002

CONCEPTUAL ROADWAY IMPROVEMENT PLAN (N. MARKET STREET)

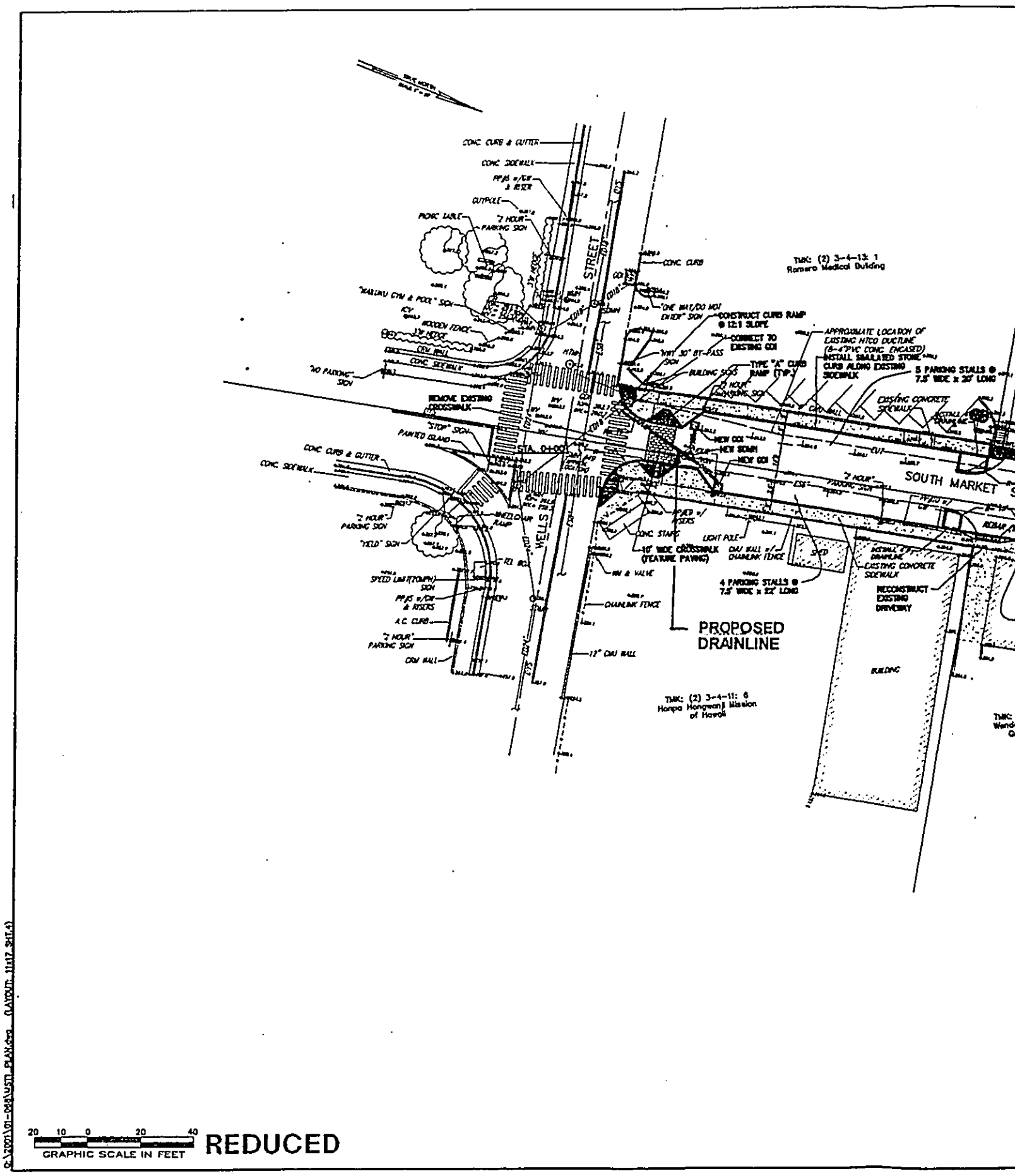
MARKET STREET IMPROVEMENT
FROM WELLS STREET TO MOKUHAU ROAD
AT WAILUKU, MAUI, HAWAII
COUNTY PROJECT NO. 03-11
FED. AID PROJ. NO. _____

SCALE: AS NOTED DATE: MARCH 2002

SHEET No. 3 OF 4 SHEET

FIGURE 9, C

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS

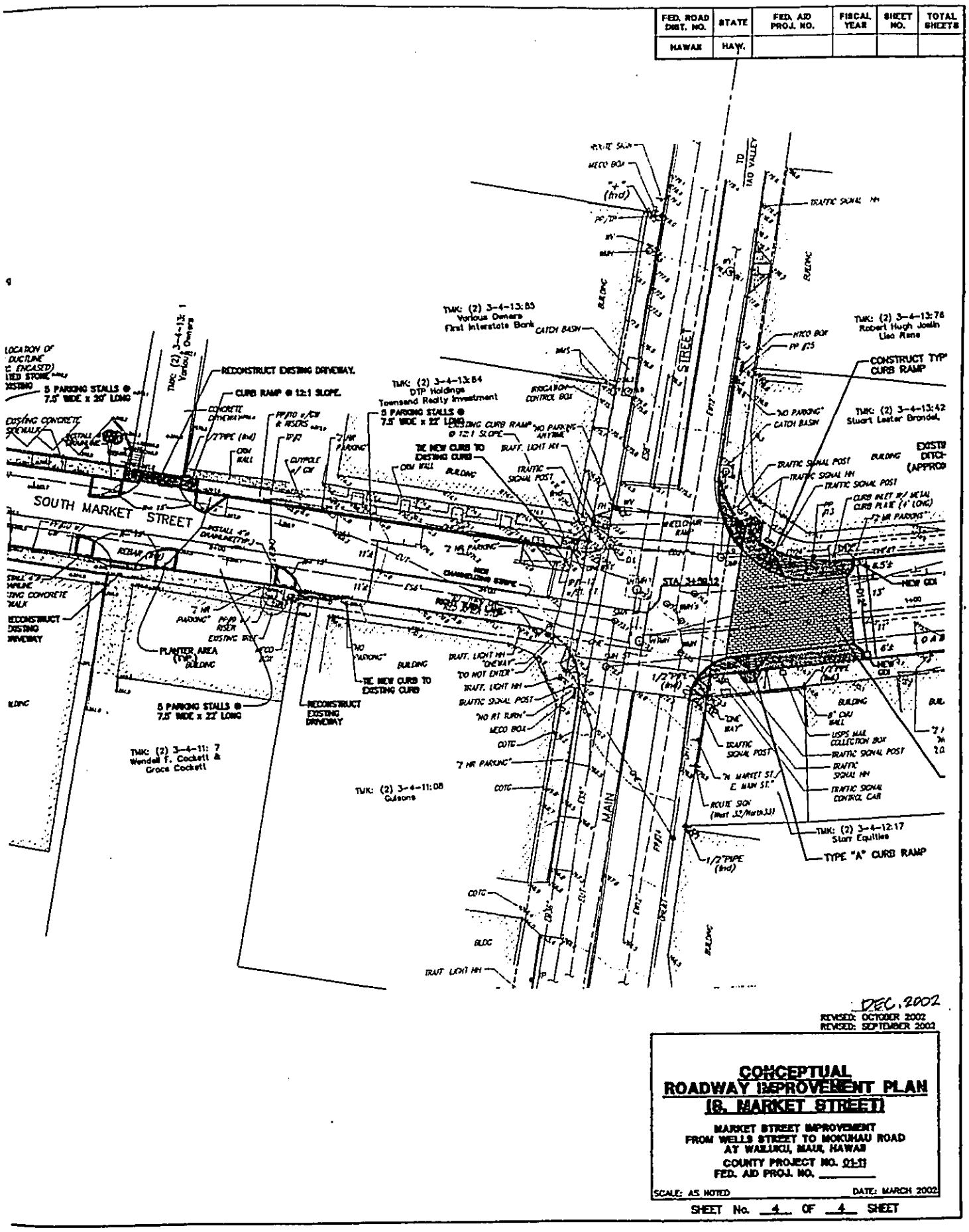
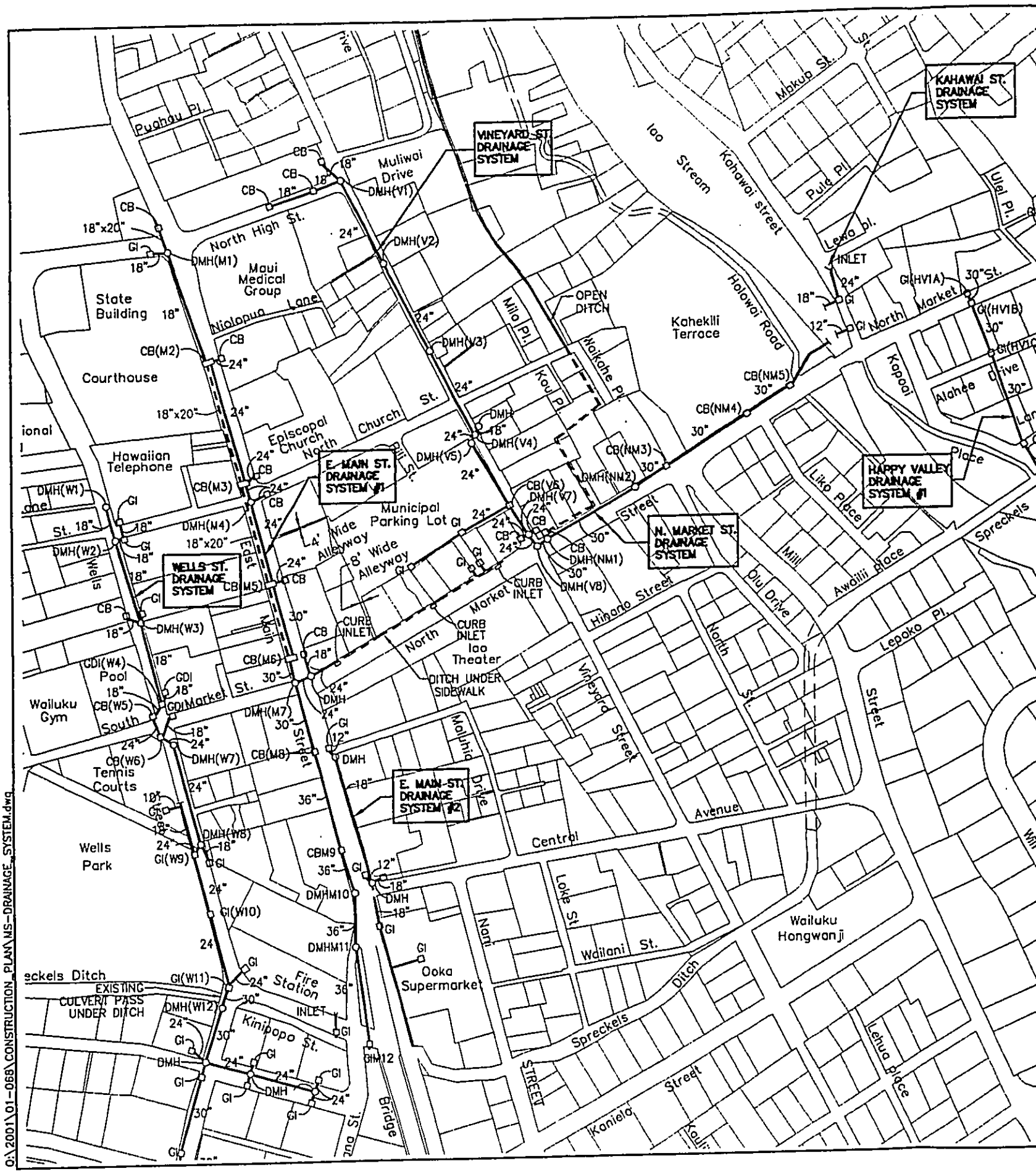


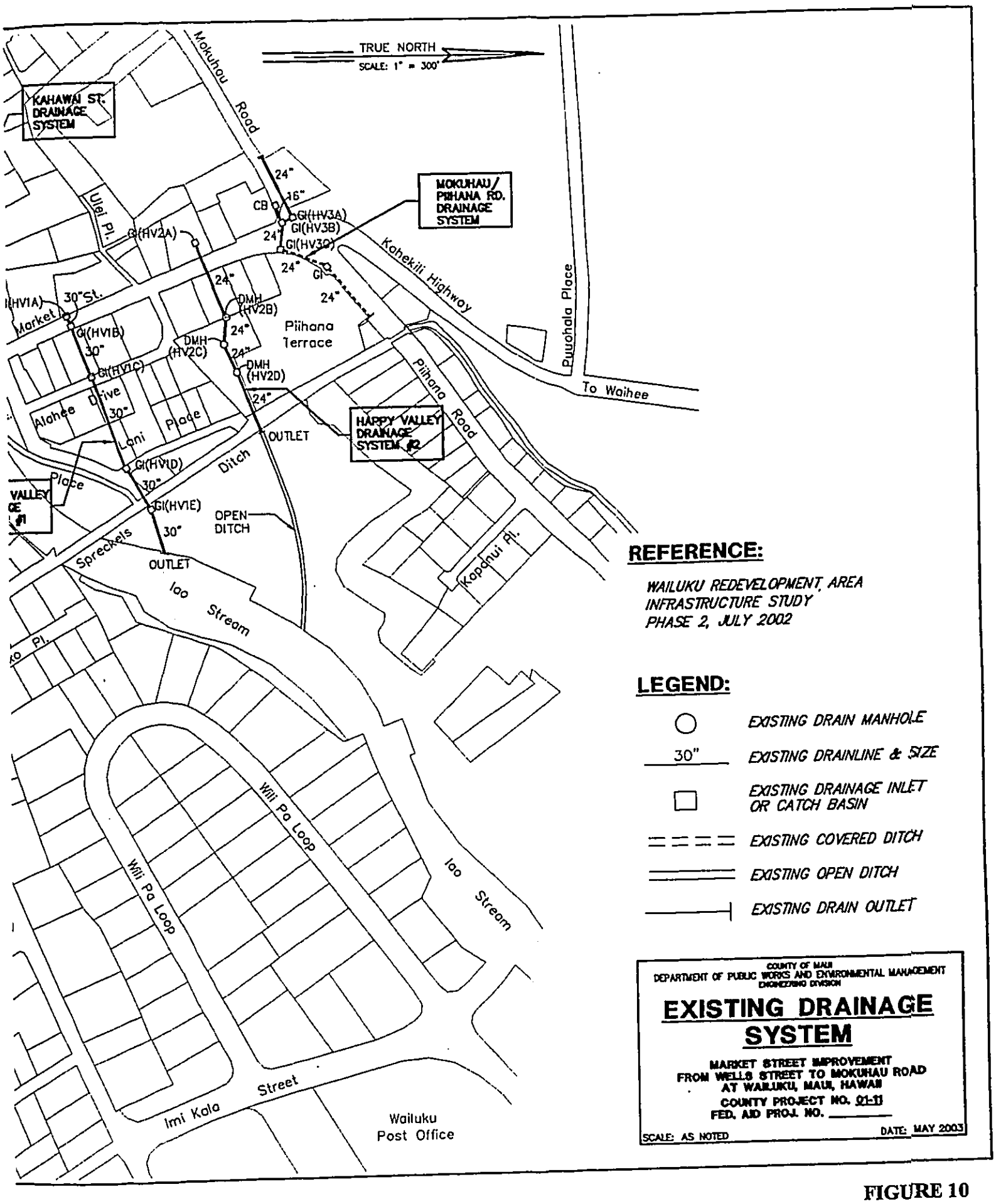
FIGURE 9, D

RECEIVED AS FOLLOWS



O:\2001\01-068\CONSTRUCTION PLAN\NS-DRAINAGE SYSTEM.dwg

RECEIVED AS FOLLOWS



REFERENCE:

WAILUKU REDEVELOPMENT AREA INFRASTRUCTURE STUDY PHASE 2, JULY 2002

LEGEND:

- *EXISTING DRAIN MANHOLE*
- 30" *EXISTING DRAINLINE & SIZE*
- *EXISTING DRAINAGE INLET OR CATCH BASIN*
- *EXISTING COVERED DITCH*
- *EXISTING OPEN DITCH*
- *EXISTING DRAIN OUTLET*

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND ENVIRONMENTAL MANAGEMENT
ENGINEERING DIVISION

EXISTING DRAINAGE SYSTEM

MARKET STREET IMPROVEMENT
FROM WELLS STREET TO MOKUHAU ROAD
AT WAILUKU, MAUI, HAWAII
COUNTY PROJECT NO. 01-11
FED. AID PROJ. NO. _____

SCALE: AS NOTED DATE: MAY 2003

FIGURE 10

RECEIVED AS FOLLOWS

G:\2001\01-068\CONSTRUCTION_PLAN\MS-DRAINAGE_SYSTEM.dwg

RECEIVED AS FOLLOWS

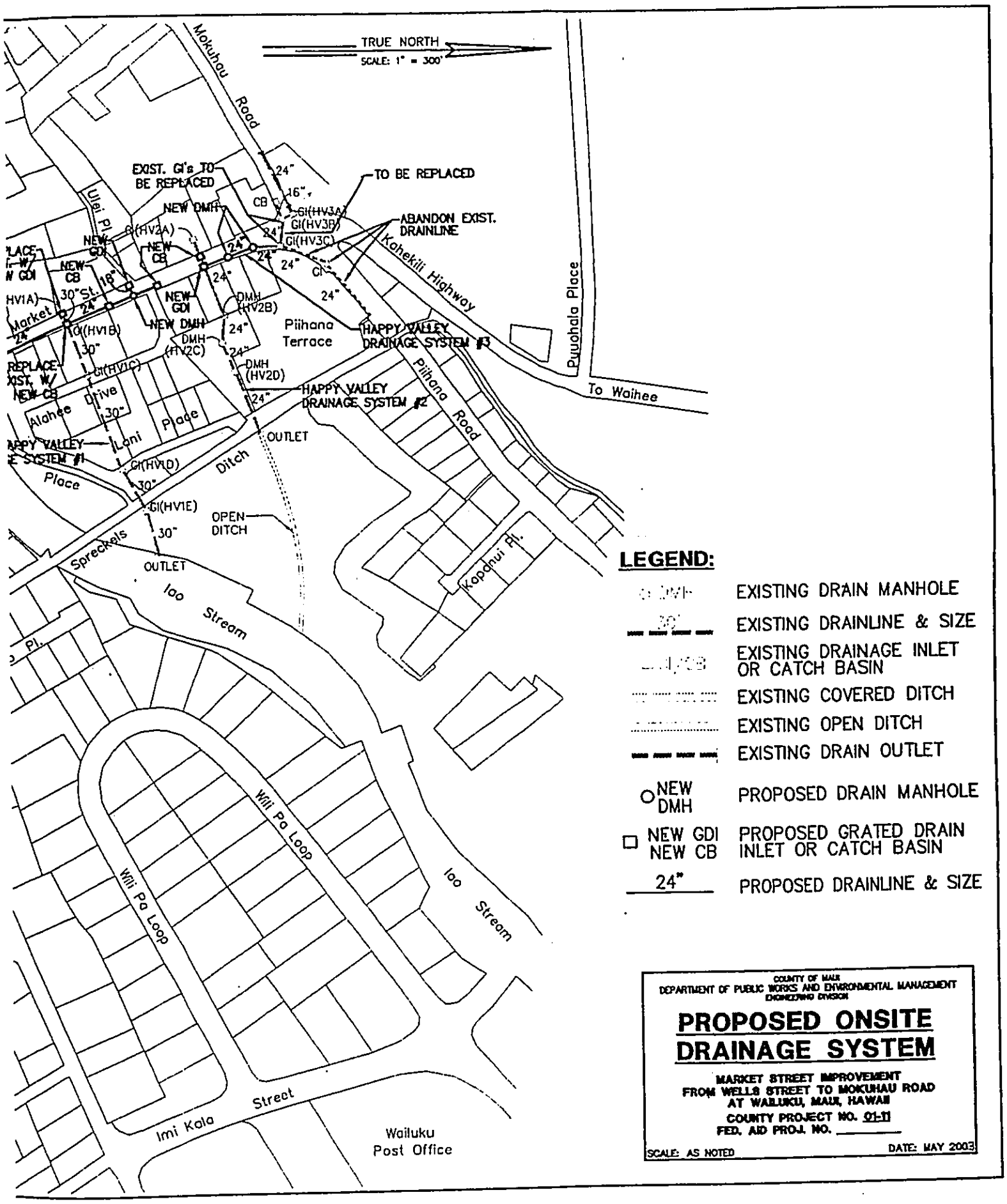
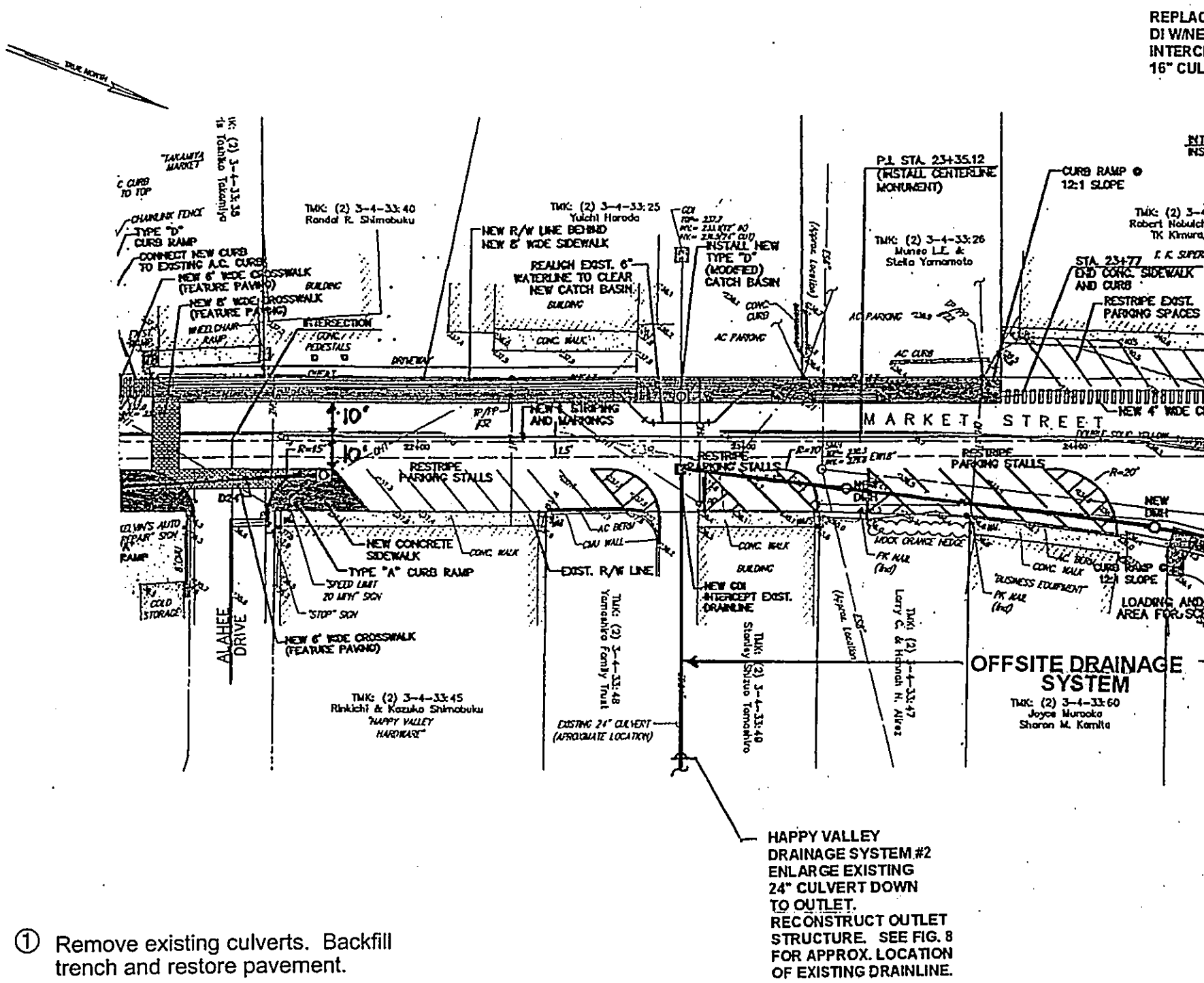


FIGURE 11

RECEIVED AS FOLLOWS



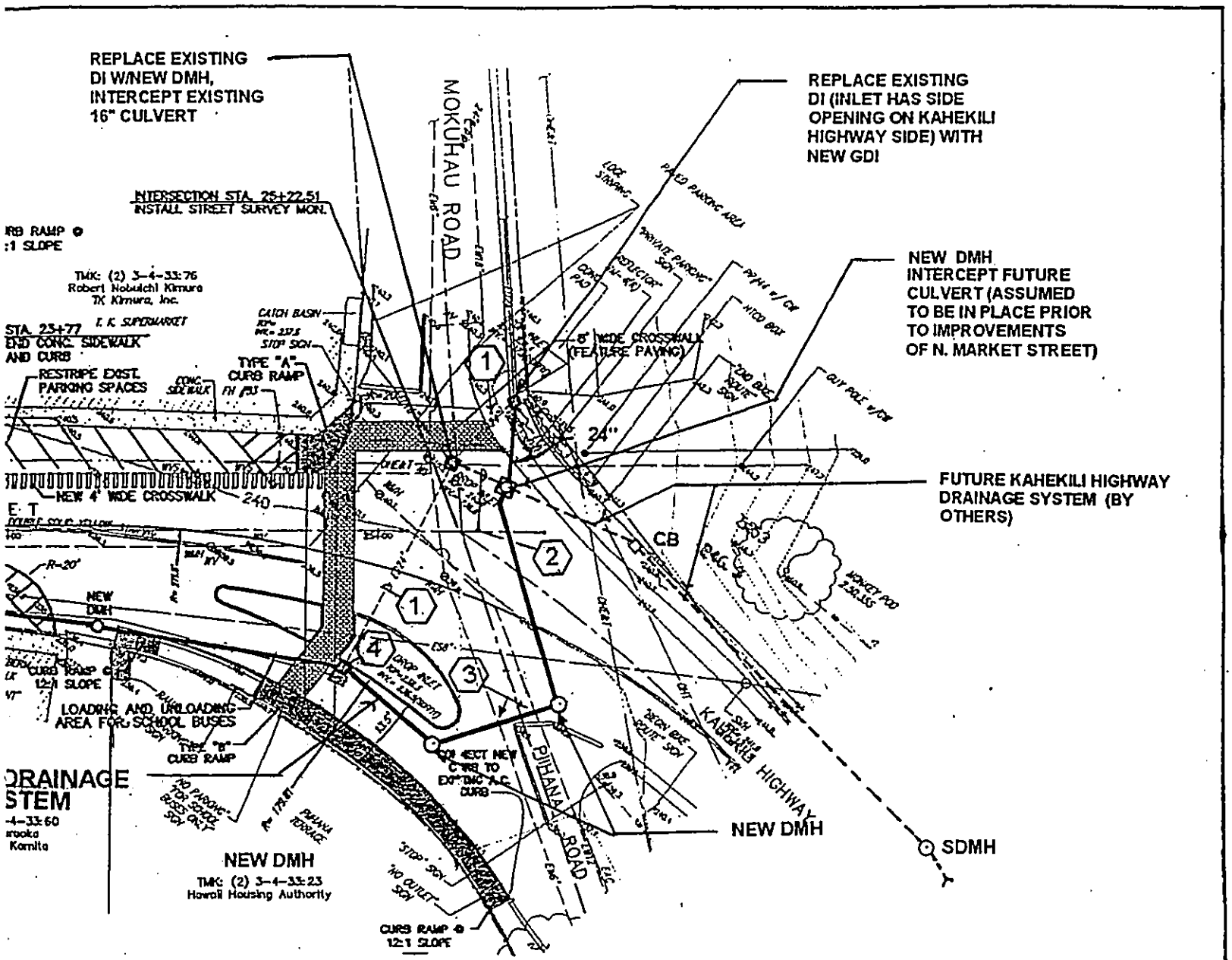
① Remove existing culverts. Backfill trench and restore pavement.

② Replace existing culvert with new 18" RCP. Reverse pipe slope to flow into new SDMH.

③ Lower existing 6" and 12" waterlines at drainline crossing as required.

④ Remove existing DI and install new GDI.

RECEIVED AS FOLLOWS



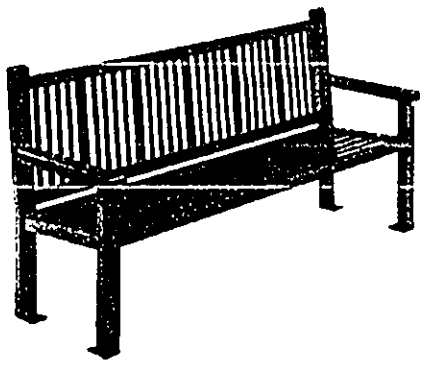
CONCEPTUAL OFFSITE DRAINAGE IMPROVEMENTS

(TO ACCOMMODATE STORM FLOW FROM KAHEKILI HIGHWAY DRAINAGE SYSTEM)

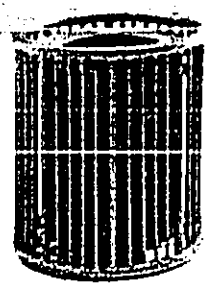
Scale: 1" =40'

FIGURE 12

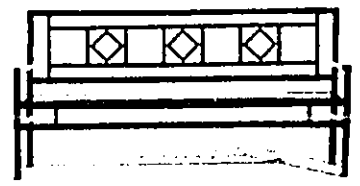
RECEIVED AS FOLLOWS



BENCH - Key Stone Ridge - Reading



TRASH RECEPTACLE -
Keystone Ridge - Horizon



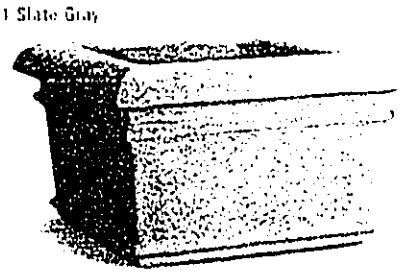
BENCH - Key Stone Ridge - Artisan

Bench Styles

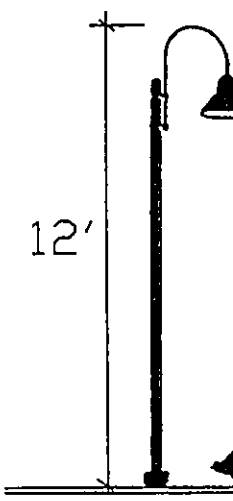
PINK TECOMA TREE - *Tabebuia rosea*

TRUE KAMANI - *Calophy*

Street Tree Types

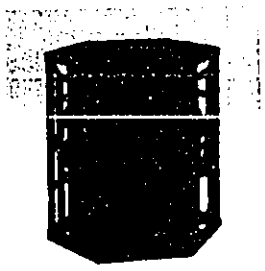


PLANTER - Dura Art Stone - 'Mediterranean' Round or Square



DECORATIVE STREET

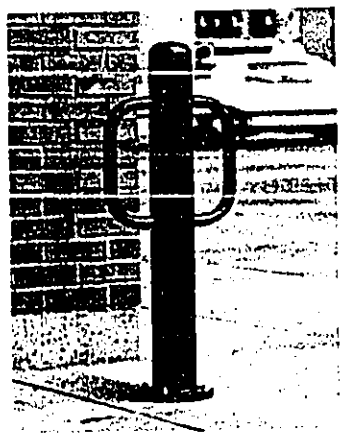
RECEIVED AS FOLLOWS



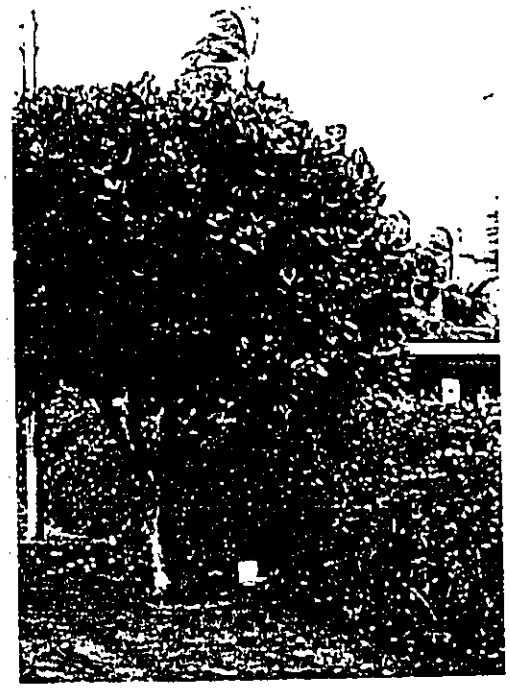
- Artisan

TRASH RECEPTACLE

Reach back to the early 20th century for restoration and workman integrity with the 'Artisan'. Capturing yesterday's craftsmanship in today's contemporary form.

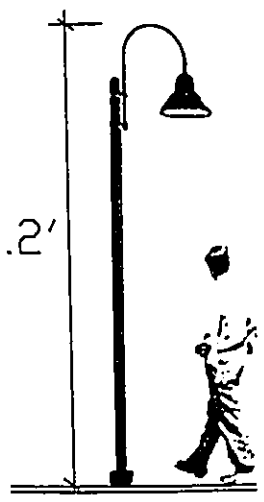


BOLLARD-STYLE BIKE RACK



IANI - *Calophyllum inophyllum*

TYPICAL TREE GRATE



ORATIVE STREET LAMP

FIGURE 13
Conceptual Landscape Planting and Streetscape Design Improvements

Market Street Improvement Project
08/2003

CHRIS HART & PARTNERS

APPENDICES

Appendix - A

Pre-Consultation

- List of consultation activities with agencies, community organizations, and neighbors prior to public hearing
- November 7, 2002, Public Information Meeting
- Survey of Adjacent Property Owners
- February 27, 2003, Public Information Meeting

- November 7, 2002, Public Information Meeting

Tanaka
ENGINEERS, INC.

CIVIL & STRUCTURAL ENGINEERING • LAND SURVEYING • CONSTRUCTION MANAGEMENT & INSPECTIONAL SERVICES

October 23, 2002

MEMO TO: All Interested parties

WHAT: Public Informational Meeting Regarding Market Street Improvements
Wells Street to Mokuhau Road

WHEN: 6:00 P.M., Thursday, November 7, 2002

WHERE: Planning Department Conference Room
250 S. High Street, First Floor
Wailuku, Maui, Hawaii

You are cordially invited to attend a public information meeting to discuss the proposed improvements to Market Street from Wells Street to Mokuhau Road.

In attendance will be County Representatives and their Civil Design Consultant, Electrical Engineer, Soils Engineer, Planner, Landscape Architect and Archaeologist to review the conceptual plans for the proposed improvements to Market Street.

871 KOLU STREET SUITE 201 • WAILUKU, MAUI, HAWAII 96793-1436 • PHONE 242-6861
FAX 244-7287 • E-MAIL - rttanaka@gte.net

NOVEMBER 7, 2002

6:00 PM

ATTENDENCE SHEET – MARKET ST. IMPROVEMENTS
INFORMATIONAL MEETING

NAME	ORGANIZATION	PHONE NO.
Tadashi Abe	Market St	244.0749
Josco Carlbom	" " resident	242-6070
Robert N. Kimura	Wailuku	244-3129
R. R. Shimabukuro	Wailuku	244-0695
GERALD HIYAKUMOTO	MRA	242-9705
Stephanie Higashi	MRA	244-7099
ROGELIO HIDALGO	Tanaka Engrs.	242-6861
Walbert Chong	ECM, Inc	242-8070 EXT. 27
LANCE TAKAMIYA	TAKAMIYA MARKET	244-3404
JOE MYHRAD	Board of Parks	242-7699
Darla Palmer	Maui OnStage @ Iao Theater	244 8680
Jocelyn A. Perreira	Wailuku Main Street Assn. Tri-Isle M.S. Res. Ctr.	244-3888
Erik Fredericksen	Xamanek Researches	572-6118
Hilton Unemori	ECM, Inc.	242 8070
Russell Guerin	Lands Arch.	242-6503
Milton Arakawa	Public Works	270-7845
Richard Day	Kamaainaloan	242-5555
Bryce Holmes	Holmes Family LLC	876-0203
Kristin Holmes	Holmes Family LLC	879-3316
John & Lorraine Hale Rippy	Rippy's Construction; Pampering at Lorraine	cell 870 3621; 242 7744 salon
JONATHAN STARR	STARR PROPERTIES	249-0032
KIRK TANAKA	R.T. TANAKA ENGINEERS, INC.	242-6861
CHRIS HART	CHP	
MICHAEL SUMMERS	CHP	
JOHN SUMMERS	PLANNING DEPT.	
[illegible]	[illegible]	

- Survey of Adjacent Property Owners

CHRIS HART & PARTNERS, INC.

December 3, 2002

Dear Market Street Property Owner:

The County of Maui has contracted R.T. Tanaka Engineers, Inc. to complete construction plans and an Environmental Assessment (EA) for the Market Street Beautification project, which is scheduled to be implemented in September of 2004. Chris Hart & Partners are contracted to complete the required EA and landscape planting plans.

The purpose of the project is to facilitate the long-term economic viability and vitality of the Wailuku downtown area through the landscape planting and urban beautification of Market Street.

The objectives of the project include the following:

- Improve vehicular circulation and control vehicular access;
- Provide lighting, shade trees, and street furniture to improve the pedestrian experience;
- Construct and repair sidewalks to improve pedestrian mobility;
- Provide narrowed street crossings and concrete textured crosswalks to slow traffic and improve pedestrian safety; and
- Repave the existing street to improve storm drainage and driving conditions.

The proposed improvements will occur along Market Street from Wells Street to Piihana Road. The improvements will be conducted in phases impacting a section of the roadway at a time. The construction phase will result in temporary construction related impacts to businesses and residences. These temporary impacts may include the following:

- Temporary loss of on-street parking stalls;
- Temporary restricted traffic flow fronting the construction area; and
- Temporary noise and dust.

In order to better mitigate these temporary construction related impacts, we are requesting that you complete the attached survey. The survey will help us design a Roadwork Mitigation Plan to better address the concerns of neighboring property owners.

Thank you for your cooperation. Please return the attached survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

Attachment

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name:

Street Address/Location:

Type of Business:

Hours of Operation:

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: _____.

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: _____.

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No _____

Comments: _____.

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No _____

Comments: _____.

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No _____

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name:

Street Address/Location: 312 N. Market St.

Type of Business:

Hours of Operation:

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: 8:00 A.M – 3:00 Pm.

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: 3:00 Pm – 10:00 Pm.

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: _____

4. Would Saturday construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: _____

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ____/_____

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Stanley S. Tamashiro
dba Tamashiro Tofu Factory - No Ka Oi Tofu
Street Address/Location:
378 North Market St. Wailuku
Type of Business:
Tofu making
Hours of Operation: varied 3 am / 4 am to 1 - 1:30 pm
Monday — Sat.

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: as long as we are able to leave area and return for delivery of tofu

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: ~~as long as~~ during above hours

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No X

Comments: as long as we are able to leave area and return for delivery of tofu

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: We hope on-street parking stalls will be only a temporary loss - for we do need the stalls infront of our property.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

RECEIVED
DEC 27 2002
CHRIS HART & PARTNERS
Landscape Architecture & Planning

Business Name: Masashi Ogawa

Street Address/Location: 327 N Market

Type of Business: Service Station

Hours of Operation: At present we are not in business. In the future we will do business using our frontage as parking for customers.

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: _____

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: _____

3. Would nighttime construction significantly impact your business/residence?

Yes ✓ No _____

Comments: Interrupt Sleep

4. Would Saturday construction significantly impact your business/residence?

Yes ✓ No _____

Comments: _____

5. Would Sunday construction significantly impact your business/residence?

Yes ✓ No _____

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Sheila's Junktique

Street Address/Location: 139 A. market St.

Type of Business: Antiques

Hours of Operation: Tues - Sat 10 AM - 5 PM

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: 10 a.m - 12pm, 2pm - 5pm.

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: 1 pm - 2 pm.

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No X

Comments: Shop is closed after 5 p.m.

4. Would Saturday construction significantly impact your business/residence?

Yes X No _____

Comments: Shop is open 10 AM - 5 p.m

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: Shop is closed.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: _____

_____

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

RECEIVED
DEC 3 0 2002
CHRIS HART & PARTNERS
Landscape Architecture & Planning

Business Name: Siam thai Cuisine

Street Address/Location: 123 N. Market st.

Type of Business: Restaurant

Hours of Operation: 11-2 MON-Fri, 5-9pm everyday

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: between 12:00-1:30 and after 5:00.

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: before 11:00 and after 2:00.

3. Would nighttime construction significantly impact your business/residence?

   Yes very much before 9:00 No _____

   Comments: _____.

4. Would Saturday construction significantly impact your business/residence?

   Yes _____ No Not during the day

   Comments: night time only.

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No Not at all

Comments: only night time.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: business is slow during the day time, so would have the least effect, Especially Sat. and Sunday.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Office of the Public Defender

Street Address/Location: 87 N. Market St.

Type of Business: Law Office

Hours of Operation: 8-4:30 M-F

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: 8 Am – 4:30 pm M-F

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: SAT/SUN, EVES M-F

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: _____

4. Would Saturday construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: _____

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ✓_____

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: Full speed ahead. Please don't forget to have adequate trash cans. From Main – Vineyard close off altogether & create Ft St. Mall, 3rd St. Promenade setting.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name:

Street Address/Location:

Type of Business:

Hours of Operation:

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: 9-2

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: 2-6 + after

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No X

   Comments: It would be best

4. Would Saturday construction significantly impact your business/residence?

   Yes X No _____

   Comments: Some

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ___X___

Comments: Nobody is open on Sunday.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

RECEIVED
DEC 12 2002
CHRIS HART & PARTNERS
Landscape Architecture & Planning

Business Name: TAKAMIYA MARKET

Street Address/Location: 359 N. MARKET ST.

Type of Business: GROCERY STORE

Hours of Operation: 5:30 AM — 6:30 PM MON → SAT

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: 5:30 AM – 8:30 AM 11:00 AM – 1:00 PM 4:00 PM – 6:00 PM

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: SUNDAY – MARKET IS CLOSE

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No X

   Comments: THIS WOULD BE GOOD FOR MY BUSINESS, BUT APARTMENTS IN NEIGHBURHOOD SHOULD BE CONSIDERED

4. Would Saturday construction significantly impact your business/residence?

   Yes X No _____

   Comments: FRIDAY & SATURDAY IS THE BUSIEST DAY OF WEEK.

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: MARKET IS CLOSE.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: KEEP US IN FORMED ON SIDEWALKS + PLANTERS — PARKING IS LIMITED IN OUR AREA.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

ANY QUESTIONS CALL JAMES TANAKA
244-3404
OR LANCE TANAKA
276-1021. TANAK-404
JAMES

CHRIS HART & PARTNERS, INC.

RECEIVED
DEC 11 2002
CHRIS HART & PARTNERS
Landscape Architecture & Planning

Business Name: Lockett, Wahann, Schmidt

Street Address/Location: 38 S. Market St.

Type of Business: Law Office

Hours of Operation: 0700 – 1530

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: 0700 – 1630 Hrs.

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: after 1630 Hrs until 0700 Hrs next day

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ____X____

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Banana Bungalow Maui Hostel

Street Address/Location: 310 N. Market St. (on Iao Canal) Wailuku

Type of Business: Hostel / hotel

Hours of Operation: office 8am - 11pm (24 hr. operation since guests need to sleep)

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: 8 pm - 8 am guests sleeping.

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: 8 am - 8 pm.

3. Would nighttime construction significantly impact your business/residence?

   Yes X No _____

   Comments: We are a hotel. The noise would disrupt our guests' sleep.

4. Would Saturday construction significantly impact your business/residence?

   Yes _____ No X

   Comments: _____.

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ___X___

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

11 Dec 02

Business Name: Brown - Kobayashi

Street Address/Location: 38 North Market Street

Type of Business: Retail

Hours of Operation: 11Am - 5Pm - M-S. Sunday closed

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: 11Am – 5Pm - M-S

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: 5Pm - 5Am – Daily

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No X

   Comments: grant – only time work should be done

4. Would Saturday construction significantly impact your business/residence?

   Yes X No _____

   Comments: After 5Pm - OK

LANDSCAPE ARCHITECTURE AND PLANNING
1955 MAIN STREET SUITE 206 WAILUKU, HAWAII 96793-1705 PHONE: (808) 242-1955 • FAX: (808) 242-1956

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Bird-of-Paradise

Street Address/Location: 56 N. Market

Type of Business: Antiques

Hours of Operation: 9:30 am to 5:00 pm

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   10 am to 3 pm

   Comments: _____

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: Night time

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No its the best time

   Comments: _____

4. Would Saturday construction significantly impact your business/residence?

   Yes X No _____

   Comments: I need access to my business to unload furniture

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No __X__

Comments: Best time to do construction work.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: Impact would be less durning summer months when sales are slower anyways. June thru August.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

RECEIVED
DEC 16 2002
CHRIS HART & PARTNERS
Landscape Architecture & Planning

Business Name: White Orchid

Street Address/Location: 40 N. Market St.

