

Memorandum

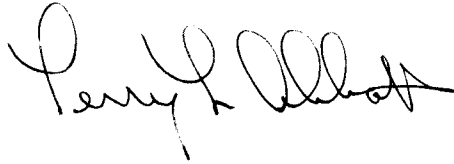
*Flex your power!
Be energy efficient!*

To: DISTRICT DIRECTORS
DEPUTY DIRECTORS
DIVISION CHIEFS

Date: March 16, 2011

File: 608 and 633

From: TERRY L. ABBOTT
Chief
Division of Design



Subject: Design Information Bulletin 81-01:

Design Information Bulletin (DIB) 81, Capital Preventive Maintenance (CAPM) Guidelines, has been updated. Version 81-01 is now available on the Division of Design website: www.dot.ca.gov/hq/oppd/dib/dib81-01.pdf and is effective as of the date of this memorandum, and shall be implemented as outlined below.

BACKGROUND

The basic purpose of CAPM projects remains unchanged. This DIB provides more specific pavement program, design, and procedural information than the pavement guidance in Chapter 600 of the *Highway Design Manual* (HDM).

SUMMARY OF KEY CHANGES IN DIB 81-01

- As a result of the recent issuance of DIB 82-04 "Pedestrian Accessibility Guidelines for Highway Projects," changes to DIB 81 were necessary for consistency. The scope of CAPM projects shall now include curb ramp work. This will require upgrading existing curb ramps to current standards or installing new curb ramps where they are missing. For further information, see DIB 82-04 and/or consult with the District Design Coordinator or Design Reviewer.
- Provided revised language to be consistent with other pavement guidance.
- Provided clarity to SHOPP program guidance.
- Updated the required reviews and checklist.

IMPLEMENTATION

Per the June 2, 2010 Americans with Disabilities Act (ADA) lawsuit settlement, all CAPM projects Ready to List (RTL) after July 1, 2010 were required to include ADA curb ramp work that is needed; either reconstructing existing out of compliance curb ramps and/or constructing any missing curb ramps. To comply with this settlement, on CAPM projects that - -

- Achieved RTL status between July 1, 2010 and March 15, 2011, Districts must:
 1. Assess the ADA curb ramp needs within these CAPM project limits, as needed.

2. Develop a conceptual approval request to prepare a Project Initiation Document (PID).
 3. Obtain PID approval prior to September 30, 2011.
- Achieve RTL status between March 16, 2011 and September 30, 2011, Districts must:
 1. Obtain concurrence from the District Design Coordinator and the ADA Program Manager prior to September 30, 2011 to defer any ADA curb ramp work that is needed and allow it to be delivered in a separate follow-up project.
 - The District must first identify all of the ADA curb ramp work that is required within the CAPM project limits; and then,
 - Document any ADA curb ramp work that needs to be deferred and why it cannot be accomplished in the CAPM project within the programmed cost and/or without delaying the delivery of the project.
 2. Develop a conceptual approval request to prepare a PID to include all ADA curb ramp work identified above.
 3. Obtain PID approval prior to September 30, 2011.

All CAPM projects programmed for delivery and/or scheduled to achieve RTL status after September 30, 2011 shall include all of the ADA curb ramp provisions of DIB 81-01.

If you have any questions on this DIB, please contact: Kevin Herritt, Chief, Office of Geometric Design Standards, at (916) 653-0253 for Division of Design guidance; Bill Farnbach, Engineering and Specification Development at (916) 227-5845 or Rob Marsh, Pavement Advisor at (916) 274-6062 for Division of Maintenance guidance. ADA Program related questions should be directed to Darold Heikens, ADA Program Manager at (916) 654-3507. Project specific applicability and questions should be referred to the Division of Design District Coordinators or the District Pavement Program Advisors.

c: Richard Land, Chief Engineer
Darold Heikens, ADA Infrastructure Program Manager
Tony Tavares, Chief, Division of Maintenance
Deputy District Directors for Design
Deputy District Directors for Project Management
Deputy District Directors for Planning
Deputy District Directors for Maintenance and Operations
District Permit Engineers

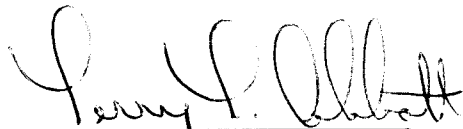
K.M. Herritt:

DESIGN INFORMATION BULLETIN NUMBER 81-01

**California Department of Transportation
Division of Design - Office of Geometric Design Standards
and
Division of Maintenance - Pavement Program**

Capital Preventive Maintenance (CAPM) Guidelines

APPROVED BY:



TERRY L. ABBOTT
Chief, Division of Design



TONY TAVARES
Chief, Division of Maintenance

March 15, 2011

TABLE OF CONTENTS

	<u>Page Number</u>
1.0 INTRODUCTION	1
1.1 Maintenance Definition	1
1.2 Capital Preventive Maintenance	1
1.2.1 Capital Preventive Maintenance Program (20.XX.201.121)	1
1.3 Other Related Pavement Programs	1
1.3.1 Roadway Rehabilitation Program (20.XX.201.120)	1
1.3.2 Pavement Preservation Programs (20.80.010.122) and (20.80.010.124)	2
1.4 CAPM Program Expectations	2
2.0 PROCESS	2
2.1 Pre-scoping Activities	2
2.1.1 Rigid Pavement Selection Criteria	2
2.1.2 Flexible Pavement Selection Criteria	3
2.1.3 CAPM in Advance of or in Lieu of Roadway Rehabilitation	3
2.1.4 Successive CAPM Projects	4
2.2 Development of Project Initiative Documents (PID)	4
2.2.1 Scoping Team Field Review	5
2.2.2 Life Cycle Cost Analysis	5
3.0 CAPM PROJECT STRATEGIES	5
3.1 Types of Work on Rigid Pavement Projects	6
3.2 Types of Work on Flexible Pavement Projects	6
4.0 COST-EFFECTIVE ENHANCEMENTS TO PAVEMENT WORK	7
4.1 Traffic Operational Review	7
4.2 Other Non-pavement Work Appropriate on CAPM Projects	8
APPENDIX A: CAPM Scoping Team Field Review Checklist	A-1

1.0 INTRODUCTION

1.1 Maintenance Definition

The preservation and keeping of rights-of-way (R/W), and each type of roadway, structure, safety convenience or device, planting, illumination equipment, and other facility, in the safe and useable condition to which it has been improved or constructed, but does not include reconstruction or other improvement.

Source: Streets and Highways Code - General Provisions

1.2 Capital Preventive Maintenance

The intent of Capital Preventive Maintenance (CAPM) is to extend the service life of pavement with minor distress by a minimum of five-years, which is in contrast to roadway rehabilitation (2R and 3R) that restores poor pavement to a good level of serviceability and has a minimum design life expectancy of twenty-years.

Since CAPM is preventive maintenance, the nature of CAPM projects is more closely related to maintenance projects than to roadway rehabilitation. The work included in a CAPM project should not propose major facility upgrades but should include all appropriate items of work as discussed in this Design Information Bulletin (DIB). Ride improvement and preservation of serviceability are key elements of CAPM projects. CAPM projects treat pavements that exhibit poor to good ride and minor distress. Therefore, the repair strategies selected should be readily constructible (see Section 3.0 of this DIB) in order to minimize disruptions to motorists, bicyclists, pedestrians and transit operations that use the facility and should provide relief from intensive maintenance activity. CAPM strategies provide decision-making flexibility so that the funds available in the biennial State Highway Operation and Protection Plan (SHOPP) can be utilized to their most effective use.

1.2.1 CAPM Program (20.XX.201.121)

All CAPM projects are programmed in the 20.XX.201.121 CAPM (121) program. The primary purpose of the CAPM program is to repair pavement exhibiting minor surface distress and/or triggered ride as determined by the Pavement Condition Survey (PCS) and the Pavement Management System (PMS). The Pavement Survey Evaluation Manual (see the Division of Maintenance website for further details) provides guidance on the departmental procedures used to identify and describe pavement distress on the State highway system.

1.3 Other Related Pavement Programs

1.3.1 Roadway Rehabilitation Program (20.XX.201.120)

Pavement repair strategies that are more extensive than those described in this DIB are considered to be roadway rehabilitation (either 3R or 2R) and shall follow the guidance provided in the Highway Design Manual (HDM) and DIB 79. For example, the following are considered roadway rehabilitation strategies: thicker overlays than

described in Section 3.2 of this DIB, cold foam recycling, lane replacement, and crack seal and overlay.