Type of Business: Gift Shop

Hours of Operation: 9-6 M-F / 10-4 Sat. / Closed Sunday

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: 10:00 am to 2:00 pm and 4:00 pm - 6:00 pm.

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: Early morning until 10:00 am / after 6 pm

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No X

Comments: Would be best! - street is empty / weekends good also - Sunday.

4. Would Saturday construction significantly impact your business/residence?

Yes X No _____

Comments: We completely rely on street traffic. Would be devestating to our store.

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: Best day, most shops closed.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: I am very concerned as we rely completely on foot traffic, business clients as well as visitors. Are there any plans for rubbish removal contracts, continued cleaning after the restoration? I know this construction will be devastating to many small shop owners such as myself.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

RECEIVED
DEC 16 2002
CHRIS HART & PARTNERS
Landscape Architecture & Planning

Business Name: KAMAAINA LOAN - CASH FOR GOLD

Street Address/Location: 42, 46, 50 N. Market St

Type of Business: Retail Store, PAWNSHOP, PayCheck LOANS

Hours of Operation: 8-5 PM M—F SAT - 10-4 PM.

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: 8-5 M-F 10-4 Sat.

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: 5 P.M -then— 8 A.M

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____

4. Would Saturday construction significantly impact your business/residence?

Yes ✓ No _____

Comments: open 10-4 Sat Question I

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ____✓____

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

U

CHRIS HART & PARTNERS, INC.

Business Name: Precision Goldsmiths

Street Address/Location: 16 N. Market

Type of Business: Jewelery Retail

Hours of Operation: 9:00 AM - 5:00 PM M-F

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence. 11:00 AM - 5:00 PM

   Comments: _____

2. Please indicate the periods of the day that construction would least impact your business/residence. Early Mourning

   Comments: _____

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No X

   Comments: _____

4. Would Saturday construction significantly impact your business/residence?

   Yes _____ No X

   Comments: _____

LANDSCAPE ARCHITECTURE AND PLANNING
1955 MAIN STREET SUITE 200 WAILUKU, MAUI, HAWAII 96793-1705 PHONE: (808) 242-1955 • FAX: (808) 242-1956

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

6. Please describe any other comments you have regarding the project's construction related impacts. The Faster the better

Describe: _____

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

Survey From
Marc Aurel

CHRIS HART & PARTNERS, INC.

Hours of Operation:

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: 6am - 1pm

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: 5pm - 5am

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

LANDSCAPE ARCHITECTURE AND PLANNING
1955 MAIN STREET SUITE 200 WAILUKU, MAUI, HAWAII 96793-1765 PHONE: (808) 242-1955 • FAX: (808) 242-1956

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: HOW WILL YOU HANDLE THE EXTRA SHORTAGE OF PARKING DURING THIS TIME FRAME?

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Wailuku FCU

Street Address/Location: 175 Market St. Wailuku

Type of Business: Credit Union

Hours of Operation: 9:00 am - 445 pm M-F

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: Mornings on Afternoon.

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: Nighttime.

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____.

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____.

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Nolic Travel

Street Address/Location: 160 N. Market St., Suite C9 D

Type of Business: Travel Agency

Hours of Operation:

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: Our office opens from 9am to 5pm daily.

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: Its hard to tell cause most of our customers are walk-ins.

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No x

Comments: _____.

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No x

Comments: We are closed on week ends.

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No x

Comments: _____

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: The good impact on the project might benefit the sleeping town and hopefully it will boast all businesses.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name:

Street Address/Location:

Type of Business:

Hours of Operation:

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: 8AM-5PM

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: 5PM — 8AM

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: GOOD

4. Would Saturday construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: GOOD

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: GOOD

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: GREAT PROJECT

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name:

Street Address/Location:

Type of Business:

Hours of Operation:

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: 10:00 Am - 4:00 pm

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: Before 10:00 a.m after 4:00 pm

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

LANDSCAPE ARCHITECTURE AND PLANNING
1955 MAIN STREET SUITE 200 WAILUKU, MAUI, HAWAII 96793-1705 PHONE: (808) 242-1955 • FAX: (808) 242-1956

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

RECEIVED
DEC 16 2002
Landscape Architecture & Planning

Business Name: Happy Valley Apt.

Street Address/Location: 385 N. Market St. Wailuku, Hi.

Type of Business: Long term rental

Hours of Operation: 24 hrs

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence. 4PM to 6:AM

Comments: _____

2. Please indicate the periods of the day that construction would least impact your business/residence. 8:AM to 4:PM

Comments: _____

3. Would nighttime construction significantly impact your business/residence?

Yes ✓ No _____

Comments: _____

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ___✓___

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe:_____
_____.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Parents and Children Together

Street Address/Location: 81 North Market Street

Type of Business: Non-profit agency servicing families w/ children in crisis + anger management classes

Hours of Operation: M-F 8:00am. - 4:30pm

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence. 8:00 a.m - 4:30 p.m.

Comments: _____.

2. Please indicate the periods of the day that construction would least impact your business/residence. After 5:00 p.m.

Comments: _____.

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No ✓_____

Comments: _____.

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No ✓_____

Comments: _____.

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: _____
_____

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: TREASURE IMPORTS

Street Address/Location: 22 N. MARKET ST., WAILUKU, HI 96793

Type of Business: JEWELRY STORE / PAWN SHOP

Hours of Operation: MON - FRI 9AM - 5PM ; SAT 9AM - 12 NOON.

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: MON - FRI 8:30AM - 5:30PM ; SAT 9AM - 1PM.

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: MON - FRI 9PM - 7AM ; SAT AFTER 2PM ; SUN - ANYTIME

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No X

   Comments: # IT WOULD NOT SIGNIFICANTLY IMPACT MY BUSINESS IF I AM ABLE TO HAVE PARKING (1 SPACE) & ACCESS TO BUSINESS AS I DO WORK AT NIGHT WHEN STORE IS CLOSED.

4. Would Saturday construction significantly impact your business/residence?

   Yes X No _____

Comments: _____

LANDSCAPE ARCHITECTURE AND PLANNING
1955 MAIN STREET, SUITE 200 WAILUKU, MAUI, HAWAII 96793-1705 (808) 242-1955 FAX: 242-1956

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No X

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: ① PARKING HAS BEEN A MAJOR PROBLEM - NOT ONLY FOR THE VENDORS BUT ALSO FOR THEIR CUSTOMERS, AS THE NEARBY MUNICIPAL PARKING LOT IS FILLED IN THE 12-HOUR PARKING BY 8AM MON-FRI. HOW WILL THIS ISSUE BE RESOLVED DURING CONSTRUCTION? (WHEN THERE WILL BE LESS SPACES?)
② WHAT ABOUT THE NOISE & DUST GENERATED?

Thank you for your cooperation. Please return this survey to the following address:

(*) DUE TO THESE PROBLEMS, WE REQUEST THAT CONSTRUCTION BE DONE DURING OFF HOURS.
THANK YOU!

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Business Name: Paul M Hutchinson CPA

Street Address/Location: 24 N. Market St

Type of Business: CPA Firm

Hours of Operation: 9A-5P Monday & See #6

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

   Comments: 9A - 5P

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: 6A - 12N

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: _____

4. Would Saturday construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: _____

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: Feb thru April is our busiest period - other than these months the impact would be Tolerable.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

Residence
~~Business~~ Name: Ruby and Tsugio Sakurada

Street Address/Location: 1995 Liko Place

Type of Business:

Hours of Operation:

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your business/residence.

Comments: Since we are both retired, it does not matter greatly what time construction goes on as we can adjust our schedules accordingly.

2. Please indicate the periods of the day that construction would least impact your business/residence.

Comments: See above

3. Would nighttime construction significantly impact your business/residence?

Yes _____ No ✓

Comments: Unless the noise level becomes too loud.

4. Would Saturday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: Except during the morning hours when we leave for church service and tennis.

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: We hope the dust will be kept to a minimum.

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

CHRIS HART & PARTNERS, INC.

RECEIVED
JAN – 9 2003
CHRIS HART & PARTNERS
Landscape Architecture & Planning

Business Name: —

Street Address/Location: 1994 Liko Lane, Wailuku

Type of Business: Residence - (Kingo + Satsue Kaneshiro)

Hours of Operation: —

Description: The Market Street Beautification Project is scheduled to begin in September of 2004 and construction is anticipated to be ongoing for twelve (12) months. Construction will occur in phases impacting different sections of the roadway at different times. Construction will occur during daytime hours but may also occur during the evening. This survey will be utilized to develop a Roadway Mitigation Plan to better address the construction phase impacts.

Questions:

1. Please indicate the periods of the day that construction would *most* impact your ~~business~~/residence.

   Comments: No Impact

2. Please indicate the periods of the day that construction would least impact your business/residence.

   Comments: No Impact

3. Would nighttime construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: _____

4. Would Saturday construction significantly impact your business/residence?

   Yes _____ No ✓

   Comments: _____

5. Would Sunday construction significantly impact your business/residence?

Yes _____ No ✓

Comments: _____

6. Please describe any other comments you have regarding the project's construction related impacts.

Describe: No Impact Known

Thank you for your cooperation. Please return this survey to the following address:

Mr. Michael Summers
Chris Hart & Partners, Inc.,
1955 Main Street, Suite 200,
Wailuku, Maui, Hawaii, 96793.

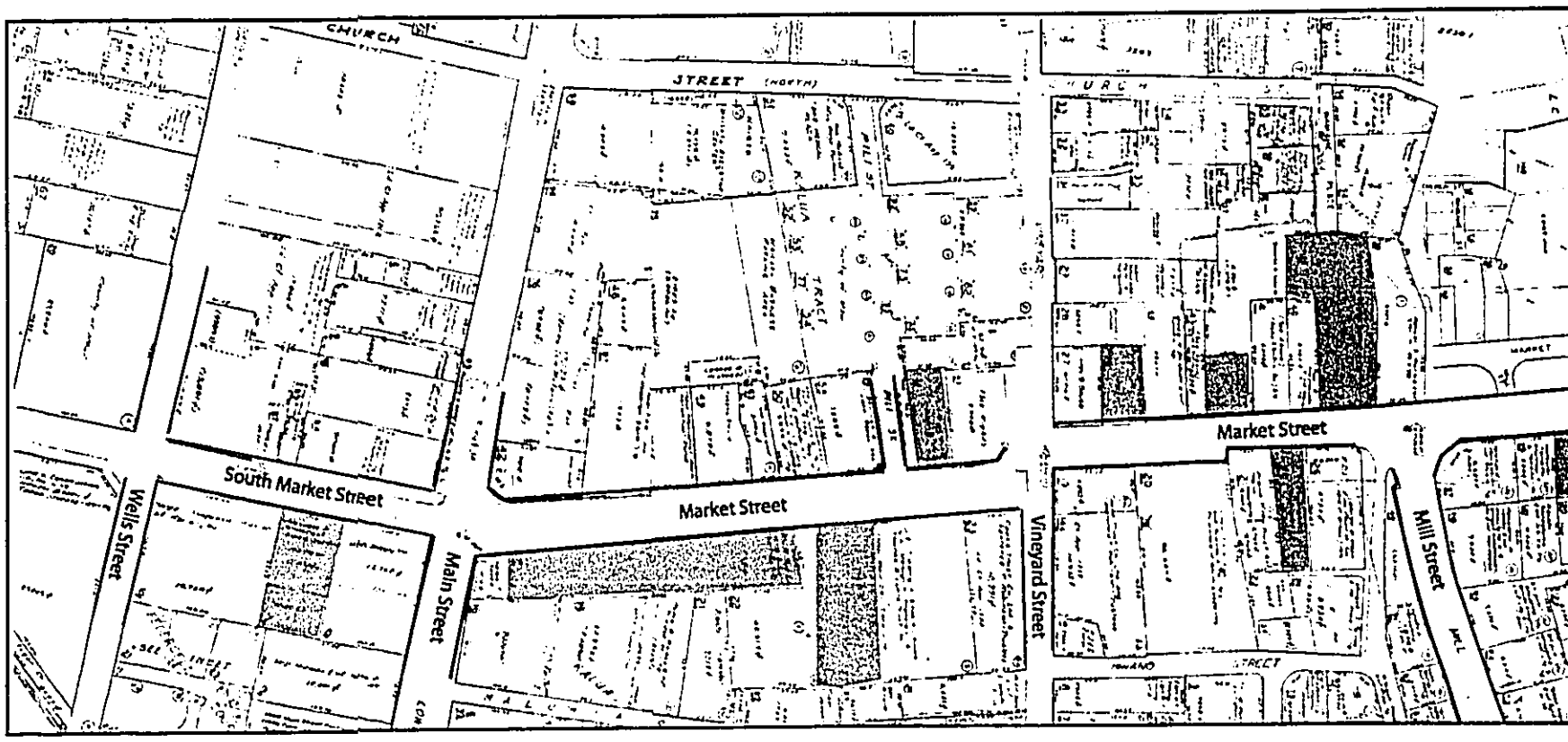
Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.

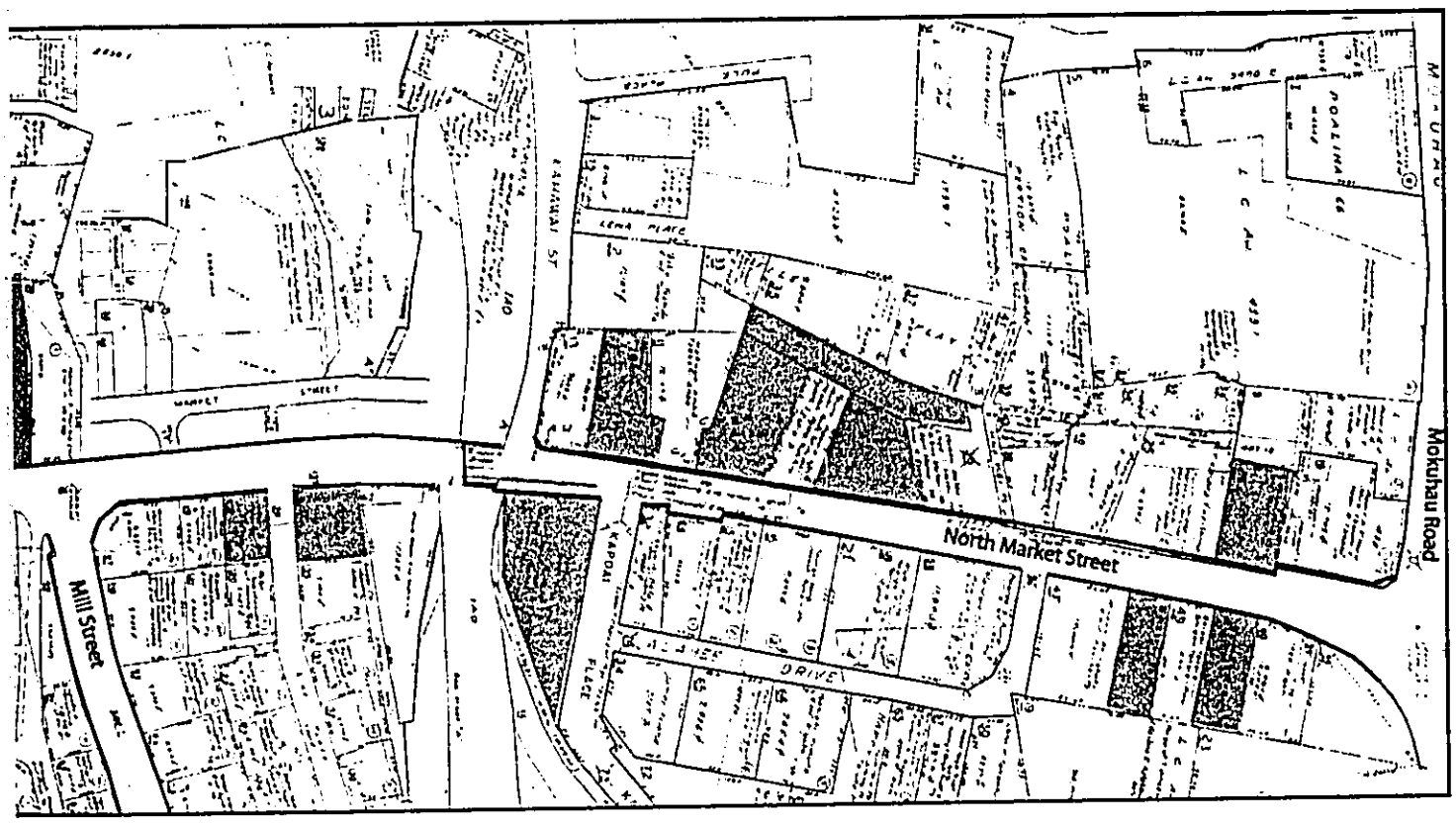
RECEIVED AS FOLLOWS



Prefer Nighttime/M-F, Sunday Construction
(Primarily Commercial Uses)

Prefer Daytime/M-F Construcion
(Primarily Residential Uses, Restaurants Iao Theatre)

RECEIVED AS FOLLOWS



CONSTRUCION PHASE IMPACTS:
SURVEY RESPONSES

MARKET STREET IMPROVEMENT PROJECT
02/21/03

CHRIS HART &PARTNERS

- February 27, 2003, Public Information Meeting

CHRIS HART
& PARTNERS, INC.

February 12, 2003

Dear Market Street Property Owner:

RE: Community Meeting to Present Preliminary Design Plans in Support of Market Street Beautification Project

Please note that a Community Meeting is scheduled for Thursday, February 27, 2003, at 6:00 PM in the Planning Department Conference Room (250 South High Street, Wailuku, HI 96793) to discuss plans prepared in support of the Market Street Beautification Project.

The purpose of the project is to enhance the urban design character of Market Street as a pedestrian shopping experience in order to facilitate the long-term economic revitalization of the Wailuku downtown area. The project will focus on the incorporation of pedestrian amenities i.e. (benches, lighting, crosswalks, etc.) and landscape planting. Repaving the existing street to improve storm drainage and driving conditions will also occur. The proposed beautification improvements will occur along Market Street from Wells Street to Piihana Road. The improvements will be conducted in phases impacting a section of the roadway at a time.

This meeting is a follow-up to an earlier community meeting conducted on November 7, 2002. Since the November 7 meeting, numerous changes have been made to the plans and a survey was administered to neighboring property owners in order to elicit concerns regarding construction phase impacts.

The purpose of the meeting is to present the further refined plans to neighboring property owners, interested individuals and community organizations. Input from the meeting will be utilized to refine the plans so that final design plans can be prepared.

Should you have any questions, please contact myself, or Mr. Michael Summers, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect – Planner

LANDSCAPE ARCHITECTURE AND PLANNING
1860 MAIN STREET, SUITE 200 · WAILUKU, MAUI, HAWAII 96793-1708 · PHONE: 808-242-1955 · FAX: 808 242-1956

cc. Mr. Kirk Tanaka, Tanaka Engineers, Inc.
Mr. John F. Summers, Department of Planning
Ms. Ann Cua, Department of Planning
Mr. Joe Krueger, Department of Public Works and Waste Management

TMK 3-4-011-006
Honpa Hongwanji Mission

TMK 3-4-011-007
Sandhills Gang Partners
38 S. Market Street
Wailuku, HI 96793

TMK 3-4-011-008
Gulsons
P.O. Box 88296
Honolulu, HI 96830

TMK 3-4-012-017
Starr Equities
c/o Commerical Properties of Maui
132 N. Church Street
Wailuku, HI 96793

TMK 3-4-012-018
Aluli Trust Estate
Box 818
Kailua, HI 96734

TMK 3-4-012-022
County of Maui
200 South High Street
Wailuku, HI 96793

TMK 3-4-012-023
Robinson, William T
First Hawn Bank Tr Div
P.O. Box 3200
Honolulu, HI 96847

TMK 3-4-013-003
Main Street Partners
P.O. Box 806
Puunene, HI 96784

TMK 3-4-013-042
Brandel, Stuart L/Roxanna
365 Hoohana St., Ste. B
Kahului, HI 96732

TMK 3-4-013-048
Gaylord, George S
c/o Brunker Robert H.
13278 Schell Rd.
Oakdale, CA 95361-8757

TMK 3-4-013-050
Kato, Ralph K
1063 L. Main St.
Wailuku, HI 96793

TMK 3-4-013-055
American Savings Bank
Facilities Management
P.O. Box 2300
Honolulu, HI 96804

TMK 3-4-013-056
Ikeda, Ralph S
P.O. Box 790730
Paia, HI 96779

TMK 3-4-013-057
Hinaga, Gregory H.
Kimura, Lloyd Y
520 Polulani Dr.
Wailuku, HI 96793

TMK 3-4-013-057
Foo Sum, Edward
P.O. Box 846
Wailuku, HI 96793

TMK 3-4-013-057
The Leasing Co, Ltd.
140 N. Market Street., #201
Wailuku, HI 96793

TMK 3-4-013-057
Makino, Richard
2180 Vineyard St., #303
Wailuku, HI 96793

TMK 3-4-013-063
Singer, David
c/o David M. Brooks
15 Kulanihakoi Rd. #3B
Kihei, HI 96753

TMK 3-4-013-085
First Interstate Bank
1314 South King Street
Honolulu, HI 96814

TMK 3-4-013-085
Beppu Realty Inc.
P.O. Box 386
Wailuku, HI 96793

TMK 3-4-013-085
National Dollar Stores
929 Market St.
San Francisco, CA 94101

TMK 3-4-013-097
FHB Properties, Inc.
P.O. Box 3200
Honolulu, HI 96801

TMK 3-4-013-049
Kawahara, Ronald A
1619 Lokia St.
Lahaina, HI 96761-1819

TMK 3-4-017-019
First Hawaiian Bank
P.O. Box 3200
Honolulu, HI 96801

TMK 3-4-017-020
Maui Three Inc.
140 N. Market Street #200
Wailuku, HI 96793

TMK 3-4-017-021
Vossler, Heino
P.O. Box 1042
Wailuku, HI 96793

TMK 3-4-017-025
Noble, John O & Teresita B
160 Market St.
Wailuku, HI 96793

TMK 3-4-017-026
Felix, Frank Jr & Clara N
46-208 Kahuhipa St.
Kaneohe, HI 96744

TMK 3-4-017-038
Wailuku Community FCU
Wailuku FCU
175 Market St.
Wailuku, HI 96793

TMK 3-4-017-039
Rippy, John S & Lorraine N
92 Maluhia Dr
Wailuku, HI 96793

TMK 3-4-017-040
Castleton, Dale M
357 Kenolio Rd.
Kihei, HI 96753

TMK 3-4-017-040
Levine, Paul J
P.O. Box 878
Santa Rosa, CA 95402

TMK 3-4-017-041
Cabebe, Dolores
151 D Market St.
Wailuku, HI 96793

TMK 3-4-017-043
Hubin, Sheila A
271 Momi Place
Wailuku, HI 96793

TMK 3-4-017-044
Kameya Family LLC
P.O. Box 1093
Wailuku, HI 96793

TMK 3-4-017-045
Wailuku Sugar Company
255 E. Waiko Rd.
Wailuku, HI 96793

TMK 3-4-017-046
Adzuara, Leticia P.
916 Puuloa St.
Wailuku, HI 96793

TMK 3-4-017-048
Kaneshima, Lynette
P.O. Box 224
Wailuku, HI 96793

TMK 3-4-017-072
Tagami Family Trust
Tagami, Dale
95-321 Kamalei St.
Mililani Town, HI 96789

TMK 3-4-017-117
Yamashiro, Shiori
P.O. Box 877
Wailuku, HI 96793

TMK 3-4-017-118
Balmoja, Alfredo & Carmilla G
214 N. Market St.
Wailuku, HI 96793

TMK 3-4-017-119
Sakurada, Tsugio & Ruby
P.O. Box 538
Wailuku, HI 96793

TMK 3-4-017-136
Kanechika, Kingo & Satsue
40 Molokini St.
Kahului, HI 96732

TMK 3-4-017-137
Wailuku Agribusiness Co
255 E. Waiko Rd
Wailuku, HI 96793

TMK 3-4-017-142
Kameya Family LLC
Kameya, Chozen
P.O. Box 1093
Wailuku, HI 96793-1093

TMK 3-4-017-143
Wakamatsu, Kanji
P.O. Box 1092
Wailuku, HI 96793

TMK 3-4-033-009
Singer, David M
P.O. Box 3017
Wailuku, HI 96793-1719

TMK 3-4-033-010
Ogawa, Masashu Tr.
327 N. Market St.
Wailuku, HI 96793

TMK 3-4-033-010
Honda, Marshall
94 Nakoa Dr.
Wailuku, HI 96793

TMK 3-4-033-011
Anbe, Carl T.
45-123 Popoki St.
Kaneohe, HI 96744

TMK 3-4-033-012
Brown, David H
2525 Kahekili Hwy
Wailuku, HI 96793

TMK 3-4-033-013
Uchida, Lowell T
309 Market Street
Wailuku, HI 96793

TMK 3-4-033-013
Takayama, Beverly E.
7214 Alakoko St.
Honolulu, HI 96825

TMK 3-4-033-015
Tamashiro, Edmund K & Kimiko
328 B Market Street
Wailuku, HI 96793

TMK 3-4-033-016
Happy Valley Hale Maui
455 S. Kihei Rd.
Kihei, HI 96753

TMK 3-4-033-018
Fujita Family Trust
Fujita, Pamela
3370 Emekona Pl
Honolulu, HI 96822

TMK 3-4-033-025
Harada, Yuichi
319 Naholo Cir
Kahului, HI 96732

TMK 3-4-033-026
Yamamoto, Stella
306 West Papa Avenue
Kahului, HI 96732

TMK 3-4-033-032
Toma, Charles Y
533 Iimi Way
Wailuku, HI 96793

TMK 3-4-033-038
Takamiya, Doris T
359 N. Market St
Wailuku, HI 96793

TMK 3-4-033-040
Shimabuku, Randal R
P.O. Box 141
Wailuku, HI 96793

TMK 3-4-033-044
Kamita, Ernest M & Hiroko
322 N. Market St.
Wailuku, HI 96793

TMK 3-4-033-045
Shimabuku, Rinkichi & Kazuko
P.O. Box 1246
Wailuku, HI 96793

TMK 3-4-033-047
Alirez, Larry C & Hannah N
384 N. Market Street
Wailuku, HI 96793

TMK 3-4-033-048
Yamashiro Family Tr
372 N. Market St
Wailuku, HI 96793

TMK 3-4-033-049
Tamashiro, Stanley S.
248 W. Hawaii St.
Kahului, HI 96732

TMK 3-4-033-050
Maui Hostel LLC
310 N. Market St.
Wailuku, HI 96793

TMK 3-4-033-058
Funai, Goerge S & Jean E
1823 Pikale Rd
Wailuku, HI 96793

TMK 3-4-033-060
Kamita, Sharon M
P.O. Box 1052
Wailuku, HI 96793

TMK 3-4-033-076
T K Kimura Inc.
399 N. Market Street
Wailuku, HI 96793

TMK 3-4-033-076
Kimura, Joyce
99 Lunalilo St.
Wailuku, HI 96793

TMK 3-4-033-076
Taniguchi, Carol T
438 Puamamane St
Honolulu, HI 96821

TMK 3-4-033-076
Yamami, Karen K
11251 Morrison St., #204
North Hollywood, CA 91601

TMK 3-4-033-076
Yamami, Matthew T
1019 S. Saint Tropez Ave.
Anaheim, CA 92808

Appendix – B
Archaeological Monitoring Plan

Archaeological Monitoring Plan for an Inventory Survey Concurrent with Construction for the Market Street Improvements Project, Wailuku *Ahupua'a*, Wailuku District, Wailuku, Maui
(TMK 3-4-12, 13, 14, 17, 33)
(Job No. 01-068)

Prepared for:

Mr. Kirk Tanaka,
R.T. Tanaka Engineering, Inc.
Wailuku, Maui

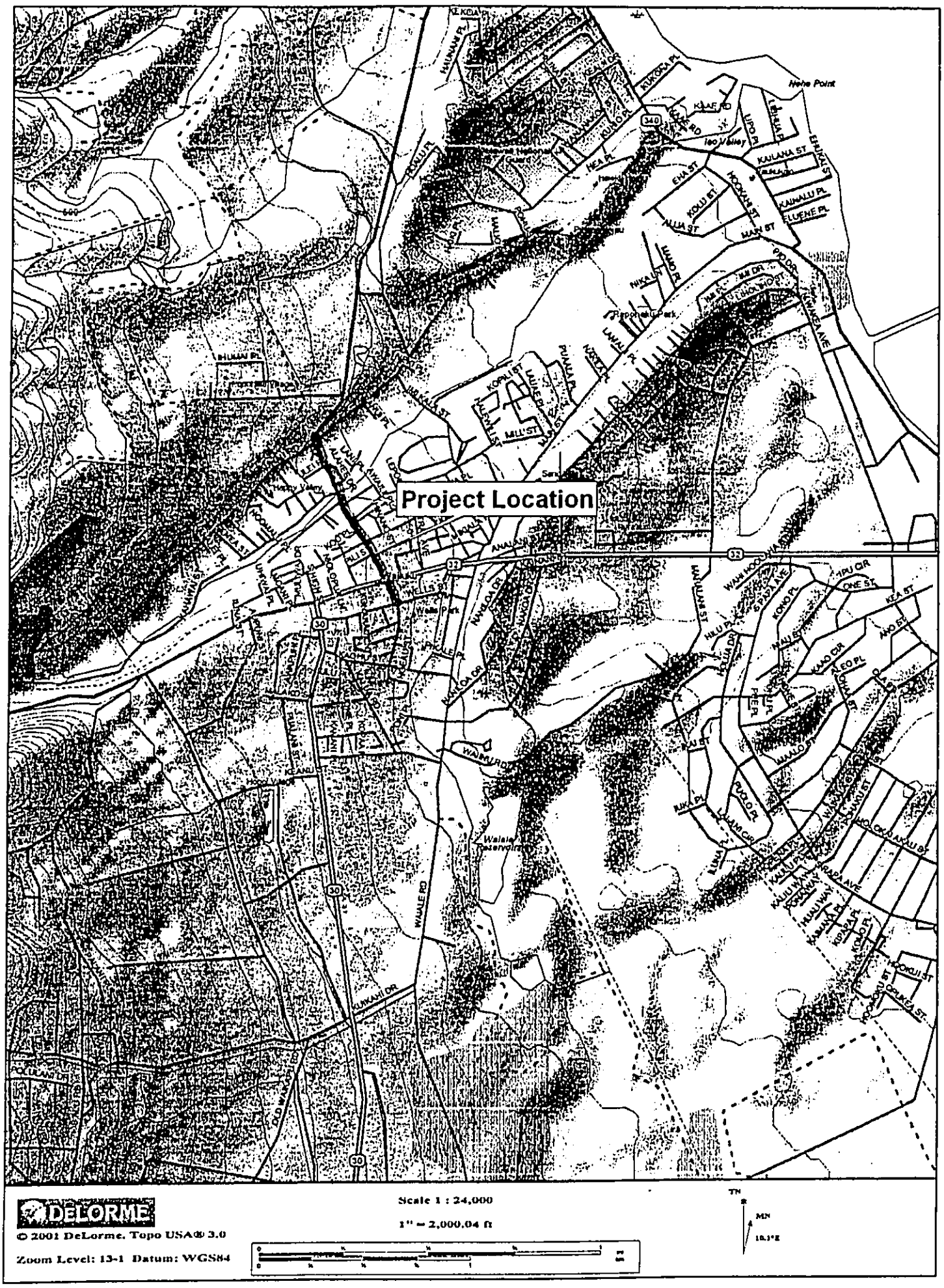
Prepared by:

Xamanek Researches
Pukalani, Maui

Erik Fredericksen

17 March 2003

RECEIVED AS FOLLOWS



INTRODUCTION

Mr. Kirk Tanaka of R.T. Tanaka Engineering, Inc. contacted us in 2001 about conducting an archaeological inventory survey for the planned Market Street Improvements Project. At the time, project plans called for improvements to the existing Market Street, as well as a portion of Kahekili Highway that runs from Mokuhau Street to Wai'ehu Beach Road. The State Historic Preservation Division (SHPD) had earlier reviewed construction plans and indicated that an archaeological inventory survey was necessary.

We were asked to provide a proposal for the necessary work, and we were subsequently contracted to carry out the inventory survey. Some preliminary fieldwork was undertaken, and one probable site was located along Kahekili Highway.[1] We were subsequently informed that the scope of work had changed, and that the County of Maui had dropped the Kahekili Highway section of the project. In subsequent discussions with Dr. Melissa Kirkendall of the SHPD Maui office in late 2002 and early 2003, it was determined that it would be more appropriate to conduct the inventory survey concurrently with road construction. This methodology has been chosen because of the logistical problems associated with the presence of the paved road, existing utilities and sidewalks, and the proximity of residences, businesses and other infrastructure along Market Street.

The revised project area lies in Wailuku Town and extends from Wells Street northwestwards to Mokuhau Street in Happy Valley, Maui (Figures 1-6). Present improvement plans include widening Market Street, placing paved pedestrian crossways at several locations, and the installation of various trees and planting strips along both sides of North Market Street. The study area is located in Wailuku *ahupua`a*, Wailuku District on the island of Maui (TMK 3-4-12, 13, 14, 17, 33).

[1] This probable site lies in the vicinity of the intersection of Wai'ehu Beach Road and Kahekili Highway. However, this site now lies outside the project area.

THE STUDY AREA

The project area lies in Wailuku Town and includes both South and North Market Street sections—a c. 2,900-foot (880-meter) long corridor. The corridor ranges from about 40 to 70 feet in width. This portion of Wailuku Town receives approximately 30 to 40 inches of annual precipitation (Juvic and Juvic, 1998). Estimated elevations in the project corridor range from a low of 236 ft AMSL to a high of 284 ft AMSL.

As previously noted above, the entire study area essentially lies under pavement and concrete. The present project area has been impacted by past earthmoving activities associated with the construction of the various buildings along Market Street as well as the street itself, along with the placement of sewer, water and other utilities.

EXISTING SITE ALONG MARKET STREET

At least one site lies in the project area, and will need documentation. Several sections of the sidewalk along both sides of the South and North Market Street segments contain basalt edging. This cut basalt edging is visible in many sections of the road shoulder, and qualifies for importance under at least Criterion "d" for its information content (Photographs 1, 2 and 3). In addition, the author knows of at least one section of WPA[2] era sidewalk that lies to the southwest of South Market Street (Photograph 4).

[2] WPA stands for the Works Program Administration, a federal work project that was carried out in the 1930s throughout various portions of the United States as well as the Territory of Hawaii. The sidewalk section to the south of the project area was constructed in 1939.

RECEIVED AS FOLLOWS

Photo 1 – General view of Market and Main Street intersection showing cut basalt curbing on the east side of Market Street.

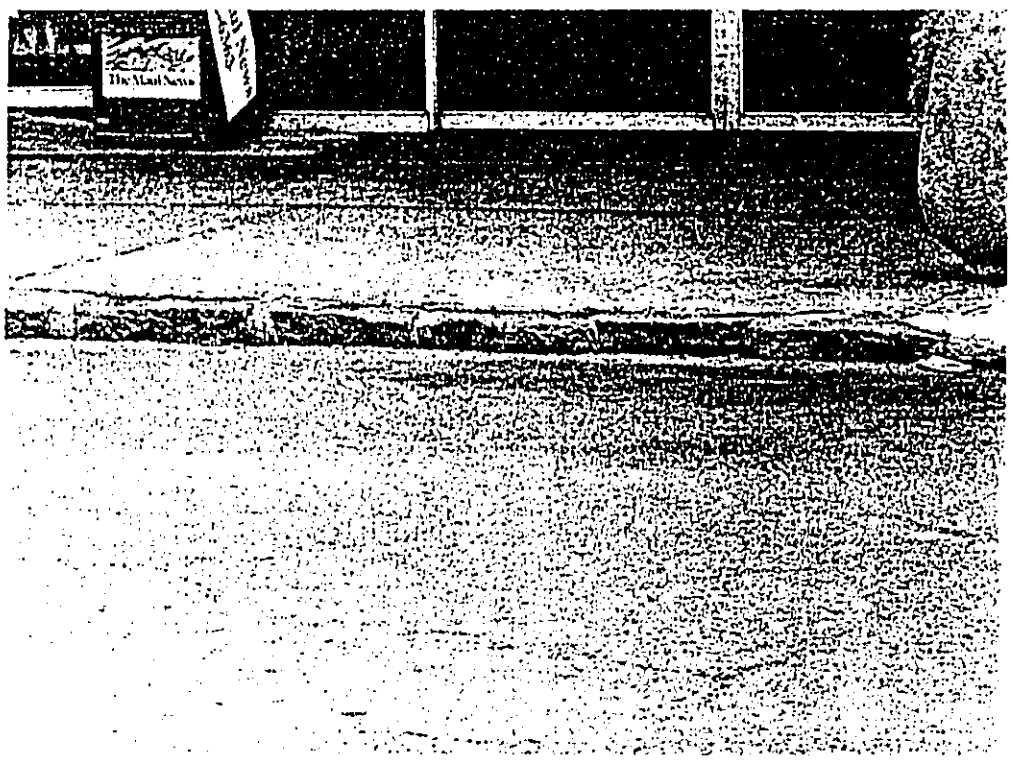


Photo 2 – Detail of cut basalt curbing along Market Street.

RECEIVED AS FOLLOWS

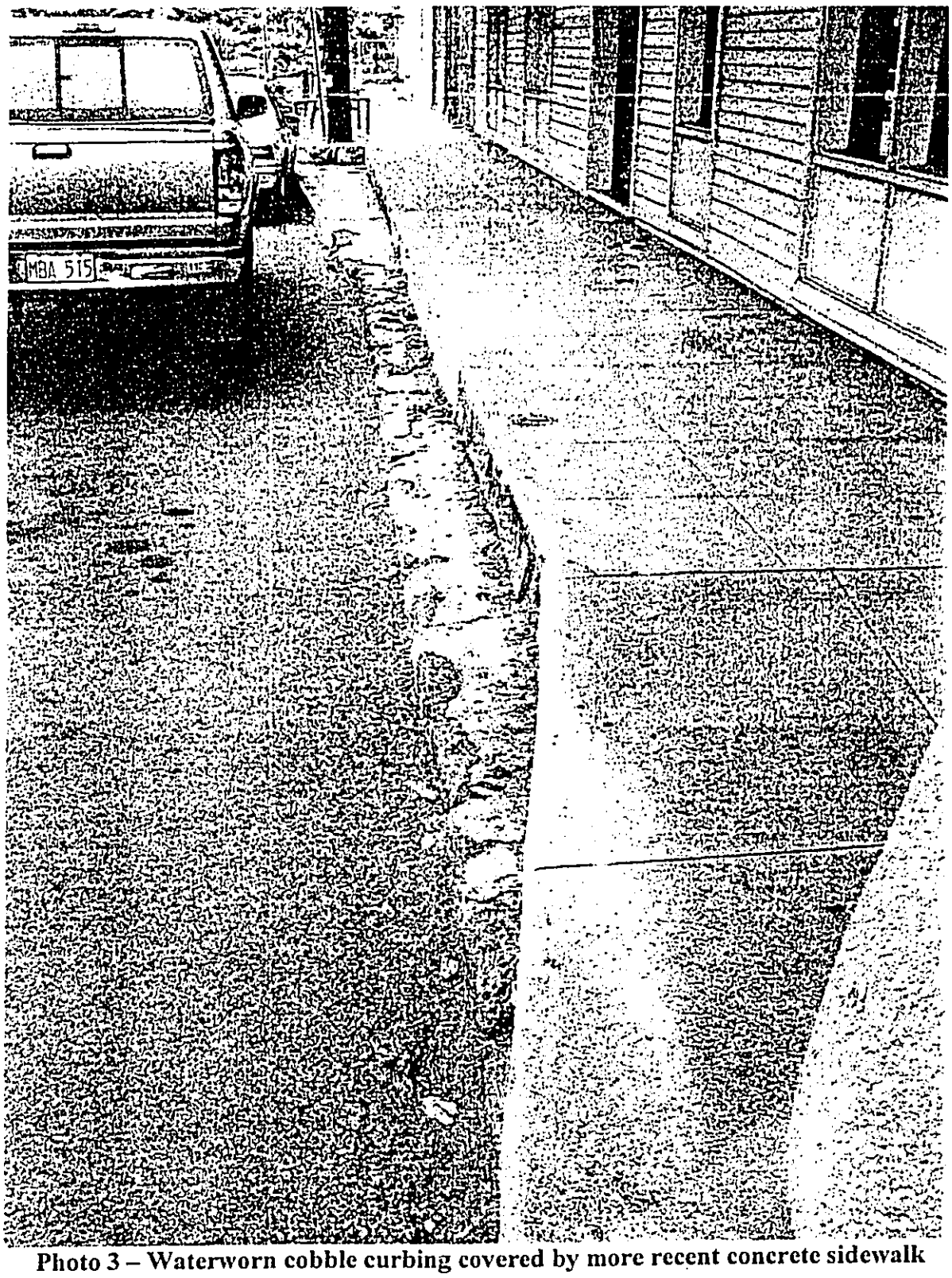


Photo 3 – Waterworn cobble curbing covered by more recent concrete sidewalk near intersection with Mill Street.

RECEIVED AS FOLLOWS

Photo 4 – Detail of concrete sidewalk mark south of Wells Street and Market Street intersection—outside the project area.

ARCHAEOLOGICAL MONITORING PLAN

Scope of monitoring

The scope of this monitoring plan includes having an archaeological monitor present during all subsurface earthmoving activities in the project area (Figures 2-6). Actual on-site time and specific actions to be followed in the event of inadvertent discoveries will be discussed at a pre-construction meeting. Additional meetings will be called should the MLIBC, the SHPD Maui office, the archaeological consultant or the general contractor believe that other relevant information should be disseminated.

Project methodology

It is possible that significant material culture remains will be discovered during earthmoving activities in this portion of Wailuku. Several sites have been previously identified in the general area. The possibility exists that precontact cultural layers and/or human burials may be contained in the study area.

Close cooperation between the archaeological monitor(s) and other project personnel is essential for the present project. Given the location of the study area, this project will be carried out as an archaeological inventory survey that is concurrent with construction. The following procedures will be followed during the course of the project:

1) The general contractor shall be responsible for ensuring that the monitoring archaeologist is aware of the excavation schedule and that a monitor is present at all earth-moving activities designated for monitoring.

2) The archaeological consultant, the general contractor and any subcontractors are responsible for ensuring that on-site work is halted in an area of significant finds and to protect the find(s) from any further damage (i.e., fencing, protective covering, etc.). The State Historic Preservation Division (SHPD) shall recommend appropriate mitigation actions (change work order). Both SHPD and the Maui/Lana`i Islands Burial Council (MLIBC) will be consulted in the event that human remains are found. (Note: significant finds will necessitate a change work order).

3) In the event of the discovery of human remains, work shall cease in the immediate find spot. The archaeological consultant shall be responsible for notifying the Historic Preservation Division Burials Program (HPDBP) and the SHPD Maui office which, in consultation with the Maui/Lana`i Islands Burial Council, will determine the appropriate mitigation measures to be

taken. The notification process will include accurate information regarding the context and composition of the find(s) [change work order].

4) The archaeological consultant shall work in compliance with Hawaii Revised Statutes Chapter 6E (procedures Relating to Inadvertent Discoveries).

5) The archaeologist shall have the authority to closedown construction activities in areas where potentially significant discoveries have been made until they have been properly evaluated (change work order). Normally, construction activities may continue in unaffected portions of the project area.

6) Field procedures to be followed for documentation of discovered cultural features or human skeletal remains: a) standard field methods including recordation of profiles showing stratigraphy, cultural layers, etc.; b) mapping; photographing of finds other than human remains; c) and excavation of cultural materials and/or exposed features (change work order).

7) The SHPD Maui staff archaeologist will be notified and consulted in regards to treatment of identified features such as cultural layers, artifact or midden concentrations, structural remains, etc., considered to be of significance under S13-279-2 (definitions).

8) The monitoring archaeologist must make a "best effort" to search for significant material culture remains (i.e. artifacts, features, midden, skeletal materials, etc.). Machine excavation speed will be reduced in the event that significant material culture remains are discovered.

9) Significant archaeological discoveries, if they occur, shall be protected and identified by construction "caution" tape, fencing, or other reasonable means, until mitigation measures have been discussed with SHPD (change work order).

10) One monitor in most instances will carry out fieldwork. Tasks will include observation of excavation activities, recordation of finds, etc. However, it may well be likely that additional archaeologist(s) will be needed in the event that significant finds occur.

11) The MLIBC requests that one archaeological monitor be assigned to each piece of equipment in the event that more than one is used for actual excavation in the project area.

12) Chapter 6E-11 (a) specifies the following "It shall be unlawful for any person or corporate, to take, appropriate, excavate, injure, destroy, or alter any historic property or aviation artifact located on the private lands of any owner thereof without the owner's written permission being first obtained. It shall be unlawful for any person, natural or corporate, to take, appropriate, excavate, injure, destroy, or alter any historic property located upon lands

owned or controlled by the State or any of its political subdivisions, except as permitted by the department."

Field methods utilized will include photographic recording (when appropriate), artifact excavation (recovery and recording), profile documentation of cultural layers and stratigraphy, excavation and recording of exposed features, and mapping of all pertinent features on an appropriate site map. A daily log (field notes) of activities and findings will also be kept. Gathered information will be utilized in the preparation of an archaeological inventory survey report to be submitted to the SHPD for review.

In the event that human skeletal remains are inadvertently encountered, notification of SHPD (HPDBP), the SHPD Maui office and the Maui/Lana`i Islands Burial Council will be made, and appropriate mitigation determined (Note: photographs of human skeletal remains will not be taken).

A supervisory archaeologist will regularly visit the monitoring site, or as often as is necessitated by the nature of the construction activities and archaeological findings. If significant discoveries are made, appropriate mitigation measures will be discussed with the SHPD Maui archaeologist (and the MLIBC if human remains are encountered).

The archaeological consultant will curate any cultural materials, other than human remains recovered from the monitoring project, until analysis is completed and then turned over to the appropriate parties. Long-term curation arrangements of such materials will be approved by the SHPD.

When fieldwork for this archaeological inventory survey in the form of monitoring project has been completed, a draft inventory survey report will be prepared. This draft report will be submitted to the State Historic Preservation Division within 180 days of the completion of fieldwork, for comment and approval. Approved changes and corrections will result in the final report for this project.

RECEIVED AS FOLLOWS

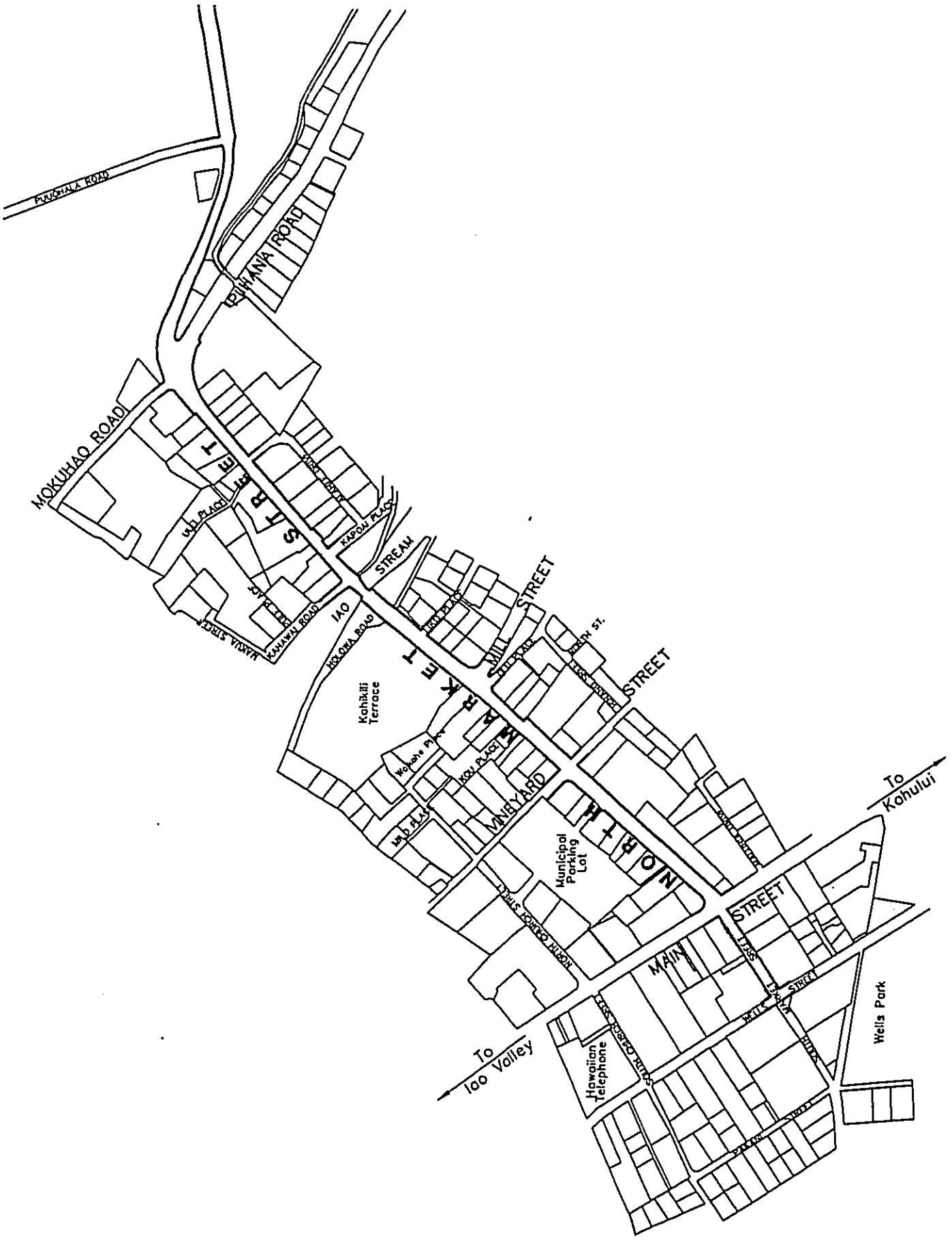


Figure 2: Overview of the Market Street Improvements project area.

RECEIVED AS FOLLOWS

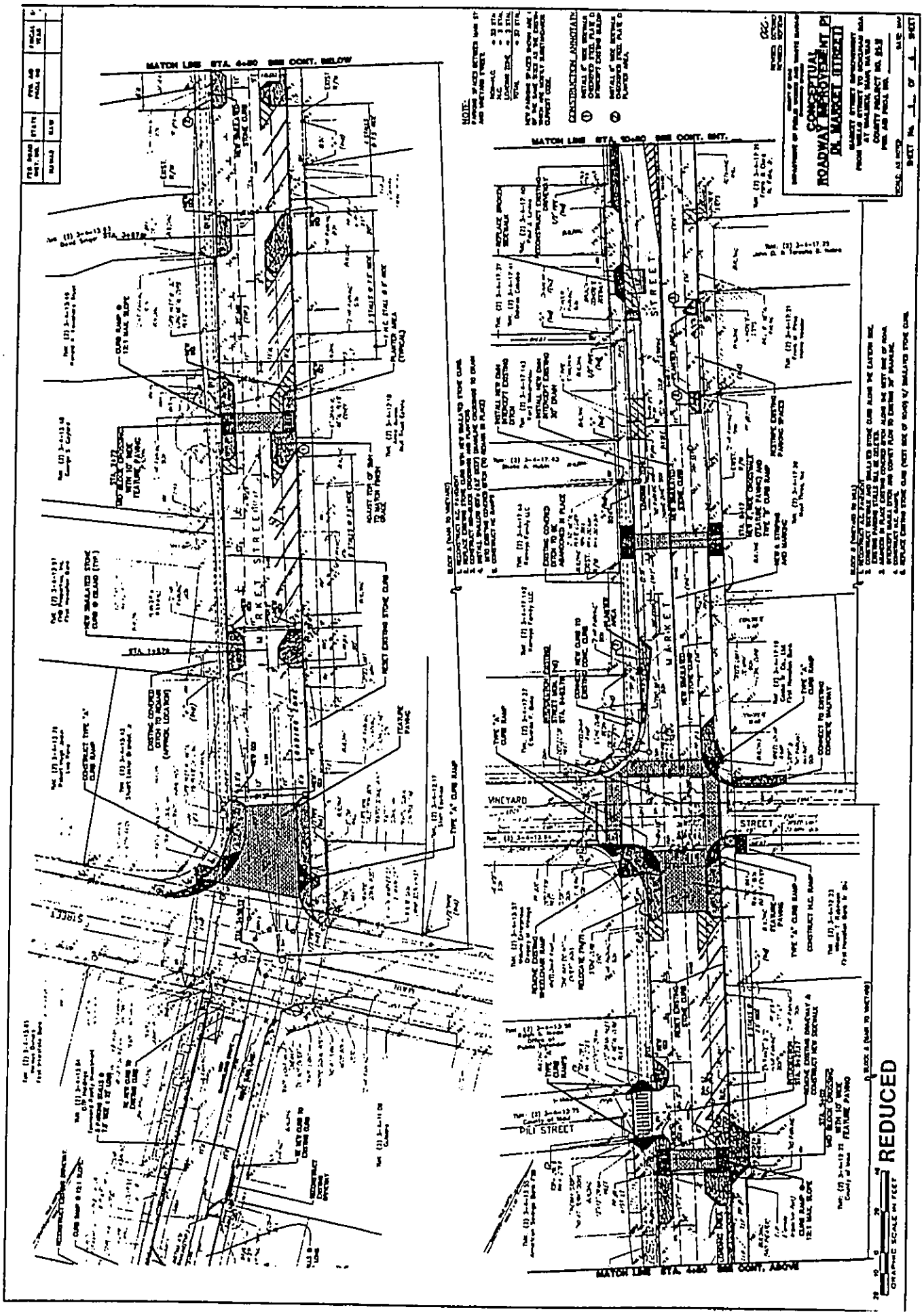


Figure 3: Section 1 of the Market Street Improvements project area.

RECEIVED AS FOLLOWS

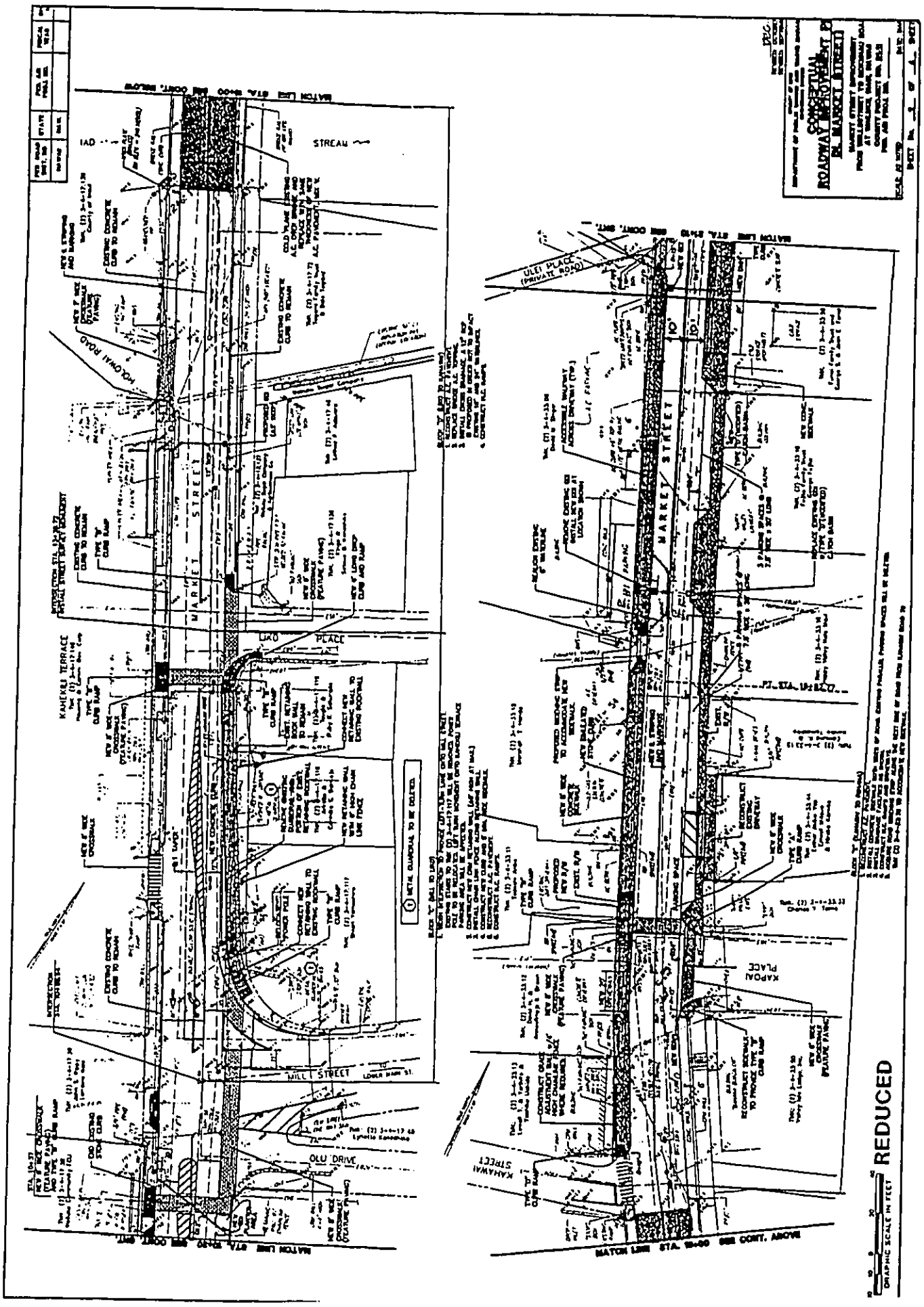


Figure 4: Section 2 of the Market Street Improvements project area.

RECEIVED AS FOLLOWS

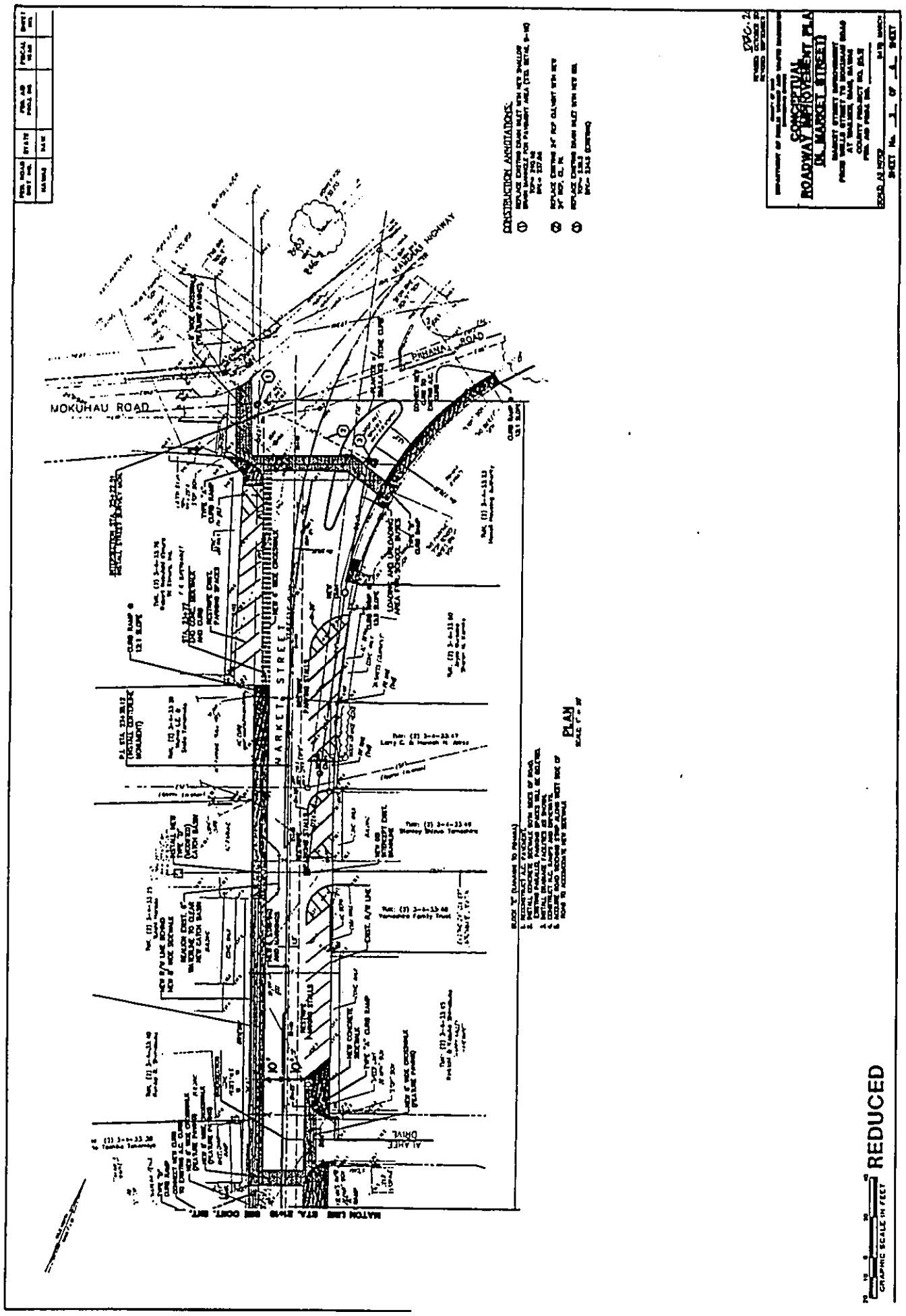


Figure 5: Section 3 of the Market Street Improvements project area.

RECEIVED AS FOLLOWS

Figure 6: Section 4 of the Market Street Improvements project area.

Appendix – C
Preliminary Drainage and Soil Erosion Control Report

PRELIMINARY

DRAINAGE & SOIL EROSION CONTROL STUDY

FOR

MARKET STREET IMPROVEMENTS

FROM WELLS STREET TO MOKUHAU ROAD

PROJECT NO. 01-11

AT WAILUKU TOWN, MAUI, HAWAII

TAX MAP KEY: (2) 3-4-11; 3-4-17 & 3-4-33

PREPARED FOR:

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS & ENVIRONMENTAL MANAGEMENT
ENGINEERING DIVISION
WAILUKU, MAUI, HAWAII - 96793

PREPARED BY:

Fonoka
ENGINEERS, INC.
CIVIL & STRUCTURAL ENGINEERING • LAND SURVEYING • CONSTRUCTION MANAGEMENT & INSPECTIONAL SERVICES

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII - 96793
JOB NO. 01-068

MAY 2003

TABLE OF CONTENTS

FIGURE 5 - CONCEPTUAL ROADWAY IMPROVEMENT PLAN

FIGURE 6 - CONCEPTUAL ROADWAY IMPROVEMENT PLAN

FIGURE 7 - CONCEPTUAL ROADWAY IMPROVEMENT PLAN

FIGURE 8 - EXISTING DRAINAGE SYSTEM

FIGURE 9 - PROPOSED ONSITE DRAINAGE IMPROVEMENTS

FIGURE 10 - CONCEPTUAL OFFSITE DRAINAGE IMPROVEMENTS

I. INTRODUCTION:

A. PROJECT LOCATION AND DESCRIPTION:

The proposed Market Street improvements which is about 3,000 feet long is located in Wailuku that stretches across the town's business core from Wells Street to the junction of Mokuhau and Piihana Roads in Happy Valley as shown on Figure 1 - Vicinity Map. The proposed project is within the redevelopment area for the economic revitalization of Wailuku Town.

The proposed roadway improvements include pavement reconstruction; construction of concrete sidewalks and handicapped wheel-chair ramps; reconstruction of driveways; installation of drainage facilities; construction of planter islands; possible realignment of existing utilities such as water, electric and telephone systems; and related improvements.

The conceptual roadway improvements are shown on Figures 4 to 7.

B. PURPOSE OF STUDY:

The purpose of this preliminary drainage report is to investigate the necessary improvements to enhance the collection and conveyance of roadway runoff to alleviate roadway flooding and ponding.

C. BASIS OF STUDY:

This drainage study is fundamentally based on the standards as set forth by the "Rules for the Design of Storm Drainage Facilities" in the County of Maui [1]. The erosion control measures to be instituted during

development of the project will be in accordance with the requirements of Chapter 20.08 of the Maui County Code (MCC) (Ordinance No. 2684).

II. WAILUKU DRAINAGE MASTER PLAN:

In 1964, the Report of Storm Drainage Study for Wailuku [5] developed a drainage system master plan for Wailuku that includes the project site. This report was updated in 1985 and storm flows were recalculated by applying the design criteria recommended by the 1971 Drainage Master Plan for the County of Maui.

The project site is also within the Wailuku Redevelopment Area (WRA) which is being planned for economic revitalization. Thus, in the 2002 WRA Infrastructure Study, Phase 2 [6], storm flows in the 1964 and 1985 report affecting the WRA were again revised by using coefficient of runoff values from the 1995 Rules for the Design of Storm Drainage Facilities in the County of Maui [1] and based upon ultimate land uses depicted in the 2000 Wailuku Redevelopment Plan Town Assessment [7].

In accordance with the WRA Infrastructure Study, Phase 2, the existing drainage systems within the project site and vicinities are generally capable of conveying storm runoff that will be generated by the redevelopment of Wailuku Town. For instance, the North Market Street Drainage System and Happy Valley Drainage System #1 (Figure 8) are adequate to convey runoff generated onsite and tributary areas west of the project site.

III. EXISTING CONDITIONS:

A. SOIL CONDITIONS:

Soils at the project site (Figure 2) are classified under "Wailuku" and "Iao" soil series [3]. Both series consist of well-drained soils on alluvial fans which were developed from basic igneous rock. Portions of the project site south of Iao Stream have soils classified as Wailuku Silty Clay (WvB), which is characterized as having slow runoff and slight erosion hazard. Soils existing in the Happy Valley portion of the project site is Iao Silty Clay (IbB), where runoff is medium and the erosion hazard is moderate.

B. FLOOD HAZARD CONDITIONS:

The project site is beyond the limits of any established flood zones in accordance with Panel 150003 0190D, March 16, 1995 of the Flood Insurance Rate Map for Maui County (Figure 3). The floodway of Iao Stream that crosses the project site is confined within the stream's existing concrete channel.

Roadway ponding; however, might occur at the low area between Kapoai Place and Mokuhau Road during a heavy storm event due to lack of adequate collection facilities.

C. DRAINAGE SYSTEM:

There are existing drainage systems that handle runoff from the project site and vicinities. These systems are shown on Figure 8. The onsite systems, graphically shown on the aforementioned figure, are located on the ground whereas the offsite systems were compiled from

available construction plans on file with the Engineering Division of the Department of Public Works and Environmental Management. The Happy Valley drainage systems were constructed in the 1950's. The systems on Wells, East Main and Vineyard Streets and the onsite system from Vineyard Street to Iao Stream were installed after 1965 and were generally planned and designed in accordance with the Wailuku Drainage Master Plan.

D. ONSITE DRAINAGE:

Runoff from South Market Street is being collected by the Wells Street Drainage System and conveyed to the Waiale/East Main Street interceptor that discharges into Iao Stream. Runoff from North Market Street between East Main and Vineyard Streets flows into the East Main Street Drainage Systems #1 and #2 and eventually discharged into Spreckels ditch. Runoff from the west side of North Market Street between Vineyard Street and Holowai Road drains into the North Market Street Drainage System and eventually conveyed to Iao Stream. Runoff from the east side of N. Market Street between Vineyard and Mill Streets flows into Mill Street and is then collected by the road drainage system further downstream or it will cross the road onto low lying adjacent properties. Runoff from the east side of North Market Street between Mill Street and Liko Place will flow into Liko Place and eventually drains into the low-lying adjacent properties. Runoff from N. Market Street between the Iao Stream Bridge and Mokuhau Road is being collected by Happy Valley Drainage System #2 and then conveyed to Iao Stream.

IV. STORM RUNOFF QUANTITIES:

Based on preliminary hydrologic calculations (see attached Hydrologic Chart) the project site currently generates the following runoff quantities:

Street	Section	Area (Acs.)	Runoff Flow (CFS)	
			Q_{10}	Q_{50}
S. Market	Wells to E. Main Streets	0.3	1.8	2.1
N. Market	E. Main to Vineyard Streets	0.9	4.7	5.4
	Vineyard to Mill Streets	0.5	2.9	3.5
	Mill Street to Iao Stream Bridge	0.5	3.0	3.6
	Iao Stream Bridge to Mokuhau Road	0.8	4.1	4.9
TOTAL		3.0	16.5	19.5

The above existing storm runoff quantities are not expected to increase after completion of the proposed roadway improvements since the existing ground characteristics and drainage flow patterns will not be significantly altered.

V. PROPOSED DRAINAGE IMPROVEMENTS:

A. ONSITE:

The proposed onsite drainage improvements are graphically shown on Figure 9. The proposed drainage facilities are also shown on the roadway conceptual plans. The recommended improvements will be connected to existing systems. The future facilities will consist of grated inlets, catch basins, drain manholes and underground drainage pipes. These facilities will hasten the collection of runoff to prevent street flooding and minimize ponding.

B. OFFSITE:

Offsite drainage system improvements will be needed should the proposed Kahekili Highway drainage system will be connected to the existing Mokuhau/Piihana Road Drainage System (Figure 9). A portion of the proposed Kahekili Highway drainage system and conceptual offsite improvements are shown on Figure 10. It calls for the upgrading of Happy Valley Drainage System #3 and a portion of Happy Valley Drainage System #2.

VI. EROSION CONTROL PLAN:

The contractor will be required to submit satisfactory soil erosion control measures to the County (Development Services Administration) prior to issuance of a grubbing and grading permit. The erosion control plan shall include Best Management Practices in compliance with Section 20-08.035 of the Maui County Code (Grading Ordinance No. 2684) and applicable sections of the Construction Best Management Practices (BMPs) for the County of Maui, May 2001.

VII. CONCLUSION:

Based on this study, completion of the proposed improvements, will not cause additional adverse drainage effects to adjacent and downstream properties. The proposed rehabilitation will not increase existing roadway runoff since the new ground characteristics and drainage flow patterns will be virtually similar to what it is at present. The installation of additional drainage facilities will

improve runoff collection thereby, preventing the potential occurrence of street flooding and minimize ponding.

VIII. REFERENCES:

1. Rules for the Design of Storm Drainage Facilities in the County of Maui, Title MC-15, Department of Public Works and Waste Management, County of Maui, Chapter 4.

2. Flood Insurance Rate Maps for the County of Maui, June 1981.

3. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, prepared by U. S. Department of Agriculture, Soil Conservation Service, August 1972.

4. Rainfall-Frequency Atlas of the Hawaiian Islands, Technical Paper No. 43, U. S. Department of Commerce, Weather Bureau, 1962.

5. Report of Storm Drainage Study for Wailuku, Maui, Department of Public Works, County of Maui, prepared by Norman Saito Consulting Engineer, September 1964 and updated May 1985.

6. Wailuku Redevelopment Area Infrastructure Study, Phase 2, Master Plan for Water, Wastewater and Drainage Systems, Office of the Mayor, County of Maui, prepared by R. T. Tanaka Engineers, Inc., November 2002.

7. Wailuku Redevelopment Plan, Town Assessment, Maui County Planning Department, January 2000.

PROJECT: Market Street Improvements
Project No. 01-011

DATE May 2003

LOCATION: Wailuku Town, Maui

T.M.K. _____

HYDROLOGY
ONSITE - EXISTING CONDITIONS

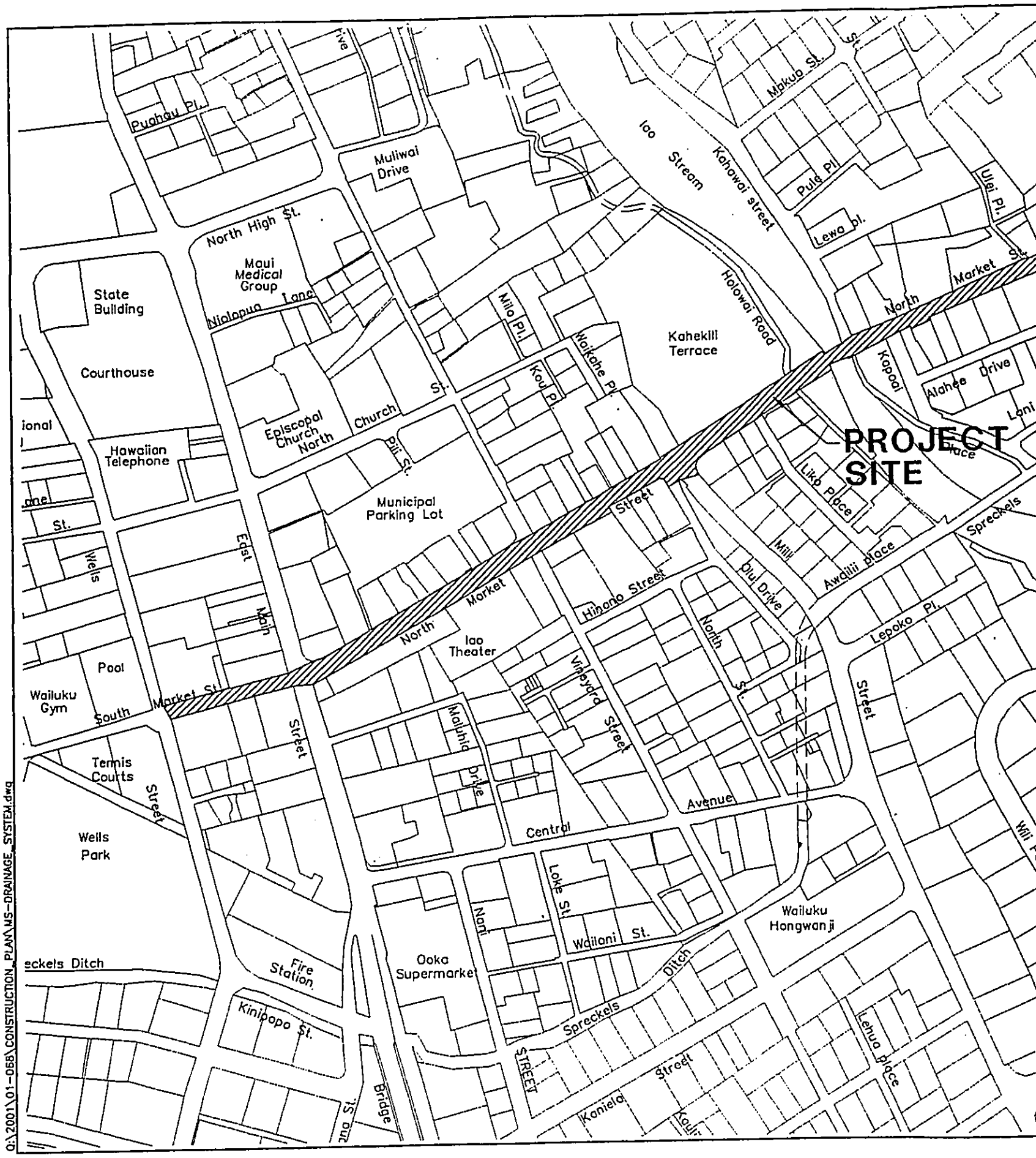
Street	Drainage Area		Area (Acres)	Length of Overland Flow (feet)	Average Slope %	Character of Ground	T_c (min.)	C	TM (years)	1-Hour Rainfall (inches)	I (in./hr.)	Q = AIC (c.f.s.)	Remarks
	From	To											
S. Market	Wells	E. Main	0.3	300	3.2	Paved	5.5	0.95	10	2.5	6.30	1.8	Total 10-Year
N. Market	E. Main	Vineyard	0.9	685	1.4	Paved	8.5	0.95			5.45	4.7	Storm
	Vineyard	Mill	0.5	415	3.4	Paved	6.0	0.95			6.20	2.9	Runoff
	Mill	Iao Bridge	0.5	455	5.0	Paved	5.5	0.95			6.30	3.0	= 16.5 c.f.s.
	Iao Bridge	Mokuhau	0.8	570	0.7	Paved	9.0	0.95			5.35	4.1	
S. Market	Wells	E. Main	0.3	300	3.2	Paved	5.5	0.95	50	3.0	7.50	2.1	Total 50-Year
N. Market	E. Main	Vineyard	0.9	685	1.4	Paved	8.5	0.95			6.30	5.4	Storm
	Vineyard	Mill	0.5	415	3.4	Paved	6.0	0.95			7.30	3.5	Runoff
	Mill	Iao Bridge	0.5	455	5.0	Paved	5.5	0.95			7.50	3.6	= 19.5 c.f.s.
	Iao Bridge	Mokuhau	0.8	570	0.7	Paved	9.0	0.95			6.40	4.9	

JOB NO.: 01-068

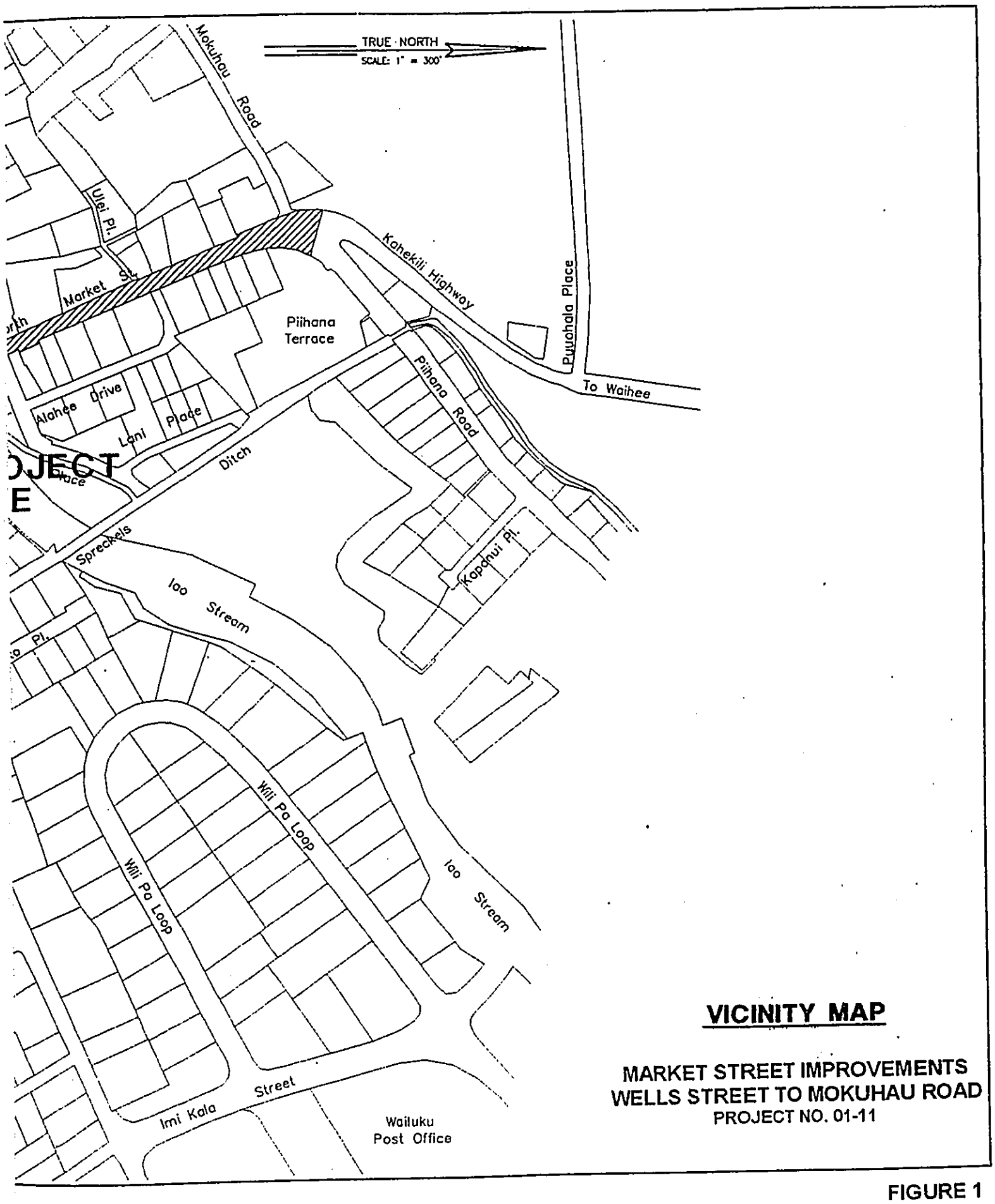
R. T. TANAKA ENGINEERS, INC.
ENGINEERS - SURVEYORS

SHEET 1 OF 1

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS



VICINITY MAP

MARKET STREET IMPROVEMENTS
WELLS STREET TO MOKUHAU ROAD
PROJECT NO. 01-11

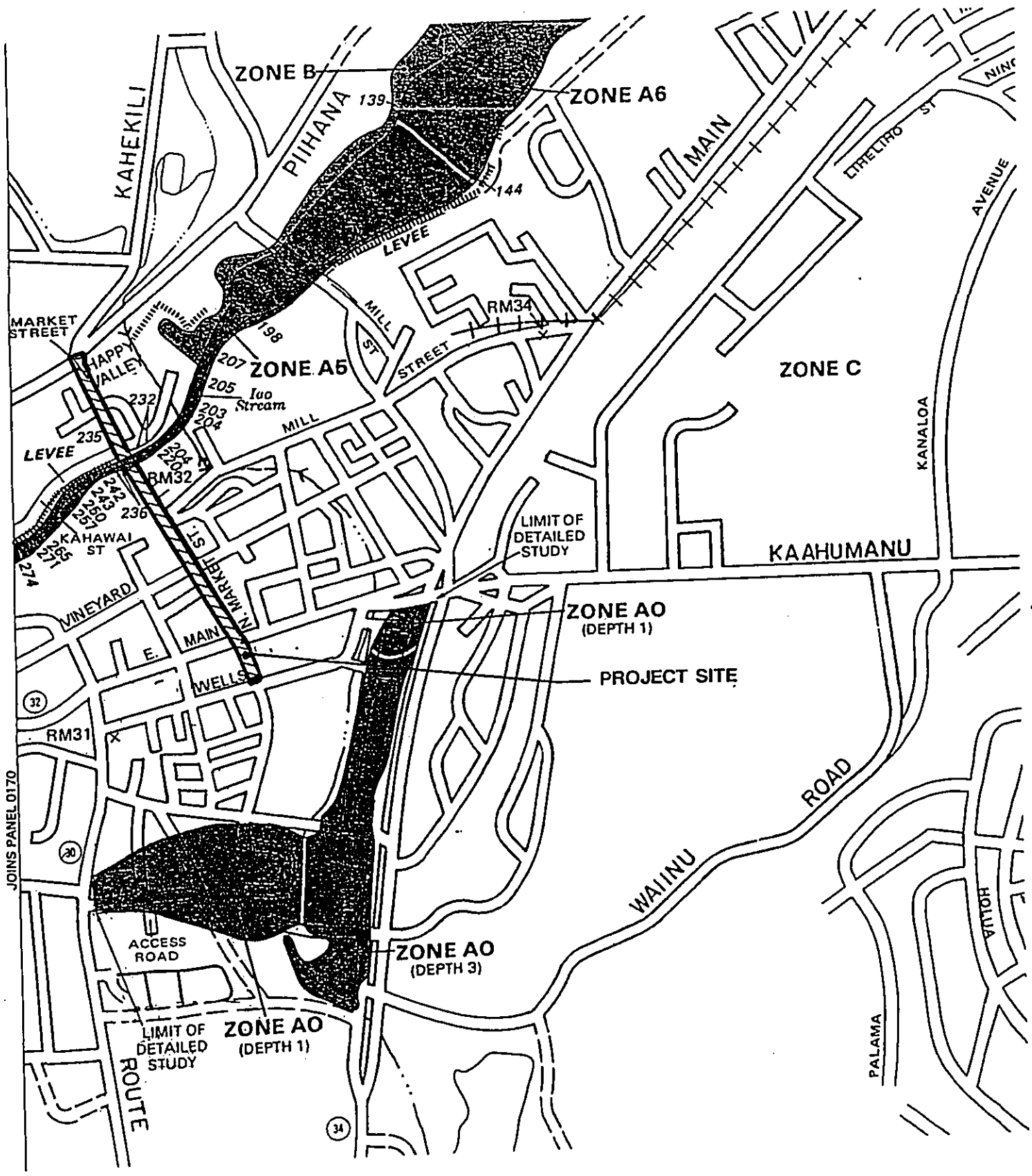
FIGURE 1

RECEIVED AS FOLLOWS

SOILS MAP
Scale: 1" = 2,000'

FIGURE 2

RECEIVED AS FOLLOWS

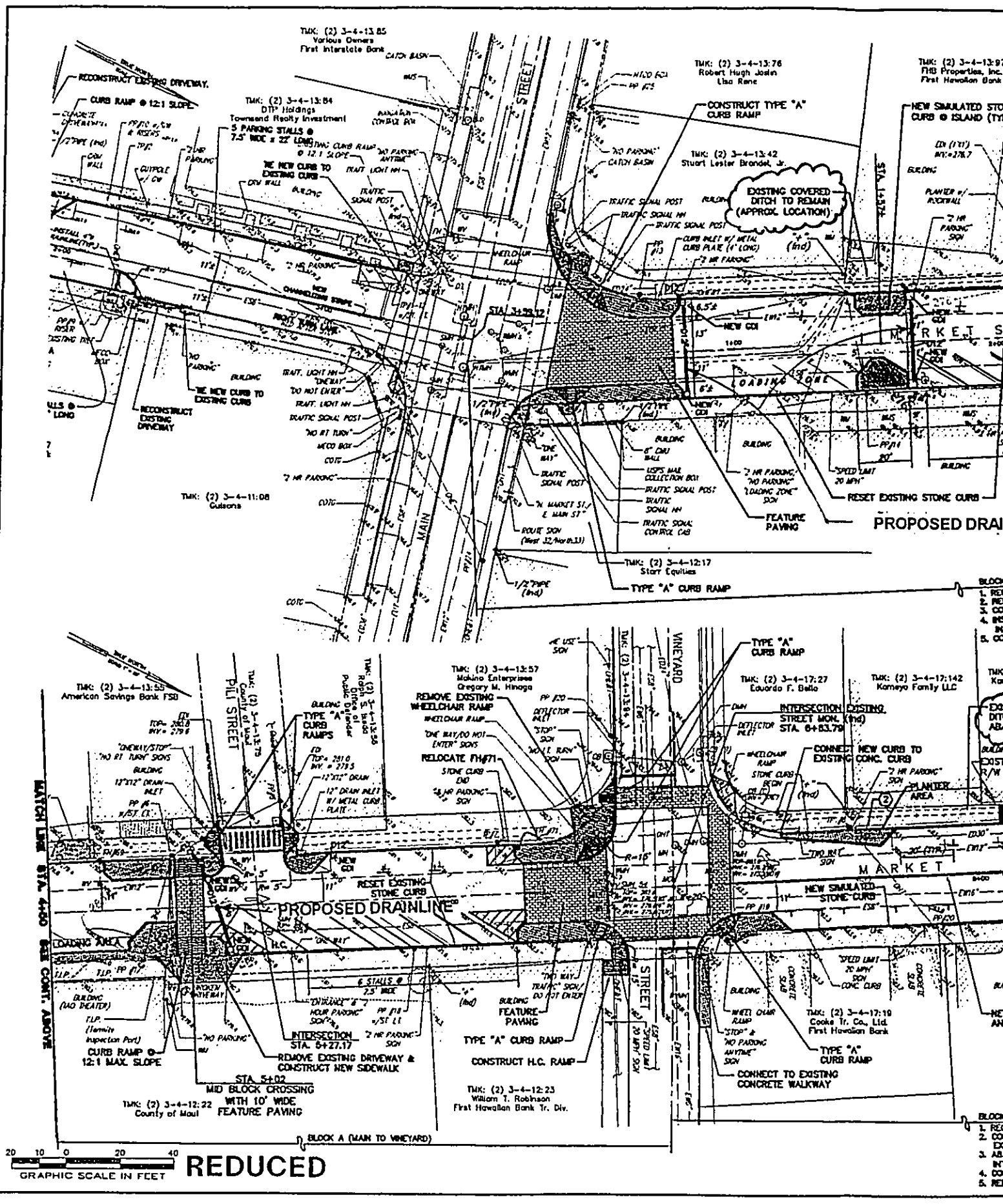


FLOOD MAP

Scale: 1" = 1,000'