1.3.2 Pavement Preservation Programs (20.80.010.122) and (20.80.010.124)

The Pavement Preservation (HM-122 and 124) programs are maintenance programs and are not part of the CAPM program, nor are they funded in the SHOPP. Typical Pavement Preservation (HM-122 and 124) program strategies include thin and ultra thin blanket overlays/seal coats, diamond grinding of rigid pavement with very low distress, and joint/crack sealing utilizing premium products such as silicon and rubberized sealants.

1.4 CAPM Program Expectations

It is the expectation that projects in the CAPM program will accomplish the following:

- Maintain the facility in a serviceable and safe condition for the traveling public.
- Perpetuate existing traffic markings, signs and safety devices except as discussed in Section 4.0 of this DIB.
- Correct ride and minor structural defects in the pavement.
- Fill the gap between preventive maintenance and roadway rehabilitation strategies.
- Make cost-effective use of limited resources to restore the facility to a near-new condition; by extending its service life and allowing lower-cost preventive maintenance strategies to be used to keep it in good condition.
- Reduce roadway worker exposure to traffic by minimizing their need to repeatedly visit deteriorating pavement locations/worksites.
- Maximize federal participation (funding) by using Capital Project funding in a coordinated pavement preservation program.

2.0 PROCESS

2.1 Pre-scoping Activities

The District Pavement Managers/Program Advisors submit project candidates to Headquarters (HQ) Pavement Management Engineer/Program Advisor. The candidate list should be submitted as early as possible in the annual project development cycle, preferably in late winter/early spring, to assure identification and refinement of the best candidate projects before the development of scoping documents.

2.1.1 Rigid Pavement Selection Criteria

A CAPM project is warranted for rigid pavement if any of the following criteria is met:

- Third stage cracking between 1% and 7% of travel lane miles
- International Roughness Index (IRI) is 170 or more with no or minor distress.
- The presence of significant faulting.

Projects with a Pavement Condition Survey/Pavement Management System (PCS/PMS) priority number of 3, 4, 12 (poor ride with minor distress), 5, 6 (poor ride with no distress), 9, 10, or 14 (acceptable ride with minor distress) would typically meet either the third stage cracking requirements, faulting or IRI measurements listed above.

2.1.2 Flexible Pavement Selection Criteria

Flexible pavements exhibiting minor distress, regardless of ride quality, are prime CAPM candidate projects.

- The PCS/PMS pavement distress levels for minor distress corresponding to priority numbers of 3, 4, 9, 10, 12 and 14 are:
 - 0% Alligator 'B' cracking (ABC) and >15% Patching
 - 1-10% ABC and >10% Patching
 - 11-29% ABC and 0 to 10% Patching
- Flexible pavements with no distress (PCS/PMS priority numbers 5 and 6) and an IRI greater than 170 are also candidates for CAPM projects.

Pavements with rutting exceeding one inch must be investigated to determine if the failure is in the surface material or in the base materials. If the failure is in the base material, the distressed pavement should be repaired in a roadway rehabilitation project.

2.1.3 CAPM in Advance of or in Lieu of Roadway Rehabilitation

Constructing a CAPM project in advance of a roadway rehabilitation project can be acceptable as a short-term strategy to allow a roadway to be kept in good condition during the time it will take to develop a long-lead time project and start the roadway rehabilitation construction work. Such a CAPM strategy may be appropriate for PCS/PMS priority numbers 1, 2, 7 and 8 projects that have long-lead time delivery issues because these priority number categories are characterized by major pavement distress. They also usually trigger roadway rehabilitation projects, which sometimes require long-lead times to deliver the project due to issues such as environmental studies, R/W complications, or structure and/or pavement structural section design delays. If these issues occur, a CAPM project may be considered when the pavement condition must be corrected sooner than a roadway rehabilitation project can be programmed in the SHOPP, and constructed, in order to relieve field maintenance personnel of an unacceptable maintenance burden. However, if such a decision is made for a project, a follow-up roadway rehabilitation project must be programmed, and then ultimately designed and constructed, once the complicating issues are resolved. The HQ Pavement Program Advisor must approve all CAPM projects that are to be done in advance and in lieu of a roadway rehabilitation project.