FIGURE 3

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS

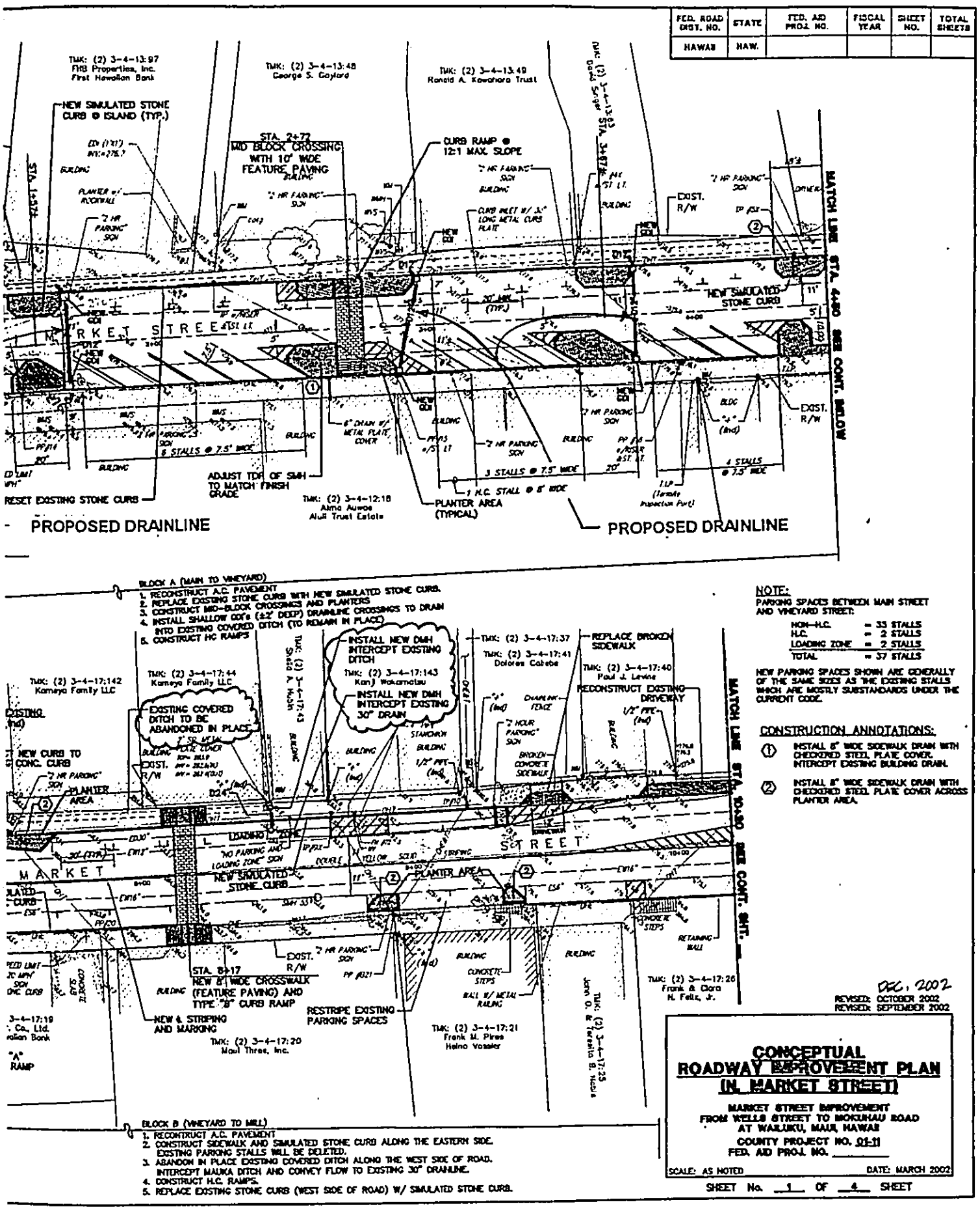
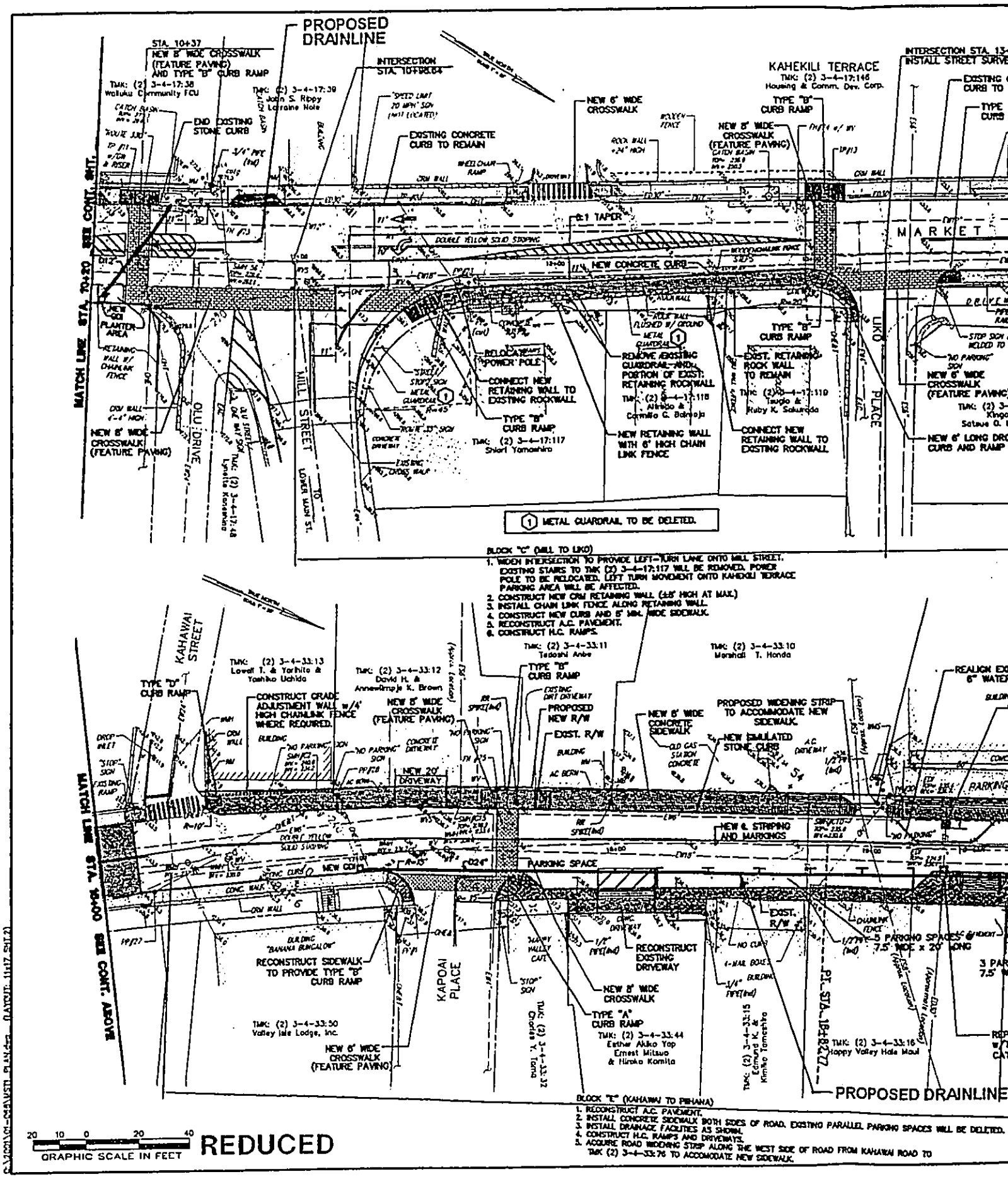


FIGURE 4

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS

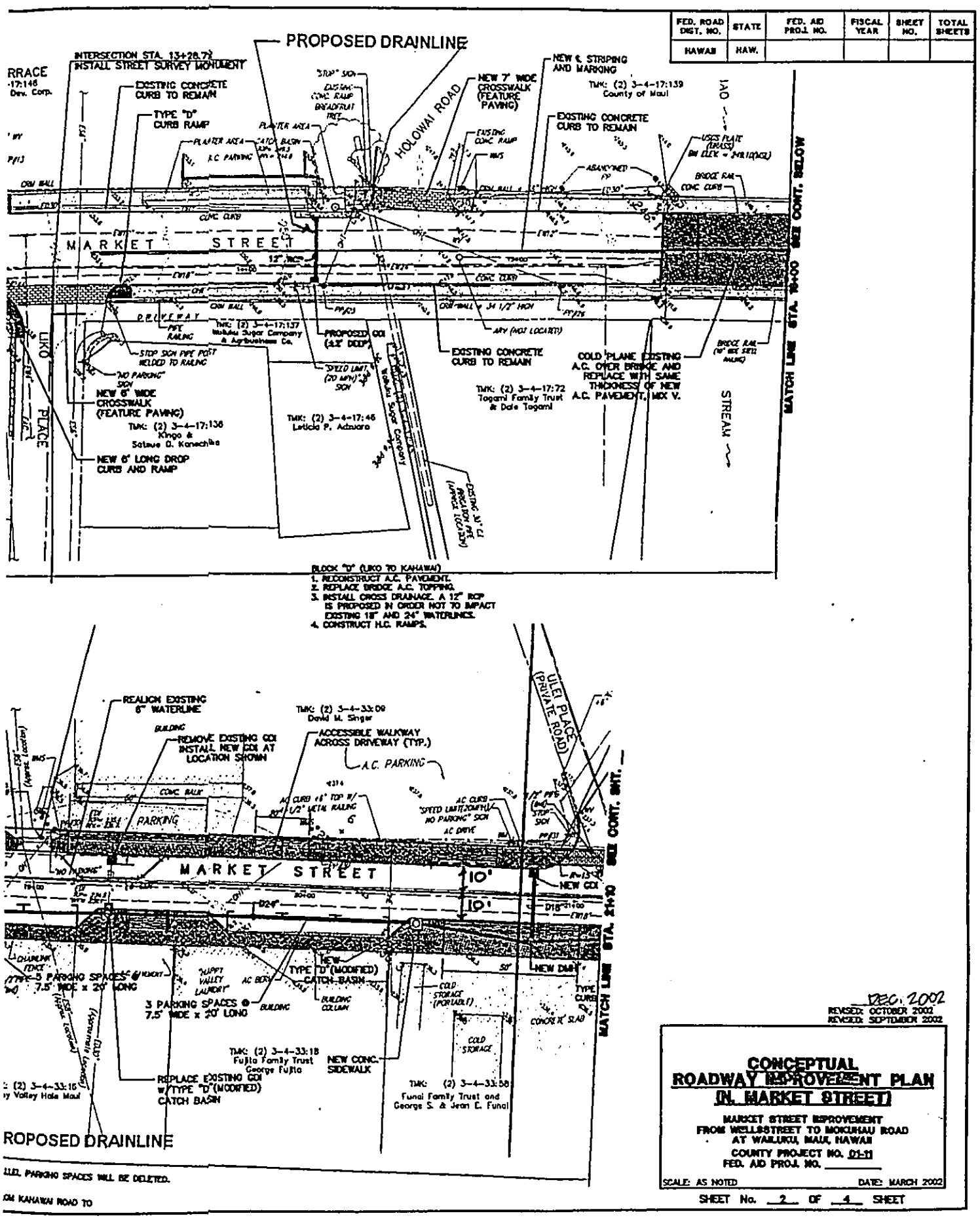
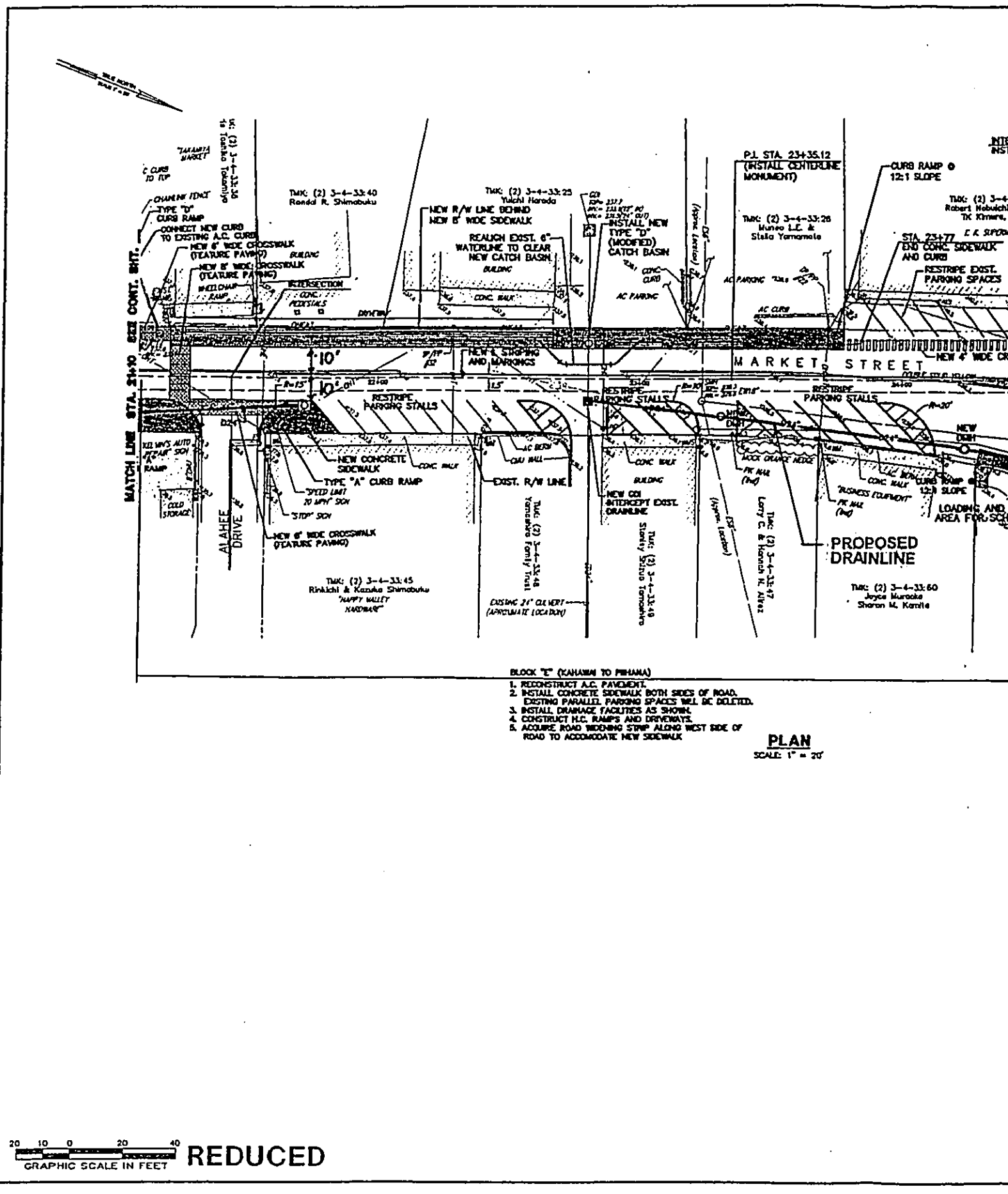


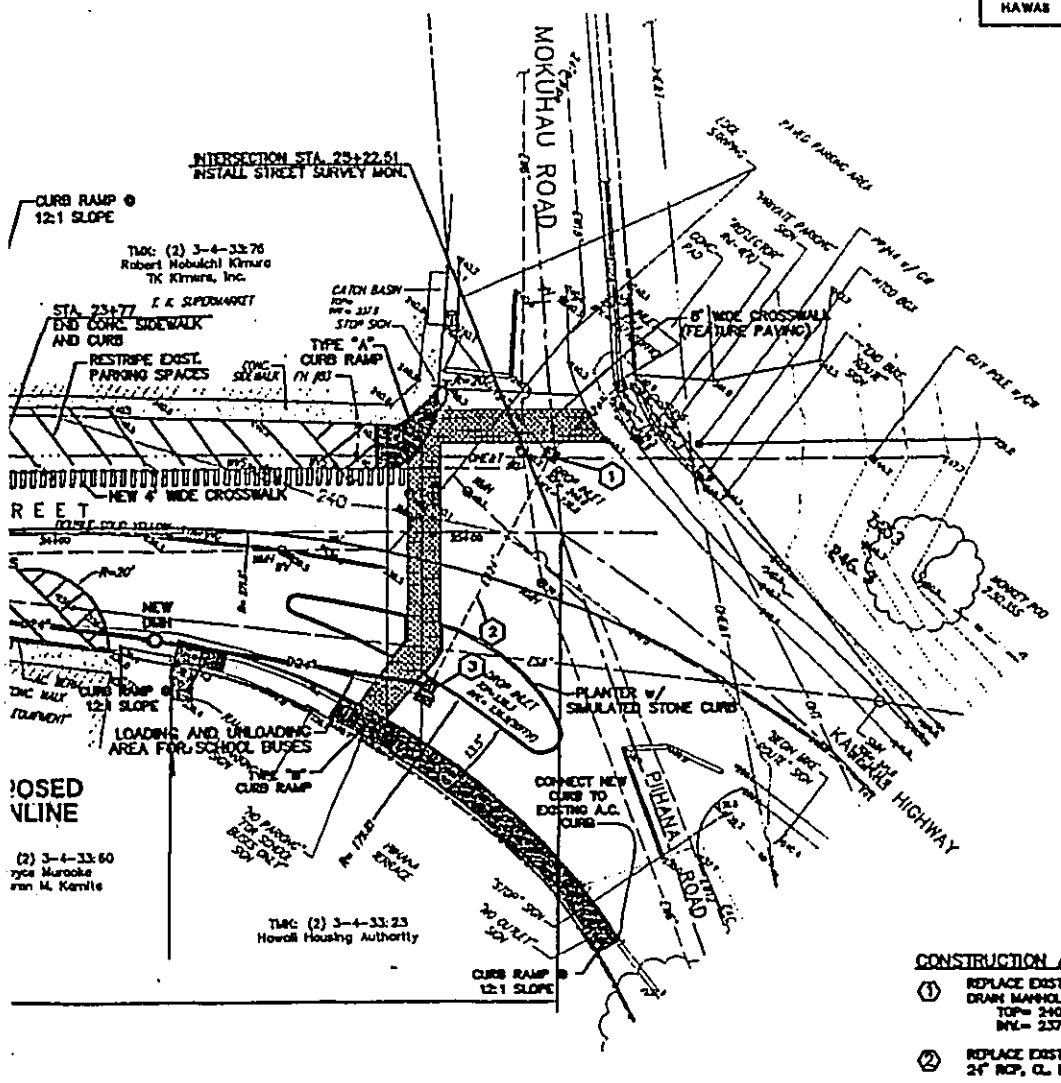
FIGURE 5

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.				



CONSTRUCTION ANNOTATIONS:

① REPLACE EXISTING DRAIN INLET WITH NEW SHALLOW DRAIN MANHOLE FOR PAVEMENT AREA (STD. DETAIL D-18)
TOP= 240.46
INV.= 237.06

② REPLACE EXISTING 24" RCP CULVERT WITH NEW 24" RCP, CL. IV.

③ REPLACE EXISTING DRAIN INLET WITH NEW CDI
TOP= 236.3
INV.= 234.5 (EXISTING)

DEC. 2002
REVISED: OCTOBER 2002
REVISED: SEPTEMBER 2002

CONCEPTUAL ROADWAY IMPROVEMENT PLAN (N. MARKET STREET)

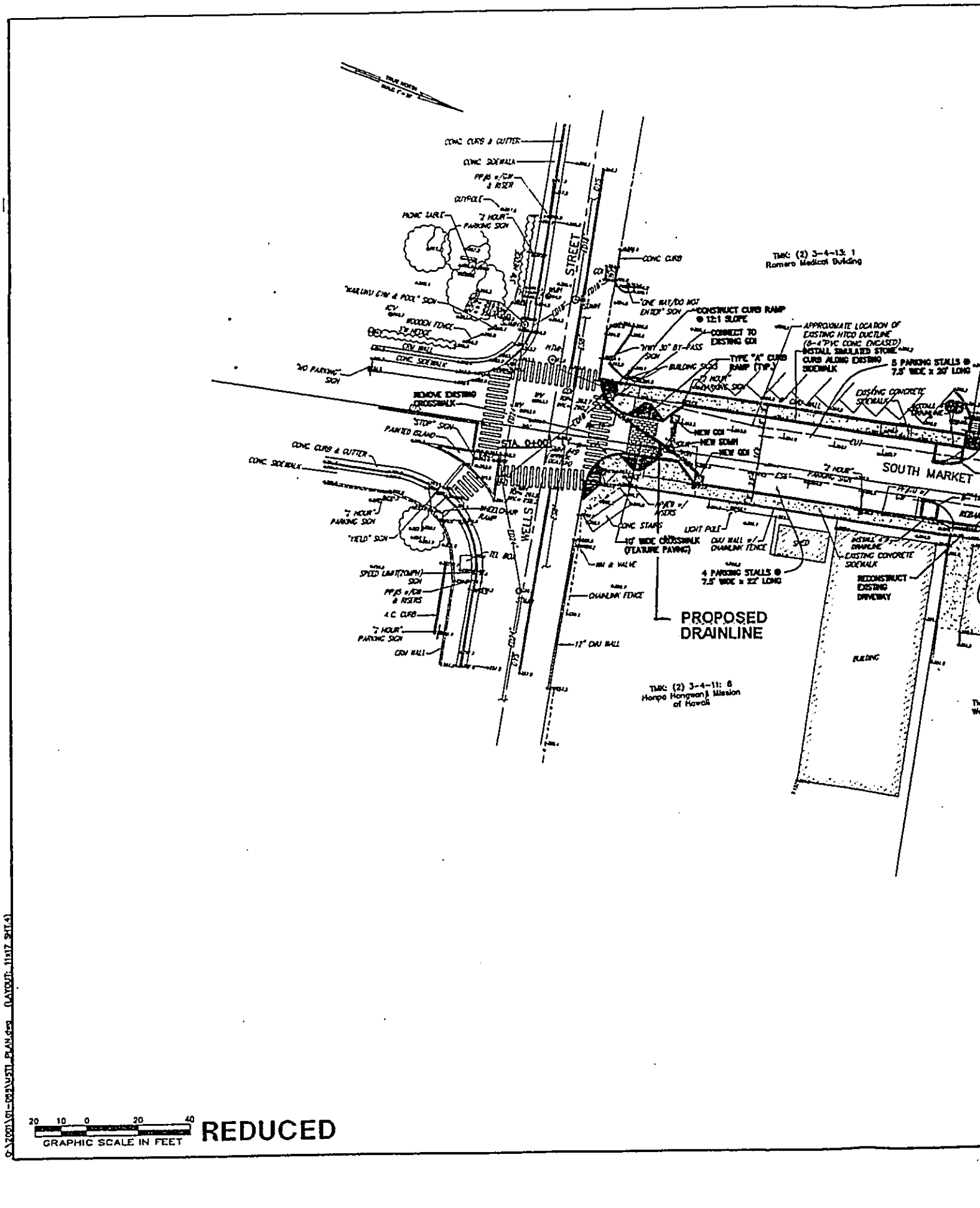
MARKET STREET IMPROVEMENT
FROM WELLS STREET TO MOKUHAU ROAD
AT WAILUKU, MAUI, HAWAII
COUNTY PROJECT NO. 01-11
FED. AID PROJ. NO. _____

SCALE: AS NOTED DATE: MARCH 2002

SHEET No. 3 OF 4 SHEET

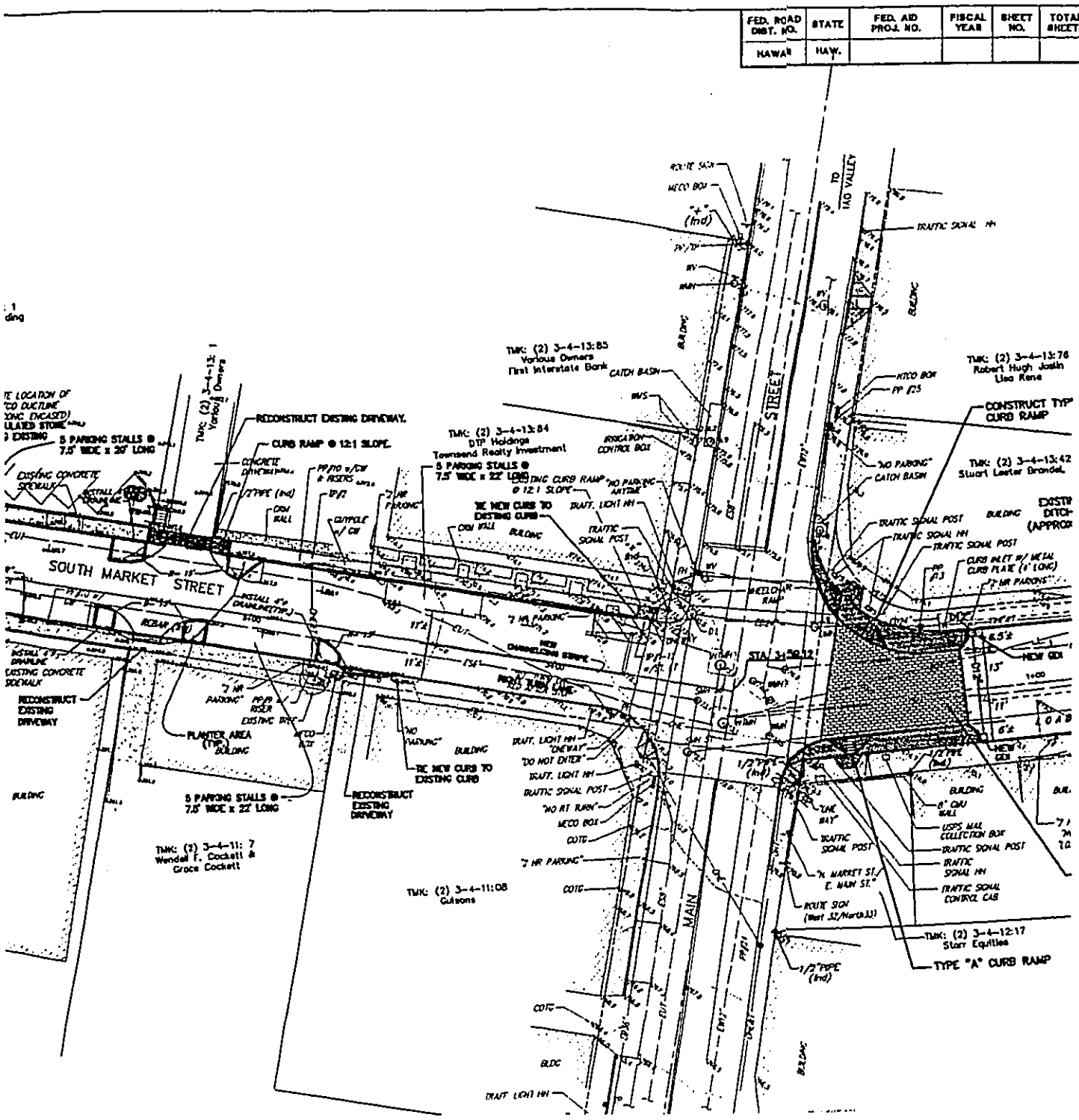
FIGURE 6

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.				



DEC. 2002
REVISED: OCTOBER 2002
REVISED: SEPTEMBER 2002

CONCEPTUAL ROADWAY IMPROVEMENT PLAN (S. MARKET STREET)

MARKET STREET IMPROVEMENT
FROM WELLS STREET TO MOKUHAU ROAD
AT WAILUKU, MAUI, HAWAII

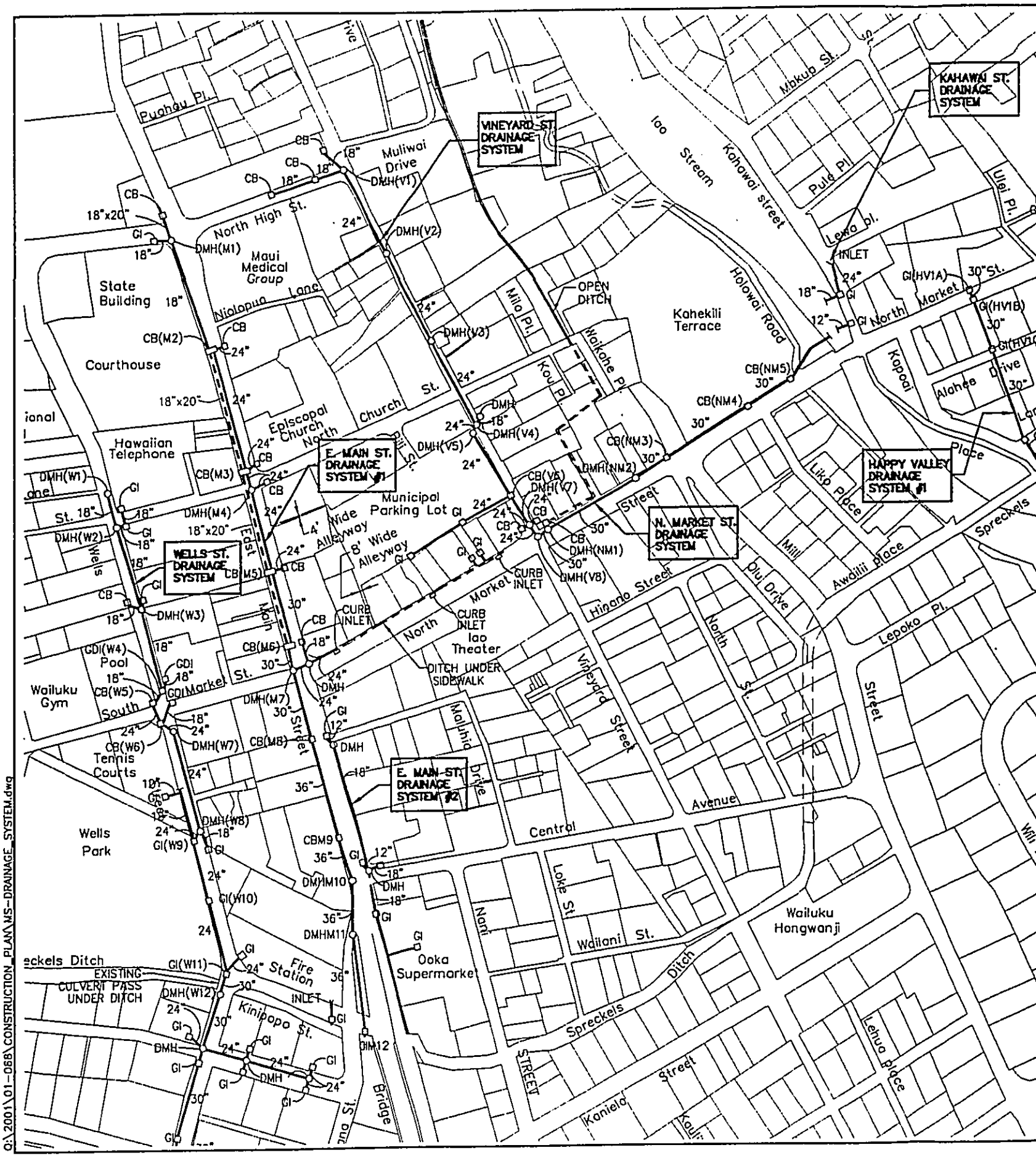
COUNTY PROJECT NO. 01-11
FED. AID PROJ. NO. _____

SCALE: AS NOTED DATE: MARCH 2002

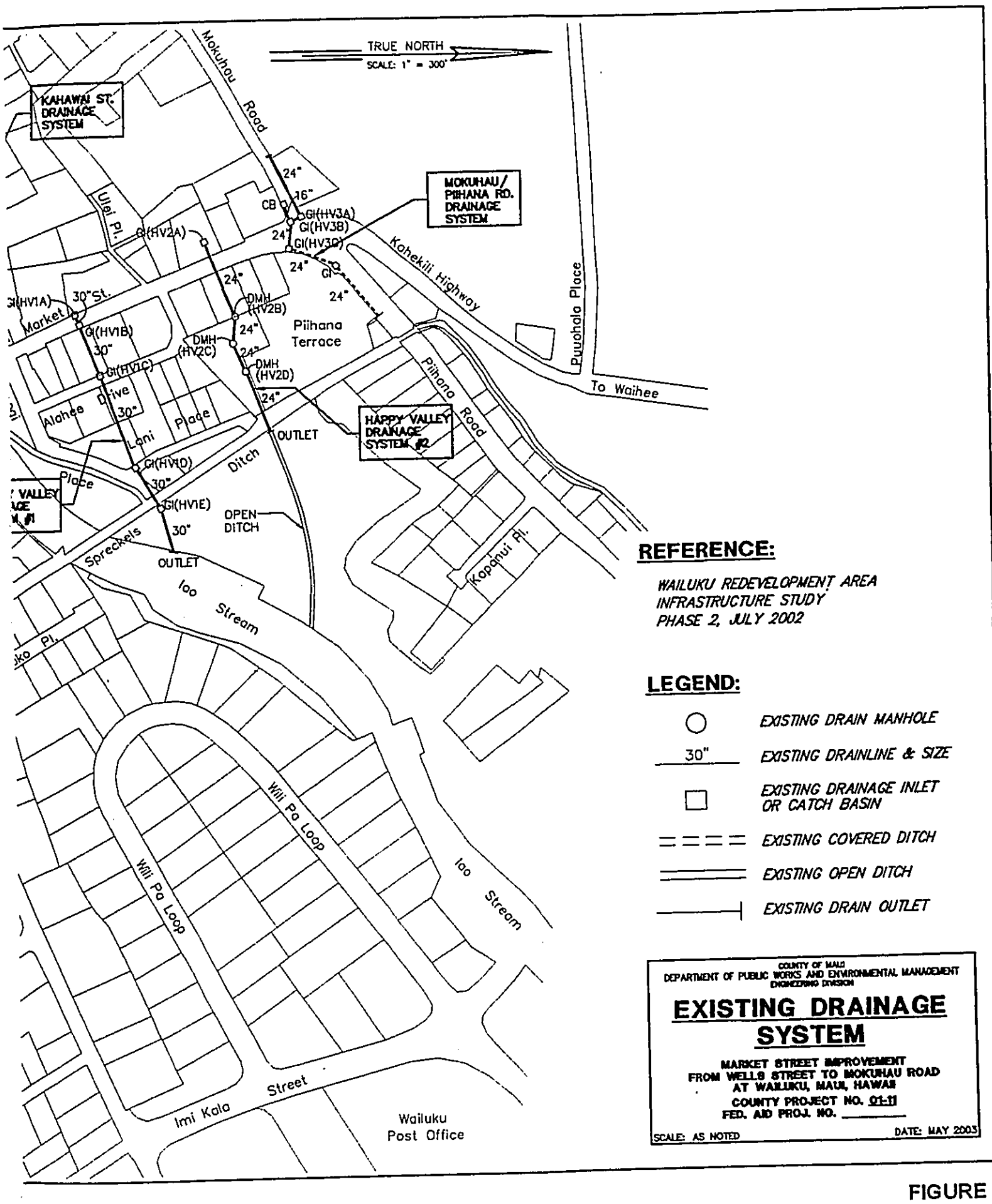
SHEET No. 4 OF 4 SHEET

FIGURE 7

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS



REFERENCE:

WAILUKU REDEVELOPMENT AREA
INFRASTRUCTURE STUDY
PHASE 2, JULY 2002

LEGEND:

- ○ — *EXISTING DRAIN MANHOLE*
- 30" — *EXISTING DRAINLINE & SIZE*
- □ — *EXISTING DRAINAGE INLET OR CATCH BASIN*
- = = = = — *EXISTING COVERED DITCH*
- ═══ — *EXISTING OPEN DITCH*
- ——| — *EXISTING DRAIN OUTLET*

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND ENVIRONMENTAL MANAGEMENT
ENGINEERING DIVISION

EXISTING DRAINAGE SYSTEM

MARKET STREET IMPROVEMENT
FROM WELLS STREET TO MOKUHAU ROAD
AT WAILUKU, MAUI, HAWAII
COUNTY PROJECT NO. 01-11
FED. AID PROJ. NO. _____

SCALE: AS NOTED DATE: MAY 2003

FIGURE 8

RECEIVED AS FOLLOWS

RECEIVED AS FOLLOWS

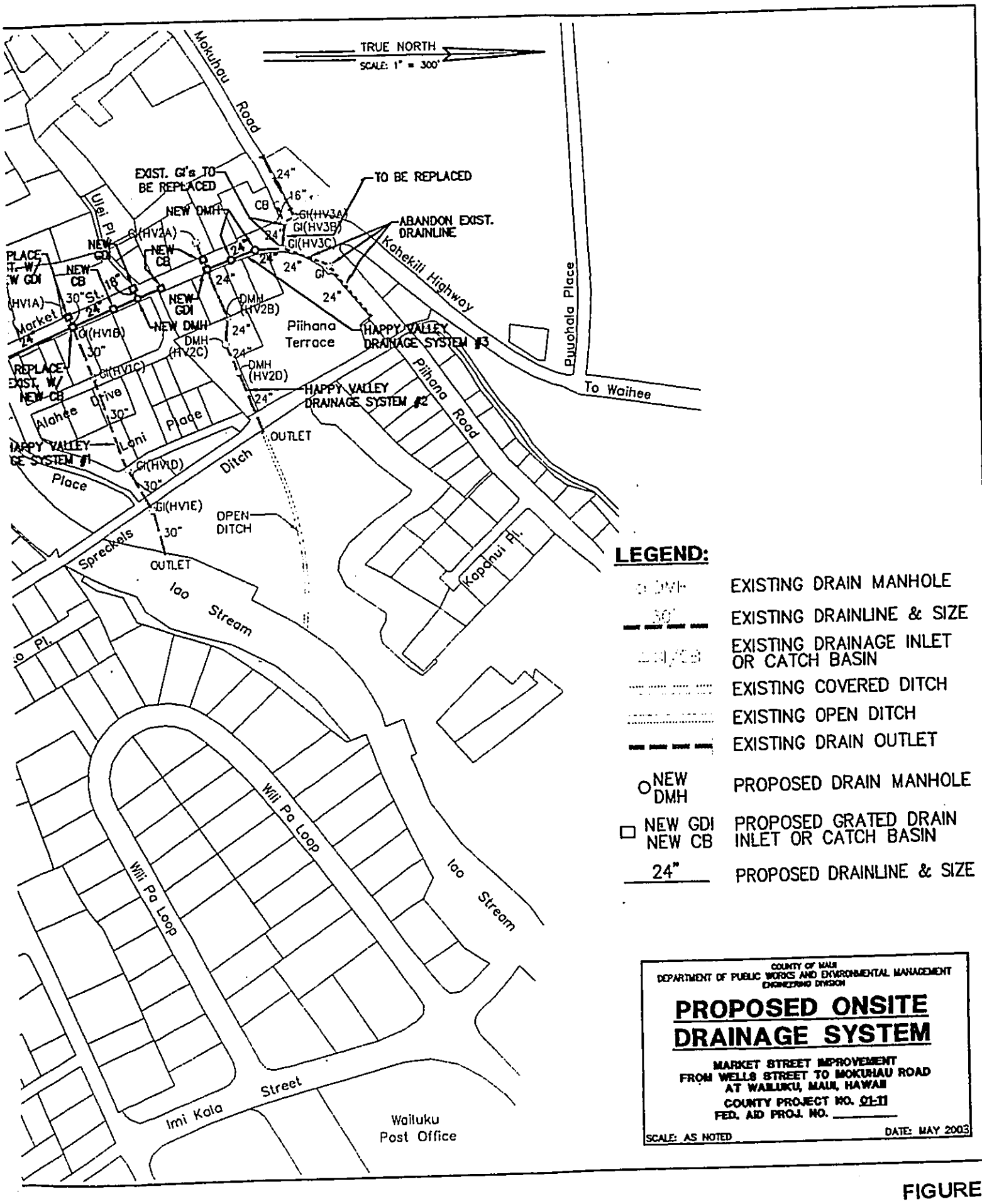
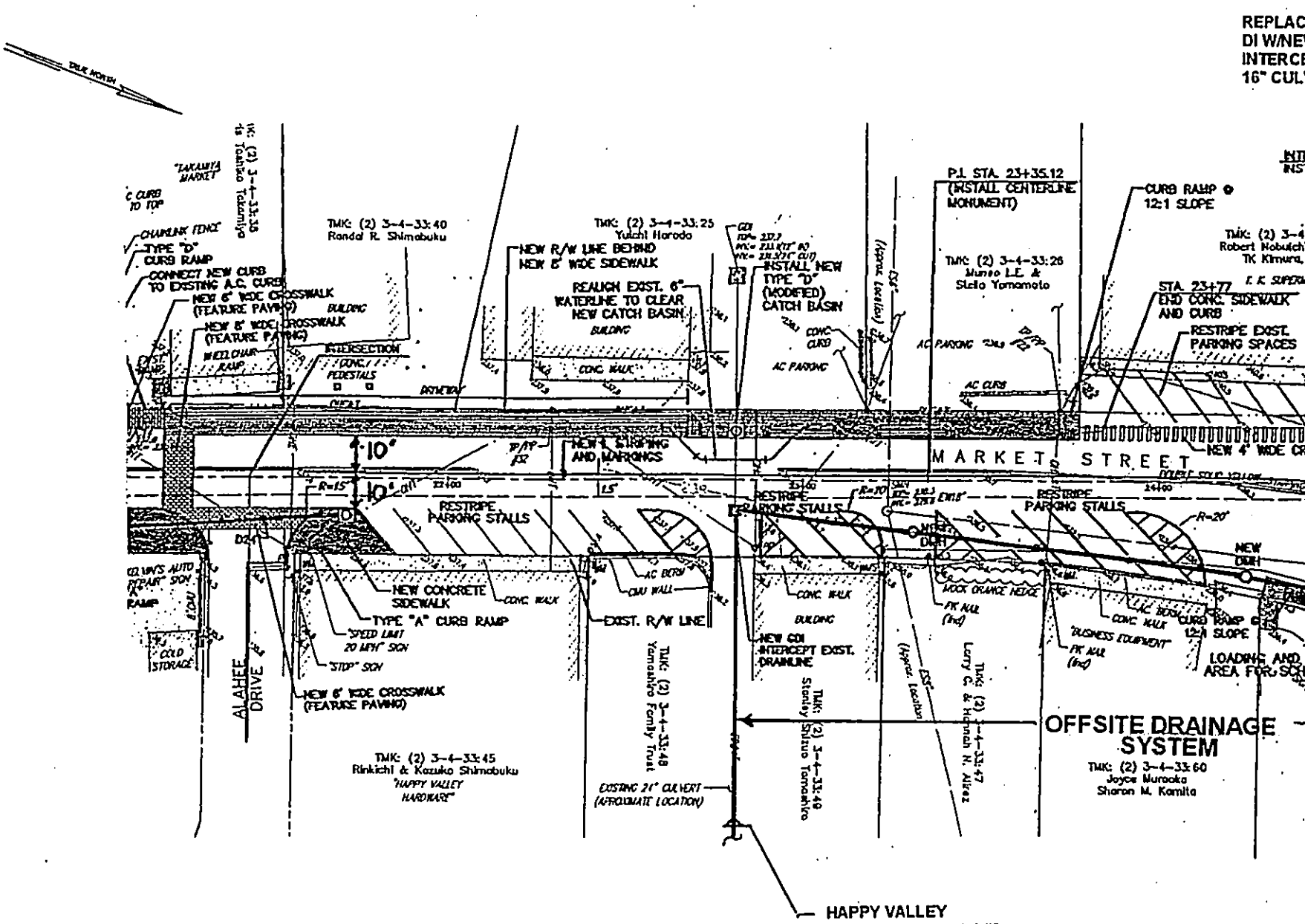


FIGURE 9

RECEIVED AS FOLLOWS



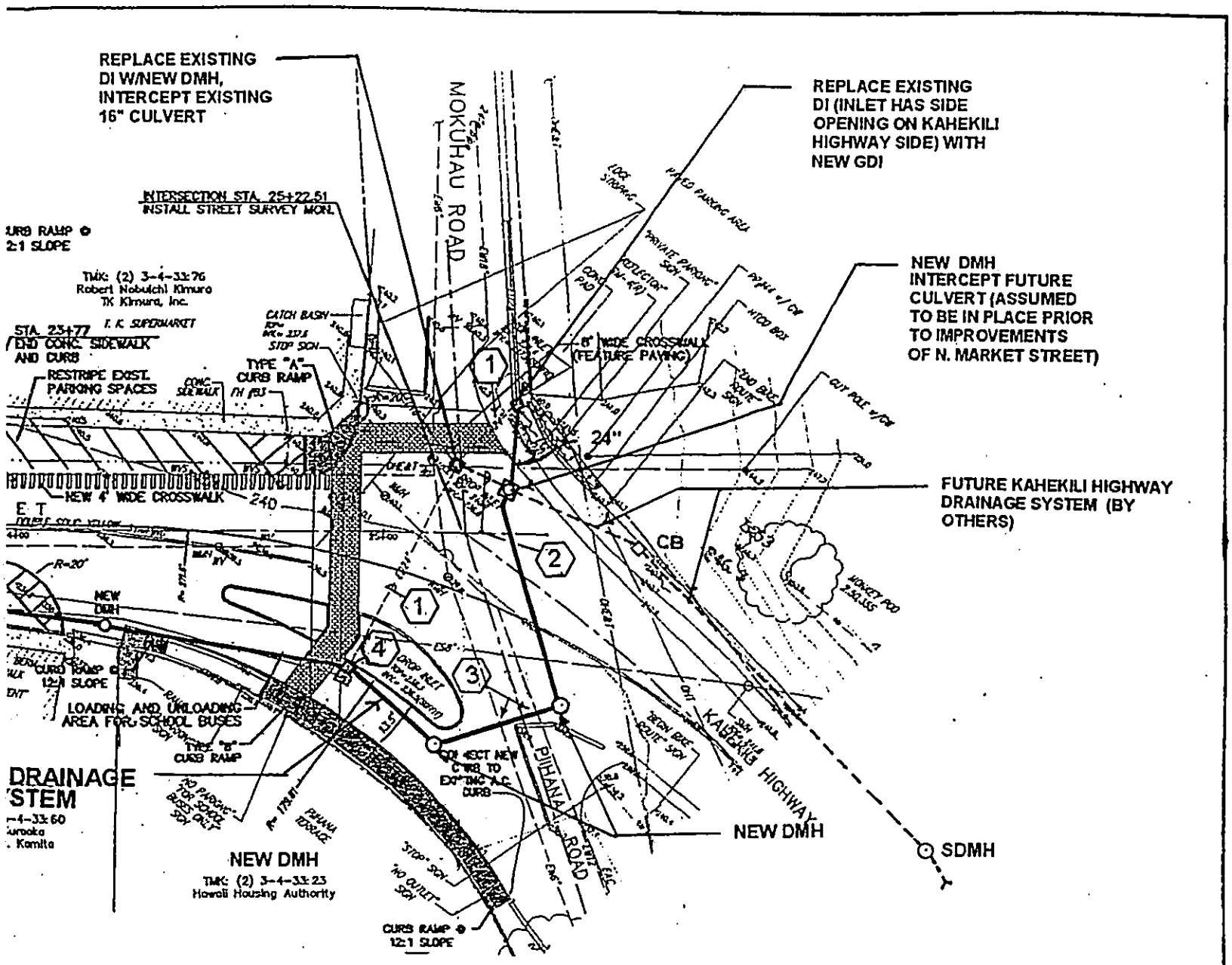
① Remove existing culverts. Backfill trench and restore pavement.

② Replace existing culvert with new 18" RCP. Reverse pipe slope to flow into new SDMH.

③ Lower existing 6" and 12" waterlines at drainline crossing as required.

④ Remove existing DI and install new GDI.

RECEIVED AS FOLLOWS



CONCEPTUAL OFFSITE DRAINAGE IMPROVEMENTS

(TO ACCOMMODATE STORM FLOW FROM KAHEKILI HIGHWAY DRAINAGE SYSTEM)

Scale: 1" =40'

FIGURE 10

Appendix – D
Traffic Impact Analysis Report

TRAFFIC IMPACT ASSESSMENT

MARKET STREET IMPROVEMENTS

IN WAILUKU, MAUI, HAWAII

Prepared For
TANAKA ENGINEERS, INC.
871 Kolu Street, Suite 201
Wailuku, Maui, Hawaii

Prepared By
PHILLIP ROWELL AND ASSOCIATES
47-273 'D' Hui Iwa Street
Kaneohe, Hawaii 96744
808-239-8206
FAX 808-239-4175
Email: prowell@gte.net

June 11, 2003

Phillip Rowell and Associates
47-273 'D' Hui Iwa Street Kaneohe, Hawaii 96744 Phone: (808) 239-8206 FAX: (808) 239-4175 Email:prowell@gte.net

DRAFT REPORT

June 11, 2003

Tanaka Engineers, Inc.
872 Kolu Street, Suite 201
Wailuku, Maui, HI, 96793-1436

Attn: Mr. Kirk T. Tanaka, P.E.

Re: **Traffic Impact Assessment Report**
Proposed Market Street Improvements
Wailuku, Maui, Hawaii

Dear Kirk:

The following is our assessment of the anticipated traffic impacts associated with the proposed Market Street Improvements in Wailuku. The following letter report summarizes our analyses and conclusions.

The report is presented in the following format:

A. Project Description and Study Area
B. Purpose and Objective of Study
C. Methodology
D. Existing Traffic Conditions
E. Future Traffic Conditions
F. Levels-of-Service for Future Conditions
G. Left Turn Storage Lane Analysis
H. Conclusions and recommendations

A. Project Description and Study Area

The project is improvement of Market Street between Wells Street and Mokuhau Road in Wailuku. Generally, the project consist on new curbs, gutters and sidewalks. Sidewalks at the major intersections will be widened. The major geometric improvement is provision of a southbound to eastbound left turn lane along Market Street at Mill Street.

The intersections analyzed in the traffic analysis are:

1. Market Street at Wells Street
2. Market Street at Main Street
3. Market Street at Vineyard Street
4. Market Street at Mill Street
5. Market Street at Mokuhau Road/Piihana Street

The remaining intersections were not analyzed because the traffic volumes were minimal.

B. Purpose and Objectives of Study

The purposes of this study are:

1. Assess the proposed traffic improvements to confirm that proposed improvements will not result in an adverse impact on traffic levels-of-service.

2. Identify traffic operational deficiencies at the study intersections before and after *implementation of the project.*

3. If required, identify and assess potential traffic improvements to mitigate the operational deficiencies identified above.

C. Methodology

1. A site reconnaissance of the study area was performed. This reconnaissance determined the existing lane configurations and right-of-way controls.

2. Morning and afternoon traffic counts were performed at the study intersections.

3. Future traffic conditions were estimated. These projections were based on established traffic growth rates for Maui and traffic projections for the proposed Wailuku Municipal Parking Garage.

4. Perform a level-of-service analysis of existing and future conditions with proposed roadway improvements in place.

5. Describe future traffic operational conditions, identifying any deficiencies that need to be addressed.

6. Identify and assess potential mitigation measures.

7. Document the analyses performed and summarize the results and conclusions.

D. Existing Traffic Conditions

Attachment A is a schematic diagram of Market Street indicating the study intersections and peak hour traffic volumes. The peak hour traffic volumes shown represent the peak hourly volumes of each traffic movement and include large vehicles and mopeds. The traffic counts were completed in 2002 and early 2003.

The intersection of Market Street at Main Street is signalized and has separate turn lanes along Main Street. The northbound approach is two lanes. The left lane is an optional through or left turn lane. The right lane is a right turn only lane. The eastbound approach has a leading left turn phase.

All the remaining intersections are STOP sign controlled.

During the traffic counts the following was observed:

1. During the morning peak hour, there were long delays and queues for the northbound through and left turn movements at Wells Street. Traffic along Wells Street is heavy and the problem is compounded by limited sight distance along the eastbound approach to the intersection. Vehicles with a higher eye level did not appear to have as much trouble crossing Wells Street.

2. During the afternoon peak hour, traffic along Market Street backs up from the commercial area to Wells Street. Traffic flow through the intersections with Wells Street and Main Street are constrained by vehicles maneuvering into and out of parking spaces along Market Street. This is important because the constrained flow may cause the traffic counts to be lower than the actual demand, resulting in an overestimation of the level-of-service. North of Pili Street, northbound traffic flow is unconstrained.

3. The right-of-way controls at the intersection of Market Street at Vineyard appear to confuse many drivers. Traffic approaching along either approach of Vineyard Street to Market Street must wait for drivers along Market Street. Many of these drivers do not give turn signals. Many drivers also do not appear to realize that Market Street north of Vineyard Street is two-way and do not expect southbound traffic. Lastly, several vehicles traveled southbound across Vineyard Street into the northbound, one-way section of Market Street. All these observations imply that the feasibility of enhancing the signing should be investigated.

The existing levels-of-service are shown in Table 1.

Table 1 Level-of-Service Analysis for Existing Traffic Conditions

Intersection and Movement	AM Peak Hour			PM Peak Hour		
	V/C[2]	Delay[3]	LOS[4]	V/C	Delay	LOS
Market Street at Wells Street						
Eastbound Left, Thru & Right		8.5	A		8.9	A
Westbound Left, Thru & Right		8.6	A		8.3	A
Northbound Left & Thru		417.1	F		364.6	F
Northbound Right		13.3	B		11.8	B
Market Street at Main Street	0.65	19.0	B	0.70	20.9	C
Eastbound Left	0.53	29.6	C	0.69	32.3	C
Eastbound Thru	0.35	4.8	A	0.42	4.6	A
Westbound Thru	0.73	21.8	C	0.68	20.3	C
Westbound Right	0.31	13.5	B	0.33	14.0	B
Northbound Left & Thru	0.60	34.7	C	0.77	47.2	D
Northbound Right	0.06	24.4	C	0.37	31.4	C
Market Street at Vineyard Street						
Northbound Left, Thru & Right		8.3	A		8.1	A
Southbound Left & Right		8.1	A		9.0	A
Westbound Thru & Right		32.3	D		102.0	F
Eastbound Left		95.9	F		>999.9	F
Eastbound Thru		25.2	D		81.1	F
Market Street at Mill Street						
Southbound Left & Thru		11.3	B		10.1	B
Westbound Left		386.4	F		72.9	F
Westbound Right		12.5	B		17.6	C
Market Street at Mokuhau Road						
Northbound Left & Thru		8.9	A		8.9	A
Southbound Left, Thru & Right		7.8	A		8.3	A
Westbound Left, Thru & Right		47.1	E		101.1	F
Eastbound :eft, Thru & Right		15.5	C		19.0	C

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street.
2. V/C denotes ratio of volume to capacity.
3. Delay is in seconds per vehicle.
4. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
5. Volume to capacity ratios and overall intersections delays and levels-of-service are not calculated for unsignalized intersections.

E. Future Traffic Conditions

The proposed project does not generate additional traffic. However, traffic along Market Street will increase between now and the design year (2015) as a result of regional background growth and traffic generated by redevelopment of the Wailuku municipal parking lot. This section of the report discusses this background growth, traffic associated with the Wailuku municipal parking lot and the resulting design year traffic projections. The design year levels-of-service are discussed in the next section.

The design year of a project is the future year for which background traffic conditions are estimated. It is not necessarily the *completion* date of the project. For this project, the year 2015 was selected as the design year for the proposed project.

Data provided in the *Maui Long-Range Land Transportation Plan*[1] was used to estimate the ambient background growth of traffic along the roadways within the study area. This plan concluded that traffic on the Island of Maui would increase 1.6% per year between 1990 and 2020. Using this growth rate, the growth factor for 2002[2] to 2015 was calculated to be 1.239 using the following formula:

$$F = (1 + i)^n$$

where F = Growth Factor
i = Average annual growth rate (0.016)
n = Growth period, 13 years (2002 to 2015)

Traffic generated by the proposed Wailuku municipal garage was added to the background traffic at the study intersections. These traffic assignments were obtained from the traffic impact study for the garage.

In summary, future traffic volumes along Market Street were estimated as follows:

1. The design year is 2015.
2. The background traffic growth rate is 1.6% per year between 2002 and 2015.
3. Traffic generated by the proposed Wailuku Municipal parking garage was added to the background traffic projections.

The resulting 2015 peak hour traffic projections are shown in Attachment B.

Peak hour traffic volumes are typically 8% to 12% of the weekday total day volumes. Weekday traffic projections were estimated from the afternoon peak hour traffic projections using a factor of 8% and are also shown in Attachment B.

F. Levels-of-Service Analysis for Future Traffic Conditions

The level-of-service analysis was performed for 2015 traffic conditions without and with the lane configurations and striping as shown on the engineering plans for the proposed project. The results are shown in Table 2. The Level-of-Service Worksheets are presented as Attachment C.

---

[1] Kaku Associates, October 1996

[2] The traffic counts were completed in 2002.

Table 2 Level-of-Service Analysis for 2015 Traffic Conditions

	AM Peak Hour						PM Peak Hour					
	Without Project			With Project			Without Project			With Project		
Intersection and Movement	V/C[2]	Delay[3]	LOS[4]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Market Street at Wells Street												
Eastbound Left, Thru & Right		9.0	A		9.0	A		9.2	A		9.2	A
Westbound Left, Thru & Right		9.2	A		9.2	A		8.3	A		8.3	A
Northbound Left & Thru		>999.9	F		>999.9	F		697.1	F		697.1	F
Northbound Right		16.9	C		16.9	C		11.9	B		11.9	B
Market Street at Main Street	0.83	26.4	C	0.83	26.4	C	0.88	30.7	C	0.88	30.7	C
Eastbound Left	0.65	33.5	C	0.65	33.5	C	0.85	43.5	D	0.85	43.5	D
Eastbound Thru	0.44	5.6	A	0.44	5.6	A	0.53	5.6	A	0.53	5.6	A
Westbound Thru	0.91	34.0	C	0.91	34.0	C	0.84	27.9	C	0.84	27.9	C
Westbound Right	0.48	15.9	B	0.48	15.9	B	0.48	16.3	B	0.48	16.3	B
Northbound Left & Thru	0.85	51.2	D	0.85	51.2	D	1.03	90.2	F	1.03	90.2	F
Northbound Right	0.09	24.8	C	0.09	24.8	C	0.48	34.1	C	0.48	34.1	C
Market Street at Vineyard Street												
Northbound Left, Thru & Right		8.8	A		8.8	A		8.6	A		8.6	A
Southbound Left & Right		8.4	A		8.4	A		10.1	B		10.1	B
Westbound Thru & Right		155.5	F		155.5	F		>999.9	F		>999.9	F
Eastbound Left		>999.9	F		>999.9	F		>999.9	F		>999.9	F
Eastbound Thru		51.1	F		33.2	D		>999.9	F		>999.9	F
Market Street at Mill Street												
Southbound Left		15.6	C		15.6	C		12.6	B		12.6	B
Westbound Left		>999.9	F		>999.9	F		650.2	F		650.2	F
Westbound Right		15.1	C		15.1	C		36.0	E		36.0	E
Market Street at Mokuhau Road												
Northbound Left & Thru		9.6	A		9.6	A		10.0-	A		10.0-	A
Southbound Left, Thru & Right		8.0	A		7.8	A		8.7	A		8.4	A
Westbound Left, Thru & Right		249.3	F		249.3	F		733.0	F		733.0	F
Eastbound :eft, Thru & Right		22.4	C		22.4	C		39.2	E		38.9	E

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street.
2. V/C denotes ratio of volume to capacity.
3. Delay is in seconds per vehicle.
4. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
5. Volume to capacity ratios and overall intersection delays and levels-of-service are not calculated for unsignalized intersections.

The results of the level-of-service analysis for 2015 conditions indicate that there will be capacity deficiencies at the following locations:

1. Northbound left and through movements along Market Street at Wells Street.
2. Northbound left and through movements along Market Street at Main Street.
3. Westbound through and right movements along Vineyard Street at Market Street.
4. Eastbound left and through movements along Vineyard Street at Market Street.
5. Westbound left along Mill Street at Market Street.
6. Westbound approach of Mokuhau Road at Market Street

These are the same locations and traffic movements that have capacity deficiencies under existing conditions.

Market Street at Wells Street

A traffic signal warrant analysis was performed for AM and PM peak hour traffic conditions at the intersection of Market Street at Wells Street. The traffic signal warrant analysis was performed using the warrants and procedures described in the *Manual of Uniform Traffic Control Devices* (MUTCD) published by the U.S. Department of Transportation, Federal Highway Administration.

There are eight warrants described in the MUTCD. These warrants are:

Warrant 1	Eight-Hour Vehicular Volume
Warrant 2	Four-Hour Vehicular Volumes
Warrant 3	Peak Hour
Warrant 4	Pedestrian Volume
Warrant 5	School Crossing
Warrant 6	Coordinated Signal System
Warrant 7	Crash Experience
Warrant 8	Roadway Network

If the traffic conditions satisfy any of the warrants, then a traffic signal should be considered. The MUTCD clearly states that satisfaction of a warrant is not necessarily justification for a traffic signal. Conversely, a signal may be warranted even though no warrants may be satisfied. Other considerations may require signals to address safety and geometric issues. Delay, congestion, confusion or other evidence of the need of right-of-way assignment must also be shown.

Sufficient data were available for the peak hour warrant analysis only. The analysis concluded that the warrants were satisfied for both the morning and afternoon peak hours. Per the MUTCD:

"This warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."[3]

It is beyond the scope of this project to install traffic signals at problem locations. However, this intersection should be monitored and a full traffic signal warrant analysis performed periodically.

Market Street at Vineyard Street

For the intersection of Market Street at Vineyard Street, the impacts of installing an all-way STOP sign were analyzed. This analysis concluded that the level-of-service would improve for the Vineyard Street approaches but the level-of-service for northbound traffic along Market Street would decrease from A to F and that the queues along Market Street would be long. The delay for the northbound approach increased from 8.6 seconds per vehicle to 710 seconds per vehicle during the afternoon peak hour.

Because the configuration of this intersection may change as part of the redevelopment of the Wailuku municipal garage, improvement of this intersection should be examined as part of the traffic study for the garage.

---

[3] U.S. Department of Transportation, Federal Highway Administration, Manual of Uniform Traffic Control Devices, 2001, Washington, D.C., p. 4C-6

Market Street at Mill Street

An all-way STOP sign would result in conditions comparable to those that would occur at the intersection of Market Street at Vineyard Street. The level-of-service for northbound traffic would decrease from A to F and the level-of-service for southbound traffic would decrease from A to C. It is recommended that no changes be made at this intersection. While the delay for westbound to southbound left turns is long (Level-of-Service F), the projected morning and afternoon peak hour volumes are only 73 and 118 vehicles per hour, respectively. There are alternate routes for drivers that do not chose to wait to complete the left turn.

Market Street at Mokuhau Road/Piihana Street

The eastbound and westbound approaches are expected to operate at Level-of-Service F for future conditions without and with the proposed improvements. These movements currently have long delays and low levels-of-service. No improvements are recommended. The minimum volumes to satisfy the Peak Hour Warrant for a traffic signal are not met and an all-way STOP would reduce the Levels-of-Service for the northbound and southbound traffic comparable to the intersection of Market Street at Vineyard Street.

G. Left Turn Storage Lane Analysis

The left turn storage lengths required to accommodate estimated traffic volumes were calculated using guidelines in *A Policy on Geometric Design of Highways and Streets* published by the American Association of State Highway and Transportation Officials, 1990 edition. There are separate policies for unsignalized and signalized intersections. Based on this policy, the assumptions used to determine the required lengths of the left turn storage lanes are:

1. For signalized intersections, the length of the left turn storage lane should be based on 2.0 times the average number of vehicles arriving during a signal cycle during the peak hour.

2. For unsignalized intersections, the average number of vehicles that arrive every 60 seconds is used to estimate the storage length required.

3. The average length required per vehicle is 25 feet.

4. The traffic signal cycle length at the intersection of Market Street at Main Street is 70 seconds.

5. The minimum storage length must accommodate at least one passenger size vehicle and one truck, or approximately 60 feet.

The is only one left turn storage lane in this project. This left turn storage lane for turns from southbound Market Street to eastbound Mill Street. During the afternoon peak hour, there are 428 left turns per hour. As shown in Table 3, the minium length of storage that should be provided is 200 feet. Only 25 feet can be provided due to right-of-way and geometry constraints.

Table 3 Left-Turn Storage Lane Requirements

Intersection	Approach	Design Volume	Cycle Length (Seconds)	Cycles per Hour	Vehicles per Cycle	Minimum Recommended Length [1]		Length Provided (Ft)
						Veh[2]	Ft	
Market St. at Mill St.	SB	467	60	60	8	8	200	25

G. Conclusions and Recommendations

1. The level-of-service analysis concluded that there will be capacity deficiencies at the intersections of Market Street at Wells Street and Market Street at Vineyard Street.

2. The peak hour warrants for a traffic signal are satisfied at the intersection of Market Street at Wells Street. It is understood that signalization is not within the scope of this project. Therefore, it is recommended that full traffic signal warrant study be performed. This study should examine all eight warrants as well as alternative measures to increase the capacity of the intersection.

3. During the traffic surveys, it was observed that northbound drivers wanting to cross Wells Street or turn left from Market Street to westbound Wells Street had difficulty. This appeared to be because of limited sight distance. It is recommended that the sight distance for left turns and through traffic be examined. If deficient, the sight distance can be increased by removing one or two parking spaces along the south side of Wells Street west of Market Street.

4. For the intersection of Market Street at Vineyard, the feasibility analysis of installing an all-way STOP concluded that while the level-of-service of the side street would improve, the level-of-service for northbound Market Street would decrease from A to F. No modifications are recommended.

5. At the intersection of Market Street at Mill Street, left turns from Mill Street to Market Street will operate at Level-of-Service F without and with the project.

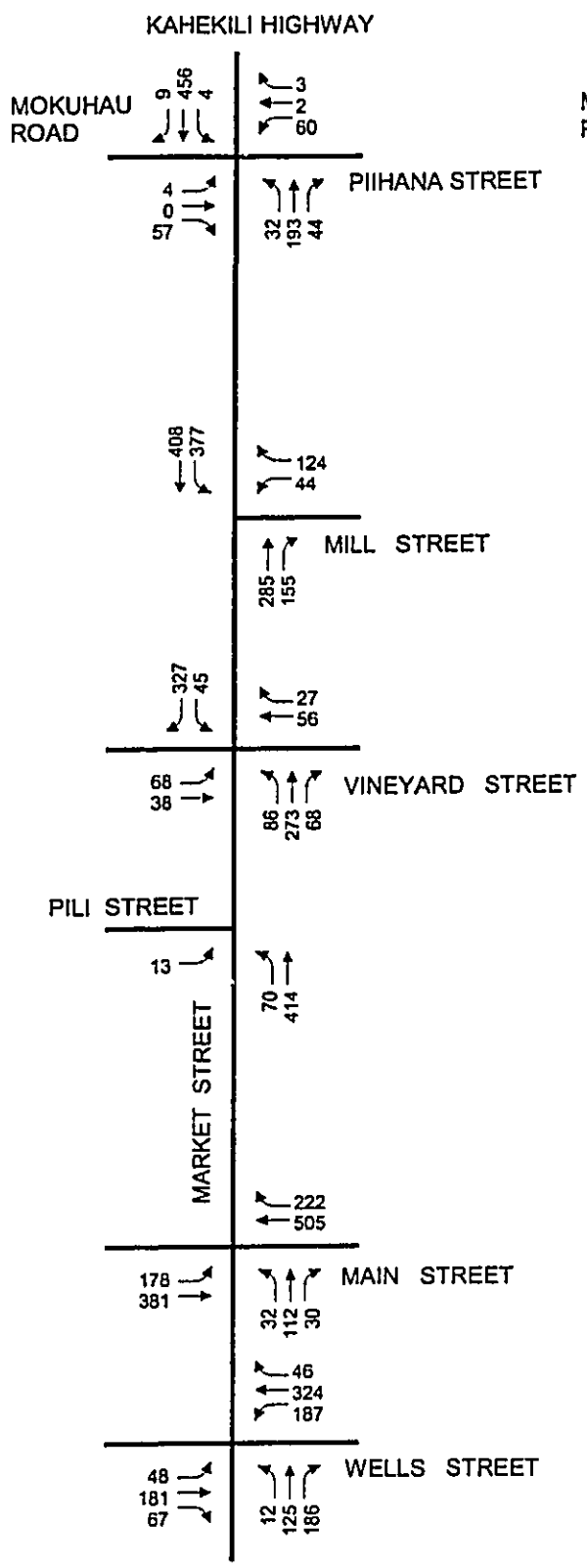
6. The left turn storage lane from southbound Market Street to eastbound Mill Street should be 175 feet long. Only 25 feet can be provided due to right-of-way and geometry constraints.

If you have questions or need additional information about the conclusions and recommendations, please do not hesitate to call.

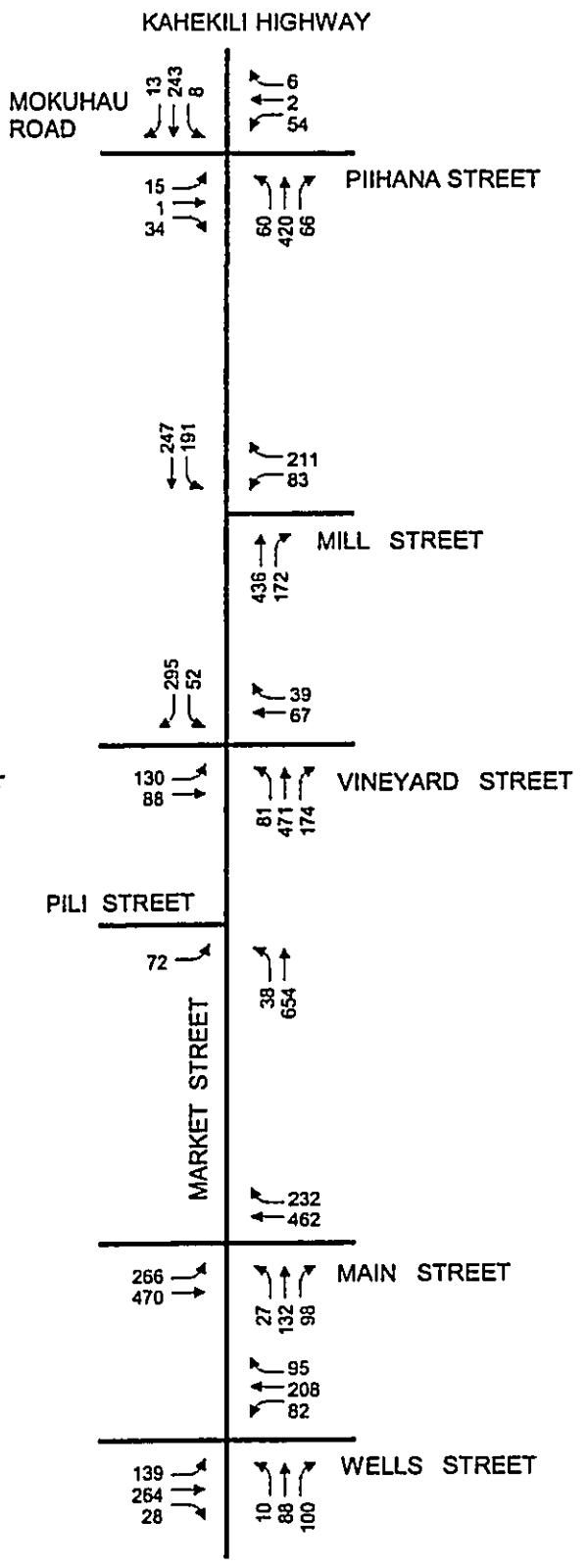
Respectfully submitted,
PHILLIP ROWELL AND ASSOCIATES

Phillip J. Rowell, P.E.
Principal

Attachment A
EXISTING PEAK HOUR TRAFFIC VOLUMES

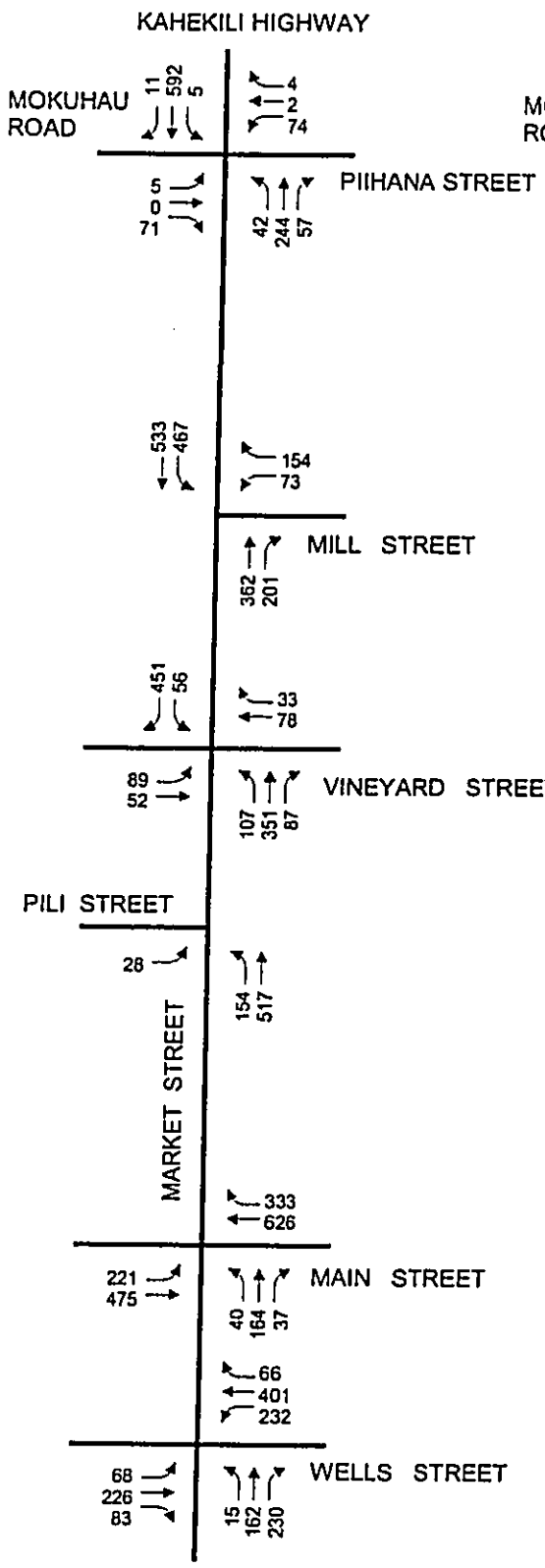


AM PEAK HOUR

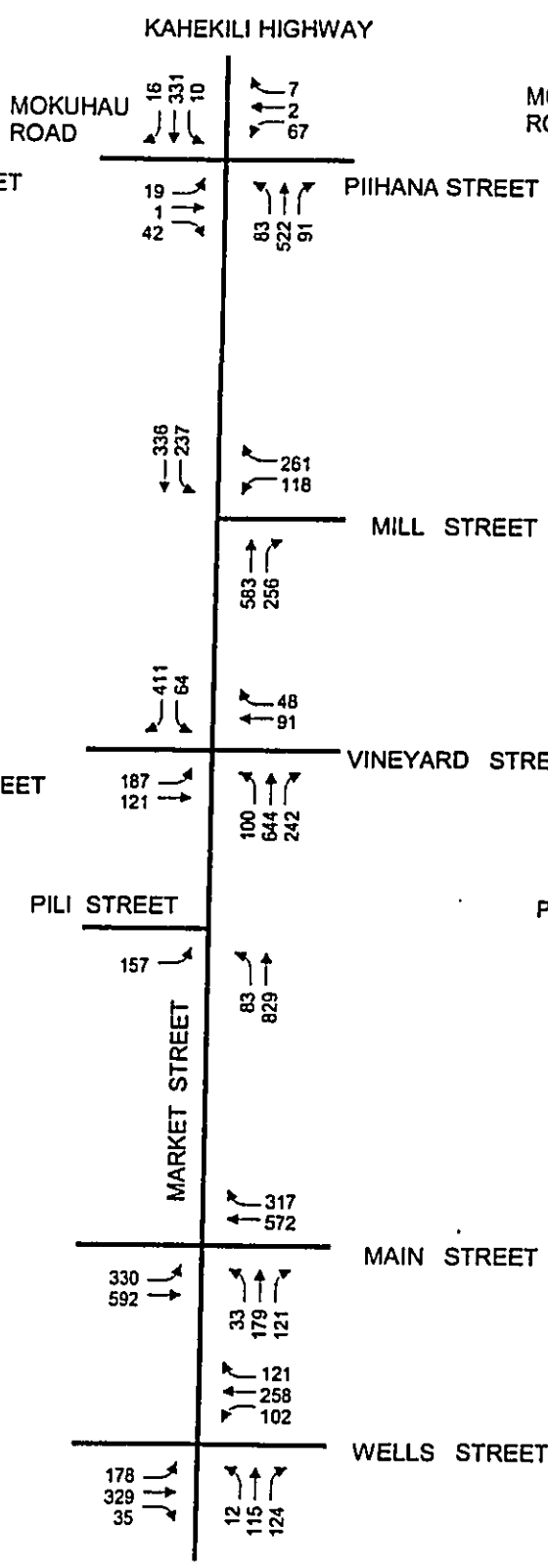


PM PEAK HOUR

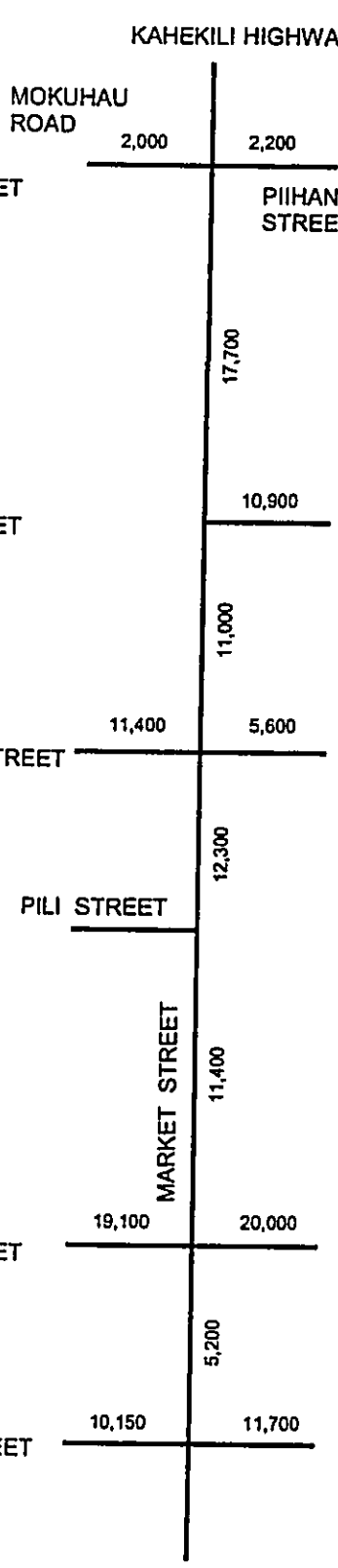
Attachment B
2015 PEAK HOUR AND WEEKDAY TRAFFIC PROJECTIONS



AM PEAK HOUR



PM PEAK HOUR



WEEKDAY TOTAL

Attachment C
LEVEL-OF-SERVICE WORKSHEETS

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PJR*
Agency/Co.	*PRA*
Date Performed	*4/3/2003*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	
Jurisdiction	
Analysis Year	*Existing*

Project Description *Market Street at Wells Street - Case1.1am*

East/West Street: *Wells Street* | North/South Street: *Market Street*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*48*	*181*	*67*	*187*	*324*	*46*
Peak-Hour Factor, PHF	*0.71*	*0.75*	*0.84*	*0.81*	*0.85*	*0.68*
Hourly Flow Rate, HFR	*67*	*240*	*80*	*231*	*380*	*68*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*12*	*125*	*186*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.60*	*0.78*	*0.60*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*19*	*160*	*308*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*0*	*0*
Configuration	*LT*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*	*LT*		*R*			
v (vph)	*67*	*231*	*179*		*308*			
C (m) (vph)	*1101*	*1229*	*106*		*738*			
v/c	*0.06*	*0.19*	*1.69*		*0.42*			
95% queue length	*0.19*	*0.69*	*13.94*		*2.07*			
Control Delay	*8.5*	*8.6*	*417.1*		*13.3*			
LOS	*A*	*A*	*F*		*B*			
Approach Delay	--	--	*161.7*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*Existing*
Analysis Time Period	*PM Peak Hour*		

Project Description	*Market Street at Wells Street - Case1.1pm*
East/West Street: *Wells Street*	North/South Street: *Market Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*139*	*264*	*28*	*82*	*208*	*95*
Peak-Hour Factor, PHF	*0.50*	*0.80*	*0.70*	*1.00*	*0.91*	*0.85*
Hourly Flow Rate, HFR	*276*	*331*	*40*	*82*	*228*	*112*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*10*	*88*	*100*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.63*	*0.73*	*0.68*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*16*	*119*	*147*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*0*	*0*
Configuration	*LT*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*	*LT*		*R*			
v (vph)	*276*	*82*	*135*		*147*			
C (m) (vph)	*1206*	*1177*	*89*		*674*			
v/c	*0.23*	*0.07*	*1.52*		*0.22*			
95% queue length	*0.88*	*0.22*	*10.55*		*0.83*			
Control Delay	*8.9*	*8.3*	*364.6*		*11.8*			
LOS	*A*	*A*	*F*		*B*			
Approach Delay	--	--	*180.7*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PJR*
Agency/Co.	*PRA*
Date Performed	*4/3/2003*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	
Jurisdiction	
Analysis Year	*2015*

Project Description	*Market Street at Wells Street - Case2.1am*
East/West Street: *Wells Street*	North/South Street: *Market Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*68*	*226*	*83*	*232*	*401*	*66*
Peak-Hour Factor, PHF	*0.71*	*0.75*	*0.84*	*0.81*	*0.85*	*0.68*
Hourly Flow Rate, HFR	*96*	*299*	*99*	*287*	*470*	*97*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*15*	*162*	*230*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.60*	*0.78*	*0.60*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*24*	*207*	*380*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*0*	*0*
Configuration	*LT*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*	*LT*		*R*			
v (vph)	*96*	*287*	*231*		*380*			
C (m) (vph)	*995*	*1150*	*51*		*676*			
v/c	*0.10*	*0.25*	*4.53*		*0.56*			
95% queue length	*0.32*	*0.99*	*25.85*		*3.52*			
Control Delay	*9.0*	*9.2*			*16.9*			
LOS	*A*	*A*	*F*		*C*			
Approach Delay	--	--	*672.1*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015*
Analysis Time Period	*PM Peak Hour*		

Project Description	*Market Street at Wells Street - Case2.1pm*
East/West Street: *Wells Street*	North/South Street: *Market Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*178*	*329*	*35*	*102*	*258*	*121*
Peak-Hour Factor, PHF	*0.58*	*1.00*	*1.00*	*1.00*	*1.00*	*0.98*
Hourly Flow Rate, HFR	*305*	*329*	*35*	*102*	*258*	*123*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*12*	*115*	*124*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.69*	*0.85*	*0.77*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*17*	*135*	*160*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*0*	*0*
Configuration	*LT*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*	*LT*		*R*			
v (vph)	*305*	*102*	*152*		*160*			
C (m) (vph)	*1165*	*1184*	*68*		*678*			
v/c	*0.26*	*0.09*	*2.24*		*0.24*			
95% queue length	*1.05*	*0.28*	*14.45*		*0.91*			
Control Delay	*9.2*	*8.3*	*697.1*		*11.9*			
LOS	*A*	*A*	*F*		*B*			
Approach Delay	--	--	*345.8*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*AM Peak Hour*		

Project Description	*Market Street at Wells Street - Case3.1am*
East/West Street: *Wells Street*	North/South Street: *Market Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*68*	*226*	*83*	*232*	*401*	*66*
Peak-Hour Factor, PHF	*0.71*	*0.75*	*0.84*	*0.81*	*0.85*	*0.68*
Hourly Flow Rate, HFR	*96*	*299*	*99*	*287*	*470*	*97*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*15*	*162*	*230*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.60*	*0.78*	*0.60*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*24*	*207*	*380*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*0*	*0*
Configuration	*LT*		*R*			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*	*LT*		*R*			
v (vph)	*96*	*287*	*231*		*380*			
C (m) (vph)	*995*	*1150*	*51*		*676*			
v/c	*0.10*	*0.25*	*4.53*		*0.56*			
95% queue length	*0.32*	*0.99*	*25.85*		*3.52*			
Control Delay	*9.0*	*9.2*			*16.9*			
LOS	*A*	*A*	*F*		*C*			
Approach Delay	--	--	*672.1*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*PM Peak Hour*		

Project Description	*Market Street at Wells Street - Case3.1pm*
East/West Street: *Wells Street*	North/South Street: *Market Street*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*178*	*329*	*35*	*102*	*258*	*121*
Peak-Hour Factor, PHF	*0.58*	*1.00*	*1.00*	*1.00*	*1.00*	*0.98*
Hourly Flow Rate, HFR	*305*	*329*	*35*	*102*	*258*	*123*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*12*	*115*	*124*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.69*	*0.85*	*0.77*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*17*	*135*	*160*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*0*	*0*
Configuration	*LT*		*R*			

Delay, Queue Length, and Level of Service

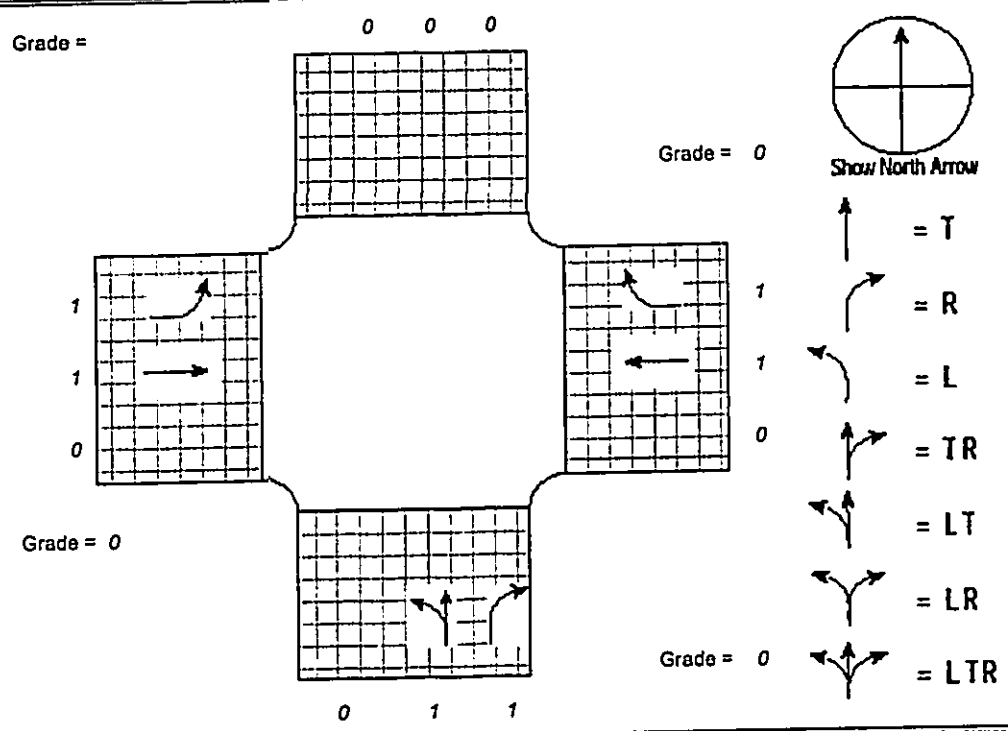
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*	*LT*		*R*			
v (vph)	*305*	*102*	*152*		*160*			
C (m) (vph)	*1165*	*1184*	*68*		*678*			
v/c	*0.26*	*0.09*	*2.24*		*0.24*			
95% queue length	*1.05*	*0.28*	*14.45*		*0.91*			
Control Delay	*9.2*	*8.3*	*697.1*		*11.9*			
LOS	*A*	*A*	*F*		*B*			
Approach Delay	--	--	*345.8*					
Approach LOS	--	--	*F*					

INPUT WORKSHEET

General Information		Site Information	
Analyst	*PJR*	Intersection	*Case1.2am*
Agency or Co.	*PRA*	Area Type	*CBD or Similar*
Date Performed	*4/3/2003*	Jurisdiction	
Time Period	*AM Peak Hour*	Analysis Year	*Existing*

Project Description *Market Street at Main Street - Case1.2am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*178*	*381*			*505*	*222*	*32*	*112*	*30*			
% Heavy veh	*0*	*0*			*0*	*0*	*0*	*0*	*0*			
PHF	*0.84*	*0.88*			*0.86*	*0.85*	*0.67*	*0.70*	*0.83*			
Actuated (P/A)	*P*	*P*			*P*	*P*	*P*	*P*	*P*			
Startup lost time	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Ext. eff. green	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Arrival type	*3*	*3*			*3*	*3*		*3*	*3*			
Unit Extension	*3.0*	*3.0*			*3.0*	*3.0*		*3.0*	*3.0*			
Ped/Bike/RTOR Volume				*0*		*40*	*0*		*15*	*0*		
Lane Width	*12.0*	*12.0*			*12.0*	*12.0*		*12.0*	*12.0*			
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*			*0*	*0*		*0*	*0*			

	EB Only	Thru & RT	03	04	NB Only	06	07	08
Timing	G = *18.4*	G = *35.3*	G =	G =	G = *15.3*	G =	G =	G =
	Y = *0*	Y = *3*	Y =	Y =	Y = *3*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *75.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Market Street at Main Street - Case1.2am*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*T*			*T*	*R*		*LT*	*R*			
Adj. flow rate	*212*	*432*			*588*	*213*		*208*	*18*			
Satflow rate	*1624*	*1710*			*1710*	*1454*		*1690*	*1454*			
Lost time	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Green ratio	*0.25*	*0.72*			*0.47*	*0.47*		*0.20*	*0.20*			
Lane group cap.	*398*	*1224*			*805*	*684*		*345*	*297*			
v/c ratio	*0.53*	*0.35*			*0.73*	*0.31*		*0.60*	*0.06*			
Flow ratio	*0.13*	*0.25*			*0.34*	*0.15*		*0.12*	*0.01*			
Crit. lane group	*Y*	*N*			*Y*	*N*		*Y*	*N*		*N*	
Sum flow ratios	*0.60*											
Lost time/cycle	*6.00*											
Critical v/c ratio	*0.65*											