In addition, CAPM projects may be proposed in lieu of roadway rehabilitation projects on Maintenance Service Level (MSL) Class 3 roads where there is agreement between the HQ Pavement Program Advisor and District Pavement Program Advisor that the facility is beyond economical management with maintenance strategies. For these projects, design exceptions, as required, a safety review, and consultation with the Division of Design (DOD) Design Coordinator is required if no future upgrades are planned as part of a future roadway rehabilitation project.

2.1.4 Successive CAPM projects

Successive CAPM pavement strategies may be utilized if the distress criteria requirements in Sections 2.1.1 and 2.1.2 of this DIB are met, and all improvements addressing correctable collision patterns are included in the project. The district Traffic Safety unit is responsible for determining these improvements. If it is not feasible to include all such improvements, and they would not be otherwise excepted from a roadway rehabilitation project per departmental design exception procedures, the project should be developed as a roadway rehabilitation project.

2.2 Development of Project Initiation Documents (PID)

A Project Initiation Document (PID) is required in order to program a project into the SHOPP. The CAPM Project Report (CAPM PR) fulfills this requirement for a PID. Additionally, it also serves as the project report that documents approval of the selected alternative. The SHOPP project selection process is established by the SHOPP HQ Program Managers.

The district is responsible for the development of the CAPM PR. Guidance for preparation of the CAPM PR is found in Chapter 9 and Appendix H of the Project Development Procedures Manual (PDPM).

The approved CAPM PR is submitted to both the HQ and District Pavement Program Advisors for comments. Major projects are programmed in the SHOPP. Minor projects will become part of the District's annual Minor Program. Most projects will be Categorically Exempt (CE), projects which have little or no environmental impact, and propose work only within the existing R/W.

CAPM projects that are consistent with the scope of intent of the 121 Program, as presented in this DIB, do not require design exception fact sheets for deviations from mandatory and advisory design standards; except as otherwise noted, mandatory and advisory pavement engineering design standards (see HDM Chapters 600 through 670) still apply to CAPM projects. CAPM projects are not intended to change existing geometric features. However, the DOD Design Coordinator must be consulted if the CAPM project proposes to create deviations from geometric design standards. Typically, these exceptions include items such as reduced shoulder width due to installation of standard dike or bridge approach rail, and increased shoulder cross slope where it conforms to the existing curb and gutter. Project strategies that exceed these guidelines, such as overlays thicker than indicated in Section 3.2 or digouts exceeding 20% of the project cost, need written concurrence of the HQ Pavement Program Manager and DOD Design Coordinator. Otherwise, the project will be considered to fall under the roadway rehabilitation program and will need to follow the guidance in DIB 79 for roadway rehabilitation projects.

Approved CAPM PRs that are more than two years old need to be re-evaluated to determine if the proposed strategy to repair the existing pavement distress is still valid. The re-evaluation should be based on the most current PCS inventory data and must include a new Scoping Team Field Review.

2.2.1 Scoping Team Field Review

All candidate CAPM projects must have a Scoping Team Field Review, which occurs after initial development of the draft CAPM PR, in order to further refine the scope of the project. One of the roles of the review team is to determine if a CAPM repair strategy is appropriate for the proposed site based upon pavement needs, traffic safety, and design standards.

Attendance at these reviews is mandatory for the HQ Pavement Program Advisor and the District Pavement Program Advisor, and recommended for the DOD Design Reviewer that is assigned to the district. If the DOD Design Reviewer or DOD Coordinator do not attend the field review, it is required that they be consulted before the project scope is finalized. Recommended district staff attendance and review resources are listed in the attached CAPM Scoping Team Field Review Checklist. Field reviews should be scheduled as time-efficiently as possible so as to encompass as many project sites as possible. All of the review team should be notified by email or in writing of scheduled reviews prior to the completion of the Project Approval and Environmental Document (PA&ED) milestone. Any project not reviewed by the HQ Pavement Program Advisor is at risk of losing funding, if it is determined later to have been improperly scoped.

2.2.2 Life Cycle Cost Analysis

A comparison of different pavement products or strategies using Life Cycle Cost Analysis (LCCA) shall be done in accordance with the Life Cycle Cost Analysis Procedures Manual during the preparation of the CAPM PR. The results of the LCCA shall be documented in the CAPM PR (see PDPM Chapter 8). For rigid pavement strategies, a strategy of individual slab replacement with diamond grinding, where warranted, should be compared to lane replacement, which is a roadway rehabilitation strategy. The designer may also opt to compare a strategy of diamond grinding with thin blanket flexible pavement overlays (composite pavement). For flexible pavements, rubberized asphalt pavements should be compared to conventional asphalt pavements.