Lane Group Capacity, Control Delay, and LOS Determination

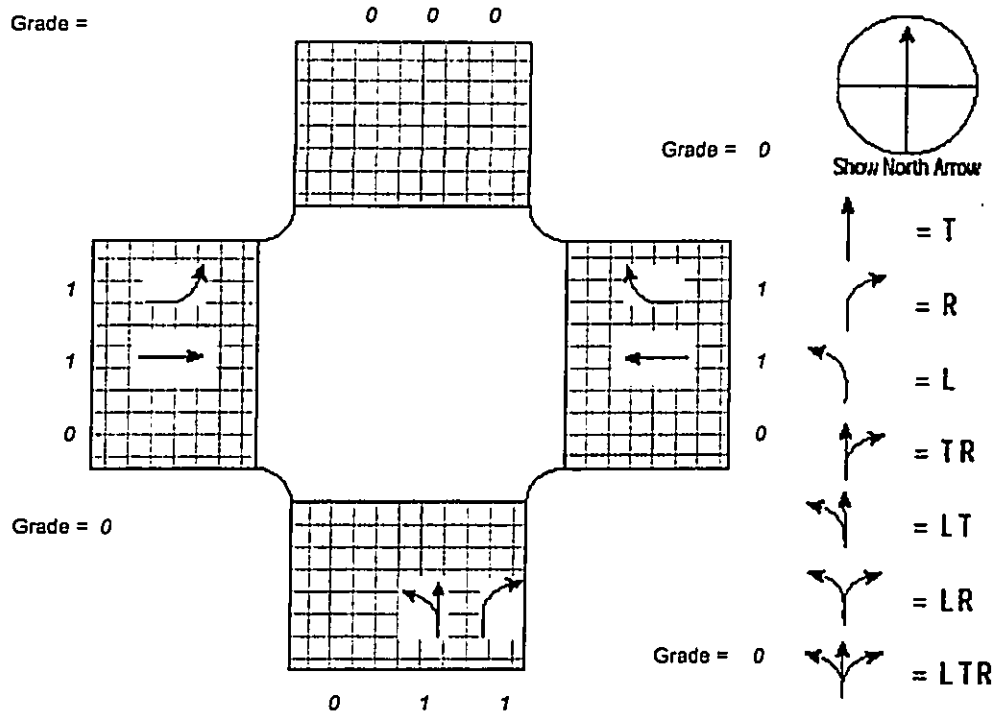
	EB			WB			NB			SB		
Lane group	*L*	*T*			*T*	*R*		*LT*	*R*			
Adj. flow rate	*212*	*432*			*588*	*213*		*208*	*18*			
Lane group cap.	*398*	*1224*			*805*	*684*		*345*	*297*			
v/c ratio	*0.53*	*0.35*			*0.73*	*0.31*		*0.60*	*0.06*			
Green ratio	*0.25*	*0.72*			*0.47*	*0.47*		*0.20*	*0.20*			
Unif. delay d1	*24.6*	*4.0*			*16.0*	*12.3*		*27.1*	*24.1*			
Delay factor k	*0.50*	*0.50*			*0.50*	*0.50*		*0.50*	*0.50*			
Increm. delay d2	*5.0*	*0.8*			*5.8*	*1.2*		*7.6*	*0.4*			
PF factor	*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*			
Control delay	*29.6*	*4.8*			*21.8*	*13.5*		*34.7*	*24.4*			
Lane group LOS	*C*	*A*			*C*	*B*		*C*	*C*			
Apprch. delay	*13.0*			*19.6*			*33.9*					
Approach LOS	*B*			*B*			*C*					
Intersec. delay	*19.0*			Intersection LOS						*B*		

INPUT WORKSHEET

General Information		Site Information	
Analyst	*PJR*	Intersection	*Case1.2pm*
Agency or Co.	*PRA*	Area Type	*CBD or Similar*
Date Performed	*4/3/2003*	Jurisdiction	
Time Period	*PM Peak Hour*	Analysis Year	*Existing*

Project Description *Market Street at Main Street - Case1.2pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*266*	*470*			*462*	*232*	*27*	*132*	*98*			
% Heavy veh	*0*	*0*			*0*	*0*	*0*	*0*	*0*			
PHF	*0.85*	*0.88*			*0.86*	*0.85*	*0.67*	*0.70*	*0.83*			
Actuated (P/A)	*P*	*P*			*P*	*P*	*P*	*P*	*P*			
Startup lost time	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Ext. eff. green	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Arrival type	*3*	*3*			*3*	*3*		*3*	*3*			
Unit Extension	*3.0*	*3.0*			*3.0*	*3.0*		*3.0*	*3.0*			
Ped/Bike/RTOR Volume				*0*		*40*	*0*		*20*	*0*		
Lane Width	*12.0*	*12.0*			*12.0*	*12.0*		*12.0*	*12.0*			
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*			*0*	*0*		*0*	*0*			

	EB Only	Thru & RT	03	04	NB Only	06	07	08
Timing	G = *21.0*	G = *34.8*	G =	G =	G = *13.1*	G =	G =	G =
	Y = *0*	Y = *3*	Y =	Y =	Y = *3*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *74.9*

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Market Street at Main Street - Case1.2pm*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*T*			*T*	*R*		*LT*	*R*			
Adj. flow rate	*313*	*533*			*538*	*226*		*229*	*94*			
Satflow rate	*1624*	*1710*			*1710*	*1454*		*1695*	*1454*			
Lost time	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Green ratio	*0.28*	*0.74*			*0.46*	*0.46*		*0.17*	*0.17*			
Lane group cap.	*455*	*1274*			*794*	*676*		*296*	*254*			
v/c ratio	*0.69*	*0.42*			*0.68*	*0.33*		*0.77*	*0.37*			
Flow ratio	*0.19*	*0.31*			*0.31*	*0.16*		*0.14*	*0.06*			
Crit. lane group	*Y*	*N*			*Y*	*N*		*Y*	*N*		*N*	
Sum flow ratios	*0.64*											
Lost time/cycle	*6.00*											
Critical v/c ratio	*0.70*											

Lane Group Capacity, Control Delay, and LOS Determination

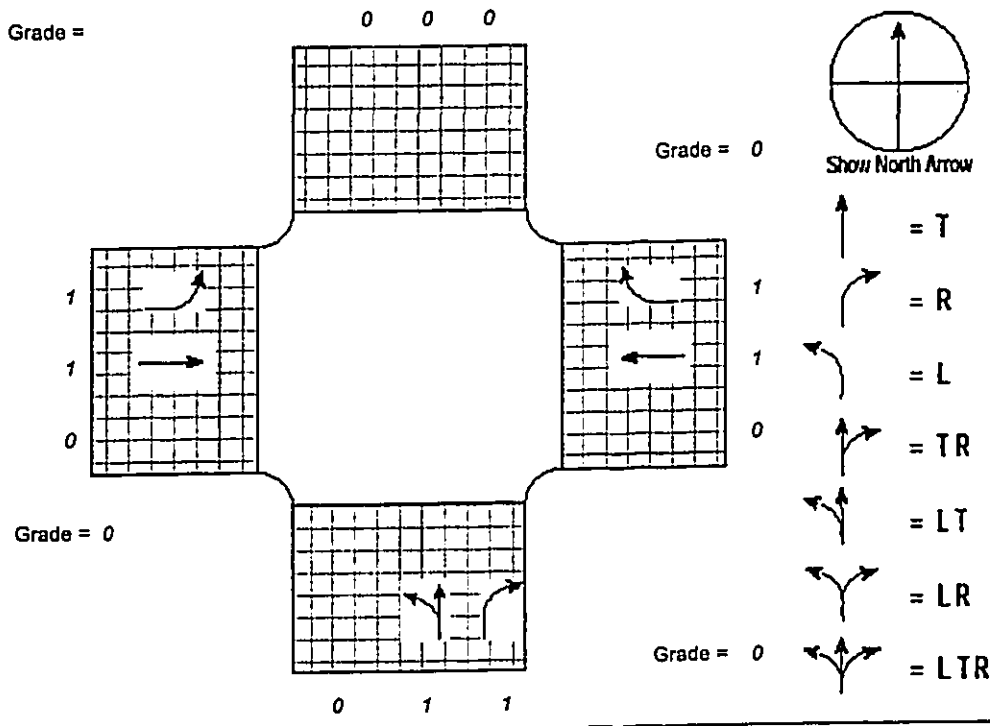
	EB			WB			NB			SB		
Lane group	*L*	*T*			*T*	*R*		*LT*	*R*			
Adj. flow rate	*313*	*533*			*538*	*226*		*229*	*94*			
Lane group cap.	*455*	*1274*			*794*	*676*		*296*	*254*			
v/c ratio	*0.69*	*0.42*			*0.68*	*0.33*		*0.77*	*0.37*			
Green ratio	*0.28*	*0.74*			*0.46*	*0.46*		*0.17*	*0.17*			
Unif. delay d1	*24.0*	*3.5*			*15.7*	*12.7*		*29.5*	*27.3*			
Delay factor k	*0.50*	*0.50*			*0.50*	*0.50*		*0.50*	*0.50*			
Increm. delay d2	*8.2*	*1.0*			*4.6*	*1.3*		*17.7*	*4.1*			
PF factor	*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*			
Control delay	*32.3*	*4.6*			*20.3*	*14.0*		*47.2*	*31.4*			
Lane group LOS	*C*	*A*			*C*	*B*		*D*	*C*			
Apprch. delay	*14.8*			*18.4*			*42.6*					
Approach LOS	*B*			*B*			*D*					
Intersec. delay	*20.9*			Intersection LOS						*C*		

INPUT WORKSHEET

General Information		Site Information	
Analyst	*PJR*	Intersection	*Case2.2am*
Agency or Co.	*PRA*	Area Type	*CBD or Similar*
Date Performed	*4/3/2003*	Jurisdiction	
Time Period	*AM Peak Hour*	Analysis Year	*2015*

Project Description *Market Street at Main Street - Case2.2am*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*221*	*475*			*626*	*333*	*40*	*164*	*37*			
% Heavy veh	*0*	*0*			*0*	*0*	*0*	*0*	*0*			
PHF	*0.85*	*0.88*			*0.86*	*0.85*	*0.67*	*0.70*	*0.83*			
Actuated (P/A)	*P*	*P*			*P*	*P*	*P*	*P*	*P*			
Startup lost time	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Ext. eff. green	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Arrival type	*3*	*3*			*3*	*3*		*3*	*3*			
Unit Extension	*3.0*	*3.0*			*3.0*	*3.0*		*3.0*	*3.0*			
Ped/Bike/RTOR Volume				*0*		*55*	*0*		*15*	*0*		
Lane Width	*12.0*	*12.0*			*12.0*	*12.0*		*12.0*	*12.0*			
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*			*0*	*0*		*0*	*0*			

	EB Only	Thru & RT	03	04	NB Only	06	07	08
Timing	G = *18.4*	G = *35.3*	G =	G =	G = *15.3*	G =	G =	G =
	Y = *0*	Y = *3*	Y =	Y =	Y = *3*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *75.0*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Market Street at Main Street - Case2.2am*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*T*			*T*	*R*		*LT*	*R*			
Adj. flow rate	*260*	*539*			*729*	*327*		*294*	*26*			
Satflow rate	*1624*	*1710*			*1710*	*1454*		*1693*	*1454*			
Lost time	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Green ratio	*0.25*	*0.72*			*0.47*	*0.47*		*0.20*	*0.20*			
Lane group cap.	*398*	*1224*			*805*	*684*		*345*	*297*			
v/c ratio	*0.65*	*0.44*			*0.91*	*0.48*		*0.85*	*0.09*			
Flow ratio	*0.16*	*0.32*			*0.43*	*0.22*		*0.17*	*0.02*			
Crit. lane group	*Y*	*N*			*Y*	*N*		*Y*	*N*		*N*	
Sum flow ratios	*0.76*											
Lost time/cycle	*6.00*											
Critical v/c ratio	*0.83*											

Lane Group Capacity, Control Delay, and LOS Determination

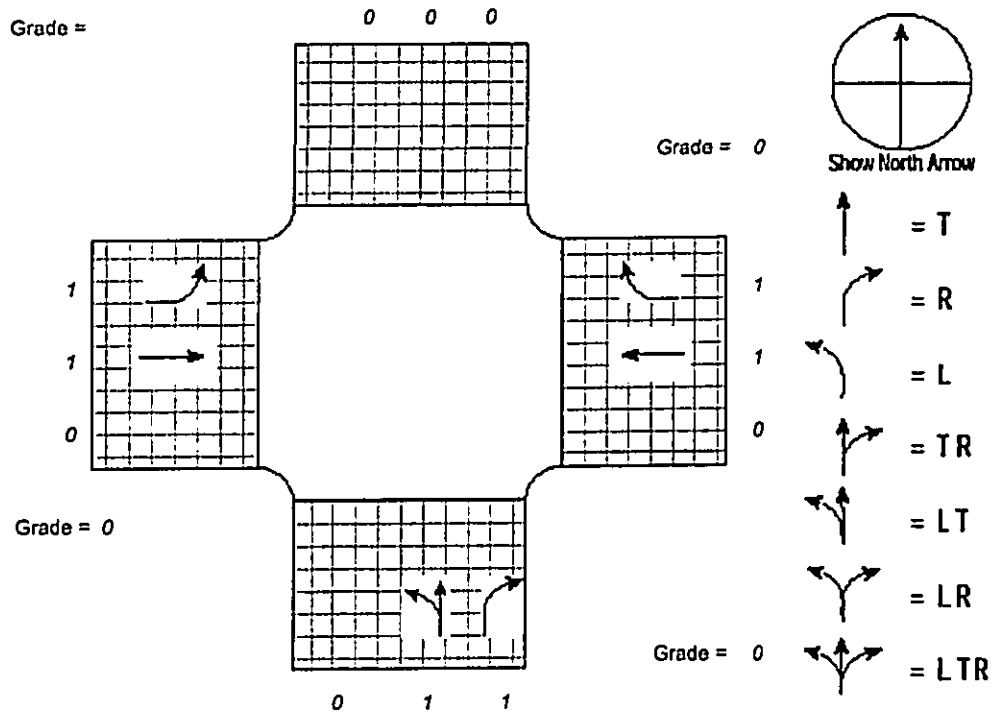
	EB			WB			NB			SB		
Lane group	*L*	*T*			*T*	*R*		*LT*	*R*			
Adj. flow rate	*260*	*539*			*729*	*327*		*294*	*26*			
Lane group cap.	*398*	*1224*			*805*	*684*		*345*	*297*			
v/c ratio	*0.65*	*0.44*			*0.91*	*0.48*		*0.85*	*0.09*			
Green ratio	*0.25*	*0.72*			*0.47*	*0.47*		*0.20*	*0.20*			
Unif. delay d1	*25.4*	*4.4*			*18.3*	*13.6*		*28.8*	*24.2*			
Delay factor k	*0.50*	*0.50*			*0.50*	*0.50*		*0.50*	*0.50*			
Increm. delay d2	*8.1*	*1.2*			*15.7*	*2.4*		*22.5*	*0.6*			
PF factor	*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*			
Control delay	*33.5*	*5.6*			*34.0*	*15.9*		*51.2*	*24.8*			
Lane group LOS	*C*	*A*			*C*	*B*		*D*	*C*			
Apprch. delay	*14.7*			*28.4*			*49.1*					
Approach LOS	*B*			*C*			*D*					
Intersec. delay	*26.4*			Intersection LOS						*C*		

INPUT WORKSHEET

General Information		Site Information	
Analyst	*PJR*	Intersection	*Case2.2pm*
Agency or Co.	*PRA*	Area Type	*CBD or Similar*
Date Performed	*4/3/2003*	Jurisdiction	
Time Period	*PM Peak Hour*	Analysis Year	*2015*

Project Description *Market Street at Main Street - Case2.2pm*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*330*	*592*			*572*	*317*	*33*	*179*	*121*			
% Heavy veh	*0*	*0*			*0*	*0*	*0*	*0*	*0*			
PHF	*0.85*	*0.88*			*0.86*	*0.85*	*0.67*	*0.70*	*0.83*			
Actuated (P/A)	*P*	*P*			*P*	*P*	*P*	*P*	*P*			
Startup lost time	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Ext. eff. green	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Arrival type	*3*	*3*			*3*	*3*		*3*	*3*			
Unit Extension	*3.0*	*3.0*			*3.0*	*3.0*		*3.0*	*3.0*			
Ped/Bike/RTOR Volume				*0*		*40*	*0*		*20*	*0*		
Lane Width	*12.0*	*12.0*			*12.0*	*12.0*		*12.0*	*12.0*			
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*			*0*	*0*		*0*	*0*			

	EB Only	Thru & RT	03	04	NB Only	06	07	08
Timing	G = *21.0*	G = *34.8*	G =	G =	G = *13.1*	G =	G =	G =
	Y = *0*	Y = *3*	Y =	Y =	Y = *3*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *74.9*		

CAPACITY AND LOS WORKSHEET

General Information

Project Description *Market Street at Main Street - Case2.2pm*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*T*			*T*	*R*		*LT*	*R*			
Adj. flow rate	*388*	*671*			*666*	*326*		*305*	*121*			
Satflow rate	*1624*	*1710*			*1710*	*1454*		*1696*	*1454*			
Lost time	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*			
Green ratio	*0.28*	*0.74*			*0.46*	*0.46*		*0.17*	*0.17*			
Lane group cap.	*455*	*1274*			*794*	*676*		*297*	*254*			
v/c ratio	*0.85*	*0.53*			*0.84*	*0.48*		*1.03*	*0.48*			
Flow ratio	*0.24*	*0.39*			*0.39*	*0.22*		*0.18*	*0.08*			
Crit. lane group	*Y*	*N*			*Y*	*N*		*Y*	*N*		*N*	
Sum flow ratios	*0.81*											
Lost time/cycle	*6.00*											
Critical v/c ratio	*0.88*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*	*T*			*T*	*R*		*LT*	*R*			
Adj. flow rate	*388*	*671*			*666*	*326*		*305*	*121*			
Lane group cap.	*455*	*1274*			*794*	*676*		*297*	*254*			
v/c ratio	*0.85*	*0.53*			*0.84*	*0.48*		*1.03*	*0.48*			
Green ratio	*0.28*	*0.74*			*0.46*	*0.46*		*0.17*	*0.17*			
Unif. delay d1	*25.5*	*4.0*			*17.6*	*13.8*		*30.9*	*27.8*			
Delay factor k	*0.50*	*0.50*			*0.50*	*0.50*		*0.50*	*0.50*			
Increm. delay d2	*18.0*	*1.6*			*10.3*	*2.5*		*59.3*	*6.3*			
PF factor	*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*			
Control delay	*43.5*	*5.6*			*27.9*	*16.3*		*90.2*	*34.1*			
Lane group LOS	*D*	*A*			*C*	*B*		*F*	*C*			
Apprch. delay	*19.5*			*24.1*			*74.3*					
Approach LOS	*B*			*C*			*E*					
Intersec. delay	*30.7*			Intersection LOS						*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*Existing*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Market Street at Vineyard Street - Case1.3am*		
East/West Street:	*Vineyard Street*	North/South Street:	*Market Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*86*	*273*	*68*	*45*	*0*	*327*
Peak-Hour Factor, PHF	*0.60*	*0.78*	*0.60*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*143*	*349*	*112*	*45*	*0*	*327*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration	*LTR*			*LTR*	*LR*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*56*	*27*	*68*	*38*	*0*
Peak-Hour Factor, PHF	*0.81*	*0.85*	*0.68*	*0.71*	*0.75*	*0.84*
Hourly Flow Rate, HFR	*0*	*65*	*39*	*96*	*50*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*			*TR*	*L*	*T*	
v (vph)	*143*	*45*			*104*	*96*	*50*	
C (m) (vph)	*1242*	*1211*			*233*	*124*	*228*	
v/c	*0.12*	*0.04*			*0.45*	*0.77*	*0.22*	
95% queue length	*0.39*	*0.12*			*2.14*	*4.50*	*0.81*	
Control Delay	*8.3*	*8.1*			*32.3*	*95.9*	*25.2*	
LOS	*A*	*A*			*D*	*F*	*D*	
Approach Delay	--	--	*32.3*			*71.7*		
Approach LOS	--	--	*D*			*F*		

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*Existing*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Market Street at Vineyard Street - Case1.3pm*		
East/West Street:	*Wells Street*	North/South Street:	*Vineyard Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*81*	*471*	*174*	*52*	*0*	*295*
Peak-Hour Factor, PHF	*0.63*	*0.73*	*0.68*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*129*	*642*	*257*	*52*	*0*	*295*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration	*LTR*			*LTR*	*LR*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*67*	*39*	*130*	*88*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.91*	*0.85*	*0.50*	*0.80*	*0.70*
Hourly Flow Rate, HFR	*0*	*73*	*45*	*258*	*110*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*			*TR*	*L*	*T*	
v (vph)	*129*	*52*			*118*	*258*	*110*	
C (m) (vph)	*1276*	*944*			*139*	*38*	*146*	
v/c	*0.10*	*0.06*			*0.85*	*6.79*	*0.75*	
95% queue length	*0.34*	*0.17*			*5.47*	*30.66*	*4.56*	
Control Delay	*8.1*	*9.0*			*102.0*		*81.1*	
LOS	*A*	*A*			*F*	*F*	*F*	
Approach Delay	--	--	*102.0*					
Approach LOS	--	--	*F*			*F*		

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	PJR	Intersection	
Agency/Co.	PRA	Jurisdiction	
Date Performed	4/3/2003	Analysis Year	2015
Analysis Time Period	AM Peak Hour		
Project Description	Market Street at Vineyard Street - Case2.3am		
East/West Street:	Vineyard Street	North/South Street:	Market Street
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	107	351	87	56	0	451
Peak-Hour Factor, PHF	0.60	0.78	0.60	1.00	1.00	1.00
Hourly Flow Rate, HFR	178	449	144	56	0	451
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			1			0
Lanes	0	1	0	0	0	0
Configuration	LTR			LTR	LR	
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	78	33	89	52	0
Peak-Hour Factor, PHF	0.81	0.85	0.68	0.71	0.75	0.84
Hourly Flow Rate, HFR	0	91	48	126	68	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR			TR	L	T	
v (vph)	178	56			139	126	68	
C (m) (vph)	1118	1112			133	14	143	
v/c	0.16	0.05			1.05	9.00	0.48	
95% queue length	0.57	0.16			7.60	16.81	2.20	
Control Delay	8.8	8.4			155.5		51.1	
LOS	A	A			F	F	F	
Approach Delay	--	--	155.5					
Approach LOS	--	--	F			F		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Market Street at Vineyard Street - Case2.3pm*		
East/West Street:	*Vineyard Street*	North/South Street:	*Vineyard Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*100*	*644*	*242*	*64*	*0*	*411*
Peak-Hour Factor, PHF	*0.63*	*0.73*	*0.68*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*160*	*878*	*358*	*64*	*0*	*411*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration	*LTR*			*LTR*	*LR*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*91*	*48*	*187*	*121*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.91*	*0.85*	*0.50*	*0.80*	*0.70*
Hourly Flow Rate, HFR	*0*	*99*	*56*	*371*	*152*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*			*TR*	*L*	*T*	
v (vph)	*160*	*64*			*155*	*371*	*152*	
C (m) (vph)	*1157*	*772*			*46*	*0*	*53*	
v/c	*0.14*	*0.08*			*3.37*		*2.87*	
95% queue length	*0.48*	*0.27*			*17.04*		*15.95*	
Control Delay	*8.6*	*10.1*						
LOS	*A*	*B*			*F*	*F*	*F*	
Approach Delay	--	--						
Approach LOS	--	--		*F*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*AM Peak Hour*		

Project Description	*Market Street at Vineyard Street - Case3.3am*
East/West Street: *Vineyard Street*	North/South Street: *Market Street*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*107*	*351*	*87*	*56*	*0*	*451*
Peak-Hour Factor, PHF	*0.60*	*0.78*	*0.60*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*178*	*449*	*144*	*56*	*0*	*451*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*0*	*1*	*0*	*1*
Configuration	*LTR*			*L*		*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*78*	*33*	*89*	*52*	*0*
Peak-Hour Factor, PHF	*0.81*	*0.85*	*0.68*	*0.71*	*0.75*	*0.84*
Hourly Flow Rate, HFR	*0*	*91*	*48*	*126*	*68*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*L*			*TR*	*L*	*T*	
v (vph)	*178*	*56*			*139*	*126*	*68*	
C (m) (vph)	*1118*	*1112*			*133*	*20*	*194*	
v/c	*0.16*	*0.05*			*1.05*	*6.30*	*0.35*	
95% queue length	*0.57*	*0.16*			*7.60*	*16.17*	*1.48*	
Control Delay	*8.8*	*8.4*			*155.5*		*33.2*	
LOS	*A*	*A*			*F*	*F*	*D*	
Approach Delay	--	--	*155.5*					
Approach LOS	--	--	*F*			*F*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*PM Peak Hour*		

Project Description	*Market Street at Vineyard Street - Case3.3pm*
East/West Street: *Vineyard Street*	North/South Street: *Market Street*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*100*	*644*	*242*	*64*	*0*	*411*
Peak-Hour Factor, PHF	*0.63*	*0.73*	*0.68*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*160*	*878*	*358*	*64*	*0*	*411*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*0*	*1*	*0*	*1*
Configuration	*LTR*			*L*		*R*
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*0*	*91*	*48*	*187*	*121*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.91*	*0.85*	*0.50*	*0.80*	*0.70*
Hourly Flow Rate, HFR	*0*	*99*	*56*	*371*	*152*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*L*			*TR*	*L*	*T*	
v (vph)	*160*	*64*			*155*	*371*	*152*	
C (m) (vph)	*1157*	*772*			*46*	*0*	*70*	
v/c	*0.14*	*0.08*			*3.37*		*2.17*	
95% queue length	*0.48*	*0.27*			*17.04*		*14.25*	
Control Delay	*8.6*	*10.1*					*666.0*	
LOS	*A*	*B*			*F*	*F*	*F*	
Approach Delay	--	--						
Approach LOS	--	--		*F*				

>

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst		Intersection	
Agency/Co.		Jurisdiction	
Date Performed	6/10/2003	Analysis Year	2015 WITH PROJECT
Analysis Time Period	AM Peak Hour		

Project ID *Market Street Case4.3am*

East/West Street: *Vineyard Street* | North/South Street: *Market Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume	89	52	0	0	78	33
%Thrus Left Lane	50			50		

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume	107	351	87	56	0	451
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	T	TR		LTR		L	R
PHF	0.85	0.85	0.85		0.85		0.85	0.85
Flow Rate	104	61	129		639		65	530
% Heavy Vehicles	0	0	0		0		0	0
No. Lanes	2		1		1		2	
Geometry Group	5		4b		4b		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0		0.2		1.0	0.0
Prop. Right-Turns	0.0	0.0	0.3		0.2		0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0		0.0		0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2	0.2	0.2	0.5	0.5
hRT-adj	-0.7	-0.7	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	8.72	8.72	8.72		8.72		8.72	8.72

Departure Headway and Service Time

hd, initial value	3.20	3.20	3.20		3.20		3.20	3.20
x, initial	0.09	0.05	0.11		0.57		0.06	0.47
hd, final value	8.72	8.72	8.72		8.72		8.72	8.72
x, final value	0.25	0.14	0.29		1.18		0.13	0.88
Move-up time, m	2.3		2.3		2.3		2.3	
Service Time	6.4	5.9	6.4	5.9	6.4	5.9	6.4	5.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity	354	311	379		639		315	596
Delay	14.34	12.23	14.34		123.62		11.02	38.09
LOS	B	B	B		F		B	E
Approach: Delay	13.56		14.34		123.62		35.13	
LOS	B		B		F		E	
Intersection Delay	68.05							
Intersection LOS	F							

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	
Agency/Co.	
Date Performed	6/10/2003
Analysis Time Period	PM Peak Hour

Site Information

Intersection	
Jurisdiction	
Analysis Year	2015 WITH PROJECT

Project ID *Market Street Case4.3pm*

East/West Street: *Vineyard Street*

North/South Street: *Market Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume	187	121	0	0	91	48
%Thrus Left Lane	50			50		

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume	100	644	242	64	0	411
%Thrus Left Lane	50			50		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	T	TR		LTR		L	R
PHF	0.85	0.85	0.85		0.85		0.85	0.85
Flow Rate	219	142	163		1158		75	483
% Heavy Vehicles	0	0	0		0		0	0
No. Lanes	2		1		1		2	
Geometry Group	5		4b		4b		5	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0		0.1		1.0	0.0
Prop. Right-Turns	0.0	0.0	0.3		0.2		0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0		0.0		0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2	0.2	0.2	0.5	0.5
hRT-adj	-0.7	-0.7	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	9.12	9.12	9.12		9.12		9.12	9.12

Departure Headway and Service Time

hd, Initial value	3.20	3.20	3.20		3.20		3.20	3.20
x, initial	0.19	0.13	0.14		1.03		0.07	0.43
hd, final value	9.12	9.12	9.12		9.12		9.12	9.12
x, final value	0.55	0.34	0.42		2.53		0.18	0.97
Move-up time, m	2.3		2.3		2.3		2.3	
Service Time	6.8	6.3	6.8	6.3	6.8	6.3	6.8	6.3

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity	389	392	379		1158		325	500
Delay	22.61	15.65	18.46		709.81		12.93	58.64
LOS	C	C	C		F		B	F
Approach: Delay	19.87		18.46		709.81		52.49	
LOS	C		C		F		F	
Intersection Delay	384.57							
Intersection LOS	F							

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*Existing*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Market Street at Mill Street - Case1.4am*		
East/West Street:	*Mill Street*	North/South Street:	*Market Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*285*	*155*	*377*	*408*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.80*	*0.79*	*0.82*	*0.89*	*1.00*
Hourly Flow Rate, HFR	*0*	*356*	*196*	*459*	*458*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*44*	*0*	*124*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.69*	*1.00*	*0.94*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*63*	*0*	*131*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (vph)		*459*	*63*		*131*			
C (m) (vph)		*1028*	*47*		*610*			
v/c		*0.45*	*1.34*		*0.21*			
95% queue length		*2.34*	*5.96*		*0.81*			
Control Delay		*11.3*	*386.4*		*12.5*			
LOS		*B*	*F*		*B*			
Approach Delay	--	--	*133.9*					
Approach LOS	--	--	*F*					

>

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PJR*
Agency/Co.	*PRA*
Date Performed	*4/3/2003*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	
Jurisdiction	
Analysis Year	*2010*

Project Description	*Market Street at Mill Street - Case1,4pm*
East/West Street:	*Mill Street*
North/South Street:	*Market Street*
Intersection Orientation:	*North-South*
Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*436*	*172*	*191*	*247*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.91*	*0.81*	*0.92*	*0.94*	*1.00*
Hourly Flow Rate, HFR	*0*	*479*	*212*	*207*	*262*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*83*	*0*	*211*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.80*	*1.00*	*0.91*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*103*	*0*	*231*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (vph)		*207*	*103*		*231*			
C (m) (vph)		*913*	*147*		*515*			
v/c		*0.23*	*0.70*		*0.45*			
95% queue length		*0.87*	*4.05*		*2.29*			
Control Delay		*10.1*	*72.9*		*17.6*			
LOS		*B*	*F*		*C*			
Approach Delay	--	--	*34.6*					
Approach LOS	--	--	*D*					

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Market Street at Mill Street - Case2.4am*		
East/West Street:	*Mill Street*	North/South Street:	*Market Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*362*	*201*	*467*	*533*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.80*	*0.79*	*0.82*	*0.89*	*1.00*
Hourly Flow Rate, HFR	*0*	*452*	*254*	*569*	*598*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*6873*	*0*	*154*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.69*	*1.00*	*0.94*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*9960*	*0*	*163*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (vph)		*569*	*9960*		*163*			
C (m) (vph)		*902*	*16*		*519*			
v/c		*0.63*	*622.50*		*0.31*			
95% queue length		*4.61*	*1246.00*		*1.33*			
Control Delay		*15.6*			*15.1*			
LOS		*C*	*F*		*C*			
Approach Delay	--	--						
Approach LOS	--	--		*F*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Market Street at Mill Street - Case2.4pm*		
East/West Street:	*Mill Street*	North/South Street:	*Market Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*583*	*256*	*237*	*336*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.91*	*0.81*	*0.92*	*0.94*	*1.00*
Hourly Flow Rate, HFR	*0*	*640*	*316*	*257*	*357*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*118*	*0*	*261*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.80*	*1.00*	*0.91*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*147*	*0*	*286*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (vph)		*257*	*147*		*286*			
C (m) (vph)		*727*	*69*		*389*			
v/c		*0.35*	*2.13*		*0.74*			
95% queue length		*1.60*	*13.76*		*5.76*			
Control Delay		*12.6*	*650.2*		*36.0*			
LOS		*B*	*F*		*E*			
Approach Delay	--	--	*244.5*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Market Street at Mill Street - Case3.4am*		
East/West Street:	*Mill Street*	North/South Street:	*Market Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*362*	*201*	*467*	*533*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.80*	*0.79*	*0.82*	*0.89*	*1.00*
Hourly Flow Rate, HFR	*0*	*452*	*254*	*569*	*598*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*73*	*0*	*154*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.69*	*1.00*	*0.94*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*105*	*0*	*163*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*569*	*105*		*163*			
C (m) (vph)		*902*	*16*		*519*			
v/c		*0.63*	*6.56*		*0.31*			
95% queue length		*4.61*	*13.95*		*1.33*			
Control Delay		*15.6*			*15.1*			
LOS		*C*	*F*		*C*			
Approach Delay	--	--						
Approach LOS	--	--	*F*					

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*4/3/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Market Street at Mill Street - Case3.4pm*		
East/West Street:	*Mill Street*	North/South Street:	*Market Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*0*	*583*	*256*	*237*	*336*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.91*	*0.81*	*0.92*	*0.94*	*1.00*
Hourly Flow Rate, HFR	*0*	*640*	*316*	*257*	*357*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*118*	*0*	*261*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.80*	*1.00*	*0.91*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR	*147*	*0*	*286*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (vph)		*257*	*147*		*286*			
C (m) (vph)		*727*	*69*		*389*			
v/c		*0.35*	*2.13*		*0.74*			
95% queue length		*1.60*	*13.76*		*5.76*			
Control Delay		*12.6*	*650.2*		*36.0*			
LOS		*B*	*F*		*E*			
Approach Delay	--	--	*244.5*					
Approach LOS	--	--	*F*					

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*PJR*
Agency/Co.	*PRA*
Date Performed	*5/11/2003*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	
Jurisdiction	
Analysis Year	*2015 WITH PROJECT*

Project ID *Market Street at Mill Street 4 way stop*

East/West Street: *Mill Street* | North/South Street: *Market Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*73*	*0*	*154*
%Thrus Left Lane	*50*			*50*		

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume	*0*	*362*	*201*	*467*	*533*	*0*
%Thrus Left Lane	*50*			*50*		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			*L*	*R*	*TR*		*L*	*T*
PHF			*0.69*	*0.94*	*0.80*		*0.82*	*0.89*
Flow Rate			*105*	*163*	*703*		*569*	*598*
% Heavy Vehicles			*0*	*0*	*0*		*0*	*0*
No. Lanes	*0*		*2*		*1*		*2*	
Geometry Group			*1*		*3b*		*5*	
Duration, T	*0.25*							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns			*1.0*	*0.0*	*0.0*		*1.0*	*0.0*
Prop. Right-Turns			*0.0*	*1.0*	*0.4*		*0.0*	*0.0*
Prop. Heavy Vehicle			*0.0*	*0.0*	*0.0*		*0.0*	*0.0*
hLT-adj			*0.2*	*0.2*	*0.2*	*0.2*	*0.5*	*0.5*
hRT-adj			*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.7*	*-0.7*
hHV-adj			*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*
hadj, computed			*0.00*	*0.00*	*0.00*		*0.00*	*0.00*

Departure Headway and Service Time

hd, initial value			*3.20*	*3.20*	*3.20*		*3.20*	*3.20*
x, initial			*0.09*	*0.14*	*0.62*		*0.51*	*0.53*
hd, final value			*0.00*	*0.00*	*0.00*		*0.00*	*0.00*
x, final value			*0.21*	*0.29*	*1.16*		*1.07*	*1.04*
Move-up time, m			*2.0*		*2.0*		*2.3*	
Service Time								

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity			*355*	*413*	*703*		*569*	*598*
Delay			*12.29*	*12.17*	*112.08*		*83.95*	*72.31*
LOS			*B*	*B*	*F*		*F*	*F*
Approach: Delay			*12.22*		*112.08*		*77.99*	
LOS			*B*		*F*		*F*	
Intersection Delay	*80.96*							
Intersection LOS	*F*							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*5/11/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*PM Peak Hour*		

Project ID *Market Street at Mill Street Case4.4pm*

East/West Street: *Mill Street* | North/South Street: *Market Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume	*0*	*0*	*0*	*118*	*0*	*261*
%Thrus Left Lane	*50*			*50*		

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume	*0*	*583*	*256*	*237*	*336*	*0*
%Thrus Left Lane	*50*			*50*		

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			*L*	*R*	*TR*		*L*	*T*
PHF			*0.80*	*0.91*	*0.88*		*0.92*	*0.94*
Flow Rate			*147*	*286*	*952*		*257*	357
% Heavy Vehicles			*0*	*0*	*0*		*0*	*0*
No. Lanes	*0*		*2*		*1*		*2*	
Geometry Group			*1*		*3b*		*5*	
Duration, T	*0.25*							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns			*1.0*	*0.0*	*0.0*		*1.0*	*0.0*
Prop. Right-Turns			*0.0*	*1.0*	*0.3*		*0.0*	*0.0*
Prop. Heavy Vehicle			*0.0*	*0.0*	0.0		*0.0*	*0.0*
hLT-adj			*0.2*	*0.2*	*0.2*	*0.2*	*0.5*	*0.5*
hRT-adj			*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.7*	*-0.7*
hHV-adj			*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*
hadj, computed			*0.00*	*0.00*	*0.00*		*0.00*	*0.00*

Departure Headway and Service Time

hd, initial value			*3.20*	*3.20*	*3.20*		*3.20*	*3.20*
x, initial			*0.13*	*0.25*	*0.85*		*0.23*	*0.32*
hd, final value			*0.00*	*0.00*	*0.00*		*0.00*	*0.00*
x, final value			*0.29*	*0.50*	*1.66*		*0.52*	*0.68*
Move-up time, m			*2.0*		*2.0*		*2.3*	
Service Time								

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity			*397*	*536*	*952*		*489*	*526*
Delay			*12.98*	*15.39*	*323.50*		*17.77*	*22.53*
LOS			*B*	*C*	*F*		*C*	*C*
Approach: Delay			*14.57*		*323.50*		*20.54*	
LOS			*B*		*F*		*C*	
Intersection Delay	*163.53*							
Intersection LOS	*F*							

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*5/11/2003*	Analysis Year	*Existing*
Analysis Time Period	*AM Peak Hour*		

Project Description	*Market Street at Mokuhau Road Case1.5am*
East/West Street: *Mokuhau Road/Pilhana Street*	North/South Street: *Market Street*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	*1*	*2*	*3*	*4*	*5*	*6*
	L	T	R	L	T	R
Volume	*32*	*193*	*44*	*4*	*456*	*9*
Peak-Hour Factor, PHF	*0.67*	*0.83*	*0.69*	*0.50*	*0.76*	*0.75*
Hourly Flow Rate, HFR	*47*	*232*	*64*	*8*	*600*	*12*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*	*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*60*	*2*	*3*	*4*	*0*	*57*
Peak-Hour Factor, PHF	*0.58*	*0.50*	*0.75*	*0.33*	*1.00*	*0.75*
Hourly Flow Rate, HFR	*104*	*4*	*4*	*11*	*0*	*76*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LTR*		*LTR*			*LTR*	
v (vph)	*47*	*8*		*112*			*87*	
C (m) (vph)	*977*	*1277*		*192*			*428*	
v/c	*0.05*	*0.01*		*0.58*			*0.20*	
95% queue length	*0.15*	*0.02*		*3.19*			*0.75*	
Control Delay	*8.9*	*7.8*		*47.1*			*15.5*	
LOS	*A*	*A*		*E*			*C*	
Approach Delay	--	--	*47.1*			*15.5*		
Approach LOS	--	--	*E*			*C*		

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*5/11/2003*	Analysis Year	*Existing*
Analysis Time Period	*PM Peak Hour*		

Project Description	*Market Street at Mokuhau Road Case1.5pm*
East/West Street: *Mokuhau Road/Piihana Street*	North/South Street: *Market Street*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*60*	*420*	*66*	*9*	*243*	*13*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*0.41*	*1.00*
Hourly Flow Rate, HFR	*60*	*420*	*66*	*9*	*599*	*13*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*	*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*54*	*2*	*6*	*15*	*1*	*34*
Peak-Hour Factor, PHF	*0.52*	*0.50*	*0.75*	*0.94*	*1.00*	*0.45*
Hourly Flow Rate, HFR	*103*	*4*	*8*	*16*	*1*	*76*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LTR*		*LTR*			*LTR*	
v (vph)	*60*	*9*		*115*			*93*	
C (m) (vph)	*977*	*1087*		*137*			*349*	
v/c	*0.06*	*0.01*		*0.84*			*0.27*	
95% queue length	*0.20*	*0.03*		*5.33*			*1.06*	
Control Delay	*8.9*	*8.3*		*101.1*			*19.0*	
LOS	*A*	*A*		*F*			*C*	
Approach Delay	--	--	*101.1*			*19.0*		
Approach LOS	--	--	*F*			*C*		

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*5/11/2003*	Analysis Year	*2015*
Analysis Time Period	*AM Peak Hour*		

Project Description	*Market Street at Mokuhau Road Case2.5am*
East/West Street: *Mokuhau Road/Piihana Street*	North/South Street: *Market Street*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	*Northbound*			*Southbound*		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*42*	*244*	*57*	*5*	*592*	*11*
Peak-Hour Factor, PHF	*0.67*	*0.83*	*0.69*	*0.50*	*0.76*	*0.75*
Hourly Flow Rate, HFR	*62*	*293*	*82*	*10*	*778*	*14*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*	*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*74*	*2*	*4*	*5*	*0*	*71*
Peak-Hour Factor, PHF	*0.58*	*0.50*	*0.75*	*0.33*	*1.00*	*0.75*
Hourly Flow Rate, HFR	*128*	*4*	*5*	*14*	*0*	*94*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LTR*		*LTR*			*LTR*	
v (vph)	*62*	*10*		*137*			*108*	
C (m) (vph)	*838*	*1195*		*108*			*314*	
v/c	*0.07*	*0.01*		*1.27*			*0.34*	
95% queue length	*0.24*	*0.03*		*9.21*			*1.49*	
Control Delay	*9.6*	*8.0*		*249.3*			*22.4*	
LOS	*A*	*A*		*F*			*C*	
Approach Delay	--	--	*249.3*			*22.4*		
Approach LOS	--	--	*F*			*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*5/11/2003*	Analysis Year	*2015*
Analysis Time Period	*PM Peak Hour*		

Project Description	*Market Street at Mokuhau Road Case2.5pm*
East/West Street: *Mokuhau Road/Piihana Street*	North/South Street: *Market Street*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*83*	*522*	*91*	*10*	*331*	*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*0.41*	*1.00*
Hourly Flow Rate, HFR	*83*	*522*	*91*	*10*	*817*	*16*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*	*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*67*	*2*	*7*	*19*	*1*	*42*
Peak-Hour Factor, PHF	*0.52*	*0.50*	*0.75*	*0.94*	*1.00*	*0.45*
Hourly Flow Rate, HFR	*129*	*4*	*9*	*20*	*1*	*93*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LTR*		*LTR*			*LTR*	
v (vph)	*83*	*10*		*142*			*114*	
C (m) (vph)	*809*	*976*		*62*			*215*	
v/c	*0.10*	*0.01*		*2.29*			*0.53*	
95% queue length	*0.34*	*0.03*		*13.85*			*2.78*	
Control Delay	*10.0-*	*8.7*		*733.0*			*39.2*	
LOS	*A*	*A*		*F*			*E*	
Approach Delay	--	--	*733.0*			*39.2*		
Approach LOS	--	--	*F*			*E*		

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*5/11/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Market Street at Mokuhau Road Case3.5am*		
East/West Street:	*Mokuhau Road/Piihana Street*	North/South Street:	*Market Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*42*	*244*	*57*	*5*	*592*	*11*
Peak-Hour Factor, PHF	*0.67*	*0.83*	*0.69*	*0.50*	*0.76*	*0.75*
Hourly Flow Rate, HFR	*62*	*293*	*82*	*10*	*778*	*14*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*	*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*74*	*2*	*4*	*5*	*0*	*71*
Peak-Hour Factor, PHF	*0.58*	*0.50*	*0.75*	*0.33*	*1.00*	*0.75*
Hourly Flow Rate, HFR	*128*	*4*	*5*	*14*	*0*	*94*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LTR*		*LTR*			*LTR*	
v (vph)	*62*	*10*		*137*			*108*	
C (m) (vph)	*838*	*1280*		*108*			*314*	
v/c	*0.07*	*0.01*		*1.27*			*0.34*	
95% queue length	*0.24*	*0.02*		*9.21*			*1.49*	
Control Delay	*9.6*	*7.8*		*249.3*			*22.4*	
LOS	*A*	*A*		*F*			*C*	
Approach Delay	--	--	*249.3*			*22.4*		
Approach LOS	--	--	*F*			*C*		

>

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PJR*	Intersection	
Agency/Co.	*PRA*	Jurisdiction	
Date Performed	*5/11/2003*	Analysis Year	*2015 WITH PROJECT*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Market Street at Mokuhau Road Case3.5pm*		
East/West Street:	*Mokuhau Road/Piihana Street*	North/South Street:	*Market Street*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*83*	*522*	*91*	*10*	*331*	*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*0.41*	*1.00*
Hourly Flow Rate, HFR	*83*	*522*	*91*	*10*	*817*	*16*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*	*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*67*	*2*	*7*	*19*	*1*	*42*
Peak-Hour Factor, PHF	*0.52*	*0.50*	*0.75*	*0.94*	*1.00*	*0.45*
Hourly Flow Rate, HFR	*129*	*4*	*9*	*20*	*1*	*93*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LTR*		*LTR*			*LTR*	
v (vph)	*83*	*10*		*142*			*114*	
C (m) (vph)	*809*	*1055*		*62*			*216*	
v/c	*0.10*	*0.01*		*2.29*			*0.53*	
95% queue length	*0.34*	*0.03*		*13.85*			*2.76*	
Control Delay	*10.0-*	*8.4*		*733.0*			*38.9*	
LOS	*A*	*A*		*F*			*E*	
Approach Delay	--	--	*733.0*			*38.9*		
Approach LOS	--	--	*F*			*E*		

>

Appendix – E
Soils Investigation Report

REPORT
SOILS INVESTIGATION

PROPOSED MARKET STREET IMPROVEMENTS
WELLS STREET TO MOKUHAU ROAD

WAILUKU, MAUI, HAWAII

for

R.T. TANAKA ENGINEERS, INC.

Project No. 01496-FM
June 17, 2003

ISLAND GEOTECHNICAL ENGINEERING, INC.
Geotechnical Consultants

222-A Kawaipuna Place
Wailuku, Maui, Hawaii 96793
Phone: (808) 243-9355
Fax: (808) 244-8997

June 17, 2003
Project No. 01496-FM

R.T. Tanaka Engineers, Inc.
871 Kolu Street, Suite 201
Wailuku, HI. 96793

The attached report presents the results of a soils investigation at the site of the proposed Market Street Improvements project to be located in Wailuku, Maui, Hawaii.

A summary of the findings is as follows:

1) The subsurface conditions at the site were explored by drilling 6 test borings (through the asphalt concrete pavement) to depths of 5.75 to 8.5 feet below existing grade. The general subsurface conditions at each test boring location are as follows:

Boring 1 encountered 4 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 1.5 feet below existing grade followed by stiff to very stiff elastic SILT to the final depth of the boring at 8.5 feet below existing grade.

Boring 2 encountered 2 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.5 feet below existing grade followed by stiff to very stiff elastic SILT to the final depth of the boring at 8.5 feet below existing grade.

Boring 3 encountered 1 inch of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.58 feet below existing grade followed by moderately dense SAND to a depth of 1 feet below existing grade followed by stiff elastic SILT to a depth of 5 feet below existing grade followed by soft elastic SILT to a depth of 6.5 feet below existing grade followed by dense COBBLES to the final depth of the boring at 6.83 feet below existing grade.

Boring 4 encountered 3.5 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.37 feet below existing grade followed by moderately stiff to stiff elastic SILT to the final depth of the boring at 8.5 feet below existing grade.

Boring 5 encountered 1.5 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.29 feet below existing grade followed by moderately dense to very dense GRAVEL with cobbles to the final depth of the boring at 6 feet below existing grade.

Boring 6 encountered 4 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.75 feet below existing grade followed by moderately stiff to stiff elastic SILT to a depth of 3 feet below existing grade followed by very soft elastic SILT to a depth of 5 feet below existing grade followed by dense COBBLES with gravel to the final depth of the boring at 5.75 feet below existing grade.

2) No groundwater was encountered in any of the test borings.

3) From the information provided by Phillip Rowell & Associates, design traffic volume for this project will be 12,300 vehicles per day. Of this 12,300 vehicles per day, 369 (3%) will be trucks with heavy axle loads.

4) The Maui County Class "A" pavement section is acceptable for use on this project. This new pavement section consist of 2.5" Asphalt Concrete + 5" Asphalt Treated Base + 8" Subbase.

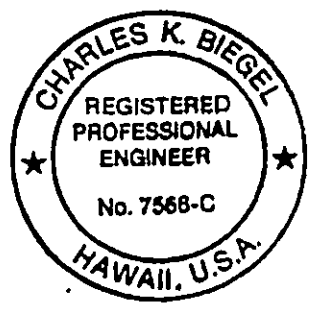
Details of the findings and recommendations are presented in the attached report.

This investigation was made in accordance with generally accepted engineering procedures and included such field and laboratory tests considered necessary for the project. In the opinion of the undersigned, the accompanying report has been substantiated by mathematical data in conformity with generally accepted engineering principles and presents fairly the design information requested by your organization. No other warranty is either expressed or given.

Respectfully submitted,

ISLAND GEOTECHNICAL ENGINEERING, INC.

Charles K. Biegel, P.E.
President



This work was prepared by me
or done under my supervision.

TABLE OF CONTENTS

INTRODUCTION

This investigation was made for the purpose of obtaining information on the subsurface conditions from which to base recommendations for pavement design and new utility line installation for the proposed Market Street Improvements to be located in Wailuku, Maui; County of Maui Project No. 01-11 . The location of the site, relative to the existing streets and landmarks, is shown on the Vicinity Map, Plate 1.

SCOPE OF WORK

The services included drilling 6 test borings to depths of 5.75 to 8.5 feet, performing 6 dynamic cone penetration (dcp) test to depths of 18 to 39 inches, obtaining samples of the underlying soils, performing laboratory tests on the samples, and performing an engineering analysis from the data gathered. In general, the following information is provided for use by the Engineer:

1. General subsurface conditions, as disclosed by the test borings.
2. Physical characteristics of the soils encountered.
3. Recommendations for utility line installation & pavement design.
4. Recommendations for placement of fill and backfill.
5. Special considerations.

PLANNED DEVELOPMENT

From the information provided, the project will consist of reconstructing the pavement on Market Street between Wells Street and Mokuhau Road. New utility lines will be installed.

SITE CONDITIONS

Surface

The project area along Market Street extends from Wells Street to Mokuhau Road in Wailuku, Maui, Hawaii. The existing roadway surface was observed to be in poor condition and contained alligator cracks and rutting in some areas of the roadway.

Subsurface

Six (6) test borings were drilled to depths of 5.75 to 8.5 feet below existing grade to determine the subsurface conditions at the site. The locations of the explorations are shown on the Plot Plan, Plate 2. Detailed logs of the explorations are presented in the Appendix to this report.

Boring 1 encountered 4 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 1.5 feet below existing grade followed by stiff to very stiff elastic SILT to the final depth of the boring at 8.5 feet below existing grade.

Boring 2 encountered 2 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.5 feet below existing grade followed by stiff to very stiff elastic SILT to the final depth of the boring at 8.5 feet below existing grade.

Boring 3 encountered 1 inch of asphalt concrete followed by moderately dense silty

GRAVEL with sand to a depth of 0.58 feet below existing grade followed by moderately dense SAND to a depth of 1 feet below existing grade followed by stiff elastic SILT to a depth of 5 feet below existing grade followed by soft elastic SILT to a depth of 6.5 feet below existing grade followed by dense COBBLES to the final depth of the boring at 6.83 feet below existing grade.

Boring 4 encountered 3.5 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.37 feet below existing grade followed by moderately stiff to stiff elastic SILT to the final depth of the boring at 8.5 feet below existing grade.

Boring 5 encountered 1.5 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.29 feet below existing grade followed by moderately dense to very dense GRAVEL with cobbles to the final depth of the boring at 6 feet below existing grade.

Boring 6 encountered 4 inches of asphalt concrete followed by moderately dense silty GRAVEL with sand to a depth of 0.75 feet below existing grade followed by moderately stiff to stiff elastic SILT to a depth of 3 feet below existing grade followed by very soft elastic SILT to a depth of 5 feet below existing grade followed by dense COBBLES with gravel to the final depth of the boring at 5.75 feet below existing grade.

No groundwater was encountere I in any of the test borings.

From the USDA Soil Conservation Service "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii", the site is located in an area designated as Iao cobbly silty clay, 3 to 7 percent slopes (IbB) and Wailuku silty clay, 3 to 7 percent slopes (WvB) .

The Iao series consist of well-drained soils on valley fill and alluvial fans. These soils developed in alluvium derived from basic igneous rock. The shrink-swell potential is moderate. (USDA, 1972, Plate 99 and pp. 46-47, 172-173).

The Wailuku series consist of well-drained soils on alluvial fans on the island of Maui. These soils developed in alluvium derived from weathered basic igneous rock. The shrink-swell potential is low (USDA, 1972, Plate 99 and pp. 133, 166-167).

Geology

The site is located on the east flank of the West Maui Mountains which is a deeply dissected volcanic dome that is nearly circular in plan and asymmetric in profile. The volcano is believed to have formed in the late Tertiary (Pliocene epoch) and early Pleistocene time (approximately 1 to 12 million years ago) by lavas flowing from a north and south rift zone (Stearns and MacDonald, 1942).

The site is situated on older alluvium (consolidated earthy deposits) which consist of deeply weathered, poorly sorted friable conglomerates that is underlain by Wailuku basalt.

RESULTS OF DYNAMIC CONE PENETRATION TEST (DCP)

Six (6) DCP test were performed on the soils at the site. The test were performed in the same general area as the borings. The purpose of the DCP test is to determine the in-place CBR values for the soils at the site. The results of the 6 DCP test are shown on the attached Plates 10 thru 15. The lowest CBR values in the first 12 inches of material ranged from 3 to 10 at the 6 locations tested. The lowest CBR values from 12 to 24 inches were 3.5 to 10 at the 6 locations tested. These CBR values were used in the pavement design analysis.

TRAFFIC ANALYSIS

Traffic count data was provided in a report by Phillip Rowell and Associates dated June 11, 2003. From this report, Phillip Rowell said (via telephone) to make the following assumption: "Large/heavy trucks were 3% of the ADT volume". Based on the above assumption, the design traffic volume for this project will be 12,300 vehicles per day; of this 12,300 vehicles per day, 369 will be trucks with heavy axle loads.

Based on the above information, the design 18 kip axle loading is assumed to be 1,427,597.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on the findings and observations of this investigation, it is concluded that the proposed new pavement shall be the Maui County Class "A" pavement section which consist of 2.5" Asphalt Concrete + 5" Asphalt Treated Base + 8" Subbase. The subgrade soil shall be compacted to a minimum of 95% compaction in accordance with the Hawaii Standard Specifications for Road, Bridge, and Public Works Construction, latest edition.

Special Considerations

1) Some of the subgrade soils were found to be very moist. Proper compaction of these soils may require aeration (drying) in order to achieve the optimum moisture content required for proper compaction.

Pavement Design

The proposed new pavement was analyzed in accordance with the AASHTO Design Manual, 1993 edition. The results are shown on the attached Plate 16. Performance of the pavement is dependent on proper compaction of the subgrade soil and all layers above the subgrade soil. To ensure proper compaction of the pavement section, a representative of this office should be present during construction.

Utility Line Installation

1. It is recommended that all utility line installation and trench backfill operations be performed in accordance with Maui County standards.

2. Some of the subgrade soils were found to be very moist. Use of these very moist soils as trench backfill may require aeration (drying) in order to achieve the optimum moisture content required for proper compaction.

3. A resisting/hard layer of material, believed to be large boulder, was encountered in Borings 3, 5 & 6 at depths of 5.75 to 6.83 feet below existing grade. Trench excavation into this material may require hoeramming for removal.

Sitework

It is recommended that the sitework, including construction methods and material quality, be performed in accordance with Maui County standards.

ON-SITE OBSERVATION

During the progress of construction, so as to evaluate general compliance with the design concepts, specifications and recommendations contained herein, a representative from this office should be present to observe the following operations:

1. Site preparation including subgrade preparation.

2. Utility trench backfill & compaction.

3. Placement and compaction of pavement materials.

REMARKS

The conclusions and recommendations contained herein are based on the findings and observations made at the exploration locations. If conditions are encountered during construction which appear to differ from those disclosed by the explorations, this office shall be notified so as to consider the need for modifications.

This report has been prepared for the exclusive use of R.T. Tanaka Engineers, Inc. and their respective design consultants. It shall not be used by or transferred to any other party or to another project without the consent and/or thorough review by this facility. Should the project be delayed beyond the period of one year from the date of this report, the report shall be reviewed relative to possible changed conditions.

Samples obtained in this investigation will deteriorate with time and will be unsuitable for further laboratory tests within one (1) month from the date of this report. Unless otherwise advised, the samples will be discarded at that time.

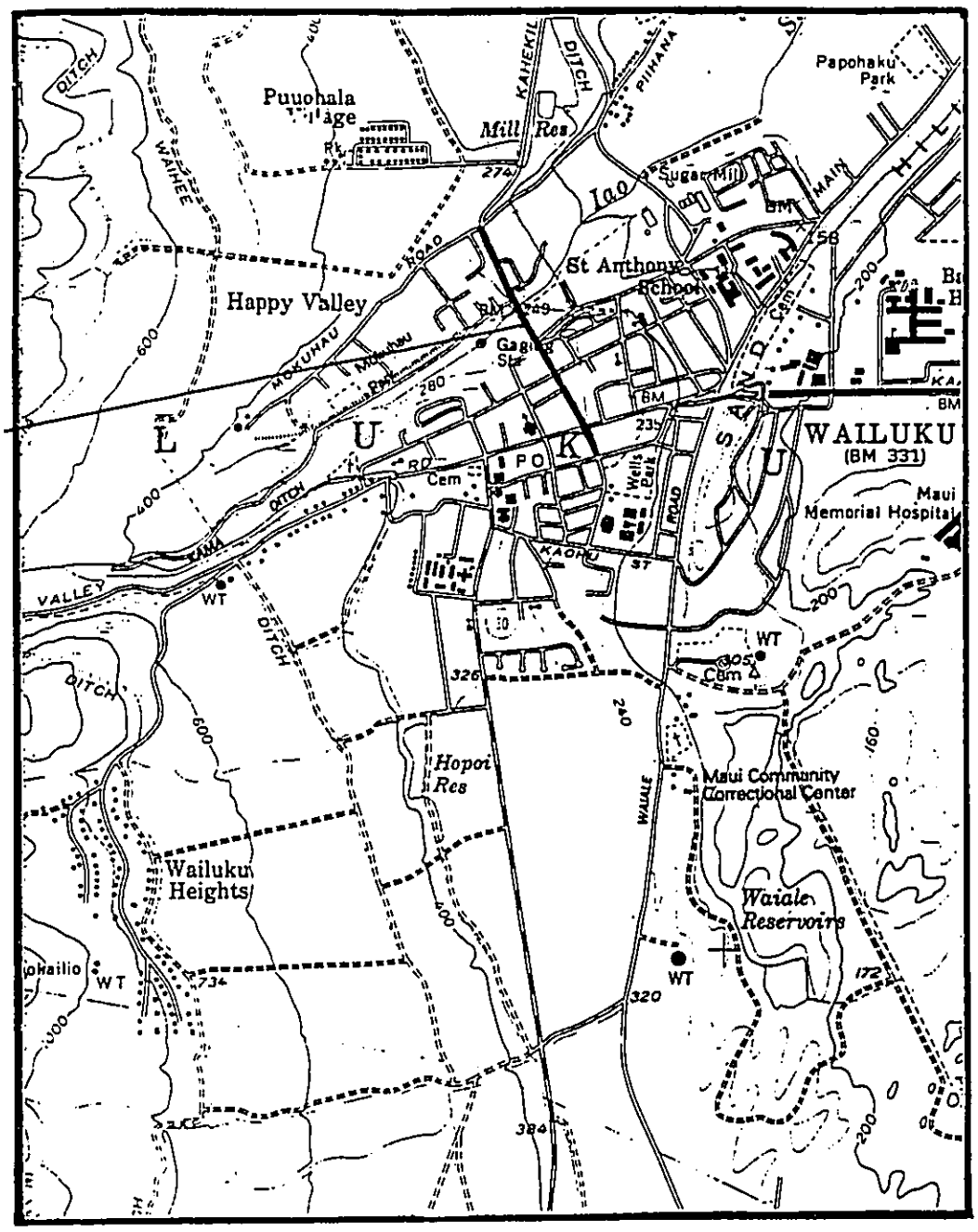
The following are included and complete this report:

Vicinity Map ---------- Plate 1

Plot Plans	Plates 2A, 2B, 2C, 2D
Logs of Test Borings	Plates 3 thru 8
Atterberg Limits	Plate 9
DCP Test Results	Plates 10 thru 15
AASHTO Pavement Design Results	Plate 16

RECEIVED AS FOLLOWS

VICINITY MAP



REFERENCE:

USGS TOPOGRAPHIC MAP
WAILUKU QUADRANGLE

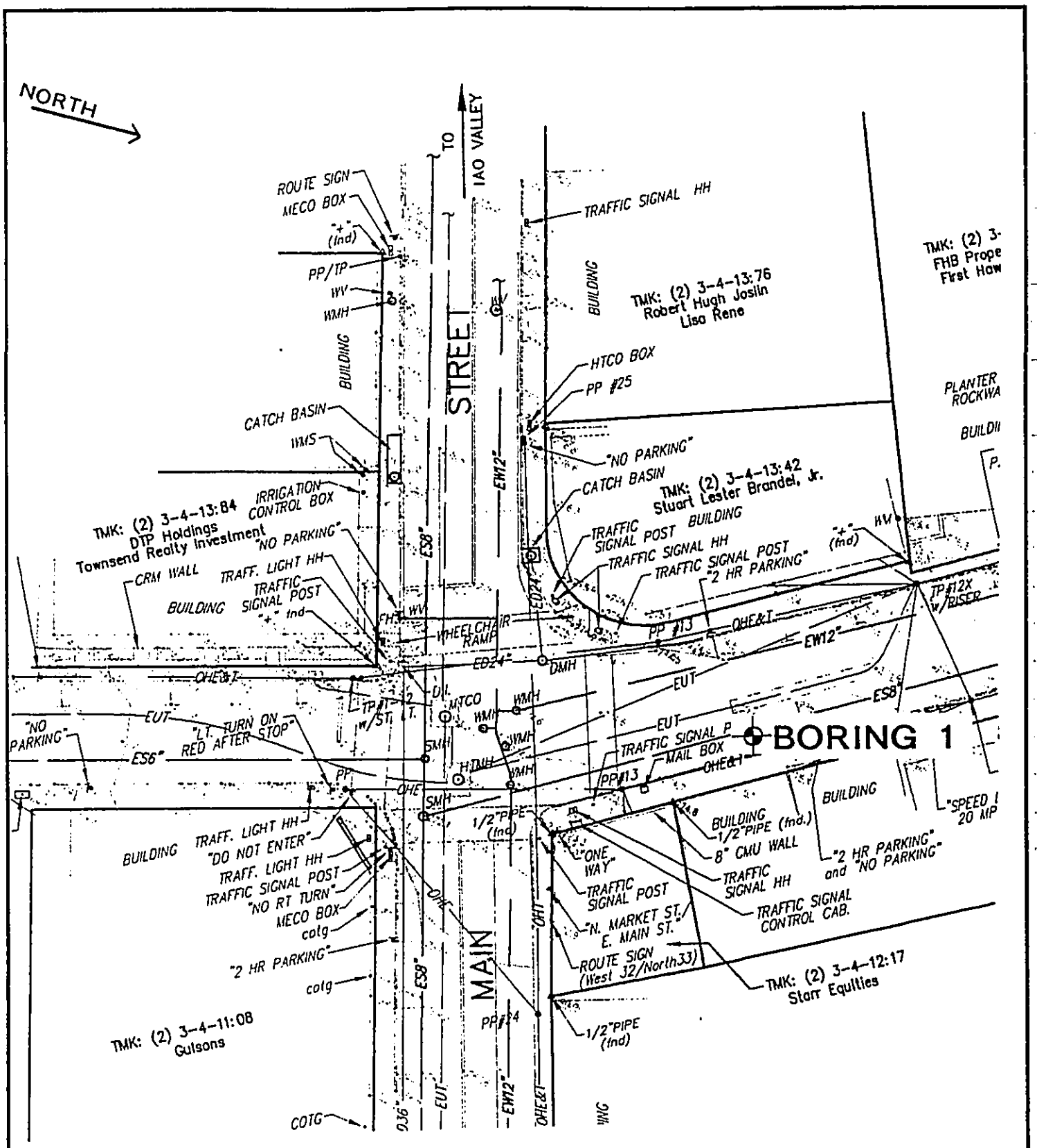
Dated: 1983

MARKET STREET IMPROVEMENTS

ISLAND GEOTECHNICAL ENGINEERING, INC.
Geotechnical Consultants

PROJECT NO.	01496-FM
DATE	Mar. 2003
SCALE	1"= 2000'
PLATE	1

RECEIVED AS FOLLOWS

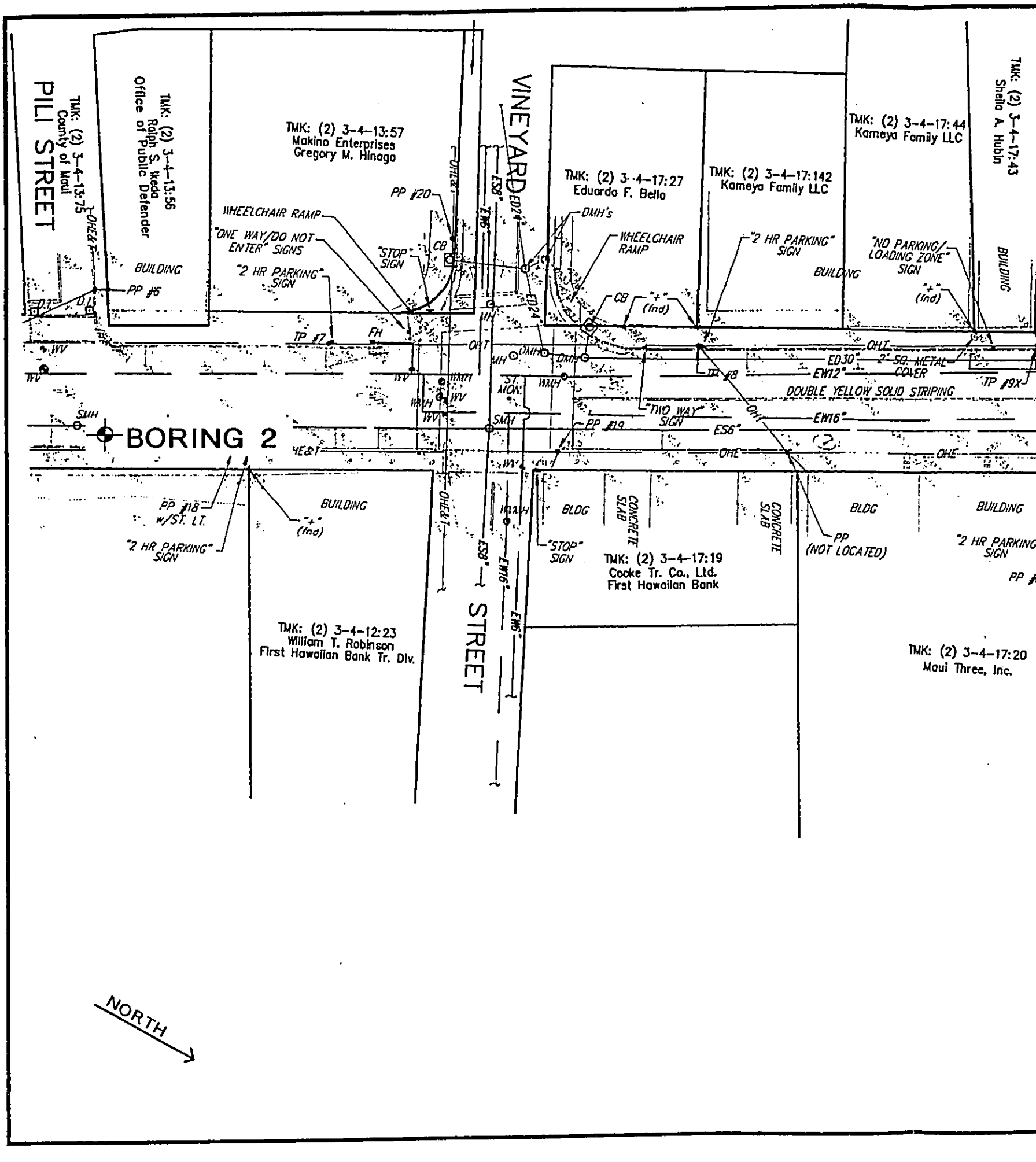


SITE PLAN
Scale: 1" = 40'

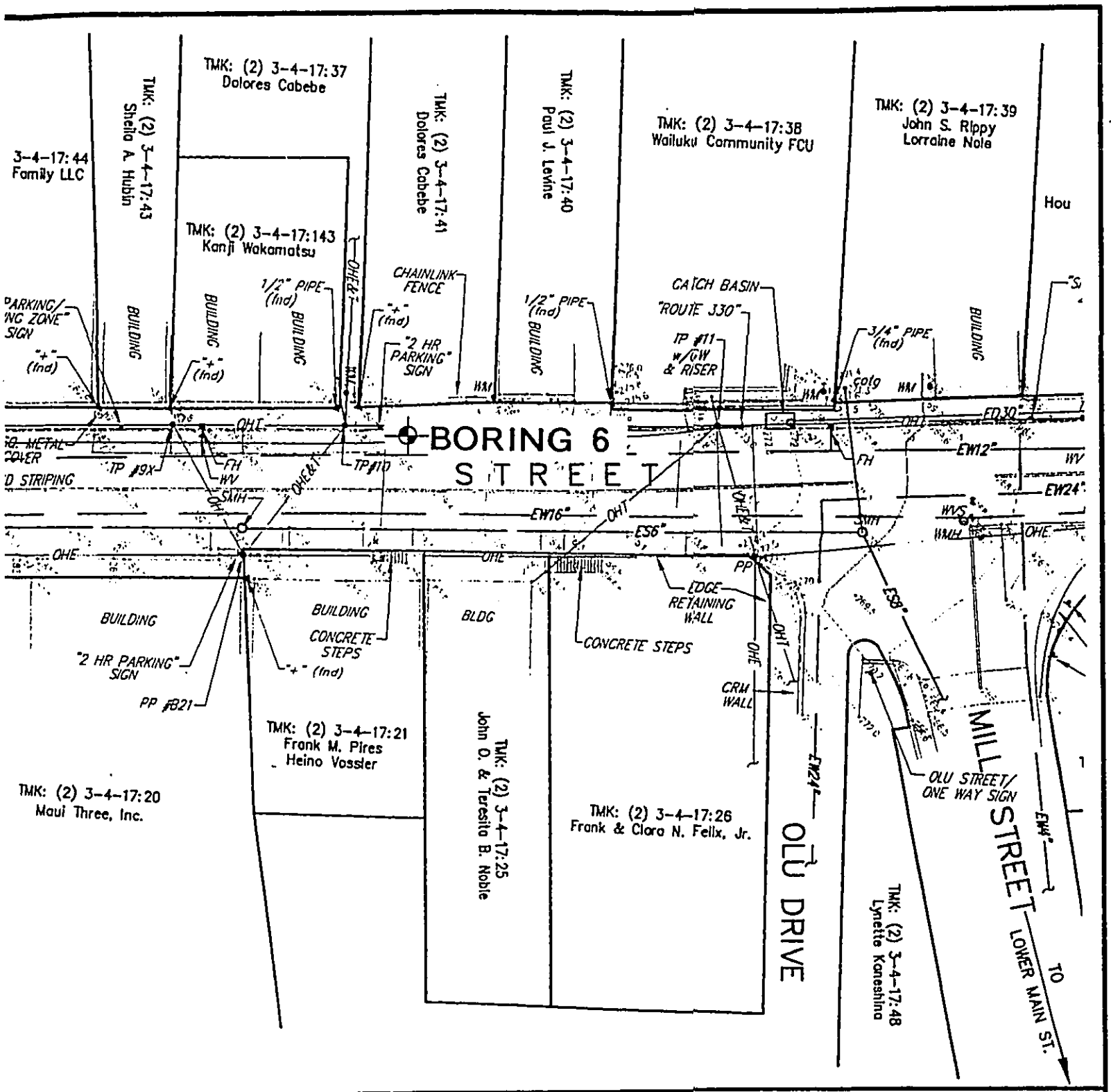
Project: MARKET STREET IMPROVEMENTS | Project No.: 01496-FM

ISLAND GEOTECHNICAL ENGINEERING, INC. | PLATE 2A

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS



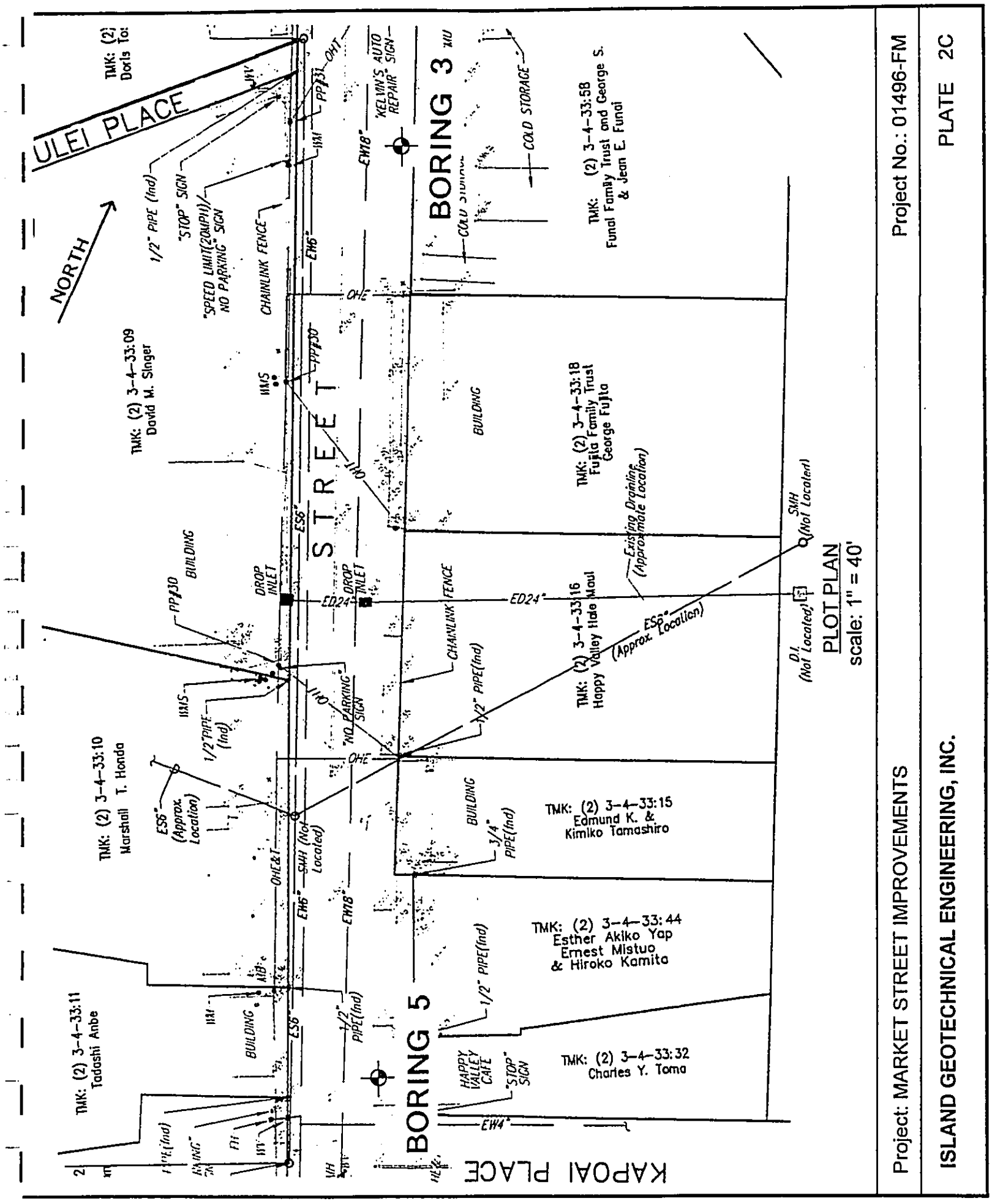
PLOT PLAN

SCALE:	APPROVED BY:	DRAWN BY
DATE:		REVISED

MARKET STREET IMPROVEMENTS

ISLAND GEOTECHNICAL PROJECT #01496-FM | PLATE 2B

RECEIVED AS FOLLOWS



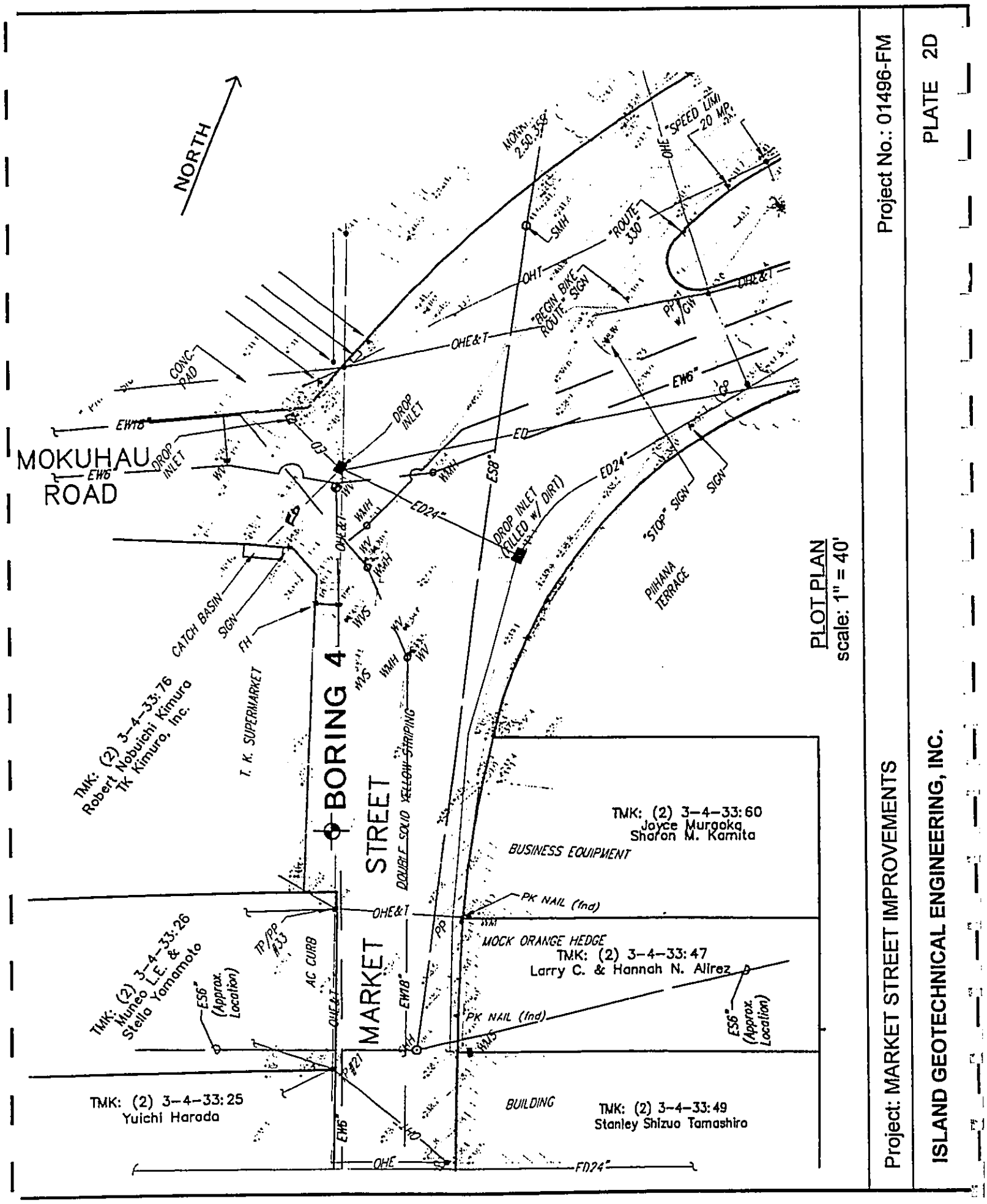
Project No.: 01496-FM

PLATE 2C

Project: MARKET STREET IMPROVEMENTS

ISLAND GEOTECHNICAL ENGINEERING, INC.

RECEIVED AS FOLLOWS



APPENDIX

FIELD INVESTIGATION AND LABORATORY TESTING

FIELD INVESTIGATION

General

The field investigation consisted of performing explorations at the locations shown on the Plot Plan. The method used for the exploratory work is shown on the respective exploration log. A description of the various method or methods used is presented below.

Test Borings Using Truck-Mounted Drilling Equipment

Truck-mounted borings are drilled using a gas-powered drilling rig. The hole is advanced using continuous flight augers, wash boring and/or NX coring.

Auger drilling is used in soils where caving does not occur. The augers are 4-1/2 inch diameter continuous helical flight augers with the lead auger having a head equipped with changeable cutting teeth. Soil cuttings are brought to the surface by the continuous flights. After the bore hole is advanced to the required depth and cleaned of cuttings by additional rotation of the augers, the augers are retracted for soil sampling or in-situ testing.

In soils where caving of the bore hole occurs, the hole is advanced by wash boring or hollow-stem augering. Wash boring consists of advancing steel casing by rotary action and water pressure to flush the soil from the casing. The lead section of the casing is equipped with a carbide or diamond casing bit. After the casing has been advanced to the required depth, soil samples are obtained through the inside of the casing. Hollow-stem drilling consists of advancing the hole with 7-5/8 inch outside diameter and 4-1/4 inch inside diameter augers. The leading drill bit is connected to drilling rods through the central portion of the auger. At the required sampling depth, the interior drill rods and lead bit are removed, and the soil sample is taken by driving a sampler

through the "hollow" section of the augers.

Coring is used for hard formations such as rock, coral or boulders. The core barrel, consisting of a 5-foot long double tube, hardened steel barrel with either a carbide or diamond bit, is attached to drilling rods and set on the hard formation. The core barrel is advanced through the formation by rotation of the core barrel. Water is used to flush out the cuttings. Upon completion of the core run, the sample is removed from the core barrel and inspected. The total core recovery length and the sum of all intact pieces over 4-inch in length are measured. The length of core recovery divided by the length of the core run is the recovery ratio. The combined length of the 4-inch or longer pieces divided by the length of core run is the Rock Quality Designation (RQD). The values provide an indication of the quality of the formation.

Test Borings Using Portable Drilling Equipment

In areas inaccessible to truck-mounted equipment, portable drilling equipment is used to drill the test boring. The boring is advanced by either 1) continuous drive sampling or by 2) using a small gas-powered drill rig with continuous flight augers, wash boring or NX coring.

Soil samples are obtained with a tripod and cathead assembly using soil sampling methods described below.

Test Pits Using Excavators/Backhoes

Test pits are excavated using a excavator or backhoe. Material excavated from the pit and the sides and bottom of the pit are visually inspected and a continuous log of the hole is kept.

Explorations Using Hand Tools

In inaccessible areas requiring only shallow explorations, borings and test pits are made using hand equipment. Borings are drilled using hand augers. Test pits are excavated using hand tools. Cuttings from the boring and/or pit are inspected and visually classified.

Soil Sampling

Relatively undisturbed samples of the underlying soils are obtained from borings by driving a sampling tube into the subsurface material using a 140-pound safety hammer falling from a height of 30 inches. Ring samples are obtained using a 3-inch outside diameter, 2.5 inch inside diameter steel sampling tube with an interior lining of one-inch long, thin brass rings. The tube is driven approximately 18 inches into the soil and a section of the central portion is placed in a close fitting waterproof container in order to retain field conditions until completion of the laboratory tests. Standard Penetration Test (SPT) values and disturbed soil samples are obtained with a 2-inch (outside diameter) split-barrel sampler instead of the 3-inch sampler. The number of blows required to drive the sampler into the ground is recorded at 6-inch intervals. The blow count for the last 12-inches is shown on the boring logs.

From test pit excavations, relatively undisturbed soil samples are obtained by pushing the 3 inch outside diameter sampling tube (mentioned above) into the ground with the backhoe bucket. In addition, undisturbed bulk samples are retained from cohesive type soil formations and disturbed bulk samples are retained from friable and cohesionless soil formations.

The soil samples are visually classified in the field using the Unified Soil Classification System. Samples are packed in moisture proof containers and transported to the laboratory for testing.

Dynamic Cone Penetrometer (DCP)

There are two types of DCP test used in the field. One test is generally used for pavement design and the other test is generally used for foundation design.

The DCP test for pavement design is an in-place test generally performed on the near surface soils. The DCP consist of a steel rod with a steel cone attached to one end which is driven into the soil by means of a sliding hammer. The angle of the cone is 60 degrees. The depth of the cone penetration is recorded at selected penetration or hammer drop intervals. The standard DCP test is designed to penetrate soils to a total depth of 1 meter (39.4 inches), however, extension rods may be used to reach greater depths. The recorded data from the DCP test can be converted to CBR values for use in pavement design.

The DCP test for foundation design (aka Wildcat DCP) is used to evaluate the consistency of the subsurface soils to depths of 25 feet. The test is performed by driving a 1.4 inch diameter (10 square centimeter area) steel cone (cone is connected to 1.1" diameter steel rods) into the ground using a 35 pound slide hammer that is dropped from a height of 15 inches. The number of blows required to drive the steel cone 10 centimeters is recorded and the process is continued until the desired depth is reached.

LABORATORY TESTING

General

Laboratory tests are performed on various soil samples to determine their engineering properties. Description of the various tests are listed below.

Unit Weight and Moisture Content

The in-place moisture content and unit weight of the samples are used to correlate similar soils at various depths. The sample is weighed, the volume determined, and a portion of the sample is placed in the oven. After oven-drying, the sample is again weighed to determine the moisture loss. The data is used to determine the wet-density, dry-density and in-place moisture content.

Direct Shear

Direct shear tests are performed to determine the strength characteristics of the representative soil samples. The test consists of placing the sample into a shear box, applying a normal load and then shearing the sample at a constant rate of strain. The shearing resistance is recorded at various rates of strain. By varying the normal load, the angle of internal friction and cohesion can be determined.

Consolidation Test

Consolidation tests are performed to obtain data from which time rates of consolidation and amounts of settlement may be estimated. The test is performed by placing a specimen in a consolidation apparatus. Loads are applied in increments to the circular face of a one (1) inch high sample. Deformation or changes in thickness of the specimen are recorded at selected time intervals. Water is introduced to or allowed to drain from the sample through porous disks placed against the top and bottom faces of the specimen. The data is then used to plot a stress-volume strain curve which is used in estimating settlement.

Expansion Index Test

Expansion Index of fine-grained soils is determined in accordance with ASTM D 4829-88 test

procedure. The soil specimen is compacted into a metal ring so that the degree of saturation is between 40 and 60 percent. The specimen and the ring are placed in a consolidometer. A vertical confining pressure of 1 psi is applied to the specimen and then the specimen is inundated with water. The deformation of the specimen is recorded for 24 hours. The data is used to determine the expansion potential of the soil.

One-Dimensional Swell Test

Another procedure for determining the expansion potential of fine-grained soils is ASTM D 4546-90 (Method B) test procedure. The soil specimen is compacted into a 2.5 inch diameter (1 inch height) metal ring using a 10 pound hammer. The specimen and the ring are placed in an expansion apparatus. A vertical confining pressure of 155 psf is applied to the specimen and then the specimen is inundated with water. The deformation of the specimen is recorded for 24 hours.

This test is similar in principle to the Expansion Index Test (see above) with the primary difference being the soil specimen in the One-Dimensional Swell Test is usually compacted to a higher dry density than the Expansion Index and, therefore, generally produces a higher degree of expansion.

Classification Tests

The soil samples are classified using the Unified Soil Classification System. Classification tests include sieve and hydrometer analysis to determine grain size distribution, and Atterberg Limits to determine the liquid limit, plastic limit and plasticity index.

California Bearing Ratio Test

California Bearing Ratio (CBR) tests are performed on materials to determine the bearing strength

of the soil for determination of pavement sections. The sample is compacted into a 6-inch diameter mold in 5 equal layers. Each layer is compacted with a 10-pound hammer falling from a height of 18-inches, with each layer receiving 56 blows. The mold is then placed in a water bath for 4-days and the vertical swell is measured under a surcharge weight of 10 pounds. After the soaking period, the sample is placed in a CBR apparatus that has a 3-square inch penetrometer. The penetrometer is pressed vertically into the soil at constant strain and the loads required to press the penetrometer are recorded. A plot of the load-strain relationship is made to determine the CBR value.

Maximum Dry Density/Optimum Moisture Content

The maximum dry density and optimum moisture content of the material is determined in accordance with the ASTM D1557-91 test procedure. The sample is compacted into a mold in 5 equal layers using a 10 pound hammer falling from a height of 18 inches. The diameter of the mold is either 4-inches or 6-inches depending on the proportion of gravel in the sample. The sample is compacted at various moisture contents to develop a compaction curve for the soil. The curve is usually bell-shaped with a peak indicating the maximum dry density and optimum moisture content.

Penetrometer Test

Penetrometer tests are performed on clayey soils to determine the consistency of the material and an approximate value of the unconfined compressive strength.

Torvane

Torvane tests are used to determine the approximate undrained shear strength of clayey soils.

The torvane apparatus consists of a torque device with a small diameter plate that has vanes situated perpendicular to the plate. The vanes are pushed into the soil and torque is applied until failure occurs. The torque required to cause failure is converted to approximate undrained strength of the soil.