3.0 CAPM PROJECT STRATEGIES

All CAPM projects shall:

- Use easily constructed corrective strategies as discussed in Sections 3.1 and 3.2 below.
- Concentrate on treating pavements exhibiting minor distress.
- Provide longer service life than preventive maintenance.
- Extend pavement service life for a minimum of five years.
- Improve ride quality and serviceability of pavement.
- Reduce maintenance effort needed on the affected section of State highway.
- Be constructed without geometric upgrades.
- Provide cost-effective minor enhancements as discussed in Section 4.0 of this DIB.
- Not degrade any safety, and/or geometric aspects of the facility.
- Apply the Americans with Disabilities Act (ADA) policy in DIB 82 by:

- Reconstructing existing curb ramps to meet the current accessibility standards; and
- Constructing curb ramps that are missing where they should be in place.

3.1 Types of Pavement Work on Rigid Pavement Projects

Rigid pavement CAPM projects consist of the following types of work depending on the distress found:

- Removing and replacing failed slabs, as required, to provide a smooth and serviceable pavement.¹
- Continuous diamond profile grinding of the rigid pavement to correct poor ride quality as the result of faulting, slab curl and irregular slab replacement surfaces. See Note 1 below.
- Sealing longitudinal and transverse joints after diamond grinding and/or retrofitting the transverse joints with dowel bars.
- Routing and sealing random transverse cracks functioning as a transverse joint that are larger in width than 1/4".
- Routing and sealing random longitudinal cracks that are larger in width than 1/4".
- Dowel bar retrofitting transverse joints (must be done prior to and in conjunction with diamond profile grinding).
- Cold planing and resurfacing flexible pavement shoulders.

Note 1:

Pavement preparation, such as slab replacement prior to diamond grinding of rigid pavement, should not exceed 20% of the project's total costs. District Pavement Managers are encouraged to accomplish any work needed to adhere to this limit by using Maintenance resources including State forces.

3.2 Types of Pavement Work on Flexible Pavement Projects

The standard overlay design thickness for a flexible pavement CAPM project with an IRI less than 170 at the time of PS&E is 0.15' when a rubberized asphalt pavement overlay is used and 0.20' for all other types of asphalt binder pavements (i.e. - conventional asphalt, or any other department-approved modified binder). A 0.20' overlay of rubberized asphalt may be appropriate in certain circumstances and may be utilized with the concurrence of the HQ Pavement Program Advisor or Pavement Program Manager.

For flexible pavement CAPM projects with an IRI greater than 170 the standard overlay design thickness is 0.25', which is to be placed in two lifts. In locations where it is needed to maintain profile grade and/or vertical clearance, the existing pavement may be planed up to the depth of the dense or gap graded layer, up to a maximum thickness of 0.25'. If the repairs needed to improve the ride cannot be adequately addressed within the parameters of this DIB, the project should be developed utilizing a roadway rehabilitation strategy.

A 0.06' to 0.10' thick Open Graded Friction Course (OGFC) may be added on top of the designed overlay thicknesses mentioned above. This layer is not to be considered a part of the thickness of the overlay required.

All dense and/or gap graded overlays, including OGFC, shall extend from edge of shoulder to edge of shoulder to overlay the entire traveled way and paved shoulders; see HDM 635.1(1).

Leveling courses may be needed to improve ride quality and/or insulate the overlay from extensive crack sealant material that has been placed on the existing pavement surface or from undesirable materials (i.e. – bleeding seal coats). Ideally, undesirable materials such as bleeding seal coats or excessive crack sealant should be removed before paving. When a leveling course is used, it is to be considered as a part of the overall overlay thickness.

Preparation of the existing pavement surface is very important to the success of the project. HDM 635.1(8) provides additional guidance on preparing existing pavement surfaces for an overlay. However, not all Alligator A and B cracking requires digouts. Digouts typically are warranted for areas of surface distress such as rutting greater than 0.08' (1") and/or loose or spalled pavement. Crack sealing is done on cracks wider than 0.02' (1/4") as a preparation for overlays. Also see Topic 635.1(8) of the HDM. Pavement preparations, such as digouts and crack sealing of existing pavement, prior to the placement of the flexible pavement overlay should not exceed 20% of project cost. District Pavement Managers are encouraged to accomplish any work needed to adhere to this limit by using Maintenance resources, including State forces.

4.0 COST-EFFECTIVE ENHANCEMENTS TO PAVEMENT WORK

4.1 Traffic Operation Review

District Traffic Operations will perform a review of the traffic operations for all CAPM projects. The goal of this review is to evaluate and identify easily implemented, cost-effective traffic operation enhancements that should be included in the CAPM project. These potential enhancements should be limited to the following:

- Updating the signing and pavement delineation to current standards.
- Maintaining, adding, replacing or eliminating rumble strips.
- Addressing collision patterns related to wet weather.
- Upgrading metal beam guard railing, thrie beam barrier, and end treatments to current hardware design.

Recommended enhancements will be incorporated in the project if the inclusion does not change the target construction season. The Project Development Team guides project development decision made on this issue. The enhancements also must not significantly increase the project cost. When a recommended enhancement cannot be included on a CAPM project, the Project Engineer must document the decision made in the Project History File and inform the district Traffic Unit why the identified enhancement will not be included in the project.

4.2 Other Non-pavement Work Appropriate on CAPM Projects

In addition to the ADA requirements previously mentioned in Section 3.0 of this DIB and the traffic operation enhancements mentioned above, the following non-pavement work is appropriate on a CAPM project:

- Metal Beam Guardrail (MBGR) height shall be adjusted as necessary to meet current standards. In-place guardrail shall be between 26" to 29" in height.
- Bridge approach guardrail and non-standard sections of MBGR shall be upgraded to current approved hardware design as needed.
- End treatments for all in-place MBGR and Vehicle Impact Attenuators shall be upgraded as needed to NCHRP Report 350 Crash Test Standard compliant end treatments as site specifics dictate. Refer to the list of approved end treatments and attenuators for specific products on the Division of Traffic Operations - Traffic Safety Traffic Safety Devices webpage on the Department Intranet website.
- Existing dike that does not meet current standards (HDM Topic 303) should be replaced with the appropriate standard dike. The installation of dike not meeting current standards requires approval of an Advisory Design Exception fact sheet.
- Replacing existing traffic stripe, pavement markings, damaged loop detectors as well as safety devices not otherwise discussed in the Traffic Operational Review. See the California MUTCD for bicycle loops guidance.
- Shoulder Backing material shall be specified in the project to avoid pavement edge drop-offs. (See Shoulder Backing Guidelines on the Caltrans Pavement Program Technical Guidance website on the Department Intranet.)
- Drainage and other traffic operational deficiencies should typically be addressed using separate funds or as a separate project. Drainage modifications should be limited to what is necessary to maintain existing drainage patterns or replacing grates for bicycle proof grates.

CAPM Scoping Team Field Review Checklist

Team Members***

- HQ Pavement Program Advisor (121 Program)*
- District Pavement Program Advisor (121 Program)*
- Project Engineer *
- Materials Engineer
- Traffic Safety
- Project Manager
- Field Maintenance
- Environmental
- Construction
- District Bicycle Coordinator
- DOD Design Coordinator or DOD Design Reviewer**

* Required attendance

** Consultation required if they do not participate in the field review

*** Coordination with the District Safety Review Committee [see HDM Index 110.8 (1)] and their involvement on the scoping team may expedite the project delivery process.

Information/Data to Bring on the Field Review

- Team Member Sign-in sheet (to be attached to approved CAPM PR)
- Major Maintenance Plan
- SHOPP 10-Year Plan
- Draft CAPM PR (bring enough copies for the field review team)
- Pavement Condition Survey (PCS)
- Project Cost Estimate
- STIP
- Highway Log
- DIBs 81 and 82

Research/Review Before the Field Review

- Non Motorized User Needs: bicyclists and pedestrians (including ADA)
- Complaints from the Public (ADA, bicyclists, pedestrians, etc.)
- Utilities
- Underground Caltrans electrical and irrigation facilities
- Environmental Issues (Potential Delays)
- Vegetation Control Needs
- Project Limits (vs. PCS project limits)