LOG OF BORING NO. 1

ELEVATION: top of asphalt pavement

EQUIPMENT USED: Nissan Drill Rig

DEPTH OF BORING (FT.): 8.5

DATE DRILLED: March 2, 2003

DEPTH OF GROUNDWATER: unknown

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	CONSISTENCY	MOISTURE	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0			Asphalt Concrete (4")			black					
		GM	silty GRAVEL with sand			gray brown	mod. dense	moist			
1.5		MH	*elastic SILT*		10	*dark reddish brown*	*stiff*			22.8	
3										31.6	
							very stiff				
4.5					19					32.0	
						dark brown		very moist			
6					19					41.4	
7.5						dark yellowish brown	stiff				
					12					37.8	
9			END OF TEST BORING								
10.5											

PROJECT NAME: MARKET STREET IMPROVEMENTS

PROJECT NO.: 01496-FM

ISLAND GEOTECHNICAL ENGINEERING, INC.

Geotechnical Consultants

PLATE 3

LOG OF BORING NO. 2

EQUIPMENT USED: Nissan Drill Rig

DATE DRILLED: March 2, 2003

ELEVATION: top of asphalt pavement

DEPTH OF BORING (FT.): 8.5

DEPTH OF GROUNDWATER: unknown

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	CONSISTENCY	MOISTURE	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0			Asphalt Concrete (2")			black					
		GM	silty GRAVEL with sand			gray brown	mod. dense	moist			
		MH	elastic SILT			dark reddish brown	stiff				
1.5					13					29.0	
3							very stiff				
					19					29.9	
4.5								moist to very moist			
6					37					34.8	
7.5						dark brown					
					18					42.0	
9			END OF TEST BORING								
10.5											

PROJECT NAME: MARKET STREET IMPROVEMENTS

PROJECT NO.: 01496-FM

ISLAND GEOTECHNICAL ENGINEERING, INC.

Geotechnical Consultants

PLATE 4

LOG OF BORING NO. 3

ELEVATION: top of asphalt pavement

EQUIPMENT USED: Nissan Drill Rig

DEPTH OF BORING (FT.): 6.83

DATE DRILLED: March 2, 2003

DEPTH OF GROUNDWATER: unknown

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	CONSISTENCY	MOISTURE	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		GM	Asphalt Concrete (1")			black	mod. dense	moist			
			silty GRAVEL with sand			gray brown					
		SP	SAND			yellow brown					
		MH	elastic SILT			very dark gray	stiff				
1.5					11					29.0	
3											
		MH	elastic SILT with sand		13					27.7	
4.5			---more sandy			dark yellowish brown	soft				
6					4					25.6	
		COB	COBBLES		16/1"		dense				
			END OF TEST BORING REFUSAL/ROCK or BOULDER								
7.5											
9											
10.5											

PROJECT NAME: MARKET STREET IMPROVEMENTS

PROJECT NO.: 01496-FM

ISLAND GEOTECHNICAL ENGINEERING, INC.

Geotechnical Consultants

PLATE 5

LOG OF BORING NO. 4

ELEVATION: top of asphalt pavement

EQUIPMENT USED: Nissan Drill Rig

DEPTH OF BORING (FT.): 8.5

DATE DRILLED: March 2, 2003

DEPTH OF GROUNDWATER: unknown

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	CONSISTENCY	MOISTURE	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0			Asphalt Concrete (3.5")			black					
		GM	silty GRAVEL with sand			gray brown	mod. dense	moist to very moist			
1.5		MH	elastic SILT		6	dark brown				33.6	
3						very dark grayish brown to very dark gray					
					7					28.8	
4.5											
							stiff				
6					11					32.5	
		MH	elastic SILT with sand (looks like saprolite)								
7.5					17					35.1	
			END OF TEST BORING								
9											
10.5											

PROJECT NAME: MARKET STREET IMPROVEMENTS

PROJECT NO.: 01496-FM

ISLAND GEOTECHNICAL ENGINEERING, INC.

Geotechnical Consultants

PLATE 6

LOG OF BORING NO. 5

EQUIPMENT USED: Nissan Drill Rig

DATE DRILLED: March 2, 2003

ELEVATION: top of asphalt pavement

DEPTH OF BORING (FT.): 6

DEPTH OF GROUNDWATER: unknown

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	CONSISTENCY	MOISTURE	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		GM	Asphalt Concrete (1.5")			black	mod. dense	moist			
		GP-GM	silty GRAVEL with sand			gray brown					
1.5			GRAVEL with cobbles								
		??	probe from 2' to 6'		11						
3											
					19						
4.5											
					25		very dense				
6			END OF TEST BORING REFUSAL/ BOULDER or ROCK		5/0"						
7.5											
9											
10.5											

PROJECT NAME: MARKET STREET IMPROVEMENTS **PROJECT NO.:** 01496-FM	**ISLAND GEOTECHNICAL ENGINEERING, INC.** *Geotechnical Consultants*	PLATE 7

LOG OF BORING NO. 6

EQUIPMENT USED: Nissan Drill Rig

DATE DRILLED: March 2, 2003

ELEVATION: top of asphalt pavement

DEPTH OF BORING (FT.): 5.75

DEPTH OF GROUNDWATER: unknown

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	CONSISTENCY	MOISTURE	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0			Asphalt Concrete (4")			black					
		GM	silty GRAVEL with sand			gray brown	mod. dense	moist			
1.5		MH	elastic SILT		10	dark brown	mod. stiff to stiff	very moist		37.4	
3							very soft				
4.5					2					41.0	
		COB	COBBLES & gravel				dense				
6			END OF TEST BORING								
7.5											
9											
10.5											

PROJECT NAME: MARKET STREET IMPROVEMENTS

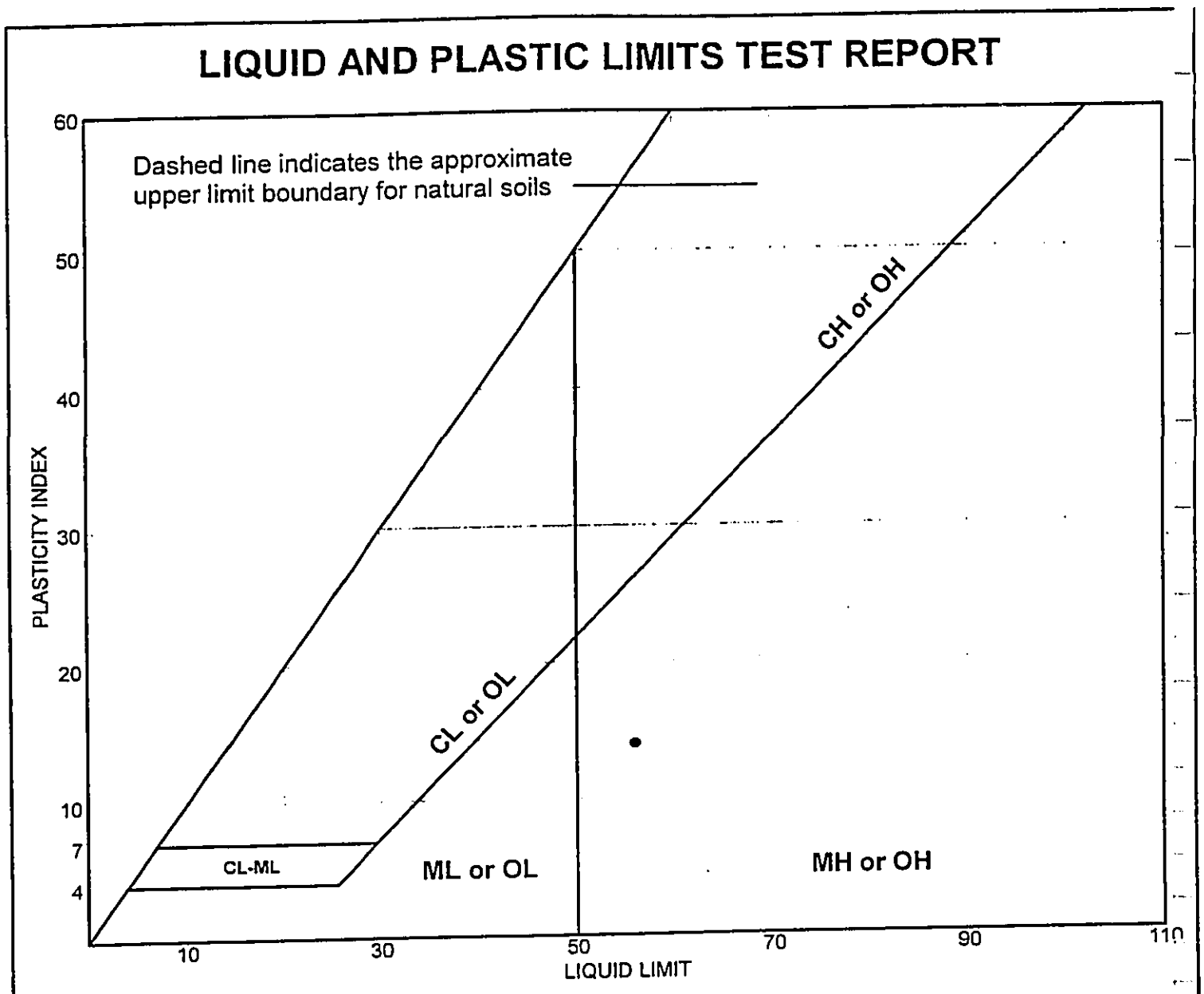
PROJECT NO.: 01496-FM

ISLAND GEOTECHNICAL ENGINEERING, INC.

Geotechnical Consultants

PLATE 8

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring 1	4	5.5-6.5'	41.4	42	56	14	MH

LIQUID AND PLASTIC LIMITS TEST REPORT

Island Geotechnical Engineering, Inc.

Client:

Project: MARKET STREET IMPROVEMENTS

Project No.: 01496-FM

Plate 9

DCP TEST DATA

File Name: DCP at Boring 1

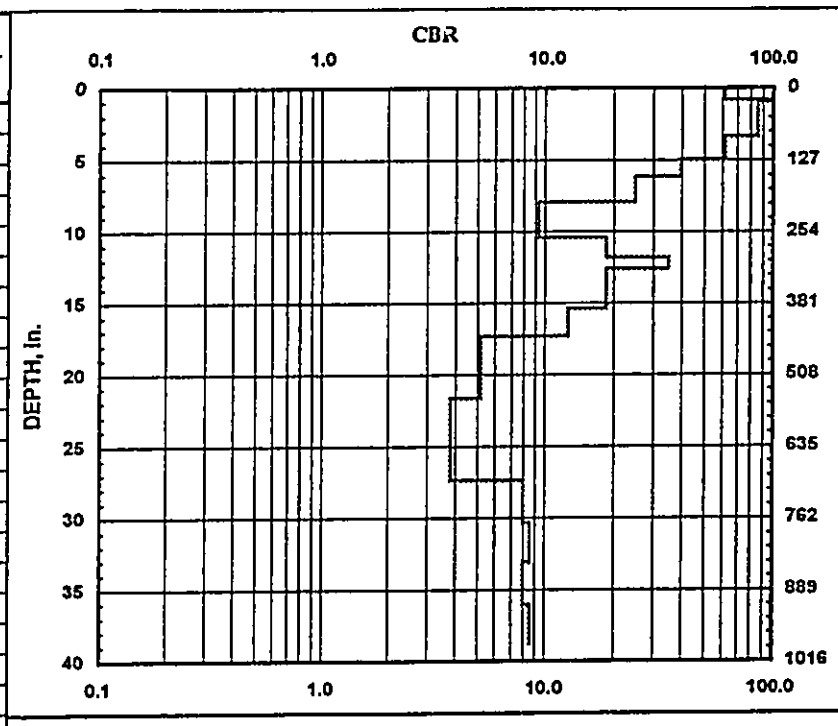
Project: *Market Street Improvements*
Location: Boring 1

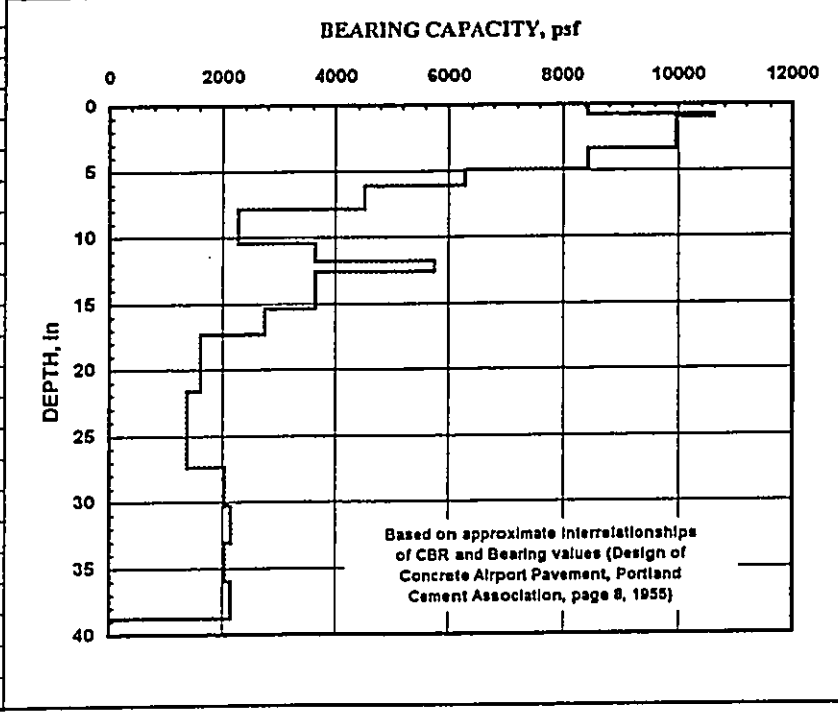
Date: 28-Feb-03
Soil Type(s): see Boring 1 log

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
5	20	1
2	25	1
10	55	1
10	85	1
5	105	1
5	125	1
5	155	1
5	200	1
3	265	1
3	300	1
3	320	1
3	355	1
3	390	1
3	440	1
3	550	1
3	695	1
3	770	1
3	840	1
3	915	1
3	985	1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1





DCP TEST DATA

File Name: DCP at Boring 2

Project: *Market Street Improvements*
Location: Boring 2
Date: 28-Feb-03
Soil Type(s): see Boring 2 log

Hammer
○ 10.1 lbs.
● 17.6 lbs.
○ Both hammers used

Soil Type
○ CH
○ CL
● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
3	25	1
3	45	1
5	60	1
10	100	1
5	140	1
5	175	1
5	255	1
5	315	1
5	420	1
5	530	1
5	635	1
5	745	1
4	840	1
5	955	1
1	980	1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1

Based on approximate interrelationships of CBR and Bearing values (Design of Concrete Airport Pavement, Portland Cement Association, page 8, 1955)

DCP TEST DATA

File Name: DCP at Boring 3

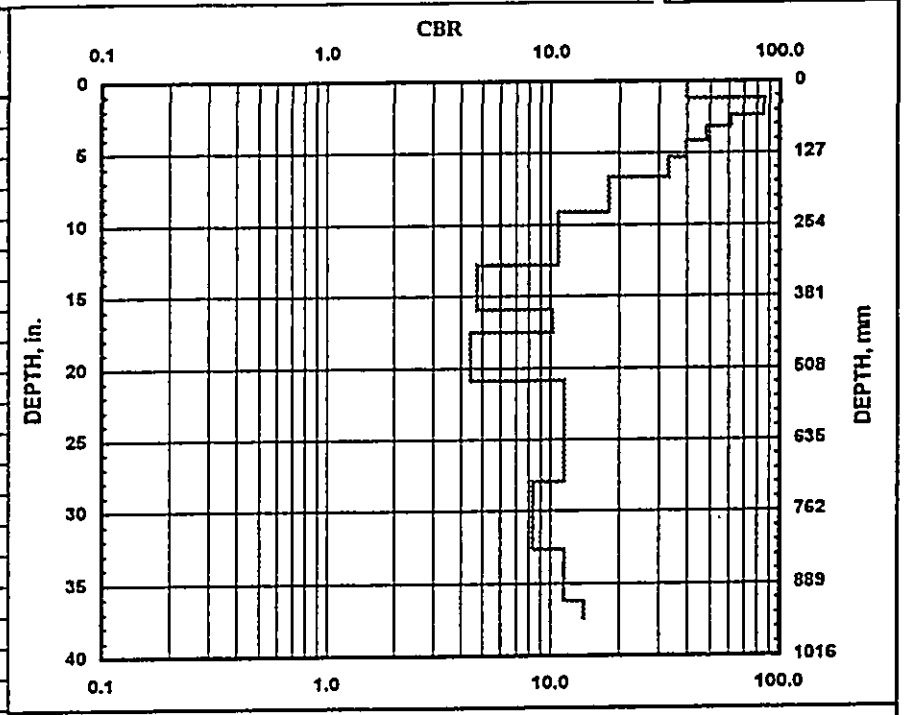
Project: *Market Street Improvements*
Location: Boring 3

Date: 28-Feb-03
Soil Type(s): see Boring 3 log

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
5	30	1
5	45	1
5	60	1
5	80	1
5	105	1
5	135	1
5	170	1
5	230	1
5	325	1
2	405	1
2	445	1
2	530	1
5	620	1
5	710	1
5	830	1
5	920	1
2	950	1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1



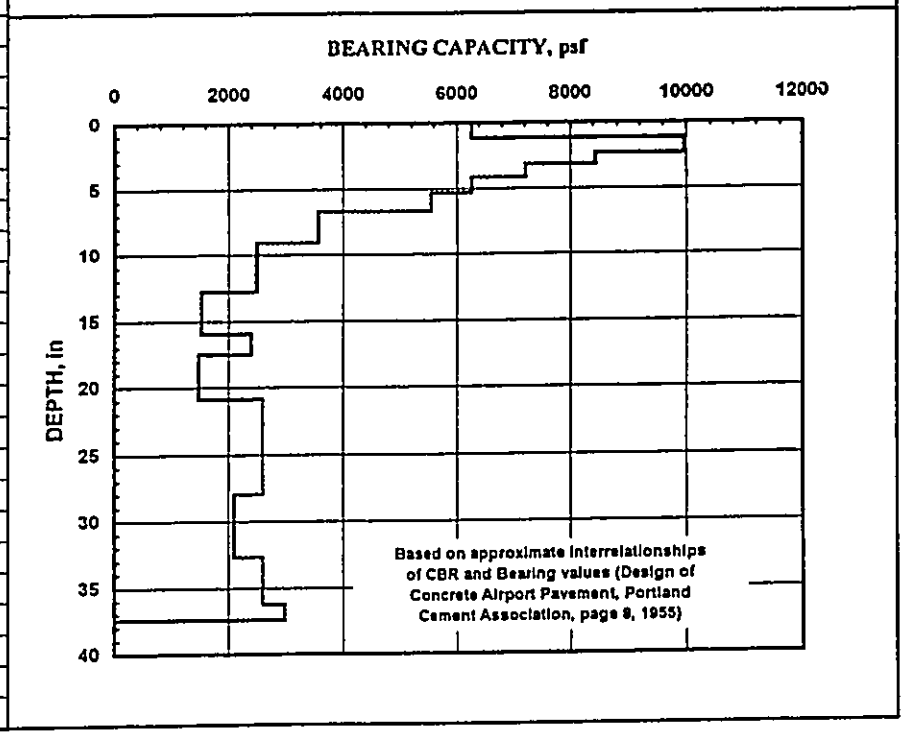


Plate 12

DCP TEST DATA

File Name: DCP at Boring 4

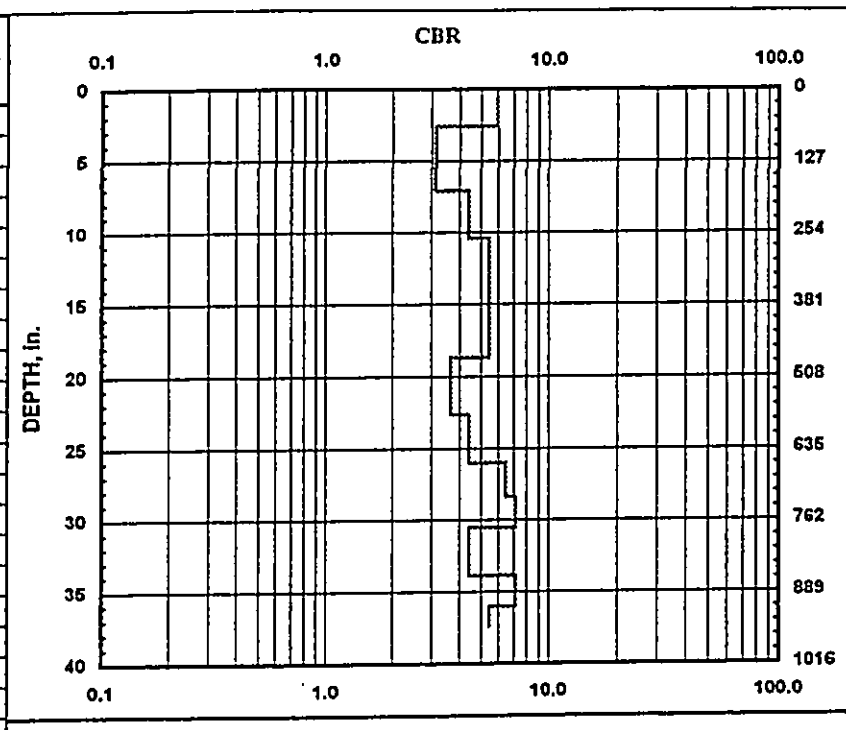
Project: *Market Street Improvements* **Date:** 28-Feb-03

Location. Boring 4 **Soil Type(s):** see Boring 4 log

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
2	65	1
2	180	1
2	265	1
2	335	1
2	405	1
2	475	1
2	575	1
2	660	1
2	720	1
2	775	1
2	860	1
2	915	1
1	950	1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1



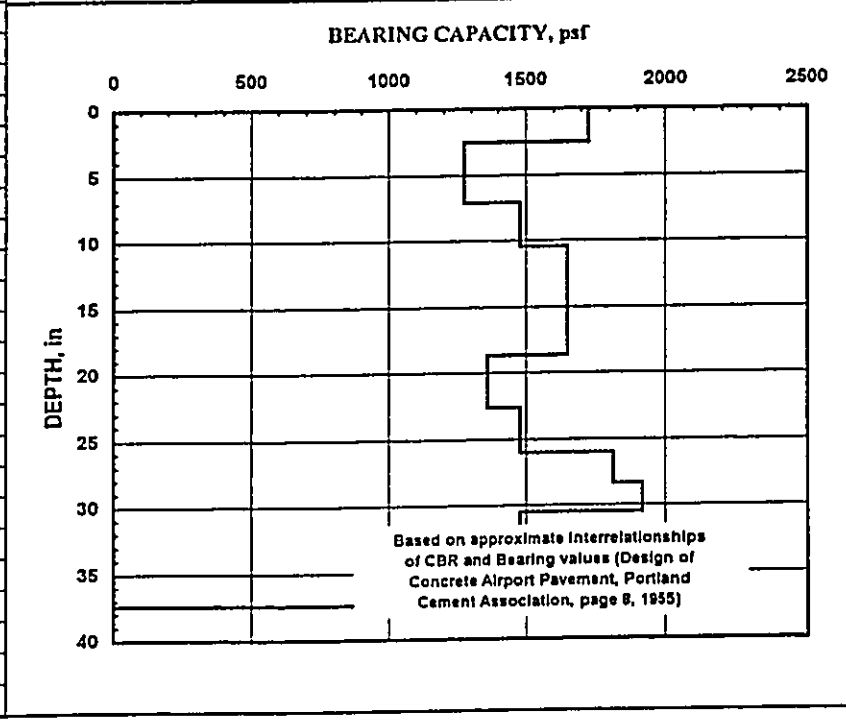


Plate 13

DCP TEST DATA

File Name: DCP at Boring 5

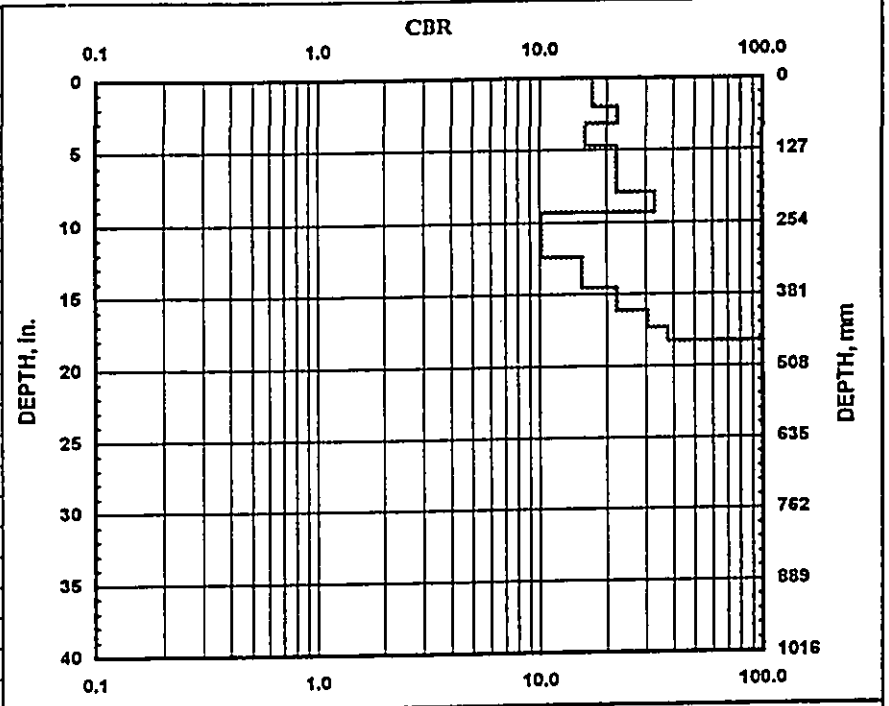
Project: *Market Street Improvements*
Location: Boring 5

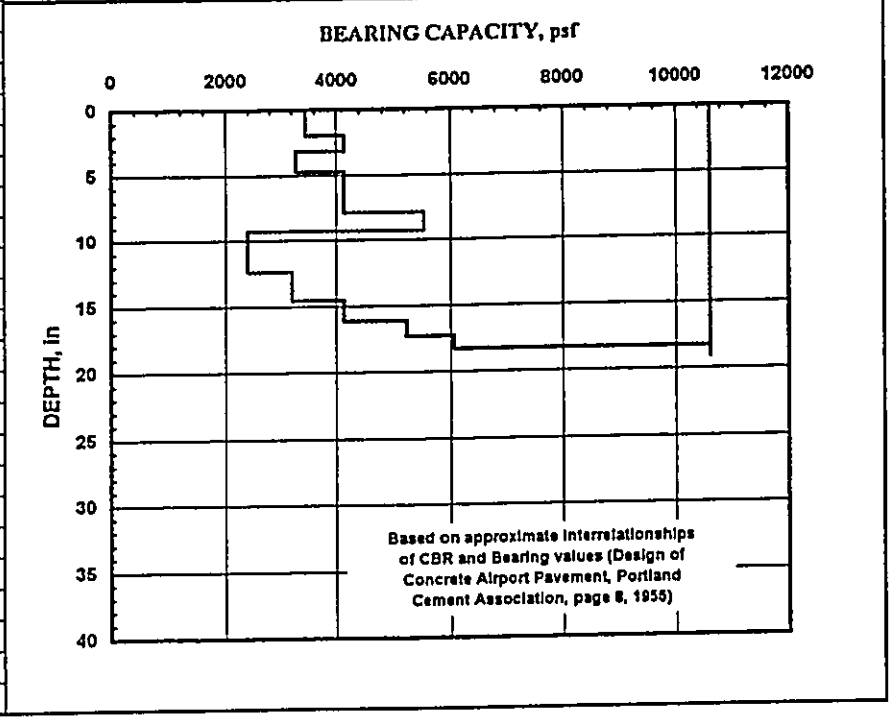
Date: 28-Feb-03
Soil Type(s): see Boring 5 log

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
4	50	1
3	80	1
3	120	1
3	150	1
5	200	1
5	235	1
4	315	1
4	370	1
4	410	1
4	440	1
4	465	1
4	475	1
4	485	1
	REFUSAL	1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1





DCP TEST DATA

File Name: DCP at Boring 6

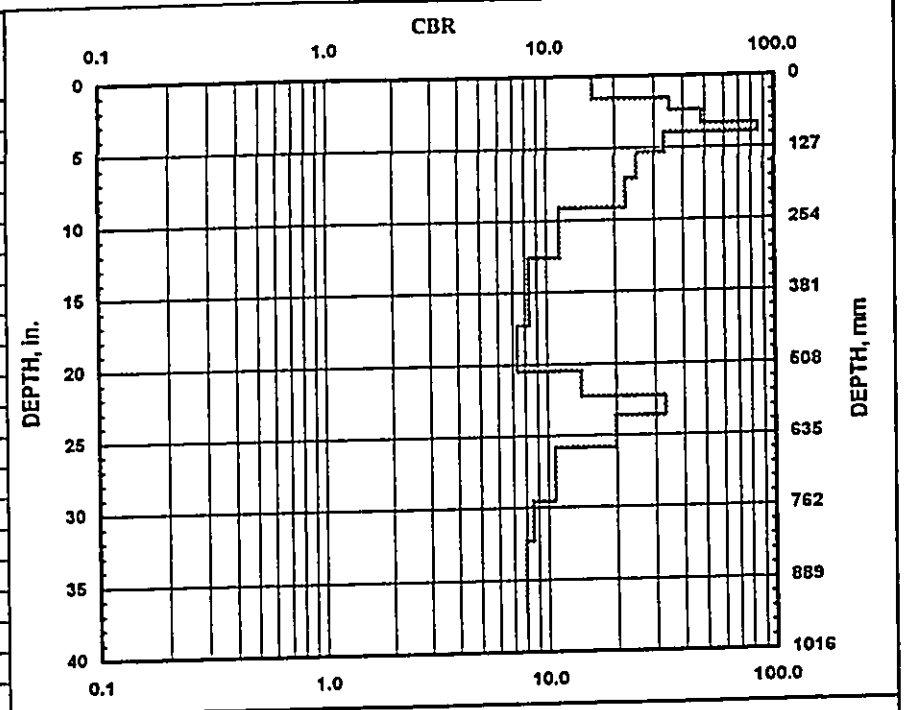
Project: *Market Street Improvements*
Location: Boring 6

Date: 28-Feb-03
Soil Type(s): see Boring 6 log

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
3	40	1
3	60	1
5	85	1
5	100	1
5	135	1
5	180	1
5	230	1
5	320	1
5	440	1
3	520	1
3	565	1
5	600	1
5	655	1
5	750	1
3	820	1
3	895	1
2	945	1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1
		1



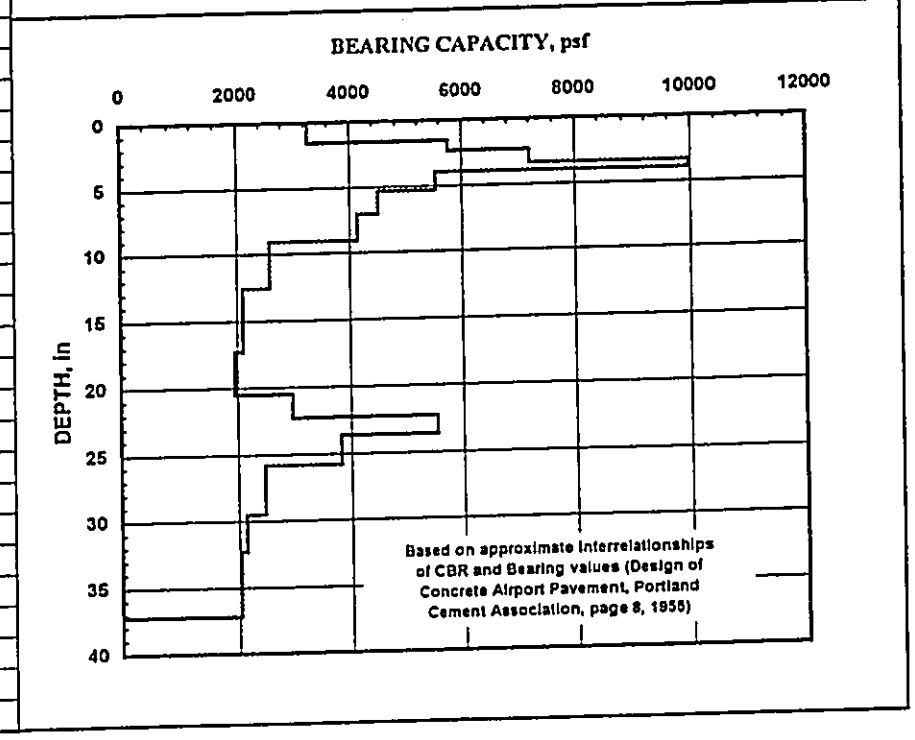


Plate 15

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product

Island Geotechnical Engineering, Inc.
222-A Kawaipuna Place
Wailuku, Hawaii 96793

Flexible Structural Design Module

MARKET STREET IMPROVEMENTS

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	1,427,597
Initial Serviceability	4.5
Terminal Serviceability	2.5
Reliability Level	80 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	6,000 psi
Stage Construction	1
Calculated Design Structural Number	3.60 in

Appendix – F
Comment and Response Letter

January 8, 2004

Mr. Michael Foley
Director
Department of Planning
250 South High Street
Wailuku, Maui, Hawaii 96793

ATTENTION: Ms. Ann Cua, Senior Planner

Dear Mr. Foley:

RE: Maui Redevelopment Agency Comments on the Draft Environmental Assessment for the Market Street Improvement Project (TMK: (2) 3-4-011, 3-4-17 and 3-4-33).

This is in response to your letter dated November 19, 2003, requesting that we address the Maui Redevelopment Agency's comments on the Draft Environmental Assessment for the Market Street Improvement Project.

1. **Placement of Utilities Underground**. In response to the MRA's request, Electrical Engineering Consultants, Inc. (ECM, Inc.) prepared a letter dated December 19, 2003, which analyzes several alternatives for placement of utilities underground along Market Street (See: Attachment A, "ECM Letter dated December 19, 2003"). As noted in ECM's letter, an initial step towards undergrounding of utilities is to place ducts for secondary power distribution, telephone distribution, and CATV distribution in the same trench with street lighting ducts. The cost associated with these improvements is anticipated to be $143,000 for secondary distribution, $70,000 for telephone distribution, and $60,300 for CATV distribution (See items A, D, and H in Table 1of EMC's letter). The advantage of installing the underground duct now rather than later is that it can be placed in the same trench with street lighting ducts; thereby, saving considerable money and avoiding the necessity to disturb the sidewalks should it be desired to place the lines underground at a later date.

   The cost associated with removing the lines from the poles and installing them underground will need to be obtained from MECO, Verizon, and Oceanic Cable and are not envisioned as part of the proposed project.

ECM also analyzed the cost associated with placing the primary distribution underground. These costs are beyond the scope of the current project.

2. **Placement of Cable and Telephone Lines Behind Buildings**. ECM analyzed the improvements and cost required to place the cable and telephone lines behind buildings on the mauka side of Market Street between Main and Vineyard and on the makai side of Market Street between Main and Mill Streets. This alternative would require that several easements be obtained to traverse County property. Access by truck is not possible on the footpath from Maluhia Drive to the County owned property at the rear of the Iao Theatre and may be an obstacle to acceptance by Verizon.

3. **Placement of Trunk Lines Undergound and Transformers on the ground**. This option is addressed in ECM's letter, which notes that several easements on County, State or private property are needed in order to accommodate the transformers. These improvements are beyond the scope of the current project.

4. **Impact to Retail Properties During Construction**. As noted in the Draft Environmental Assessment, the proposed improvements will be constructed in phases thereby directly impacting only one section of the roadway at a time. During construction, one lane of traffic and pedestrian access will be in operation at all times. Flagging crews will direct traffic flow during one-lane operation. It is anticipated that construction between Wells Street and Vineyard Street will primarily occur during evening and weekend hours. Construction within Happy Valley will occur during standard work hours due to existing residences in the area. Pedestrian traffic will be limited to one shoulder of the roadway during some construction operations.

5. **Notification of Schools regarding Construction Schedule**. Wailuku Elementary School, Iao Intermediate School, Waihe'e School, and Baldwin High School will be notified of the construction schedule prior to initiation of construction.

6. **Selection of an Alternative Lighting Standard**. Discussions are currently underway between the County, its consultants, and MECO regarding the selection of an alternative lighting standard for Market Street. Pursuant to these discussions, MECO has indicated it is agreeable to an alternative lighting standard and the consultant team is currently in the process of working with MECO and the Wailuku Main Street Association with the selection of an acceptable lighting fixture.

7. **Maintenance of Trash Receptacles and Landscape Planting Areas.** The maintenance of the landscape planting areas will be the responsibility of adjacent property owners. The Department of Parks and Recreation will be

responsible for maintaining the street trees. The maintenance of trash receptacles will be the responsibility of the Department of Public Works and Environmental Management's Highways Division.

Thank you for your consideration of our application. Should you have any questions, please contact myself, or Mr. Michael Summers, Chris Hart & Partners, at 242-1955.

Sincerely yours,

Christopher L. Hart, ASLA
Landscape Architect - Planner

cc. Mr. Joe Krueger, Department of Public Works and Environmental Management
Ms. Wendy Kobashigawa, Department of Public Works and Environmental Management
Mr. Kirk Tanaka, RT Tanaka Engineers
Project File

ECM Electrical Engineering Consultants

130 N. Market Street • Wailuku HI 96793-1716 • (808) 242-8070 • Fax (808) 244-9539 • E-mail: ecm.maui@verizon.net

MEMORANDUM

DATE: December 19, 2003

TO: Mike Summers
Chris Hart & Partners

FAX: 242-1956

FROM: Hilton H. Unemori, P.E.

SUBJECT: **Response to Maui Redevelopment Agency Comments on the Draft Environmental Assessment for the Market Street Improvements Project at TMK: 3-4-11, 3-4-17 and 3-4-33, Wailuku, Maui**

1. "Utility poles to be placed underground"

This probably was meant, as "utilities are to be placed underground," not poles.

Since funds are limited, a step toward minimizing overhead facilities may be included in this project. Ducts under sidewalks on both sides of Market Street for lighting are already part of the improvements proposed. Additional ducts for secondary distribution would be placed in the same trench with street lighting ducts. Hand holes, 2 feet by 4 feet, originally scheduled for each streetlight would be increased to 3 feet by 5 feet. Additional hand holes will be needed for stub outs to each property to minimize future sidewalk digging. Placing secondary distribution underground becomes easier when money becomes available. Cost for four (4) 3-inch secondary conduits is $143,000 including incremental cost for hand holes. See Table 1, Item A.

Additional costs for placing electric services to meters are estimated at $132,000. Table 1, Item E.

Provision for moving primary distribution underground is much more costly. Larger conduits that would be placed in the street since future large manholes in the street are required to place and service the cables. Cost for four (4) 6-inch conduit for primary is estimated at $190,000 and $225,000 for manholes. Five transformer pads and a switchgear pad are estimated to cost $37,500. MECO charges have not been estimated and would be added to the cost of the project. Table 1, Item B.

Attachment "A", "ECM Letter dated December 19, 2003"

Telephone feeder facilities underground would require at least 6 4-inch ducts and 5 feet by 10 feet manholes in the street. Cost for six (6) 4-inch conduits is estimated at $432,000. Table 1, Item C. Verizon costs have not been estimated.

Telephone distribution ducts and pull boxes can be placed, similar to electric secondary distribution. Cost is $70,000, Table 1, Item D. When underground is implemented there will be telephone entry modifications. Cost estimated at $66,000, Table 1, Item F.

An alternative suggestion to place telephone and CATV cables behind existing buildings for a limited section is discussed below.

Cable television ducts and pull boxes may be placed on this project for future use in a similar manner as for electrical secondary distribution or distributed behind buildings with telephone lines as discussed below. Costs for feeders are estimated at $41,800 and $60,300 for distribution, Table 1, Items G and H.

Crossing Iao River on Iron Bridge is an obstacle for underground facilities. A structural analysis of the bridge may be warranted since heavy ducts, supports, and cables will be added.

2. Placing telephone and cable lines behind existing buildings

This option is limited to between Main and Vineyard on the mauka side of Market and makai between Main and Mill. Easements must be obtained to traverse County property in the footpath from Maluhia Drive to County property at the parking lot at Iao Theater. Access by truck is not possible on the footpath and could be an obstacle to acceptance by Verizon.

A possible routing: Starting at manhole at Main and Market, underground to Maluhia, and then overhead to Vineyard as described above. Overhead cable continues west on Vineyard to meet the existing main cable on Market. A branch cable would be installed to the municipal parking lot for overhead distribution cable in the parking lot to the buildings mauka of Market.

The main distribution cable also could continue on Hinano then down to Market at Mill. Another small overhead cable along Market would service buildings mauka of Market from Vineyard to Mill Streets.

Verizon is willing to consider this option. An estimate of cost is being made by Verizon but has not been received as of this writing. Relocation of optical fiber cable will be a major expense.

3. Place trunk lines underground and transformers on the ground

"Trunk lines" may mean secondary distribution since it is associated with transformers on the ground. See related Item 1 above since transformers on the ground should be accompanied by a distribution system.

Easements on County, State or private property are needed for transformers. County properties are at 2-3-4-008-020, 2-3-4-011-005 (corner Wells and Market, tennis courts and swimming pool), 2-3-4-013-075 (municipal parking lot), 2-3-017-139 (near Iron Bridge).

State agency, Hawaii Housing Authority, owns 2-3-4-033-023, on Piihana Street in Happy Valley.

Two or more transformers and switchgear could be placed in the municipal parking lot with feeds from Vineyard and Pili and easements for ducts through an alley from the parking lot to Market at First Hawaiian Bank.

At least two transformer locations will be needed in Happy Valley.

Table 1. Summary of Estimated Costs, Main to Mokuhau Street

Item	Estimated Cost	Notes
A. Secondary distribution duct system	$143,000	MECO charges not included
B. Primary distribution duct system	$487,000	MECO charges not included
C. Telephone feeder duct system	$432,000	Verizon charges not included
D. Telephone distribution duct system	$70,000	Verizon charges not included
E. Meter risers and modifications	$120,000	MECO charges not included
F. Telephone entry modifications	$66,000	Verizon charges not included
G. CATV feeder system	$41,800	Oceanic charges not included
H. CATV distribution system	$60,300	Oceanic charges not included
I. Placing telephone and CATV lines behind buildings –Main to Vineyard or Main to Mill	$9,000 (cost to rearrange drops only)	No estimate from Verizon

Also note that engineering fees have not been included and time impacts have not been discussed in the above response. The final submittal of our construction drawings and specifications are planned for May 2004. We will be glad to answer any questions you may have.

c Kirk Tanaka
Joe Krueger

21032\chris hart_1.mem

ALAN M. ARAKAWA
Mayor

MICHAEL W. FOLEY
Director

WAYNE A. BOTEILHO
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

November 19, 2003

Mr. Christopher L, Hart, ASLA
Chris Hart & Partners
1955 Main Street, Suite 200
Wailuku, Hawaii 96793-1706

Dear Mr. Hart:

RE: Maui Redevelopment Agency Comments on the Draft Environmental Assessment for the Market Street Improvement Project at TMK: 3-4-11, 3-4-17, and 3-4-33, Wailuku, Maui

At its regular meeting on November 18, 2003, the Maui Redevelopment Agency was presented with the Market Street Improvement project in the context of the Draft Environmental Assessment for the project. Overall, the Agency felt that the project is well designed and will enhance the Redevelopment Area. The Agency offered the following comments on the DEA:

1. The Agency feels strongly that the utility poles should be placed underground. The Agency is aware of the cost constraints associated with such action, however they believe this issue should be further pursued.

2. As an alternative to placing all utilities underground, the Agency suggested that the telephone and cable lines could be placed behind the existing buildings.

3. Still another alternative could be to place trunk lines underground and transformers on the ground.

4. The Agency is concerned about the impact of the project on retail properties during construction. The Agency acknowledged the County's commitment to maintain pedestrian access within the town throughout the project construction and to stagger construction hours to accommodate the needs of the community.

5. The schools in the area should be notified of project construction.

6. The County and its consultant should work with Maui Electric Company (MECO) to develop an alternative lighting standard that would be appropriate for Wailuku Town and other special design districts. The Agency is aware that MECO currently has two lighting design standards. They would like a third standard to be developed for small towns. The consultant should notify the Planning Department of who they are working with at MECO. The Planning Department would then prepare a letter to MECO on the MRA's behalf.

7. The maintenance of the trash receptacles on the sidewalks and landscape planting areas should be defined in the Final EA document.

If additional clarification is required, please contact Ms. Ann Cua, Staff Planner, of this office at 270-7735.

Sincerely,

MICHAEL W. FOLEY
Planning Director

MWF:ATC:lar
c: Wayne A. Botelho, Deputy Planning Director
Clayton I. Yoshida, AICP, Planning Program Administrator
John Summers, Planner
Ann Cua, Staff Planner
Project File
General File
(K:\WP_DOCS\PLANNING\EA\2003\MarketStreetImprovProj\MRAcomments111403.wpd)